Natura Impact Statement (NIS)

Coom Green Energy Park

December 2020

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Planning and Environmental Consultants

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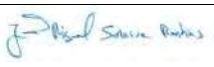
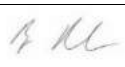
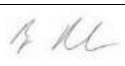
Quality Assurance

The findings outlined within this report and the data we have provided are to our knowledge true, and express our bona fide professional opinions. This report has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Code of Professional Conduct. Where pertinent CIEEM Guidelines used in the preparation of this report include the *Guidelines for Ecological Report Writing* (CIEEM, 2017a), *Guidelines for Preliminary Ecological Appraisals* (CIEEM, 2017b) and *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018). CIEEM Guidelines include model formats for Preliminary Ecological Appraisal and Ecological Impact Assessment. Also, where pertinent, evaluations presented herein take cognisance of recommended Guidance from the EPA such as *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017), and in respect of European Sites, *Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC* (European Commission, 2018).

Due cognisance has been given at all times to the provisions of the *Wildlife Act, 1976,* the *Wildlife (Amendment) Act, 2000*, the *European Union (Natural Habitats) Regulations. SI 378/2005*, the *European Communities (Birds and Natural Habitats) Regulations 2011 (as amended),* EU Regulation on Invasive Alien Species under *EU Regulation 1143/2014*, the EU Birds *Directive 2009/147/EC* and *Habitats Directive 92/43/EEC*.

Version	**Date**		**Name**	**Signature**
1	13/10/2020	**Report prepared by:**	Joao Martins BE (Hons) MSc MIEnvSc	
1	19/10/2020	**Report checked by:**	Roger Macnaughton MSc, MCIEEM	
1	22/10/2020	**Report signed off by:**	Howard Williams CEnv, MCIEEM CBIOL MRSB MIFM	
2	24/11/2020	**Report signed off by:**	Roger Macnaughton MSc, MCIEEM	
3	07/12/2020	**Report signed off by:**	Roger Macnaughton MSc, MCIEEM	
Title		Natura Impact Statement – Coom Green Energy Park		

Notice

This report was produced by INIS Environmental Consultants Ltd (INIS) on behalf of Coom Green Energy Park Ltd., the client, for the specific purpose of informing an Appropriate Assessment in respect of the proposed Coom Green Energy Park, Co. Cork, with all reasonable skill, care and due diligence within the terms of the contract with the client, incorporating our terms and conditions and taking account of the resources devoted to it by agreement with the client.

This report may not be used by any person other than the client, without the client's express permission. In any event, INIS accepts no liability for any costs, liabilities or losses arising as a result of the use of or reliance upon the contents of this report by any person other than the client.

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1. Introduction

This Natura Impact Statement (NIS) Report has been prepared by Inis Environmental Consultants to inform the Appropriate Assessment (AA) process required for the proposed Coom Green Energy Park).

1.1 Project Background

Coom Green Energy Park Limited, intend to apply for planning consent for a renewable energy development referred to as the Coom Green Energy Park Project (CGEP), located in north County Cork. Coom Green Energy Park Limited is a 50/50 joint venture company including Brookfield Renewable Ireland Limited (BRIL) and Coillte Cuideachta Ghníomhaíochta Ainmnithe (Coillte). The proposed energy park is located approximately 12km to the south east of Mallow and approximately 5km south west of Ballyhooly, County Cork.

In summary the proposed project will consist of the following:

- Erection of up to 22 no. wind turbines with a tip height of up to 169m;
- Construction of turbine foundations and crane pad hardstanding areas;
- Construction of approximately 15 km of new site tracks and associated drainage infrastructure;
- Upgrading of approximately 10 km of existing tracks and associated drainage infrastructure where necessary;
- 3no. on site borrow pits and associated ancillary infrastructure. (New access tracks serving borrow pits shall be reinstated following completion of construction);
- All associated drainage and sediment control;
- Installation of new watercourse or drain crossings consisting of pre-cast concrete box culverts.
- Re-use or upgrading of existing internal watercourse and drain crossings;
- Construction of up to 2 no. onsite electrical substations and associated compounds including:
    - Welfare facilities;
    - Electrical infrastructure;
    - Parking;
    - Waste water holding tanks;
    - Rainwater harvesting
    - All associated infrastructure, services and site works including landscaping;
- 20 no. of Battery storage units and associated compound;
- Temporary accommodation works associated with the Turbine Delivery Routes to facilitate the delivery of turbine components;
- 3 no. Temporary construction site compounds and associated ancillary infrastructure including parking;
- Tree felling and associated replanting;
- Installation of approximately 30 km of medium voltage (20/33kV) underground cabling between the proposed turbines and the proposed on-site substations and associated ancillary works;
- Installation of approximately 7.7km of high voltage (up to 110kV) underground cabling between the proposed 2no. on site substations and ancillary works within private lands and public roads including up to 7 no. pre-cast joint bays;
- Installation of approximately 16.7km of high voltage (up to 110kV) underground cabling between the proposed on-site substations and the existing Barrymore substation and associated ancillary works within private lands and public roads. The proposed grid connection cable works will include 14 no. existing watercourse and drain crossings and the installation of up to 17 no. pre-cast joint bays.

- Communication cables and associated infrastructure;
- Erection of 2 no. permanent meteorological masts;

The preparation of this Appropriate Assessment Report has had regard to:

- EU Habitats Directive (92/43/EEC).
- EU Birds Directive (Council Directive (2009/147/EC).
- the Part XAB of the Planning and Development Act 2000.
- European Communities (Birds and Natural Habitats) Regulations 2011.
- Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001;
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (DoEHLG, 2010).
- Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC (European Commission, 2018).

1.2 Authors and Contributors to the present report

This report has been produced by Inis Environmental Consultants ltd (IEC) with input from Fehily Timoney & Company (FT). IEC has carried out examination and analysis on the whole project elements focused on the CGEP & Grid Connection Route but also including incorporation of the key findings of the Turbine Delivery Route (TDR) and Replant Lands assessments. Examination and analysis at both Stage 1 and Stage 2 of the Appropriate Assessment process in respect of the TDR and Replant Lands, where pertinent, has been carried out by Fehily Timoney (FT).

The following experienced personnel contributed to this AA Screening and NIS.

Mr Howard Williams MCIEEM BSc CEnv MCIEEM CBiol MRSB MIFM reviewed and authorised the report. Mr Williams is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). He is a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc Env) and a Chartered Biologist (CBiol) with the Society of Biology. He is also a full member of the Institute of Fisheries Management. Mr Williams has more than 20 years professional experience in the ecology sector, is lead ecologist with INIS Environmental Consultants Ltd and currently project manager on all INIS projects in the Ireland and the UK.

Mr. Roger Macnaughton MCIEEM is Principal Ecologist with Inis Environmental Consultants Ltd. He managed and drafted the updated (2020) draft of the NIS. He is a qualified and experienced environmental consultant specialising in ecology. He has over eighteen year's professional experience in the environmental consultancy sector and an additional seven years of primarily research-based experience in freshwater and marine ecology. He specialises in the delivery of Ecological Impact Assessment (EcIA) and Appropriate Assessment (AA) for a broad range of projects potentially affecting; terrestrial, freshwater and marine ecology.

Mr. Joao Martins B.E. (Hons) MSc edited and drafted the updated 2020 report. He is an Ecologist with 8 years' experience in freshwater monitoring of both lotic and lentic systems. He has worked on the EU Water Framework Directive (WFD), e.g. macroinvertebrates, habitat/hydromorphology, and on other freshwater projects of scientific nature, in Germany, Portugal and Ireland. Beyond his freshwater experience, Joao has developed considerable experience in terrestrial ecology. Joao has been carrying out field surveys and has been responsible for the preparation of screenings for Appropriate Assessment (AA), Ecological Impact Assessments

(EcIA), Environmental Impact Assessment Reports (EIAR). Joao has also been involved in specific field surveys, such as Invasive Alien Plant Species, and Bat Activity surveys amongst others.

Fehilly Timony and Company provided detail on the description of the proposed development, detail on other plans and projects (to inform the in-combination impacts assessment), hydrology assessments and associated mitigation measures, the Construction Environment Management Plan (CEMP) **Appendix A** and Surface Water Management Plan (SWMP) **Appendix F**. FT also conducted the surveys and assessments for the Turbine Delivery Route Assessments and Replant Lands Assessment. The FT reports for the Replant and TDR are provided in **Appendices B and C** respectively.

1.3 Legislative Context

Article 6(3) of the Habitats Directive requires that, in relation to European designated sites (i.e. SACs and SPAs that form the Natura 2000 network), "*any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives*".

A competent authority (e.g. a Local Authority) can only agree to a plan or project after having determined that it will not adversely affect the integrity of the site concerned. Under article 6(4) of the Directive, if adverse impacts are likely, and in the absence of alternative options, a plan or project must nevertheless proceed for imperative reasons of overriding public interest (IROPI), including social or economic reasons, a Member State is required to take all compensatory measures necessary to ensure the overall integrity of the European site. The European Commission have to be informed of any compensatory measures adopted, unless a priority habitat type or species is present and in which case an opinion from the European Commission is required beforehand (unless for human health or public safety reasons, or of benefit to the environment).

1.4 Appropriate Assessment Process

Appropriate Assessment is the process through which the possible nature conservation implications of any plan or project on the European sites within the Natura 2000 network is considered by a Competent Authority, before a decision is made to allow that plan or project to proceed.

1.4.1 Stages of the Appropriate Assessment Process

Appropriate Assessment involves a number of steps and tests that are applied using a stage-by-stage approach. Each step or stage in the assessment process precedes and provides a basis for other steps. The four stages in an Appropriate Assessment (AA), are further described below.

Guidance on the Appropriate Assessment (AA) process was produced by the European Commission in 2002, which was subsequently developed into guidance specifically for Ireland by the Department of Environment, Heritage and Local Government (DoEHLG) (2010). These guidance documents identify a staged approach to conducting an AA, as shown in Error! Reference source not found..

Figure 1-1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DoEHLG, 2010).

1.4.1.1 Stage 1 - Screening for AA

This stage examines the likely effects of a project either alone or in combination with other projects upon a European site and considers whether it can be objectively concluded that these effects will not be significant.

1.4.1.2 Stage 2 – Appropriate Assessment

In this stage, the impact of the project on the integrity of the European site is considered with respect to the conservation objectives of the site and to its structure and function. Mitigation measures should be applied to the point where no adverse impacts on the site(s) remain.

1.4.1.3 Stage 3 - Alternative Solutions

Should the Appropriate Assessment determine that adverse impacts are likely upon a European site, this stage examines alternative ways of implementing the project that, where possible, avoid these adverse impacts. For the avoidance of doubt, no reliance is placed on Stage 3.

1.4.1.4 Stage 4 - IROPI

Assessment where no alternative solutions exist and where adverse impacts remain: Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the European site will be necessary. European case law highlights that consideration must be given to alternatives outside the project area in carrying out the IROPI test. It is a rigorous test which projects are generally considered unlikely to pass. In any event, the developer does not purport to place any reliance on Stage 4.

2. Receiving Environment

2.1.1 Context of the Study Area

The proposed CGEP development is located in north County Cork. It is not located within or adjacent to any European designated site. The receiving environment for the proposed wind turbine locations includes lands under active management predominantly for commercial forestry and smaller areas of intensively managed farmland. The landcover is classified on Corine as pastures, coniferous forest, transitional woodland scrub and mineral extraction sites. In addition, there is an unopened, previously consented municipal landfill in close proximity within the townland of Bottlehill. The Grid connection follows local roads through a mosaic of largely improved farmland and forestry eastwards to a substation at Farran South, near Fermoy.

Features of the local environment on or around the proposed development site include the River Bride and other tributaries of the Blackwater (Munster) River, in addition to the Nagle Mountains to the north of the site.

The design of Coom Green Energy Park has been carried out with consideration for the Environmental Impact Statement, planning permit and waste license associated with the permitted Bottlehill Landfill site.

2.2 Methodologies

2.2.1 Desktop study

Each element of the proposed CGEP Project has been appraised in terms of baseline conditions. The sources of Information that were considered included both desktop studies and fieldwork:

- Conservations Objectives, Site Synopsis and Site boundary information for the European Sites within the study area[1].
- National Biodiversity Data Centre[2].
- EPA online mapping for watercourse features[3].
- Construction and Environmental Management Plan (**Appendix A**)
- Site visits and field survey reports conducted yearly between 2016 and October 2020 for the CGEP and Grid Connection carried out by IEC personnel.
- Site visits and field survey reports provided by FT personnel in respect of TDR and Replant elements.
- Review of planning documentation and environmental reports for other plans/projects available on pertinent County Council and An Bord Pleanála websites.

2.2.2 Field Study

2.2.2.1 Habitats and Flora

All habitat surveys undertaken for CGEP,CGEP Grid Connection Route, TDR and replant lands followed best practice guidance (Smith *et al*., 2011) and utilised the habitat classification presented in Fossitt (2000). All surveys were carried out at an appropriate time of the year, during the botanic growing season. Surveys were conducted in 2016, 2019 and 2020

Detailed habitat surveys of the proposed Grid Connection plus a 50m buffer were undertaken in June 2018 and rechecked again in August 2020 to confirm no change.

During all surveys listed above, a search for Invasive Alien Species (IAS) listed under the Third Schedule of European Communities (Bird and Natural Habitats) Regulations 2011 (S.I. 477 of 2011 (as amended) was conducted.

Terrestrial ecological surveys were undertaken on the Turbine Deliver Route by FT on 16th July and 13th August 2019 and 13th August 2020. The objective of these visits was to obtain data on relevant node locations in regard to the presence of invasive plant species, and habitats or species that are protected and/or are qualifying interests of nearby European sites. The area surveyed was the over sail and load-bearing areas and immediate surroundings for each node, including drainage features. The survey was carried out in accordance with the guidance document Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road-Schemes (NRA, 2009).

[1] Available at https://www.npws.ie/. Accessed in September 2020.

[2] Available at https://maps.biodiversityireland.ie/Map. Accessed in September 2020.

[3] Available at https://gis.epa.ie/EPAMaps/. Accessed in September 2020.

Terrestrial ecological surveys were undertaken on the replant lands by FT on 17th July 2019 (Moneygorm), 29th January 2020 (Ballard) and 30th January 2020 (Ballard). These surveys included habitat, protected mammal, and avifauna surveys.

2.2.2.2 Avifauna

Bird surveys were conducted on the site and environs included a focus on Annex 1 listed bird species (Birds Directive), in particular breeding hen harrier. The area of the proposed development is a regularly used breeding area for hen harrier, though not designated as a SPA. The site is not considered an ex situ site of any Special Protection Area, given extensive distances (>25km) to the closest breeding hen harrier SPA (Mullaghanish to Musheramore Mountains SPA). However, surveys conducted are outlined for hen harrier and Merlin given potential national importance of the wider area including the site, specifically for hen harrier. Wintering wildfowl survey methods are outlined here as general wildfowl and Annex 1 listed waders e.g. Golden Plover special conservation interests of SPA's in Ireland, potentially use the area and hence are considered in this report.

2.2.2.2.1 Hen Harrier Flightlines

Vantage point surveys on initial lands under consideration, commenced for Hen Harrier in March 2016 and finished in February 2017 (Year 1- covering March to August inclusive (36hrs) as Breeding Season and September to February inclusive (36hrs) as Wintering Season). A total of 19 vantage points was selected following viewshed analysis to provide ground level coverage of all the lands under consideration at the time and inform the initial constraints-based design layout process.

The above vantage points were also utilised to inform a second year of vantage point flight activity surveys commencing in March 2017 and finishing in February 2018 (Year 2 – covering March to August 2017 (36Hrs) as breeding Season and October to February inclusive as Winter Season (30hrs).

In July 2017, an indicative turbine layout, and revised viewshed analysis led to a reduction in requirement for VP's from 19 in total downwards to 15, with further iterations to turbine layout occurring in July and August of 2017 resulting in a further downwards revision to 14 VP's in total. These 14 no. VP's covering the entire turbine (+500m) envelope were utilised until February 2018.

Year 3 of survey effort commenced in March 2018 (March to August inclusive (36Hrs) as breeding) and completed in February 2019 (October to March inclusive as Winter (36hrs)). A total of 13 no. VP's were used for March 2018, which was dropped to 12 in April 2018 for the remainder of fieldwork, in line with further layout changes. At all times turbine +500m buffer viewshed coverage in line with SNH Guidance was adhered to.

Year 4 of survey effort commenced in April 2019 and was completed in September 2019 (April to September inclusive as breeding (36hrs/VP and 12 no. VP's).

To summarise, available data to inform the current baseline evaluation of flight activity, comprising 4 consecutive breeding seasons (2016-2019 inclusive) is presented, covering the period March-August of Yrs. 1 ,2 and 3, and April-September of Year 4, representing a total of (36X4) 144Hrs of flight activity data in total at each vantage point location. The variation in months of survey from March-August in 2016, 2017 and 2018 to April-September in 2019 is not considered a significant constraint; March 2019 was also covered as part of winter 2018/19 effort, and thus any information on early displaying Hen Harrier was still available (Hen Harrier begin to occupy breeding areas in the uplands in March with a view towards pair bonding (NPWS,2015)).

Breeding status surveys were conducted of previously used nesting areas during April – June 2020.

In respect of winter effort, data from 3 consecutive winters (i.e. winter period 2016/17, 2017/18 and 2018/19) is presented, covering the period September to February inclusive (Year 1), October to February inclusive (Year 2) and October to March inclusive (Year 3) (36x1, 30x1 and 36x1) representing 102Hrs in total at each vantage point location.

Additional Grid Connection Route (GCR) VP Surveys covered the period from October 2017 to September 2018 inclusive (12 months). Four vantage points were used in these surveys, resulting in 72Hrs of flight activity data from each vantage point location. These surveys focussed on the GCR eastwards from the substation at Lackendarragh North to Farran South (Remaining lands where the GCR is to be located overlap the CGEP study area) in particular potential suitable Hen Harrier breeding (or winter roosting) habitat within 500m of the likely locations of cable laying works.

In line with Best Practice (SNH, 2014,2017) recommendations, no impact pathways pertaining to collision mortality are to be expected from an underground Grid Option, therefore, VP coverage was focussed on those areas which could be subject to possible usage by Hen Harrier i.e. suitable hen harrier habitat, in particular during the breeding season as possible nest sites (where disturbance pathways become relevant). Survey areas were chosen based on aerial imagery information followed up by ground truthing.

2.2.2.2.2 Hen Harrier Winter Roost Surveys

Winter roosts watches in line with established methods from the Irish Hen Harrier Winter Roost Survey (IHHWRS[4]) were carried out in the winter periods of 2016/17 (winter #1) and 2017/18 (winter #2). Surveys were targeted at known roosts identified through consultation and/or suitable habitat in the hinterland of the proposed development.

In the first winter of survey, roosts watches spanned the months of November 2016 through to March 2017 inclusive and took place at 9no. locations where suitable habitat for roosting birds was either identified from field survey or desktop review, or where consultation with local birdwatchers suggested Hen Harriers may be roosting. Most roosts surveys were conducted at dusk (n=29), but dawn was also utilised on 8no. occasions. A total of 37 watches were completed.

Similarly, in the second winter of survey (2017/18), roosts watches spanned the months of October 2017 through to March 2018 inclusive and took place at 2no. locations where roosts had been confirmed in winter #1. Most roosts surveys were conducted at dusk (n=9), but dawn was also utilised on 8no. occasions. A total of 17 watches were completed.

In the case of one of the above identified roosts, a known nearby roost which was identified from additional studies conducted by IEC (IEC, unpublished) in the winter of 2016/17, data from the winter period of 2016/17 in respect of this location is also utilised in the current appraisal.

2.2.2.2.3 Wintering Wildfowl Surveys

Wintering wildfowl surveys took place in the winter period of 2016/17 and also 2017/18. The purpose of these surveys was to establish numbers if any of wintering Whooper Swan along the Blackwater River corridor, to the north of CGEP, between Mallow town and Fermoy town. This survey comprised a 'round-robin' style survey in line with established methods such as IWeBS/National Swan Census methods whereby suitable locations for

[4] http://www.ihhws.ie/

feeding/roosting swans on both sides of the Blackwater River corridor (North and South) were visited over the course of a single day per month, across 4 months (October to January inclusive of winter 2016/17 and November to February inclusive of winter 2017/18).

Additional VP watches were also carried out at dawn or dusk during the winter months (1 dawn and 1 dusk watch per month November to February inclusive and usually around the same date as the monthly census), to determine whether or not wildfowl (particularly swans) possibly utilising the corridor eastwards from Mallow town along the Blackwater also occasionally traversed southwards through the proposed development area.

No requirement for Winter Wildfowl surveys was scoped in regarding the proposed Grid Connection Route eastwards from Lackendarragh North to Farran South. Habitats adjacent are unsuitable for larger wintering wildfowl such as geese or swans, the underground cabling will not pose a risk in terms of collision mortality along regularly used flight paths, and the CGEP surveys of the River Blackwater provide background information on numbers of wildfowl. Remaining lands where the GCR is to be located overlap the GCR study area, this includes the section of grid connection route between Mullenboree and Lackendarragh.

2.2.2.2.4 Breeding Merlin

Breeding Merlin surveys took place in 2019 and targeted lands within 2km of CGEP (on foot surveys to within 500m of all suitable habitat). Methods employed were from Hardey *et al.,* 2013. Potentially suitable Merlin habitat within the site boundary as described in Fernández *et al*., 2010 and Hardey *et al.,* 2013 and 2km outside of the site boundary was identified using aerial photography, these habitats were then ground-truthed and surveyed. The survey consisted of a search for suitable Merlin habitat and identification of potential nesting locations (such as old corvid (crows such as Hooded Crow) nests or plucking posts (fence lines, isolated posts, hummocks, boulders, trees, etc.) which are all checked for faecal droppings, pellets, the plucked remains of kills and moulted Merlin feathers. The locations of any signs found are mapped.

2.2.2.2.5 Kingfisher

Kingfisher surveys of suitable reaches of the Bride River, downstream of CGEP, were undertaken in Spring of 2018. The method involved a systematic search of suitable habitats (slow moving water with suitable nest banks) along the river as far east as the M8 Motorway crossing at Rathcormac, to determine suitability and/or evidence of Kingfisher. Evidence of Kingfisher nesting was also recorded if present during 2020 aquatic surveys.

2.2.2.3 Otter

Targeted surveys for this species were focussed on watercourse crossings associated with the proposed Grid Connection, in addition to downstream watercourses where connectivity may exist. Once a refined layout and associated infrastructure was available (2019) then further targeted studies also included evaluation of watercourse crossings occurring within the potential zone of influence for Otter. Updated otter surveys were conducted in August 2020 of all stream crossings along the cable route, and all downstream locations sampled during 2020 aquatic surveys

2.2.2.4 Aquatic Environment

Aquatic surveys and assessments have been conducted of receiving waters over an extended period between September 2017 and October 2018 and repeated and extended to include additional areas in July and September 2020. The following summarises the survey approach. The focus of the following section is based on the 2020 survey results (**Appendix G**), as these are the most up to date and also captured all relevant

receiving waters within the drainage catchment of the proposed development, including any new areas introduced by very minor design changes in 2020.

2.2.2.4.1 Walkover surveys

All watercourses which are linked via surface water drainage to the proposed development were considered as part of the current baseline assessment, refer to **Table 2.1** and **Figure 2.1.** This included the proposed cable route crossings of riverine watercourses or watercourses near/draining the proposed wind turbine layout. Detailed aquatic surveys were not required for the proposed TDR and replant works based on nature and scale of works. For the Moneygorm replant lands, which are close to the main CGEP site and grid route, aquatic surveys conducted were nevertheless relevant. The Ballard replant lands are not hydrologically connected to any relevant European sites. The nomenclature for the watercourses surveyed is as per the Environmental Protection Agency's (EPA) online map viewer[3].

The most recent aquatic survey of sites were conducted in July 2020. Survey sites were assessed considering linkage via drainage from the proposed development and associated cable route, with survey effort focused on both instream and riparian habitats at each location. Surveys at each aquatic site included a fisheries assessment (electro-fishing), fisheries habitat appraisal and white-clawed crayfish assessment. A freshwater pearl mussel assessment was undertaken in September 2020 across the wider catchment of the proposed development. Rare, protected and or conservation interest aquatic species, such as otter, were also searched for at each survey site. This holistic approach informed the overall aquatic ecological evaluation of each site in context of the proposed development and cable route.

A broad aquatic habitat assessment was conducted at each site utilising elements of the methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (Environment Agency, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). All sites were assessed in terms of:

- Stream width and depth and other physical characteristics;
- Substrate type, listing substrate fractions in order of dominance, i.e. bedrock, boulder, cobble, gravel, sand, silt, etc;
- Flow type, listing percentage of riffle, glide and pool in the sampling area;
- In-stream macrophyte, bryophytes occurring and their percentage coverage of the stream bottom at the sampling sites; and
- Riparian vegetation composition.

The watercourse at each aquatic survey site was described in terms of the important aquatic habitats and species, which helped to evaluate species and habitats of ecological value in the vicinity of the proposed development and watercourse crossings.

Table 2-1: Aquatic survey site locations in the footprint of the proposed Coom Green Energy Park development, Co. Cork.

Site no.	Watercourse	EPA code	Location / townland	ITM (x)	ITM (y)
A1	Unnamed stream	n/a	Knuttery Bridge	562621	591186
A2	Unnamed stream	n/a	Tooreen North	561491	589545
A3	Tooreen North Stream	19T33	Tooreen North	561359	589281
A4	Slievedotia 19 Stream	19S09	Daly's Cross Roads	561011	587722

Site no.	Watercourse	EPA code	Location / townland	ITM (x)	ITM (y)
A5	Unnamed stream	n/a	Lissard	559515	588386
A6	Monparson River	18M58	Lissard	558677	590203
B1	Toor River	18T51	Mullenaboree	564085	591709
B2	Coom 18 Stream	18C03	Bottlehill Landfill	563229	589796
B3	Coom 18 River	18C03	Coom	565442	588887
B4	Toor River	18T51	Raheen	565547	589591
B5	Lyravarrig 18 Stream	18L82	Commons	566739	593598
B6	Seefin 18 Stream	18S52	Commons	566862	593456
B7	River Bride	18B05	Commons	566523	592989
B8	Lyravarrig 18 Stream	18L66	Mullenaboree	565741	592184
B9	Field Chimney Stream	18F43	Chimneyfield	568146	591922
B10	Inchinanagh River	18I16	Inchinanagh	568592	590845
B11	River Bride	18B05	Bride Bridge	568376	590182
B12	Unnamed stream	n/a	Knockdoorty	570075	594332
B13	Unnamed stream	n/a	Powers Bridge	570337	593908
B14	Bunnaglanna Stream	18B07	Moneygorm	570301	593711
B15	River Bride	18B05	Old Bridge	571380	589562
C1	Slumberhill 18 Stream	18S40	Knockacullata	564792	594397
C2	Ross Stream	18R02	Knockacullata	563403	593486
D1	Shanowen Trib 1	18S42	Ballynahina	578462	595293
D2	Farran North River	18F27	Farran North	582016	594305

2.2.2.4.2 Fisheries assessment (electro-fishing)

An application was made in 2020 under Section 14 of the Fisheries (Consolidation) Act, 1959, as substituted by Section 4 of the Fisheries (Amendment) Act, 1962, to undertake a catchment-wide electro-fishing survey of the proposed CGEP. Permission was granted on Monday 27th July 2020 and the survey was undertaken following receipt of this in July 2020.

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish sites on both named and unnamed watercourses in the footprint of the proposed CGEP, following notification to Inland Fisheries Ireland (Macroom) and under the conditions of a Department of Communications, Climate Action & Environment (DCCAE) license. Both river and holding tank water temperature were monitored continually throughout the survey to ensure temperatures of 20°C were not exceeded, thus minimising stress to the captured fish due to low dissolved oxygen levels. A portable battery-powered aerator was also used to further reduce stress to any captured fish contained in the holding tank.

Salmonids, European eel and other captured fish species were transferred to a holding container with oxygenated fresh river water following capture. Where captured, European eel and larval Lamprey were anaesthetised using 0.5ml/l clove oil solution (emulsified in ethanol at a ratio of 1:9) to facilitate accurate measurement and speciation. All other fish (e.g. salmonids) were not anaesthetised, to reduce fish stress levels. All fish were measured to the nearest millimetre and released in-situ following a suitable recovery period.

As three primary species groups were targeted during the survey, i.e. salmonids, lamprey, and eel, the electro-fishing settings were tailored for each species. By undertaking electro-fishing using the rapid electro-fishing technique, the broad characterisation of the fish community at each sampling reach could be determined as a longer representative length of channel surveyed. Electro-fishing methodology followed accepted European standards (CEN, 2003) and best practice (e.g. CFB, 2008) and is outlined below.

The catchment-wide electro-fishing (CWEF) survey was undertaken across n=25 sites (see **Table 2.1** and **Figure 2-1**). Length frequency graphs and species composition graphs for all species with numbers captured are illustrated in section 2.4 below.

2.2.2.4.2.1 *Salmonids, European eel and cyprinids*

For salmonid species and European eel, as well as other incidental species such as three-spined stickleback (*Gasterosteus aculeatus*), electro-fishing was carried out in an upstream direction for a 10-minute CPUE, an increasingly common standard approach for wadable streams (Matson et al., 2018). A total of approx. ≥100m channel length was surveyed at each site, where feasible, in order to gain a better representation of fish stock assemblages. At certain, more minor watercourse sites or sites with limited access, it was more feasible to undertake electro-fishing for a 5-minute CPUE. Discrepancies in fishing effort (CPUE) between sites are accounted for in the subsequent results section.

Relative conductivity of the water at each site was checked in-situ with a conductivity meter and the electro-fishing backpack was energised with the appropriate voltage and frequency to provide enough draw to attract salmonids and European eel to the anode without harm. For the low to moderate conductivity waters of the sites (most draining upland/sandstone areas) a voltage of 250-300V, frequency of 40-45Hz and pulse duration of 3.5ms was utilised to draw fish to the anode without causing physical damage.

2.2.2.4.2.2 Lamprey

Electro-fishing for Lamprey ammocoetes was conducted using targeted box quadrat-based electro-fishing (as per Harvey & Cowx, 2003) in objectively suitable areas of sand/silt, where encountered. As lamprey take longer to emerge from silts and require a more persistent approach, they were targeted at a lower frequency (30Hz) setting which also allowed detection of European eel, if present. Settings for lamprey followed those recommended and used by Harvey & Cowx (2003), APEM (2004) and Niven & McAuley (2013). Using this approach, the anode was placed under the water's surface, approx. 10–15 cm above the sediment, to prevent immobilising lamprey ammocoetes within the sediment. The anode was energised with 100V of pulsed DC for 15-20 seconds and then turned off for approximately five seconds to allow ammocoetes to emerge from their burrows. The anode was switched on and off in this way for approximately two minutes. Immobilised ammocoetes were collected by a second operator using a fine-mesh hand net as they emerged.

Lamprey species were identified to with the assistance of a hand lens, through external pigmentation patterns and trunk myomere counts as described by Potter & Osborne (1975) and Gardiner (2003b).

2.2.2.4.2.3 General fisheries habitat

A broad appraisal/overview of the upstream and downstream habitat at each site was also undertaken to evaluate the wider contribution to salmonid and lamprey spawning and general fisheries habitat. River habitat surveys and fisheries assessments were also carried out utilising elements of the approaches in the River Habitat Survey Methodology (Environment Agency, 2003) and Fishery Assessment Methodology (O'Grady, 2006) to broadly characterise the river sites (i.e. channel profiles, substrata etc.).

2.2.2.4.3 White-clawed crayfish

White-clawed crayfish surveys were undertaken at the aquatic survey sites in 2020 under a National Parks and Wildlife (NPWS) open licence (no. C79/2020), as prescribed by Sections 9, 23 and 34 of the Wildlife Act (1976-2012), to capture and release crayfish to their site of capture, under condition no. 5 of the licence. As per Inland Fisheries Ireland recommendations, the crayfish licence sampling started at the uppermost site(s) of the wind farm catchment/sub-catchments in the survey area to minimise the risk of transfer invasive propagules (including crayfish plague) in an upstream direction.

Hand-searching of instream refugia and sweep netting was undertaken, according to Reynolds et al. (2010). Trapping of crayfish was not feasible given the small nature of most aquatic survey sites sampled. An appraisal of white-clawed crayfish habitat at each site was also carried out based on physical channel attributes, water chemistry and incidental records in otter spraint. Furthermore, a desktop review of known distributions of crayfish within the relevant watercourses and wider catchment(s) was also completed.

2.2.2.4.4 Freshwater Pearl Mussel

Freshwater pearl mussel surveys of watercourses in the wider footprint of the proposed CGEP were completed over the 4th to 7th September 2020. Conditions were suitable, with bright, sunny weather and good water visibility under base flow conditions. This helped to maximise visibility of pearl mussel against dark substrata and also improved chances of detection when mussels were filter feeding in brighter conditions. Pearl mussel surveys were carried out under a national open licence (licence no. C15/2020), issued by the National Parks and Wildlife Service (NPWS). The survey methodology used was in accordance with the Stage 1 & 2 guidelines given in Irish Wildlife Manual No. 12, NPWS (Anonymous, 2004).

2.2.2.4.5 *Biological water quality (macro-invertebrates)*

Biological water quality sampling was conducted across the survey area in locations as outlined in **Table 2-1**, **Figure 2.1**.

Macro-invertebrate samples were converted to Q-ratings, as per Toner et al. (2005) - **Table 2-2**. All riverine samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a two-minute sample, as per ISO standards for water quality sampling (ISO 10870:2012). Large cobble was also washed at each site where present and samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification. Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster et al., 2009), mayflies (Kelly-Quinn & Regan, 2012) and other relevant taxa (i.e. Byrne et al., 2009; Feeley et al., 2020; Nelson et al., 2011).

Table 2-2: Reference Categories for EPA Q-Ratings (Q1 to Q5).

Q Value	WFD Status	Pollution Status	Condition
Q5 or Q4-5	High Status	Unpolluted	Satisfactory
Q4	Good Status	Unpolluted	Satisfactory
Q3-4	Moderate Status	Slightly polluted	Unsatisfactory
Q3 or Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2 or Q1	Bad	Seriously polluted	Unsatisfactory

2.2.2.4.6 *Aquatic ecological evaluation*

2.2.2.4.6.1 *Fisheries Habitat Evaluation*

A fisheries habitat appraisal of the watercourses in the footprint of the proposed Coom Green Energy Park and associated cable route was undertaken to establish their importance for salmonid, lamprey, European eel and other fish species. The baseline assessment considered the quality of spawning, nursery and holding habitat within the vicinity of the survey sites using Life Cycle Unit (salmonids) and Lamprey Habitat Quality Index scores (lamprey).

2.2.2.4.6.2 *Aquatic Habitat Evaluation*

The physical morphology and chemical status of affected waterbodies are evaluated fully in the Water Chapter (Chapter 10), while the aquatic habitat value with regard to biodiversity receptors is evaluated with regard to its supporting function in relation to the conservation objectives as set out for the respective SAC sites, i.e. the Blackwater River (Cork/Waterford) SAC (NPWS, 2012) and also the WFD status and objectives as specified in the River Basin Management Plan (2018-2021) sub-catchment reporting for each respective waterbody / sub-catchment. Aquatic habitat is evaluated in terms of the EC Surface Water Regulations (2009) environmental quality standards for WFD status, as well as local biodiversity value for water-dependant receptors identified during this assessment.

2.2.2.4.6.3 Freshwater Pearl Mussel Evaluation

Freshwater pearl mussel habitat is evaluated following the requirements of the European Union Environmental Objectives (Freshwater Pearl Muscle (Amendment) Regulations 2018 S.I. No. 355/2018 and following the assessment criteria published in the Munster Blackwater Sub-basin Management Plan (NS2, 2010) and the Conservation Objectives prescribed for this species within the Blackwater River (Cork/Waterford) SAC (NPWS, 2012).

2.2.2.4.6.4 Aquatic Macroinvertebrate Community Evaluation

The aquatic macroinvertebrate community was evaluated following the EPA standard Q-value assessment (Toner, 2005) with scores attributed according to this biotic index. Additional evaluation scores were attributed to smaller watercourses following the updated Small Stream Risk Score (SSRS) methodology (Walsh, 2005; EPA, 2018) as appropriate.

2.2.2.4.6.5 Summary Aquatic Evaluation

The final summary evaluation of aquatic ecological receptors at all sites (Table 2.1) contained within this report uses the geographic scale and criteria defined in the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009), refer to **Table 2.3** below. This evaluation followed an appraisal of each specific aquatic receptor scoring as relevant for each site.

Table 2-3. Evaluation Criteria for Aquatic Ecology sites

Resource Evaluation	NRA Criteria
International Importance	• 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. • Proposed Special Protection Area (SPA). Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). Features essential to maintaining the coherence of the Natura 2000 Network. • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. • Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). • Biosphere Reserve (UNESCO Man & The Biosphere Programme). Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). • Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).

Resource Evaluation	NRA Criteria
	• Biogenetic Reserve under the Council of Europe. European Diploma Site under the Council of Europe. • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance	• Site designated or proposed as a Natural Heritage Area (NHA). • Statutory Nature Reserve. • Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); • Statutory Nature Reserve; • Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. • Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.
County Importance	• Area of Special Amenity. • Area subject to a Tree Preservation Order. • Area of High Amenity, or equivalent, designated under the County Development Plan. • Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. • Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. • County important populations of species, viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared. • Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. • Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (Higher Value)	• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; • Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.

Resource Evaluation	NRA Criteria
	• Sites containing semi natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; • Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (Lower Value)	• Sites containing small areas of semi natural habitat that are of some local importance for wildlife; • Sites or features containing non-native species that is of some importance in maintaining habitat links.

2.2.2.4.7 *Biosecurity*

A strict biosecurity protocol following the Check-Clean-Dry approach was employed during the survey. Equipment and PPE used was disinfected with Virkon® between survey sites to prevent the transfer of pathogens and/or invasive species between survey areas. Where feasible, equipment was also be thoroughly dried (through UV exposure) between survey areas. As per best practice, surveys were undertaken at sites in a downstream order (i.e. uppermost site surveyed first etc.) to prevent the upstream mobilisation of invasive propagules and pathogens. Any invasive species recorded within or adjoining the survey area were geo-referenced.

2.3 Desktop Study Results

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the receiving environment as relevant to this NIS.

2.3.1 Habitats and Flora

The site is not included in any European Site. However, surveys conducted included identification of Annex 1 listed habitats to ensure impacts to non-designated habitats of significant ecological importance, were avoided where possible at design stage.

2.3.2 Invasive Alien Plant Species

The National Biodiversity Data Centre (NBDC) online database indicates that 16no. Invasive Alien Plant Species have been recorded at the 10x10km Grid Squares W68, W69, W79 and W89, associated with the locations of the proposed CGEP development and Grid Connection Route locations (**Table 2.4)**.

Table 2-4: Invasive Alien Plant Species within the Proposed CGEP and Grid Connection Route (Source: NBDC).

Common Name	*Scientific Name*	Date of Record	Grid Square	Invasive Impact
American Skunk-cabbage	*Lysichiton americanus*	12/03/2017	W79	Medium Impact Invasive Species Regulation S.I. 477 (Ireland)

Common Name	*Scientific Name*	Date of Record	Grid Square	Invasive Impact
Black Currant	*Ribes nigrum*	22/06/2007	W69	Medium Impact Invasive Species
		23/08/2006	W79	
Butterfly-bush	*Buddleja davidii*	27/04/2017	W68	Medium Impact Invasive Species
Canadian Waterweed	Elodea canadensis	16/09/2009	W89	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Cherry Laurel	*Prunus laurocerasus*	27/04/2017	W68	High Impact Invasive Species
		23/08/2006	W79	
		20/07/2004	W89	
Douglas Fir	*Pseudotsuga menziesii*	31/07/2006	W79	Medium Impact Invasive Species
Fallopia japonica x *sachalinensis* = *F.* x *bohemica*		21/04/2017	W68	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Giant Hogweed	*Heracleum mantegazzianum*	11/03/2020		High Impact Invasive Species Regulation S.I. 477 (Ireland)
Himalayan Knotweed	*Persicaria wallichii*	16/08/2018	W69	Medium Impact Invasive Species Regulation S.I. 477 (Ireland)
		08/09/2015	W68	
Indian Balsam	*Impatiens glandulifera*	16/09/2009	W69	High Impact Invasive Species Regulation S.I. 477 (Ireland)
		31/07/2015	W68	
		16/09/2009	W79	
		29/07/2017	W89	
Japanese Knotweed	*Fallopia japonica*	10/10/2007	W69	High Impact Invasive Species Regulation S.I. 477 (Ireland)
		12/04/2018	W68	
		26/01/2019	W79	
		08/05/2019	W89	

Common Name	*Scientific Name*	Date of Record	Grid Square	Invasive Impact
Nuttall's Waterweed	*Elodea nuttallii*	12/08/2008	W68	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Rhododendron ponticum		16/02/2018	W69	High Impact Invasive Species Regulation S.I. 477 (Ireland)
		06/03/2019	W79	
		29/04/1997	W89	
Sycamore	*Acer pseudoplatanus*	15/11/2018	W69	Medium Impact Invasive Species
		27/04/2017	W68	
		16/09/2009	W79	
		16/09/2009	W89	
Three-cornered Garlic	*Allium triquetrum*	21/04/2017	W68	Medium Impact Invasive Species Regulation S.I. 477 (Ireland)
Traveller's-joy	*Clematis vitalba*	06/10/2015	W89	Medium Impact Invasive Species

High Impact Invasive species were a focus for Field surveys and are discussed in **section 2.4.2.**

2.3.2.1 Turbine Delivery Route (Nodes)

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the site's (*TDR Nodes*) natural environment (*emphasis added*). Records available on the NPWS and the National Biodiversity Data Centre websites were reviewed (see **Appendix C**).

2.3.2.2 Replant Lands

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the (*Replant*) site's natural environment (*emphasis added*). Records available on the NPWS and the National Biodiversity Data Centre websites were reviewed (see **Appendix B**).

2.3.3 Avifauna

The receiving environment within the CGEP and Grid Connection Study Area supports a wide variety of general bird species of open countryside, farmland and woodland (**Table 2-5**). Some migratory species are only present during the summer or winter months within which they disperse widely over suitable habitat, whilst other sedentary species are present throughout the year.

Table 2-5: Species of Birds recorded historically within the 10km squares (W68, W69, W79 and W89) in which the CGEP development and GCR are located, from desktop review (Source: NBDC[2])

Common name	Scientific Name	Birds Directive	BoCCI	W68		W69		W79		W89	
				Max	Date	Max	Date	Max	Date	Max	Date
Mute Swan	*Cygnus olor*		Amber	1	29/2/84	17	31/12/11	10	31/12/11	25	31/12/11
Whooper Swan	*Cygnus Cygnus*	Annex I	Amber			1	31/12/01			5	08/02/15
Shelduck	*Tadorna tadorna*		Amber			1	31/12/01				
Wigeon	*Anas Penelope*		Red			1	31/12/01			2	31/12/11
Shoveler	*Anas clyptea*		Red			1	31/12/01				
Teal	*Anas crecca*		Amber	1	29/02/84	5	31/12/11	5	31/12/11	11	31/12/11
Pochard	*Aythya farina*		Red			1	31/12/01				
Tufted Duck	*Aythya fuligula*		Red			1	31/12/01	2	31/12/11		
Scaup	*Aythya marila*		Amber	1	29/02/84						
Goldeneye	*Bucephala clangula*		Red	1	29/02/84	1	31/12/01				
Red Grouse	*Lagopus lagopus*		Red			1	31/07/72				
Grey Partridge	*Perdix perdix*		Red							2	31/12/11
Little Grebe	*Tachybaptus ruficollis*		Amber					1	31/07/72	2	31/12/11
Cormorant	*Phalacrocorax carbo*		Amber	3	31/12/11	9	31/12/11	10	31/12/11	12	31/12/11
Sparrowhawk	*Accipiter nisus*		Amber	16	04/08/17	15	31/12/11	8	31/12/11	14	31/12/11
Goshawk	*Accipiter gentilis*		Amber	2	31/12/11	1	31/12/11				
Hen Harrier	*Circus cyaneus*	Annex I	Amber	11	31/12/11	16	26/6/26	12	10/04/16		
Corncrake	*Crex crex*	Annex I	Red	1	31/07/72					1	31/07/72
Coot	*Fulica atra*		Amber			3	31/12/11	2	31/12/11		
Lapwing	*Vanellus vanellus*		Red	4	31/12/11	1	31/12/01	2	29/02/84	5	31/12/11
Golden Plover	*Pluvialis aprocaria*	Annex I	Red			1	31/12/01	4	31/12/11	5	31/12/11
Woodcock	*Scolopax rusticola*		Red	2	31/12/11	6	31/12/11	3	31/12/11	3	31/12/11
Jack Snipe	*Lymnocryptes minimus*		Amber					2	31/12/11	2	31/12/11
Snipe	*Gallinago gallinago*		Amber	7	31/12/11	7	31/12/11	4	31/12/11	10	31/12/11
Black-tailed Godwit	*Limosa limosa*		Amber			1	31/12/01				

Common name	Scientific Name	Birds Directive	BoCCI	W68		W69		W79		W89	
				Max	Date	Max	Date	Max	Date	Max	Date
Curlew	*Numenius arquata*		Red	3	03/08/17	4	31/12/11	3	31/07/91	1	29/02/84
Redshank	*Tringa totanus*		Red			1	31/12/01				
Common Sandpiper	*Actitis hypoleucos*		Amber			1	31/12/01			3	31/12/11
Dunlin	*Calidris alpina*	Annex I	Red			1	31/12/01				
Black-headed Gull	*Chroicocephalus ridibundus*		Red	1	29/02/84	2	31/12/01	4	31/07/91	3	31/12/11
Common Gull	*Larus canus*		Amber			1	31/12/01	1	29/02/84	2	31/12/11
Great Black-backed Gull	*Larus marinus*		Amber			1	29/02/84			1	29/02/84
Herring Gull	*Larus argentatus*		Red	1	29/02/84	1	29/2/84	1	29/02/84		
Lesser Black-backed Gull	*Larus fuscus*		Amber	1	31/12/01					7	31/12/11
Stock Dove	*Columba oenas*		Amber	4	31/12/11	5	31/12/11	4	31/12/11	14	31/12/11
Barn Owl	*Tyto alba*		Red	3	30/11/17	1	27/07/16	4	31/12/11	3	31/12/11
Short-eared Owl	*Asio flammeus*	Annex I	Amber							2	31/12/11
Nightjar	*Caprimulgus europeaus*		Red			1	31/7/72				
Swift	*Apus apus*		Amber	1	31/07/72	5	31/12/11	5	31/12/11	14	31/12/11
Kingfisher	*Alcedo atthis*	Annex I	Amber			9	31/12/11	11	31/12/11	18	31/12/11
Kestrel	*Falco tinnunculus*		Amber	14	11/06/17	28	22/09/16	14	31/12/11	15	31/12/11
Merlin	*Falco colimbarius*	Annex I	Amber	3	31/12/11			1	31/12/11		
Peregrine	*Falco peregrinus*	Annex I	Green	4	31/12/11	3	31/12/11	3	31/12/11	7	31/12/11
Skylark	*Alauda arvensis*		Amber	7	31/12/11	10	31/12/11	10	31/12/11	10	31/12/11
Sand Martin	*Riparia riparia*		Amber	3	31/12/11	14	31/12/11	8	21/05/16	14	31/12/11
Swallow	*Hirundo rustica*		Amber	13	04/08/17	31	31/12/11	13	31/12/11	24	03/07/16
House Martin	*Delichon urbicum*		Amber	7	31/12/11	8	31/12/11	10	31/12/11	9	31/12/11
Goldcrest	*Regulus regulus*		Amber	19	31/12/11	27	31/12/11	14	31/12/11	31	31/12/11
Starling	*Sturnus vulgaris*		Amber	23	22/05/16	21	31/12/11	10	31/12/11	34	31/12/11
Mistle Thrush	*Turdus viscivorus*		Amber	11	22/05/16	15	31/12/11	10	31/12/11	21	31/12/11

Common name	Scientific Name	Birds Directive	BoCCI	W68		W69		W79		W89	
				Max	Date	Max	Date	Max	Date	Max	Date
Spotted Flycatcher	*Muscicapa striata*		Amber	4	04/08/17	12	31/12/11	4	31/12/11	11	31/12/11
Robin	*Erithracus rubecula*		Amber	28	31/12/11	32	31/12/11	21	31/12/11	38	03/07/16
Stonechat	*Saxicola rubicola*		Amber	6	31/12/11	19	31/12/11	7	31/12/11	12	31/12/11
Dipper	*Cinclus cinclus*		Green	9	31/12/11	31	31/12/11	12	31/12/11	36	08/02/15
House Sparrow	*Passer domesticus*		Amber	12	01/07/17	18	31/12/11	16	31/12/11	31	31/12/11
Grey Wagtail	*Motacilla cinerea*		Red	10	14/06/16	32	31/12/11	19	31/12/11	45	21/03/12
Meadow Pipit	*Anthus pratensis*		Red	13	31/12/11	29	31/12/11	14	31/12/11	18	31/12/11
Greenfinch	*Carduelis chloris*		Amber	9	10/06/17			10	31/12/11	30	31/12/11
Linnet	*Linaria cannabina*		Amber	13	31/12/11	18	31/12/11	8	31/12/11	13	31/12/11
Yellowhammer	*Emberiza citrinella*		Red			6	31/12/11	6	31/12/11	16	31/12/11

The desk survey confirmed that the site is not located within any Special Protection Area designated for birds. Special Conservation Interest bird species of national SPA's identified as potentially within the zone of influence of the development based on the findings of the desk study include;

- Hen Harrier (breeding and wintering)
- Peregrine
- Kingfisher
- Short eared owl
- Dunlin
- Whooper swan
- Wader and water fowl species (non Annex 1)

Corncrake do not use this area anymore (no records since early 1970's) and hence no adverse effects are possible or likely.

Focused species-specific surveys to detect these species and establish usage of the windfarm area were conducted and are discussed in section **2.4.3** below.

Given the temporary nature, scale and location of proposed works no bird surveys for the above species were determined as required for the proposed TDR.

Breeding hen harrier surveys for the CGEP included the proposed replant lands at Moneygorm. The managed nature (improved agricultural farmland) at Moneygorm mean the site has limited importance for sensitive bird species including hen harrier and the location is not a known breeding hen harrier area.

Walkover surveys were conducted of Ballard replant lands to evaluate likely importance of the site for sensitive bird species. Ballard is not a known hen harrier breeding area. The habitats at Ballard replant lands are considered unsuitable for breeding merlin for which the Wicklow Mountains SPA is designated. Merlin typically nest on the ground on moorland, mountain and blanket bog. This species can also nest in woodland and has

taken to nesting in forestry plantations adjacent to moorland. These habitats are not present within the replant lands site.

2.3.4 Otter

The desktop study for otter records in the NBDC online database and map viewer[5] revealed the presence of otter (**Table 2-6**) within the areas potentially affected by the proposed CGEP and Grid Connection Route.

Table 2-6: Records of protected mammal fauna within grid squares W69, W79, W89, W68 (Source: NBDC Error! Bookmark not defined.**)**

Mammal Name	Legal Protection	Conservation Status (Marnell et al., 2019)
European Otter (*Lutra lutra*)	EU Habitats Directive Annex II, IV Wildlife Acts	Least Concern

Otter (*Lutra lutra*) records were widespread throughout the respective grid squares, with several records overlapping the survey area (NBDC data; NPWS data). A single otter record was available for the lower Ross Stream, approx. 2.8km downstream from survey site C1, the Lyravarrig Stream approx. 1km downstream from site B8, Bride Bridge on the River Bride (site B11) and at Old Bridge on the River Bride (site B15) (NPWS data).

No otter records were determined for the site of the proposed windfarm and grid route.

Otter surveys were conducted as part of the proposed development and relevant findings are discussed in section 2.4.

Given the temporary nature, scale and location of proposed works (away from rivers and streams) no otter surveys were required for the proposed TDR.

No evidence of Otter were recorded during surveys of replant lands. Key habitats for this species including streams will be avoided by proposed replant works.

2.3.5 Bats

No records of any bat species listed as qualifying interest for SAC's occur around the proposed development including the TDR and replant lands. Extensive bat surveys conducted between 2016 and 2020 did not record Lesser Horsehoe Bat (*Rhinolophus hipposideros*) the only QI bat species, with sites designated as SAC, currently in Ireland. Sites designated for this species are a minimum of 40km (Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC) from the site and well outside the potential zone of influence of the proposed development.

2.3.6 Fisheries and Aquatic Ecology

A sensitive species data request for terrestrial and aquatic flora and fauna covering 10km grid squares adjoining the proposed development (i.e. W58, W59, W68, W69, W78, W79 and W89) revealed records for a number of

[5] https://maps.biodiversityireland.ie/

protected (freshwater) QI aquatic species in the vicinity of the proposed watercourses crossings, as did data from the National Biodiversity Data Centre[2].

Numerous records for Freshwater Pearl Mussel (*Margaritifera margaritifera*) were available for the respective grid squares but all were confined to the River Blackwater. No records overlapped with the survey area. Similarly, White-Clawed Crayfish (*Austropotamobius pallipes*) records were available for the River Blackwater and the Ballyclogh Stream (upper tributary upstream of Mallow, W59) but no records overlapped with the survey area.

Numerous Sea Lamprey (*Petromyzon marinus*) records were available for the Munster Blackwater catchment (e.g. River Blackwater, Clyda River) but no records overlapped with the survey area. River Lamprey (*Lampetra fluviatilis*) records were available for the River Blackwater and River Bride at Rathcormack Bridge (not within survey area).

A catchment-wide electro-fishing survey was undertaken for an early precursor to the propose CGEP development. The wider catchment was found to support Brown Trout (*Salmo trutta*), European Eel (*Anguilla anguilla*), Lampetra sp. ammocoetes and low numbers of Atlantic Salmon in 2017.

2.3.6.1 Turbine Delivery Route

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the site's (*TDR Nodes*) natural environment (*emphasis added*). Records available on the NPWS and the National Biodiversity Data Centre websites were reviewed (see **Appendix C.** Given the nature, scale and location of proposed works (existing roads) no aquatic surveys were deemed required.

2.3.6.2 Replant Lands

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the (*Replant*) site's natural environment (*emphasis added*). Records available on the NPWS and the National Biodiversity Data Centre websites were reviewed (see **Appendix B**). Direct Impacts to aquatic habitats are avoided by the proposed replant lands.

2.4 Field study

2.4.1 Habitats

No Annex 1 listed habitats associated with European sites will be affected by the development. No habitats evaluated (NRA, 2009) as being of International, National or county importance will be impacted by the development. No habitats listed under Annex 1 of the Habitat Directive were recorded within the development site. Downstream (offsite) non designated Annex 1 river habitat; Watercourses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation (3260) was encountered and is discussed as relevant in **section 2.4.4**.

2.4.2 Invasive Alien Plant Species

Invasive Alien plant species listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) are herein described.

2.4.2.1 Proposed CGEP development

Rhododendron (*Rhododendron ponticum*) was recorded at one location and Japanese knotweed (*Fallopia japonica*) or Himalayan knotweed (*Persicaria wallichii*) infestations were recorded at 11 locations during habitat assessments on the CGEP development site. None of these infestations however occur within the study area, i.e. within 50m of the proposed CGEP development infrastructure.

Buddliea (*Buddleja davidii*) and Pheasant berry (*Leycesteria Formosa*) were recorded at one and two locations, respectively. These species, while not listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) are listed as a 'Medium impact' non-native invasive species (Kelly et al., 2013a, O' Flynn et al., 2014). Montbretia (*Crocosmia x crocosmiflora*), which is also considered an invasive species in Ireland was also recorded at one location. Of the above listed 'medium impact' invasive species, only two infestations of Pheasant berry occur within the CGEP Development study area.

2.4.2.2 Grid Connection Route

Three Japanese knotweed infestations were recorded during habitat assessments on the Grid Connection Route, two of which occur within the Grid Connection study area (i.e. within 50m of the proposed Grid Connection Route). The only other Third Schedule invasive species recorded was Rhododendron, which occurs at one location outside of the study area.

Himalayan balsam (*Impatiens glandulifera*) was recorded during the aquatic survey. It was widespread and abundant along both banks of channel at site 13 (Farran North stream) and also present in smaller, scattered patches at site 9 (Bunnaglanna River). (**Figure 2.1**)

Cotoneasteer (*Cotoneaster* sp.), which is listed as a 'Medium impact' non-native invasive plant species (Kelly et al., 2013a; O' Flynn et al., 2014), was recorded at two locations within the Grid Connection Route study area. Montbretia (*Crocosmia* x *crocosmiflora*), was also recorded at two locations, with one of these infestations is located within the Grid Connection Route study area. While not listed as a "Medium Impact" invasive species, Montbretia is considered an invasive species in Ireland.

2.4.2.3 Turbine Delivery Route (Nodes)

The Invasive Alien Plant Species recorded at and in the vicinity of nodes associated with the TDR are summarised in **Table 2-7** below. Their risk of invasiveness impact, legal status and an indication whether or not they will interact with proposed works are outlined.

The only legally restricted species recorded was Japanese knotweed at one location potentially within the zone of influence. Cherry laurel, snowberry, winter heliotrope and old man's beard are present within the footprint of a number of nodes; Himalayan honeysuckle is present adjacent to the vegetation clearance footprint at Node 1.4.

Table 2-7: Invasive Alien Plant Species present at and in the vicinity of the Turbine Delivery Route Nodes

Node	Species	Invasiveness impact/legal status	Interaction
Route 1 Tivoli-Bottlehill			
1.3	Old man's beard	Medium impact; no legal restriction	In load-bearing footprint
1.4	Old man's beard	Medium impact; no legal restriction	In vegetation clearance footprint
	cherry laurel	High impact; no legal restriction	None

Node	Species	Invasiveness impact/legal status	Interaction
	Japanese knotweed	High impact; Schedule III listed species*	None likely though within 7m.
1.7	cherry laurel	High impact; no legal restriction	In vegetation clearance footprint
	snowberry	Low impact; no legal restriction	In vegetation clearance footprint
	montbretia	Not assessed; no legal restriction	None
Route 2 Dunkettle – Nagle's Mountains			
2.0	winter heliotrope	Low impact; no legal restriction	In bank re-grading footprint
2.2	Himalayan honeysuckle	Medium impact; no legal restriction	Potential- adjacent to vegetation clearance footprint
2.3	Old man's beard	Medium impact; no legal restriction	In vegetation clearance footprint
2.4	winter heliotrope	Low impact; no legal restriction	In load-bearing footprint

** Third Schedule listed invasive species under Regulations 49 & 50 S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011.*

2.4.2.4 Replacement Lands

2.4.2.4.1 Moneygorm, Co. Cork

No Third Schedule listed invasive species were recorded. For full results of any pertinent flora baseline surveys, see the accompanying Replant Lands EcIA, included as **Appendix B**.

2.4.2.4.2 Ballard, Co. Wicklow.

No Third Schedule listed invasive species were recorded. For full results of any pertinent flora baseline surveys see the accompanying Replant Lands EcIA, included as **Appendix B**.

2.4.3 Avifauna

2.4.3.1 CGEP and Grid Connection Route

All wild bird species are protected by legislation under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000. Further international protection is provided to bird species in the Annex I of the EU Birds Directive 2009/147/EC. Notwithstanding the protection afforded to some bird species at National and International levels, the importance of each species in relation to the proposed CGEP Development and Grid Connection Route, in the context of the Appropriate Assessment, takes account of the their inclusion as Special Conservation Interest (SCI) of the European sites within the Zone of Influence of the proposed CGEP Project (see **Section 3.7.2**).

Taking in consideration the Qualifying Interests (QI) and Special Conservation Interests (SCI) of the European sites within the Zone of Influence of the proposed CGEP Development and Grid Connection Route (**Table 3-9**), the range of habitat suitability for QI and SCI within the proposed CGEP Development and Grid Connection Route, Whooper Swan was the only pertinent bird species scoped in for further assessment (it is an a SCI species for the Blackwater Callows SPA).

Whooper Swan is sensitive to disturbance at both foraging and roosting sites during the winter. Such sites are usually traditional areas to which birds show high fidelity in respect of both foraging and roosting, and often regularly used corridors for commuting between feeding and/or roosting locations.

Wintering wildfowl surveys took place in the winter periods of 2016/17 and 2017/18. The purpose of these surveys was to establish numbers if any of wintering Whooper Swan along the Blackwater River corridor, to the north of CGEP, between Mallow town and Fermoy town. This survey comprised a 'round-robin' style survey in line with established methods such as IWeBS/National Swan Census methods whereby suitable locations for feeding/roosting swans on both sides of the Blackwater River corridor (North and South) were visited over the course of a single day per month, across 4 months (October to January inclusive of winter 2016/17 and November to February inclusive of winter 2017/18).

Additional VP watches were also carried out at dawn or dusk during the winter months (1 dawn and 1 dusk watch per month November to February inclusive and usually around the same date as the monthly census), to determine whether or not wildfowl (particularly swans) possibly utilising the corridor eastwards from Mallow town along the Blackwater, also occasionally traversed southwards through the proposed development area.

No requirement for Winter Wildfowl surveys was scoped in regarding the proposed Grid Connection Route eastwards from Lackendarragh North to Farran South. Habitats adjacent are unsuitable for larger wintering wildfowl such as geese or swans, the underground cabling will not pose a risk in terms of collision mortality along regularly used flight paths, and the CGEP surveys of the River Blackwater provide background information on numbers of wildfowl. Remaining lands where the GCR is to be located overlap the GCR study area, this includes the section of grid connection route between Mullenboree and Lackendarragh.

Records of other pertinent wetland species such as Black-tailed Godwit, Wigeon, Teal which is also an SCI for the Blackwater Callows SPA, were recorded as a matter of course to inform the baseline appraisal.

Key findings of these surveys are outlined below.

2.4.3.1.1 *Whooper Swan*

Whooper Swan was historically recorded proximal to the study area and were included as a target species for VP watches and also subject to a bespoke survey as outlined above due to potential impacts from the proposed CGEP Development on migratory or commuting birds. No Whooper Swans were recorded during these surveys.

2.4.3.1.2 *Wigeon*

No records of Wigeon were recorded.

2.4.3.1.3 *Teal*

One record, ca.30 birds were flushed from a disused sand pit between Mallow and Fermoy in November 2017. None were recorded in the vicinity of the proposed development.

2.4.3.1.4 *Black-tailed Godwit*

No records from the proposed development areas.

2.4.3.1.5 *Hen Harrier*

Hen harrier surveys and findings (2016 – 2020) are discussed in detail in the EIAR for the proposed development. It is considered that the site is not an ex situ site (of SPA's designated for this species), given the site is at an extensive distance (>25km) from the closest SPA designated for protection of breeding hen harrier. This distance is well outside typical foraging ranges of adult hen harrier. Hen harrier also use the area in the vicinity of the windfarm during the winter period and three winter roost sites are identified in the EIAR close to the site. The closest winter roost to the windfarm is < 2km. Based on a precautionary approach wintering hen harrier could include individuals from populations outside the local area, including individuals from distant SPA's. No impacts are identified in the EIAR to wintering hen harrier and no disturbance will arise to any wintering hen harrier roosts due to the project. It is considered therefore that no significant adverse effects are likely to SCI hen harrier associated with SPA's.

Precautionary mitigation is outlined in the EIAR including habitat enhancement measures to minimise risks to local populations of breeding and wintering hen harrier that use the locality of the proposed windfarm development. The TDR and replant lands are not important for hen harrier. The lands at Ballard are not within known breeding areas for hen harrier. The habitats at Moneygorm are dominated by intensively managed agriculture grassland and are considered to be low value habitat for foraging Hen Harrier and unsuitable breeding habitat.

2.4.3.1.6 Merlin

No evidence of breeding Merlin was observed during this survey. Several winter records were made. Measures are outlined in the EIAR that will avoid risks to Merlin including positive habitat enhancement measures. The TDR and replant lands are not suitable for Merlin. It is considered that no significant adverse effects are likely to SCI Merlin associated with national SPA's.

2.4.3.1.7 Kingfisher

The site does not have suitable habitat for this species, and none were recorded. No SPA (river) sites occur downstream of the development. It is considered that no significant adverse effects are likely to SCI Kingfisher associated with national SPA's.

2.4.3.1.8 Golden Plover

Small numbers of Golden Plover pass through the area and were recorded occasionally during winter surveys on farmland, away from the proposed development. It is considered that no significant adverse effects are likely to SCI Golden Plover associated with national SPA's.

2.4.3.1.9 Other Annex 1 listed species

No other records of note of Annex 1 listed Bird Directive species potentially associated with SPA sites were recorded.

2.4.4 Aquatic Environment

2.4.4.1 Proposed CGEP development and Grid Connection Route

2.4.4.1.1 Site descriptions

The following describes the location of aquatic sampling locations downstream of the development with a focus on QI aquatic species associated with European sites as relevant. The aquatic sampling locations are outlined in **Figure 2-1**.

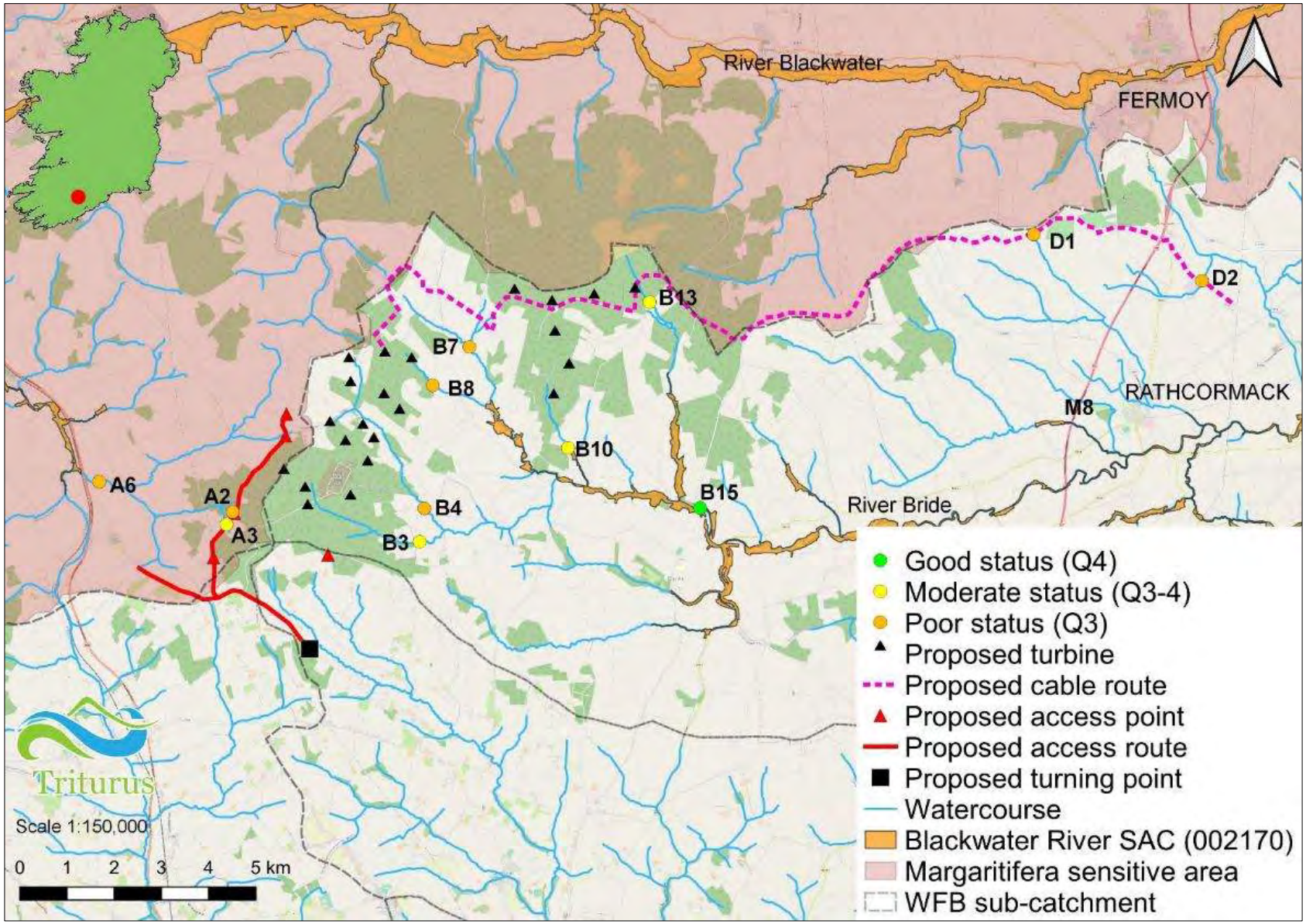

Figure 2-1: Aquatic Sampling Locations in the vicinity of the proposed Coom Green Energy Park, Co. Cork.

2.4.4.1.1.1 Site A1 – unnamed stream, Knuttery Bridge

Site A1 is located on the upper reaches of a small, unnamed stream (no EPA code; aka Leapford Stream) at Knuttery Bridge. The small stream, a tributary of the Monparson River, had been straightened and deepened historically in the vicinity of the local road crossing and featured a deep V-shaped channel, less than 1m wide with 2.5-3m bank heights over a moderate gradient. The channel did not contain water at the time of survey (100% dry). The bed comprised compacted cobble, gravel and mud (likely dry for a significant period of time). The banks were heavily scrubbed over and comprised primarily Nettle (*Urtica dioca*), Rosebay Willowherb (*Chamaenerion angustifolium*), Bracken (*Pteridium aquilinum*), Foxglove (*Digitalis purpurea*) and Hogweed (*Heracleum sphondylium*). Scattered Hawthorn (*Crataegus monoygna*) and Sitka Spruce (*Picea sitchensis*) were present downstream. The adjoining land use patterns were of coniferous afforestation (WD4) upstream and heavily improved agricultural grassland (GA1) downstream and adjoining the survey area.

The upper reaches of the unnamed stream at site A1 offered no fisheries value at the time of survey owing to the lack of water and was considered unlikely to support fish throughout much of the year due to evident seasonality. Given the dry nature of the site, it was not possible to take a Q-sample to infer water quality.

2.4.4.1.1.2 Site A2 - unnamed stream, Tooreen North

Site A2 is located on the upper reaches of an unnamed stream (no EPA code) at St. John's Well, Tooreen North. The site represented a small upland eroding watercourses (FW1), 0.5m wide and 0.1-0.2m deep on average. The stream emerges from a spring known as St. John's Well and then flows through a steep valley in a sitka spruce plantation (WD4) with a buffer of Grey Willow (*Salix cinerea*). The gradient steepened significantly moving through the plantation with cascading reaches visible. Low banks (0.5m high) graded into the adjoining valley. The profile iis dominated by riffle (95%) with a single localised shallow pool located at the well itself. The substrata were clean and unbedded, dominated by fine, medium and coarse gravels. The riparian areas are dominated by scrub (WS1) with Bracken, Bramble and Nettle being very dense. The site supported no macrophytes although abundant Opposite-Leaved Golden Saxifrage (*Chrysosplenium oppositifolium*) was present in the margins (visible downstream, away from the well).

No fish were recorded via electro-fishing. The stream was not of fisheries value due to its very small size and location in the very upper reaches of a catchment with limited accessibility for fish. The site was unsuitable for white-clawed crayfish and offered no Otter value given the lack of prey resource. A biological water quality rating of Q3, corresponding to WFD 'Poor' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.3 Site A3 - Tooreen North Stream, Tooreen North

The Tooreen North Stream (EPA code: 19T33) at site A3 is a small, semi-natural upland eroding watercourse (FW1), characteristic of an upland spate channel. The stream flowed in a deep U-shaped channel (2m to 3m bank heights), 1.5m wide and had shallow water (<0.1m deep). The profile is dominated by riffle (90%) with 10% glide and an absence of pools due to its very small nature. The bed comprised compacted small boulder, cobble and mixed medium and fine gravels. Siltation was considered moderate. The riparian zone is composed of mature conifers (Lodgepole Pine *Pinus contorta*) and dense Bracken and Bramble scrub (WS1). Adjoining land uses are improved agriculture (GA1) and coniferous afforestation (WD4) upstream. Macrophyte growth was not present although the liverwort species Jagged Germanderwort (*Riccardia chamedryfolia*) is locally abundant on instream boulders and cobble.

No fish were recorded via electro-fishing. The stream was not considered of fisheries value due to its very small size and location in the very upper reaches of a catchment with limited accessibility for fish. The site is unsuitable for White-Clawed Crayfish and offered no Otter value given the lack of prey resource. A biological water quality rating of Q3-4, corresponding to WFD 'Moderate' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.4 Site A4 - Slievedotia 19 Stream, Daly's Cross

The Slievedotia 19 Stream (EPA code: 19S09) at site A4 is a small drainage channel (FW4) which averaged less than 1 and 0.1m deep. The stream had been historically straightened and deepened in the vicinity of the road crossing (culverted underneath Daly's Cross) and is contained in a deep U-shaped channel. The channel substrata comprised a 100% deep silt base with an imperceptible flow at the time of survey. The channel was bordered to the east by an earthen embankment (2.5m high) and grassy meadow habitat with improved grassland (GA1) to the west. The stream was heavily scrubbed-over with Bramble, Gorse and Bracken scrub (WS1) encroaching into the channel- riparian shading was approaching 100%. Consequently, there were no macrophytes recorded instream. A small block of willow-dominated scrub was present in vicinity of the road crossing with a small linear block of coniferous afforestation (WD4) present along the channel downstream of the survey site.

No fish were recorded present at the site via electro-fishing and it is not considered of fisheries value due to its small size and heavily modified nature and likely seasonality. However, the site may be utilised by migratory European Eel during periods of higher flow (e.g. autumn, winter). The site is unsuitable for White-Clawed Crayfish and offered little to no Otter value.

2.4.4.1.1.5 Site A5 – unnamed stream, Lissard

Site A5 is located on the upper reaches of unnamed stream at Lissard in the vicinity of a local road crossing. The stream was 100% dry at the time of survey and the 100% dry mud channel bed indicated it had been dry for some time prior to the survey. The channel is 1.0m wide with bank heights of 1.5-2m. The channel was culverted under the local road (small pipe culvert) and was bordered by a treeline (WL2) of Grey Willow, Hawthorn, Blackthorn (*Prunus spinosa*), Elder (*Sambucus nigra*) and Gorse on the east bank. The west bank features dense scrub (WS1) with Bramble, Nettle, Great Willowherb (*Epilobium hirsutum*), Wild Angelica (*Angelica sylvestris*) and rank grasses. This adjoins a trackway that was colonised by a dry grassy meadow habitat (GS2). The wider landscape comprises heavily improved grassland (GA1).

The channel is evidently of no fisheries value. However, given downstream connectivity to the Monparson River, the stream may be used by migratory European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value is considered low given likely seasonality.

2.4.4.1.1.6 Site A6 – Monparson River, Lissard

The Monparson River (EPA code: 18M58) at site A6 is a small lowland depositing watercourse (FW2), averaging 5-6m wide and 0.2-0.3m deep. Located in the vicinity of a local road crossing, the tributary of the River Clyda had been historically straightened but good recovery was present throughout. The bankfull heights were 1.0m with no historical deepening evident. The river profile was dominated by glide (60%), 30% riffle and 10% pool. The bed was dominated by cobble (60%), boulder 10% with fine and medium gravel making up 20% by surface area of the bed. Coarse gravel, sand and silt made up the remaining 10%. The substrata at time of survey was partially bedded with moderate siltation evident. The riparian areas comprised mature alder and Grey Willow woodland supporting an understory dominated by Nettle, Bracken, Meadowsweet (*Filipendula ulmaria*),

Opposite-Leaved Golden Saxifrage and Bramble. Dry grassy fields (GS2) bordered the river to the south Shading was moderate, locally (higher upstream of the bridge). The macrophyte community comprised abundant Hemlock Water Dropwort in the margins and riparian areas with localised Yellow Iris (*Iris psuedacorus*). Stream Water Crowfoot (*Ranunculus penicillatus* var. *penicillatus*) was rare and was only present in more open riffle areas. The aquatic bryophytes included frequent *Chiloscyphus polyanthos* on cobble with occasional *Fontinalis antipyretica*. The macrophyte and bryophyte community composition shared links with the Annex I Habitat, Watercourses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation (3260) given the presence of two aquatic bryophyte indicators and crowfoot vegetation. Green filamentous algae was present but very localised (1% cover).

Overall, the site offers excellent salmonid habitat, with good spawning and excellent nursery habitat present. The quality of the spawning substrata is reduced somewhat due to siltation and compaction. High densities of both Atlantic Salmon (*Salmo* salar) and Brown Trout were recorded via electro-fishing, in addition to moderate abundances of *Lampetra* sp. ammocoetes. Good quality lamprey spawning and larval habitat is present locally. European Eel habitat is considered moderate to good despite none being recorded via electro-fishing. No White-Clawed Crayfish were recorded and the site is considered unsuitable given the species' known absence from the wider catchment (i.e. sandstone dominated). No signs of Otter were recorded but the presence of healthy salmonid population and seclusion from human activity provides high suitability. A biological water quality rating of Q3, corresponding to WFD 'Poor' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.7 Site B1 – Toor River, Mullenaboree

Site B1 is located on the upper reaches of the Toor River (EPA code: 18T51) at a local road crossing. Here, the channel flows through a deep U-shaped channel, averaging 1-1.5m wide with very shallow water <0.1m deep. The bank heights are variable but typically 1.2m (loally higher downstream of the bridge). The river has been extensively deepened and straightened historically and retains very little natural character. Shallow glide and riffle characterises the site with only very localised shallow pools present downstream of the bridge. The substrata is dominated by small cobble with occasional boulder and frequent pockets of medium to coarse gravels. These are moderately silted. The riparian areas comprises dense Bramble, Gorse, Wild Angelica and Willow scrub with rank grasses. Adjoining the riparian areas, young conifer plantations with 'additional broadleaved' (ADB) Birch (*Betula pendula*) buffers present. The catchment land use practices are primarily coniferous plantations (WD4) and improved grassland (GA1). The channel features heavy macrophyte cover in open areas (up to 90% cover) with Watercress (*Nasturtium officinale*), Water-Forget-Me-Not (*Myosotis scorpioides*), Water Mint (*Mentha aquatica*), and localised Common Water Starwort (*Callitriche stagnalis*). No aquatic bryophytes were recorded.

No fish were recorded during electro-fishing but only 50m^2 was effectively fished due to the overgrown nature of the channel. The site is considered to have poor fisheries value given the shallow, overgrown nature of the river at his site. Given improved fisheries habitat downstream, the site may be utilised by Brown Trout and European Eel during periods of higher flow (e.g. autumn, winter), although its overall fisheries value is considered low at this location. No White-Clawed Crayfish were recorded and the site is considered unsuitable given the species' known absence from the wider catchment. No signs of Otter were recorded and suitability is considered low.

2.4.4.1.1.8 Site B2 – Coom Stream, Bottlehill landfill

Site B2 on the upper reaches of the Coom Stream (EPA code: 18C03) is located at a local road crossing near the entrance to the Bottlehill Landfill site. The semi-natural upland eroding watercourse (FW1) averaged 0.5-1m

wide with low bank heights grading into the surrounding conifer plantations (WD4). The stream is predominantly shallow (0.1m deep) with localised pools to 0.4m. The channel is dominated by riffle and glide habitat with 40% by surface area of each and 20% pool. The stream bed comprises small boulder, coarse, medium and fine gravels which were angular and unbedded. The riparian zone supports mosaics of wet heath (HH3), scrub (WS1) and wet grassland (GS4) in small, narrow strips between adjoining mixed aged conifer plantations. The stream has good sinuosity meandering through a narrow stream valley and had low levels of siltation. Macrophyte growth was absent and the aquatic bryophyte community was poorly represented.

No fish were recorded during electro-fishing but only 70m^2 was effectively fished due to the overgrown nature of the channel. The site is considered to have poor fisheries value given the shallow, upland nature of the stream at this site. Given improved fisheries habitat downstream, the site may be utilised by European Eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered low at this location. No White-Clawed Crayfish were recorded and the site is considered unsuitable given the species' known absence from the wider catchment. No signs of Otter were recorded, and suitability was considered low.

2.4.4.1.1.9 Site B3 – Coom River, Coom

Site B3 is located on the lower reaches of the Coom River (EPA code: 18C03) at a local road crossing, approx. downstream from site B2. The small, lowland depositing river (FW2) averages 4m wide and 0.1-0.4m deep. The bankfull heights are c.1.0m with no significant deepening. Although the channel has been historically straightened, good recovery was evident (i.e. still retaining good semi-natural habitat). The river profile is characterised by riffle (60%) with 30% glide and 10% pool. The bed comprises abundant boulder and cobble (40%) but was dominated by coarse, medium and fine gravels that formed large patches between coarser substrata. The substrata sufferes from partial bedding and moderate siltation. The riparian areas bordering the river is rank grassy areas forming a buffer to adjoining heavily improved pasture (GA1). Scattered Ash (*Fraxinus excelsior*), Beech (*Fagus sylvatica*) and conifers are also present in adjoining riparian areas. No macrophytes were recorded present. The aquatic bryophytes are limited to localised *Fontanalis Squamosa* an oligotrophic indicator species.

The site offeres excellent salmonid habitat, with excellent quality nursery and good quality spawning and holding habitat present. The quality of the spawning substrata is reduced somewhat due to siltation and partial compaction. High densities of both Atlantic Salmon and Brown Trout were recorded via electro-fishing. The site is considered of too high energy for Lamprey and provides a low value European Eel nursery (none recorded). No White-Clawed Crayfish were recorded, and the site is considered unsuitable given the species' known absence from the wider catchment. No signs of Otter were recorded but the presence of healthy salmonid population provides high suitability. A biological water quality rating of Q3-4, corresponding to WFD 'Moderate' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.10 Site B4 – Toor River, Raheen

Site B4 is located on the middle reaches of the Toor River (EPA code: 18T51) at a local road crossing. The small lowland depositing watercourse is 3m wide and 0.3-0.6m wide on average. The river had been historically straightened but good recovery is evident (i.e. still retaining good semi-natural habitat). The bankfull heights are 1.0m with no significant deepening. The river profile is dominated by glide (60%), 10% riffle and 30% pool. The bed is dominated by cobble (40%), boulder 30% with coarse and medium gravels making up the remaining 30% by surface area of the bed. The riparian areas comprised of low scrubby areas of Gorse, Bracken, Wild Angelica and Bramble with scattered Blackthorn and Ash. The bordering land uses is heavily improved pasture (GA1) upstream of the bridge and maturing conifer plantation (WD4) downstream. The macrophyte community

comprises abundant Hemlock Water Dropwort (*Oenanthe crocata*) in the margins with localised Branched Bur-Reed (*Sparganium erectum*). Water crowfoot (*Ranunculus* sp.) is locally frequent near shallow glide and riffle areas with Common Water Starwort recorded as rare. The aquatic bryophytes includes frequent *Chiloscyphus polyanthos* on boulder with localised *Fontanalis squamosa*. The macrophyte and bryophyte community composition shares links with the Annex I Habitat, Watercourses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation (3260) given the presence of two aquatic bryophyte indicators and water crowfoot vegetation.

The site is considered a good salmonid nursery with a relatively high number of Brown Trout present in addition to a small number of Atlantic Salmon parr. The site's spawning potential for salmonids is impacted by siltation with partial bedding of the substrata and light to moderate siltation pressures. The site is of too high energy for Lamprey and is considered of low value as an Eel nursery and foraging habitat. No White-Clawed Crayfish were recorded, and the site iss considered unsuitable given the species' known absence from the wider catchment. No signs of Otter were recorded but the presence of healthy salmonid population provides high suitability. A biological water quality rating of Q3, corresponding to WFD 'Poor' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.11 Site B5 – Lyravarrig Stream, Commons

Site B5 is located on the Lyravarrig Stream (EPA code: 18L82) at a local road crossing. The stream is a heavily modified lowland depositing watercourse (FW2) habitat, contained in a 1m to 1.5m wide channel that averages 0.1m deep. The stream profile comprised 70% shallow glide, 20% riffle and 10% shallow pool (max. depth 0.25m). The bank heights are variable but typically 2-3m high. The stream flows through a deep U-shaped channel that had been historically straightened and deepened. The stream suffers from very heavy siltation with the majority of the substrata covered in silt. No macrophytes are present due to heavy shading and siltation. The stream is bordered by a mature riparian zone dominated by Ash and Sycamore (*Acer psuedoplatanus*) with a Bramble understory. The land use is predominantly heavily improved grassland (GA1) bordering the stream with the upstream catchment comprising mature conifer plantations (WD4).

The stream is considered a lower value nursery and spawning area for Brown Trout (moderate quality habitat), with low numbers recorded via electro-fishing. It is also a lower value nursery for European Eel. The stream appears to be of moderate value for Lamprey (given abundant silt accumulations), but none were recorded during the survey. No White-Clawed Crayfish were recorded and the site is considered unsuitable given high siltation, small nature and the species' known absence from the wider catchment. The site is not considered of value for Otter.

2.4.4.1.1.12 Site B6 – Seefin Stream, Commons

Site B6 on Seefin Stream (EPA code: 18S52) is located in the vicinity of a local road crossing (pipe culvert). Here, the stream is a heavily modified, historically straightened and over-deepened watercourse contained in a 1-1.5m wide channel that averages 0.05m deep. The site was semi-dry at the time of survey, with low flows and localised near-stagnant pools. The stream profile comprises of 90% slow glide and 10% riffle with very low flow in a very deep, U-shaped channel. The bank heights are variable but typically 3-4m. The substrata comprises 20% boulder, 40% cobble and 30% sand and silt. There is also a small proportion of medium and fine gravels (10% overall). The stream suffers from moderate to heavy siltation with the majority of the wetted substrata covered in silt. The land use is predominantly of heavily improved grassland (GA1) bordering the stream with the upstream catchment comprising mature conifer plantations (WD4). The stream is bordered by a mature treeline of Beech, Ash, Hawthorn and Grey Willow. No macrophytes are present due to heavy shading and siltation.

The stream has very poor inherent fisheries value given the small size and low flows apart from a single Eel captured during targeted electro-fishing. The site is not of value for salmonids, Lamprey, White-Clawed Crayfish or Otter.

2.4.4.1.1.13 Site B7 – River Bride, Commons

Site B7, located on the upper River Bride (EPA code: 18B05), is transitional between an upland eroding watercourse (FW1) and a lowland depositing watercourse (FW2). The spate channel is 2.5m wide and 0.2m deep with substrata dominated by small boulder and cobble (40% by area of both). The remaining proportions are of coarse gravel that was situated between boulder and cobble areas. The river profile comprises 40% glide and 40% riffle with 20% pool, invariably located on meanders. The bank heights are between 0.5-1.2m. The river has some localised straightening but retains some meanders and has overall a good semi-natural profile with a well-defined thalweg. The stream suffers from moderate siltation with silt plumes underfoot. Livestock poaching is frequent throughout the site (no riparian fencing). The river is bordered by mature treelines of Norway Spruce (*Picea abies*), scattered Grey Willow and Rowan (*Sorbus aucuparia*) with frequent Bilberry (*Vaccinium myrtillus*), Gorse, Marsh Thistle (*Cirsium palustre*), Butterbur (*Petasites hybridus*), Meadowsweet, Soft Rush, Foxglove, Marsh Ragwort, Fuchsia (*Fuchsia magellanica*), Bramble and Nettle. The adjoining land use is predominantly of heavily improved grassland (GA1) and large tracts of Gorse and Bramble-dominated scrub (WS1). Instream macrophytes are limited to Common Water Starwort (rare) and marginal Reed Canary Grass (*Phalaris arundinacea*). Instream, the bryophyte community is represented by occasional *Chiloscyphus polyanthos* and *Hygroamblystegium fluviatile*. The river suffers from heavy enrichment with filamentous algae visible on the bed covering 40% by surface area.

The river is evidently a very good salmonid nursery, with moderate numbers of juvenile and small adult Brown Trout only recorded via electro-fishing. However, the overall value of the site is diminished due to siltation and enrichment. Spawning habitat is good locally with some good holding habitat present locally, especially in association with meanders. European Eel habitat was moderate given the paucity of deeper pool areas and instream refugia. Although some localised Lamprey spawning habitat is present (interstitial spaces), larval Lamprey habitat is not present (i.e. no fine sediment accumulations). There is no White-Clawed Crayfish potential given the known absence of the species from the wider catchment. There were no Otter signs recorded in the vicinity of the survey site although there is good potential. A biological water quality rating of Q3, corresponding to WFD 'Poor' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.14 Site B8 – Lyravarrig Stream, Mullenaboree

Site B8 on the Lyravarrig Stream (EPA code: 18L66; not the same watercourse as site B5 despite identical nomenclature) is located at a local track crossing approx. 1.4km upstream of the River Bride confluence. Here, the stream is a semi-natural lowland depositing watercourse (FW2) that is 2.0m wide and 0.1-0.2m deep. The bank heights are between 0.5m and 1.2m high. The substrata is dominated by small boulder and cobble (35% by area of both) with coarse medium and fine gravels making up 25% of the remaining composition along with a small proportion of silt (5%). The profile comprises 45% glide and 45% riffle with 10% pool. The stream exhibits historical straightening and deepening but retains some meanders and has a moderate to good semi-natural profile, overall. The stream, however, suffers from moderate to heavy siltation with heavy bedding of the substrata and evident filling of interstitial gravels between boulder and cobble. The river is bordered by mature treelines of Grey Willow and Hawthorn, with frequent Bramble scrub, particularly downstream of the bridge. Cattle poaching of the banks upstream and downstream of the bridge is evident and runoff from the adjoining

land is contributing to heavy siltation. The land uses beyond the immediate riparian areas are improved grassland (GA1, very wet in nature) and mature Sitka Spruce plantations (WD4).

The river is evidently a good Brown Trout nursery, with relatively high numbers of juveniles recorded via electro-fishing. Adult numbers were low. Spawning habitat is impacted by siltation pressures and holding habitat is largely lacking in the shallow stream. European Eel were present in low numbers and the habitat is considered moderate overall. No Lamprey were recorded and the site was considered sub-optimal (no larval habitat). There is no White-Clawed Crayfish potential given the known absence of the species from the wider catchment. There were no Otter signs recorded in the vicinity of the survey site although there is some low potential for the species. A biological water quality rating of Q3, corresponding to WFD 'Poor' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.15 Site B9 – Field Chimney Stream, Chimneyfield

Site B9 on the Field Chimney Stream (EPA code: 18F43) is located approx. 1.2km upstream from site B10. The site is a semi-natural upland eroding channel (FW1) that is 1.5m wide and between 0.1m to 0.2m deep. The bank heights are between 0.5m and 1.5m high but there is no evidence of channel modification works at the survey location; the stream exhibited good sinuosity. The stream profile comprises 30% glide and 60% riffle with 10% pool. The substrata comprises abundant small boulder and cobble (both making up 50% by surface area) with coarse medium and fine gravels making up the remaining 45%, along with a small proportion of silt and sand (5%). However, moderate siltation (plumes underfoot) is evident with partial bedding of the substrata. The river is bordered by a broadleaved buffer zone of Beech, Rowan, Ash and Grey Willow for approximately 15m. The riparian buffer area adjoins large tracts of mature conifer plantation (WD4).

The site is evidently a good salmonid nursery, with moderate numbers of Brown Trout and low numbers Atlantic Salmon recorded via electro-fishing (all juveniles). Salmonid spawning (impacted by siltation) and holding habitat are both considered of moderate value. The site is of too high energy to support Lamprey and none were recorded. Despite some moderate suitability as a nursery/foraging area, no European Eel were recorded. There was no White-Clawed Crayfish potential given the known absence of the species from the wider catchment. There were no Otter signs in the vicinity of the survey site although there was good potential.

2.4.4.1.1.16 Site B10 - Inchinanagh River, Inchinanagh

Site B10 on the Inchinanagh River (EPA code: 18I16) (also known locally as the Chimneyfield River) is a semi-natural lowland depositing river (FW2) that averaged 2.0m wide and 0.1-0.2m deep. The bank heights are between 1.2m high and the site had a well-defined thalweg. The substrata has good proportions of small boulder and cobble making up 60% of the bed area with coarse, medium and fine gravels making up the remaining 50%. The bed however suffers from moderate siltation with evident partial bedding of the substrata and silt plumes underfoot. The profile comprises of 40% glide and 50% riffle with 10% pool. The river is bordered by rank grassy areas with scrub comprising Bramble, Great Willowherb, Rosebay Willowherb, Gorse, Bracken and Bramble. The land uses beyond the immediate riparian areas are of improved grassland (GA1) with mature Sitka Spruce plantations (WD4), c.0.5km upstream. Instream macrophytes are absent with occasional *Chiloscyphus polyanthos* and *Hygroamblystegium fluviatile* on instream boulder.

The river is evidently a good salmonid nursery with a particularly high abundance of juvenile Brown Trout recorded via electro-fishing, in addition to low numbers of small adults. Brown Trout density recorded was the highest recorded across all survey sites (0.385 fish per m2). A low number of Atlantic Salmon parr (two size classes) and adult European Eel were also present. The site is of too high energy for larval Lamprey. The site is

considered a good Eel nursery/foraging area with ample boulder habitat present throughout. There is no White-Clawed Crayfish potential given the known absence of the species from the wider catchment. A single old Otter spraint (containing salmonid bones) was present on an instream boulder (ITM 568573, 590853). A biological water quality rating of Q3-4, corresponding to WFD 'Moderate' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.17 Site B11 – River Bride, Bride Bridge

Site B11 is located on the River Bride (EPA code: 18B05) at Bride Bridge. The river represents an upland eroding watercourse (FW1) with cascading reaches of channel with a largely natural profile. The river averages 6-7m in width and 0.2-06m deep, with localised deeper pools to >1.2m. The bank height varied from 1.5-3m. The substrata is largely free of sediment and dominated by cobble (40%) and boulder (20%) with plentiful well-sorted medium-coarse gravels. Exposed bedrock is also present (10%) at this high energy site. Riffle, glide and pool are present in roughly equal proportions. The river is bordered by dense Willow/Bracken and Bramble-dominated scrub (WS1) and treelines. Moving away from the riparian zone, the site is adjoined by mature coniferous afforestation (WD4) and improved agricultural grassland (GA1). Given the high shading and high flow rates, instream macrophytes are absent. The bryophyte community is well developed with *Chiloscyphus polyanthos* and *Hygroamblystegium fluviatile* frequent on instream boulders.

The upland, cascading site offers excellent holding habitat for adult salmonids, in addition to being an evidently good nursery. Brown Trout and Atlantic Salmon were present in moderate numbers. The same species assemblage was also recorded during a 2017 survey of this site, although abundances of Atlantic Salmon were notably higher in 2020. Spawning habitat is of good quality (frequent well-sorted coarse-medium gravels) although typically more suited to Atlantic Salmon. The site is not suitable for Lamprey given the higher energy nature of the site. While no European Eel was recorded during the survey, the site offers some good suitability for the species, especially in deeper pool areas. There is no White-Clawed Crayfish potential given the known absence of the species from the wider catchment and high energy nature. There were no Otter signs in the vicinity of the survey site although there is good potential throughout.

2.4.4.1.1.18 Site B12 – unnamed stream, Knockdoorty

Site B12 is located on an unnamed historical branch of the Bunnaglanna River at a forestry track crossing. The small upland eroding watercourse (FW1) averages 1-1.5m wide and 0.1m deep and flowed in a V-shaped channel that grades into a natural river valley with bank heights at the gradient of the stream grading into the valley. The river profile is dominated by riffle (80%) with 15% glide and 5% pool. The bed is dominated by boulder and cobble that make up 70% by surface area of the streambed. The remaining proportions are comprised of coarse, medium and fine gravels with sand. The substrata is heavily bedded with moderate siltation evident. The riparian areas are Hazel (*Corylus avellana*) woodland with scattered Rowan (WN2). The understory comprises of Bramble, Wood Sorrel (*Oxalis acetosella*) and a well-developed moss layer. Away from the riparian buffer areas, mature conifer plantations (WD4) is present. No macrophytes are present due to heavy shading of the channel. The aquatic bryophytes are limited to frequent *Chiloscyphus polyanthos* on submerged boulders and in splash zones.

No fish were recorded during electro-fishing at site B12. The shallow, upland nature of the small channel with heavily bedded substrata (moderate siltation) reduces its viability for salmonids albeit populations would be present further downstream in higher order reaches. Lamprey habitat is absent. The stream may be utilised seasonally by migratory European Eel during periods of higher flow (e.g. autumn, winter) although the site's overall fisheries value is considered low. The site is not suitable for White-Clawed Crayfish and no Otter signs were recorded (suitability low).

2.4.4.1.1.19 Site B13 – unnamed stream, Powers Bridge

Site B13 is located on an unnamed historical branch of the Bunnaglanna River at Powers Bridge, approx. 1km downstream of site B12. The stream represents an upland eroding watercourse (FW1) which averages 2-3m wide and 0.1m deep which features a V-shaped channel of variable gradient. The banks grade into a natural river valley with bank heights at the gradient of the stream. The river profile is dominated by riffle (60%) with 30% glide and 10% pool. The bed is dominated by boulder and cobble that make up 60% by surface area of the riverbed, with the remaining proportions comprised of coarse, medium and fine gravels with sand. The substrata is heavily bedded with moderate siltation evident. The riparian areas comprise of dense Willow, Bracken and Bramble scrub (WD1) with mature conifer plantations (WD4) upstream. No macrophytes are present due to heavy shading. The aquatic bryophytes are limited to frequent *Chiloscyphus polyanthos* on submerged boulders and in splash zones.

The shallow nature of the small river channel with heavily bedded substrata reduces its viability for salmonids (none recorded) albeit populations are present downstream as the channel deepens. However, a small Eel population is present. The site is not suitable for White-Clawed Crayfish and no Otter signs were recorded (suitability low). A biological water quality rating of Q3-4, corresponding to WFD 'Moderate' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.20 Site B14 – Bunnaglanna River, Moneygorm

Site B14 is located on the upper reaches of the Bunnaglanna River (EPA code: 18B07) at a local road crossing. The small upland eroding watercourse (FW1) averages 2m wide and 0.15m deep in a shallow V-shaped channel grading into a natural river valley. The river profile is dominated by riffle (50%) with 30% glide and 10% pool. The bed is dominated by boulder and sand 40% by surface area of each with coarse, medium and fine gravels making up the remaining 20%. The substrata is heavily bedded with heavy siltation evident. The riparian areas comprise of dense Willow, Bracken and Bramble scrub (WS1) with mature conifer plantations (WD4) upstream. No macrophytes are present due to heavy riparian shading. The aquatic bryophytes are limited to locally frequent Water Earwort (*Scapania undulata*) on the topsides of instream boulders and more locally *Chiloscyphus polyanthos* on submerged boulders.

No fish were recorded during electro-fishing at site B14. The shallow, upland nature of the small channel with heavily bedded substrata and heavy siltation reduces its viability for salmonids albeit populations are present further downstream in higher order reaches. Lamprey habitat is absent. The stream may be utilised seasonally by migratory European Eel during periods of higher flow (e.g. autumn, winter) although the site's overall fisheries value is considered low. The site is not suitable for White-Clawed Crayfish and no Otter signs were recorded (suitability low).

2.4.4.1.1.21 Site B15 – River Bride, Old Bridge

Site B11 is located on the River Bride (EPA code: 18B05) at Old Bridge, approx. 3.3km downstream from site B11. The river represents a large upland eroding watercourse (FW1) that is approximately 8m wide with depths of 0.4- 0.6m deep. The bank heights are low and were 0.5-1m high. The substrata is dominated by boulder and cobble (60%) with coarse medium and fine gravels making up the remaining 40% of the riverbed in small pockets between areas of larger substrata. The substrata is largely unbedded and clean with light siltation only. The stream profile comprises of 70% deeper glide, 20% riffle and 10% pool. The channel exhibits a high degree of naturalness with no evident significant bank modification works. The river is more open near the bridge with areas of amenity grassland (GA2) near picnic areas. However, further upstream the channel becomes more

canopied with a mature riparian zone of Alder, Ash and Willow (WD1/WL2). The land uses beyond the immediate riparian areas comprise of mixed broadleaved woodland (WD1) and conifer woodland (WD4). Macrophytes are absent apart from a very localised stand of Water Crowfoot.

The site is evidently an excellent salmonid nursery and also exhibits good spawning habitat locally, as reflected by the stock demographic captured during the survey (moderate numbers of Atlantic Salmon and Brown Trout). With the exception of European Eel, the same species assemblage was also recorded during a 2017 survey of this site, although abundances of juvenile Atlantic Salmon and Brown Trout were notably higher in 2020. However, the River Bride is of too high energy at site B15 to support Lamprey species. Some suitability exists as an Eel nursery in the boulder and cobble areas although none were recorded during the survey. No White-Clawed Crayfish were recorded; unsurprising given the known absence of the species from the wider catchment. There were no Otter signs in the vicinity of the survey site although there is good potential throughout. A biological water quality rating of Q4, corresponding to WFD 'Good' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.22 Site C1 – Slumberhill Stream, Knockacullata

Site C1 is located on the Slumberhill Stream (EPA code: 18S40) in the Ross River (Killavullen) sub-catchment at a local road crossing (pipe culvert) and flowed north away from the proposed development boundary. The channel represents an upland eroding stream habitat (FW1) contained in a 1-1.5m wide channel that is, on average, 0.05m deep. The bank heights are variable but typically 1-1.5m high. The stream has been historically straightened and deepened (a two-stage channel had naturally formed in places). The stream sits in a shallow U-shaped channel with some local bank erosion indicating a spate nature. The profile is dominated by shallow glide and riffle with very little pool (0.1m max where present). The substrata comprises of coarse gravel and small cobble (70% overall) with localised finer gravels. Siltation is light overall. Flow was slight at the time of survey. The stream is heavily shaded by low-lying riparian vegetation which includes Soft Rush, Great Willowherb, rank grasses, Hogweed, Marsh Ragwort, St. John's Wort (*Hypericum* sp.), Selfheal (*Prunella vulgaris*), Wild Angelica, Creeping Thistle (*Cirsium arvense*), Broad-Leaved Dock (*Rumex obtusifolius*), Nettle and Bramble. A treeline of Grey Willow scrub with abundant Rosebay Willowherb is present along the roadside. Species-poor wet grassland (GS4) borders the stream on the south bank with improved agricultural grassland (GA1) to the north. Macrophytes are limited to occasional Watercress and some localised Brooklime (*Veronica beccabunga*).

The site has poor fisheries value given the very shallow and likely seasonal nature of the stream at this location. No fish were recorded via electro-fishing although the site had some low suitability for European Eel. The site is not suitable for White-Clawed Crayfish or Otter.

2.4.4.1.1.23 Site C2 – Ross Stream, Knockacullata

Site C2 is located on the upper reaches of the Ross Stream (EPA code: 18R02) in the Ross River (Killavullen) sub-catchment. The site represents a small upland eroding stream habitat (FW1), contained in a 1-1.5m wide channel that averaged just 0.1-0.15m deep. The bank heights are variable but typically 1.5-2.5m high. The stream flows through a deep U-shaped channel that has been recently straightened upstream of the road crossing and historically deepened downstream. Downstream of the road culvert, the stream retains some semi-natural characteristics with riffle, glide and pool sequences in roughly equal proportions. It does however suffer from heavy livestock poaching of the northern bank and resultant heavy siltation. Much of the bedrock, boulder, cobble and coarse gravels are covered with silt. The stream is bordered by a mature riparian zone dominated by alder with localised Grey Willow and dense Bramble scrub. The land use iss predominantly of

heavily improved grassland (GA1). Riparian shading of the narrow channel is locally high. No macrophytes are present due to heavy shading but *Chiloscyphus polyanthos* is present on instream cobbles. Filamentous algae covered 20% by surface area of the bed at time of survey.

The site has poor fisheries value given the shallow and very heavily silted nature. However, a low number of Brown Trout (juveniles and small adults) were recorded in addition to European Eel. The stream is considered to be of moderate value, at best, for both species. The site is not suitable for White-Clawed Crayfish and is poor habitat for Otter.

2.4.4.1.1.24 Site D1 – Shanowen Trib 1 Stream, Ballynahina

Site D1 is located on the upper reaches of the Shanowen Trib 1 Stream (EPA code: 18S42) in the Bride (Blackwater)_030 sub-catchment at a proposed cable route crossing (i.e. local road crossing). The site represents a small, very shallow lowland depositing small stream habitat (FW2) that is very heavily modified in a shallow U-shaped channel which has been historically deepened and straightened. The stream is 0.5-1m wide and 0.05m deep, with bank heights of 1.0m. The river profile is dominated by slow moving shallow glide and riffle (approximately 50% by area of each). The substrata comprises small boulder, cobble with mixed coarse, medium and fine gravels. The channel bed suffers from moderate siltation with the majority of the harder substrata bedded. No filamentous algae was visible on the stream bed. The small stream channel is bordered by a Hawthorn hedgerow (WL1) with Bramble, Foxglove, Willowherb and rank grasses in the understory. The channel is bordered by heavily improved pasture (GA1) downstream.

No fish were recorded via electro-fishing and the site is considered too shallow to be of fisheries value (seasonality likely). In higher flow periods, the site is considered likely to offer some low suitability for European Eel as a migratory pathway. The site is not suitable for White-Clawed Crayfish and is poor habitat for Otter. A biological water quality rating of Q3, corresponding to WFD 'Poor' status was assigned for this site (**Table 2-8**).

2.4.4.1.1.25 Site D2 – Farran North River, Farran North

Site D2 is located on the Farran North River (EPA code: 18F27) in the Bride (Blackwater)_030 sub-catchment at a proposed cable route crossing (i.e. local road crossing). The site represents a small lowland depositing habitat (FW2) that is very heavily modified in a deep U-shaped channel which had been historically deepened and straightened. The bank heights are variable but typically 1.5-2.5m. The profile is dominated by slow moving glide and pool (approximately 50% by area of each). The channel bed suffers from very heavy siltation with the majority of the harder substrata not visible apart from the overgrown upper reaches upstream of the meander bordering the road crossing. At this location the channel is dominated by bedded coarse and medium gravels with more localised cobble. Deep beds of fine soft silt to 0.4m deep make up the majority of the bed composition. Filamentous algae covered 10% by surface area of the bed along with localised sewage fungus present (5% cover). The site evidently suffers from water quality issues and a storm drain at the meander appeared to be contributing to the majority of the habitat degradation. The site is bordered by a mature Beech, Willow and Ash (WD1) with Bramble and Nettle in the understory. The channel is bordered by a road upstream and heavily improved pasture (GA1) downstream.

A total of five fish species were recorded from site D2 on the Farran North Stream. Larval Lamprey (*Lampetra* sp.) were the most abundant, followed by Brown Trout, European Eel, Three-Spined Stickleback and a low number Atlantic Salmon parr. The density of Lamprey ammocoetes was the highest recorded across all survey sites (16.25 larvae per m^2 of targeted $1m^2$ quadrat). A 2017 electro-fishing survey of this site reported only Brown Trout and *Lampetra* sp. ammocoetes.

The site is considered a lower value salmonid nursery area (due to siltation), with better spawning habitat noted upstream of the survey area. However, the site is considered an excellent nursery area for Lamprey (likely Brook Lamprey) and a good Eel habitat also, despite evident water quality issues. No White-Clawed Crayfish or Otter signs were recorded. A biological water quality rating of Q3, corresponding to WFD 'Poor' status was assigned for this site (**Table 2-8**).

2.4.4.1.2 White-Clawed Crayfish

No White-Clawed Crayfish were recorded from the n=25 riverine survey sites. Furthermore, no crayfish remains were identified in mustelid spraint, where encountered, in the vicinity of the survey sites. There were no historical or contemporary records for the species within the survey area, although crayfish are known from the wider River Blackwater SAC (002170) site (i.e. Blackwater main channel).

2.4.4.1.3 Freshwater Pearl Mussel

No Freshwater Pearl Mussel (*Margaritifera margaritifera*) were recorded from wider catchment of the proposed development, including sites on the River Bride, Martin and Clyda (**Appendix G**). This was despite some physical habitat suitability (e.g. River Bride). There were no Freshwater Pearl Mussel records farther downstream of the stretches surveyed in the Rivers Bride and Martin. Freshwater Pearl Mussel is known to occur in the Munster River Blackwater, downstream of the Clyda River confluence. The current absence of mussels from the lower reaches of the Clyda River was considered probably due to land use practices.

2.4.4.1.4 Biological water quality

Q-samples were collected and analysed from n=12 riverine sites in the footprint of the proposed CGEP development and associated cable route. A total of n=46 species across n=33 families were recorded in the kick samples.

Following the methodology of Toner et al. (2005), the Environmental Protection Agency (EPA) group invertebrates into classes whereby pollution intolerant species are denoted class A, and species with greater pollution tolerance fall into successive classes (B through E, respectively). As such, the presence or absence of these groups and their relative abundance facilitates an assessment of biological river health. Good status (Q4) unpolluted water quality is achieved according to the EPA if at least one Group A taxon is present in, at least, fair numbers (5-10% total sample composition). Group B taxa may be common or absent and *Baetis rhodani* (large dark olive Mayfly) is often dominant. Other Group C taxa are never excessive and group D/E taxa are present in small numbers or absent (Toner et al., 2005). Our results are discussed in this context in order to interpret potential changes in the macroinvertebrate community composition.

Of the 12 Q sampling sites seven (A2, A6, B4, B7, B8, D1 & D2) had Q3 poor status water quality. These sites typically had low numbers of EPA group B taxa and a dominance of EPA group C taxa. Four sites (site A3, B3, B10 & B13) had Q3-4 water quality. These sites had low numbers of EPA group A taxa and from only a single taxonomic group only (i.e. clean water Stonefly or Mayfly species).

A single site, B15 on the River Bride at Old Bridge, achieved 'good status (Q4) water quality as required under the Water Framework Directive. The presence of moderate numbers of clean-water EPA group A (Plecoptera) Stoneflies and good numbers of class B Stoneflies (Plecoptera) was indicative of cleaner water.

No invertebrate species of higher conservation value than 'least concern' were recorded in the invertebrate assemblage when compared to national red lists (Byrne et al., 2009; Feeley et al., 2020; Foster et al., 2009; Kelly-Quinn & Regan, 2012).

Table 2-8: Summary of the biological water quality (Q-rating) recorded at selected sites in the footprint of the proposed CGEP development.

Site	Q Rating	WFD Status
Site A2	Q3	Poor
Site A3	Q3-4	Mod
Site A6	Q3	Poor
Site B3	Q3-4	Mod
Site B4	Q3	Poor
Site B7	Q3	Poor
Site B8	Q3	Poor
Site B10	Q3-4	Mod
Site B13	Q3-4	Mod
Site B15	Q4	Good
Site D1	Q3	Poor
Site D2	Q3	Poor

2.4.4.1.5 *Aquatic ecological evaluation*

An evaluation of each aquatic survey site was based on the results of the aquatic surveys (**Table 2-9**). A total of eleven aquatic survey sites (A6, B3, B4, B5, B6, B7, B8, B9, B13, C2, D2) were considered of local importance (higher value) given the presence of moderate to good salmonid, Lamprey and or European Eel habitat.

A further eleven sites (A1, A2, A3, A4, A5, B1, B2, B12, B14, C1 and D1) were considered of local importance (lower value) due to their small size, low fisheries value and absence of good status Q4 water quality.

A total of three sites (B10 (Inchinanagh River) and B11 & B15 (River Bride) were considered of International importance given they form part of the Blackwater River SAC (002170).

Table 2-9: Aquatic evaluation summary of the survey sites (according to NRA, 2009 guidelines).

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
A1	Unnamed stream	n/a	Local Importance (lower value)	No fisheries value (100% dry habitat)
A2	Unnamed stream	n/a	Local Importance (lower value)	No fisheries value
A3	Tooreen North Stream	19T33	Local Importance (lower value)	No fisheries value
A4	Slievedotia 19 Stream	19S09	Local Importance (lower value)	Low fisheries value
A5	Unnamed stream	n/a	Local Importance (lower value)	No fisheries value (100% dry habitat)
A6	Monparson River	18M58	Local Importance (higher value)	Excellent quality salmonid habitat; Atlantic salmon, lamprey and European eel present
B1	Toor River	18T51	Local Importance (lower value)	Low fisheries value
B2	Coom 18 Stream	18C03	Local Importance (lower value)	No fisheries value

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
B3	Coom 18 River	18C03	Local Importance (higher value)	Excellent quality salmonid habitat
B4	Toor River	18T51	Local Importance (higher value)	Good quality salmonid habitat
B5	Lyravarrig 18 Stream	18L82	Local Importance (higher value)	Salmonids and European eel present
B6	Seefin 18 Stream	18S52	Local Importance (higher value)	European eel present
B7	River Bride	18B05	Local Importance (higher value)	Good quality salmonid habitat; European eel present
B8	Lyravarrig 18 Stream	18L66	Local Importance (higher value)	Good salmonid nursery; European eel present
B9	Field Chimney Stream	18F43	Local Importance (higher value)	Good salmonid nursery (Atlantic salmon & brown trout)
B10	Inchinanagh River	18I16	**International importance**	Within River Blackwater SAC (002170)
B11	River Bride	18B05	**International importance**	Within River Blackwater SAC (002170)
B12	Unnamed stream	n/a	Local Importance (lower value)	Low fisheries value
B13	Unnamed stream	n/a	Local Importance (higher value)	European eel present
B14	Bunnaglanna Stream	18B07	Local Importance (lower value)	Low fisheries value
B15	River Bride	18B05	**International importance**	Within River Blackwater SAC (002170)
C1	Slumberhill 18 Stream	18S40	Local Importance (lower value)	Low fisheries value
C2	Ross Stream	18R02	Local Importance (higher value)	Salmonids and European eel present
D1	Shanowen Trib 1	18S42	Local Importance (lower value)	Low fisheries value
D2	Farran North River	18F27	Local Importance (higher value)	Excellent lamprey nursery; good salmonid habitat; European eel present

3. Stage 1: Screening for Appropriate Assessment

3.1 Screening Evaluation Process

The purpose of the screening state is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone and in-combination with other plans or projects, could have significant effects on a Natura 2000 site in view of the site's conservation objectives. The Screening evaluation comprises four steps, as outlined in **Figure 3-1**:

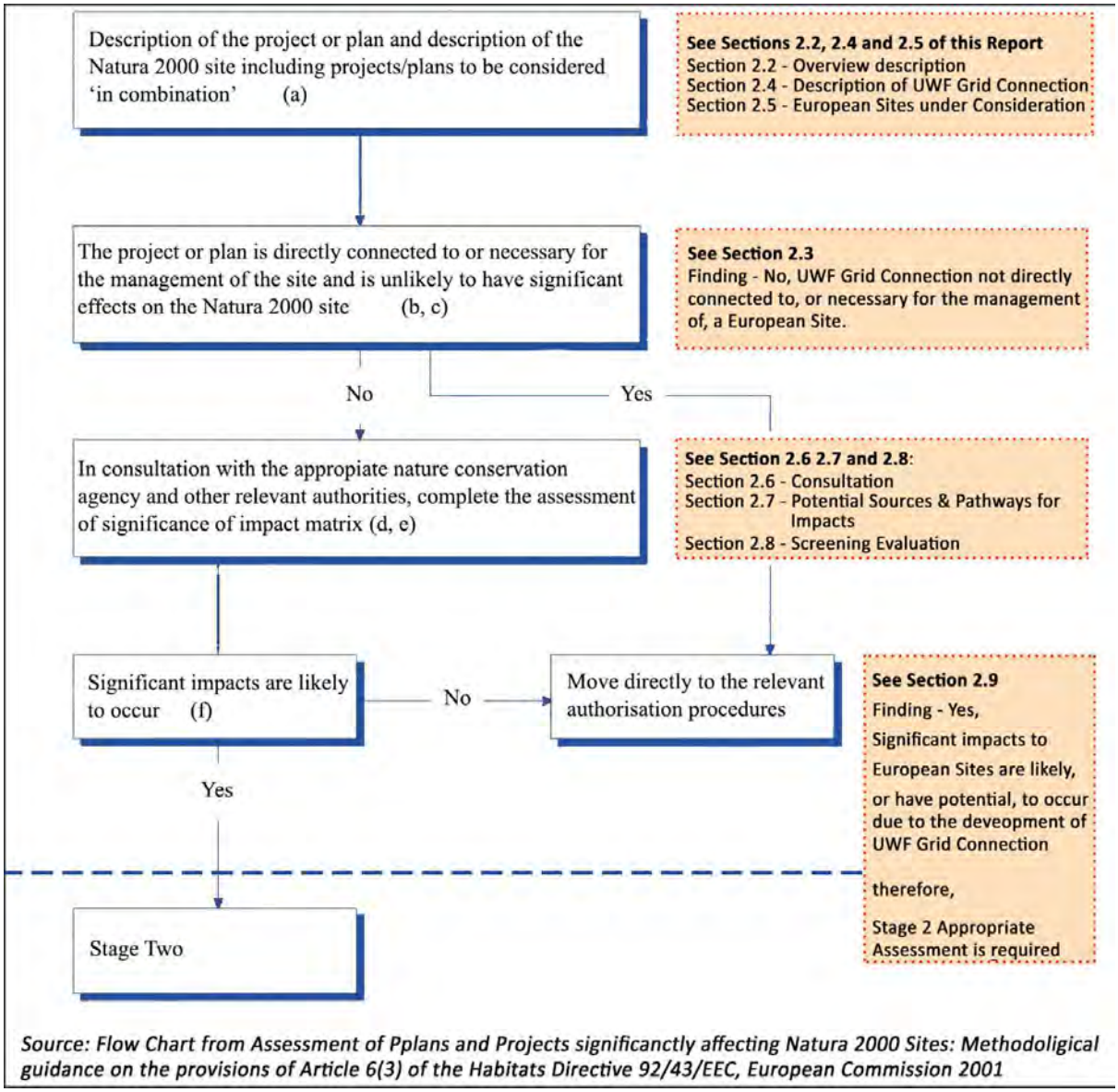

Figure 3-1: Flow Chart for the Assessment of Plans and Projects.

3.2 Screening: Overview of the Proposed CGEP Project

Coom Green Energy Park Limited (CGEPL) is applying to An Bord Pleanála for consent for the proposed Coom Green Energy Park (CGEP) in County Cork. The proposed energy park is located approximately 12km to the south east of Mallow, and approximately 13 km west of Fermoy in County Cork.

The proposed project development will primarily consist of a wind farm of up to 22 no. wind turbine generators (WTG's), up to 2 no. substation compounds and a battery energy storage system along with ancillary civil and electrical infrastructure. The associated grid connection route (GCR) will consist entirely of underground cable and will connect the on-site substations to an existing 110kV substation at Barrymore, within the townland of Farran South near Rathcormac.

The project also considers the turbine delivery route and associated minor works along access roads to allow delivery of the turbines to the site, and replant lands i.e. two land holdings at Moneygorm Co. Cork and Ballard, Co. Wicklow which will be afforested with trees as a result of the windfarm development, refer also to **Appendix C.**

3.3 Screening: Is the Development Directly Connected to or Necessary for the Management of an European site?

For a project or plan to be 'directly connected with or necessary to the management of the site', the 'management' component must refer to management measures that are for conservation purposes, and the 'directly' element refers to measures that are solely conceived for the conservation management of a site and not direct or indirect consequences of other activities.

The proposed CGEP and associated elements are not directly connected to, or necessary for, the management of any European site.

3.4 Screening: Description of the Proposed CGEP Project

The proposed project development will primarily consist of a wind farm of up to 22 no. wind turbine generators (WTG's), up to 2 no. substation compounds and a battery energy storage system along with ancillary civil and electrical infrastructure. The proposed CGEP site is detailed in **Figure 3.2**.

The total Maximum Export Capacity (MEC) of the energy park is approximately 105MW. The exact MEC will be dependent on the output power of the models available at procurement stage.

The exact rating and design of the proposed turbine and preferred battery energy storage system (BESS) unit will be subject to a competitive procurement process that will only commence if the project receives consent. The proposed turbine will be detailed by the turbine and BESS manufacturer on award of the contract.

However, the proposed CGEP turbines will have the following specifications:

- Typical three bladed, horizontal axis type turbine;
- Maximum height envelope of 169m from top of foundation to blade tip height; and
- Maximum rotor diameter of up to 138m.

Within this maximum turbine-size envelope, various configurations of hub height, rotor diameter and ground to blade tip height may be used. The exact make and model of the turbine will be dictated by a competitive tender process, but it will not exceed the maximum size envelope set out above.

Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics with only minor cosmetic differences differentiating one from another.

The associated grid connection route (GCR) will consist entirely of underground cable and will connect the on-site substations to an existing 110kV substation at Barrymore, within the townland of Farran South near Rathcormac. The GCR will be ca.24.4km in length, with ca. 16.7km to be constructed within the existing road corridor. The proposed GCR arrangement is illustrated in Error! Reference source not found.. The 110kV grid connection cable will follow public roads and shall feature horizontal directional drilling (HDD) at up to 4 no. locations to cross existing watercourses and the M8 motorway. Watercourse crossing locations are shown in **Figure 3-3**.

It is expected that large components associated with the wind farm construction will be transported to site via two separate turbine delivery routes (TDR's). One route will approach from the N20 to the west of the site (the West TDR) and shall enter the site via an existing Coillte forestry access point which will be upgraded as part of the development. The second route (the East TDR) shall come from the M8 motorway at Junction 14 and approach the site from the east along the N72 via Fermoy, Castlehyde, turning south onto local roads just to the east of Ballyhooly and entering the site at an existing Coillte forestry access which will be upgraded as part of the development.

The West TDR shall primarily serve the areas of the wind farm located at Bottlehill and Mullenaboree including a proposed onsite substation at Knockacullata. Components for 15no. WTG's, the substation and ancillary works will be carried to site via this route. In order to access the site via the existing Coillte entrance point on the L-1219-0, turbine delivery vehicles shall pass the final junction to the site entrance between the L-1217 and L-1219-0, turn at a temporary hard standing in Coillte land at Glashaboy South which is located approximately 2km south-east of the proposed site entrance and make their final approach to the site from the east and south. At the offsite turning area, wind turbine blade components shall be transferred via crane from standard extendable trailers to 'Superwing' blade lifting trailers which will allow them to negotiate the L-1217/L-1219-0 junction. The East TDR shall primarily facilitate the construction of the areas of the windfarm at Knockdoorty and Glannasack including a proposed onsite substation at Lackendarragh North. Components for 7no. WTG's, the substation and ancillary works will be carried to site via this route.

The development shall include the opening of 3no. borrow pits on site. The locations of the proposed borrow pits are shown in Error! Reference source not found.. The proposed borrow pits shall provide site-won stone that will significantly reduce the amount of construction aggregates that would need to be delivered to site. The proposed borrow pits shall also act as soil deposition areas which will avoid the need to export waste spoil to off-site facilities.

Battery energy storage system (BESS) units, to facilitate on site energy storage and to provide ancillary services to the electricity grid, will be situated next to the main onsite substation compound at Lackendarragh North. They will be housed in glass reinforced plastic (GRP) units or modified shipping containers.

The units will be mounted on shallow concrete plinths within a gravel hard standing and shall be bounded in the same fashion as the substation compounds using a galvanised steel security palisade fencing.

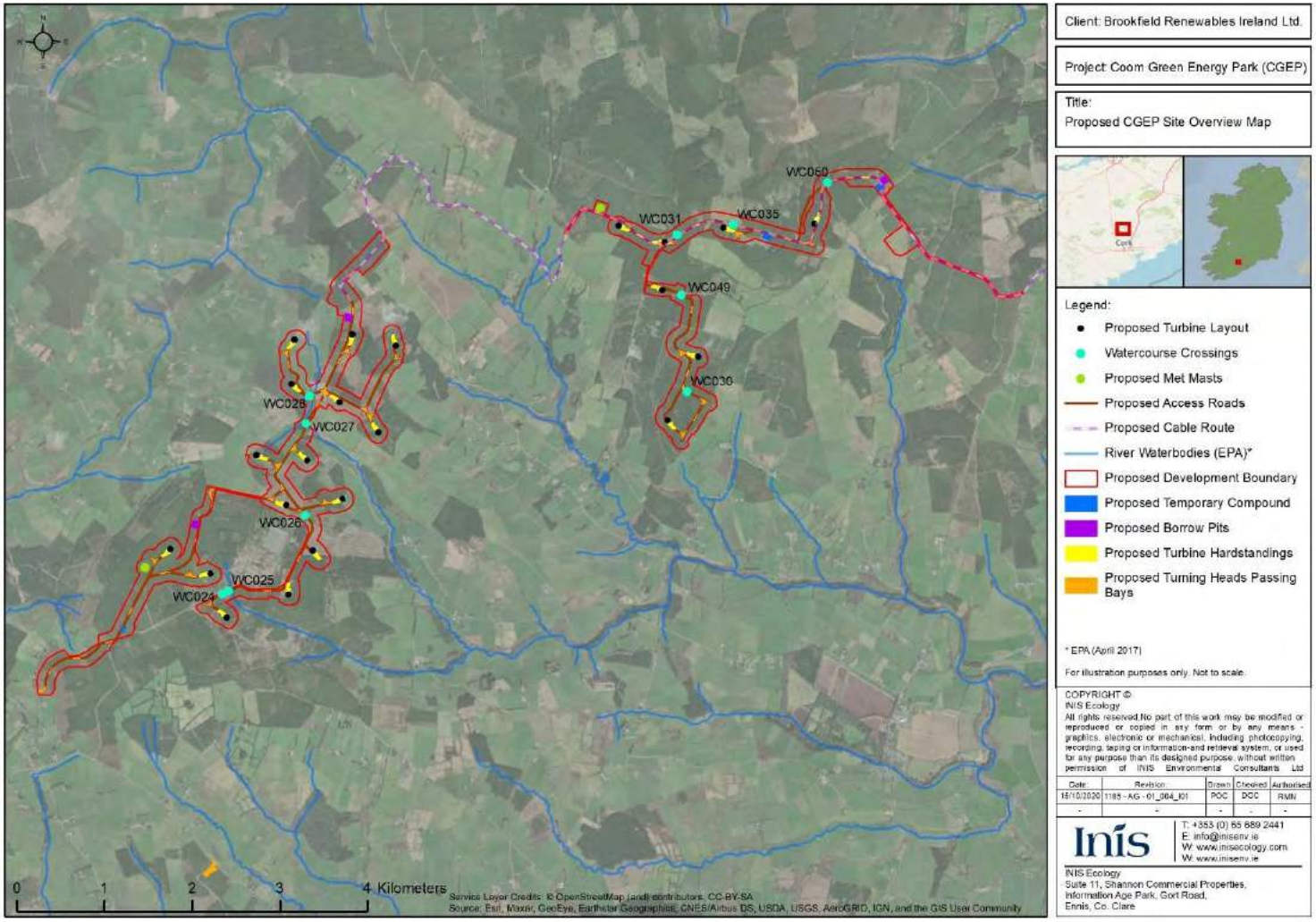

Figure 3-2: Proposed CGEP Site Overview Map

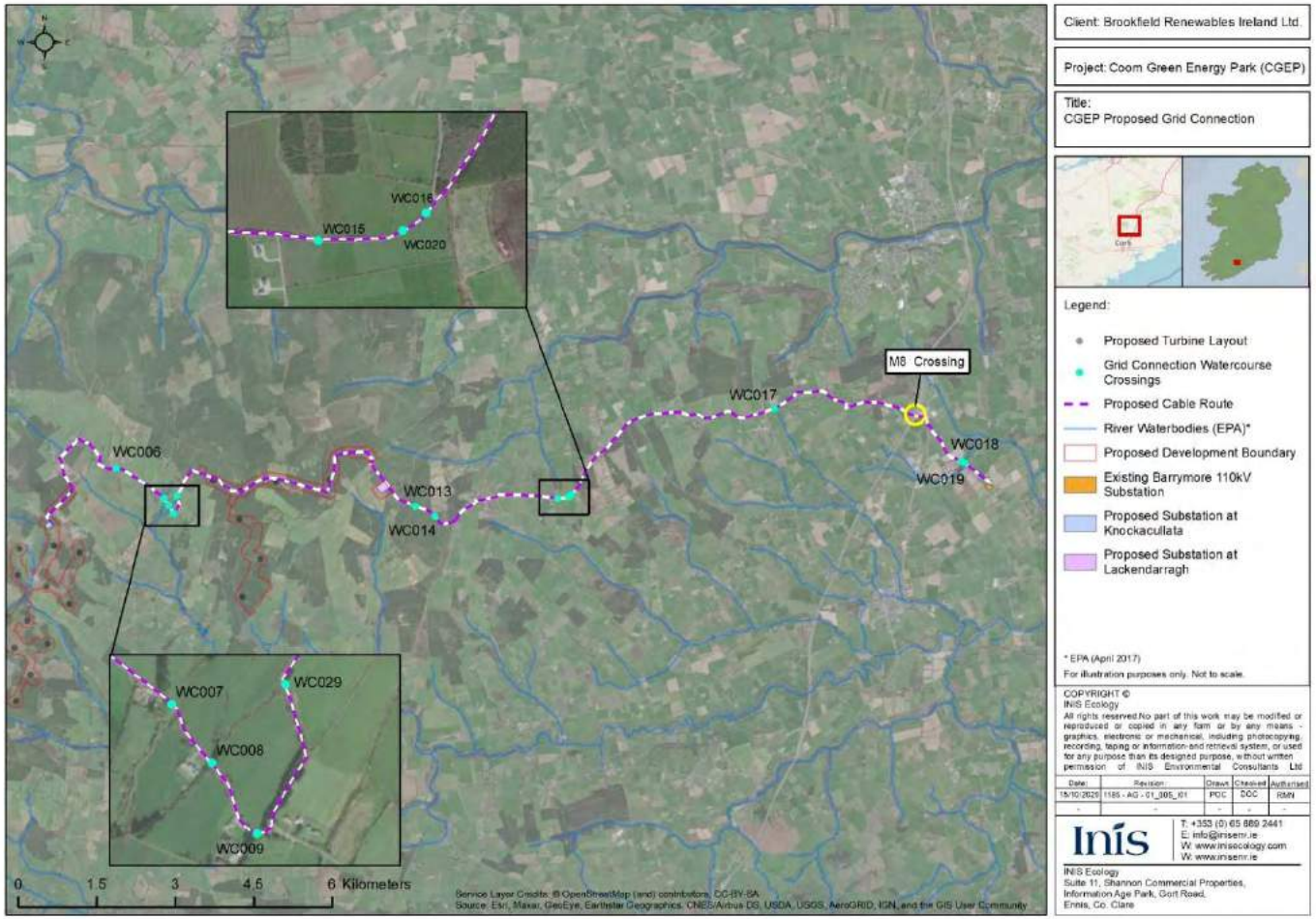

Figure 3-3: Site Overview Map Grid Connection Route and watercourse crossings

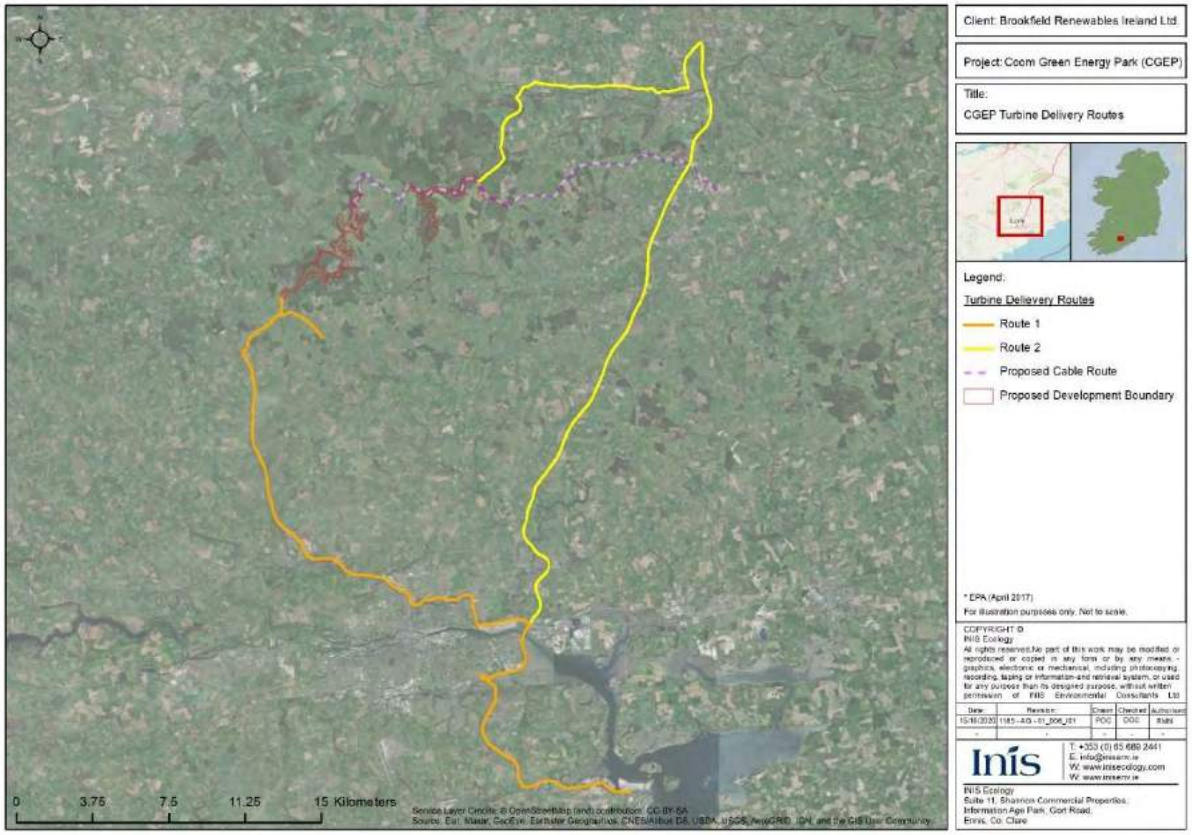

Figure 3-4: Proposed Turbine Deliver Route (TDR)

In summary the proposed project will consist of the following:

- Erection of up to 22 no. wind turbines with a tip height of up to 169m;
- Construction of turbine foundations and crane pad hardstanding areas;
- Construction of approximately 15 km of new site tracks and associated drainage infrastructure;
- Upgrading of approximately 10 km of existing tracks and associated drainage infrastructure where necessary;
- 3no. on site borrow pits and associated ancillary infrastructure. (New access tracks serving borrow pits shall be reinstated following completion of construction);
- All associated drainage and sediment control;
- Installation of new watercourse or drain crossings consisting of pre-cast concrete box culverts.
- Re-use or upgrading of existing internal watercourse and drain crossings;
- Construction of up to 2 no. onsite electrical substations and associated compounds including:
    - Welfare facilities;
    - Electrical infrastructure;
    - Parking;
    - Waste water holding tanks;
    - Rainwater harvesting
    - All associated infrastructure, services and site works including landscaping;
- 20 no. of Battery storage units and associated compound;
- Temporary accommodation works associated with the Turbine Delivery Routes to facilitate the delivery of turbine components;
- 3 no. Temporary construction site compounds and associated ancillary infrastructure including parking;
- Tree felling and associated replanting;
- Installation of approximately 30 km of medium voltage (20/33kV) underground cabling between the proposed turbines and the proposed on-site substations and associated ancillary works;
- Installation of approximately 7.7km of high voltage (up to 110kV) underground cabling between the proposed 2no. on site substations and ancillary works within private lands and public roads including up to 7 no. pre-cast joint bays;
- Installation of approximately 16.7km of high voltage (up to 110kV) underground cabling between the proposed on-site substations and the existing Barrymore substation and associated ancillary works within private lands and public roads. The proposed grid connection cable works will include 14 no. existing watercourse and drain crossings and the installation of up to 17 no. pre-cast joint bays.
- Communication cables and associated infrastructure;
- Erection of 2 no. permanent meteorological masts;

3.4.1 Summary of the Statutory Development Description for Consent

The proposed grid connection to the national grid at Barrymore substation proposed on the public road is considered as part of the project's assessment in this EIAR but does not form part of this application for consent. Equally an environmental assessment has been carried out for replant lands at Moneygorm, Co. Cork and Ballard, Co. Wicklow which are also not included in the application for consent.

The lands at Moneygorm and Ballard form part of the overall project and relate to replant lands and these have been assessed in detail in the EIAR but are considered cumulatively with other elements of the wind farm project in this section.

Therefore the development description, as per the newspaper notice and the application form for which consent from An Bord Pleanála is being sought, is as follows:

In accordance with section 37E of the Planning and Development Act 2000, as amended, Coom Green Energy Park Limited seeks permission for a period of 10 years, for development consisting the construction of a wind farm and related works within the townlands of Glashaboy North, Coom (Hudson), Tooreen South, Killeagh, Coom (Fitzgerald), Knuttery, Mullenaboree, Knockacullata, Knoppoge, Carrig, Glannasack, Knockdoorty, Lackendarragh North, Glashaboy South, Toorgarrif, Castleblagh, Ballyhooly South and Grange West, County Cork. The development will consist of:

- The construction of up to 22 no. wind turbines with a maximum tip height of 169 m and a maximum rotor diameter of 138 m and ancillary works including hardstanding areas;
- Upgrade of existing site tracks and the construction of new site tracks and associated drainage infrastructure both permanent and temporary;
- 3 no. on site borrow pits and associated ancillary infrastructure within the townlands of Tooreen South, Mullenaboree and Lackendarragh North;
- Construction of up to 2 no. onsite electrical substations including control buildings and electrical plant and equipment, a battery energy storage facility, welfare facilities, carparking and waste water holding tanks within the townlands of Knockacullata and Lackendarragh North;
- 3 no. Temporary construction site compounds and associated ancillary infrastructure including parking within the townlands of Tooreen South, Knockdoorty and Lackendarragh North;
- All associated underground electrical and communications cabling within private lands connecting the wind turbines to the 2no. proposed on-site substation;
- Upgrade of existing access junctions for temporary construction access from the local roads, L-1219-0 and L-1501 within the townlands of Tooreen South and Lackendarragh North;
- Permanent access junctions; from the local road L-1219-0 within the townland of Tooreen South, and from the local road L-1501 within the townland of Lackendarragh North.
- Erection of 2no. permanent meteorological masts with a maximum height of 100 m for the measuring of metrological conditions within the townlands of Tooreen South and Knoppoge;
- Temporary accommodation works at 5 no. locations to facilitate delivery of abnormal loads on the public road within the townlands of Grange West, Ballyhooly South, Glashaboy South and Castleblagh. These works will primarily relate to the cutting back of

hedgerows and lowering of boundary walls and the temporary installation of hardcore including an off-site turning area;

- All related site works and ancillary development including landscaping and drainage;
- A 10 year planning permission and 30 year operational life from the date of commissioning of the entire wind farm.

3.4.2 Turbine Layout

The layout of the proposed wind farm has been designed to minimise the potential environmental effects of the wind farm while at the same time maximising the energy yield of the wind resource passing over the site. **Figure 3-2** shows the proposed CGEP layout. The layout reflects the outcome of the iterative design process. The turbines are referenced from T2 to T23 and the co-ordinates in Irish Transverse Mercator (ITM) are detailed in **Table 3-1**. This reflects the original assigned turbine numbering system in which several turbines were removed including T1.

Table 3-1: Proposed Coom Green Energy Park Turbine Coordinates.

Turbine ID	X (ITM)	Y (ITM)
T2	562583	590234
T3	563227	589449
T4	563039	589951
T5	563936	589713
T6	564212	590214
T7	563907	590734
T8	563567	591306
T9	564146	591247
T10	564550	590806
T11	564002	592625
T12	563969	592119
T13	564515	591909
T14	564961	591567
T15	564661	592686
T16	565156	592556
T17	568267	591705
T18	568612	592430
T19	568206	593193
T20	568229	593738
T21	567708	593928
T22	568905	593906
T23	569943	593950

3.4.3 Power Output

The proposed CGEP windfarm will have an estimated Export Capacity (MEC) of approximately 105MW depending on final turbine technology installed. Turbines of the exact same make, model and dimensions can have different power outputs depending on the capacity of the electrical generator installed in the turbine nacelle.

A rated capacity of 105 MW has been used below to calculate the power output of the proposed wind farm. Assuming an installed capacity of 105 MW, the proposed wind farm has the potential to produce

approximately 303,500 MWh (megawatt hours) of electricity per year, based on the following calculation:

A x B x C = Megawatt Hours of electricity produced per year

where:

A = The number of hours in a year: 8,760 hours

B = The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 33 % is applied here

C = Rated capacity of the wind farm: 105 MW

The 303,500 MWh of electricity produced by the proposed wind farm would be sufficient to supply approximately 72,262 Irish households with electricity per year, based on the average Irish household using 4.2 MWh of electricity (this latest figure is available from the March 2017 CER Review of Typical Consumption Figures Decision).

The Census of Ireland recorded a total of 195,853 private households in Cork (City and County) in 2016. Based on a capacity factor of 33%, the proposed wind farm would therefore produce enough electricity for the equivalent of over on third of all households in Co. Cork.

EirGrid in their All Island Generation Capacity Statement (2019-2028) estimates a capacity factor of approximately 28.5% for onshore wind. The capacity factor applied for the proposed development is greater than the EirGrid estimation as a result of improvements in turbine technology and the good wind flows at the site. The proposed turbine type allows for the use of fewer, taller turbines with an increased efficiency and in return greater economic benefit to the consumer.

3.4.4 Turbines

3.4.4.1 Turbine Description

The proposed turbines will have a tip height of up to 169m. Detailed drawings, which accompany the planning application, show a turbine that may be used for the proposed development. However, the exact make and model of the turbine will be dictated by a competitive tender process which is informed by the energy production efficiencies of various turbines on the market at the time but will not exceed the maximum size envelope set out within the development description. The proposed wind turbine design envelope which has been assessed in the EIAR allows for flexibility of the turbine component configuration within the tip height limit.

Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics with only minor cosmetic differences differentiating one from another.

The wind turbines that will be installed on site will be conventional three-blade turbines, that will be designed to ensure the rotors of all turbines rotate in the same direction at all times. Each discipline within the EIAR has assessed various types and sizes of turbines within the overall envelope based on the worst-case scenario for that discipline; that is, the design envelope parameters that would produce the greatest potential impact. For example, modelling for bird collision risk was carried out

based on a turbine with the maximum rotor diameter of 138m and the maximum tip height of 169m. The exact combination of rotor diameter and hub height will be dictated by the final selection of the turbine make and model at turbine selection stage/pre-construction but will in any case comply with the environmental impact limits set out in this EIAR.

The turbine will be of the generic three bladed, tubular tower model with horizontal axis. The rotor blades are bolted to the central hub, which is connected to a generator located in the nacelle. The nacelle holds the following turbine components:

- Generator;
- Electrical components; and
- Control unit.

A glass fibre reinforcing polyester hood covers the nacelle. Earthing and isolation protect all components from lightning strikes.

3.4.4.2 Turbine Blades

The blades of a modern turbine are typically made up of glass fibre reinforced polyester. They typically turn at between 5 and 15 revolutions per minute depending on wind speed and make of turbine.

A typical turbine begins generating electricity at a wind speed of 3 to 4m/s depending on turbine type, with rated power generation at wind speeds of approximately 12 to 14m/s.

The turbines usually shut down at wind speeds greater than 25m/s, although some machines are designed to operate at up to 30m/s. The yaw machine mechanism turns the nacelle and blades into and out of the wind. A wind vane on the nacelle controls the yaw mechanism. Blades are pitched to match the wind conditions.

3.4.4.3 Turbine Tower and Foundation

The tower of the turbine is a conical steel tube, with multiple paint finish. It is generally delivered to site in four or five sections. The first section is bolted to the steel base, which is cast into the concrete foundation.

The shape and size of the foundation can vary depending on the turbine manufacturer however it is approximately 22m in diameter and approximately 3m in depth.

The upper sections of the tower are bolted to the lower ones in sequence. The base of the tower is typically around 4-5m in diameter, tapering to approximately 2-3m, where it is attached to the nacelle. The first floor of the tower is approximately 2-3m above ground level and it is accessed by a galvanised steel staircase and a steel hatch door, which will be kept locked, except during maintenance. The exact details of the turbine tower will be dictated by final selection of the turbine make and model for maximum efficiency of wind energy production.

3.4.4.4 Turbine Transformer

The turbine will have a transformer located within the tower. The turbine will generate electricity at approximately 660volts, depending on the machine chosen. The turbine transformer will step up the voltage to approximately 33kV to reduce the electrical loss on the cabling connector circuits that connect to the site substation.

3.4.4.5 Turbine Colour

The turbines have a multiple coating to protect against corrosion. They are coloured off-white or light grey to blend into the sky background. This minimises visual impact, as recommended by the following guidelines on wind energy development:

- "Wind Energy Development – Planning Guidelines" (2006), Department of the Environment, Heritage and Local Government;
- "The Influence of Colour on the Aesthetics of Wind Turbine Generators", ETSU W/14/00533/00/00;
- PAN 45, The Scottish Office Environment Department;
- PPG22, Department of the Environment - Welsh Office; and
- Technical Advice Note 8, Welsh Assembly, 2005.

3.4.5 Turbine Delivery Route Access Tracks and Hardstandings

3.4.5.1 Turbine Delivery Route (TDR)

The proposed turbine delivery routes are presented in **Figure 3-4**. Turbine deliveries will be from Ringaskiddy and be delivered along two distinct routes. One route to the west of the site, servicing the Bottlehill and Mullenaboree parts of the site and a second route servicing the Knockdoorty part of the site.

3.4.5.1.1 Turbine Delivery to the West

The port of entry is Ringaskiddy where the turbine components will be offloaded and transported to the site, via the N28 and the N40 to the Dunkettle Interchange. At the Dunkettle Interchange, the components will take the N8 to Silversprings and then take the R635 (north ring road) around the north side of Cork City. At Blackpool, the components will join the N20 and turn off at the junction with the L-1217 towards Bottlehill Landfill.

In order to access the site via the existing Coillte entrance point on the L-1219-0, turbine delivery vehicles shall pass the final junction to the site entrance between the L-1217 and L-1219-0, turn at a temporary hard standing in Coillte land at Glashaboy South which is located approximately 2km south-east of the proposed site entrance and make their final approach to the site from the east and south. At the temporary turning area, wind turbine blade components shall be transferred via crane from standard extendable trailers to 'Superwing' blade lifting trailers which will allow them to negotiate the L-1217/L-1219-0 junction.

3.4.5.1.2 Turbine Delivery to the East

The port of entry is the same as above and the turbine components will take the same route to Dunkettle Interchange. At the Dunkettle Interchange, the turbine components will travel north along the M8 motorway. At Junction 14 on the M8, the turbine components will exit the motorway and travel south into Fermoy. Once the turbines reach Fermoy, they will travel west along the N72 and turning south just east of Ballyhooly. From there they will follow local roads across the Blackwater River and to the site entrance at Lackendarragh North.

3.4.5.2 Site Entrances

The Coom Green Energy Park will be served by four site entrances. Two entrances are required to the west to access the Bottlehill and Mullenaboree areas of the proposed development. Two site entrances will be required to the east. One of these is required for access to the turbines and associated infrastructure in the Knockdoorty area and the other is required for access to construct the substation at Lackendarragh North.

One of the western (Bottlehill) access points is located at the Bottlehill Landfill site (off the L-1217 local road) and is already constructed to TII guidelines (DN-GEO03060). The site entrance here will accommodate access to the Bottlehill part of the site for standard construction vehicles. Vehicles entering the site at this point shall only have the right to access turbines T2 – T7.

Access to the remaining turbines in the Bottlehill and Mullenaboree parts of the site shall be via the main site access off the L-1219-0. The main site access serving the Bottlehill and Mullenaboree parts of the site is an existing Coillte forestry access located on the L-1219-0 which will be upgraded to facilitate oversize loads associated with wind turbine component deliveries. All oversize turbine delivery vehicles for the Bottlehill and Mullenaboree areas of the site shall use this entrance.

The existing forestry access from the L-1504 local road at Mullenaboree shall not be used during the construction phase but shall remain as an access point for forestry operations and operational access to the proposed substation at Knockacullata.

The main Knockdoorty site entrance to the east is an existing Coillte forestry entrance which will be upgraded to facilitate the wind farm construction and operations in the Knockdoorty area. This will be a dedicated site entrance located along the L-1501 Ballyhooly to Chimneyfield road. This site entrance has been designed in accordance with TII guidelines and shall be upgraded to achieve sightlines of 160m in both directions at a setback distance of 3m. The Cork County Council requirements for local roads here are 90m sight lines in both directions.

A new entrance will also be located near the Knockdoorty site entrance to facilitate access for the construction of the proposed Lackendarragh North substation off the L-1501 local road. The new site entrance to the proposed Lackendarragh North substation will be constructed in line with Cork County Council requirements.

3.4.5.3 Temporary Accommodation Works

In some cases, accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening. Any accommodation works will be carried out in advance of the turbine deliveries, following consultation and agreement with the local authority.

5 no. locations have been identified where more extensive works will be required and are described below. The locations requiring additional works are as follows:

- Local widening near Castlehyde along the N72 between Fermoy and Ballyhooly in the townlands of Grange West (Node 2.3);
- Local widening at the junction of the N72 and the Ballyhooly North Road east of Ballyhooly in the townland of Ballyhooly South (Node 2.5);

- Local widening at the approach road to the Blackwater Bridge south of Ballyhooly in the townland of Ballyhooly South (Nodes 2.6 & 2.7);
- Removal of trees and construction of an aggregate hard standing at Castleblagh south of Ballyhooly in the townlands of Castleblagh and Gortroche (Node 2.8);
- Widening of existing forestry access, tree felling and construction of an off-site turning area at Glashaboy South (Temporary turning and transfer area);

The location and nature of proposed temporary accommodation works are described in further detail in Chapter 13 of the accompanying EIAR.

3.4.5.4 Internal Access Tracks

Approximately 10 km of internal access tracks will be required to be upgraded as part of the development and 15 km of new internal access tracks will be required. **Figure 3-2** illustrates the internal access tracks within the proposed CGEP development site. The proposed internal site track layout will permit access for vehicles during the construction phase, for maintenance during the operational phase and for vehicles to decommission the turbines at the end of the life of the proposed CGEP development. An extensive network of agricultural and forestry access tracks exists within the site. These existing access tracks have been utilised wherever possible for the proposed CGEP development.

All access tracks will be approximately 4.5-5m wide along straight sections and wider at bends. The tracks will be finished with a well graded aggregate. The drainage system will be installed adjacent to the internal access tracks. Existing drainage infrastructure will be maintained and upgraded where necessary.

It is anticipated that the stone required for the construction of the internal access roads will be sourced from quarries in the vicinity and 3no. on-site borrow pits at locations shown in **Figure 3-2**.

Access track formation will consist of a minimum 500mm hardcore on geo-textile membrane. The construction methodology for newly constructed tracks will be as follows:

- The formation will be prepared to receive the geotextile membrane;
- Stone will be placed and compacted in layers to minimum 500mm depth;
- A drainage ditch will be formed, within the excavated width and along the sides of the track; and
- Surplus excavated material will be placed along the side of sections of the tracks and dressed to blend in with surrounding landscaping and partially obscure sight of the track.

3.4.5.5 Turbine Hardstandings

A turbine hardstanding area consists of a main crane pad hardstanding of approximately 40m x 75m with a number of additional smaller hardstandings that act as set down and assembly areas, located as shown on the accompanying planning drawings. This area will accommodate a main crane and an assist crane during the assembly of the turbine, as well as during occasional maintenance periods during the operation of the wind farm.

3.4.6 Temporary Site Facilities

During the construction phase, it will be necessary to provide temporary facilities for the construction personnel. The location of the temporary site compounds is shown on **Figure 3-2**. A wheel wash

facility will be provided at site entrances. CGEP will have 3no. temporary compounds, two of which will be located near the entrance to the Bottlehill and Knockdoorty areas of the site with a third located within the Knockdoorty site which shall be used as a temporary storage area. Site welfare facilities and offices shall be located at the main temporary compounds near the site entrances.

Temporary compounds shall be aggregate hard standings, located as shown on the accompanying drawings. Temporary facilities will be removed and the lands reinstated on completion of the construction phase.

Facilities to be provided in the temporary site compound will include the following:

- site offices, of Portacabin type construction;
- employee parking;
- portaloos;
- bunded fuel storage;
- bottled water for potable supply;
- contractor lock-up facility;
- a water tanker to supply water used for other purposes; and
- diesel generator.
- canteen facilities;
- waste management areas; and
- storage areas.

3.4.7 Grid Connection

The CRU introduced a new grid connection policy in April 2018 to replace the older systems of Gates and non-GPA ((Group Processing Approach) – the Enduring Connection Policy (ECP-1: 2018 Batch). The purpose of the ECP is to provide more frequent opportunities for projects to connect to the network. Applicants are required to have gained planning permission for the wind farm in order to lodge an application for the grid connection as of the first ECP-1 stage. The applicant intends to apply for a grid connection as soon as possible as part of the ECP2 application process.

The proposed CGEP development will have an export capacity of 105 MW, depending on final turbine and BESS technology installed. Connection will be sought under the Enduring Connection Process (ECP) grid access regime. Following consultation with EirGrid to date and an in-depth examination of grid capacity as part of this project, it is anticipated that the project will connect from the onsite substations via underground 110 kV cable to Barrymore 110kV substation in the townland of Farran South. The cable will be installed along the public road and shall feature horizontal directional drilling at up to 4 no. locations to cross existing watercourses and the M8 Motorway. The proposed grid connection is shown in Error! Reference source not found.. No overhead lines are required for this connection.

Electricity generated from wind turbines at the Bottlehill and Mullenaboree parts of the site shall be collected at medium voltage (20/33kV) by an internal circuit of buried cables, which will follow on-site access tracks. This circuit shall be terminated at a proposed onsite substation at Knockacullata in the Mullanboree part of the site. The power from this western part of the site shall be transferred to the onsite substation at Lackendarragh via a buried 110kV cable through private lands and a section of public road as shown on Figure 3-4. Electricity generated from wind turbines at the Knockdoorty part

of the site shall also be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks and terminated directly into the on-site substation at Lackendarragh and exported to the grid via a 110kV buried cable to the existing Barrymore substation.

The proposed 110 kV grid connection route will cross private lands and will follow the existing road to the substation at Barrymore.

Connection works will involve the installation of ducting, joint bays, drainage and ancillary infrastructure and the subsequent running of cables along the existing road network. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches.

It is expected that full road closures will be put in place to facilitate cabling works rather than partial road closures or stop/go systems. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. These would typically be undertaken on a rolling basis with short sections closed for short periods before moving onto the next section.

3.4.7.1 Crossing of the M8 Motorway

Where the grid connection route crosses the M8 motorway, horizontal directional drilling (HDD) will be used, namely a 110kV duct crossing at Corrin View Estate to the South of Junction 15, as shown on **Figure 3-3**.

The locations of the launch and reception pits will be adequately spaced from the carriageway to ensure the bore is at such depth as not to conflict with the drainage or surface of the motorway or associated embankments.

Consideration was given to trying to accommodate the cables in the over-bridge which spans the motorway at this location however following consultation with TII, Direct Route, and Cork County Council, it was deemed preferable to employ the proposed crossing technique.

There is sufficient room available to accommodate the necessary equipment. The cables will be laid at sufficient depth below the motorway to stay below the motorway drainage and without impacting on the road foundations. There will be a detailed consultation and agreement with TII and the PPP Company, Direct Route in advance of completing the works.

The locations of start and finish points for the HDD have been identified following desktop assessments, site visits and consultation with both the local authority, TII and Direct Route. Detailed designs for the motorway embankment and bridge crossing as well as site investigation records were reviewed by FT's geotechnical engineers to confirm the suitability of the proposed crossing method at this location.

3.4.8 Watercourse Crossings

3.4.8.1 Proposed CGEP

The proposed development layout will have 9 stream crossings within the site boundary. These crossings are listed in **Table 3-2** and shown in **Figure 3.2**.

Existing crossing WC028 will be replaced with box culvert of minimum 1200 mm width and 400 mm height, with additional height required for embedment and freeboard.

There will be one new proposed watercourse crossing WC024 over the unnamed tributary of the Coom River and one new proposed crossings WC025 over the Coom River required as a result of the development. There will be one new proposed watercourse crossing WC027 over the Toor River required as a result of the development.

Table 3-2: Onsite Access Watercourse Crossings.

Feature ID	ITM_X	ITM_Y	Existing/ Proposed	Feature/Activity	Proposed Method of Crossing
WC024	563175.65	589720.58	Pro	Grid cable crossing and proposed new access track crossing over the unknown tributary of the Coom River	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert
WC025	563250.25	589754.30	Pro	Grid cable crossing and proposed new access track crossing over the tributary of the Coom River	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert
WC027	564133.20	591667.40	Prop	Grid cable crossing and proposed new access track crossing over the Toor River	New Crossing. Box culvert 2000mmx1100mm + freeboard + embedment, cable over the culvert
WC028	564171.10	591981.30	Ext	Grid cable and proposed new access track crossing over the Toor River	Replace existing pipe with a box culvert of min 1200mm x400mm + freeboard + embedment, cable over the culvert
WC030	568492.90	592029.20	Ext	Grid cable and existing forestry track crossing over the forestry ditch, tributary of the Inchinanagh stream	Standard trench crossing above or below existing culvert.
WC031	568375.20	593820.90	Ext	Grid cable and existing forestry track crossing over the forestry ditch, in the proximity of the turbine T35	Standard trench crossing under existing service. Pipe to be extended to facilitate widening of existing access road or replaced with suitable pipe of same or greater diameter
WC035	569019.61	593940.22	Ext	Grid cable and existing forestry track crossing over the forestry ditch,	Standard trench crossing under existing service. Pipe to be extended to facilitate

Feature ID	ITM_X	ITM_Y	Existing/ Proposed	Feature/Activity	Proposed Method of Crossing
				in the proximity of turbine T20	widening of existing access road or replaced with suitable pipe of same or greater diameter
WC049	568425.66	593132.46	Prop	Grid cable and proposed new access track crossing over drain east of turbine T19	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert
WC050	570093.25	594420.14	Prop	Grid cable and proposed new access track crossing over drain north of turbine T23	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert

A description of construction methodologies for watercourse crossings is presented in the CEMP (**Appendix A)**.

3.4.8.2 Watercourse Crossings Along the GCR

Table 3-3 summarises existing watercourse and service crossing locations and proposed method for crossing same along the proposed 110kV grid connection route, which are projected in **Figure 3.3**.

Table 3-3: Summary of Watercourse and Buried Service Crossings Along GCR.

Feature ID	ITM_X	ITM_Y	Feature Type	Proposed Crossing Method
WC006	565856.78	594166.05	Watercourse Crossing	HDD under structure within public road corridor. Alternative: Concrete bridge beam in road deck with ducts in flat profile. Reinstate bridge surface to same level as existing.
WC007	566767.03	593590.72	Watercourse Crossing	HDD under structure within public road corridor.
WC008	566855.33	593463.30	Watercourse Crossing	Trench in road above structure and reinstate road surface to existing levels.
WC009	566953.13	593308.63	Drain Crossing	Standard trench crossing under existing service
WC013	571579.31	593438.66	Drain Crossing	Standard trench crossing under existing service

WC014	571953.73	593251.56	Drain Crossing	Standard trench crossing under existing service
WC015	574302.28	593592.15	Drain Crossing	Standard trench crossing under existing service
WC016	574563.28	593659.12	Drain Crossing	Standard trench crossing under existing service
WC017	578448.83	595314.38	Watercourse Crossing	Standard trench crossing under existing service
WC018	582024.33	594307.32	Watercourse Crossing	Replace existing stone culvert with an RC box culvert and bring ducts underneath.
WC019	582076.81	594271.41	Watercourse Crossing	HDD under structure within public road corridor. Alternative: Concrete bridge beam in road deck with ducts in flat profile. Reinstate bridge surface to approximately 100mm above existing.
WC020	574506.00	593616.00	Drain Crossing	Standard trench crossing under existing service.
WC029	567015.50	593633.90	Drain Crossing	Standard trench crossing above or below existing culvert.

3.4.8.3 TDR Watercourse Crossings

There are 3no. existing watercourse crossings along the TDR between the M8 and the site at the locations shown in the table below. No works are expected to be required at any of these locations.

There are 2no. existing watercourse crossings between the N20 and Bottlehill Area site entrance. No works are expected to be required at either of these locations.

Existing watercourse crossing structures between the proposed port of entry and the respective turn-off points from the M8 and N20 were not assessed as part of this EIAR as they consist of routes which make up part of the national motorway and primary national road network. It is considered that any existing crossing structures located along these routes would be of sufficient design and condition so as to not require any modification works.

Table 3-4: TDR Watercourse crossings

ID	ITM_X	ITM_Y	Route	Water Framework Directive (WFD) Waterbody Designation
WC001	559419.37	586219.49	TDR West	MARTIN_010
WC002	560960.04	587718.62	TDR West	MARTIN_020
WC032	571881.00	595965.50	TDR East	BLACKWATER (MUNSTER)_180
WC033	572870.50	598793.70	TDR East	BLACKWATER (MUNSTER)_170
WC034	582013.97	598842.80	TDR East	BLACKWATER (MUNSTER)_190

3.4.9 Onsite Electricity Substation

It is proposed to construct 2 no. onsite electricity substations within the proposed CGEP development site. These will provide a connection point between the wind farm and the proposed grid connection point at the existing Barrymore substation.

Electricity generated from wind turbines at the Bottlehill and Mullenaboree parts of the site shall be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks. This circuit shall be terminated at a proposed onsite substation at Knockacullata in the Mullanboree part of the site. The power from this western part of the site shall be transferred to the onsite substation at Lackendarragh North via a buried 110kV cable through private lands and a section of public road as shown on Figure 3-4. Electricity generated from wind turbines at the Knockdoorty part of the site shall also be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks and terminate at the on-site substation at Lackendarragh North and transformed to 110 kV. Electricity from Bottlehill, Mullenaboree and Knockacullata circuits will be exported from Lackendarragh North substation to the existing grid via a 110kV buried cable to the existing Barrymore substation.

The dimensions of the proposed substation compounds will be approximately 178m x 153m and 124m x 104m at Lackendarragh and Knockacullata, respectively, and will include a substation control building and electrical components necessary to export the electricity generated from the wind farm to the national grid. The substation compounds will be surrounded by a ca. 2.5m high steel palisade fence and internal fences will also be provided to segregate different areas within the main substation compound.

Lighting will be required on site and this will be provided by lighting poles located around the substation and exterior wall mounted lights on the control buildings.

At each of the locations, one control building will be located within the substation compound and will measure approximately 20m by 10m and approximately 6m in height. The control building will include the Independent Power Production (IPP) and grid operator control rooms, an office space and welfare

facilities for staff during the operational phase of the wind farm. Due to the nature of the project there will be a small water requirement for occasional toilet flushing/hand washing with a rainwater harvesting tank adjacent to the control building.

A wastewater holding tank will be provided outside the substation compound fence line so that it can be maintained where required without requiring access to the substation compound. The wastewater holding tank will be a sealed storage tank with all wastewater tankered off site as required by an authorised waste collector to a wastewater treatment plant. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007, will be employed to transport wastewater away from the site. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. This approach for managing wastewater on site has become standard practice on wind farm sites, which are often proposed in areas where finding the necessary percolation requirements for on-site treatment can be challenging and has been accepted by numerous Planning Authorities and An Bord Pleanála as an acceptable proposal.

3.4.10 Electrical Cabling

Electricity generated from wind turbines at the Bottlehill and Mullenaboree parts of the site shall be collected at medium voltage by an internal circuit of buried cables which will follow on-site access tracks. This circuit shall be terminated at a proposed onsite substation at Knockacullata in the Mullanboree part of the site. The power from this western part of the site shall be transferred to the onsite substation at Lackendarragh via a buried 110kV cable through private lands and a section of public road. Electricity generated from wind turbines at the Knockdoorty part of the site shall also be collected at medium voltage by an internal circuit of buried cables which will follow on-site access tracks and terminated directly into the on-site substation at Lackendarragh before being exported to the grid via a 110kV buried cable to the existing Barrymore substation. The proposed grid connection is shown in **Figure 3-3**.Error! Reference source not found.

Internal collector circuit cable routes are shown indicatively on the planning application drawings and will generally follow the alignment of the internal access tracks.

The electricity will be transmitted as a three-phase power supply so there will be three individual conductors (or individual cables) in each cable circuit. The three conductors will each be laid in separate ducts which will usually be laid in a trefoil formation but may also be laid in a flat formation. The specification for the cables and cable-laying will be in accordance with ESBN requirements

The width of a cable trench with a trefoil formation will be 600mm, a flat formation would require a wider trench width. The depth of cover to the ducts carrying the cables will usually be 950mm cover to the top of the upper duct in public roadways and grassed areas. The depth of trench for the cables will be approximately 1220mm and the depth of cover for the cables will usually be 950mm. However, in certain instances, for example when crossing a bridge with shallow cover, a shallower depth of 450-950mm could be utilised. In those circumstances, the particular design will be agreed with Eirgrid and additional cable protection measures such as steel plates or reinforced concrete cover may be required. Cables laid within the site will be laid to a depth of up to 1100mm to the top of the upper

duct in field locations. The diameter of the ducting will be selected to suit the range of cross-sectional areas of electrical cables and is likely to fall between 100mm and 200mm diameter.

3.4.10.1 Cable Installation

The specifications for cables and cable installation will be in accordance with Eirgrid requirements. An description of cable installation works is presented in the CEMP (**Appendix A**).

3.4.10.2 Buried Drains and Service Crossings

Watercourse crossings required for the proposed 110kV cable route are summarised in **Table 3-2**. For the crossing of culverts or services, if encountered, the following options for construction may be used:

- Piped Culvert Crossings – Where sufficient cover is available, the cable ducts will be laid above the culvert with a minimum separation distance, typically 300mm to be agreed with the local authority and Eirgrid;
- Piped Culvert Crossings - Where sufficient cover is not available, the cable ducts will be laid under the culvert with a minimum separation distance, typically 300mm to be agreed with the local authority and Eirgrid; and
- Flatbed Formation over Culverts - where the cable duct is to be installed over an existing culvert where sufficient cover is not available, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the culvert. The duct will be laid in this trench in a flatbed formation over the existing culvert and will be encased in 6mm thick steel galvanized plate with a 30N concrete surround as per Eirgrid specification.

3.4.10.3 Joint Bays

Joint bays are pre-cast concrete chambers where individual lengths of cables are joined to form one continuous cable. These locations may be adjusted slightly at detailed design stage assessed if required in consultation with Eirgrid and Cork Co. Co. It is expected that 24no. of joint bays will be required for the UGC. Of these, 17 no. joint bays shall be located in public roads with 7no. located on private lands.

A joint bay will be constructed in a pit. The bay typically will be approximately 4.5m x 1.8m x 1.2m deep. A reinforced concrete slab will be constructed in the bay to accommodate the jointing enclosure.

Communication chambers, which are similar to small manholes, will also be installed at the joint bay locations to facilitate connection of fibre-optic communication cables.

3.4.11 Traffic Management

A careful approach will be taken to planning the works to ensure minimal impacts on road users and the general public. As discussed during consultation with Cork County Council, the cable trenching will be carried out with the aid of either a lane closure or road closure, which will ensure that the trenching works are completed as expeditiously as possible. Due to the length of cabling within the road corridor (ca. 16km), these works could be conducted over 10-month period of time (ca. 40weeks). The road closures will be applied for by the appointed contractor and will outline local diversions whilst maintaining local access at all times for residents, farms and businesses. Road closures will be subject

to the applicable statutory processes as implemented by the roads authority. Road closures will be facilitated by the good network of roads in the area. 'Rolling road closures' will be implemented, whereby the site will progress each day along a road, which will have the effect of reducing the impact for local residents.

A traffic management plan for the cable trenching will be adopted in consultation with Cork County Council to provide a safe environment for road users and construction workers.

A Traffic Management Plan is contained in the Construction Environmental Management Plan (**Appendix A**). The Traffic Management Plan shall be finalised following the appointment of the contractor for the main construction works in consultation with Cork County Council and will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by the Board.

3.4.12 Peat Management

There are no peat deposition areas required as part of this proposed CGEP development following assessment of the existing environment. Peat excavated for the construction of access roads within the site will be re-used on site in berms and for landscaping purposes and along the margins of the access roads. A number of berms will also be created around turbine hardstandings and parallel to the access tracks.

These berms will be created from suitable excavated material and are located on the opposite side of infrastructure to any interceptor drains. The berms will therefore not obstruct flow or risk siltation to interceptor drains. Berms will be placed outside the roadside drains which drain the new access tracks. Further details on soils and peat management can be found in the Soils Management Plan contained within the CEMP, in **Appendix A**.

3.4.13 Drainage

The drainage system will be constructed alongside all turbine hardstands, internal access tracks, substation and the temporary construction compound. The drainage system for the existing tracks and roads will largely be retained. Where the roads require widening, this will involve the slight re-location of existing roadside swales to allow for widening. Further details on the hydrology and drainage are contained in the CEMP in **Appendix A**.

The number of stilling pond, dimensions and locations of stilling ponds are provided in Surface Water Management Plan (SWMP), within the CEMP (**Appendix A**).

3.4.14 Temporary Stockpile Areas

Due to the possibility of soil-borne diseases, all topsoil recovered from each farm property will remain on the same property. These stockpiles will be covered and where required, drainage and sediment controls including temporary silt fencing will be put in place. The topsoil will be re-used for landscaping and will also be used for reinstatement purposes around turbine bases and hardstanding areas.

Further details on soils management can be found in the Soils Management Plan contained within the CEMP in **Appendix A**. Further details on site drainage can be found in the Site Drainage Management Plan contained within the CEMP (**Appendix A**).

3.4.15 Tree Felling

Much of the proposed CGEP development site comprises commercial coniferous forestry. 15no. turbines are located within forestry and consequently tree felling will be required as part of the project. Felling of approximately 62.8 ha of coniferous forestry is required within and around the wind farm infrastructure to accommodate the construction of some turbines, hardstands, crane pads, access tracks and the proposed onsite substation. The felling area proposed is the minimum necessary to construct the proposed CGEP development and comply with any environmental mitigation.

The felling will be the subject of a Felling Licence Application to the Forest Service prior to construction as per the Forest Service's policy on granting felling licenses for wind farm developments.

The Forest Service Policy requires that a copy of the planning permission for the wind farm be submitted with a felling licence application therefore the felling licence cannot be applied for until planning permission is received for the proposed development site. The licence will include the provision of relevant replant lands to be planted in lieu of the proposed tree felling on the site as discussed in Section 3.5.15 below. It should be noted that the forestry within the proposed wind farm site was originally planted as a commercial crop and will be felled in the coming years should the wind farm proceed or not.

To ensure a tree clearance method that reduces the potential for sediment and nutrient runoff, the construction methodology will follow the specifications set out in the Forest Service Forestry and Water Quality Guidelines (2000) and Forest Harvesting and Environmental Guidelines (2000).

Before any harvesting works commence on site all personnel, particularly machine operators, will be made aware of the following and will have copies of relevant documentation, including:

- the felling plan, surface water management, construction management, emergency plans and any contingency plans;
- environmental issues relating to the site;
- the outer perimeter of all buffer and exclusion zones; and
- all health & safety issues relating to the site.

The proposed method of tree felling near 'infrastructure' will be limited to:

- 20m wide corridors for new and upgraded access tracks;
- 10m buffer surrounding hardstandings and compounds;
- 6m corridor for buried cables in private lands; and
- 92.4m radius around each turbine located in forestry for bat impact mitigation

3.4.16 Replant Lands

Replacement replanting of forestry in Ireland is subject to licence in compliance with the Forestry Act 2014 as amended. The consent for such replanting is covered by the Forestry Regulations 2017 (S.I. No. 191 of 2017).

As it is proposed to fell 62.8 ha of coniferous forestry for the proposed Coom Green Energy Park development, replant lands of the same area are required. The replacement replanting of forestry can occur anywhere in the State subject to licence. Potential replanting sites have been identified at Moneygorm, Co. Cork (**Figure 3.5**) and Ballard, Co. Wicklow (**Figure 3.6**). The total approved area for

replanting is 77.1 ha which has been granted Forest Service Technical Approval for afforestation. These lands have been assessed as part of this NIS.

Appendix B presents a project specific NIS of these replant lands.

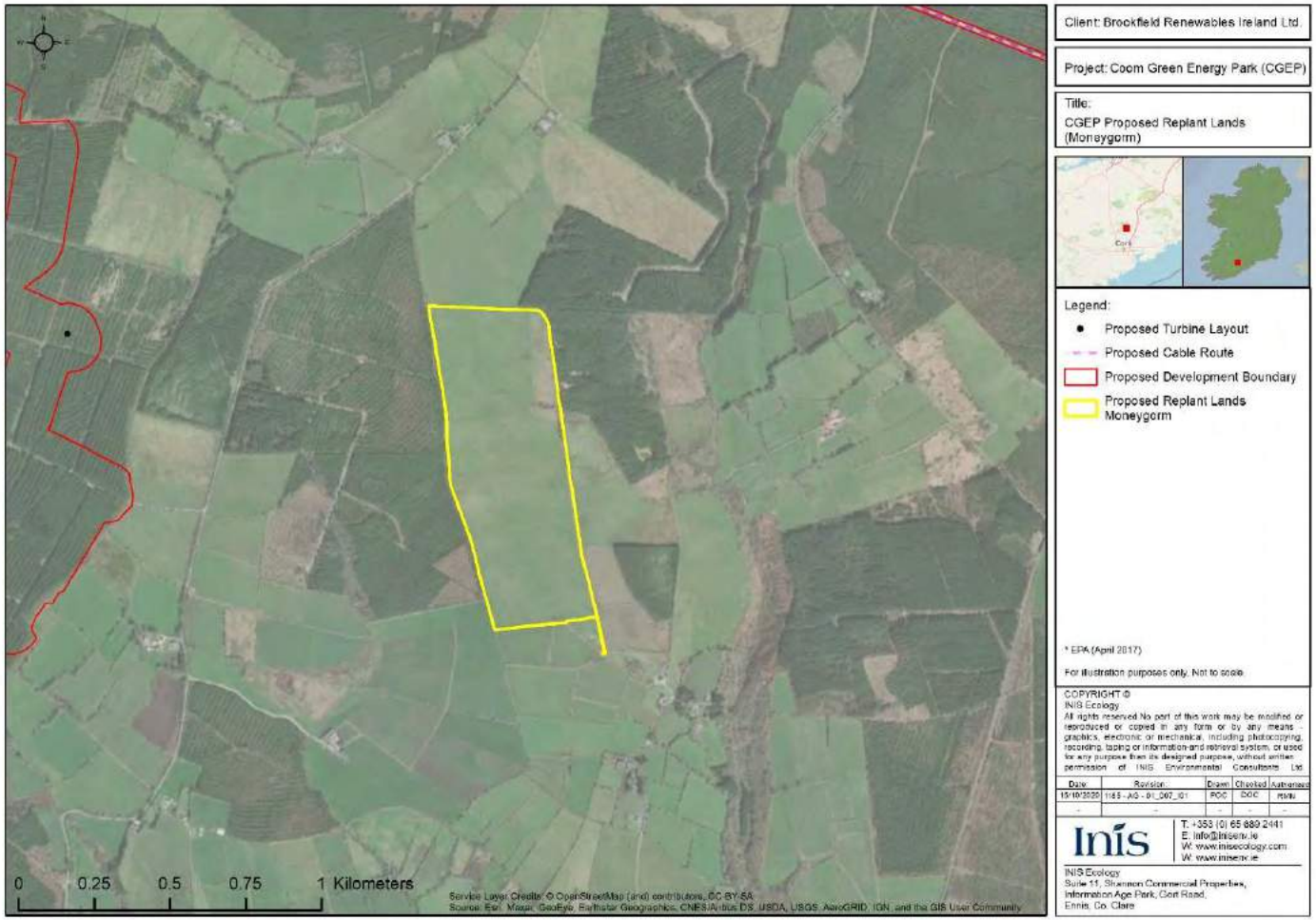

Figure 3-5: Site Location of Proposed Replant Lands at Moneygorm, Co Cork close to the proposed development.

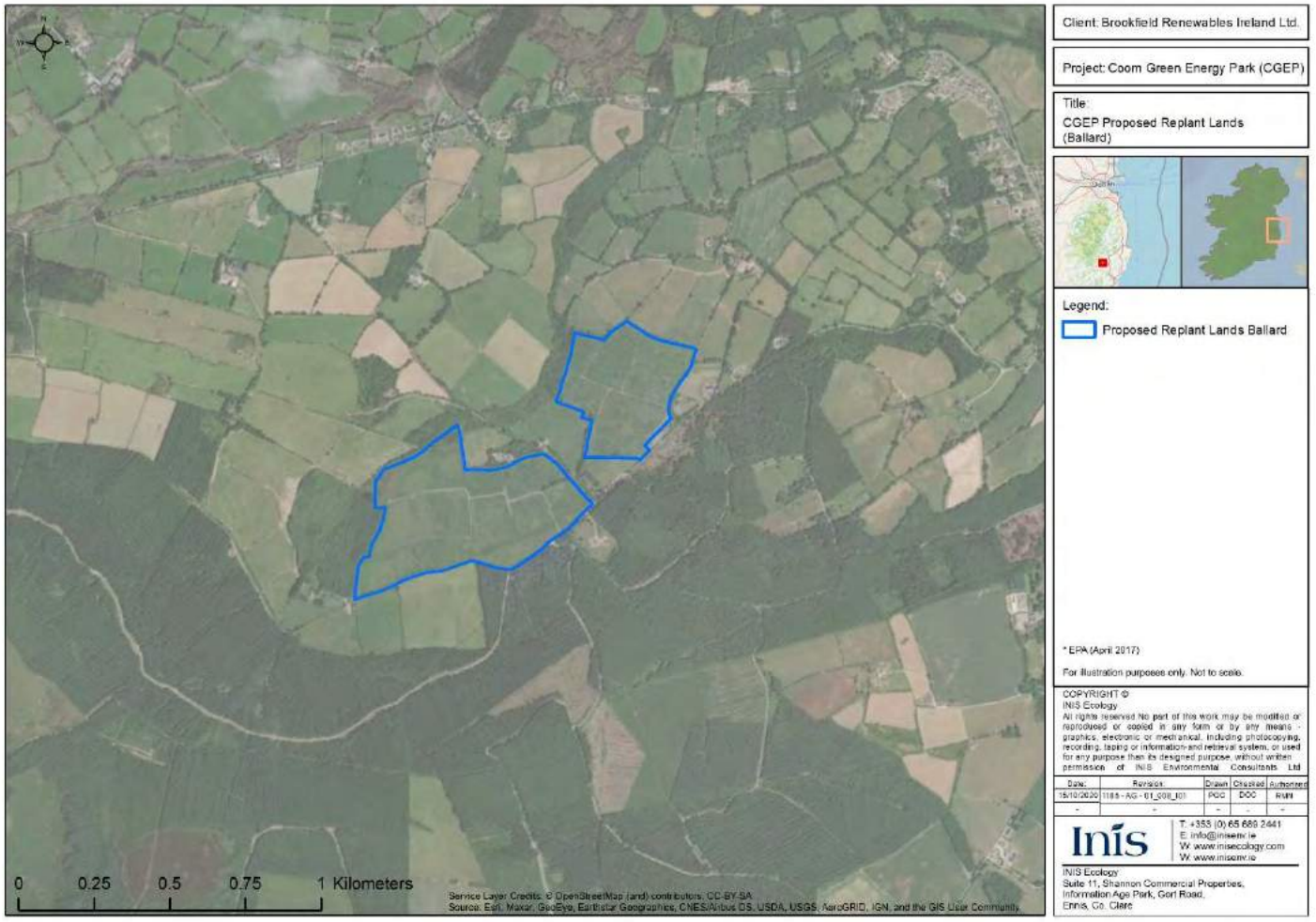

Figure 3-6: Site Location of Proposed Replant Lands at Ballard, Co Wicklow.

3.4.17 Permanent Meteorological Masts

Two permanent meteorological (Met) masts shall be erected on site at Bottlehill and Knockdoorty as shown in Figure 3-2. These shall replace two existing temporary met masts which are located at Mullenaboree and Knockdoorty. These temporary met masts shall be dismantled and removed from site prior to construction of CGEP.

The temporary met masts are both lattice structures of 100m height which are fixed to ground anchors by guy wires.

The permanent met masts shall be of the following general configuration:

- A 100m high lattice steel mast with a shallow concrete foundation, fixed to ground anchors by 3no. guy-wires;

3.4.18 Construction Stage

3.4.18.1 Construction and Environmental Plan

A Construction and Environmental Management Plan (CEMP) is contained in **Appendix A**.

The CEMP sets out the key environmental management measures associated with the construction, operation and decommissioning of the proposed wind farm, to ensure that during these phases of the development, the environment is protected, and any potential impacts are minimised. In the event An Bord Pleanála (the Board) decides to grant approval for the proposed development, the final CEMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by the Board.

3.4.18.2 Construction Activities

The construction sequence will be as follows. Tree felling, upgrading of existing site tracks and the provision of new site tracks will precede all other activities. Drainage infrastructure will be constructed in parallel with the track construction. This will be followed by the construction of the turbine foundations and the provision of the hardstanding areas.

In parallel with these works the on-site electrical works; sub-station and internal cable network and off-site connection works to the national grid will be completed.An outline of construction techniques is contained in the CEMP in **Appendix A**.

3.4.18.3 Site Access Tracks and Drainage

Access tracks are required to facilitate the construction of the proposed wind farm and to provide access to each of the turbines. Drainage infrastructure will be constructed in parallel with the access track construction.

Access tracks to facilitate turbine and material deliveries for CGEP shall consist of the construction of approximately 15 km of new site tracks and associated drainage infrastructure. The project will incorporate the upgrading of approximately 10 km of existing forest tracks. Existing drainage infrastructure shall be retained where possible and improved as necessary

3.4.18.4 Cable Trenches

The proposed cable route is indicated in **Figure 3-3**. As part of the scoping and consultation process for the proposed CGEP project, searches of existing utility services were carried out to identify areas where existing major assets exist such as high voltage electricity cables or gas mains. Private utility and telecommunications companies were also consulted during this period. In advance of the construction phase, records of services such as watermains, sewers, gas mains and other power cables will be obtained from the relevant service providers. Cable detection tools, a ground penetrating radar and slit trenches will be used, as appropriate, to find the exact locations of existing services. The final locations of the cable routes in the public roads and in the verge along the public road will be selected to minimise conflicts with other services.

A minimum separation distance of 300mm will be maintained with existing services. Usually the new cables will be laid below existing services.

For cable trenches located in public roads, the contractor will excavate cable trenches and then lay high density polyethylene (HDPE) ducting in the trench in a surround of cement bound material (CBM). A rope will be inserted into the ducts to facilitate cable-pulling later. The as-constructed detail of the cable duct locations will be carefully recorded. Cable marker strips will be placed above the ducts and the two communication ducts will also be laid. An additional layer of cable marker strips will be laid above the communication ducts and the trench back-filled. Back-filling and reinstatement in public roads will be to a specification to be agreed with the road authority and will be at least as good as the existing.

A similar construction methodology will apply for cable trenches laid within site access tracks. In this case the cable-ducts will generally be laid when the track is being constructed and will follow the edge of the site access tracks. The trenches within these locations will generally be backfilled using the excavated material.

The following is a synopsis of the main activities for the installation of cabling:

- All relevant bodies, i.e. ESBN, Gas Networks Ireland, Eir, Cork County Council, Irish Water etc., will be contacted and all drawings for all existing services will be sought to confirm the conditions predicted in this EIAR
- Immediately prior to construction taking place the area where excavations are planned will be surveyed and all existing services will be identified, and temporary warning signs erected where necessary;
- For cable works in the public road, the traffic management plan will be implemented. Clear and visible temporary safety signage will be erected all around the perimeter of the live work area to visibly warn members of the public of the hazards of ongoing construction works;
- An excavator will be used to excavate the trench to the dimensions of approximately 600mm wide by approximately 1.2m deep;
- A silt filtration system will be installed on all existing drainage channels for the duration of the cable construction to prevent contamination of any watercourse;
- Any ingress of ground water will be removed from the trench using submersible pumps and pumped to the nearest available existing drainage channel

- Once the trench has been excavated, a bedding layer of sand or 15 Newton concrete will be installed and compacted. All concrete will be offloaded directly from the concrete truck into the trench;
- PVC ducts will be installed on top of the compacted base layer material in the trench;
- Once the ducts have been installed, couplers will be fitted and capped to prevent any dirt etc. entering the unjointed open end of the duct. In poor ground conditions, the open end of the duct will be shimmed up off the bed of the trench to prevent any possible ingress of water and dirt into the duct. The shims will be removed once the next length of duct has been joined to the duct system;
- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to ensure recording of exact location of the ducts, and hence the operational electricity cable. These co-ordinates will be plotted on as-built record drawings for the grid connection cable operational phase;
- When ducts have been installed in the correct position on the trench base layer, sand (in road trench) or Lean-mix CBM4 (CL1093) (off road trench) will be carefully installed in the trench around the ducts so as not to displace the duct and compacted;
- Spacer templates will be used during installation to ensure that the correct cover of duct surround material is achieved above, below and at the sides of the duct in the trench;
- A red cable protection strip will be installed above duct surround layer of material and for the full length of the cable route;
- A layer of Lean-mix CBM4 (CL1093) (in road) or excavated material (off road) will be installed on top of the duct surround material to a level 300mm below the finished surface level;
- Yellow marker warning tape will be installed for the full width of the trench, and for the full length of the cable route, 300mm from the finished surface level;
- The finished surface of the road, road verge, or agricultural land will be reinstated as per its original condition or to the requirements of the Cork Area Engineer;
- Precast concrete cable joint bays will be installed within excavations in line with the trench. The cable joint bays are backfilled and the finished surface above the joint bay reinstated as per its original condition. The cable joint bays are re-excavated a second time during cable pulling and jointing, after which the finished surface above the joint bays is reinstated again to its original condition;
- When trenching and ducting is complete, the installation of the grid connection cable will commence between the wind farm onsite sub-stations to the existing Barrymore 110kV substation;
- Construction work areas and traffic management measures will be setup at 2 no. consecutive cable joint bays simultaneously. The underground cable will be pulled through the installed ducts from a cable drum set up at one joint bay and using a winch system which is set up at the next joint bay, the cable is pulled through;
- The cables are jointed within the precast concrete cable joint bays; and
- The finished surface above each cable joint bay is reinstated to its original condition, and the construction work area removed.

For simplicity, each cable circuit is referred to as a cable in the remainder of this document.

3.4.18.5 Watercourse Crossings

Watercourse crossings can generally be classified as follows:

- Existing structures (bridges or culverts) that need to be crossed by infrastructure (access tracks or cables) associated with the proposed CGEP development, without a need to modify the existing structure;
- Installation of new structures to facilitate the crossing of existing watercourses by infrastructure associated with the proposed CGEP development;
- Existing structures that need to be either replaced or upgraded to facilitate the crossing of existing watercourses by infrastructure associated with the proposed CGEP development;

The proposed methods for crossing existing watercourses along the grid connection route are described in **Table 3-3**.

The sequence of works associated with the proposed watercourse crossing methods for watercourses listed is described below.

3.4.18.5.1 Box Culvert Crossing (Access Tracks and Electrical Cables)

In order that flood flows would not be obstructed, the stream crossings will be sized to convey a 1 in 100-year flood flow with a 20% allowance for Climate Change.

For the construction of the box culvert crossings, the following methodology shall apply:

- The access track construction will finish at least 10m from the nearside bank of the drain;
- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in the CEMP (**Appendix A**);
- Culvert installation will only take place during dry periods;
- The bed of the drain will be prepared using a mechanical digger and hand tools to the required levels in accordance with the design;
- A bedding layer will be laid in the base of the watercourse using Class 6 aggregate material and blinding to the desired levels in accordance with the design;
- The box culvert is laid in one lift or in sections using a crane in accordance with an approved lift plan;
- Bedding material is placed and compacted around the culvert to the desired levels in accordance with the design;
- 500mm of suitable bedding material in the form of clean round gravel between 10-100mm diameter, shall be laid in the base of the culvert in accordance with the recommendations set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses from Inland Fisheries Ireland;
- The culvert shall be covered using compacted Class 6N fill material in accordance with the design up to the levels required by the access track sub formation;
- Rock armour headwalls will be constructed where necessary to protect culvert ends and the base of slope embankments on either side of the track; and
- The access track construction continues over the crossing in accordance with the design; and
- Ductwork will be installed above the box culvert in accordance with the design to carry the grid connection cables across the watercourse.

3.4.18.5.2 Horizontal Directional Drilling (HDD) Under Existing Structure (Electrical Cables)

HDD will be employed at up to 4no. locations along the grid connection route as part of the proposed CGEP development as shown on the site layout plans. 3 no. of these locations will be for the crossing of existing watercourses.

The operation shall take place from one side of the watercourse within the public road corridor or verge and will be carried out by an experienced HDD specialist. Each crossing is expected to take place in a single day under one mobilisation.

A traffic management plan shall be finalised in advance in agreement with the County Council and implemented in advance of the works.

The process will involve setting up a small tracked drilling rig on one side of the watercourse, within the public road corridor, and at least 10m back from the stream bank.

A shallow starter pit will be excavated at the point of entry and shall be located at a sufficient distance from the watercourse to achieve a minimum clearance depth below the bed of the watercourse.

A pilot hole will be bored as per the agreed alignment and shall be tracked and controlled using a transmitter in the drill head. By tracking the depth, position and pitch of the drill head the operator can accurately steer the line of the drilling operation. Typically, the drilling operation is lubricated using a fluid. When the pilot hole has been drilled to the correct profile, its diameter is increased, if necessary, to match the external diameter of the cable duct. The flexible plastic ducting is then pulled through the pre-drilled hole and sealed at each end until required for cable installation.

A detailed method statement with site specific mitigation measures for this activity is included in the CEMP (**Appendix A**). Minimum environmental protection measures to be implemented on site shall include the following:

- A site-specific drilling design, risk assessment and method statement shall be prepared by the contractor prior to the works;
- If drilling fluids are required, a biodegradable fluid such as CLEARBORE shall be used rather than Bentonite;
- HDD operations to be limited to daytime hours and conditions when low levels of rainfall are forecast;
- The depth of the bore shall be at least 3m below the bed of the watercourse;
- Visual inspection to take place at all times along the bore path of the alignment;
- A field response plan to minimize loss of returns of drilling fluid and actions to restore returns shall be provided;
- Silt fences will be constructed around proposed work areas prior to commencement of works;
- No refuelling will take place within 50m of the watercourse or any sensitive habitats;
- Pre-construction verification surveys shall take place at drilling sites to flag any sensitive species occurring; and
- A qualified biological monitor will be onsite for the duration of the drilling operation.

The depth of the bore shall be at least 3m below the level of the public road and stream bed. A detailed survey of buried services within the public road to confirm the conditions predicted in this EIAR will

be carried out by the contractor prior to commencement of the operation. The council will be made aware in advance of the operation and invited to oversee the activity.

Where the grid connection route crosses the M8 motorway, horizontal directional drilling (HDD) will be used, namely a 110kV duct crossing at Corrin View Estate to the South of Junction 15, as shown on **Figure 3-3** and accompanying planning drawings.

The locations of the launch and reception pits will be adequately spaced from the carriageway to ensure the bore is at such depth as not to conflict with the drainage or surface of the motorway or associated embankments.

Consideration was given to trying to accommodate the cables in the over-bridge which spans the motorway at this location however following consultation with TII, Direct Route, and Cork County Council, it was deemed preferable to employ the proposed crossing technique.

There is sufficient room available to accommodate the necessary equipment. The cables will be laid at sufficient depth below the motorway to stay below the motorway drainage and without impacting on the road foundations. There will be a detailed consultation and agreement with TII and the PPP Company, Direct Route in advance of commencing the works.

3.4.18.5.3 Alternative: Concrete Bridge Beam in Road Deck with Ducts in Flat Profile (Electrical Cables)

An alternative to HDD at 2no. bridge crossing locations (WC006 and WC019) is to install the cable ducts in flat formation with a concrete encasement referred to as a concrete bridge beam. The methodology for this option is described as follows:

- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in the CEMP (**Appendix A**)..
- Setting out and location of services will be carried out in the same manner as for trench excavations.
- Traffic management to be set up as per traffic management plan. A TMP has been prepared as part of the EIAR and can be found in Appendix 3-2 of the EIAR.
- The road surface along the route will be milled by road plainer and skid steer.
- A 360-degree excavator will first remove the top layer from the route along the roadside and load onto a haulage truck. This material will be recycled, then the excavation of trench will commence and a trained spotter will be used to assist machine operators while reversing or when their visibility becomes restricted.
- Excavator to run at low revs to avoid damage to the existing structure by sudden movement.
- A banksman to dig trial holes after each layer of the road surface is removed. The maximum depth will be exposed to allow for the greatest cover to be achieved.
- Where necessary as per the engineer's design, protective steel plates will be placed at the base of the excavation such as over the top of bridge key stones.
- Ducts will be placed into trench manually, having been delivered to roadside embankment/verge areas by way of tractor and pipe trailer and then offloaded by hand.
- Concrete is then poured between and 50mm over the ducts maintaining the required spacing's as per the engineer's design.

- A protective steel plate is placed to the sides and over the newly laid ducts as per the engineer's design.
- Cable marker strips in accordance with ESB code:2955103 are placed on top of the steel plates.
- Additional concrete is then placed over the marker tape followed by steel reinforcing mesh.
- Additional concrete is then placed on top of the mesh to the required finished level.
- Depending on the finished levels, if the finish level is below ground level than the remaining depth will be filled with approved fill material the following day after the concrete has set.
- Warning tape will be placed above the concrete beam. The top level will be finished as per the Local Authority Requirements.

It is expected that if the above method is employed, sufficient cover is in place to facilitate the ducting without any need to raise the level of the road carriageway at one location and at the second location (WC019), the potential increase in elevation of the surface level of the road would be less than 150mm and would not result in the need to alter the bridge parapets walls.

3.4.18.5.4 Standard Trench Crossings of Existing Culverts or Services (Electrical Cables)

For the crossing of buried pipe drains, culverts or services, if encountered, the following options for construction may be used:

- Piped Culvert Crossings – Where sufficient cover is available, the cable ducts will be laid above the culvert with a minimum separation distance, typically 300mm to be agreed with the local authority and Eirgrid.
- Piped Culvert Crossings - Where sufficient cover is not available, the cable ducts will be laid under the culvert with a minimum separation distance, typically 300mm to be agreed with the local authority and Eirgrid.
- Flatbed Formation over Culverts - where the cable duct is to be installed over an existing culvert where sufficient cover is not available, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the culvert. The duct will be laid in this trench in a flatbed formation over the existing culvert and will be encased in a reinforced concrete surround as per Eirgrid specification.

When crossing existing culverts or buried services, the following methodology will be employed:

- The general method of trench construction will follow the procedure outlined above for Installation of cable ducting.
- The service infrastructure shall be located and marked by an engineer in accordance with the Code of Practice for Avoiding Underground Services.
- All services will be safeguarded and protected in accordance with the asset owner's specifications.
- Within 500mm of the existing service, hand digging will be employed to expose it.
- Cable ducts shall pass over or under the existing service, depending on the depth of the service and other constraints. Plate 3-2 shows typical design details for ducts passing in flat formation above existing culverts and buried services.
- A minimum separation distance of 300mm shall be maintained between the cable ducts and the existing services.

- Existing services within the trench shall be left in the same condition as they were found. Any issues shall be reported to the asset owner immediately.

3.4.18.5.4.1 Piped Culvert Crossing – Ducting Over Culvert

Watercourses will not be directly impacted upon since no instream works or bridge/culvert alterations are proposed. Where sufficient cover exists above the culvert, the trench will be excavated above the culvert and the ducts will be installed in the trefoil arrangement passing over the sealed pipe where no contact will be made with the watercourses. This method of duct installation is further detailed in **Figure 3.7**.

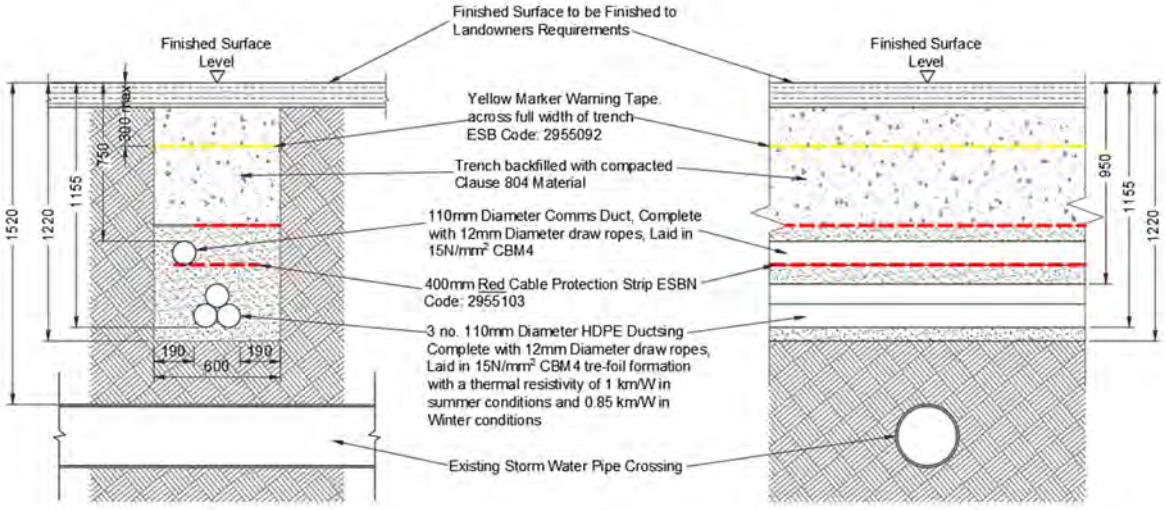

Figure 3-7: Typical Piped Culver Crossing - Ducting over culvert crossing details.

3.4.18.5.4.2 Piped Culvert Crossings – Ducting Under Culvert

Where the culvert consists of a socketed concrete or sealed plastic pipe where sufficient cover over the culvert does not exist to accommodate the cable trench, a trench will then be excavated beneath the culvert and cable ducts will be installed in the trefoil arrangement under the sealed pipe.

This method of crossing is illustrated in **Figure 3-8** below. If these duct installation methods cannot be achieved or utilized, the ducts will be installed by alternative means as set out in the following sections.

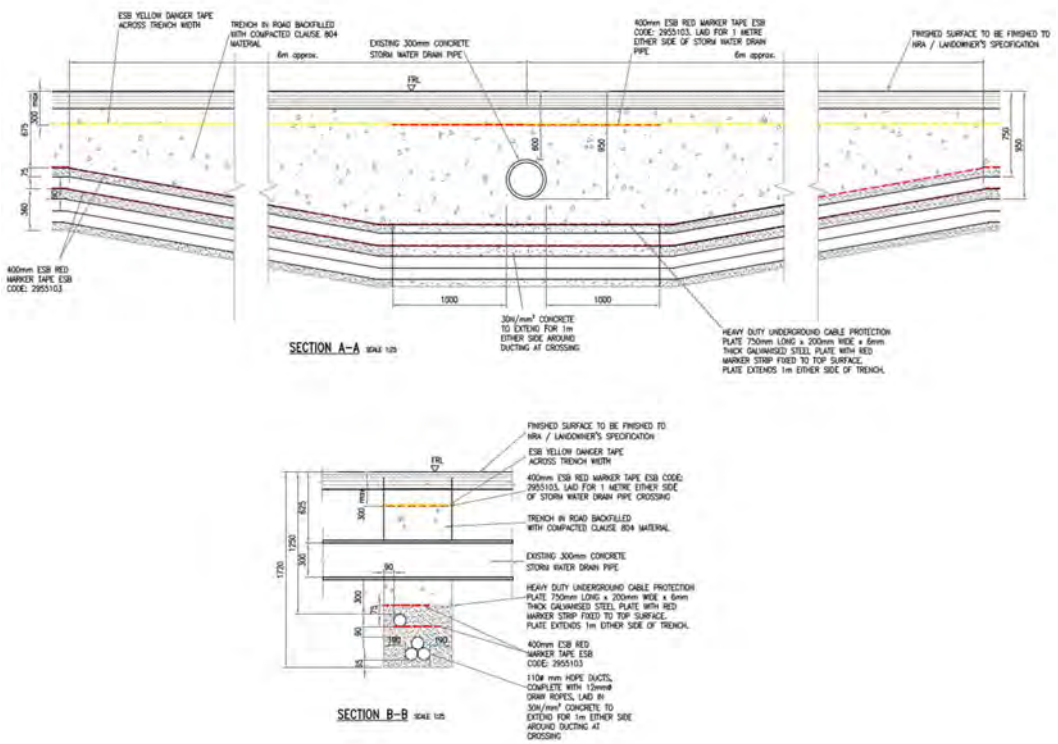

Figure 3-8: Typical Piped Culvert Crossings - Ducting under culvert crossing details.

3.4.18.5.4.3 Flatbed Formation Over Culverts

Where cable ducts are to be installed over an existing culvert where sufficient cover cannot be achieved by installing the ducts in a standard trefoil arrangement, the ducts will be laid in a much shallower trench, the depth of which will be determined by the location of the top of the culvert. The ducts will be laid in a flatbed formation over the existing service and will be encased in a reinforced concrete surround as per Eirgrid specification (**Figure 3-9**).

After the crossing over the culvert has been achieved, the ducts will resume to the trefoil arrangement within a standard trench. This will be done gradually to comply with minimum duct and cable design bend requirements. In transition sections between trefoil and flat formation, the base of the trench shall be graded to eliminate stepping and minimum bedding and surround material will be maintained throughout.

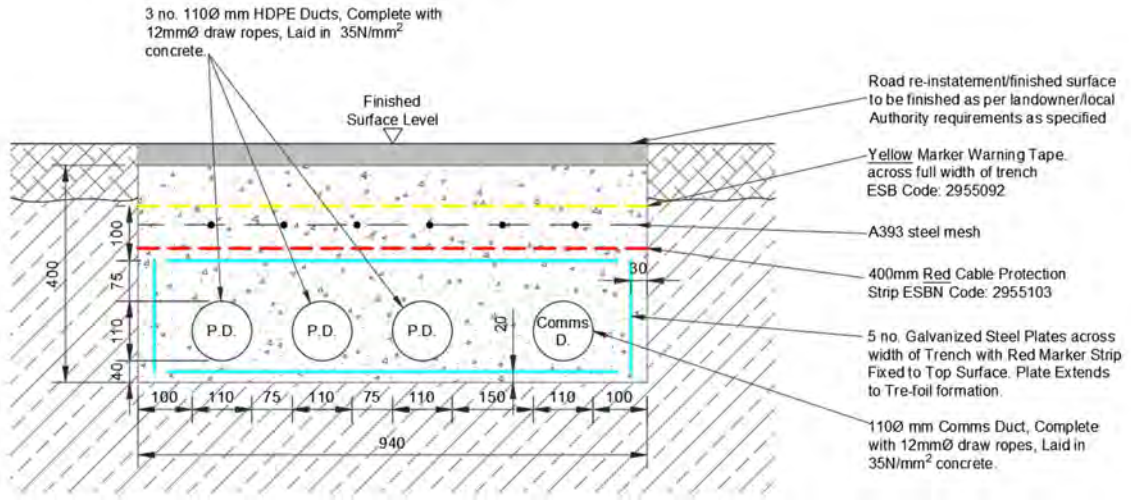

Figure 3-9: Typical Flatbed Formation Detail.

3.4.18.5.5 Minor Watercourses and Drain Crossings (Access Tracks)

All minor watercourse and drain crossings within the site will be crossed using piped culverts. Piped culverts will only be used over very short stretches i.e. at track crossings. Pipe culverts will be sized to take the 1 in 100-year flood flow with a 20% allowance for Climate Change. Concrete or HDPE pipes may be used depending on the size of the watercourse to be crossed. Pipe culverts will be installed in accordance with the typical design shown in **Figure 3-10** below.

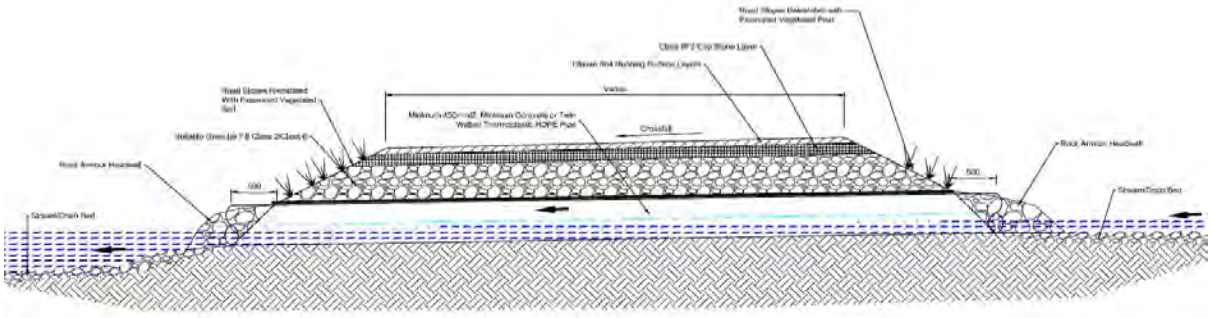

Figure 3-10: Typical Piped Culvert Crossing Long Section.

For a minor watercourse/drain crossing using a piped culvert, the following methodology will be used:

- The access track construction will finish at least 10m from the nearside bank of the minor watercourse/drain.
- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in the CEMP in **Appendix A**.
- Pipe culvert installation will only take place during dry periods.
- The bed of the watercourse will be prepared using a mechanical digger and hand tools to the required levels in accordance with the design.
- A bedding layer will be laid in the base of the minor watercourse/drain using Class 6 aggregate material and blinding to the desired levels in accordance with the design.
- The pipe is laid in one lift or in sections using a crane in accordance with an approved lift plan.

- Bedding material is placed and compacted around the pipe to the desired levels in accordance with the design.
- Where appropriate 500mm of suitable bedding material in the form of clean round gravel between 10-100mm diameter, shall be laid in the base of the pipe in accordance with the recommendations set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses from Inland Fisheries Ireland.
- The pipe is covered using compacted Class 6N fill material in accordance with the design up to the levels required by the access track sub formation.
- Rock armour headwalls will be constructed where necessary to protect pipe ends and the base of slope embankments on either side of the track.
- For small drain crossings, pipes of suitable diameter will be laid directly into the bed of the drain.

In some cases, where existing internal forest tracks need to be widened, it will be necessary to widen, replace or extend existing pipe drains. In such cases, the above measures shall also be employed.

3.4.18.6 Turbine Hardstands

A turbine hardstanding area will be constructed at the base of each turbine to provide a solid area for the main installation crane that will be used to erect the turbine and for the assembly of the turbine.

It is anticipated that the stone required for the construction of the internal access roads will be sourced from quarries in the vicinity and 3no. on-site borrow pits at locations shown in **Figure 3.2** and in the Chapter 3 of the EIAR.

The surrounding quarries currently in operation and indicative haul routes to the site from each of these have been identified. See Chapter 9 and Chapter 13 for more information on quarries and haul routes from same. The list of quarries is as follows:

- Danesfort, Co. Cork. Located 16km from Bottlehill and 35km from Knockdoorty entrance.
- Mallow, Co Cork. Located 20km from Bottlehill and 20km from Knockdoorty.
- Lyravarrig, Co. Cork. Located between the two site entrances, 13km to the Bottlehill entrance and 9km to the Knockdoorty site entrance.

Hard standing formation will consist of a minimum 500mm hardcore on geo-textile membrane. The likely construction methodology for newly constructed tracks will be as follows:

- The formation will be prepared to receive the geotextile membrane.
- Stone will be placed and compacted in layers to minimum 500mm depth.
- A drainage ditch will be formed, within the excavated width and along the sides of the hard standing.
- Surplus topsoil will be placed along the side of the hard standing and dressed to blend in with surrounding landscaping.
- Surplus excavated subsoil will be used to reinstate borrow pits.

3.4.18.7 Turbine Foundation

The base of the foundations are excavated to competent bearing strata or where this depth is excessive piling may be required. However based on site investigations carried out to date, it is considered that all turbine foundations shall be shallow base types and founded on either rock or glacial till. This will be confirmed with further site investigations prior to construction.

Excavated soil will be placed in the temporary storage areas adjacent to the turbines. Formwork and reinforcement are placed, and the concrete poured. Once the concrete is set the earthing system is put in place and the foundation is backfilled with suitable material.

3.4.18.8 Turbine Erection

Once the turbine components arrive on site they will be placed on the hardstand and lay down areas prior to assembly. The towers will be delivered in sections and each blade will be delivered in a separate delivery. Once there is a suitable weather window the turbine will be assembled.

It is anticipated that each turbine will take approximately 3 to 4 days to erect (depending on the weather), requiring two cranes. Finally, the turbines will be commissioned and tested.

It is expected that the construction phase, including civil, electrical and grid works, and turbine assembly will take between approximately 18-24 months.

3.4.18.9 Erection of Permanent Met Masts

The works shall be carried out by a small crew and the following mobile plant:

- Low-loader;
- Flat bed trucks;
- Works Van;
- Telescopic Handler; and
- Mobile Crane

The sequence of works for the erection of the permanent met masts is as follows:

- The site of the mast location shall be marked out and the necessary area cleared of vegetation.
- Mark out mast base and anchor positions in accordance with detailed design drawings. Mast anchor positions are at approximately 30m and 50m radius from the mast in the direction of each corner of the mast's triangular base.
- A temporary access track shall be extended towards the mast location from the existing energy park and forest track network. The access track shall be up to 3.5m in width.
- Temporary and permanent drainage infrastructure shall be extended also.
- A small crane pad of approximately 10m x 10m in size shall be constructed in front of the proposed mast location.
- General construction methods for the above access track and hard standing shall match those described in **Sections 3.4.5.4**. However, the dimensions and stone depth requirements of the access infrastructure will be considerably less than that required for that serving the wind turbine construction.
- The foundation shall be excavated followed by shuttering, steel fixing and finally concrete pouring by ready mix truck. Excavation and concrete operations shall be carried out in accordance with the CEMP (**Appendix A**).

- Excavate holes for anchors to required depth and install anchors. These shall not exceed a depth of 2m.
- Following crane setup, the mast sections shall be delivered and unloaded by truck.
- In accordance with an agreed lifting plan, mast sections shall be lifted by crane into place. Wind speeds shall be monitored at all times during lifting operations by the lead climber and crane operator.
- Mast sections shall be bolted together by climbers.
- Before raising of the third mast section, 10mm stainless steel guy ropes are fitted at the lugs on the top triangular section of the mast. These ropes are connected using shackles and are uncoiled to hang down when the section is erected.
- Following erection of main mast sections, lightning protection and other ancillary components shall be fixed to the mast.

The masts will be decommissioned using a similar methodology as the construction except in reverse.

3.4.18.10 Waste Management

The Developer, in conjunction with appointed contractor, will prevent, reduce, reuse and recover as much of the waste generated on site as practicable and to ensure the appropriate transport and disposal of residual waste off site. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

Any waste generated during the development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary compound during construction. It will be the responsibility of the contractor for the main construction works (when appointed) to nominate a suitable site representative, such as a Project Manager, Site Manager or Site Engineer as Waste Manager, who will have overall responsibility for the management of waste. The waste manager will have overall responsibility to instruct all site personnel including sub-contractors to comply with on-site requirements. They will ensure, at an operational level, that each crew foreman is assigned direct responsibility.

3.4.18.10.1 Waste Generated

It is envisaged that the following categories of waste will be generated during the construction of the CGEP Project:

- municipal solid waste (MSW) from the office and canteen.
- construction and demolition waste.
- waste oil/hydrocarbons.
- paper/cardboard.
- Timber.
- steel.

Sanitary waste will be removed from site by a licensed waste disposal contractor. All portaloo units located on site during the construction phase will be operated and maintained in accordance with the manufacturer's instructions and will be serviced under contract with the supplier. All such units will be removed off-site following completion of the construction phase.

A fully authorised waste management contractor will be appointed prior to construction works commencing. This contractor will provide appropriate receptacles for the collection of the various waste streams and will ensure the regular emptying/and or collection of these receptacles.

The following **Table 3.5** lists licensed waste facilities in the surrounding area:

Table 3-5: Licensed Waste Facilities

Facility	Type of wasted accepted	Location
McGill-Glenville	Compostable waste	Glenville
Red Fox	Recyclables, non-recyclables, wood, metal, rubble, junk removal	Churchfield Industrial Estate
Ashgrove recycling	Construction waste, metal, wood, soil, rubble, plastic	Churchfield Industrial Estate
Munster waste management	Domestic, commercial, industrial, agricultural	Mallow
Enva	Construction waste, general waste, hazardous waste	Ringaskiddy
Raffeen civic amenity site dump	Paper, cardboard, metal, green waste, plastic, waste oil, glass, timber	Monkstown

3.4.18.10.2 Waste Minimisation/Reduction

All efforts will be made by site management to minimise the creation of waste throughout the project. This will be done by:

- material ordering will be optimised to ensure only the necessary quantities of materials are delivered to site;
- material storage areas will be of a suitable design and construction to adequately protect all sorted materials to ensure no unnecessary spoilage of materials occurs which would generate additional waste.
- all plant will be serviced before arriving on site. This will reduce the risk of breakdown and the possible generation of waste oil/hydrocarbons on site.
- all operators will be instructed in measures to cut back on the amount of wastage for trimming of materials etc. for example cutting of plywood, built into the amount ordered.
- educating foremen and others to cut/use materials such as ply wisely for shutters etc.
- prefabrication of design elements will be used where suitable to eliminate waste generation on site.
- where materials such as concrete are being ordered, great care will be practiced in the calculation of quantities to reduce wastage.

3.4.18.10.3 Waste Reuse

When possible, materials shall be re used onsite for other suitable purposes, e.g.:

- re-use of shuttering etc. where it is safe to do so.

- re-use of rebar cut-offs where suitable.
- re-use of excavated materials for screening, berms etc.
- re-use of excavated material, etc. – where possible will be used as suitable fill elsewhere on site for site tracks, the hardstanding areas and embankments where possible.
- excess subsoils from excavations shall be used to reinstate borrow pits on site.

It is important to clarify that any excess excavated material that will be used for fill, re-instatement, or similar activities, within the development site boundary, is not technically categorised as a waste material under relevant waste legislation, rather this material is exempt from waste classification.

Article 2 (1) (c) of Directive 2008/98/EC on waste, transposed through Article 26 (1) (c) of the European Communities (Waste Directive) Regulations (S.I. 126 of 2011) identifies the following as being an exemption from waste regulation:

> "*uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated*".

Surplus material will be re-instated in its natural condition on the site from which it was excavated, this material is not considered as waste.

3.4.18.10.4 Waste Recycling, Recovery & Disposal

In accordance with national waste policy, source separation of recyclable material will take place. This will include the provision of receptacles for the separation and collection of dry recyclables (paper, cardboard, plastics etc.), biological waste (canteen waste) and residual waste.

Receptacles will be clearly labelled, signposted and stored in dedicated areas.

The following source segregated materials containers will be made available on site at a suitable location:

- timber.
- ferrous metals.
- aluminium.
- dry mixed recyclables.
- packaging waste.
- food waste.

The materials will be transported off-site by an authorised contractor to a permitted recovery centre and these materials will be processed through various recovery operations.

Residual waste generated on-site may require disposal. This waste will be deposited in dedicated receptacles and collected by the permitted waste management contractor and transported to an appropriate facility. All waste movements will be recorded, of which records will be held by the waste manager on-site.

3.4.18.11 Turbine Delivery Route

While the TDRs contain more nodes than those examined in this report, only those nodes with potential to affect Natura 2000 sites (due to nature of works) are covered in this report. These nodes are described below and summarised in **Table 3.6.**

Route 1 contains 4 relevant nodes; nodes 1.3 and 1.4 are at the slip road junction linking the R635 to the N8. The first of these (Node 1.3) will require street furniture removal, hedge/tree trimming, and ramping of an existing traffic splitter island. The next (Node 1.4) requires removal of a street light and may require extra load bearing along a section of road verge. Node 1.6 at the N20/L2950 junction requires scrub trimming for oversail. Node 1.7 is at the existing Bottlehill landfill site; this will require scrub clearance and hedgerow trimming for both oversail and load-bearing.

Route 2 contains 15 nodes; these are at M8 Junction 14, R639/N72 Junction (Fermoy Town), immediately east of Fermoy Town, at Ballyhooly, near Bloomfield Crossroads to the south of Ballyhooly Bridge, and along the local road approaching the proposed windfarm site.

Node 2.0 at M8 Junction 14 will require removal of street furniture, hedge trimming, and extra load bearing on sections of grassed verges. Node 2.1 in Fermoy Town will require removal of street furniture and ramping of two splitter islands. Node 2.2 east of Fermoy will require tree trimming. Node 2.3 east of Fermoy will require removal of a low bank, and possibly also load bearing along the road verge. Node 2.4 which is in the same area will require removal of road signs, and load bearing along the road verge. Node 2.5 at Ballyhooly will require lowering of sections of hedgerow, removal of a section of wall, and load bearing in sections of verges. Node 2.6 at Ballyhooly will require lowering of a stone wall to ground level and regrading of the hillside behind the wall. Node 2.7 at Ballyhooly will require lowering of a section of wall and load bearing along the road verge. Node 2.8 to the south of Bloomfield Crossroads will require road widening and tree felling.

Nodes 2.9 and 2.10, will require road widening and tree felling. Road widening, lowering of hedge/bank and tree trimming is required at Node 2.11; tree trimming at Node 2.12; scrub trimming at Node 2.13, and road widening & scrub felling at Node 2.14.

The construction works in the nodes associated with the TDR are expected to last 3 weeks.

Table 3-6: Works at each Node in preparation for the TDR (Appendix C).

Node	Works/actions
Route 1 Tivoli-Bottlehill	
1.3	• Street furniture removal; • hedge/tree trimming; • ramping of existing traffic splitter island.
1.4	• Removal of street light and possibly extra load bearing along a section of road verge
1.6	• Scrub clearance and furniture removal
1.7	• Scrub clearance and hedgerow trimming
Route 2 Dunkettle – Nagle's Mountains	
2.0	• Removal of street furniture, hedge trimming, extra load bearing on sections of grassed verges
2.1	• Removal of street furniture, ramping of two splitter islands (using asphalt wedges)
2.2	• Hedge trimming; reduce to 3m over road level & 2.5m depth
2.3	• Removal of roadside bank and possibly also load bearing along the road verge
2.4	• Removal of road signs and load bearing along the road verge
2.5	• Removal of pole and road signs, lowering of wall (south side) and bank (north (side)
2.6	• Lowering of [retaining] wall and re-grading of slope
2.7	• Lowering of a section of wall and may require load bearing along road verge
2.8	• Road widening and tree felling
2.9	• Road widening and tree felling
2.10	• Road widening and tree felling
2.11	• Road widening and hedge trimming
2.12	• Tree trimming
2.13	• Hedge/scrub trimming
2.14	• Road widening and scrub trimming

3.4.19 Operation and Lifespan

3.4.19.1 Proposed CGEP

During the operational period, the turbines will operate automatically on a day to day basis, responding by means of anemometry equipment and control systems to changes in wind speed and direction. The turbine manufacturer or a service company will carry out regular maintenance of the turbines.

Scheduled services will typically occur twice a year. The operation of the wind turbines will be monitored remotely, and a caretaker will oversee the day to day running of the proposed wind farm.

The expected physical lifetime of the turbine is approximately 30 years, and permission is sought for a 30-year operation period commencing from full operational commissioning of the wind farm. It should be noted that Section 7.2 of the Planning Guidelines 2006 includes for the following:

> "*The inclusion of a condition which limits the life span of a wind energy development should be avoided, except in exceptional circumstances*"

In this respect, the applicant requests the grant of permission is on the basis of a 30-year operational period from the date of full operational commissioning of the wind farm.

3.4.20 Decommissioning

3.4.20.1 Proposed CGEP Development and Grid Connection Route

Following the end of their useful life, the wind turbines may, subject to planning permission, be replaced with a new set of turbines or the site may be decommissioned. On decommissioning, cranes will disassemble the above ground turbine components which would be removed off site for recycling. All the major component parts are bolted together, so this is a relatively straightforward process. The foundations will be covered over and allowed to re-vegetate naturally if required. Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise and vibration and dust. It is proposed that the internal site access tracks will be left in place, subject to agreement with Cork County Council and the relevant landowners.

The proposed on-site substations shall be taken in charge by ESBN/Eirgrid upon completion and shall be left in place forming part of the national electricity network.

Underground cables will be cut back and left in place.

A detailed decommissioning plan will be agreed in advance of construction with Cork County Council. An decommissioning plan is contained in the CEMP in **Appendix A**.

3.5 Application of Protection Measures in the Screening Evaluation

The Screening evaluation to inform the AA process is carried out in the absence of any protective measures for the proposed CGEP Project, which may be required or prescribed to avoid or reduce harmful effects on designated European Sites.

3.6 Other Projects included in Screening assessment in relation to in-combination effects

3.6.1 Other proposed CGEP Project Elements

3.6.1.1 Replacement Lands

Replacement replanting of forestry can occur in Ireland subject to licence in compliance with the Forestry Act 2014as amended. The consent for such replanting is covered by statutory instrument (S.I.) 191mof 2017 Forestry Regulations 2017 as amended. This legislation provides for development of afforestation and forest road construction project's adherence to compliance with the Environmental Impact Directive and Habitats Directive insofar as it applies to forestry development.

As part of the application for the CGEP Project, felling of approximately 62.8ha of coniferous forestry is required within and around the wind farm infrastructure to accommodate the construction of some turbines, hardstands, crane pads, access tracks and the onsite substations, with a requirement to replant the same area. Two areas are then proposed for replanting, in Moneygorm, Co. Cork and Ballard, Co. Wicklow, totalling approximately 77.3 ha.

3.6.1.1.1 Moneygorm, Co. Cork

The proposed replant lands are made up of a large (c.40 Ha) open expanse of Improved Agricultural Grassland (GA1) bordered by Scrub (WS1) and Grassy Verges (GS2) in the townland of Moneygorm on the southern side of Nagle's Mountains on a flat spur overlooking the Bride valley, accessed via the R614, un-named local roads, and farm/forestry access tracks **Figure 3-5**. The surrounding landscape is both mountainous and rural in character, with pasture and commercial forestry being the dominant land uses; the replant lands site is surrounded to the west and north-east by conifer plantations, and to the north, south and south-east by agricultural land.

The planned activities at Moneygorm, Co. Cork are:

- Tree Planting:
  - Sitka Spruce (34.2 ha); and
  - Additional Broadleaved Species (6 ha).
- Additional Details:
  - Drainage;
  - Ground preparation: Mounding;
  - Planting Method: Angle Notch;
  - Access: Existing Track;
  - Fertilizer [Zero Phosphate];
  - Herbicide Control (years 0 – 2);
  - Manual Control (years 3 - 4); and
  - Upgrade existing fence to deer and sheep-proof specification.

3.6.1.1.2 Ballard, Co. Wicklow

The proposed afforestation area in Ballard, Co. Wicklow, is surrounded by a landscape both mountainous and rural in character, with pasture and commercial forestry being the dominant land uses. The replant lands site is surrounded to the west and south by conifer plantations, and to the north, by semi-natural woodland, rivers and then further to agricultural land. The site is divided into two sections by a private road, the westerly and easterly sections and are composed of areas of c.23.7 and 12.8 Ha, respectively. Both sites are at elevations of 160-207m OD.

Technical approval has been granted by the Department of Agriculture, Food and the Marine for the following planting at Ballard, Co. Wicklow (Forest Owner No: FO101174V, Contract No: CN77296):

- Tree Plantig:
  - Sitka Spruce / Additional Broadleaved Species Integrated Mix (34.11 ha)
  - Alder / Silver Birch Integrated Mix (1.67 ha)
  - Alder (1.32 ha)
- Additional Details:

- Drainage
- Ground preparation: Mounding
- Planting Method: Angle Notch
- Access: Existing Track
- Fertilizer [Zero Phosphate]
- Herbicide Control (years 0 – 2)
- Manual Control (years 3 - 4)
- Upgrade existing fence to deer-proof specification

The replanting will be compliant with the procedures & standards of Forestry Schemes Manual (2011), and Forestry & Water Quality Guidelines[6].

3.6.2 Other Plans and Projects included in the assessment of in-combination effects

Projects and land use activities identified with potential to result in in-combination effects with the proposed CGEP Project are presented in **Table 3-7**.

Table 3-7: Evaluation of potential in-combination effects on European sites.

Development	Planning Reference	Potential for significant in-combination/ cumulative effects
Windfarm Developments	Several as detailed	The closest windfarm development is a single wind turbine at Moneygorm, Glenville, Co Cork (1.4km distant from the site). The following windfarm developments are the closest windfarm developments to the site which have been granted planning; Castlepook Wind farm (14 turbines, c. 21.8km from site); Knocknatallig Wind Farm (6 turbines, c. 24km from the site); Boggeragh Wind Farm (38 turbines, c. 23km from the site); Esk Windfarm (12 turbines, c. 21km from the site). These projects having been granted planning and were subject to Appropriate Assessment that ruled out significant adverse effects. **No significant in-combination effects between the proposed CGEP Project and European sites are anticipated.**

[6] Available at https://www.agriculture.gov.ie/forestservice/environmentalinformation/. Accessed in February 2020.

Development	Planning Reference	Potential for significant in-combination/ cumulative effects
Alteration of Mallow Sewerage Scheme	195078	A NIS and EIS have been submitted and has concluded that it has been concluded that the proposed development will not have an adverse effect on the integrity of the Blackwater River (Cork/Waterford) SAC or any other European sites. Furthermore, the environmental reports also state that, during construction, there will be a short-term impact on the River Blackwater which will be effectively minimised by the implementation of mitigation measures. **Given the separation distance of over 10km from the proposed CGEP development, no potential in-combination impacts on European Sites are likely, with the exception of possible in-combination effects to identified short term adverse effects on the River Blackwater SAC. <u>Further consideration (AA) of in combination effects is required for this European site.</u>**
Agricultural Development, Ballyhooly Mallow, Co. Cork	186848	An EIS has been submitted and has concluded the following: "*As the proposed development would take place primarily within habitats of low ecological value and given the small development footprint, the potential impacts upon bird and mammals species would be greatly reduced.* *Assuming all mitigation measures are put in place, there would be no significant residual impacts to the aquatic environment from the proposed development. It is considered that due to the drainage system design and the distance of the proposed development to the Blackwater River SAC and Blackwater Callows SPA, there would be no significant impact upon a designated site due to drainage."* **Considering the above and given the separation distance from the proposed CGEP development, no potential in-combination effects on European sites are anticipated.**
Redevelopment of Former Central Hotel	186167	A NIS has been submitted which concluded that "*the habitats to be affected are highly modified and of minimal ecological value. Thus, no potential impact from loss of habitat have been identified. Given the scale and nature of the project and proposed construction mitigation measures, it can be objectively concluded that the proposed development on its own, and in combination with other plans and projects, will not have a significant impact on qualifying interests and conservation objectives for Natura 2000 sites, and the integrity of these sites will not be adversely affected".* **Considering the above and given the separation distance from the proposed CGEP development, no potential in-combination effects on European sites are anticipated.**

Development	Planning Reference	Potential for significant in-combination/ cumulative effects
Residential development and associated works, Navigation Road Annabella Mallow Co. Cork	185112	A NIS has been submitted which concludes: "*As none of the Natura 2000 sites overlap the proposed development site, direct impacts via habitat loss or disturbance/ displacement are not relevant. The development proposes to manage and control surface-water run off during both construction and operational phases prior to release into the environment by implementing standard environmental controls. Surface water run-off from other new proposed or permitted unbuilt developments that will also connect into the same public stormwater sewer network could result in a cumulative and in-combination effect. However, assuming that all developments closely adhere to best practice regarding water quality protection during construction and operational phases, then no significant negative cumulative impacts are expected to occur".* **Considering the above and given the separation distance from the proposed CGEP development, no potential in-combination effects on European sites are anticipated.**
Dairygold Co-operative Society Ltd: Construction works. Annabella West End Mallow Co. Cork	184946	A NIS and EIS have been submitted which concludes that "*No significant ecological residual impacts are expected as a result of the construction and operational phase of the proposed development. Provided the recommended mitigation measures are implemented in full it is not expected that the construction and operational phases will result in an adverse residual impact on the integrity of Natura 2000 sites considered in this NIS, namely Blackwater River (Cork/Waterford) SAC".* **Considering the above and given the separation distance from the proposed CGEP development, no potential in-combination effects on European sites are anticipated.**
Development of residential units, Clyda Court Quartertown Lower Mallow Co. Cork	176722	An AA Screening Report has been submitted which concludes that, potentially, the proposed development could impact on aquatic species due to increased silt run-off or chemical contamination of groundwater or surface during construction. Overall, given the limited nature of the development and the distance from European sites and the precautionary measures described, impacts on water quality and aquatic ecology are predicted to be negligible. The development will not have a significant impact on qualifying interests and conservation objectives for Natura 2000 sites, and that the integrity of these sites will not be adversely affected. No significant direct, indirect or cumulative effects on Natura 2000 sites have been identified. **The impacts on water quality and aquatic ecology are predicted to be negligible and no potential in-combination effects on European sites are expected in-combination with the CGEP Project.**

Development	Planning Reference	Potential for significant in-combination/ cumulative effects
The development of 14 no. serviced sites for future employment uses. Ballydahin and Gooldshill Mallow Co. Cork	167121	Potential in-combination impacts with the proposed CGEP Project can be inferred from the Screening Assessment for the Proposed Quarry Industrial Estate Site at Ballydahin, Mallow, Co. Cork. These are based on the identified potential to spread invasive alien plant species (Japanese knotweed and Himalayan balsam) and downstream habitat degradation through increased siltation. **However, the project includes a number of best-practice and mitigation measures. In this case, no potential in-combination effects with the proposed CGEP Project are expected.**
The construction of 108 no. dwelling houses, "Clonmore" Ballyviniter Lower Mallow Co. Cork	166949	An EIS an AA Screening Report have been submitted concluding that: "*Due to the small scale of the run-off and additional discharges from the Glasha Stream that will be generated by the proposed development relative to the flows in the River Blackwater, and the distance of the site from the SAC, it can be concluded that the proposed development will not have a measurable impact on water quality or flow rates in the SAC. Construction work is not likely to cause significant disturbance to the local otter population, due to distance from suitable habitat.*" **Considering the above and given the separation distance from the proposed CGEP development, no potential in-combination effects on European sites are expected.**
A residential development comprising the construction of 88 no. dwelling houses, Annabella Mallow Co. Cork	156970	An AA Screening Report has been submitted which concludes that adopting the environmental design features as outlined for the proposed development will ensure no significant effects to any species for which the Blackwater SAC is designated will occur as a result of the development. **Considering that the environmental design measures described in the report are complied with, no potential in-combination impacts on biodiversity receptors are expected.**
Construction of 61 no. dwelling houses, Annabella Mallow Co. Cork.	156119	An AA Screening Report has been submitted which concludes that due to the location and nature of the proposed works, and with the implementation of standard appropriate environmental actions and best practice, negative effects on the qualifying interests of the Blackwater River SAC will be avoided. **Assuming the implementation of standard appropriate environmental actions and best practice, as described in the report are complied with, no potential in-combination impacts on biodiversity receptors are expected.**

Development	Planning Reference	Potential for significant in-combination/ cumulative effects
Construction of fabricating workshop, office block, ESB substation and other associated works, Mallow Business & Technology Park Quartertown Lower Mallow	154690	An Appropriate Assessment Report has been submitted which concludes that there is no evidence to indicate that works will cause, either directly or indirectly, significant deterioration of important habitats, of the habitats of the qualifying species and species of special conservation interest or significant disturbance to these species, thus ensuring the integrity of the Blackwater SAC is protected. **The AA screening references standard construction mitigation measures to be implemented, documenting details that no surface water, soils or contaminants will be permitted to the nearby Quarterstown stream, precluding hydrological connectivity with European sites. No in-combination effects with the proposed CGEP Project are therefore expected.**
The construction of 10 no. dwelling houses to replace 8 no. residential serviced sites, An Gleann Ull Ballyhooly North Fermoy Co. Cork	196597	An EIAR and AA Screening Report have been submitted for this development which conclude that, following a comprehensive evaluation of the proposed direct, indirect and cumulative impacts on the qualifying interests and conservation objectives for the Blackwater River SAC, the proposed development will not have an adverse effect on the integrity of the Blackwater River SAC or any other Europeans site. **The AA Report includes a number of generic and specific mitigation measures in relation to the management of wastewater, construction waste, noise and prevention of invasive species that would be expected to prevent any in-combination effects with the proposed CGEP Project.**
Construction of 20 no. semi-detached 2-storey houses and associated site works, Lios Ard Ballyhooly South Fermoy Co. Cork	195486	An Appropriate Assessment Screening Report has been submitted which concludes that there is no evidence to indicate that works will cause, either directly or indirectly, significant deterioration of important habitats, of the habitats of the qualifying species and species of special conservation interest or significant disturbance to these species, thus ensuring the integrity of the Blackwater SAC is protected. **The AA Report includes the reference to a number of standard environmental controls to be followed during construction and operation phases, in relation to the management of wastewater, construction waste, noise and prevention of invasive species that would prevent any in-combination effects with the proposed CGEP Project.**

Development	Planning Reference	Potential for significant in-combination/ cumulative effects
The construction of 31 no. dwelling houses and all associated works, Glanworth (Townland) Fermoy Co. Cork	195486	An Appropriate Assessment Screening Report has been submitted which concludes there will be no significant effects on the Blackwater River SAC and Blackwater Callows SPA. **The Appropriate Assessment Screening indicates the implementation of standard environmental controls, during construction phase, and SuDS infrastructure, during operation phase, to eliminate the potential impacts affecting habitats or species due to increased silt-laden or contaminated surface water runoff. Disturbance/displacement effects are also considered insignificant due to the absence of habitats of ecological interest or value within the vicinity of the development. No in-combination effects with the proposed CGEP Project are expected.**
6 no semi-detached 3 storey houses and 8 no residential serviced sites and associated site works. An Gleann Ull Ballyhooly North Fermoy Co. Cork	175734	An Appropriate Assessment Report has been submitted which concludes there will be no significant effects on the Blackwater River SAC and Blackwater Callows SPA. **The Assessment concluded that the development is located at a distanced enough from a designated site to preclude any disturbance or displacement effects on habitats and mobile species. The Assessment also mentions the management of surface and wastewater emissions, ensuring the water quality of hydrologically connected receptors. No in-combination effects with the proposed CGEP Project are expected.**
Permit extension for the construction of 102 no. dwelling houses, creche and associated site works, Ballynamona Pike Road Fermoy	155973	No environmental information available.
Construction of a creche facility to serve the adjacent permitted residential development (Cork County Council Ref. 18/6579), the construction of 19 no. dwelling houses and other site works, Lisnagar Demesne (Townland) Rathcormac Co. Cork	196892	A NIS has been submitted which concludes that there will be no significant effects, either alone or in combination with other plans and projects, on the integrity of the Blackwater SAC as a result of the proposed development **The mitigation measures/best practice measures proposed in the NIS report are meant to prevent pollution to receiving water bodies. With the implementation of such measures, no significant effects are anticipated to European sites and no in-combination effects with the proposed CGEP Project are expected.**
Residential Development - Construction of 96 no. dwelling houses and all associated ancillary site development works, Lisnagar Demesne Rathcormac, Co. Cork	186579	A NIS has been submitted which concludes that there will be no adverse impacts, either alone or in combination with other plans and projects, on the integrity of the Blackwater SAC as a result of the proposed development. **The mitigation measures/best practice measures proposed in the NIS report are meant to prevent pollution to receiving water bodies. With the implementation of such measures, no significant effects are anticipated to European sites and no in-combination effects with the proposed CGEP Project are expected.**

Development	Planning Reference	Potential for significant in-combination/ cumulative effects
Existing Forestry Activity on the site	None	Forest management is subject to licencing that include protection measures for safeguarding water quality. **No significant in-combination effects with the proposed CGEP Project are expected.**

The rationale provided in **Table 3-7** above, regarding each of the listed projects, awards a high degree of confidence that there is no potential for significant in-combination/cumulative effects with the proposed development, with the possible exception of Mallow Sewerage Scheme which is considered in more detail in **Section 4.5** below.

3.7 European sites under consideration

3.7.1 Distance of the Development to European sites

A precautionary distance of 15km from each of the proposed CGEP Project elements (i.e. CGEP, Grid Connection, TDR, Replant Lands) was chosen to evaluate the potential for significant effects on European sites. The potential zone of influence was also considered to extend to European sites located outside the 15 km buffer, where downstream hydrological links exist. No additional European sites beyond the 15 km buffer were identified as being within the zone of influence, based on the potential for significant effects associated with the proposed project. This assessment includes consideration of possible adverse effects (displacement, collision, disturbance) to birds associated with remote SPA's (refer to **section 2.4.3**).

There are eleven European sites within 15km of the proposed CGEP Project. **Table 3-8** identifies the relevant European sites identified for the proposed CGEP Project and are projected in **Figure 3-11**, **Figure 3-12**, **Figure 3-13**, **Figure 3-144** and **Figure 3-15**.

Table 3-8: Proximity of European Sites to the proposed CGEP Project elements.

Element	Site	European Site	Distance from the nearest CGEP Element
CGEP development		Blackwater Callows SPA (Site Code 004094)	11.7 km
		Blackwater River (Cork/Waterford) SAC (Site Code 002170)	551 m
Grid Connection Route		Blackwater River (Cork/Waterford) SAC (Site Code 002170)	1.3 km
		Blackwater Callows SPA (Site Code 004094)	4.2 km
TDR Nodes		Cork Harbour SPA (Site Code 004030)	1.3 km

Element	Site	European Site	Distance from the nearest CGEP Element
		Great Island Channel SAC (Site Code 001058)	5.6 km
		Lower River Suir SAC (Site Code 002137)	14 km
		Blackwater River (Cork/Waterford) SAC (Site Code 002170)	10 m
		Blackwater Callows SPA (Site Code 004094)	1.3 km
Met Masts		Blackwater River (Cork/Waterford) SAC (Site Code 002170)	2.3 km
Replacement Lands	Moneygorm	Blackwater River (Cork/Waterford) SAC (Site Code 002170)	380 m
		Blackwater Callows SPA (Site Code 004094)	13.9 km
	Ballard	Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733)	4.7 km
		Wicklow Mountains SPA (Site Code: 004040)	7.8 km
		Wicklow Mountains SAC (Site Code: 002122)	7.8 km
		Deputy's Pass Nature Reserve SAC (Site Code: 000717)	9.0 km
		Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729)	13.4 km
		Slaney River Valley SAC (Site Code: 000781)	14.7 km

3.7.2 Description of the European sites under consideration

Table 3-9 synthetises the description of the European sites considered under this Screening. Full site Synopsis and Conservation Objectives for each of the European sites are available at the National Parks & Wildlife Service website[7] and are listed in **Appendix D**.

Table 3-9: Description of European sites within a 15km radius of the proposed CGEP Project.

European site Name and Code	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Locational Context of European site (extracted from site Synopsis)
Blackwater River (Cork/Waterford) SAC (002170)	• Freshwater Pearl Mussel *Margaritifera margaritifera* [1029] • White-clawed Crayfish *Austropotamobius pallipes* [1092] • Sea Lamprey *Petromyzon marinus* [1095] • Brook Lamprey *Lampetra planeri* [1096]	The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. In times of heavy rain fall the levels can fluctuate widely by more than 12 feet on the gauge at Careysville. The peaty nature of the

[7] Available at https://www.npws.ie/protected-sites. Accessed in November 2020.

European site Name and Code	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Locational Context of European site (extracted from site Synopsis)
	• River Lamprey *Lampetra fluviatilis* [1099] • Twaite Shad *Alosa fallax* [1103] • Atlantic Salmon *Salmo salar* (only in fresh water) [1106] • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Perennial vegetation of stony banks [1220] • Salicornia and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Otter *Lutra lutra* [1355] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Killarney Fern *Trichomanes speciosum* [1421] • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] • *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0] • **Taxus baccata* woods of the British Isles [91J0]	terrain in the upper reaches and of some of the tributaries gives the water a pronounced dark colour. The site consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, the tidal stretches as far as Youghal Harbour and many tributaries, the larger of which include the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun. the River Blackwater is of considerable conservation significance for the occurrence of good examples of habitats and populations of plant and animal species that are listed on Annexes I and II of the EU Habitats Directive, respectively. Additionally, the importance of the site is enhanced by the presence of a suite of uncommon plant species.
Blackwater Callows SPA (004094)	• Whooper Swan *Cygnus cygnus* [A038] • Wigeon *Anas Penelope* [A050] • Teal *Anas crecca* [A052] • Black-tailed Godwit *Limosa limosa* [A156] • Wetland and Waterbirds [A999]	The Blackwater Callows SPA comprises the stretch of the River Blackwater that runs in a west to east direction between Fermoy and Lismore in Counties Cork and Waterford, a distance of almost 25 km. The site includes the river channel and strips of seasonally-flooded grassland within the flood plain. The Blackwater Callows SPA is of importance for its populations of wintering waterfowl, including an internationally important population of Whooper Swan and nationally important populations of Wigeon, Teal and Black-tailed Godwit. The presence of Whooper Swan, as well as Little Egret, is of particular note as these species are listed on Annex I of the E.U. Birds Directive. Part of the Blackwater Callows SPA is a Wildfowl Sanctuary.
Cork Harbour SPA (004030)	• Little Grebe (*Tachybaptus ruficollis*) [A004] • Great Crested Grebe (*Podiceps cristatus*) [A005] • Cormorant (*Phalacrocorax carbo*) [A017] • Grey Heron (*Ardea cinerea*) [A028] • Shelduck (*Tadorna tadorna*) [A048] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Pintail (*Anas acuta*) [A054]	Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. Cork Harbour is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and

European site Name and Code	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Locational Context of European site (extracted from site Synopsis)
	• Shoveler (*Anas clypeata*) [A056] • Red-breasted Merganser (*Mergus serrator*) [A069] • Oystercatcher (*Haematopus ostralegus*) [A130] • Golden Plover (*Pluvialis apricaria*) [A140] • Grey Plover (*Pluvialis squatarola*) [A141] • Lapwing (*Vanellus vanellus*) [A142] • Dunlin (*Calidris alpina*) [A149] • Black-tailed Godwit (*Limosa limosa*) [A156] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Common Gull (*Larus canus*) [A182] • Lesser Black-backed Gull (*Larus fuscus*) [A183] • Common Tern (*Sterna hirundo*) [A193] • Wetlands & Waterbirds	also for its populations of Black-tailed Godwit and Redshank. In addition, it supports nationally important wintering populations of 22 species, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, as the site provides both feeding and roosting sites for the various bird species that use it. Cork Harbour is also a Ramsar Convention site and part of Cork Harbour SPA is a Wildfowl Sanctuary.
Great Island Channel SAC (001058)	• Mudflats and sandflats not covered by seawater at low tide [1140] • Atlantic salt meadows* (*Glauco-Puccinellietalia maritimae*) [1330]	The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. The site is of major importance for the two habitats listed on Annex I of the E.U. Habitats Directive, as well as for its important numbers of wintering waders and wildfowl. It also supports a good invertebrate fauna.
Lower River Suir SAC (002137)	• Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] • White-clawed crayfish (*Austropotamobius pallipes*) [1092] • Sea lamprey (*Petromyzon marinus*) [1095] • Brook lamprey (*Lampetra planeri*) [1096] • River lamprey (*Lampetra fluviatilis*) [1099] • Allis shad (*Alosa alosa*) [1102] • Twaite shad (*Alosa fallax fallax*) [1103] • Salmon (*Salmo salar*) [1106] • Atlantic salt meadows (*Glauco- Puccinellietalia maritimae*) [1330] • Otter (*Lutra lutra*) [1355] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	Lower River Suir SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore in Co. Waterford, and many tributaries. The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. The site also supports populations of several important animals species, some listed on Annex II of the Habitats Directive or listed in the Irish Red Data Book. The presence of two legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the site adds further to the ecological interest and importance
Wicklow Mountains SAC (002122)	• Otter *Lutra lutra* [1355] • Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] • Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* [3130] • Natural dystrophic lakes and ponds [3160] • Northern Atlantic wet heaths with *Erica tetralix* [4010]	Wicklow Mountains SAC is a complex of upland areas in Counties Wicklow and Dublin, flanked by the Blessington reservoir to the west and Vartry reservoir in the east, Cruagh Mountain in the north and Lybagh Mountain in the south. Wicklow Mountains is important as a complex, extensive upland site. It shows great diversity

European site Name and Code	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Locational Context of European site (extracted from site Synopsis)
	• European dry heaths [4030] • Alpine and Boreal heaths [4060] • Calaminarian grasslands of the *Violetalia calaminariae* [6130] • Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] • Blanket bogs (* if active bog) [7130] • Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] • Calcareous rocky slopes with chasmophytic vegetation [8210] • Siliceous rocky slopes with chasmophytic vegetation [8220] • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	from a geomorphological and a topographical point of view. The vegetation provides examples of the typical upland habitats with heath, blanket bog and upland grassland covering large, relatively undisturbed areas. In all, twelve habitats listed on Annex I of the E.U. Habitats Directive are found within the site. Several rare or protected plant and animal species occur, adding further to its value.
Buckroney-Brittas Dunes and Fens SAC (000729)	• Annual vegetation of drift lines [1210] • Perennial vegetation of stony banks [1220] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes)* [2130]; • Atlantic decalcified fixed dunes (Calluno-Ulicetea)* [2150]; • Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) [2170] • Humid dune slacks [2190] • Alkaline fens [7230]	Buckroney-Brittas Dunes and Fen is a complex of coastal habitats located about 10 km south of Wicklow town. This site is important as an extensive sand dune/fen system with well-developed plant communities. Several coastal habitats listed on the E.U. Habitats Directive, including two priority habitats - fixed dune and decalcified dune heath - are present. The area contains two legally protected plants, as well as a number of other rare or scarce plant species. The site provides habitat for some rare species of invertebrate and for the vulnerable Little Tern (Sterna albifrons). A rich flora and fauna has persisted on this site despite extensive amenity use and adjacent farming. However, future land use practices will need to be managed to ensure the continued survival of this unique mosaic of coastal habitats.
Slaney River Valley SAC (000781)	• Freshwater Pearl Mussel *Margaritifera margaritifera* [1029] • Sea Lamprey *Petromyzon marinus* [1095] • Brook Lamprey *Lampetra planeri* [1096] • River Lamprey *Lampetra fluviatilis* [1099] • Twaite Shad *Alosa fallax* [1103] • Atlantic Salmon *Salmo salar* (only in fresh water) [1106] • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Otter *Lutra lutra* [1355] • Harbour Seal *Phoca vitulina* [1365] • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	This site comprises the freshwater stretches of the River Slaney as far as the Wicklow Mountains, a number of tributaries, the estuary at Ferrycarrig and Wexford Harbour. The site supports populations of several species listed on Annex II of the E.U. Habitats Directive, and habitats listed on Annex I of this Directive, as well as important numbers of wintering wildfowl including some species listed on Annex I of the E.U. Birds Directive. The presence of wet and broadleaved woodlands increases the overall habitat diversity and the occurrence of a number of Red Data Book plant and animal species adds further importance to the site. Overall

European site Name and Code	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Locational Context of European site (extracted from site Synopsis)
	• Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)* [91E0]	it is of considerable conservation significance
Vale of Clara (Rathdrum Wood) SAC (000733)	• Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	The Vale of Clara woodland is situated mostly on the east side of the Avonmore River, immediately north of Rathdrum in Co. Wicklow. This site is a good example of what remains of the once extensive oak forests of east Wicklow, and is representative of the relatively dry, acid oak woods of eastern Ireland. The woodlands are of considerable conservation significance as they conform to a type listed on Annex I of the E.U. Habitats Directive. The historical record of land use within the woods adds to the interest of the site, as does the occurrence of a number of rare and scarce species.
Deputy's Pass Nature Reserve SAC (000717)	• Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	Deputy's Pass woodland is located on the northern spur of the Deputy's Pass near Glenealy in Co. Wicklow. It was designated a Nature Reserve in 1982. Deputy's Pass is managed as a Nature Reserve and is part of an internationally important series of oak woods in Co. Wicklow which are almost certainly natural in origin and which retain much of their original character and species composition (other examples include Glendalough, Clara Vale and Ballinacor).
Wicklow Mountains SPA (004040)	• Merlin *Falco columbarius* [A098] • Peregrine *Falco peregrinus* [A103]	This is an extensive upland site, comprising a substantial part of the Wicklow Mountains. The Wicklow Mountains SPA is of high ornithological importance as it supports nationally important populations of Merlin (Falco columbarius) and Peregrine (Falco peregrinus), both species that are listed on Annex I of the E.U. Birds Directive. Part of Wicklow Mountains SPA is a Statutory Nature Reserve.

* indicates a priority habitat under the Habitats Directive

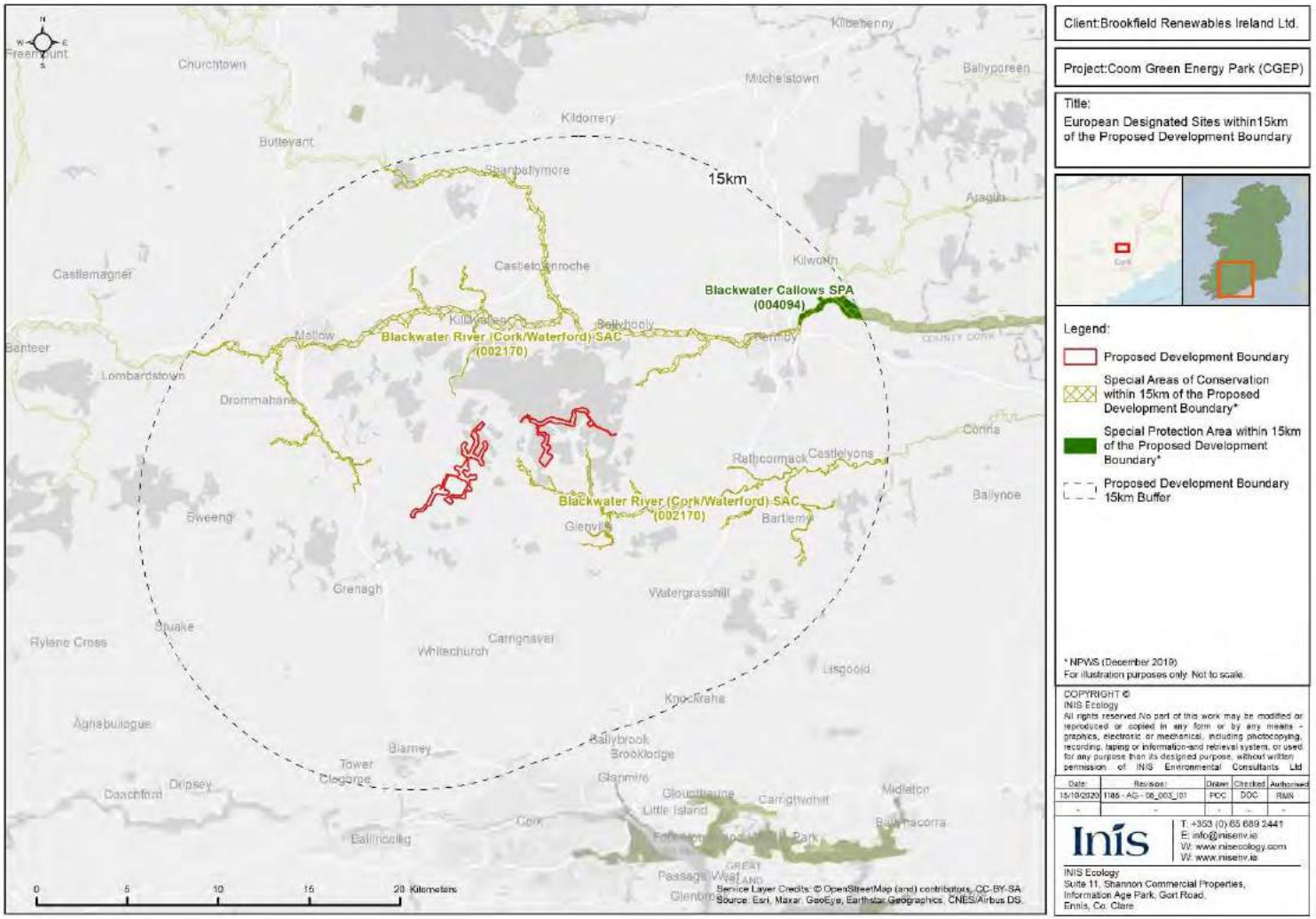

Figure 3-11: European sites within 15 km of the Proposed CGEP development Boundary.

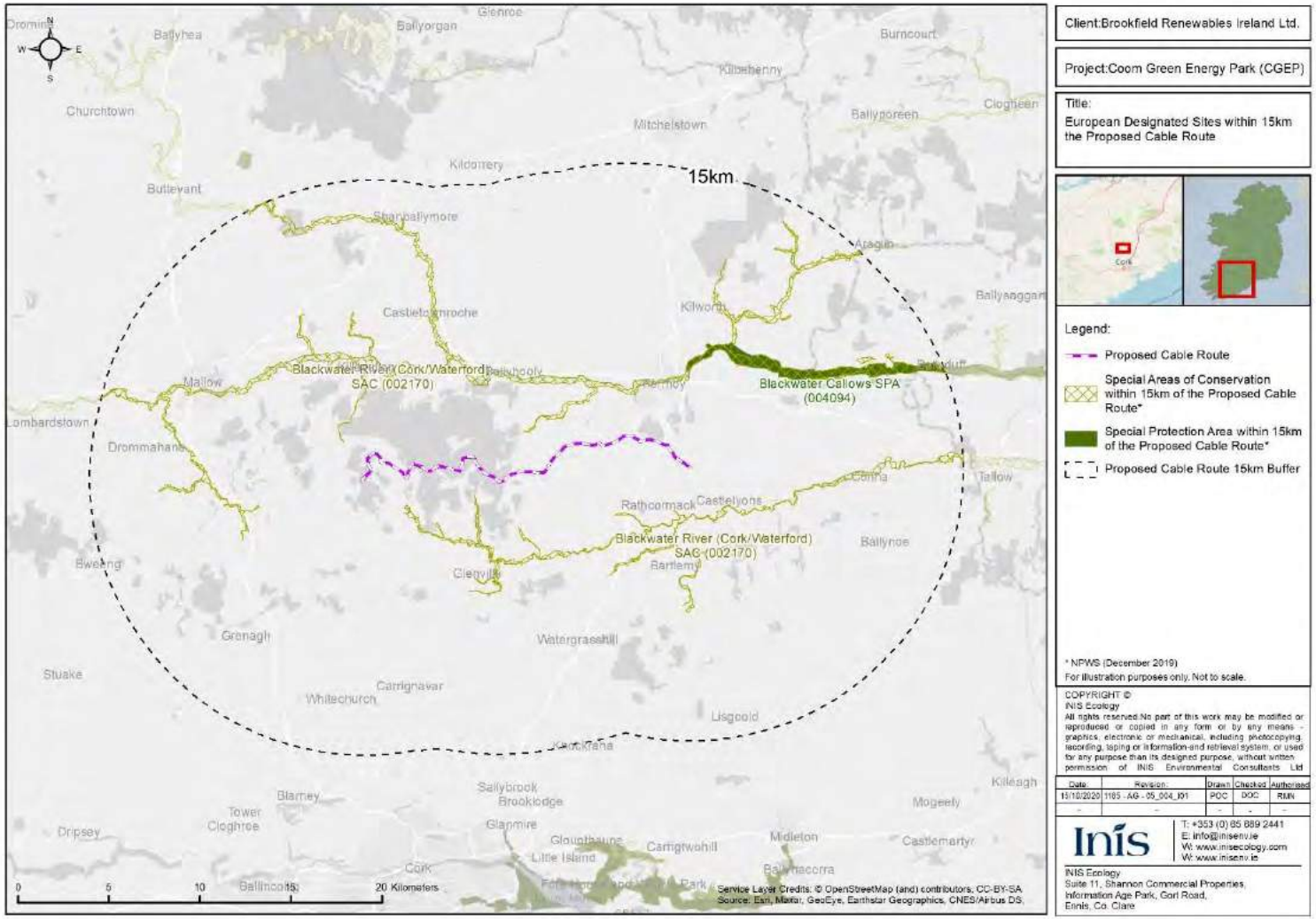

Figure 3-12: European sites within 15 km of the Proposed Grid Connection Route.

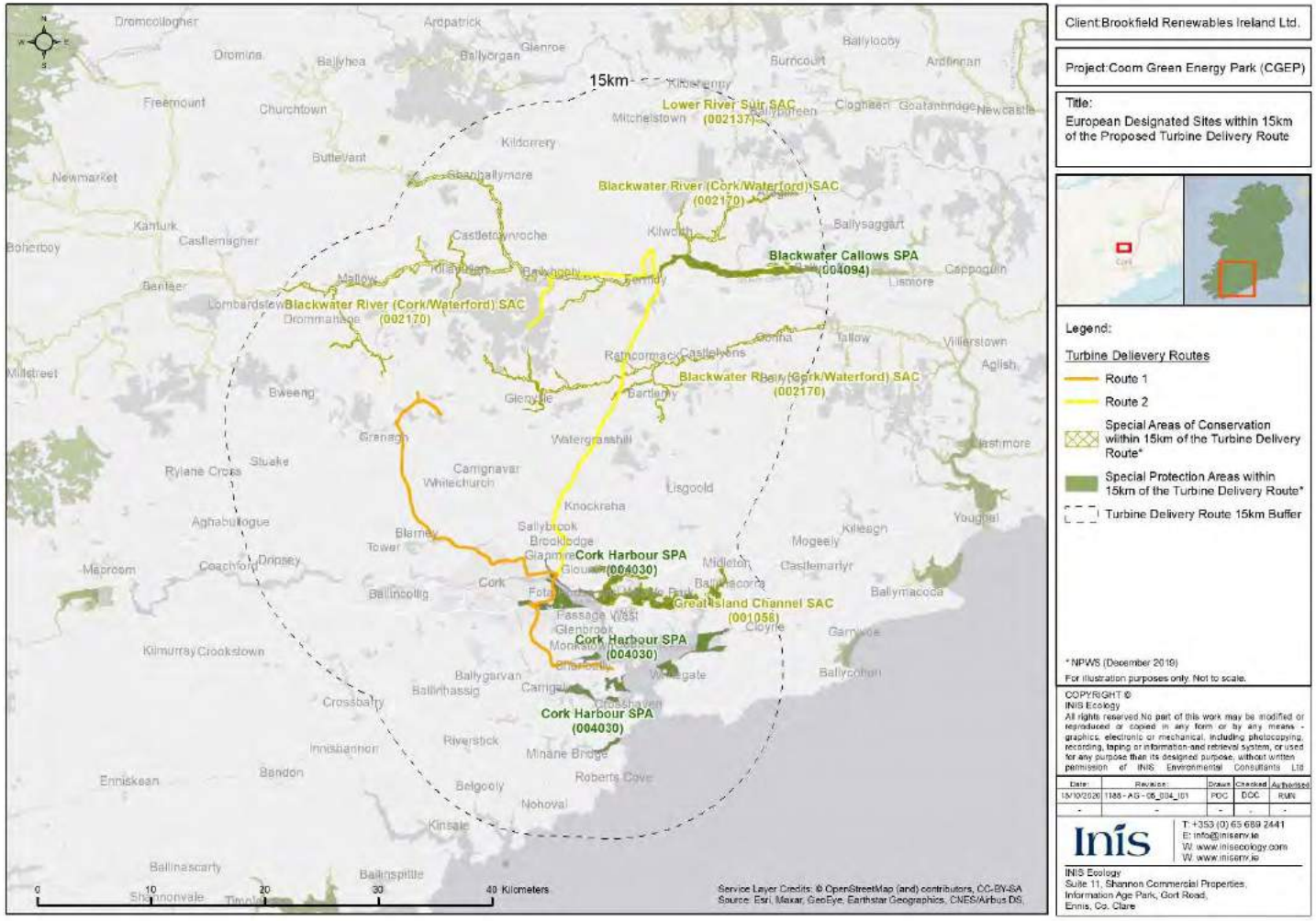

Figure 3-13: European sites within 15 km of the Proposed Turbine Delivery Route**.**

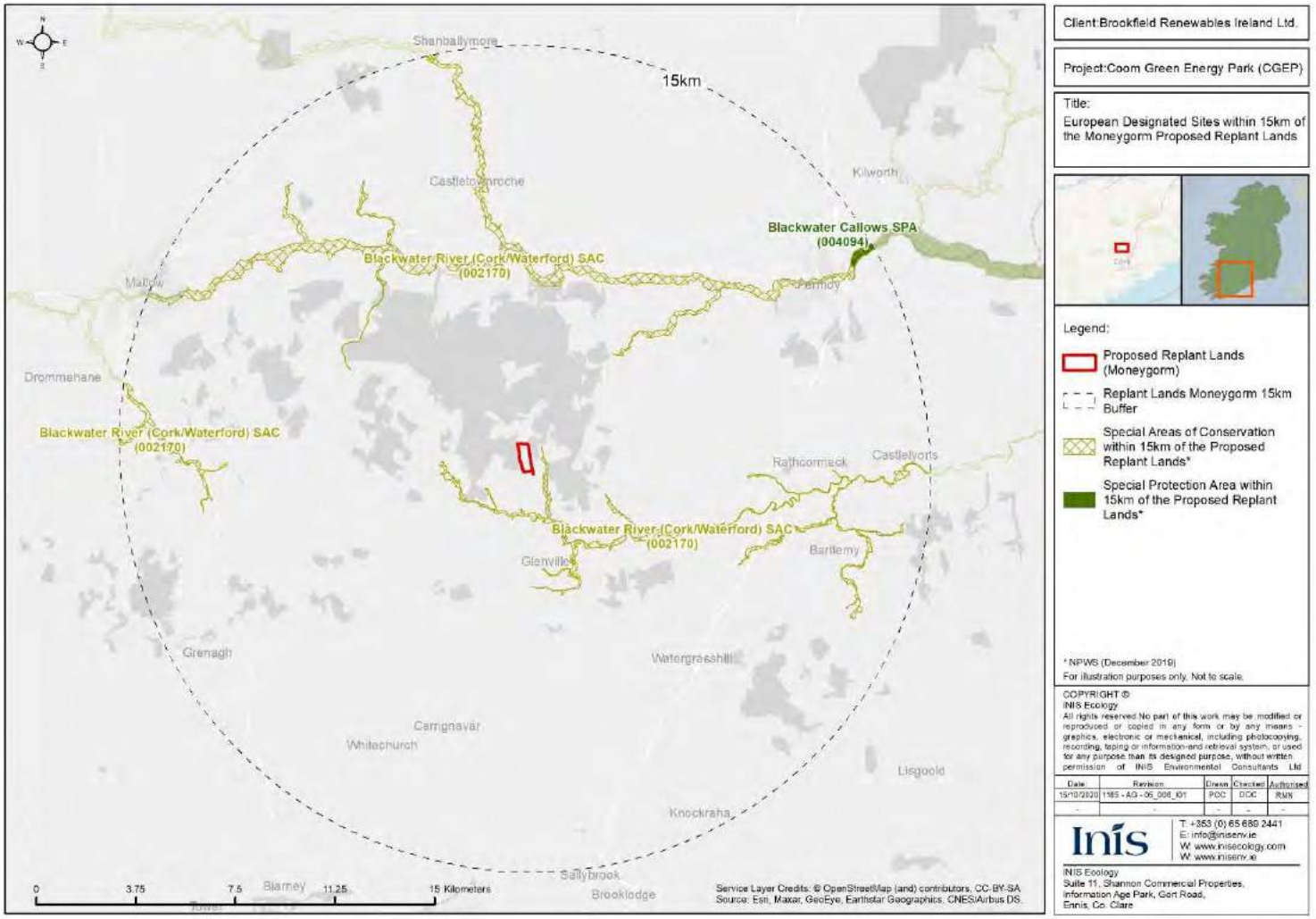

Figure 3-14: European sites within 15 km of the Proposed Replacement Lands - Moneygorm.

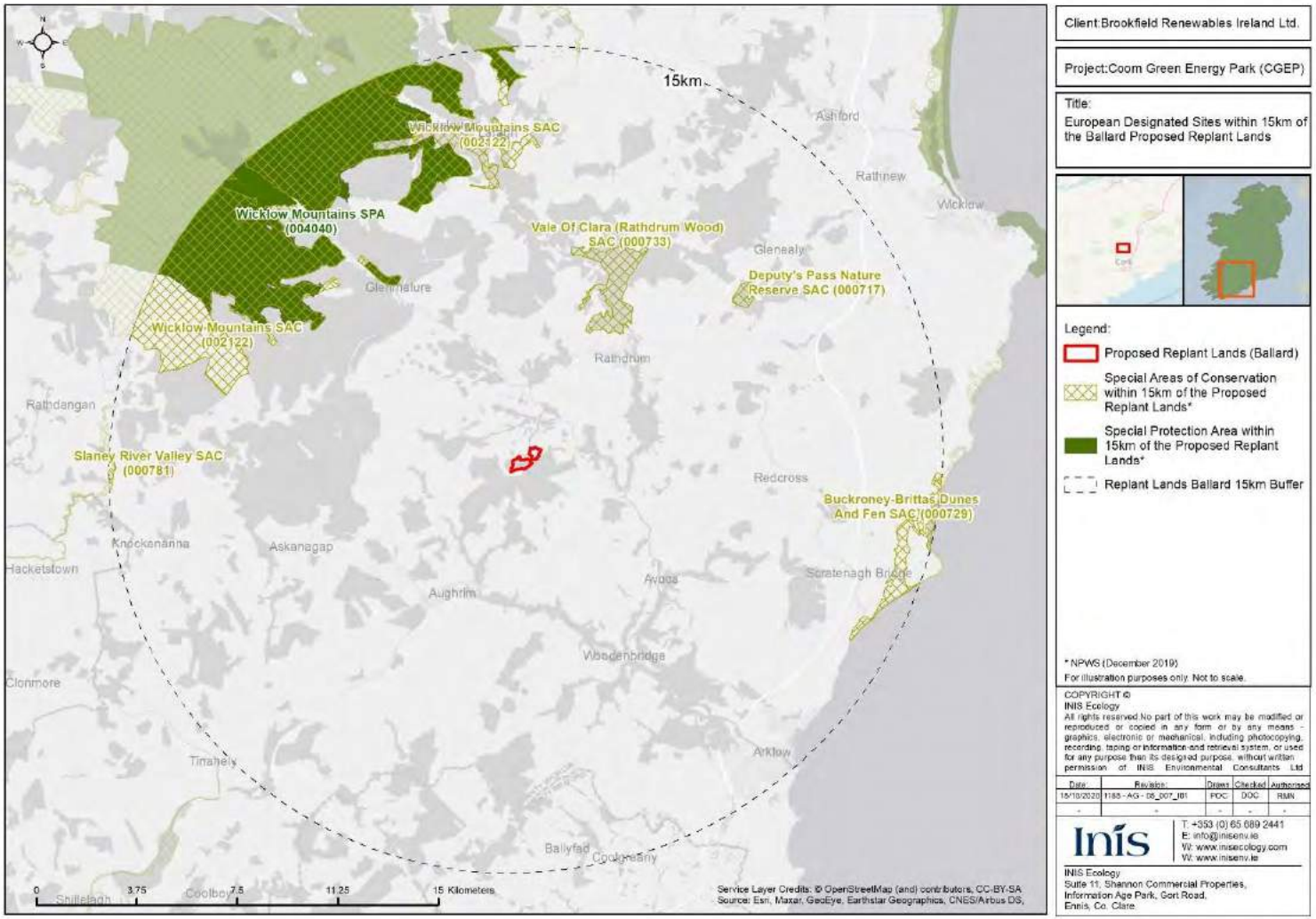

Figure 3-15: European sites within 15 km of the Proposed Replacement Lands - Ballard.

3.8 Sources of Information and Consultation

3.8.1 Consultation

Consultation (including in relation to scoping) with the Developments Application Unit (the Manager), National Parks & Wildlife Services has been attempted, refer to Table 3.10. However, no information has been provided at the time of this report.

Table 3-10: Consultation with relevant consultees in relation to the project.

Date	Consultees	Action	Response
07/09/2020	Development Applications Unit (DAU)	Detail on project issued to Manager DAU.	No response received to date.
13/01/2020	Development Applications Unit (DAU)	An email requesting any observations regarding biodiversity on the project was sent to Manager DAU.	No response received to date.
21/08/2019	Inland Fisheries Ireland (IFI)	A meeting was held on site with Inland Fisheries Ireland	Inspections took place of water crossing points, both on the public road and within the development site associated with the proposed grid connection cable route and the proposed internal access road network. Crossing points were inspected, and preferred design solutions and construction methodologies were agreed for both the examined crossing points and generally throughout the site.
26/03/2019	Development Applications Unit (DAU)	An email requesting any observations regarding biodiversity on the project was sent to Manager DAU.	No response received to date.
14/02/2019	NPWS	An email requesting a consultation in March/ April was issued to NPWS Divisional Ecologist..	An email was received on 14/02/2019 stating a meeting could not be guaranteed:
08/01/2018	Development Applications Unit (DAU)	An email requesting a pre planning consultation, with a meeting agenda and proposed attendees attached, was sent to Manager DAU.	A receipt of consultation was received on 09/01/2018 from Sinéad O' Brien, advising a turnaround for consultation of six weeks from date of receipt: "*Our Ref: G Pre00256/2017 (Please quote in all related correspondence)* *A Chara* *On behalf of the Department of Culture, Heritage and the Gaeltacht, I acknowledge receipt of your below email.* *In the event that the NPWS is in a position to facilitate your meeting request, you will receive a co-ordinated heritage-related response by email from Development Applications Unit (DAU) on behalf of the Department.* *The normal target turnaround for pre-planning and other general consultations is six weeks from date of receipt. In relation*

Date	Consultees	Action	Response
			to general consultations from public bodies under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 to 2011, the Department endeavours to meet deadline dates, where requested. *If you have not heard from DAU and wish to receive an update, please telephone the direct line number below or email manager.dau@ahg.gov.ie .* *Le meas* *Sinéad O' Brien*"
13/11/2017	Development Applications Unit (DAU)	A consultation letter containing the project description and map of the proposed CGEP/ grid connection was sent to Manager DAU.	A receipt of consultation was received on 18/12/2017 from Sinéad O' Brien, advising a turnaround for consultation of six weeks from date of receipt: "*Your Ref: INIS DAU Bottlehill Consultation* *Our Ref: G Pre00256/2017 (Please quote in all related correspondence)* *A Chara On behalf of the Department of Culture, Heritage and the Gaeltacht, I acknowledge receipt of your below consultation. I apologise for the delay in reply but unfortunately, I have been out of the office for the past couple of months on sick leave. In the event of observations, you will receive a co-ordinated heritage-related response by email from Development Applications Unit (DAU) on behalf of the Department. The normal target turnaround for pre-planning and other general consultations is six weeks from date of receipt. In relation to general consultations from public bodies under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 to 2011, the Department endeavours to meet deadline dates, where requested.* *If you have not heard from DAU and wish to receive an update, please telephone the direct line number below or email manager.dau@ahg.gov.ie .* *Le meas* *Sinéad O' Brien*"

3.8.2 Sources of Information

In addition to consultation with NPWS and IFI, other sources of Information, which were considered during this evaluation, included both desktop studies and fieldwork:

- Conservations Objectives, Site Synopsis and Site boundary information for the European Sites within with study area.

- Location and layout mapping for the CGEP project.
- Detailed description of the CGEP and a review of the descriptions of the other elements of the whole CGEP Project, as provided in Chapter 3, Description of the Development, of the accompanying EIAR.
- EPA online mapping for watercourse features (https://gis.epa.ie/EPAMaps/).
- Supporting ecological receptor information described in full in the accompanying EIAR Biodiversity Chapter 8.
- Site visits and field surveys for the CGEP AND Turbine Delivery Route.
- Provided reporting in respect of TDR and Replant elements.
- Review of planning documentation and environmental reports for other unrelated projects available on relevant County Council and An Bord Pleanála websites.

3.9 Potential Sources, Pathways and Timing of Impacts to European Sites

The Screening for Appropriate Assessment evaluation is based on a conceptual model source-pathway-receptor, which identifies potential significant effects between a proposed development and European sites.

The conceptual model for the case of the proposed CGEP Project is described in the Sections below. The model contemplates the activities in the construction and operation phases of the proposed CGEP Project, identifies sources and pathways that could potentially generate significant effects to receiving European sites. These sources and pathways are then evaluated for each European site (SACs and SPAs) and a rationale for inclusion or exclusion for further appraisal is also included in the conceptual model.

3.9.1 Construction Phase: Source-Pathway-Receptor Model of Potential Effects from the Proposed CGEP Project

3.9.1.1 Proposed CGEP development

Activities such as earthworks, vegetation clearance and other construction works, the use of machinery, the occurrence of construction noise and the presence of personnel are associated with the potential for likely significant effects on European sites during the proposed CGEP development Construction Phase (see **Section 3.4**). **Table 3-11** describes the Source-Pathway-Receptor model for the case of the Construction Phase of the proposed CGEP development and the screening rational for the Appropriate Assessment.

Table 3-11: Source-Pathway-Receptor model for the Construction Phase of the proposed CGEP Project.

Works Activity	Source of Potential Effect	Description of Pathway	Potential Effects to Receptors	European sites	Screening rationale
CGEP					
Access tracks	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; • Reinstatement works.	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact; • Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs.	1. **Blackwater Callows SPA (Site Code 004094)** 2. **Blackwater River (Cork/Waterford) SAC (Site Code 002170)**	**1. Screened <u>In</u> for further assessment (Site Code 004094) as the potential for significant effects cannot be excluded.** • Although the proposed CGEP is not located within the boundary of the SPA, its construction phase could potentially affect hydrologically connected riverine habitats that support the European site's SCIs (see **Table 3-9**), through the decrease of river water quality. This potential decrease could develop an indirect disturbance throughout the food chain and, ultimately, develop significant effects to the SCIs; • The construction phase of the proposed CGEP could also spread IAPS to European sites. Movement of soils and machinery and surface water runoff can potentially transport vegetative material (e.g. spores, fragments, seeds) to the SPA, causing IAPS to become established and reproduce there. This will potentially cause a degradation of the receiving habitats and, indirectly, cause significant effects to the SCIs of the SPA; and Accidents with hydrocarbons and cement-based materials at the proposed CEGP Development, given the hydrological connectivity with the SPA, has the potential to give rise to significant effects to the SPA SCIs. **2. Screened <u>In</u> for further assessment (Site Code 002170) as the potential for significant effects cannot be excluded.** • Although the proposed CGEP Project is not located within the boundary of the SAC, its construction phase could potentially affect hydrologically connected aquatic QIs of this European site (see **Table 3-9**), generating significant effects to the species, their habitats and food sources. • The construction phase of the proposed CGEP could also spread
	•	•	•		
Turbine Hardstands	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling;	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact; • Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs.		
Box Culvert Crossings	• Instream works; • Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Reinstatement works; • Water abstraction.	• Direct water contamination; • Soils; • Surface water runoff; • River water bodies; • Habitat removal/disturbance; • Movement of soils and machinery; • Direct contact.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs; • Indirect effects to downstream protected habitats.		

Piped Culvert Crossings	• Instream works; • Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Reinstatement works; • Water abstraction.	• Direct water contamination; • Soils; • Surface water runoff; • River water bodies; • Habitat removal/disturbance; • Movement of soils and machinery; • Direct contact.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs; • Indirect effects to downstream protected habitats.		IAPS to European sites. Movement of soils and machinery and surface water runoff can potentially transport vegetative material (e.g. spores, fragments, seeds) to the SAC, causing IAPS to become established and reproduce there. This will potentially cause a degradation of the receiving habitats and, indirectly, cause significant effects to the SCIs of the SPA; and • Accidents with hydrocarbons and cement-based materials at the proposed CEGP Development, given the hydrological connectivity with the SAC, have the potential to give rise to significant effects to the SAC QIs; • Mobile QIs (e.g. otter) have the potential to be affected by the works of the proposed CGEP development. Direct deaths and habitat disturbance (e.g. holts) could represent significant effects to these QIs.
Turbine Construction works	• Movement of soils and machinery; • Excavation works and piling; • Tree felling; • Use of hydrocarbons & cement-based compounds; • Soil Stockpiling; • Reinstatement works.	• Soils; • Surface water runoff (contamination and volume increase); • River water bodies; • Movement of soils and machinery; • Direct contact; • Habitat removal;	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs.		
Onsite Electric Substations	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; • Reinstatement works; • Wastewater.	• Soils; • Surface water runoff (contamination and volume increase); • River water bodies; • Movement of soils and machinery; • Direct contact; • Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs.		

Battery Energy Storage System	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; • Reinstatement works.	• Soils; • Surface water runoff (contamination and volume increase); • River water bodies; • Movement of soils and machinery; • Direct contact; • Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs.		
Temporary Site Facilities	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; • Reinstatement works.	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact; • Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs.		
	•	•	•		
CHMP	**No source of potential effects is identified.**				
Access tracks	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; Reinstatement works.	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact; Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; Disturbance of mobile QIs or SCIs.	**Cork Harbour SPA (Site Code: 004030)** **Great Island Channel SAC (Site Code: 001058)**	Screened Out for further assessment (Site Code 004030 and 001058) as no potential for significant effects. • These European coastal sites are linked via a very small portion of the overall CGEP site at the south westernmost point of the site. This area is located in the northernmost extent of the Manin_SC_010 sub-catchment. This river is high in the River Lee catchment and drainage from here ultimately drains into Cork Harbour and Great Channel SAC. Given the very minor portion of

Turbine Hardstands	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; Tree felling;	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact; Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; Disturbance of mobile QIs or SCIs.		the overall windfarm site (c.a. <1% of spatial area) and distance to these European sites (connectivity) via river drainage exceeding 25km, no risks of adverse effects are likely in the absence of mitigation.
Box Culvert Crossings	• Instream works; • Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Reinstatement works; Water abstraction.	• Direct water contamination; • Soils; • Surface water runoff; • River water bodies; • Habitat removal/disturbance; • Movement of soils and machinery; Direct contact.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs; Indirect effects to downstream protected habitats.		
Piped Culvert Crossings	• Instream works; • Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Reinstatement works; Water abstraction.	• Direct water contamination; • Soils; • Surface water runoff; • River water bodies; • Habitat removal/disturbance; • Movement of soils and machinery; Direct contact.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs; Indirect effects to downstream protected habitats.		

Turbine Construction works	• Movement of soils and machinery; • Excavation works and piling; • Tree felling; • Use of hydrocarbons & cement-based compounds; • Soil Stockpiling; Reinstatement works.	• Soils; • Surface water runoff (contamination and volume increase); • River water bodies; • Movement of soils and machinery; • Direct contact; Habitat removal;	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; Disturbance of mobile QIs or SCIs.		
Onsite Electric Substations	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; • Reinstatement works; Wastewater.	• Soils; • Surface water runoff (contamination and volume increase); • River water bodies; • Movement of soils and machinery; • Direct contact; Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; Disturbance of mobile QIs or SCIs.		
Battery Energy Storage System	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; Reinstatement works.	• Soils; • Surface water runoff (contamination and volume increase); • River water bodies; • Movement of soils and machinery; • Direct contact; Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; Disturbance of mobile QIs or SCIs.		

Temporary Site Facilities	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; Reinstatement works.	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact; Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct mortality of mobile QIs or SCIs; Disturbance of mobile QIs or SCIs.		
Grid Connection Route (where it occurs outside the proposed development application boundary)					
Cable trenches	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Reinstatement works.	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact;	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs;	**1. Blackwater Callows SPA (Site Code 004094)** **2. Blackwater River (Cork/Waterford) SAC (Site Code 002170)**	**1.Screened <u>In</u> for further assessment (Site Code 004094) as the potential for significant effects cannot be excluded.** • Although the proposed Grid Connection Route is not located within the boundary of the SPA, its construction phase could potentially affect hydrologically connected riverine habitats that support the European site's SCIs (see **Table 3-9**), through the decrease of river water quality. This potential decrease could develop an indirect disturbance throughout the food chain and, ultimately, develop significant effects on the European site; • The construction phase of the proposed Grid Connection could also spread IAPS to European sites. Movement of soils and machinery and surface water runoff can potentially transport vegetative material (e.g. spores, fragments, seeds) to the SPA, causing IAPS to become established and reproduce there. This will potentially cause a degradation of the receiving habitats and, indirectly, cause significant effects to the SCIs of the SPA. Accidents with hydrocarbons and cement-based materials at the proposed CEGP Development, given the hydrological connectivity with the SPA, have the potential to give rise to significant effects to the SPA SCIs.
	•	•	•		
Box Culvert Crossings	• Instream works; • Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Reinstatement works; • Water abstraction.	• Direct water contamination; • Soils; • Surface water runoff; • River water bodies; • Habitat removal/disturbance; • Movement of soils and machinery; • Direct contact.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs; • Indirect effects to downstream protected habitats.		

HDD water crossings	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds;	• Soils; • Surface water runoff; • Habitat disturbance; • Movement of soils and machinery; • Direct contact.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs; • Indirect effects to downstream protected habitats.		**2.Screened <u>In</u> for further assessment (Site Code 002170) as the potential for significant effects cannot be excluded.** • Although the proposed Grid Connection Route is not located within the boundary of the SAC, its construction phase could potentially affect hydrologically connected aquatic QIs of this European site (see **Table 3-9**), generating significant effects to the species, their habitats and food sources. • The construction phase of the proposed Grid Connection Route could also spread IAPS to European sites. Movement of soils and machinery and surface water runoff can potentially transport vegetative material (e.g. spores, fragments, seeds) to the SAC, causing IAPS to become established and reproduce there. This will potentially cause a degradation of the receiving habitats and, indirectly, cause significant effects to the SCIs of the SPA. • Accidents with hydrocarbons and cement-based materials at the proposed Grid Connection Route, given the hydrological connectivity with the SAC, have the potential to give rise to significant effects to the SAC Qis. • Mobile QIs (e.g. otter) have the potential to be affected by the works of the proposed Grid Connection Route. Direct deaths and habitat disturbance (e.g. holts) could represent significant effects to these QIs.
Concrete Beam in road deck on existing water crossings	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Reinstatement works.	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact;	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs;		
Standard Trench on existing water crossings	• Instream works; • Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Reinstatement works; • Water abstraction.	• Direct water contamination; • Soils; • Surface water runoff; • River water bodies; • Habitat removal/disturbance; • Movement of soils and machinery; • Direct contact.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs; • Indirect effects to downstream protected habitats.		
TDR					

Vegetation clearance (e.g. scrub)	• Movement of soils and machinery; • Reinstatement works.	• Soils; • Surface water runoff; • Habitat removal/disturbance; • Movement of soils and machinery; • Direct contact.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs; • Indirect effects to downstream protected habitats.		**1.Screened <u>In</u> for further assessment (Site Code 002170) as the potential for significant effects cannot be excluded.** • While the number (17) and extensive distribution of the nodes means the project is of a moderate-medium scale, the nodes themselves are of a small size, being limited to tight corners and bends along both routes. • The distances of nodes from European sites range from 10m to 14 km; with a number of nodes are in close proximity; • Japanese Knotweed occurs approximately 7m from works area at Node 1.4. The fact that Japanese knotweed is restricted under Regulation 49 of the EC (Birds & Natural Habitats) Regulations (2011) makes it an offence to cause it's spread, and as such any works are subject to compliance with this restriction. Therefore, while adverse effects are unlikely, a buffer zone is required (mitigation). **There is a possibility that works could result in the spread of Japanese knotweed to a European site, in particular River Blackwater SAC.** • The presence of other (low-medium impact) invasive alien plant species at a number of nodes (cherry laurel at Nodes 1.4 & 1.7; snowberry & montbretia at Node 1.7; winter heliotrope at Nodes 2.0 & 2.4; Himalayan honeysuckle at Node 2.2 and old man's beard at Nodes 1.3, 1.4 & 2.3) means that works at these nodes could potentially result in the localised spread of these species. However, the spread of these species is extremely unlikely and impacts would likely be imperceptible. • While a limited amount of sediment arising from ground disturbance, wall demolition and washout of fines from aggregate may be transported towards the SPA, these would not have the potential to result in significant effects, due to negligible quantity potentially released. • In addition, it should be noted that most case studies (e.g. Mahler et. al, 2015; Scoggins et. al, 2007) demonstrating toxic effects of coal-tar on aquatic life relate to the use of concentrated coal-tar based pavement sealants which contain high levels of PAHs; asphalt "concrete" which would be used at Node 2.1 contains c. 5 % petroleum based binder material, with the remainder being made up of aggregates, in comparison to pavement sealants which are concentrated. As such, no significant effects in terms of sediment input or toxicity are envisaged.

					• The use of vehicles and machinery during upgrade works and turbine deliveries shall result in some minimal emissions to air via exhausts, etc. There will be no significant emissions from the proposed works to any European site.

Vegetation trimming	• Trimming/cutting;	• Habitat disturbance; • Movement of soils and machinery; • Direct contact.	• Spread of IAPS; • Direct kill of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs;		**2. Screened <u>In</u> for further assessment (Site Code 004030) as the potential for significant effects cannot be excluded.** • While the number (17) and extensive distribution of the nodes means the project is of a moderate-medium scale, the nodes themselves are of a small size, being limited to tight corners and bends along both routes. • The distances of nodes from European sites range from 10m to 14 km; with a number of nodes are in close proximity. • Japanese Knotweed occurs approximately 7m from works area at Node 1.4. The fact that Japanese knotweed is restricted under Regulation 49 of the EC (Birds & Natural Habitats) Regulations (2011) makes it an offence to cause it's spread, and as such any works are subject to compliance with this restriction. Therefore, while adverse effects are unlikely, a buffer zone is required (mitigation). **There is a possibility that works could result in the spread of Japanese knotweed to a European site, in particular River Blackwater SAC.** • The presence of other (low-medium impact) invasive alien plant species at a number of nodes (cherry laurel at Nodes 1.4 & 1.7; snowberry & montbretia at Node 1.7; winter heliotrope at Nodes 2.0 & 2.4; Himalayan honeysuckle at Node 2.2 and old man's beard at Nodes 1.3, 1.4 & 2.3) means that works at these nodes could potentially result in the localised spread of these species. However, the spread of these species is extremely unlikely and impacts would likely be imperceptible. • While a limited amount of sediment arising from ground disturbance, wall demolition and washout of fines from aggregate may be transported towards the SPA, these would not have the potential to result in significant effects, due to negligible quantity potentially released. • In addition, it should be noted that most case studies (e.g. Mahler et. al, 2015; Scoggins et. al, 2007) demonstrating toxic effects of coal-tar on aquatic life relate to the use of concentrated coal-tar based pavement sealants which contain high levels of PAHs; asphalt "concrete" which would be used at Node 2.1 contains c. 5 % petroleum based binder material, with the remainder being made up of aggregates, in comparison to pavement sealants which are concentrated. As such, no significant effects in terms of sediment input or toxicity are envisaged.

					• The use of vehicles and machinery during upgrade works and turbine deliveries shall result in some minimal emissions to air via exhausts, etc. There will be no significant emissions from the proposed works to any European site.

Tree felling	• Movement of soils and machinery; • Habitat removal;	• Soils; • Surface water runoff; • Habitat disturbance; • Movement of soils and machinery; • Direct contact.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs; • Indirect effects to downstream protected habitats.		**3. Screened <u>In</u> for further assessment (Site Code 002137) as the potential for significant effects cannot be excluded.** • While the number (17) and extensive distribution of the nodes means the project is of a moderate-medium scale, the nodes themselves are of a small size, being limited to tight corners and bends along both routes. • The distances of nodes from European sites range from 10m to 14 km; with a number of nodes are in close proximity; • Japanese Knotweed occurs approximately 7m from works area at Node 1.4. The fact that Japanese knotweed is restricted under Regulation 49 of the EC (Birds & Natural Habitats) Regulations (2011) makes it an offence to cause it's spread, and as such any works are subject to compliance with this restriction. Therefore, while adverse effects are unlikely, a buffer zone is required (mitigation). **There is a possibility that works could result in the spread of Japanese knotweed to a European site, in particular River Blackwater SAC.** • The presence of other (low-medium impact) invasive alien plant species at a number of nodes (cherry laurel at Nodes 1.4 & 1.7; snowberry & montbretia at Node 1.7; winter heliotrope at Nodes 2.0 & 2.4; Himalayan honeysuckle at Node 2.2 and old man's beard at Nodes 1.3, 1.4 & 2.3) means that works at these nodes could potentially result in the localised spread of these species. However, the spread of these species is extremely unlikely and impacts would likely be imperceptible. • While a limited amount of sediment arising from ground disturbance, wall demolition and washout of fines from aggregate may be transported towards the SPA, these would not have the potential to result in significant effects, due to negligible quantity potentially released. • In addition, it should be noted that most case studies (e.g. Mahler et. al, 2015; Scoggins et. al, 2007) demonstrating toxic effects of coal-tar on aquatic life relate to the use of concentrated coal-tar based pavement sealants which contain high levels of PAHs; asphalt "concrete" which would be used at Node 2.1 contains c. 5 % petroleum based binder material, with the remainder being made up of aggregates, in comparison to pavement sealants which are concentrated. As such, no significant effects in terms of sediment input or toxicity are envisaged. • The use of vehicles and machinery during upgrade works and

					turbine deliveries shall result in some minimal emissions to air via exhausts, etc. There will be no significant emissions from the proposed works to any European site.

Road works (e.g. removal of street furniture, structures)	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Reinstatement works.	• Soils; • Surface water runoff; • Movement of soils and machinery; • Direct contact;	• Effects on river water quality (silting and/or contamination); • Spread of IAPS;	**1. Blackwater Callows SPA (Site Code 004094)** **2.Blackwater River (Cork/Waterford) SAC (Site Code 002170)** **3.Cork Harbour SPA (Site Code 004030)** **4.Great Island Channel SAC (Site Code 001058)** **5.Lower River Suir SAC (Site Code 002137)**	**1. Screened <u>In</u> for further assessment (Site Code 004094) as the potential for significant effects cannot be excluded.** • While the number (17) and extensive distribution of the nodes means the project is of a moderate-medium scale, the nodes themselves are of a small size (largest individual footprint is 1,577 m^2: Node 2.14), being limited to tight corners and bends along both routes; • The distances of nodes from European sites range from 10m to 14 km; while a number of nodes are in close proximity; • The fact that Japanese knotweed is restricted under Regulation 49 of the EC (Birds & Natural Habitats) Regulations (2011) makes it an offence to cause it's spread, and as such any works are subject to compliance with this restriction. **There is a possibility that works could result in the spread of Japanese knotweed to a European site, in particular River Blackwater SAC.** • The presence of other (low-medium impact) invasive alien plant species at a number of nodes (cherry laurel at Nodes 1.4 & 1.7; snowberry & montbretia at Node 1.7; winter heliotrope at Nodes 2.0 & 2.4; Himalayan honeysuckle at Node 2.2 and old man's beard at Nodes 1.3, 1.4 & 2.3) means that works at these nodes could potentially result in the spread of these species to the SPA. However, the spread of these species to these sites is considered unlikely to occur due to the limited scale of the proposed works, and unlikely to result in significant negative effects to the European site in the unlikely event of their occurrence; • While a limited amount of sediment arising from ground disturbance, wall demolition and washout of fines from aggregate may be transported towards the SPA, these would not have the potential to result in significant effects, due to negligible quantity potentially released and a lack of potential for Blackwater Callows SPA conservation interests to the impacted (**Table 3-9**); • In addition, it should be noted that most case studies (e.g. Mahler et. al, 2015; Scoggins et. al, 2007) demonstrating toxic effects of coal-tar on aquatic life relate to the use of concentrated coal-tar based pavement sealants which contain high levels of PAHs; asphalt "concrete" which would be used at Node 2.1 contains c. 5 % petroleum based binder material, with the remainder being made up of aggregates, in comparison to pavement sealants which are concentrated. As such, no significant

					effects in terms of sediment input or toxicity are envisaged; and • The use of vehicles and machinery during upgrade works and turbine deliveries shall result in some minimal emissions to air via exhausts, etc. • There will be no significant emissions from the proposed works to any European site.
Met Masts					
Access tracks extension	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; • Reinstatement works.	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact; • Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs.	**1.Blackwater River (Cork/Waterford) SAC (Site Code 002170)** **2.Blackwater Callows SPA (Site Code 004094)**	**1. Screened <u>In</u> for further assessment (Site Code 002170) as the potential for significant effects cannot be excluded.** • Although the proposed CGEP Project is not located within the boundary of the SAC, its construction phase could potentially affect hydrologically connected aquatic QIs of this European site (see **Table 3-9**), generating significant effects to the species, their habitats and food sources. • The construction phase of the proposed CGEP could also spread IAPS to European sites. Movement of soils and machinery and surface water runoff can potentially transport vegetative material (e.g. spores, fragments, seeds) to the SAC, causing IAPS to become established and reproduce there. This will potentially cause a degradation of the receiving habitats and, indirectly, cause significant effects to the SCIs of the SPA; and • Accidents with hydrocarbons and cement-based materials at the Met Masts locations, given the hydrological connectivity with the SAC, have the potential to give rise to significant effects to the SAC QIs; • Mobile QIs (e.g. otter) have the potential to be affected by the works. Direct deaths and habitat disturbance (e.g. holts) could represent significant effects to the European site. **2. Screened <u>Out</u> from further assessment (Site Code 004094) as no potential for significant effects.** • The distance between the SPA and the met masts, in addition to the particular sensitivities of the SCI species for which the SPA is designated mean no potential for significant effects are predicted.
Crane pad	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; • Reinstatement works.	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact; • Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs.		
Masts hardstand	• Movement of soils and machinery; • Excavation works; • Use of hydrocarbons & cement-based compounds; • Tree felling; • Reinstatement works.	• Soils; • Surface water runoff; • River water bodies; • Movement of soils and machinery; • Direct contact; • Habitat removal.	• Effects on river water quality (silting and/or contamination); • Spread of IAPS; • Direct kill of mobile QIs or SCIs; • Disturbance of mobile QIs or SCIs.		
Replant Lands – Moneygorm, Co. Cork					

Tree Planting	• Land works (e.g. Mounding); • Fertilizing; • Herbicide application; • Fencing and • Movement of People and vehicles	• Surface water runoff;	• Effects on river water quality (silting, nutrient and/or herbicide enrichment); • Indirect effects to downstream protected habitats.	**1.Blackwater River (Cork/Waterford) SAC (Site Code 002170)**	**1. Screened <u>In</u> for further assessment (Site Code 002170) as the potential for significant effects cannot be excluded.** • susceptible conservation interest species which could occur nearby/downstream (salmon, river, brook and sea lamprey, and otter) to be affected by potential sediment, herbicide and/or nutrient inputs means significant effects or effects of unknown magnitude could occur to the Blackwater River (Cork/Waterford) SAC; • The potential for inputs of sediment, nutrient and herbicides to Blackwater River (Cork/Waterford) SAC) during the forest establishment phase exists. There is a high risk of sediment input during and immediately following harvesting, and subsequent nutrient release from brash and dead root systems following harvesting; • There is also potential for acidification of nearby watercourses to occur through the capture of airborne pollutants, which can be concentrated on needles and then washed off into the surrounding hydrological network.
				2.Blackwater Callows SPA (Site Code 004094)	**2. Screened <u>Out</u> from further assessment and no potential for significant effects are predicted.** • The distance between the SPA and the replant lands (13.9 km), in addition to the particular sensitivities of the SCI species for which the SPA is designated mean no potential for significant effects are predicted.
Replant Lands – Ballard, Co. Wicklow					

Tree Planting	• Land works (e.g. Mounding); • Fertilizing; • Herbicide application; • Fencing and • Movement of People and vehicles	• Surface water runoff;	• Effects on river water quality (silting, nutrient and/or herbicide enrichment); • Indirect effects to downstream protected habitats.	**Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733)** **Wicklow Mountains SPA (Site Code: 004040)** **Wicklow Mountains SAC (Site Code: 002122)** **Deputy's Pass Nature Reserve SAC (Site Code: 000717)** **Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729)** **Slaney River Valley SAC (Site Code: 000781)**	**Screened <u>Out</u> from further assessment and no potential for significant effects are predicted.** • It is not likely the land replantation at Ballard will cause significant effects to any of the European sites listed due to direct avoidance and no hydrological connectivity between the European sites and the replant lands.

3.9.2 Operational Phase: Source-Pathway-Receptor Model of Potential Effects from the Proposed CGEP Development

Potential likely significant effects to European sites for the Operation phase of the proposed CGEP Project are only predicted in relation to the proposed CGEP windfarm and the replant lands at Moneygorm when tree felling is proposed. No significant activity is anticipated for the other elements of the proposed CGEP Development (i.e. Grid Connection Route, TDR and replant lands at Ballard). **Table 3-12** describes the source-pathway-receptor model for the operation phase of the proposed CGEP windfarm and the respective screening rationale for the Appropriate Assessment.

Table 3-12: Source-Pathway-Receptor model for the Operation Phase of the proposed CGEP Project

CGEP Element	Source of Potential Effect	Description of Pathway	Potential Effects to Receptors	European sites	Screening rationale
Windfarm	• Rotating Turbine Blades; • Physical blocking structure; • Movement of maintenance vehicles and personnel; and • Turbine hardstandings.	• Surface water runoff; and • Noise.	• Effects on river water quality (silting and/or contamination); • Noise disturbance; • Visual intrusion. • Collision: with turbines, blades and guy ropes, leading to • death or injury; • Displacement from habitats; • Habitat loss or change: fragmentation of landscape, or site-specific damage;	**Blackwater Callows SPA (Site Code 004094)**	**Screened Out from further assessment. No potential for significant effects to any European site.** • It is likely that the overall water runoff from the proposed CGEP windfarm area will increase as a result of the placement of built structures. However, the increased water runoff from the windfarm is not likely to significantly interfere with the hydrological regime and sedimentation processes of the whole area and affect the river systems located downstream. • The Blackwater Callows SPA is of importance for its populations of wintering waterfowl. The proposed CGEP windfarm does not hold habitats with significant potential to harbour these SCIs species. No records of Whooper Swan, Wigeon, Teal or Black-tailed Godwit (SCI species) flightpaths were recorded through the development area in the 4 years of baseline ornithological studies which were conducted based on best practise SNH (2014, 2017) survey guidance. No evidence of migration was noted during these surveys. Known migratory flight paths of these SCIs are located significantly distanced from the windfarm, making the risk of collision with the turbines unlikely. Regarding the turbine operation noise, the distance to the river Blackwater valley where these species will concentrate (approximately 11km), is considered sufficient to preclude effects to the SCIs.
				Blackwater River (Cork/Waterford) SAC (Site Code 002170)	**Screened Out from further assessment. No potential for significant effects to any European site.** • It is likely that the overall water runoff from the proposed CGEP windfarm area will increase as a result of the placement of built structures. However, the increased water runoff from the windfarm is unlikely to significantly interfere with the hydrological regime and sedimentation processes of the whole area and affect the river systems located downstream.

ReplantLands - Moneygorm	• Harvesting.	• Surface water runoff.	• Sediment intake; • Nutrient intake; • Acidification.	**Blackwater River (Cork/Waterford) SAC (Site Code 002170)**	**Screened <u>In</u> for further assessment. The potential for significant effects to a European site cannot be excluded.** • There is a risk of sediment input during and immediately following harvesting, and subsequent nutrient release from brash and dead root systems following harvesting; • There is also potential for acidification of nearby water bodies to occur through the capture of airborne pollutants, which can be concentrated on needles and then washed off into the surrounding hydrological network.
				Blackwater Callows SPA (Site Code 004094)	**Screened <u>Out</u> from further assessment. No potential for significant effects to any European site.** • It is not likely the operation of the replant lands will cause any significant effects to Blackwater Callows SPA.
Replant Lands – Ballard, Co. Wicklow	• Harvesting.	• Surface water runoff.	• Sediment intake; • Nutrient intake; • Acidification.	**Vale of Clara (Rathdrum Wood) SAC (Site Code: 000733)** **Wicklow Mountains SPA (Site Code: 004040)** **Wicklow Mountains SAC (Site Code: 002122)** **Deputy's Pass Nature Reserve SAC (Site Code: 000717)**	**Screened <u>Out</u> from further assessment. No potential for significant effects to any European site.** • It is not likely the operation of the replacement lands will cause any significant effects due to absence of hydrological pathways to the European site.

				Slaney River Valley SAC (Site Code 000781)	
				Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729)	

3.10 Stage One Screening Conclusion

The Screening Evaluation provided herein has examined potential effects via source pathway linkages on the designated SACs and SPAs within 15km of the proposed development.

There is a total of eleven European sites within the considered Zone of Influence of the proposed CGEP Project, 8no. SAC's and three 3no. SPAs. Following screening, it can reasonably be concluded that there is no likelihood of significant effects seven European sites within the Zone of Influence as a result of the proposed development, either alone or in-combination. The European sites screened out from further appraisal are:

- Blackwater River (Cork/Waterford) SAC (Site Code 002170)
- Great Island Channel SAC (Site Code 001058)
- Lower River Suir SAC (Site Code 002137)
- Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733)
- Wicklow Mountains SAC (Site Code: 002122)
- Deputy's Pass Nature Reserve SAC (Site Code: 000717)
- Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729)
- Slaney River Valley SAC (Site Code: 000781)
- Blackwater Callows SPA (Site Code 004094)
- Cork Harbour SPA (Site Code 004030)
- Wicklow Mountains SPA (Site Code: 004040)

The works and activities within the construction and/or operation phase of the CGEP Project are potentially associated with likely significant effects to the two European sites through hydrological pathways. These European sites are:

- Blackwater River (Cork/Waterford) SAC (Site Code 002170)
- Blackwater Callows SPA (Site Code 004094)

A risk of spread of Japanese Knotweed is identified in relation to works and activities involved with the TDR nodes. In this regard mitigation measures are required during the construction and operation phases of the proposed CGEP Project, specifically with regards to the proposed CGEP development, Grid Connection Route (for protection of water quality in the Blackwater River (Cork/Waterford) SAC and Blackwater Callows SPA) and the Replant Lands in Moneygorm (for the protection of water quality in the Blackwater River (Cork/Waterford) SAC). The recommendation of the screening process is, then, to proceed to **Stage 2 – Appropriate Assessment** (**Section 4**) for the European sites Blackwater River (Cork/Waterford) SAC (Site Code 002170) and Blackwater Callows SPA (Site Code 004094).

4. Stage 2 Appropriate Assessment Report

This Stage 2 Appropriate Assessment Report (Natura Impact Statement) examines the likely significant effects of the updated proposed development on the Blackwater River (Cork/Waterford) SAC (Site Code 002170) and the Blackwater Callows SPA (Site Code 004094) as identified within the Stage 1 Screening (see **Section 3**). This report will specifically appraise the significance of any effects on the special conservation interests of these European Sites and their associated conservation objectives. A description of the development' components, the relevant European sites within the study area and the zone of influence of the proposal is presented in **Section 3.7**.

4.1 Existing Environment

The proposed CGEP Development includes lands contained within the following townlands: Glashaboy North, Coom (Hudson), Tooreen South, Killeagh, Coom (Fitzgerald) , Knuttery, Mullenaboree, Knockacullata, Knoppoge, Carrig, Glannasack, Knockdoorty, Lackendarragh North, Glashaboy South, Toorgarrif, Castleblagh, Ballyhooly South and Grange West, County Cork. The site is approximately 570 hectares in size. The proposed CGEP development and GCR are located south of the Nagle Mountains. The main towns and villages within this vicinity include Mallow, Fermoy, Castletownroche, Rathcormac, Watergrasshill, Glenville, Carrignavar, Grenagh, Dromahane. Other settlements in the vicinity are Killavullen, Monanimy, Ballyhooly, Bottlehill, Glashaboy, Burnfort, Ballyknockane, Grange, Kilworth, Glanworth, Castlelyons / Bridebridge.

The Replant Lands (Moneygorm) are located in the townland of Moneygorm, on the southern side of Nagle's Mountains, on a flat spur overlooking the Bride valley, accessed via the R614, un-named local roads, and farm/forestry access tracks. The proposed afforestation area in Ballard, Co. Wicklow, is surrounded by a landscape both mountainous and rural in character, with pasture and commercial forestry being the dominant land uses. The replant lands site is surrounded to the west and south by conifer plantations, and to the north, by semi-natural woodland, rivers and then further to agricultural land. The site is divided into two sections by a private road, the westerly and easterly sections and are composed of areas of c.23.7 and 12.8 Ha, respectively. Both sites are at elevations of 160-207m OD.

As detailed in **Section 2**, a number of ecological surveys have been conducted and the findings have informed the description of the receiving environment. A detailed description of ecological features of the area, including information on habitats, avifauna, aquatic ecology, bats, invasive alien plant species and other protected mammals has also been presented.

As stated in Stage 1: Screening for Appropriate Assessment (**Section 3**), possible significant effects may arise from the construction and/or operation of the proposed CGEP Project through hydrological pathways. The following section describes the existing hydrology and water quality of the local environment that could be affected by the activities associated with the proposed CGEP Development, TDR, Grid Connection Route and Replant Lands in Moneygorm (lands in Ballard, Co. Wicklow are excluded from further consideration at this stage) and/or the pathways for the likely significant effects to the European sites identified in **Section 3** for the proposed CGEP Project (i.e. Blackwater River (Cork/Waterford) SAC and the Blackwater Callows).

4.1.1 Hydrology

The hydrological context of the proposed CGEP Development area was studied (Chapter 10) as part of the Environmental Impact Assessment Report (EIAR). Beyond describing the area in terms of hydrological catchments, river water bodies, Water Framework Directive (WFD) water quality status of the river water bodies, the study also describes the site's existing and proposed drainage configuration, mitigation measures and residual impacts. Relevant findings in terms of potential effects to European sites are described below.

4.1.1.1 Proposed CGEP Development

Coom Energy Green Park is located within Hydrometric Area No. HA 18, Blackwater (Munster), of the Irish River Network System. It is situated in the South Western River Basin District (SWRBD). The average annual rainfall in period 1981-2010 in the area of development is 1,437 mm.

M5-60[8] at development location is 17.3 mm according to the Met Éireann rainfall data. This is the predicted rainfall depth in a sixty minute storm that will occur with a frequency of once every five years.

The site is situated within four sub-catchments as defined by the WFD. These waterbodies are known as:

- Bride (Waterford)_SC_010 (18_11)
- Blackwater (Munster)_SC_110 (18_14)
- Bride (Waterford)_SC_020 (18_25)
- Blackwater (Munster)_SC_080 (18_23)

Coom Green Energy Park is situated within eight sub-basins as defined by the WFD. These waterbodies are known as:

- Clyda_030 – IE_SW_18C020300
- Coom_010 - IE_SW_18C030400
- Bride (Blackwater)_010 - IE_SW_18B050050
- Bride (Blackwater)_020 – IE_SW_18B050320
- Ross (Killavullen)_010 – IE_SW_18R020500
- Bride (Munster)_180 – IE_SW_18B022100
- Blackwater (Munster)_190 – IE_SW_18B022300
- Bride (Blackwater)_030 – IE_SW_18B050400

The hydrological context relative to the development including turbine locations and grid connection is outlined in **Figure 4.1** below. Turbines T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13 and T14 are within Coom_010 - IE_SW_18C030400 waterbody catchment. Turbines T15, T16, T17, T18, T19, T20, T21 and T22 are within Bride (Blackwater)_010 – IE_SW_18B050050 sub-basin and turbine T23 is within Bride (Blackwater)_020 – IE_SW_18B050320 sub-basin.

The cable route between the proposed on-site 110 kV substation at Knockacullata and proposed on-site 110 kV substation at Lackendarragh North is within four waterbodies (river sub-basins) catchments as defined by the WFD. These are:

- Bride (Blackwater)_010 - IE_SW_18B050050,
- Ross (Killavullen)_010 – IE_SW_18R020500,
- Bride (Blackwater)_020 – IE_SW_18B050320,
- Bride (Munster)_180 – IE_SW_18B022100 sub-basin.

The cable route between proposed 110 kV substation at Lackendarragh North and existing 110 kV substation at Barrymore is within four waterbodies (river sub-basins) catchments as defined by the WFD. These are:

- Bride (Blackwater)_020 – IE_SW_18B050320,

[8] This is for a 5-year return period, with a 60-minute duration rainfall.

- Bride (Munster)_180 – IE_SW_18B022100,
- Blackwater (Munster)_190 – IE_SW_18B022300,
- Bride (Blackwater)_030 – IE_SW_18B050400 sub-basin.

Surface runoff from turbines T2, T3, T4 and T5 drains to the Coom River. The Coom River rises to an elevation of 270 m OD approximately 90 m west of the turbine T4. The river flows in an easterly direction for approximately 6.4 km, where it joins the Bride River.

Surface runoff from turbines T6, T7, T8, T9, T10, T11, T12, T13 and T14 drains to the Toor River. The Toor River rises to an elevation of 245 m OD approximately 110 m east of the turbine T11. From there it flows to the south for approximately 0.85 km before Mullenaboree stream joins, it then flows south-easterly for approximately 3.4 km, where it joins the Coom River.

The runoff from turbines T15 and T16 drain to the Lyravarrig stream which is a tributary of the Bride River. The Lyravarrig stream rises to an elevation of 190 m OD approximately 0.70 km south east of the turbine T16. The Lyravarrig stream flows in an easterly direction for 1.3 km, before joining Bride River.

The surface runoff from turbines T17, T18, T19, T20, T21 and T22 drain to the Bride River which is a tributary of the Blackwater River. The Bride River rises to an elevation of 240 m OD approximately 2.60 km west of the turbine T21. The river flows in a south-easterly direction for 5.1 km before Coom river joins it. Bride River continues to flow in easterly direction for approximately 41.7 km where it joins Blackwater River.

The runoff from turbine T23 drains to the Bunnaglanna River which is also a tributary of the Bride River. The river rises to an elevation of 260 m OD approximately 0.4 km south east of the turbine T23. The river flows in a southerly direction for 4.1 km before joining the Bride River.

The site entrance for TDR-West is in the sub-basin Clyda_030. The existing access road connecting the site entrance and CGEP will be widened. Approximately 465m of a new road will be constructed in the sub-basin Clyda_030. A temporary compound and a met-masts are planned in this sub-basin.

4.1.1.1.1 Proposed Drainage including Mitigation

An appropriate drainage design will be the primary mitigation measure for the proposed CGEP development. It will incorporate silt protection control measures and reduce the rate of surface water runoff from the site. The proposed drainage for the proposed CGEP development is set out below. The mitigation measures refer to the drainage design and also include other best practice measures to mitigate any potential significant effects from the development.

The proposed layout of the drainage for the development is shown in the Surface Water Management Plan (SWMP) (**Appendix)**. Where possible, existing access roads and tracks have been utilised in the layout design for the proposed CGEP development to minimise the disturbance to soils.

The following types of surfaces are considered on this site in addressing the drainage for the proposed CGEP development:

1) existing hardcore tracks and surfaced access roads which might be widened.
2) proposed new site access tracks and hard standings associated with the construction of turbine.
3) proposed on-site substations.
4) temporary site compounds.
5) borrow pits.

4.1.1.1.1.1 Interceptor Drains

It is not expected that overland flows will be obstructed to any great extent by the drainage layout. However, where required, interceptor drains will collect overland flows on the upslope side of the access tracks and hardstanding areas. The overland flow will then discharge diffusely on the downslope side over vegetated areas within the site boundary.

Existing forest track drainage is extensive throughout the site and shall be maintained wherever possible and upgraded as required to meet the requirements of the proposed CGEP drainage design. SuDS design approach shall ensure that existing drainage patterns shall be maintained throughout the site.

4.1.1.1.1.2 Existing Hardcore Tracks and Surfaced Access Roads

The drainage system for the existing tracks and roads will largely be retained. During the site walkovers to inform the Hydrology Chapter of the EIAR it was observed that most of the existing tracks were approximately 4 m wide. It is proposed to widen approximately 7.0 km of existing roads by approximately 1 m, with some additional widening at bends. All track widening will be undertaken using clean uncrushable stone with a minimum of fines. This will involve slight relocation of existing roadside swales to allow widening. Still traps will be placed in the new roadside swales.

4.1.1.1.1.3 New Site Access Tracks and Hard Surfaces

It is proposed to construct approximately 15.1 km of completely new access track. Proposed new tracks and turbine hard standing areas will be drained as per the existing drainage system via roadside swales with stilling ponds at the end of the swale. These grassed swales will serve to detain flow and reduce the velocities of surface water flows. The swales will be 0.30 m deep with a bottom width of 0.9 m and side slope of 1 in 3. The swales will be constructed in accordance with CIRIA C698 Site Handbook for the Construction of SuDS.

Where roadside drains are laid at slopes greater than 2%, check dams will be provided. This will reduce effective slope and runoff velocities and any consequent potential for erosion.

Site drainage, including silt traps and stilling ponds, will be put in place in parallel with or ahead of construction, such that excavation for new infrastructure will have functional drainage system in place.

The stilling ponds will remain in place during construction phase. The stilling ponds will drain diffusely overland, over existing vegetated areas, within the site boundary. The stilling ponds will be filled in and the swales that were connected to them will be re-connected to the outfall once construction is completed.

The number of stilling ponds, dimensions and locations is included in the SWMP (**Appendix**).

Silt fencing will be provided at strategic locations to further protect watercourses during the construction phase.

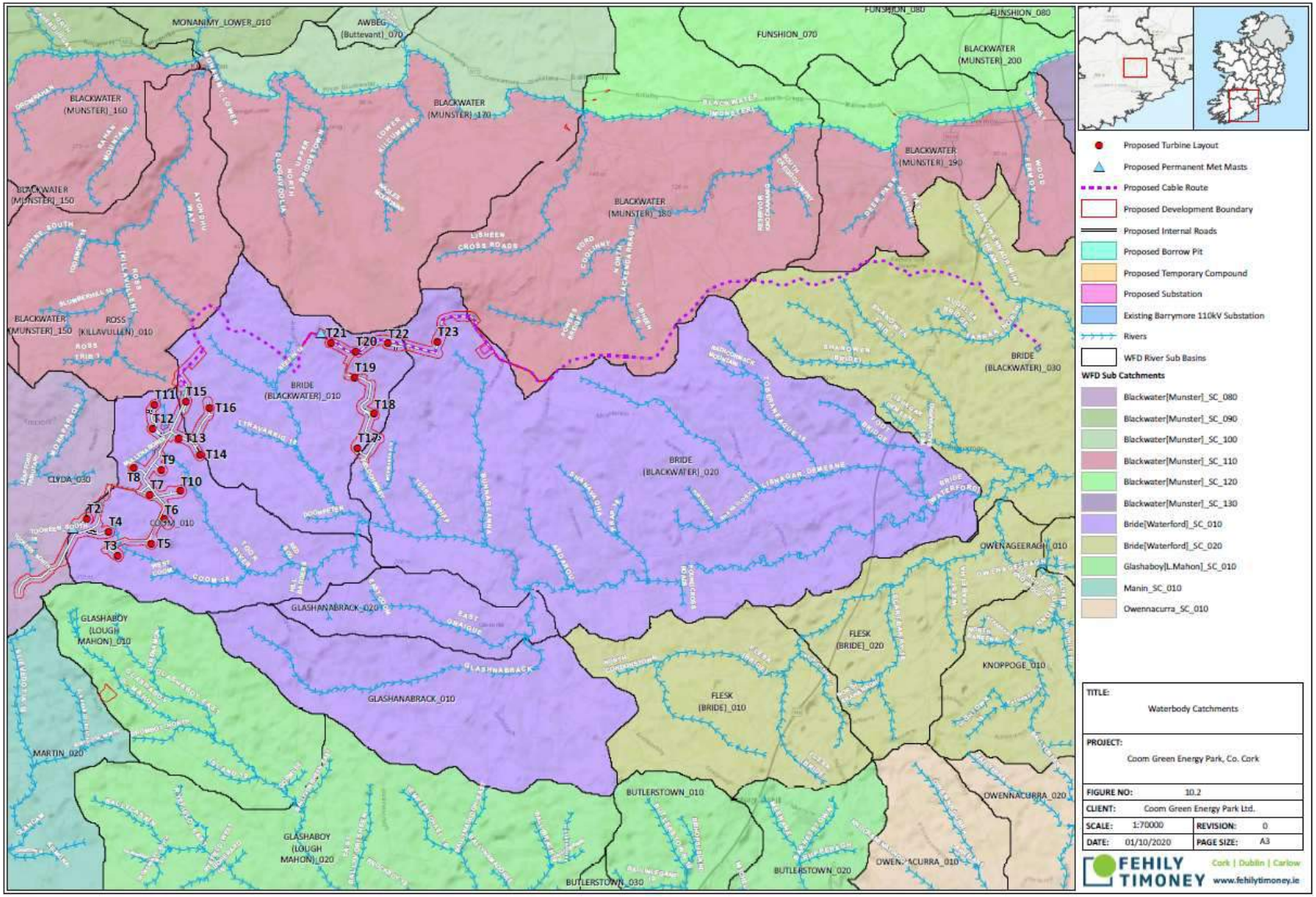

Figure 4-1: Hydrological Features Overview.

4.1.1.1.1.4 Proposed Watercourse Crossings

The proposed development layout will have 9 stream crossings within the site boundary. These crossings are listed in **Table 4-1** below**.**

Existing crossing WC028 will be replaced with box culvert of minimum 1200 mm width and 400 mm height, with additional height required for embedment and freeboard. There will be one new proposed watercourse crossing WC024 over the unnamed tributary of the Coom River and one new proposed crossing WC025 over the Coom River required as a result of the development. There will be one new proposed watercourse crossing WC027 over the Toor River required as a result of the development.

The size of the stream crossings is estimated as part of the flood risk assessment. A summary of the culvert sizing is provided in Section 10.5.

A Section 50 application will be required to obtain the consent of the OPW for the construction of the stream crossing at , WC025, WC027 and for replacement of the existing culvert WC028. The IFI were consulted at the planning stage and were satisfied with the proposed crossing structure.

Minor drains such as manmade agricultural and forest drains will be crossed using 450mm diameter pipes. Where cross drains are to be provided to convey the drainage across the track, the recommended sizes of these cross drains are 225 mm diameter pipes.

Silt Protection Controls (SPCs) are proposed at the location of the drain crossings. SPCs will consist of a minimum of silt traps containing filter stone and filter material staked across the width of the swales and upstream of the outfall to any watercourse.

Some drain clearing will be required at existing crossings, where they have become blocked, to maintain the continuity of flows. These existing pipes may need replacing if they are found to be in a collapsed state.

Table 4-1: Existing Internal Site Stream Crossings.

Feature ID	ITM_X	ITM_Y	Existing/ Proposed	Feature/Activity	Proposed Method of Crossing
WC024	563175.65	589720.58	Prop	Grid cable crossing and proposed new access track crossing over the unknown tributary of the Coom River	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert
WC025	563250.25	589754.30	Prop	Grid cable crossing and proposed new access track crossing over the tributary of the Coom River	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert
WC027	564133.20	591667.40	Prop	Grid cable crossing and proposed new access track crossing over the Toor River	New Crossing. Box culvert 2000mmx1100mm + freeboard + embedment, cable over the culvert
WC028	564171.10	591981.30	Ext	Grid cable and proposed new access track crossing over the Toor River	Replace existing pipe with a box culvert of min 1200mmx400mm + freeboard + embedment, cable over the culvert
WC030	568492.90	592029.20	Ext	Grid cable and existing forestry track crossing over the forestry ditch, tributary of the Inchinanagh stream	Standard trench crossing above or below existing culvert.
WC031	568375.20	593820.90	Ext	Grid cable and existing forestry track crossing over the forestry ditch, in the proximity of the turbine T35	Standard trench crossing under existing service. Pipe to be extended to facilitate widening of existing access road or replaced with suitable pipe of same or greater diameter
WC035	569019.61	593940.22	Ext	Grid cable and existing forestry track crossing over the forestry	Standard trench crossing under existing service. Pipe to be extended to facilitate widening of existing access road or replaced

Feature ID	ITM_X	ITM_Y	Existing/ Proposed	Feature/Activity	Proposed Method of Crossing
				ditch, in the proximity of turbine T20	with suitable pipe of same or greater diameter
WC049	568425.66	593132.46	Prop	Grid cable and proposed new access track crossing over drain east of turbine T19	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert
WC050	570093.25	594420.14	Prop	Grid cable and proposed new access track crossing over drain north of turbine T23	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert

4.1.1.1.1.5 Drainage of On-site Substation

The proposed locations of the two substations are shown on **Figure 3-3**. It is proposed to drain the substation using shallow swales, with a stilling pond at the end of the swale run. The stilling pond will remain in place following the construction period.

At the upslope side of the substation, interceptor drains will be installed.

The runoff from roofs will be collected to water harvesting tanks. Waste water will drain to a tank which will be regularly emptied and maintained.

A suitable permanent petrol and oil interceptor will be installed to deal with all substation surface water drainage. Details of drainage measures are provided in SWMP (**Appendix**).

4.1.1.1.1.6 Drainage of Temporary Site Compound

The site layout consists of 3 temporary site compounds as shown on **Figure 3-2**. The compounds are set back from the drains. Drains around the hardstanding areas of the site compound will be in the form of shallow grassed swales to minimise the disturbance to sub-soils. Surface water runoff from the compound will be directed through a *Class 1 Full Retention Oil Interceptor* before discharge to the dirty water drainage system for the site. This dirty water drain flows to a stilling pond before final discharge over land.

During the construction phase, it will be necessary to provide bottled water for potable supply for the construction personnel. A water tanker will supply water used for other purposes. Portaloo and/or containerised toilets and welfare units with storage tanks will be used to provide toilet facilities for site personnel during construction. All portaloo units located on site during the construction phase will be operated and maintained in accordance with the manufacturer's instructions and will be serviced under contract with the supplier. All such units will be removed off-site following completion of the construction phase

4.1.1.1.1.7 Drainage of Borrow Pits

The proposed borrow pits are located as shown on **Figure 3-2**. The borrow pits will be set back a minimum 50 m from any streams. At the upslope of the borrow pit interceptor drains will be installed. It is proposed to drain the borrow pits to stilling ponds.

The site drainage system will be put in place prior to excavation. Therefore, the discharge routes from any temporary stockpiling will be via the site drainage system as detailed in the planning drawings. There will be no permanent stockpiling of material on the site.

4.1.1.2 Grid Connection Route

The grid connection route from the proposed 110kV substation at Knockacullata to the proposed 110kV substation at Lackendarragh North crosses watercourses at five locations, as shown on **Figure 4-1** The grid route from the proposed 110 kV substation at Lackendarragh North to the existing Barrymore 110 kV substation crosses watercourses at eight locations (**Figure 4-1**).

The proposed grid route will have 13 stream crossings. These crossings are listed in **Table 4-2** below.

Table 4-2: Grid Route Crossing Method.

Feature ID	ITM_X	ITM_Y	Proposed grid cable method crossing
WC006	565856.78	594166.05	Horizontal directional drilling (HDD) under structure within public road corridor. Alternative: Concrete bridge beam in road deck with ducts in flat profile. Reinstate bridge surface to same level as existing.
WC007	566767.03	593590.72	HDD under structure within public road corridor.
WC008	566855.33	593463.30	Trench in road above structure and reinstate road surface to existing levels.
WC009	566953.13	593308.63	Standard trench crossing under existing service
WC013	571579.31	593438.66	Standard trench crossing under existing service
WC014	571953.73	593251.56	Standard trench crossing under existing service
WC015	574302.28	593592.15	Standard trench crossing under existing service
WC016	574563.28	593659.12	Standard trench crossing under existing service
WC017	578448.83	595314.38	Standard trench crossing under existing service
WC018	582024.33	594307.32	Replace existing stone culvert with a reinforced concrete box culvert and bring ducts underneath.
WC019	582076.81	594271.41	HDD under structure within public road corridor. Alternative: Concrete bridge beam in road deck with ducts in flat profile. Reinstate bridge surface to approximately 100mm above existing.
WC020	574506.00	593616.00	Standard trench crossing under existing service.
WC029	567015.50	593633.90	Standard trench crossing above or below existing culvert.

The proposed grid route is situated within six sub-basins as defined by the WFD. These sub-basins are known as:

- Bridge (Blackwater)_010 – IE_SW_18B050050
- Ross (Killavullen)_010 – IE_SW_18R020500
- Bridge (Blackwater)_020 – IE_SW_18B050320
- Blackwater (Munster)_180 – IE_SW_18B022100
- Blackwater (Munster)_190 – IE_SW_18B022300
- Bridge (Blackwater)_030 – IE_SW_18B050400

Crossings for the cables in the internal access roads serving the proposed development, have been assessed as part of the proposed drainage for proposed CGEP development.

The grid connection trench will be approximately 850 mm wide and 1500 mm deep. Should any unidentified culvert be encountered, the grid cable will be installed above or below the culvert depending on its depth. The cable will be installed so as not to impact the culvert.

4.1.1.3 Replant Lands

Replant Lands at MoneyGorm, Co. Cork, and at Ballard, Co. Wicklow hydrological considerations are located within Bride (Blackwater) and Avoca, respectively. Considerations on the receiving environment for these two forestry developments have been made in **Section 3.4.16.**

4.2 Conservation Objectives

A Stage Two AA is a focused and detailed examination, analysis and evaluation carried out by the competent authority (in this case, the Board) of the implications of the plan or project, alone or in-combination with other plans and projects, on the integrity of a European site in view of that site's conservation objectives. The European Commission guidance on Natura 2000 (European Commission, 2000) states that:

> "*The integrity of a site involves its ecological functions. The decision as to whether it is adversely affected should focus on, and be limited to the site's conservation objectives*".

The maintenance of favourable condition of qualifying interests at the site level will contribute to the overall maintenance of favourable conservation status of those habitats and species at national level:

- **Favourable conservation status** of a **habitat** can be described as being achieved when: "*its natural range, and the area it coves within that range, is stable or increasing, and the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable*".
- **Favourable conservation status** of a **species** can be described as being achieved when: "*population data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and there is, and will probably continue to be, sufficiently large habitat to maintain its populations on a long term basis*".

Where conservation objectives have not yet been set, a set of generic conservation objectives has been produced by NPWS. Generic Conservation Objectives for SACs are as follows:

- To maintain Annex I habitats and Annex II species for which the SAC has been selected at favourable conservation condition.

Generic Conservation Objectives for SPAs are as follows:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the SPA.

4.2.1 Blackwater River (Cork/Waterford) SAC [002170]

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. The European site consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, the tidal stretches as far as Youghal Harbour and many tributaries, the larger of which include the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun. The portions of the Blackwater and its tributaries that fall within this SAC flow through the counties of Kerry, Cork, Limerick, Tipperary and Waterford. Nearby towns include Rathmore, Millstreet, Kanturk, Banteer, Mallow, Buttevant, Doneraile, Castletownroche, Fermoy, Ballyduff, Rathcormac, Tallow, Lismore, Cappoquin and Youghal.

Overall, the River Blackwater is of considerable conservation significance for the occurrence of good examples of habitats and populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats

Directive respectively. The importance of the site is enhanced by the presence of a suite of uncommon plant species.

The Conservation Objectives for Blackwater River (Cork/Waterford) SAC (**Appendix D**) are to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been designated, namely:

- Freshwater Pearl Mussel *Margaritifera margaritifera* [1029];
- White-clawed Crayfish *Austropotamobius pallipes* [1092];
- Sea Lamprey *Petromyzon marinus* [1095];
- Brook Lamprey *Lampetra planeri* [1096];
- River Lamprey *Lampetra fluviatilis* [1099];
- Twaite Shad *Alosa fallax* [1103];
- Atlantic Salmon *Salmo salar* (only in fresh water) [1106];
- Estuaries [1130];
- Mudflats and sandflats not covered by seawater at low tide [1140];
- Perennial vegetation of stony banks [1220];
- Salicornia and other annuals colonizing mud and sand [1310];
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330];
- Otter *Lutra lutra* [1355];
- Mediterranean salt meadows (*Juncetalia maritimi*) [1410];
- Killarney Fern *Trichomanes speciosum* [1421];
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260];
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0];
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion* albae) [91E0]*; and
- Taxus *baccata* woods of the British Isles[91J0]*.

The Conservation Objectives and site Synopsis documents for the Blackwater River (Cork/Waterford) (**Appendix D**) contain further information of the Qualifying Interests for this European site.

4.2.2 Blackwater Callows [004094]

The Blackwater Callows SPA comprises the stretch of the River Blackwater that runs in a west to east direction between Fermoy and Lismore in Counties Cork and Waterford, a distance of almost 25 km. The site includes the river channel and strips of seasonally-flooded grassland within the flood plain. Sandstone ridges, which run parallel to the river, confine the area of flooding to a relatively narrow corridor. The Blackwater Callows SPA is of importance for its populations of wintering waterfowl, including an internationally important population of Whooper Swan and nationally important populations of Wigeon, Teal and Black-tailed Godwit. Part of the Blackwater Callows SPA is a Wildfowl Sanctuary.

The Generic Conservation Objectives for Blackwater River (Cork/Waterford) SAC (**Appendix D**) are to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA, namely:

- Whooper Swan *Cygnus cygnus* [A038]
- Wigeon *Anas Penelope* [A050]
- Teal *Anas crecca* [A052]
- Black-tailed Godwit *Limosa limosa* [A156]

Furthermore, a second objective is included to acknowledge the importance of Ireland's wetlands to wintering waterbirds, a second Conservation Objective is included:

> "*To maintain or restore the favourable conservation condition of the wetland habitat at Blackwater Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.*"

4.3 Likely Significant Effects

4.3.1 Potential Effects on Surface Water Runoff

4.3.1.1 CGEP

The Hydrological assessment identifies tree felling, new access tracks and upgrade of existing tracks, turbine hardstanding areas, the on-site substations and other new hard surfaces as drivers that have the potential to contribute to the increase in runoff water from the proposed CGEP Development site.

The study estimates that surface water runoff from impermeable surfaces of the subject development within the Coom_010 catchment will increase by 0.108 m^3/s (or 0.45%). It will increase by 0.078 m^3/s (or 0.28%) within Bride (Blackwater)_010 and by 0.039 m^3/s (or 0.04%) within Bride (Blackwater)_020. It will also increase by 0.003 m^3/s (or 0.01%) within Blackwater (Munster)_180 and by 0.006 m^3/s (or 0.01%) in Clyda_030 sub-basin. Furthermore, the study also estimates that three sub-basins will have no change in the volume of runoff water as there will be no changes in these areas in hard surface cover.

The overall estimated increase in the runoff due to the proposed CGEP development is 0.234 m^3/s (or 0.06 %). This potential increase due to the proposed CGEP development is not considered to be significant because of the differences in magnitude of the receiving waters. This estimated increase in runoff will reduce over time as vegetation is re-established on the site.

The Hydrology Chapter of the EIAR for the proposed CGEP Project identifies a number of indirect impacts from the construction phase of the proposed CGEP. Activities in the construction phase like tree felling will potentially:

- Increased sediment loading of streams from personnel and traffic activities.
- Standing water in excavations could contain an increased concentration of suspended solids as a result of the disturbance of the underlying soils.
- Haul roads passing close to watercourses could allow the migration of silt laden runoff into watercourses.
- Silt carried on the wheels of vehicles leaving the site could be carried onto the public road.
- Tree felling could lead to an increase in sediment and nutrients in the surface water runoff, if the brash is left in place in the riparian buffer zones.
- Small diameter cross-drains could lead to blockages and consequent flooding and concentration of flows.
- Suspended solids could potentially lead to siltation and physical effects on flora and fauna in aquatic habitats.
- Re-fueling activities could result in fuel spillages.
- There is the potential for fuel spill/leaks from storage tanks which will be stored on site for plant machinery.
- Sanitary waste could lead to contamination of receiving waters and groundwater.
- The removal of the vegetated material will also lead to an increase in the rate of runoff along the route of the site access roads and hardstanding areas. This increase in the rate of runoff could lead to a minor increase in flooding downstream.

- Inappropriate site management of excavations could lead to loss of suspended solids to surface waters.
- Inappropriate management of the excavated material could lead to loss of suspended solids to surface waters.
- Inappropriate management of the drainage of material storage areas could lead to loss of suspended solids to surface waters.
- Blockage of cross-drains could lead to consequent flooding and concentration of flows.
- Overland flow entering excavations could increase the quantity of surface water to be treated for sediment removal.
- Overland flows entering roadside drains could result in a concentration of flows and subsequent erosion of drains.
- Grid connection and internal cable trenches could act as a conduit for surface water flows.
- The velocity of flows in roadside drainage could cause erosion in steeply sloping roadside drains.
- Runoff from the borrow pit area could be silt laden, with the risk of draining into receiving watercourses, given the exposed nature of the borrow pit areas due to the excavation and haulage of stone from the area.
- Flows from the new drainage system could be impeded, should blockages occur in the existing roadside drains.
- Open bodies of water and saturated ground present a risk to the safety of site personnel and the public.
- The construction of new infrastructure has the potential to obstruct existing overland flow.
- A blockage in the proposed roadside drains could allow a break out of silt laden runoff to reach adjacent watercourses or streams.
- Wet concrete could lead to contamination of receiving waters and groundwaters.
- Inappropriate management of spoil heaps could result in accidental break outs of silt on site leading to the loss of suspended solids to surface waters.
- Proposed roadside drains on the uphill side of new roads will have to convey all of the contributing runoff from the land above resulting in large drains being required in certain areas and mixing of overland flow with runoff from construction works. This would reduce the efficiency of any proposed stilling ponds.

In respect of fisheries and aquatic fauna, works in proximity to watercourses could result in:

- direct mortality of fauna, affecting in-situ or ex-situ populations of QI's.
- changes to watercourse morphology through sediment entrainment thus affecting distribution and abundance.
- secondary effects on aquatic habitat quality and therefore prey abundance for QI species through sediment entrainment or release of deleterious materials.
- modification of riparian habitat, resulting in effective habitat loss for QI species within or ex-situ to European Sites.

4.3.1.2 Grid Connection Route

Potential effects from the construction works and activities of the grid connection route and associated watercourse crossings are:

- Cable trench could act as a conduit for surface runoff.
- Excavated soil could be mobilised in the surface water runoff during an extreme rainfall event.
- Inadequate storage of fuels and oils could lead to contamination of surface water.
- The excavation of trenches for cable laying and the launch and reception areas for directional drilling, could lead to silt laden surface water run-off.

- Silt carried on the wheels of vehicles could be carried onto the public roads.
- Refuelling activities could result in fuel spillage.
- Suspended solids drained to watercourse could potentially lead to siltation and physical effect on flora.
- Works leading to erosion of the river banks/bed could negatively impact on the fisheries habitat (availability and quality).

4.3.1.3 TDR

Likely significant effects in relation to spread of Japanese Knotweed (high impact invasive plant species) have been identified in relation to the TDR.

4.3.1.4 Replant Lands – Moneygorm

Possible adverse effects are identified to several aquatic QI due to land replanting activities carried out as part of the proposed CGEP Project. These are identified in the CGEP Replant Lands Ecological Assessment (**Appendix B**), as mentioned in **Section 3.9**, and consist of sedimentation, eutrophication and acidification of the water bodies within the Blackwater River (Cork/Waterford) SAC associated with commercial afforestation of the site.

4.3.1.5 Replant Lands – Ballard

No adverse effects to European site QI/ SCI have been identified in relation to the replant plants in Ballard, Co. Wicklow.

4.3.2 Qualifying Interests Sensitive to Likely Significant Effects

The sensitivity of the QI and/or SCI of the European sites included for further appraisal in **Section 3**, is reviewed in **Table 4-3**. As the pathway for likely significant effects identified in **Section 3** is hydrological, a QI/SCI was considered to be potentially affected by the proposed CGEP Project if its population is identified as being distributed along downstream reaches from the proposed CGEP Project. However, there are QIs/SCIs that, even though connected to the proposed CGEP Project through hydrological pathways (distribution is downstream of the proposed CGEP Project), they are not considered sensitive to the potential hydrological impacts identified e.g. Estuaries [1130]. In these cases, the QI/SCI are considered not sensitive.

If no information is available with regards to the QI/SCI distribution, the precautionary principle is adopted and the QI/SCI is understood to be present along the whole European site.

The QIs/SCIs identified as potentially affected are highlighted in **Table 4-3**.

Table 4-3: Qualifying Interests and/or Special Conservation Interests of the European sites potentially affected by the proposed CGEP Project through hydrological pathways (highlighted).

SAC/ SPA	Species	Distribution (Appendix D)	Rationale
Blackwater River (Cork/Waterford) SAC [002170]	Freshwater Pearl Mussel *Margaritifera margaritifera* [1029]	Upstream and downstream of the proposed CGEP Project	Species highly sensitive to siltation;
	White-clawed Crayfish *Austropotamobius pallipes* [1092]	Upstream and downstream of the proposed CGEP Project	Species sensitivity to changes in water quality;
	Sea Lamprey *Petromyzon marinus* [1095]	Upstream and downstream of the proposed CGEP Project	Species sensitivity to changes in water quality and habitat degradation (e.g. siltation);
	Brook Lamprey *Lampetra planeri* [1096]	Upstream and downstream of the proposed CGEP Project	Species sensitivity to changes in water quality and habitat degradation (e.g. siltation);
	River Lamprey *Lampetra fluviatilis* [1099]	Upstream and downstream of the proposed CGEP Project	Species sensitivity to changes in water quality and habitat degradation (e.g. siltation);

SAC/ SPA	Species	Distribution (Appendix D)	Rationale
	Twaite Shad *Alosa fallax* [1103]	No information available	Species sensitivity to changes in water quality;
	Atlantic Salmon *Salmo salar* (only in fresh water) [1106]	No information available	Species sensitivity to changes in water quality and habitat degradation (e.g. siltation);
	Estuaries [1130]	Located downstream of the proposed CGEP Project	Habitat is susceptible to the presence of certain Invasive Alien Plant Species, which can lead to its degradation
	Mudflats and sandflats not covered by seawater at low tide [1140]	Located downstream of the proposed CGEP Project	Habitat is susceptible to the presence of certain Invasive Alien Plant Species, which can lead to its degradation
	Mudflats and sandflats not covered by seawater at low tide [1140]	Located downstream of the proposed CGEP Project	Habitat is susceptible to the presence of certain Invasive Alien Plant Species.
	Salicornia and other annuals colonizing mud and sand [1310]	Located downstream of the proposed CGEP Project	Habitat is susceptible to the presence of certain Invasive Alien Plant Species.
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Located downstream of the proposed CGEP Project	Habitat is susceptible to the presence of certain Invasive Alien Plant Species.
	Otter *Lutra lutra* [1355]	No information available	Species sensitivity to changes in water quality and habitat disturbance;
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	Located downstream of the proposed CGEP Project	Habitat is susceptible to the presence of certain Invasive Alien Plant Species.
	Killarney Fern *Trichomanes speciosum* [1421]	Identified in 2 locations of the Blackwater River valley, in a relative upstream location to the proposed CGEP Development	No effects can be reasonably anticipated
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	No information available	Habitat is susceptible to the presence of certain Invasive Alien Plant Species
	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	Terrestrial habitat located upstream and downstream of the proposed CGEP Project	No effects can be reasonably anticipated
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion* albae) [91E0]*	Upstream and downstream of the proposed CGEP Project	Habitat is susceptible to the presence of Invasive Alien Plant Species
	Taxus *baccata* woods of the British Isles[91J0]*	Terrestrial habitat located downstream of the proposed CGEP Project	No effects can be reasonably anticipated
Blackwater Callows [004094]	Whooper Swan *Cygnus cygnus* [A038]	No information available	No direct effects are anticipated but the species is sensitive to habitat deterioration and decrease of food sources from decreased water quality
	Wigeon *Anas Penelope* [A050]	No information available	No direct effects are anticipated but the species is sensitive to habitat deterioration and decrease of food sources from decreased water quality

SAC/ SPA	Species	Distribution (Appendix D)	Rationale
	Teal *Anas crecca* [A052]	No information available	No direct effects are anticipated but the species is sensitive to habitat deterioration and decrease of food sources from decreased water quality
	Black-tailed Godwit *Limosa limosa* [A156]	No information available	No direct effects are anticipated but the species is sensitive to habitat deterioration and decrease of food sources from decreased water quality
	Wetland and Waterbirds [A999]	All the SPA Boundary	Habitat is susceptible to the presence of certain Invasive Alien Plant Species; Species are sensitive to decrease of food sources from decreased water quality

4.4 Mitigation

4.4.1 Construction Phase

The conclusion of Stage 1: Screening for Appropriate Assessment (**Section 3.10**) upon the source-pathway-receptor model for the likely significant identifies to European sites from the Construction Phase of the proposed CGEP Project, described in **Table 3-11**, identifies hydrology as the pathway connecting European sites to the source of potential significant effects. To that effect, all mitigation measures described herein intend to minimize or, if possible, eliminate any potential for a pathway between the proposed CGEP Project and European sites to be established.

4.4.1.1 CGEP and GCR

The proposed drainage design will be the primary mitigation measure for the subject development which will incorporate silt protection control measures and reduce the rate of surface water runoff from the proposed development. The mitigation measures for aquatic ecology potential impacts are reliant on CIRIA Best Practice guidance for SuDS (Woods-Ballard, et al., 2015). The mitigation measures for protection of water quality is outlined below.

- The increase in the rate of runoff along the route of the site access roads and hardstanding areas will be mitigated by the proposed drainage system which includes provision of stilling ponds to reduce concentration of suspended solids in the runoff from these areas. This has been further mitigated by avoidance through design, in the utilisation of existing tracks and existing drainage systems where possible. A minimum buffer of 50m from watercourses has been adopted, where possible, for all new site tracks that run parallel to a watercourse, with the existing tracks being widened in their existing locations.
- There is one location where proposed access and drainage infrastructure (in the vicinity of T17) are located within 50m of an existing drain. This flows into the Chimneyfield Stream which subsequently joins the River Bride. Due to the proximity of this infrastructure to a waterbody which flows into a downstream SAC, Blackwater River (Cork/Waterford), specific details of silt management mitigation measures for this area have been detailed in the CEMP (**Appendix A**). This includes proposed locations of temporary construction stage silt management infrastructure.
- Stilling ponds with a diffuse outflow detail will be put in place in advance as construction progresses across the site. Erosion control and retention facilities, including stilling ponds will be regularly maintained during the construction phase. The three-stage treatment train (swale – stilling pond – diffuse outflow) proposed to retain and treat the discharges from hard surface areas as a result of the development will reduce any risk of significantly increased flows downstream.
- Where haul roads pass close to watercourses, silt fencing will be used to protect the streams.
- Silt traps will also be provided at outfalls from roadside swales to stilling ponds.

- Standing water, which could arise in excavations, has the potential to contain an increased concentration of suspended solids as a result of the disturbance to soils. The excavations for turbines will be pumped into the site drainage system (including stilling ponds), which will be constructed at site clearance stage, in advance of excavations for the turbine bases.
- Drains around hardstanding areas will be shallow to minimise the disturbance of sub soil.
- The developer will ensure that erosion control, namely silt-traps, silt fencing, swales, stilling ponds and diffuse outflow areas are regularly maintained during the construction phase.
- Interceptor cut-off drains will be provided on the upslope side of the access roads to prevent the mixing of overland flows with the drainage for the proposed development. These interceptor drains will discharge diffusely over land to avoid concentration of runoff. The roadside drains will therefore only carry the site access road runoff and so avoid carrying large volumes of water and concentrating flows.
- Interceptor cut-off drains will be provided around borrow pits to divert overland flow to the nearest watercourse and prevent it from entering the borrow pits.
- Cross drains of 450 mm will be provided to prevent a risk of clogging for drainage crossings and conveying flow from agricultural drains and forestry drains under access track roads.
- Where new cross-drains are proposed on this site to convey surface water from roadside swales to stilling ponds, these will be sized at a minimum of 225 mm diameter to avoid blockages.
- Roadside swales will serve to attenuate any increase in surface water runoff.
- Silt fencing will be erected at the locations of the drain crossings for the duration of the construction period.
- All open water bodies adjacent to proposed construction areas will be protected by fencing including the proposed stilling ponds.
- Excavated subsoil material not required for in-site reinstatement will be removed to the designated material storage areas at the borrow pit locations.
- Site access tracks have been laid out to reduce longitudinal slope of roadside drains where possible. Where roadside drains are laid at slopes greater than 2%, check damns will be provided. This will reduce effective slope and runoff velocities and any consequent potential for erosion.
- Where agricultural tracks and forestry roads will be used to access the development, the roadside drains alongside these roads will be cleared of obstructions, should it be found that debris and vegetation are impeding flows.
- Any diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks – the bund area will have a volume of at least 110 % of the volume of such materials stored.
- Refueling of plant during construction will only be carried out at designated refueling station locations on site.
- Prior to leaving the site, every truck delivering concrete to the site must wash the chute only to a lined pit provided at each turbine location.
- Silt fencing will be erected at the location of stream crossings along the cable route.
- Cables will be installed in trenches adjacent to the site access roads, or laid within the access road line, where required. Trenches will be excavated during dry periods in short sections and left open for minimal periods, to avoid acting as a conduit for surface water flows.
- The temporary storage of excavated material on site will be put at least 50 m from watercourses.
- Wet concrete operations are not required for this site within or adjacent to watercourses.
- Portaloos and/or containerised toilets and welfare units will be used to provide toilet facilities for site personnel. Sanitary waste will be removed from site via a licenced waste disposal contractor.
- Emergency drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site. The emergency response procedure is provided in section 1.8 of SWMP.

- All open water bodies adjacent to proposed construction areas will be protected by fencing.
- Weather warnings will be monitored, and no construction will take place during extreme events to mitigate against potential flooding.
- Excavated subsoil material not required for in-site reinstatement will be removed to the designated material storage areas at the borrow pit locations.
- Any diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks – the bund area will have a volume of at least 110 % of the volume of such materials stored.
- Refueling of plant during construction will only be carried out at designated refueling station locations on site.
- Additional protection will be provided in the form of silt fencing downslope during construction, to further ensure that there is no impact from the development to streams and rivers downslope of the site.
- Daily visual inspections of drains and streams will be performed during the construction period to ensure suspended solids are not entering the streams and rivers alongside the work area, to identify any obstructions to channels, and to allow for appropriate maintenance of the existing roadside drainage regime.

A water quality monitoring programme will be established to ensure that water quality is maintained throughout the construction phase. This programme will ensure that designed measures are working, and water quality is not affected.

Water samples will be taken monthly during ground disturbance works and will include measurement of the parameters provided in **Table 4.4**

Table 4-4: Surface Water Quality Monitoring Parameters

Parameter	Maximum Value	Regulation
Turbidity	-	-
pH	6.0 < pH < 9.0	Surface Water Regulations. S.I. No. 272/2009 – European Communities Environmental Objectives (Surface Waters) Regulations, 2009
BOD	High Status < 1.3 (mean) or <2.2 (95%ile) Good Status <1.5 (mean) or < 2.6 (95%ile)	Surface Water Regulations. S.I. No. 272/2009 – European Communities Environmental Objectives (Surface Waters) Regulations, 2009
Total Suspended Solids (mg/l)	<25	Salmonid Water Regulations. S.I. No. 293/1988 – European Communities (Quality of Salmonid Waters) Regulations, 1988
Total Ammonia (mg/l N)	High Status < 0.04 (mean) or <0.09 (95%ile) Good Status <0.14 (mean) or	Surface Water Regulations 2009.

Parameter	Maximum Value	Regulation
	< 0.065 (95%ile)	S.I. No. 272/2009 – European Communities Environmental Objectives (Surface Waters) Regulations, 2009
Nitrite (NO_2) (mg/l)	<0.05	Salmonid Water Regulations. S.I. No. 293/1988 – European Communities (Quality of Salmonid Waters) Regulations, 1988
Molybdate Reactive Phosphorus (mg/l P)	High Status < 0.025 (mean) or <0.045 (95%ile) Good Status <0.035 (mean) or < 0.075 (95%ile)	Surface Water Regulations. S.I. No. 272/2009 – European Communities Environmental Objectives (Surface Waters) Regulations, 2009

An Environmental Manager will be on-site during construction to monitor water quality. Turbidity meters will be installed prior to construction downstream of the site. Levels of turbidity were monitored pre-construction to determine existing levels in the waterbodies. Should the turbidity levels measured during construction be higher than the existing levels, construction will be stopped, and measures including additional silt fences, will be put in place immediately.

In addition, the following measures will be enforced during the construction stage and overseen through the appointment of an appropriately qualified and experienced Project Ecologist(s)/ Hydrologist(s)/ Ecological Clerk of Works (ECoW):

Project Ecologist – Pre-construction/ Construction Phase

An ecologist(s) / EcOW(s) will be appointed and will be responsible for:

- Advising the Environmental Manager, Project Manager, Construction Manager and Project Owner.
- Advise on relevant wildlife/environmental legislation to aid in the development of practical Solutions.
- Carrying out confirmatory habitat and species surveys during the appropriate periods.
- Aiding with the implementation of biodiversity related planning conditions.
- Monitoring and aiding with the implementation of biodiversity related Project Design Environmental measures.
- Monitoring the implementation of the biodiversity related Best Practice Measures.
- Monitoring the implementation of the Invasive Plant Species Management Plan.
- Monitoring vegetation clearance, tree root protection.
- Monitoring the success of the re-vegetation work.
- Monitoring instream works at Class 1 and Class 2 watercourses including water quality monitoring.
- Monitoring the reinstatement of these watercourses following works..
- Advising the Environmental Manager and the Construction Manager on techniques to be implemented.

Proposed Mitigation Measures for Tree Felling

- Tree felling will be undertaken prior to the construction of site access tracks and hardstanding areas. The area of proposed felling is small relative to the overall area and is expected to develop a vegetation ground cover relatively quickly on areas which are not built upon. Thus, no significant increase in the rate of runoff is anticipated as a result of felling nor is there a risk of downstream flooding or sedimentation due to increased erosion.
- Tree felling will be the subject of a felling license from the Forest Service and to the conditions of such a license. A Limited Felling License will be in place prior to works commencing on site.
- To ensure a tree clearance method that reduces the potential for sediment and nutrient runoff, the construction methodology will follow the specifications set out in the Forest Service Forestry and Water Quality Guidelines (2000) and Forest Harvesting and Environmental Guidelines (2000).
- Trees will be felled away from aquatic zones. Brash mats will be used as necessary on any off-road harvesting routes, removed and replenished if they become worn. Branches, logs or debris will not be allowed to accumulate in aquatic zones and will be removed as soon as possible.

Proposed Mitigation Measures for Instream Works

- Instream works in minor water courses shall only take place during the period July to September (as required by IFI for instream works). However, as stated above, all instream works shall take place in written agreement with the IFI;
- Operation of machinery in-stream will be kept to an absolute minimum. All construction machinery operating in-stream will be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery will be checked prior to commencement of in-stream works. Furthermore, machinery will be steam cleaned and appropriate measures for the spread of, amongst others, the crayfish plague shall be carried:
    - Before contact with water is made, any equipment or machinery that will be used in the water, including Personal Protective Equipment (e.g. footwear, gloves), will be sprayed and cleaned with a 1% solution of Virkon® Aquatic (or other proprietary disinfectant);
    - Upon completion of the work or moving the equipment or machinery from the water, these will be visually inspected for any possible sources of contamination and any attached plant or animal material or debris will be removed. The equipment and machinery will be further sprayed and cleaned with a 1% solution of Virkon® Aquatic (or other proprietary disinfectant); and
    - Any observations of aquatic species mortality will be reported to the relevant authorities within 1 hour of evidence being found.
- As the river water bodies hold fish species protected under the EU Habitats Directive (e.g. Atlantic salmon, Brown trout, European eel), a pre-construction electrofishing survey will be conducted, in agreement with IFI, in the water bodies affected by the proposed CGEP Development watercourse crossings. This survey results, in addition with the results presented will confirm the significance of the fish abundances in relation to the local populations. If deemed significant by the IFI, dewatering of these water bodies will not be employed. If IFI considers the fish abundances not significant and authorises dewatering of the water body reach as part of the instream works, a fish salvage operation shall be undertaken. The fish salvage operation shall be authorised and licensed by the IFI and carried out by either the IFI or by fully qualified, licensed and authorised freshwater ecologists.

- If temporary diversion channels are necessary as part of the instream works, they will provide for fish passage, be non-eroding, and be of similar width to the natural stream channel. The channel diversion will be compliant with the following 1) to 29) measures:
    1) Diversion of water to and from temporary channels will only take place during the period July to September (as required by IFI for instream works) and in accordance with the IFI.
    2) Consultation with the NPWS will also be carried out as species protected under the Wildlife Act, EU Habitats Directive and the EU Freshwater Fish Directive occur within the river water bodies affected by the instream works.
    3) The works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation.
    4) A minimum 10 meter vegetative buffer zone will be maintained between disturbed areas and the water body. There will be no storage of material/equipment, excavated material or overnight parking of machinery inside the 10m buffer zone.
    5) Double silt fencing will be placed upslope of the buffer zone on each side of the water body. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location.
    6) Bog mats will be used underneath the excavator inside the 10 meter vegetative buffer zone to prevent soil erosion and potential water quality impacts from localised surface water runoff.
    7) Temporary storage of excavated overburden from the diversion channel will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the water body.
    8) The water body dam (in the stream to be diverted) will be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment (the dam will be installed once the diversion channel is in place).
    9) The banks and bottom of the diversion channel will be lined with impermeable geotextile to prevent erosion and surface water quality impacts. A layer of clean course gravel will be placed over the geotextile on the bed of the channel to keep it in place.
    10) An energy dissipater (such as clean rock fill or splash plates) will be placed on the water body bed and opposing bank of the receiving water body downstream of the diversion channel. This will prevent scouring and erosion of the water body bed and bank at the outfall during diversion.
    11) Water body bed trench excavation works will commence once stream flow is fully diverted from the crossing excavation area.
    12) Temporary storage of excavated material from the crossing trench will be undertaken separately to the material from the diversion channel. All storage areas will be outside the 10m buffer zone. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the water body.

13) Sediment laden water from trench dewatering will be discharged onto a well vegetated, dry, flat area at least 50m from a water body via a straw bale dewatering structure or geotextile filter bag. The outfall will also be surrounding by silt fencing.
14) If there is no suitable area for discharge onto ground, mobile unit settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works.
15) Any water from trench dewatering will not be discharged directly to a water body.
16) Clay bunds will be placed within the trench backfill on either side of the water body to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts.
17) Once the lean mix concrete is in place in the trench, a layer of fine sand (5–10cm) will be laid over the cement prior to backfilling. This will prevent release of cement into the water body when flow is restored.
18) Upon completion of the in-stream works, the stream crossing will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required.
19) The diversion channel will be backfilled and reinstated to its original level and rock armour will be placed at the stream banks where the inflow and outflow of the diversion channel previously existed.
20) The ground surface along the reinstated diversion channel will be re-seeded at the soonest opportunity to prevent soil erosion.
21) The silt fencing on either side of the stream buffer will be left in place and maintained until the disturbed ground has re-vegetated.
22) Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance.
23) Disturbance of bankside soils and stream sediments will be restricted to the minimum required for the cable laying process to avoid unnecessary impact on the stream morphology.
24) There will be no batching or storage of cement allowed at any stream crossing.
25) There will be no refuelling allowed within 100m of any stream crossing.
26) All plant will be checked for purpose of use prior to mobilisation at the stream crossing;
27) Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.
28) Once construction of the structure is completed, reconnection to the existing water body can be made and this should only occur within the approved operational window for in-stream works.
29) All works will be overseen by a suitably qualified Aquatic Ecologist, member of CIEEM.

Proposed Mitigation Measures for Culverts

- Construction/Replacing of culverts will only be done over a dry period between July and September (as required by IFI).
- Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted.
- Work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies.

- Where there is a requirement to disturb either the bed or bank as a result of the construction/replacement works, the watercourse will be dammed upstream and pumped prior to work commencing.
- A temporary berm (i.e. sandbags and/or rectangular straw bales) will placed along the edge of the track/road to prevent loose material being dislodged or washed into the water body.
- All culverts to be installed as part of the works, new and replacements, shall be of the open-bottomed type. These should be oversized, so that they can be set a minimum of 500 mm below bed-level, with a minimum diameter of 900mm regardless of the anticipated flood flow.
- The culverts will be of similar width to that of the natural low-flow channel. The use of multiple units of lesser width is unacceptable.
- The culverts will be laid at a level and grade which allows the upstream invert to remain drowned (by back-watering) under low-flow conditions, to a depth suitable for the easy passage of the largest species frequenting the stream (150mm for salmon).
- The effective slope of the culvert will not exceed 5%.
- Pools will be formed at each end of the culvert to provide for transition from the shape of the culvert to the shape of the river downstream.
- Culvert screening shall not be adopted in any circumstance.
- Where culvert widening has been completed, only clean, well-sorted fill or hardcore will be used to widen the road/track at the crossing location. Poorly sorted material will not be used as it would be a potential source of fine sediment.
- Before the road/track surface layer is put in place, a layer of geotextile will be placed over the fill to prevent wash down of fines into the fill and potentially into the water body.
- In the unlikely event that high levels of silt or other contamination is noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied.
- All disturbed ground will be re-seeded at the soonest opportunity to prevent erosion.
- There will be no batching or storage of cement allowed at the watercourse crossing.
- There will be no refuelling allowed within 100m of the watercourse crossing.
- All plant will be checked for purpose of use prior to mobilisation at the water body crossing.
- All culverts will be passable by fish and Otter.
- All works will be overseen by a suitably qualified Aquatic Ecologist, member of CIEEM.

Proposed Mitigation Measures for Excavation works within close proximity (<50m) of surface water bodies

To prevent river water quality impacts from sediment runoff during excavation works within the proximity of surface water bodies (<50m), the following measures shall be put in place:

- Weather forecasting resources will be used, and works will be planned when a dry spell of weather is forecasted.
- All works will be overseen by a suitably qualified Ecologist, member of CIEEM.
- Where the cable trench/access track/road/ works area is running within the 50m of a surface water body, a minimum 5m buffer will be maintained between the works area and the water body wetted width limit.
- Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m water body buffer.
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;

- In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side.
- Additional silt fencing or temporary straw bales (rectangular bales, pinned down firmly with stakes) will be placed across any natural surface depressions/channels that slope towards a local water body.
- Where the cable trench/access track/road route slopes down perpendicular towards a water body (i.e. base of stream valley), regularly spaced, temporary bunds or shallow swales will also be put in place perpendicular across the route corridor to dissipate surface water runoff from the works area and onto adjacent vegetated ground. Additional silt fencing will be put at the outfall location of the bunds/swales.
- Temporary check dams/silt fencing arrangements will be placed in any drainage ditches within 30m of the works corridor (this will also include existing road drains along the haul route works);
- The check dams/silt fencing arrangements will be placed every 10m.
- Bog mats will be used in wet/boggy areas areas to prevent ground rutting and soil erosion which could lead to potential water quality impacts. All ground rutted by vehicles/machinery will be levelled or backfilled to prevent their progression as preferential pathways for surface water runoff.
- If high levels of silt or other contaminants are noted in any local water body, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied.
- Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies.
- All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion.
- All temporary surface water control/protection measures, such as silt fencing and check dams, will be kept in place until disturbed ground has vegetated and stabilised. Regular daily checks will be undertaken.
- Where the cable trench route runs downslope for long distances (>50m) towards a water body or drainage ditch, regular spaced impermeable bunds will be placed within the trench backfill to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts from surface water drainage within the trench.
- There will be no refuelling allowed within 100m of a water body/drainage ditch.
- All plants will be checked for purpose of use prior to mobilisation.

Proposed Mitigation Measures for Management of invasive alien species

To avoid the introduction, establishment and spread of invasive species in and around the proposed CGEP Development during the construction phase, the following measures shall be attended to:

- An updated confirmatory survey of proposed works areas will be conducted prior to works commencing. Areas of high impact invasives such as Japanese Knotweed (at Node 1.4 of the TDR) will be identified and suitable buffer zones established for monitoring by the site ecologist. This information will be provided to the works contractor and the site ecologist will monitor for invasives during the works phase to ensure it is not disturbed.
- Prior to arrival of vehicles that will be kept on the site for extended periods e.g. earth moving machinery the contractor's vehicles and equipment will be thoroughly cleaned and then dried

using high-pressure steam cleaning, with water >65 °C, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic);

- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. The level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site.
- The flagmen, which will be present at each active site access points, will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the site, and will receive training in the correct techniques.
- Each flagman will be equipped with a 'disinfection box'. This will contain Virkon® Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution.
- Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and which has come into contact with water or soils) for evidence of attached plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site, securely stored away from traffic for removal to the waste storage area in the Temporary Compound at the end of the work day.
- No removed material or run-off will be allowed to enter a water body of any sort.
- Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually.
- Records of supplies and cleaning of delivery vehicles will be kept by the flagmen and will be regularly inspected by the Environmental Clerk of Works.
- Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.
- The above measures may not apply for vehicles that require regular on and offsite movements e.g. deliveries of cement during construction. These vehicles are highly unlikely to be at risk of contamination/ contact with aquatic habitats or invasive species. Before deliveries start the site EcoW/ Environmental Manager will review quarries supplying cement to confirm if the above disinfectant measure applies.

Proposed Mitigation Measures for Grid Cable Installation

The following mitigation measures are proposed during construction stage:

- Weather warnings will be monitored, and no construction will take place during extreme events to mitigate against potential flooding.
- Mitigation measures will be provided where surface water flows may be temporarily prevented from reaching gullies during trench excavation. Mitigation measures will include the provision of temporary over ground surface water channels using sand bagging for example to divert flows to downstream gullies.
- Trenches will be excavated during dry periods where possible in short sections and left open for minimal periods, to avoid acting as a conduit for surface water flows.
- Any excavated material will be used in the reinstatement of the cable trenches subject to approval. Surplus material will be removed from the site to an appropriate licenced facility. There will be no stockpiling of excavated material. For trenching within the domain of public roads, approved fill material will be imported in accordance with the method statement described in Section 3.

- All excavated soil material will be managed on site in accordance with the CEMP.
- Silt fencing will be provided around any exposed areas to prevent the ingress of suspended solids into adjacent watercourses. These mitigation measures will prevent surface water contamination and will prevent subsequent flows of contaminated water into watercourses.
- Additional protection will be provided in the form of silt fencing downslope where required during construction, to further ensure that there is no impact from the development to streams and rivers downslope of the site.

Daily visual inspections of drains and streams will be performed during the construction period to ensure suspended solids are not entering the streams and rivers alongside the work area, to identify any obstructions to channels, and to allow for appropriate maintenance of the existing roadside drainage regime.

Proposed Mitigation Measures for Horizontal Directional Drilling

The proposed mitigation measures during HDD are listed below:

An Environmental Engineer with a "stop work" authority will be engaged to monitor the construction phase of the development when the water crossing is being undertaken.

- The working area around the bridge/culvert crossings will be fenced off prior to the commencement of works to avoid damage to bankside habitat
- Watercourses will be visually inspected
- Should increase levels of siltation be recorded within the watercourses during the course of the construction phase, the environmental auditor will seek to halt construction works until the source of the pressure can be found and remediated
- Surplus material will be removed from the site to an appropriate facility. There will be no stockpiling of excavated material. A setback distance of at least 20 m from watercourses will be adhered to when storing temporary spoil
- Prior to any works taking place near water courses the Inland Fisheries Ireland will be consulted
- Construction works onsite will be timed to occur outside periods where heavy rainfall would be expected
- Silt traps will be regularly maintained during the construction phase. All personnel working onsite will be trained in pollution incident control response.
- Appropriate signage will be placed along the proposed route outlining the spillage response procedure and a contingency plan to contain silt. A regular review of weather forecasts of heavy rainfall is required, and the contractor is required to prepare a contingency plan for before and after such events
- Visual inspection to take place at all times along the bore path of the alignment.
- Silt fences will be constructed around proposed work areas prior to commencement of works.
- No refueling will take place within 50m of the stream zone or any sensitive habitats.
- During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid will be used.

Proposed Mitigation Measures for Installation of Meteorological Mast

Drainage infrastructure shall be put in place prior to commencement of works. Dirty water from roads will be drained to swales which will be connected to a settlement pond with a diffused outfall.

- There will be small usage of concrete for foundations and anchoring. No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete product and where possible, emplacement of pre-cast elements, will take place.
- No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.
- Use weather forecasting to plan dry days for pouring concrete
- Ensure pour site is free of standing water. Plastic covers will be ready in case of sudden rainfall event.
- Concrete operations shall be carried out in accordance with the CEMP (**Appendix A**).

4.4.1.2 Replant Lands – Moneygorm.

The mitigation measures are listed on **Table 4-5**, along with information on when they will be implemented, how the measures will avoid or reduce adverse effects on the European sites, who will implement the measures and the degree of confidence in their successful implementation. Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise Best Practice methods which will be applied at the replanting site. For the avoidance of doubt these measures will be carried out at both replant locations, regardless of connectivity to European Sites. These include:

- Appropriate drainage design and management will be employed. This includes the provision of collector drains which will disperse drainage water with low velocity through wide (20m) vegetated buffer zones increasing the efficacy of sediment and nutrient retention across the area. Silt fencing will be erected along the drainage ditches at the location of the proposed replanting to provide additional protection to the watercourses in this area.
- Adherence to 'Forestry and Water Quality Guidelines' (Forest Service, 2000) for approved afforestation plans.
- The Forest Service Code of Practice and in the FSC Certification Standard for the installation of buffer zones adjacent to aquatic zones at planting stage will be fully adhered to.

Table 4-5: Mitigation Measures for Afforestation for Moneygorm, Co. Cork.

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
Mitigation Measures in Relation to Water Quality to be Implemented Prior to and During Planting			
Adherence to Forestry and Water Quality Guidelines	Comprehensive guidelines to protect water quality, including specifications for: • Conservations sites • Areas vulnerable to acidification • Areas vulnerable to erosion • Riparian buffer zones • Ground preparation and drainage	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. Adherence to guidelines is a requirement for approval by the Forest service. This is outlined in the CEMP, included in **Appendix A**.	Reporting to developer and communication and collaboration with contractor. Stop works authority for pollution events and failure to implement measures.

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
	• Fertiliser application and storage • Chemicals, fuel and machine oils • Roads • Bridges, culverts and fords • Harvesting		
The Ecological Clerk of Works or Environmental Manager appointed by the developer to inspect the wind farm construction works will also inspect planting operations to ensure the effective operation and maintenance of drainage and other mitigation measures.	Ensure mitigation measures are implemented correctly and effectively.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	Reporting to developer and communication and collaboration with contractor. Stop works authority for serious incidents for pollution events and failure to implement measures.
Excavated subsoil material will be used for backfilling or removed off site to an appropriate facility.	Remove a potential source of siltation, reducing the probability of sediment being transported in surface water.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Temporary spoil heaps will be surrounded by silt fencing to filter sediment from the surface water	Contain any silt mobilised by surface water runoff over temporary spoil heaps at source,	Mitigation measures will be implemented by the developer through the	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
run-off from excavated material.	preventing transport of silt into the drainage network and adjacent water bodies	mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Drains around hard-standing areas will be shallow to minimise the disturbance to sub-soils.	Minimise the area of exposed soil, reducing the potential silt load.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Access track drainage will follow natural flow paths. Existing overland flow channels will be maintained, and cross-drains provided in the access road to allow continuity of flow.	Maintain existing drainage conditions. This will also reduce the potential for erosion and siltation, since established flow paths are less likely to erode and acquire sediment.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
All ditches adjacent to proposed planting areas will be protected by	Prevent machinery or other interference damaging ponds and drainage ditches, which	Mitigation measures will be implemented by the developer through the	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
fencing, including any proposed stilling ponds.	could result in increased siltation.	mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
All personnel working on site will be trained in pollution incident control response. Emergency Silt Control and Spillage Response Procedures contained within the Site Drainage Management Plan of the Construction Environmental Management Plan (CEMP) will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt.	Ensure site operatives are informed and equipped to deal pollution incidents such as spillages or silt containment failures.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
During the planting period, sandbags will be used during emergency events to control the discharge from the stilling pond	Reduce the risk of any accidental spillage on site affecting watercourses and adjacent waterbodies.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Any existing ditches will be protected by fencing	Prevent machinery or other interference damaging ponds and	Mitigation measures will be implemented by the developer through the	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
	drainage ditches, which could result in increased siltation.	mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
A regular review of weather forecasts of heavy rainfall will be undertaken, and a contingency plan will be prepared for before and after such events.	Ensure works are not carried out during periods of heavy rainfall and ensure potential sources of siltation are secured in advance of heavy rainfall.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
A record will be kept of daily visual examinations of watercourses which receive flows from the proposed development, during and for an agreed period after the installation phase.	Determine the effectiveness of mitigation measures and indicate whether extra measures or repair of existing measures are required.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Silt traps and silt fencing will be put in place in	Ensure erosion control and silt arrest measures	Mitigation measures will be implemented by the developer through the	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
advance as planting progresses across the site.	are in place in advance of planting activities.	mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
The developer will ensure that the above erosion control measures are regularly maintained during the installation phase.	Ensure erosion control and silt arrest measures continue to function adequately during planting.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Access tracks will be capped as soon as practicably possible.	Cover exposed subsoils, thereby reducing the concentration of suspended solids in any run-off.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Where haul roads pass close to ditches, silt fencing will be used to protect the ditch at locations where runoff from the tracks flows towards existing ditches. Silt traps will be provided at outfalls from roadside	Prevent silt generated by road use entering drainage channels	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
swales to existing drains. Silt traps will be kept upstream of outfalls to allow a buffer zone to the outfall.		combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	measures during the planting process.
Additional silt fencing will be kept on site in case of an emergency break out of silt laden run-off.	Allow repair and strengthening of silt interception measures if and where necessary.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Refuelling of plant & machinery during planting will only be carried out at designated refuelling station locations on site. Each station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. Only emergency breakdown maintenance will be carried out on site. Drip trays and spill kits will be kept available on site, to ensure that any spills from the vehicle are contained and removed off site.	Prevent fuels, oils or other contaminants from entering the drainage network.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in **Appendix A**.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Operational Phase Mitigation Measures in Relation to Water Quality			

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
The surface water run-off from the hardstanding areas will be attenuated in settlement ponds which will discharge to existing drainage ditches.	This will ensure that any potential increase in flooding downstream of the site is negligible.	Mitigation measures will be implemented directly by the developer or through the mechanism of its contract with any contractor responsible for operating the replant lands. This is outlined in the CEMP, included in **Appendix A**.	Reporting to Developer and communication and collaboration with Contractor.
The operations management of the replant lands will include the application of herbicide.	Ensure an approved and suitable herbicide is used, and operatives are certified in its use.	Mitigation measures will be implemented directly by the developer or through the mechanism of its contract with any contractor responsible for operating the replant lands. This is outlined in the CEMP, included in **Appendix A**.	Reporting to Developer and communication and collaboration with Contractor.

4.4.2 Operational Phase

4.4.2.1 CGEP and GCR

The main hydrological impact of the development is an increase in runoff. This is mitigated by the drainage layout. Due to the insignificant increase in potential runoff from the site, there should be negligible release of sediment to the watercourses post-construction. It is therefore not envisaged that the operation period of both the CGEP windfarm and the GCR will involve any significant effects to the hydrological regime of the area and, by association, to European sites hydrologically connected to the site.

When operational, the development will have a negligible effect on surface water quality as there will be no further disturbance of soils post-construction. During the operation stage, small quantities of oil will be used in cooling the transformers associated with the facility. There is therefore a potential for small oil spills. Risks of potential oil leakage and pollutions draining to the watercourse from the installed transformer is mitigated with transformer interceptor bund wall.

The operation of the development will incorporate effective maintenance of the drainage system and the permanent mitigation measures detailed in **Section 4.4.1**. The maintenance regime will include inspection and servicing of:

- Drains, cross-drains and culverts for any blockages.
- Outfalls to existing field drains and watercourses.
- Existing roadside swales for any obstructions.
- Swales.
- Progress of the re-establishment of vegetation.

The maintenance regime will also include implementing appropriate remedial measures as required after the above inspections and testing the water quality at the outfalls at appropriate intervals. Visual inspections will be undertaken during the maintenance period in accordance with maintenance schedule following relevant recommendations outlined in The SuDS Manual (CIRIA C753).

Furthermore, and in order to prevent the spread of invasive alien species that are already established within the site, the following measures shall be implemented:

- Monitoring in the form of confirmatory surveys will be carried out by the appointed Project Ecologist to accurately determine the current status of invasive species locations identified during baseline studies; and identify any other infestations close to the construction works areas or operational stage maintenance works areas.
- Surveying will be carried out each year of operation and this survey information will be used to inform any construction works/operational stage maintenance activities. Surveys will focus on the works area and up to 10m from here.
- The results of this will be made available to Project Team, and any bodies as required at the consenting stage.
- The measures included in the Invasive Species Management Plan will be implemented.

4.4.2.2 Replant Lands

During the Operation period of the Replant Lands at both Moneygorm, Co. Cork and Ballard Co Wicklow, full compliance with the Forest Quality Guidelines (Forest Service, 2000) will be followed and other mitigation in relation to work activities as outlined in **Table 4.5** above.

4.4.3 Decommissioning Stage

In the event of decommissioning of the Coom Green Energy Park, the access tracks may be used in the decommissioning process. Mitigation measures applied during decommissioning activities will be similar to those applied during construction.

It is proposed that turbine foundations and hardstanding area should be left in place and covered with local soil/topsoil at decommissioning stage. It is considered that leaving the turbine foundations, access tracks and hardstanding areas in-situ will cause less environmental damage than removing them.

Mitigation measures as outlined for construction phase protection of water quality will be implemented in full as required for the windfarm element of the project.

The grid connection cables will be left in the ground, therefore no potential impacts during decommissioning stage are likely to occur. Hence no mitigation measures are required for this element.

4.5 Cumulative and In-Combination Effects

Projects and land use activities with potential to result in cumulative impacts with the proposed CGEP Project were identified, the results of which are presented herein. **Table 4-6** lists the projects within the zone of potential cumulative effects and highlights the project(s) which require further consideration with the proposed CGEP Project. In **Table 4-7** the potential in-combination effects to European sites resulting from the highlighted developments are identified, after which an evaluation of these potential effects on European sites is undertaken.

Table 4-6: Plans or projects with potential cumulative, or in-combination, effects with the Proposed CGEP Project on European sites.

Development evaluated for in combination effects	Planning Reference	Potential in-combination impacts identified
Windfarm Developments		The closest windfarm development is a single wind turbine at Moneygorm, Glenville, Co Cork (1.4km distant from the site). The following windfarm developments are the closest windfarm developments (>1 turbine each) to the site which have been granted planning; Castlepook Wind farm (14 turbines, c. 21.8km from site); Knocknatallig Wind Farm (6 turbines, c. 24km from the site); Boggeragh Wind Farm (38 turbines, c. 23km from the site); Esk Windfarm (12 turbines, c. 21km from the site). These projects having been granted planning and were subject to Appropriate Assessment that ruled out significant adverse effects including consideration of relevant QI aquatic receptors (as relevant) in River Blackwater SAC and Blackwater Callows SPA. **No significant in-combination effects with the proposed CGEP Project are identified.**
Alteration of Mallow Sewerage Scheme	195078	A NIS and EIA Screening have been submitted and have concluded that the proposed development will not have an adverse effect on the integrity of the Blackwater River (Cork/Waterford) SAC or any other European sites. During construction, there will be a short-term impact on the River Blackwater which will be effectively minimised by the implementation of mitigation measures. The long-term impact is predicted to be negligible. During construction, there will be increased noise and disturbance which could potentially impact on birds and mammals including otter. However, such impacts will be temporary, and the long-term impact is predicted to be negligible. No impact from the spread of invasive species or impacts relating to biosecurity will occur. **A potential short-term impact on the River Blackwater SAC is predicted from this project alone.** Given the separation distance of over 10km from the proposed CGEP development and identified mitigation for CGEP for protection of water quality; no potential in-combination impacts are identified as water quality for sensitive aquatic receptors will not change due to CGEP i.e. the baseline conditions for aquatic QI in relation to the Mallow Sewage Scheme will not be altered due to CGEP.
Agricultural Development, Ballyhooly Mallow, Co. Cork	186848	An EIS has been submitted and has concluded the following: *As the proposed development would take place primarily within habitats of low ecological value and given the small development footprint, the potential impacts upon bird and mammals species would be greatly reduced.* *Assuming all mitigation measures are put in place, there would be no significant residual impacts to the aquatic environment from the proposed development. It is considered that due to the drainage system design and the distance of the proposed development to the Blackwater River SAC and Blackwater Callows SPA, there would be no significant impact upon a designated site due to drainage.* **Considering the above and given the separation distance from the proposed CGEP development no potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
Redevelopment of Former Central Hotel	186167	An NIS has been submitted which concluded that "*the habitats to be affected are highly modified and of minimal ecological value. Thus, no potential impact from loss of habitat have been identified. Given the scale and nature of the project and proposed construction mitigation measures, it can be objectively concluded that the proposed development on its own, and in combination with other plans and projects, will not have a significant impact on qualifying interests and conservation objectives for Natura 2000 sites, and the integrity of these sites will not be adversely affected".*

Development evaluated for in combination effects	Planning Reference	Potential in-combination impacts identified
		Considering the above, and given the separation distance from the proposed CGEP development no potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.
Residential development and associated works, Navigation Road Annabella Mallow Co. Cork	185112	An NIS has been submitted which concludes; *As none of the Natura 2000 sites overlap the proposed development site, direct impacts via habitat loss or disturbance/ displacement are not relevant. The development proposes to manage and control surface-water run off during both construction and operational phases prior to release into the environment by implementing standard environmental controls. Surface water run-off from other new proposed or permitted unbuilt developments that will also connect into the same public stormwater sewer network could result in a cumulative and in-combination effect. However, assuming that all developments closely adhere to best practice regarding water quality protection during construction and operational phases, then no significant negative cumulative impacts are expected to occur".* **Considering the above, and given the separation distance from the proposed CGEP development no potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
Dairygold Co-operative Society Ltd: Construction works. Annabella West End Mallow Co. Cork	184946	An NIS and EIS has been submitted which concludes that "*No significant ecological residual impacts are expected as a result of the construction and operational phase of the proposed development. Provided the recommended mitigation measures are implemented in full it is not expected that the construction and operational phases will result in an adverse residual impact on the integrity of Natura 2000 sites considered in this NIS, namely Blackwater River (Cork/Waterford) SAC".* **Considering the above, and given the separation distance from the proposed CGEP development no potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
Development of residential units, Clyda Court Quartertown Lower Mallow Co. Cork	176722	An AA Screening Report has been submitted which concludes that Theoretically the proposed development could impact on aquatic species due to increased silt run-off or chemical contamination of groundwater or surface during construction. Overall given the limited nature of the development and the distance from sensitive receptors, the precautionary measures described, the impacts on water quality and aquatic ecology is predicted to be negligible. The proposed development will not have a significant impact on qualifying interests and conservation objectives for Natura 2000 sites, and that the integrity of these sites will not be adversely affected. No significant direct, indirect or cumulative impacts on Natura 2000 sites have been identified. **The impacts on water quality and aquatic ecology are predicted to be negligible, therefore no potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**

Development evaluated for in combination effects	Planning Reference	Potential in-combination impacts identified
The development of 14 no. serviced sites for future employment uses. Ballydahin and Gooldshill Mallow Co. Cork	167121	Potential in-combination impacts with the proposed CGEP Development can be inferred from the Screening Assessment for the Proposed Quarry Industrial Estate Site at Ballydahin, Mallow, Co. Cork. These are based on the identified potential to spread invasive alien plant species (Japanese knotweed and Himalayan balsam) and downstream habitat degradation through increased siltation. **However, the project includes a number of best-practice and mitigation measures which would ensure impacts are avoided. Therefore, no potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
The construction of 108 no. dwelling houses, "Clonmore" Ballyviniter Lower Mallow Co. Cork	166949	An EIS an AA Screeng Report have been submitted concluding that: *Due to the small scale of the run-off and additional discharges from the Glasha Stream that will be generated by the proposed development relative to the flows in the River Blackwater, and the distance of the site from the SAC, it can be concluded that the proposed development will not have an measurable impact on water quality or flow rates in the SAC. Construction work is not likely to cause significant disturbance to the local otter population, due to distance from suitable habitat.* **Considering the above and given the separation distance from the proposed CGEP development, no potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified..**
A residential development comprising the construction of 88 no. dwelling houses, Annabella Mallow Co. Cork	156970	An AA Screening Report has been submitted which concludes that adopting the environmental design features as outlined for the proposed development will ensure no significant impact to any species for which the Blackwater SAC is designated will occur as a result of the development. **Environmental design measures have been proposed. No potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
Construction of 61 no. dwelling houses, Annabella Mallow Co. Cork.	156119	An AA Screening Report has been submitted which concludes that due to the location and nature of the proposed works and with the implementation of standard appropriate environmental actions and best practice negative impacts on the qualifying interests of the Blackwater River SAC will be avoided. The report also concludes that the proposed development will not have any significant impact on the water quality of the Blackwater River. **Assuming the implementation of standard appropriate environmental actions and best practice as described in the report are complied with, no potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
Construction of fabricating workshop, office block, ESB substation and other associated works, Mallow Business & Technology Park Quartertown Lower Mallow	154690	An Appropriate Assessment Report has been submitted which concludes that there is no evidence that works will cause deterioration of important habitats, or the habitats of the habitats of the qualifying species and species of special conservation interest or significant disturbance to these species thus ensuring the integrity of the Blackwater SAC is protected. **The AA screening references standard construction mitigation measures to be implemented, documenting details that no surface water, soils or contaminants will be permitted to the nearby Quarterstown stream, precluding hydrological connectivity with sensitive receptors. No potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**

Development evaluated for in combination effects	Planning Reference	Potential in-combination impacts identified
The construction of 10 no. dwelling houses to replace 8 no. residential serviced sites, An Gleann Ull Ballyhooly North Fermoy Co. Cork	196597	An EIAR and AA Screening Report has been submitted for this development which concludes that following a comprehensive evaluation of the propsed direct, indirect and cumulative impacts on the qualifying interests and conservation objectives for the Blackwater River SAC, it has been concluded that the proposed development will not have an adverse effect on the integrity of the Blackwater River SAC or any other Europeans Site. **The AA Report includes a number of generic and specific mitigation measures in relation to the management of wastewater, construction waste, noise and prevention of invasive species that would prevent any impacts to sensitive receptors. No potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
Construction of 20 no. semi-detached 2-storey houses and associated site works, Lios Ard Ballyhooly South Fermoy Co. Cork	195486	An Appropriate Assessment Screening Report has been submitted which concludes that there is no evidence to indicated that works will cause either directly or indirectly significant deterioration of important habitats, of the habitats of the habitats of the qualifying species and species of special conservation interest or significant disturbance to these species thus ensuring the integrity of the Blackwater SAC is protected. **The AA Report includes the reference to a number of standard environmental controls to be followed during construction and operation phases, in relation to the management of wastewater, construction waste, noise and prevention of invasive species that will prevent any impacts to sensitive receptors. No potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
The construction of 31 no. dwelling houses and all associated works, Glanworth (Townland) Fermoy Co. Cork	195486	An Appropriate Assessment Screening Report has been submitted which concludes there will be no significant effects on the Blackwater River SAC and Blackwater Callows SPA. **The Appropriate Assessment Screening indicates the implementation of standard environmental controls, during construction phase, and SuDS infrastructure, during operation phase, to eliminate the potential impacts affecting habitats or species due to increased silt-laden or contaminated surface water runoff. Disturbance/displacement impacts are also considered insignificant due to the absence of habitats of ecological interest or value within the vicinity of the development. No potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
6 no semi-detached 3 storey houses and 8 no residential serviced sites and associated site works. An Gleann Ull Ballyhooly North Fermoy Co Cork	175734	An Appropriate Assessment Report has been submitted which concludes there will be no significant effects on the Blackwater River SAC and Blackwater Callows SPA. **The Assessment concluded that the development is located at far enough away to preclude any disturbance or displacement impacts on habitats and mobile species. The Assessment also mentions the management of surface and wastewater emissions, ensuring the water quality of hydrologically connected receptors. No potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**

Development evaluated for in combination effects	Planning Reference	Potential in-combination impacts identified
Construction of a creche facility to serve the adjacent permitted residential development (Cork County Council Ref. 18/6579), the construction of 19 no. dwelling houses and other site works, Lisnagar Demesne (Townland) Rathcormac Co. Cork	196892	An NIS has been submitted which concludes that there will be no adverse impacts either alone or in combination with other plans and projects on the integrity of the Blackwater SAC as a result of the proposed development **The mitigation measures/best practice measures are proposed in the NIS report to prevent pollution to receiving water bodies. With the implementation of such measures, no impacts will occur to ecological receptors. No potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**
Residential Development - Construction of 96 no. dwelling houses and all associated ancillary site development works, Lisnagar Demesne Rathcormac, Co. Cork	186579	An NIS has been submitted which concludes that there will be no adverse impacts either alone or in combination with other plans and projects on the integrity of the Blackwater SAC as a result of the proposed development. **Mitigation measures are proposed in the NIS to prevent pollution entering water bodies in the vicinity of the development. With the implementation of such measures, no impacts to aquatic ecological receptors in the River Blackwater SAC and Blackwater Callows SPA are identified.**
29 no. one and two-storey detached and semi-detached dwelling houses, including the alteration, extension and refurbishment of the former dispansary/fever hospital building, Shanowen Rathcormac Co. Cork	156359	An AA Screening Report has been submitted which concludes there is no evidence that that the proposed development will cause significant deterioration in the habitat or features of the Blackwater SAC. **Neither of the environmental reports assigns potential impacts to terrestrial ecological receptors. Furthermore, the EcIA outlines that the Construction Management Plan contains mitigation/best practice measure to ensure that no impacts to aquatic receptors will arise from the development. Local SuDS infrastructure is sufficient to prevent any potential impacts during operation phase. No potential in-combination impacts on the River Blackwater SAC and Blackwater Callows SPA are identified.**

4.6 Conclusion

This Natura Impact Statement assesses the likely significance of all potential impacts arising from the proposed project on the integrity of the relevant European sites. It has been prepared taking into account the precautionary principle and is based on the best scientific knowledge in the field.

For the reasons set out in detail in the NIS, in the light of the best scientific knowledge in the field, all aspects of the proposed project which, by itself, or in combination with other plans or projects, which may affect the relevant European Sites have been considered. The NIS contains information which the Board, as competent authority, may consider in making its own complete, precise and definitive findings and conclusions and upon which the Board is capable of determining that all reasonable scientific doubt has been removed as to the effects of the proposed development on the integrity of the relevant Natura 2000 sites. In conclusion, in the light of the conclusions of the assessment which it shall conduct on the implications for the European sites concerned, the Board is enabled to ascertain that the proposed development will not adversely affect the integrity of any of the European sites concerned.

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Appendix A: Construction and Environmental Management Plan (CEMP)

INSERT CEMP HERE

Appendix B: CGEP Replant Lands AA and NIS

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

COOM GREEN ENERGY PARK

APPROPRIATE ASSESSMENT SCREENING REPORT AND NATURA IMPACT STATEMENT FOR COOM GREEN ENERGY PARK REPLANT LANDS MONEYGORM, COUNTY CORK, AND BALLARD, COUNTY WICKLOW

Prepared for: Coom Green Energy Park Limited

coom green energy

Date: December 2020

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1. INTRODUCTION

Fehily Timoney & Company (FT) were commissioned by Coom Green Energy Park Limited to provide consultancy services in respect of the proposed replant lands at Moneygorm, Co. Cork, and Ballard, Co. Wicklow for the proposed wind farm at Coom Green Energy Park at Bottlehill and Nagle's Mountains, Co. Cork. An Appropriate Assessment Screening Report and Natura Impact Statement has been prepared in respect of the proposed project.

The requirements for Appropriate Assessment (AA) are set out in Article 6 of the Habitats Directive (92/43/EEC) and Part XAB of the Planning and Development Act 2000, as amended. An AA is required of the implications for the European site concerned in view of the site's conservation objectives of any plan or project not directly connected with or necessary to the management of that site but likely to have a significant effect thereon, either individually or in combination with any other plans or projects.

European sites comprise both Special Protection Areas (SPAs) for birds and Special Areas of Conservation (SACs) for habitats and species. The Habitats Directive formed a basis for the designation of SACs. Similarly, SPAs are legislated for under the Birds Directive (Council Directive 79/409/EEC on the Conservation of Wild Birds). In general terms, European sites are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community.

The assessment procedure is based on a four-stage approach, where the outcome at each successive stage determines whether a further stage in the process is required.

The purpose of the screening stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone or in-combination with other plans or projects, could have significant effects on a Natura 2000 site in view of the site's conservation objectives. There is no necessity to establish such an effect; it is merely necessary for the competent authority to determine that there may be such an effect. The need to apply the precautionary principle in making any key decisions in relation to the tests of AA has been confirmed by the case law of the Court of Justice of the European Union (CJEU). Plans or projects that have no appreciable effect on a European site may be excluded.

An Appropriate Assessment:

(i) must identify, in the light of the best scientific knowledge in the field, all aspects of the project which can, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;
(ii) must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and
(iii) may only include a determination that the proposed development will not adversely affect the integrity of any relevant European site where the competent authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of the identified potential effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete.

If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three and, if necessary, stage four.

Article 6 of the Habitats Directive envisages a two-stage process, which is implemented in some detail by the provisions of sections 177U and 177V of the Planning and Development Act.

Screening for appropriate assessment in accordance with section 177U is the first stage of the AA process (Stage One), in which the possibility of there being a significant effect on a European site is considered. Plans or projects that have no appreciable effect on a European site are thereby excluded, or screened out, at this stage of the process. Where screening concludes that there is the potential for significant effects, then it is necessary to carry out an AA (Stage Two) for the purposes of Article 6(3), and a Natura Impact Statement (NIS) is produced. The NIS, which forms the basis of the AA, considers the effect of a project or plan on the integrity of a European site and on its conservation objectives, and where necessary, draws up mitigation measures to avoid/minimise negative effects.

The competent authority, in this case An Bord Pleanála, in carrying out an AA, is required to make an examination, analysis, evaluation, findings, conclusions and a final determination as to whether or not the proposed development would adversely affect the integrity of the relevant European site in view of its conservation objectives.

This report comprises of the Stage One Screening Report (Section 4) and Stage Two Natura Impact Statement (Section 5), to evaluate the potential effect(s) of the proposed replant lands for the proposed Coom Green Energy Park on the European sites. To evaluate the potential effect(s) of the proposed replant lands on the European sites, all European sites located within a 15 km radius of the replant lands, or those which are ecologically linked were considered. Please note that while a 15 km buffer is recommended for projects, there is no hard and fast rule for buffer size (DoEHLG, 2010). A 15 km buffer was used in line with standard industry practice; however, the potential zone of influence was considered to extend to European sites located outside the 15 km buffer where downstream hydrological links exist. No additional sites beyond the 15 km buffer were identified as being within the zone of influence.

There are 2 European sites within the potential zone of influence (15km radius) of the Moneygorm replant lands in Co. Cork; these are:

- Blackwater River (Cork/Waterford) SAC* (Site Code: 002170) is located 380 m east
- Blackwater Callows SPA (Site Code: 004094) is located 13.9 km east.

There are 6 European sites within the potential zone of influence (15km radius) of the Ballard replant lands in Co. Wicklow; these are:

- Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733) is located 4.7 km north
- Wicklow Mountains SPA (Site Code: 004040) is located 7.8 km northwest
- Wicklow Mountains SAC* (Site Code: 002122) is located 7.8 km northwest
- Deputy's Pass Nature Reserve SAC (Site Code: 000717) is located 9 km northeast
- Buckroney-Brittas Dunes and Fen SAC* (Site Code: 000729) is located 13.4 km east
- Slaney River Valley SAC* (Site Code: 000781) is located 14.7 km west.

** At present many SACs in Ireland are 'candidate' SACs and referred to as cSACs. The relevant Statutory Instruments for the cSACs in Ireland have not yet been made, however, these "candidate" sites must still be afforded the same level of protection as if they were SACs as designated in accordance with the EU Habitats Directive.*

1.1 Legislative Requirements

The requirements for an AA are set out in the Habitats Directive 92/43/EEC. Articles 6(3) and 6(4) of this Directive state:

> *6(3) Any plan or project not directly connected with or necessary to the management of the site (Natura 2000 sites) but likely to have significant effect thereon, either individually or in combination with other plans or projects, shall be subject to Appropriate Assessment of its implications for the site in view of the sites conservation objectives.*
>
> *In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*
>
> *6(4) If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*
>
> *Where the site concerned hosts a priority natural habitat type and/or a priority species the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.*

The statutory agency responsible for European sites is the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht (DAHG).

In December 2009 'Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities, Department of the Environment, Heritage and Local Government' was published (DoEHLG, 2009). This guidance document was prepared jointly by the NPWS and Planning Divisions of DoEHLG (now DCHG), with input from local authorities. The was revised in 2010 with a minor amendment. This report was also prepared with reference to EC guidance, *Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*, European Commission 2001 and European Commission (2018). *Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC.* Brussels, 21.11.2018 C (2018) 7621 final.

This Appropriate Assessment Screening Report and Natura Impact Statement has been prepared in accordance with the relevant Irish and European Commission Guidance as detailed in the preceding paragraph.

1.1.1 Regulatory Context

In 1997, the Habitats Directive was transposed into Irish National Law by the European Communities (Natural Habitats) Regulations, SI 94/1997 (as amended by S.I. 233/1998 & S.I. 378/2005). The European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477/2011) revoked the 1997 Regulations (and amendments) as well as the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010.

The purpose of the 2011 Regulations was to address transposition failures identified in the Court of Justice of the European Union (CJEU) judgements. Following additional amendments in 2013 (S.I. 499/2013) and 2015 (S.I. 355/2015) the regulations are now cited as the European Communities (Birds and Natural Habitats) Regulations 2011 to 2015.

The Regulations have been prepared to address several judgments of the CJEU against Ireland, notably cases C-418/04 (*Commission v Ireland*) and C-183/05 (*Commission v Ireland*), in respect of failure to transpose elements of the Birds Directive and the Habitats Directive into Irish law.

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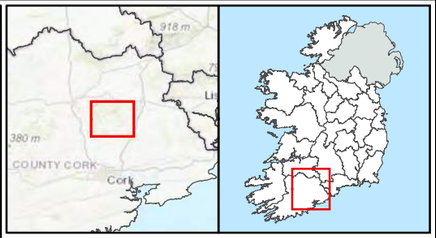

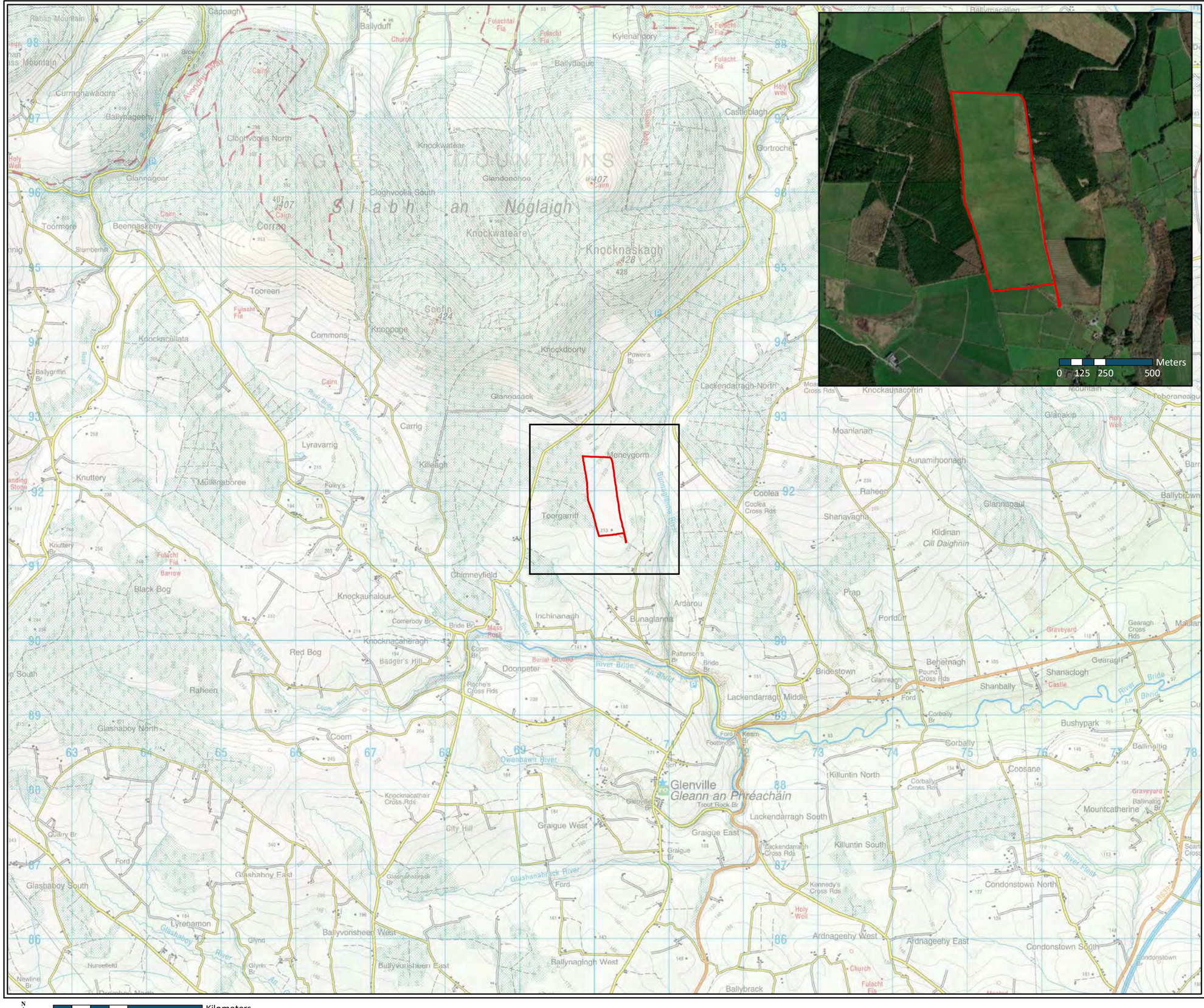

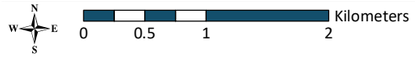

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PROJECT: Coom Green Energy Park, Co. Cork	
FIGURE NO: 1.1	
CLIENT: Coom Green Energy Park Ltd.	
SCALE: 1:50000	**REVISION:** 0
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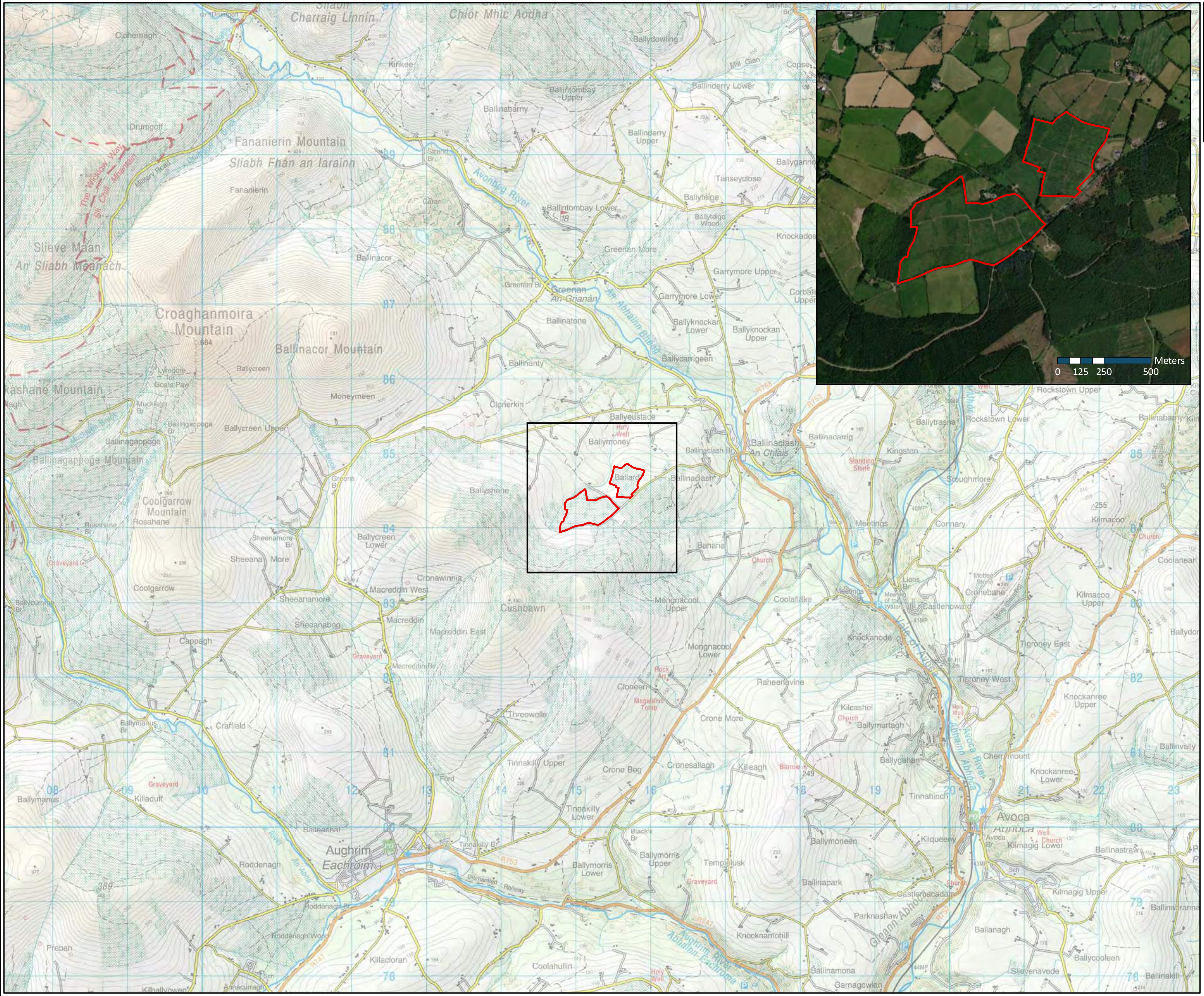

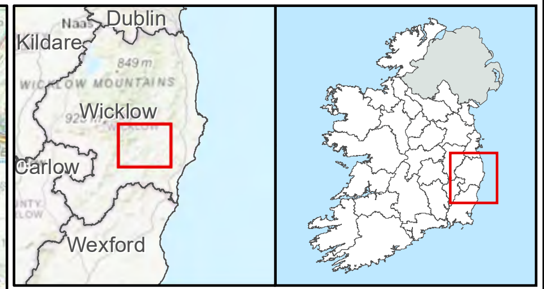

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TITLE:	Location of Replant Lands at Ballard, Co. Wicklow
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FIGURE NO:	1.2
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SCALE: 1:50000	**REVISION:** 0
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2. METHODOLOGY

2.1 Appropriate Assessment Methodology

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures to be addressed in the AA process. Firstly, a project should aim to avoid any negative effects on European sites by identifying possible effects early in the project and should design the project in order to avoid such effects.

There are four stages in an AA, as outlined in the European Commission Guidance document (2001). The following is a summary of these steps.

- Stage One – Screening: The purpose of the screening stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone and in-combination with other plans or projects, could have significant effects on a Natura 2000 site in view of the site's conservation objectives. There is no necessity to establish such an effect; it is merely necessary for the competent authority to determine that there may be such an effect. The need to apply the precautionary principle in making any key decisions in relation to the tests of AA has been confirmed by the case law of the Court of Justice of the European Union (CJEU). Plans or projects that have no appreciable effect on a European site may be excluded.
- Stage Two – Appropriate Assessment: The need for Stage Two AA arises where the first stage (or screening process) has either determined (or it was at least implicitly accepted) that the project, alone or in-combination with other plans or projects, is likely to have a significant effect on a European site. A Stage Two AA is a focused and detailed examination, analysis and evaluation carried out by the competent authority of the implications of the plan or project, alone and in-combination with other plans and projects, on the integrity of a European site in view of that site's conservation objectives.
- Stage Three - Assessment of Alternative Solutions: This stage of the potential process arises where adverse effects on the integrity of a European site cannot be excluded and examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site.
- Stage Four – This is the derogation process of Article 6(4), which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a project to proceed where adverse effects on the integrity of a European site have been predicted. Compensatory measures must be proposed and assessed as part of this stage.

In the preparation of this assessment regard has been given to the relevant guidance, in particular:

- *Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*, European Commission 2001.
- European Commission (2018). *Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC.* Brussels, 21.11.2018 C (2018) 7621 final.
- *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin 2010.

2.1.1 Assessment of Impacts (Effects)

The first step in the screening process is to develop a list of European sites potentially affected by the proposed development. Each European site is reviewed to establish whether or not the proposed development is likely to have a significant effect on the integrity of the site, as defined by its structure and function, and its conservation objectives.

The qualifying interests of each European site are identified, and the potential threats are summarised into the following categories for the screening process, and described within the screening matrix as follows:

- Direct effects refer to habitat loss or fragmentation arising from land-take requirements for development or agricultural purposes. Direct effects can be as a result of a change in land use or management, such as the removal of agricultural practices that prevent scrub encroachment.
- Indirect and secondary effects do not have a straight-line route between cause and effect, and it is potentially more challenging to ensure that all the possible indirect effects of the plan or project – in combination with other plans and projects – have been established.

  These can arise when a development alters the hydrology of a catchment area, which in turn affects the movement of groundwater to a site, and the qualifying interests that rely on the maintenance of water levels. Deterioration in water quality can occur as both an indirect or direct consequence of development, which in turn changes the aquatic environment and reduces its capacity to support certain plants and animals. The introduction of invasive species can also be defined as an indirect effect, which results in increased movement of vectors (humans, fauna, surface water), and consequently the transfer of alien species from one area to another.
- Disturbance to fauna can arise directly through the loss of habitat (e.g. bat roosts) or indirectly through noise, vibration and increased activity associated with construction and operation.

2.2 Desktop Study

In order to complete the Screening for Appropriate Assessment certain information on the existing environment is required. A desk study was carried out to collate available information on the site's natural environment. This comprised a review of the following publications, data and datasets:

- Cork County Development Plan 2014
- Cork County Council Planning Enquiry System
- Wicklow County Development Plan 2016-2022
- Wicklow County Council Planning Enquiry System (http://www.eplanning.ie/WicklowCC/searchexact)
- National Parks and Wildlife Service (NPWS) website and metadata available (www.npws.ie)
- OSI Aerial photography and 1:50,000 mapping
- National Biodiversity Data Centre (NBDC) (on-line map-viewer)
- Environmental Protection Agency (EPA) water quality data
- River Catchment & Sub-catchment WFD datasets.

2.3 Field Studies

Terrestrial ecological surveys were undertaken on 17th June and 13th August 2019 at Moneygorm, Co. Cork, and on the 28th October 2018; 29th and 30th January 2020 at Ballard, Co. Wicklow. The objective of these visits was to obtain data on the habitats and species present at the replant lands and determine whether connections exist between these lands and any Natura 2000 sites. Weather conditions were favourable for surveying.

The survey area was limited to the replant lands and those areas immediately adjacent.

All flora and fauna (signs and direct observations) present were identified, and habitats were classified according to Fossitt's (2000) "A Guide to Habitats in Ireland", with habitat mapping undertaken in accordance with "*Best Practice Guidance for Habitat Survey and Mapping*" (Smith et. Al, 2011). Any non-native invasive plant species were recorded and mapped using GPS devices.

Any observations or signs of fauna including mammals, birds and other fauna were recorded, and investigated further where required.

Physical data on hydrological regimes and soils were recorded where these have the potential to interact with ecological receptors within the site and surrounding landscape.

2.3.1 Aquatic

Aquatic surveys were carried on 24th, 25th and 29th to 31st July 2020 by Triturus Environmental Ltd. All watercourses which could be affected directly or indirectly by the proposed replant lands at Moneygorm were considered as part of the current baseline assessment. Survey effort focused on both instream and riparian habitats at each location. Surveys at each aquatic site included a fisheries assessment (electro-fishing), fisheries habitat appraisal and white-clawed crayfish assessment. A freshwater pearl mussel assessment was undertaken across the wider catchment of the proposed development. Additionally, biological water quality (Q-sampling) was undertaken at *n*=12 sites. Rare, protected and or conservation interest aquatic species such as otter were also searched for at each survey site. This holistic approach informed the overall aquatic ecological evaluation of each site in context of the proposed project.

A broad aquatic habitat assessment was conducted at each site utilising elements of the methodology given in the Environment Agency's *'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003'* (EA, 2003) and the Irish Heritage Council's *'A Guide to Habitats in Ireland'* (Fossitt, 2000). All sites were assessed in terms of:

- Stream width and depth and other physical characteristics.
- Substrate type, listing substrate fractions in order of dominance, i.e. bedrock, boulder, cobble, gravel, sand, silt etc.
- Flow type, listing percentage of riffle, glide and pool in the sampling area.
- In-stream macrophyte, bryophytes occurring and their percentage coverage of the stream bottom at the sampling sites.
- Riparian vegetation composition.

The watercourse at each aquatic survey site was described in terms of the important aquatic habitats and species. This helped to evaluate species and habitats of ecological value in the vicinity of the proposed development and watercourse crossings. The aquatic baseline prepared would inform mitigation for the replant lands at Moneygorm where required.

This survey confirmed the absence of freshwater pearl mussel and white-clawed crayfish, and the lack of suitable habitat for either species.

The higher reaches of river systems are not used by twaite and allis shad.

Figure 2-1: Location of aquatic survey locations (Moneygorm, Co. Cork)

2.3.2 Birds

The suitability of habitats for birds was recorded during walkover surveys conducted at both Moneygorm and Ballard replant lands. Birds were also recorded during these walkover surveys.

3. PLANTING DESCRIPTION

3.1 Moneygorm, Co. Cork

Technical approval has been granted by the Department of Agriculture, Food and the Marine for the following planting at Moneygorm, Co. Cork (Forest Owner No: FOI35956U, Contract No: CN82229):

Tree Planting:

- Sitka Spruce (34.02 ha)
- Additional Broadleaved Species (6 ha).

Additional Details:

- Drainage
- Ground preparation: Mounding
- Planting Method: Angle Notch
- Access: Existing Track
- Fertilizer [Zero Phosphate]
- Herbicide Control (years 0 – 2)
- Manual Control (years 3 - 4)
- Upgrade existing fence to deer & sheep-proof specification.

The technical approval document (included in Appendix 2) states that all applications must be developed in accordance with detailed procedures & standards as described in the current Forestry Schemes Manual, and also requires Adherence to Forestry & Water Quality Guidelines (included in Appendix 3).

3.2 Ballard, Co. Wicklow

Technical approval has been granted by the Department of Agriculture, Food and the Marine for the following planting at Ballard, Co. Wicklow (Forest Owner No: FO101174V, Contract No: CN77296):

Tree Planting:

- Sitka Spruce / Additional Broadleaved Species Integrated Mix (34.11 ha)
- Alder / Silver Birch Integrated Mix (1.67 ha)
- Alder (1.32 ha).

Additional Details:

- Drainage
- Ground preparation: Mounding
- Planting Method: Angle Notch
- Access: Existing Track
- Fertilizer [Zero Phosphate]
- Herbicide Control (years 0 – 2)
- Manual Control (years 3 - 4)
- Upgrade existing fence to deer-proof specification.

3.3 3rd Party Consultation

Inland Fisheries Ireland (IFI) were consulted for the Moneygorm site by the Forest Service during the process of technical approval for afforestation; their response and recommendations are included in Appendix 4.

National Parks and Wildlife Service (NPWS) were consulted for the Moneygorm site. No formal response to date. NPWS indicated construction-stage projects are being prioritised at present.

4. STAGE ONE - SCREENING REPORT

4.1 Brief Description of Existing Site

4.1.1 Moneygorm, Co. Cork

The proposed replant lands are made up of a large (c.39.9 Ha) open expanse of Improved Agricultural Grassland (GA1) bordered by Scrub (WS1) and Grassy Verges (GS2) in the townland of Moneygorm on the southern side of Nagle's Mountains on a flat spur overlooking the Bride valley, accessed via the R614, un-named local roads, and farm/forestry access tracks.

The surrounding landscape is both mountainous and rural in character, with pasture and commercial forestry being the dominant land uses; the replant lands site is surrounded to the west and north-east by conifer plantations, and to the north, south and south-east by agricultural land.

The site is at an elevation of 210-230m OD. The bedrock geology is purple mudstone and sandstone of the Ballytrasna Formation; the soils are made up of fine loamy drift with siliceous stones. The surrounding land drops off on three sides and the land at the site was observed to be dry, with no associated drainage network.

The Bunaglanna watercourse is located c. 450m east of the proposed replant lands; drainage channels carrying flowing water are present: one flowing north-south along the eastern replant lands boundary which joins another channel flowing west-east from within the replant lands site exit the site to join a drainage channel flowing downhill (west-east) along the edge of the adjacent conifer plantation towards the Bunaglanna. Assessment of satellite imagery indicates this drainage channel connects with the Bunaglanna c. 565m downstream of the replant lands site.

The Bunnaglanna is a tributary of the Bride River, which it joins c. 2.5 km to the south of the replant lands site. The Bride is a tributary of the Blackwater River, flowing east from the Bunnaglanna/Bride confluence for c. 52 km before joining the Blackwater south of Villierstown in Co. Waterford.

The Bunaglanna and Bride are within the Blackwater River (Cork/Waterford) SAC (002170); the SAC boundary is c. 380m east of the replant lands site at its closest point. The in-stream distance between the replant lands and Blackwater River (Cork/Waterford) SAC is c. 565m.

4.1.2 Ballard, Co. Wicklow

The proposed replant lands are made up of two large sections (c.23.7 and 12.8 Ha) of open expanse of scrub (WS1), recently felled woodland (WS5), dry-humid acid grassland (GS3), dense bracken (HD1), recolonising bare ground (ED3), hedgerow (WL1), treeline (WL2), immature woodland (WS2), species poor wet grassland (GS4), drainage ditches (FW4), species poor bog woodland (WN7), conifer plantation (WD4) and buildings and artificial surfaces (BL3).

The surrounding landscape is both mountainous and rural in character, with pasture and commercial forestry being the dominant land uses. The replant lands site is surrounded to the west and south by conifer plantations, and to the north, by semi-natural woodland, rivers and then further to agricultural land.

The site is divided into two sections by a private road, the westerly and easterly sections and are composed of areas of c.23.7 and 12.8 Ha, respectively. Both sites are at elevations of 160-207m OD.

The bedrock geology is sandstone and shale till (Lower Paleozoic); the soils are clayey and classed as Tills (diamictons). The surrounding gently slopes in a north-westerly direction and the land at the site was observed to be dry at higher altitudes, becoming increasingly wetter as the westerly block sloped downhill eventually ending in standing pools. The easterly block was observed as dry. Drainage throughout the site is typical of conifer plantation, with small drains every 2-3 metres typically dry, larger drains contained quantities of standing water.

Both the easterly and westerly aspects of the replacement lands site are drained by the Ballyeustace Stream (EPA Code: 10B05). A 1st order watercourse, the Ballyeustace Stream flows in a north-easterly direction for ca. 3km before its confluence with the Avonbeg River (EPA Code: 10A04).

Along the northerly section of the easterly aspect of the replant lands, a section of the Ballyeustace Stream has been split from the natural course though an artificial course to the south. It was previously noted in 2019 ecological surveys completed within the site that the bed of the Ballyeustace Stream flows to the north of the western portion of Ballard replacement lands, that the stream bed was laden with sediment, presumably originating from recently reseeded agricultural land. This was found to also be the case during surveys in January 2020.

The Ballyeustace Stream (EPA Code: 10B05) flows into the Avonbeg River (EPA Code: 10A04), a 4th order watercourse, at the edge of the Ballinatone Lower and Ballard townlands. From here the Avonbeg River flows for approximately 5.6 km in a southerly direction before entering the Avoca River (EPA Code: 10A03). The Avoca River travels for approximately 15.48 km until entering the Irish Sea at Arklow.

4.2 Habitats Within Existing Site

4.2.1 Moneygorm, Co. Cork

Improved agricultural grassland GA1

Improved agricultural grassland covers the majority of the site. Grasses include Yorkshire fog *Holcus lanatus*, perennial rye-grass *Lolium perenne* and annual meadow-grass *Poa annua,* with a range of herbaceous plants including common mouse-ear *Cerastium fontanum*, creeping buttercup *Ranunculus repens,* daisy *Bellis perennis,* dandelion *Taraxicum officinale* Agg., broad-leaved dock *Rumex obtusifolius* white clover *Trifolium repens,* greater plantain *Plantago major*, creeping thistle *Cirsium arvense* cuckooflower *Cardamine pratensis* and field forget-me-not *Myosotis arvensis* also present.

GA1 is an artificial and intensively managed habitat type, with limited biodiversity value.

Dry meadows and grassy verges GS2

The semi-natural habitat dry meadows and grassy verges is present as narrow strips bordering the replant lands fields. Species recorded in this habitat included Yorkshire fog *Holcus lanatus,* annual meadow-grass *Poa annua* cocksfoot *Dactylis glomerata,* soft rush *Juncus effusus,* creeping buttercup *Ranunculus repens,* birds foot trefoil *Lotus corniculatus*, hogweed *Heracleum sphondylium*, spear thistle *Cirsium vulgare*, common sorrel *Rumex acetosa*, cleavers *Galium aparine,* bilberry *Vaccinium myrtillus*, creeping cinquefoil *Potentilla reptans* and herb Robert *Geranium robertianum.*

Scrub WS1

Scrub was also present in strips associated mainly with the outer margins of the replant lands; one narrow strip also extends into the improved agricultural grassland (GA1) which dominates the site. Species recorded included goat willow *Salix caprea*, bramble *Rubus fruticosus* Agg., Bracken *Pteridium aquilinum*, willowherb *Epilobium* sp.gorse *Ulex* sp. foxglove *Digitalis purpurea,* soft shield fern *Polysticum setiferum*, rowan *Sorbus aucaparia*, holly *Ilex aquifolium*, oak *Quercus* sp. and a single Fuchsia *Fuchsia magellanica* bush. Fuchsia is a non-native naturalised species. Its invasiveness impact has not been assessed.

Drainage ditches FW4

The drainage channels within and bordering the replant lands site are shallow (1-3 cm wet depth), narrow (0.2 -0.3 m wet width) carrying flowing water over a rocky substrate. Aquatic vegetation is absent, with grasses such as Yorkshire fog and soft rush *Juncus effusus* present fringing the channels. The amount of water in these channels is likely to fluctuate markedly between wet and dry periods.

4.2.2 Ballard, Co. Wicklow

Scrub WS1 and dry-humid acid grassland GS3 mosaic

This habitat mosaic was found to be dominant across the westerly portion of the replant lands site. Young saplings of downy birch (*Betula pubescens*) of between 2 and 3m in height were frequent, with lodgepole pine (*Pinus contorta*) also frequent to occasional. Bramble (*Rubus fruticosus* agg.) and gorse (*Ulex europaeus*) were found to be abundant, forming dense stands across the habitat, classified as areas of scrub (WS1). The abundance of other species including rosebay willowherb (*Chamaenerion angustifolium*) give the habitat elements of recently felled woodland (WS5). *Agrostis capillaris* and *Molinea caeulea* were found to be frequent in the field layer with *Centaurea nigra* noted as being rare. Stands of bracken (*Pteridium aquilinum*) and gorse (*Ulex* spp.) were found to be frequent.

Scrub (WS1) and dry-humid acid grassland (GS3) mosaic, with elements of recently felled woodland (WS5) is the result of the re-vegetation of an area following the cessation of conifer plantation management practices. This habitat type is of biodiversity value, although it does not conform to any protected habitat types under the EU habitats directive.

Dense bracken HD1

This habitat type is found occasionally to frequently across both the westerly and easterly portions of the replant lands site. This habitat is dominated by bracken (*Pteridium aquilinum*), with bryophytes such as *Rhytidiadelphus triquetrus* being dominant at ground level.

Dense bracken (HD1) is of some limited biodiversity value, through the provision of food and shelter for wildlife, although is considered a nuisance species due to its ability to out compete other native plants.

Recolonising bare ground ED3

Recolonising bare ground was identified in both the westerly and easterly portions of the replant lands site. This habitat was largely found along the disused conifer plantation access tracks throughout the site. These habitats were largely composed of mats of vegetation (>50%) with areas of exposed stone chipping. Grass species such as *Poa annua* were occasional along with species such as rosebay willowherb (*Chamaenerion angustifolium*). The habitat was dominated by lichen and bryophyte species including; *Cladonia chlorophaea* agg., *Peltigera hymenina* and *Rhytidiadelphus triquetrus.*

Recolonising bare ground (ED3) is of some local value to wildlife.

Hedgerow WL1

Hedgerow habitats are found across both the westerly and easterly portions of the replant lands site. Species recorded within this habitat type included bramble (*Rubus fruitcosus* agg.), bracken (*Pteridium aquilinum*), ash (*Fraxinus excelsior*), holly (*Ilex aquifolium*), hawthorn (*Crataegus monogyna*) and gorse (*Ulex* spp.). One invasive species was identified at a single location across the site, cherry laurel (*Prunus laurocerasus*) was identified at a hedgerow/ treeline edge at 52.898757, -6.283634 (WGS 84 Web Mercator).

Hedgerow (WL1) habitat is classified as being locally important (higher value).

Treeline WL2

Treelines within the proposed replant lands site are largely located along the boundary of the site, with one exception of a birch dominant treeline at the westerly portion, which appears to be an old field boundary. This habitat is largely abundant in species such as holly (*Ilex aquifolium*) and hawthorn (*Crataegus monogyna*), with ash (*Fraxinus excelsior*) being dominant. Gorse (*Ulex* spp.), bramble (*Rubus fruitcosus* agg.) and bracken (*Pteridium aquilinum*) were also found to be frequent to occasional across the field layer of this habitat.

Trees with the potential for roosting bats were identified . These trees are largely ash with heavy densities of ivy (*Hedera helix*) and include trees at 1= 52.902031, -6.282566, 2= 52.902147, -6.283352, 3= 52.899662, -6.283321 (WGS 84 Web Mercator). These potential roost trees are located along the boundary of the proposed development footprint and will not be impacted as a result of the proposed development.

Treelines (WL2) are classified as being locally important (higher value).

Species poor wet grassland GS4

An area of wet grassland was identified along the northern border of the proposed westerly portion of the replant lands. *Molinea caeulea* and *Juncus inflexus* is frequent within this habitat with *Juncus conglomeratus* frequent in dryer areas. Within wet pools between hammocks and stands of *Juncus* spp is noted. Species including lesser spearwort (*Ranunculus flammula*), broad buckler-fern (*Dryopteris dilatate*), gorse (*Ulex* spp.) is occasional. This wet habitat is fed by a small unnamed stream which flows through adjacent conifer plantations and disperses into pre-existing drains before flowing into the adjacent Ballyeustace Stream. Stands of scrub are encroaching upon this habitat

Species poor Wet grassland (GS4) is classified as being locally important (higher value).

Drainage ditches FW4

Drainage ditches are found across both sites in varying sizes. The larger drainage ditches are located within the western aspect of the proposed replant lands and have been identified as providing adequate spawning grounds for frogs. Vegetation within these ditches is largely composed of overhang of *Juncus* spp. and *Rubus fruiticosus* agg.

Drainage ditches (FW4) is classified as being locally important (higher value).

Species poor wet bog woodland WN7

A small section of species poor bog woodland (840 m^3) was identified north of westerly section of the proposed replant lands, within the site boundary. This habitat is waterlogged, containing a canopy layer dominant in downy birch (*Betula pubescens*) and rare in scots pine (*Pinus Sylvestris*).

The field layer is dominant in hummocks of *Molinea caerulea*, abundant in *Juncus effuses*, occasional in lesser spearwort (*Ranunculus flammula*), *Polytrichum commune*, *Polypodium vulgare*, *Sphagnum palustre*, *Rhytideodelphyus triquetius*, *Thuidium tamariscinum* and Great Woodrush (*Luzula sylvatica*) and rare in *Cirsium palustre*, *Sphagnum papilosum* and *Veronica beccabunga*. This habitat was identified as being species poor and lacking the adequate species assemblage in order to be termed as the Annex I protected habitat of 91D0 Bog woodland.

Species poor Bog Woodland (WN7) is classified as being locally important (higher value).

Immature woodland WS2 and scrub WS1 mosaic

Mosaic habitats of immature woodland and scrub was identified across both sections of the proposed replant lands. The canopy layer of this habitat mosaic is dominant in downy birch (*Betula pubescens*). The field layer is dominant in bramble (*Rubus fruitcosus* agg.).

Immature woodland (WS2) and scrub (WS1) are classified as being locally important (higher value).

Conifer plantation WD4

A small area (1,688 m^2) of conifer plantation was identified to the west of the replant lands site. Sitka spruce (*Picea sitchensis*) dominates the canopy layer of this habitat type, bryophytes including *Rhytidiadelphus triquetrus* dominate the field layer.

This habitat type is man-made and composed of non-native conifers, of little use to biodiversity and is classified as being locally important (lower value).

Eroding/ upland rivers FW1

The Ballyeustace Stream flows adjacent, in a northerly direction, to both blocks of the replant lands site. Drainage ditches from both sites feed into this stream. The stream contains low levels of instream vegetation and evidence of its management can be observed.

This habitat type is classified as being locally important (higher value) due to its connectivity.

Oak-ash-hazel woodland WN2

This habitat type is present along the northern edge of the eastern block site boundary. This habitat's canopy layer is dominant in ash (*Fraxinus excelsior*) and rare in *Quercus robur*. The ground layer is dominated by bare litter filled ground with ivy (*Hedera helix*) and holly (*Ilex aquifolium*) being frequent.

This habitat type is classified as being locally important (higher value).

Scrub WS1

This habitat type is dominant within the easterly portion of the proposed replant lands site. It is largely dominated by species such as bramble (*Rubus fruticosus* agg.), gorse (*Ulex europaeus*) and rosebay willowherb (*Chamaenerion angustifolium*).

This habitat is of importance locally, although is typically of recently felled pre-immature woodland sites. This habitat type is classified as being locally important (higher value).

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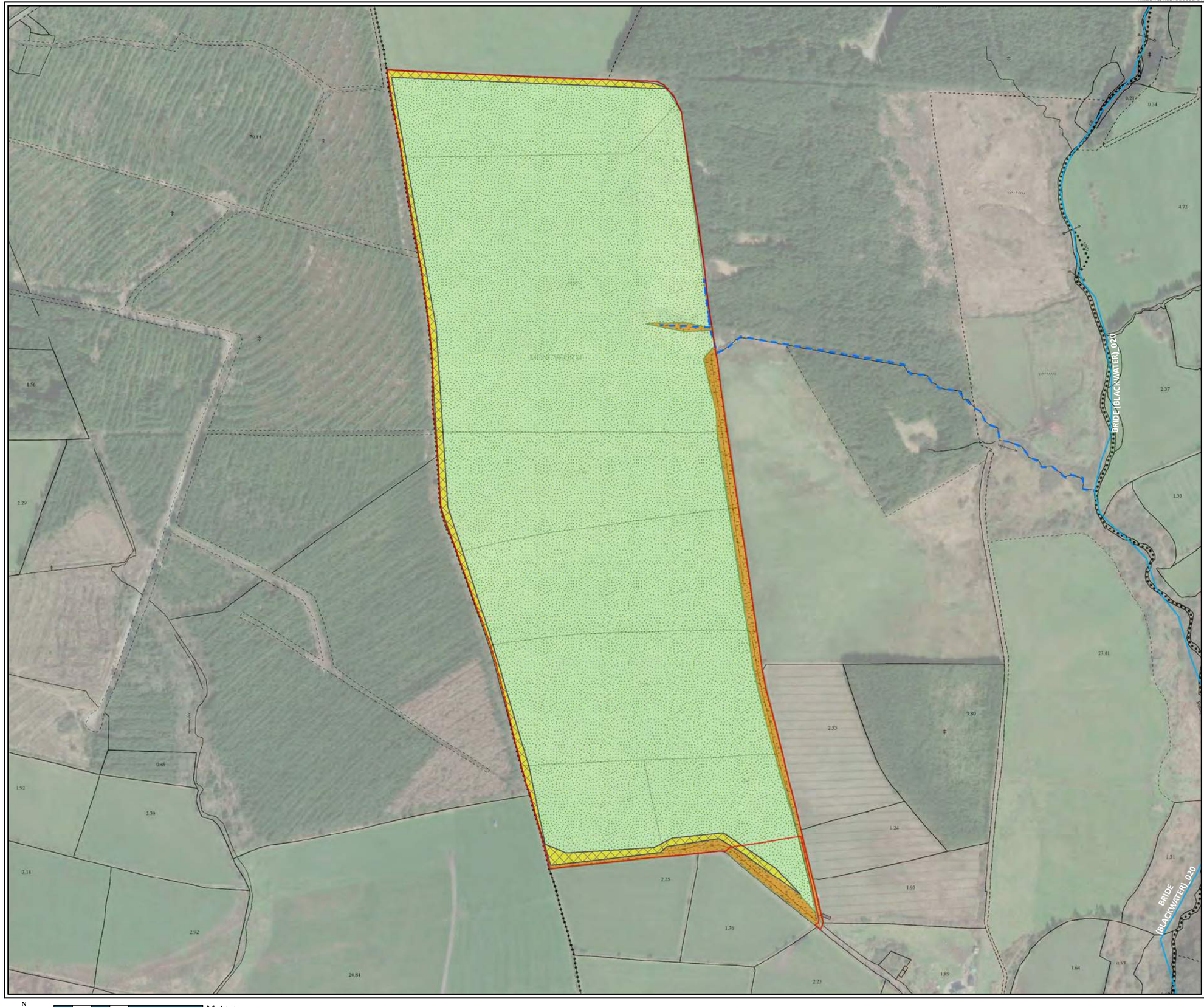

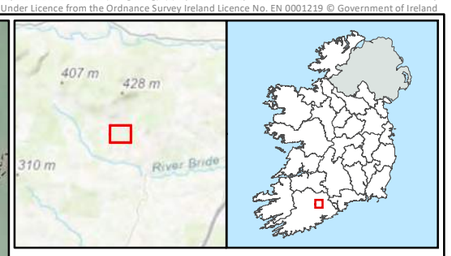

Site Boundary

WFD River Water Bodies

Habitat Classification

FW4, Drainage Ditch

GS2, Dry meadows and grassy verges

WS1, Scrub

GA1, Improved Agricultural Grassland

N
W E
S

0 50 100 200 Meters

TITLE:	Habitat Map of Replant Lands at Moneygorm, Co. Cork		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	4.1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:5000	**REVISION:**	0
DATE:	25/09/2020	**PAGE SIZE:**	A3

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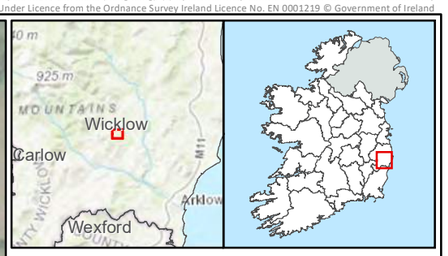

- Cherry Laurel (Invasive Species)
- Site Boundary

Habitat Classification

- ED3, Recolonising bare ground
- FW1, Eroding/upland rivers
- FW4, Drainage ditches
- WL1, Hedgerows
- WL2, Treelines
- GS4, Wet grassland
- HD1, Dense bracken
- WD4, Conifer plantation
- WN2, Oak-ash-hazel woodland
- WN7, Bog woodland
- WS1, Scrub
- WS1/GS3, Scrub / Dry-humid acid grassland
- WS1/WS2, Scrub / Immature woodland

TITLE:	Habitats of Replant Lands at Ballard, Co. Wicklow		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	4.2		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:5000	**REVISION:**	0
DATE:	25/09/2020	**PAGE SIZE:**	A3

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N W E S

0 100 200 400 Meters

4.3 European sites within 15 km

4.3.1 Moneygorm, Co. Cork

There are 2 European sites within the potential zone of influence (15km radius), (see Figure 4-3). Table 4-1 lists these sites, including their qualifying interests, conservation objectives and known threats and pressures (according to information provided by the NPWS); these sites are:

- Blackwater River (Cork/Waterford) cSAC* (Site Code 002170) is located c. 380 m east
- Blackwater Callows SPA (Site Code 004094) is located c. 13.9 km northeast.

The full NPWS site synopses for the relevant designated sites are included in Appendix 5. Table 4-1 below sets out the qualifying interests and threats/pressures for each site.

4.3.2 Ballard, Co. Wicklow

There are 6 European sites within the potential zone of influence (15km radius), (see Figure 4-4). Table 4-2 lists these sites, including their qualifying interests, conservation objectives and known threats and pressures (according to information provided by the NPWS); these sites are:

- Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733) is located 4.7 km north
- Wicklow Mountains SPA (Site Code: 004040) is located 7.8 km northwest
- Wicklow Mountains SAC (Site Code: 002122) is located 7.8 km northwest
- Deputy's Pass Nature Reserve SAC (Site Code: 000717) is located 9 km northeast
- Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729) is located 13.4 km east
- Slaney River Valley SAC (Site Code: 000781) is located 14.7 km west.

The full NPWS site synopses for the relevant designated sites are included in Appendix 5.

Table 4-1: European Sites Within 15 km of Replant Lands at Moneygorm, Co. Cork

Designated Site (Site Code)	Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
Blackwater River (Cork/Waterford) SAC (002170)	380 m	To maintain/restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected	• Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] • White-clawed crayfish (*Austropotamobius pallipes*) [1092] • Sea lamprey (*Petromyzon marinus*) [1095] • Brook lamprey (*Lampetra planeri*) [1096] • River lamprey (*Lampetra fluviatilis*) [1099] • Allis shad (*Alosa alosa*) [1102] • Twaite shad (*Alosa fallax fallax*) [1103] • Salmon (*Salmo salar*) [1106] • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Perennial vegetation of stony banks [1220] • *Salicornia* and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Otter (*Lutra lutra*) [1355] • Mediterranean salt meadows	• E02 Industrial or commercial areas (medium, outside) • A08 Fertilisation (high, outside) • A03 Mowing/ cutting of grassland (high, inside) • C01.01 Sand and gravel extraction (low, outside) • J02.01 Landfill, land reclamation and drying out, general (medium, outside) • E01 Urbanised areas, human habitation (medium, outside) • B Sylviculture, forestry (low, inside) • D01.04 Railway lines, TGV (low, inside) • A04 Grazing (high, inside)	Effects to this EU site could occur for the following reasons: Close proximity and hydrological connection to SAC (c. 565m in-stream). Potential for conservation interests to be affected by sediment and/or nutrient inputs. Bunaglanna and Bride Rivers in close proximity to replant lands may contain salmonid & lamprey spawning grounds; SAC conservation objectives mapping indicates juvenile brook/river lamprey record c. 4 km downstream near Keam Bridge.

Designated Site (Site Code)	Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
			(*Juncetalia maritimi*) [1410] • Killarney fern (*Trichomanes speciosum*) [1421] • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] • Old sessile oak woods with *Ilex* and *Blechnum* in British Isles [91A0] • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] • *Taxus baccata* woods of the British Isles [91J0]	• E03.01 Disposal of household / recreational facility waste (low, inside) • I01 Invasive non-native species (medium, outside) • G02 Sport and leisure structures (low, outside) • I01 Invasive non-native species (medium, inside) • A08 Fertilisation (high, inside) • J02.01 Landfill, land reclamation and drying out, general (low, inside) • K01.01 Erosion (low, inside) • G01.01 Nautical sports (low, inside) • B Sylviculture, forestry (medium, outside)	

Designated Site (Site Code)	Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
				• F02.03 Leisure fishing (medium, inside) • A04 Grazing (high, outside) • D01.02 Roads, motorways (low, inside)	
Blackwater Callows SPA (004094)	13.9 km	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the SPA	• Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Black-tailed Godwit (*Limosa limosa*) [A156] • Wetlands & Waterbirds [A999]	• A04 Grazing (medium, inside) • A08 Fertilisation (high, outside) • F02.03 Leisure fishing (medium, inside) • E01 Urbanised areas, human habitation (high, outside) • A08 Fertilisation (high, inside)	There is no potential for significant effects to this EU site for the following reasons: Lack of potential for conservation interests to be affected by sediment and/or nutrient inputs c. 14 km upstream; and, Distance from SPA

Table 4-2: European sites within 15km of Replant lands at Ballard, Co. Wicklow

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
Vale of Clara (Rathdrum Wood) SAC (000733)	4.7km	To maintain or restore the favourable conservation condition of the Annex I habitat for which the SAC has been selected.	• Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	• G01.02 walking, horseriding and non-motorised vehicles) (high) (inside) • E01.03 dispersed habitation (medium) (outside) • F03.01.01 damage caused by game (excess population density) (high) (inside) • F05.04 poaching (medium) (inside) • B04 use of biocides, hormones and chemicals (forestry) (high) (both) • F04.02 collection (fungi, lichen, berries etc.) (high) (inside) • E01.03 dispersed habitation (high) (outside) • I01 invasive non-native species (medium) (both).	There is no potential for significant effects on this SAC given: • The absence of a hydrological or ecological connection between the replant site and this SAC; • The intervening distance of 4.7 km; and, • SAC is designated for habitat which occurs within its boundary.
Wicklow Mountains	7.8 km	To maintain or restore the	• Oligotrophic waters containing very	• G01.03.02 off-road motorized	There is no potential for significant effects on this SAC given:

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
SAC (002122)		favourable conservation condition of the Annex I habitats and Annex II species for which the SAC has been selected.	few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] • Natural dystrophic lakes and ponds [3160] • Northern Atlantic wet heaths with *Erica tetralix* [4010] • European dry heaths [4030] • Alpine and Boreal heaths [4060] • Calaminarian grasslands of the *Violetalia calaminariae* [6130] • Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] • Blanket bogs (* if active bog) [7130] • Siliceous scree of the montane	driving (high) (both) • E03.01 disposal of household / recreational facility waste (low)(inside) • K04.05 damage by herbivores (including game species) (medium) (inside) • B06 grazing in forests/ woodland (high) (inside) • G01.04 mountaineering, rock climbing, speleology (low) (both) • G05.07 missing or wrongly directed conservation measures (medium) (both) • G01.02 walking, horseriding and non-motorised vehicles (medium) (both) • I01 invasive non-native species (high) (both) • K01.01 Erosion (high) (inside) • A04 Grazing (medium) (both)	• The absence of a downstream hydrological connection between the replant site and this SAC; • The intervening distance of 7.8 km; and, • The absence of an ecological connection between the replant site and this SAC.

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
			to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] • Calcareous rocky slopes with *chasmophytic* vegetation [8210] • Siliceous rocky slopes with *chasmophytic* vegetation [8220] • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] • *Lutra lutra* (Otter) [1355]	• G02.09 wildlife watching (low) (inside) • G05.01 Trampling, overuse (medium) (both) • A05.02 stock feeding (low) (inside) • E01 Urbanised areas, human habitation (medium) (both) • F03 Hunting and collection of wild animals (terrestrial) (medium) (inside) • L05 collapse of terrain, landslide (low) (inside) • F04.02 collection (fungi, lichen, berries etc.) (low) (inside) • G05.04 Vandalism (medium) (inside) • G01 Outdoor sports and leisure activities, recreational activities (medium) (both) • G05.06 tree surgery, felling for public safety,	

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
				removal of roadside trees (low) (inside) • G04.01 Military manouvres (medium) (both) • J01.01 burning down (high) (both) • D01.01 paths, tracks, cycling tracks (medium) (both) • C01.03 Peat extraction (medium) (inside) • F03.02.02 taking from nest (falcons) (medium) (both)	
Wicklow Mountains SPA	7.8 km	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	• Merlin (*Falco columbarius*) [A098] • Peregrine (*Falco peregrinus*) [A103]	• A04 grazing (medium) (inside) • C01.03 Peat extraction (medium) (inside) • G01.02 walking, horseriding and non-motorised vehicles (high) (inside) • D01.01 paths, tracks, cycling tracks (medium) (inside) • B Sylviculture, forestry (high) (outside)	There is no potential for significant effects this SAC given: • The absence of a downstream hydrological connection between the replant site and this SPA; • The intervening distance of 7.8 km; • The absence of an ecological connection between the replant site and this SPA; • The on-site habitats are

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
					considered unsuitable breeding habitat for the qualifying interests of this SPA and no evidence of breeding/roosting was noted onsite; and, • Small scale of works, with abundance of nearby displacement habitats means significant effects on designated bird species that may potentially use proposed site for foraging are unlikely.
Deputy's Pass Nature Reserve SAC (000717)	9 km	To maintain or restore the favourable conservation condition of the Annex I habitat for which the SAC has been selected.	• Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	• B06 grazing in forests/ woodland (high) (inside) • E03.01 disposal of household / recreational facility waste (high) (inside) • A04 grazing (low) (inside) • G05.04 Vandalism (high) (inside) • G01.02 walking, horseriding and non-motorised vehicles (high) (inside)	There is no potential for significant effects on this SAC given: • The absence of a hydrological or ecological connection between the replant site and this SAC; • The intervening distance of 9 km; and, • This SAC is designated for habitat which occurs within its boundary.

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
				• G02.06 attraction park (low) (inside) • B Sylviculture, forestry (low) (outside) • I01 invasive non-native species (high) (both)	
Buckroney-Brittas Dunes and Fen SAC (000729)	13.4 km	To maintain or restore the favourable conservation condition of the Annex I habitats for which the SAC has been selected.	• Annual vegetation of drift lines [1210] • Perennial vegetation of stony banks [1220] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] • Atlantic decalcified	• I01 invasive non-native species (medium) (inside) • H02.07 diffuse groundwater pollution due to non-sewered population (medium) (both) • G02.08 camping and caravans (medium) (both) • A04.01.01 intensive cattle grazing (low) (inside) • G01.02 walking, horseriding and non-motorised vehicles (medium) (both) • K01.01 Erosion (medium) (inside)	There is no potential for significant effects on this SAC given: • The absence of a hydrological or ecological connection between the replant site and this SAC; and, • The intervening distance of 13.4 km.

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
			fixed dunes (*Calluno-Ulicetea*) [2150] • Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) [2170] • Humid dune slacks [2190] • Alkaline fens [7230]	• A05.02 stock feeding (medium) (inside) • J02 human induced changes in hydraulic conditions (high) (both) • G02.01 golf course (medium) (both) • D04.01 airport (low) (outside) • F03.01 Hunting (low) (inside) • J01 fire and fire suppression (high) (both) • E01.02 discontinuous urbanisation (low) (both) • G05.04 Vandalism (medium) (both) • G01.02 walking, horseriding and non-motorised vehicles (medium) (both) • G05.01 Trampling, overuse (high) (both) • A08 Fertilisation (medium) (both)	

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
				• K02.01 species composition change (succession) (high) (both) • E03.01 disposal of household / recreational facility waste (low) (both) A04.02 non-intensive grazing (high) (inside)	
Slaney River Valley SAC (000781)	14.7 km	To maintain or restore the favourable conservation condition of the Annex I habitats and Annex II species for which the SAC has been selected.	• Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Water courses of plain to montane levels with the *Ranunculion*	• F02.03.01 bait digging / collection (medium) (inside) • J02.05.02 modifying structures of inland water courses (medium) (inside) • H01.01 pollution to surface waters by industrial plants (medium) (both) • D01.01 paths, tracks, cycling tracks (medium) (inside) • J02.12.02 dykes and flooding defence in inland water	There is no potential for significant effects on this SAC given: • The absence of a hydrological or ecological connection between the replant site and this SAC; • This SAC is located in a different catchment; and, • The intervening distance of 14.7 km.

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
			fluitantis and *Callitricho-Batrachion* vegetation [3260] • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] • *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] • *Petromyzon marinus* (Sea Lamprey) [1095] • *Lampetra planeri* (Brook Lamprey) [1096] • *Lampetra fluviatilis* (River Lamprey) [1099] • *Alosa fallax fallax* (Twaite Shad) [1103]	systems (medium) (inside) • A10.01 removal of hedges and copses or scrub (medium) (inside) • A01 Cultivation (high) (both) • A09 Irrigation (medium) (both) • C01.01 Sand and gravel extraction (medium) (inside) • F03.02.04 predator control (medium) (inside) • H01.08 diffuse pollution to surface waters due to household sewage and waste waters (medium) (both) • K01.01 Erosion (medium) (inside) • E05 Storage of materials (low) (inside) • I01 invasive non-native species (high) (both) • J02.06 Water abstractions from surface waters	

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
			• *Salmo salar* (Salmon) [1106] • *Lutra lutra* (Otter) [1355] • *Phoca vitulina* (Harbour Seal) [1365]	(medium) (inside) • F01.03 bottom culture (medium) (inside) • B02 Forest and Plantation management & use (high) (both) • A08 Fertilisation (high) (both) • E03 Discharges (medium) (inside • J02.06.01 surface water abstractions for agriculture (medium) (inside) • J02.11 Siltation rate changes, dumping, depositing of dredged deposits (medium) (inside) • H01.05 diffuse pollution to surface waters due to agricultural and forestry activities (high) (both) • D01.05 bridge, viaduct (medium) (inside)	

Designated Site (Site Code)	Distance from Proposed Development	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
				• D03.01.03 fishing harbours (low) (inside • H01 Pollution to surface waters (limnic, terrestrial, marine & brackish) (medium) (inside).	

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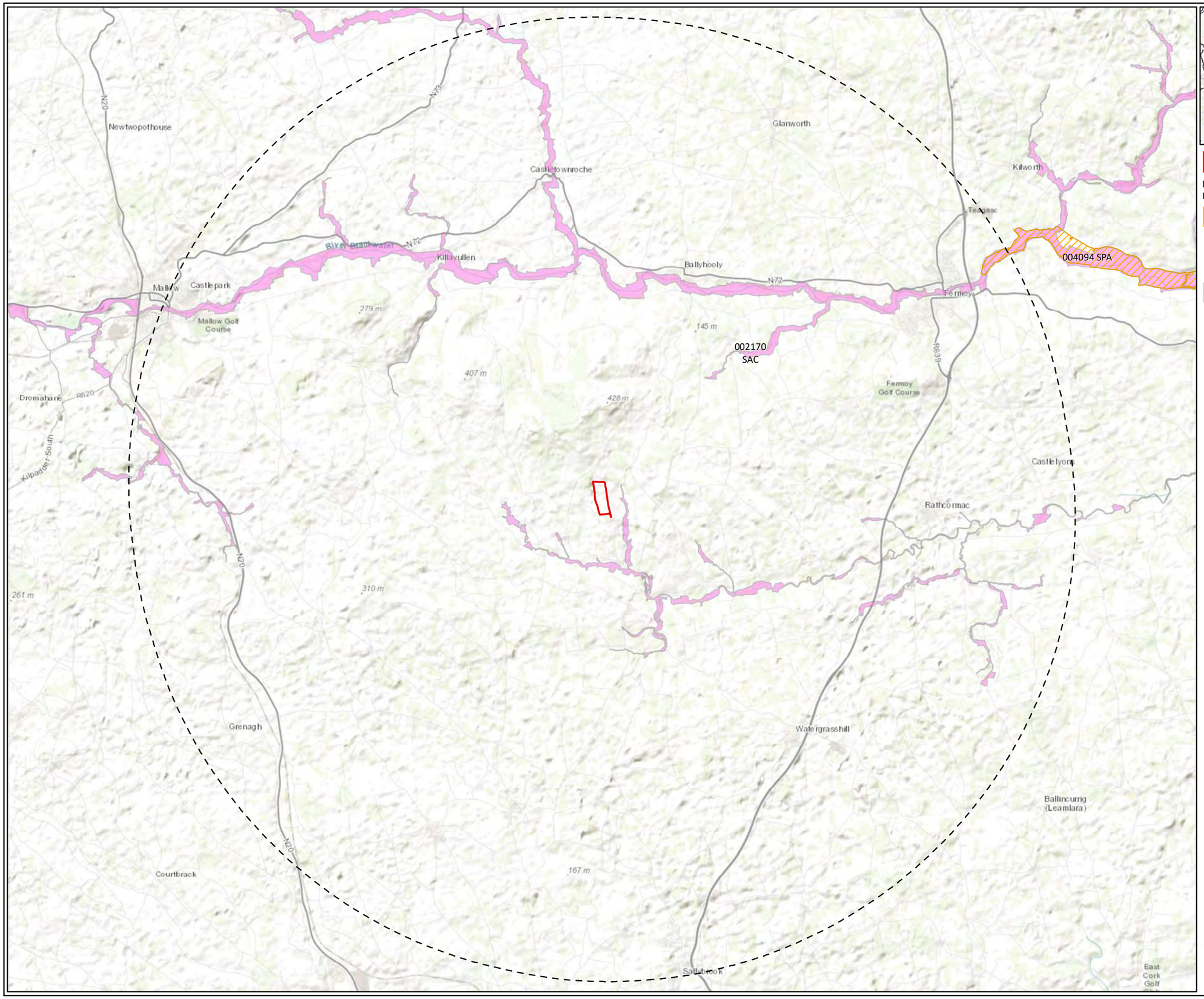

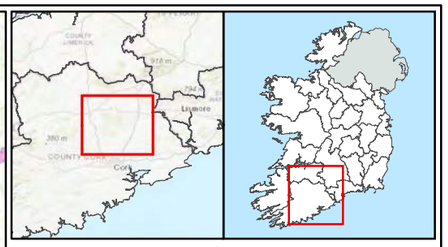

Site Boundary

15km Distance from Site Boundary

Special Protection Area (SPA)

Site Code, Site Name, Distance(km)

004094, Blackwater Callows SPA, 13.9

Special Area of Conservation (SAC)

Site Code, Site Name, Distance(km)

002170, Blackwater River SAC, 0.4

N W E S

0 1 2 4 Kilometers

TITLE:	European Sites within 15km of Replant Lands at Moneygorm, Co. Cork		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	4.3		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:120000	**REVISION:**	0
DATE:	25/09/2020	**PAGE SIZE:**	A3

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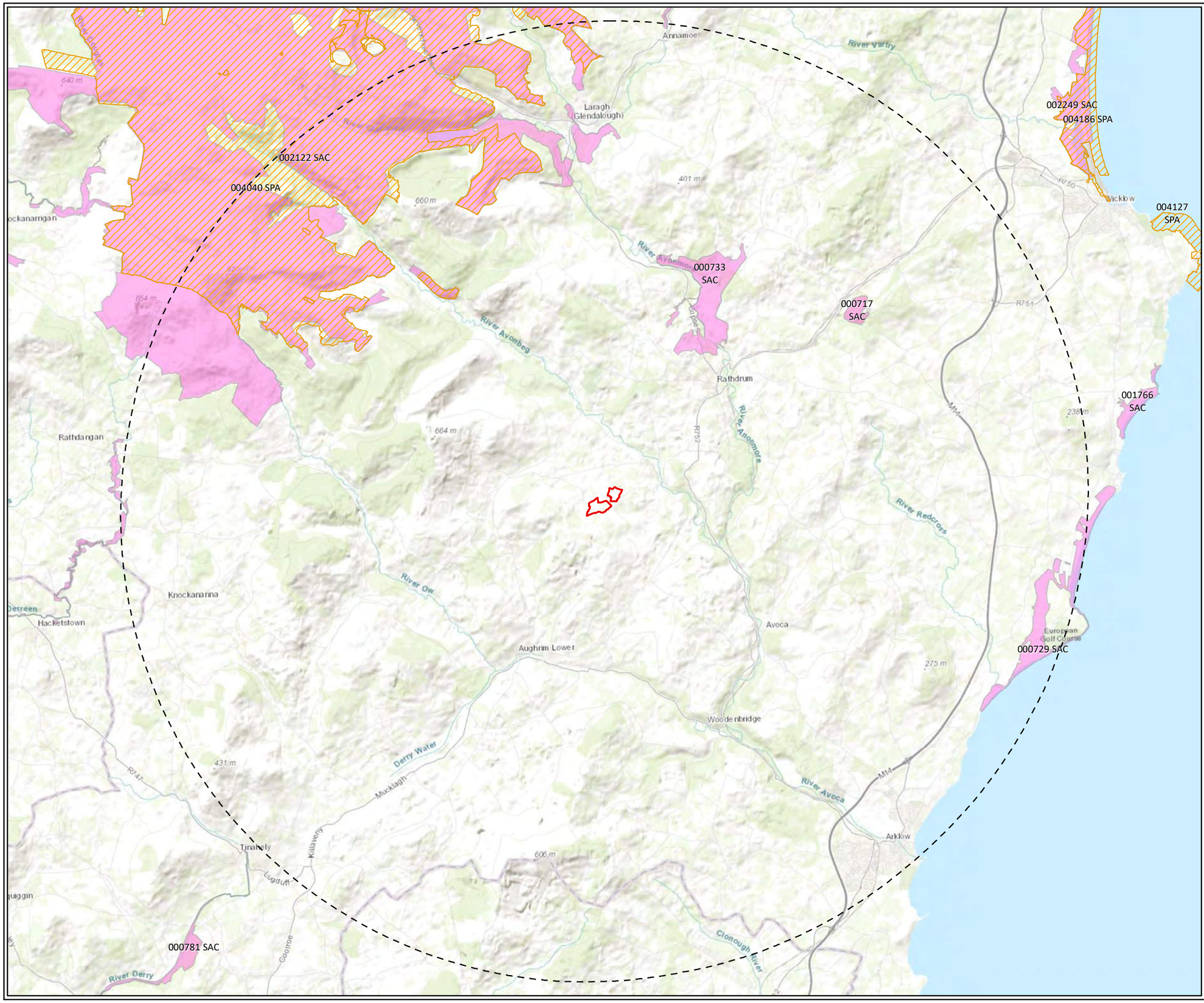
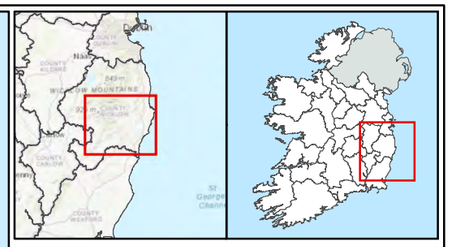
Path: R:\Map Production\2020\P20-099\Workspace\AA NIS\P20_099_GIS_Fig4-4_EuropeanSitesWithin15km_Ballard_A3.mxd





Site Boundary

15km Distance from Site Boundary

Special Protection Area (SPA)

Site Code, Site Name, Distance

004040, Wicklow Mountains SPA, 7853m

Special Area of Conservation (SAC)

Site Code, Site Name, Distance

000717, Deputys Pass Nature Reserve SAC, 9010m

000729, Buckroney-Brittas Dunes And Fen SAC, 13406m

000733, Vale of Clara Rathdrum Wood SAC, 4708m

000781, Slaney River Valley SAC, 14744m

002122, Wicklow Mountains SAC, 7852m

N W E S

Kilometers
0 1 2 4

TITLE:	European Sites within 15km of Replant Lands at Ballard, Co. Wicklow		
PROJECT:	Coom Green Energy Park		
FIGURE NO:	4.4		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:120000	**REVISION:**	0
DATE:	25/09/2020	**PAGE SIZE:**	A3

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4.4 Conservation Objectives

According to the Habitats Directive, the *conservation status of a natural habitat* will be taken as 'favourable' within its biogeographic range when:

- its natural range and areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable as defined below.

According to the Habitats Directive, the conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' within its biogeographic range when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The specific conservation objectives for each site are available on www.npws.ie. These have been accessed for the sites listed in Table 4-1 and Table 4-2 above on the 23rd of September 2020.

4.4.1 Moneygorm, Co. Cork

Site specific conservation objectives were available for the following site:

- Blackwater River (Cork/Waterford) SAC (Site Code 002170) published on the 31st of July 2012.

Generic Conservation Objectives were available for the following site:

- Blackwater Callows SPA (Site Code 004094) published on the 21st February 2018.

The following conservation objectives supporting documents have been produced for the Blackwater River (Cork/Waterford) SAC (Site Code 002170):

- River Blackwater (Cork/Waterford) SAC (site code 2170) Conservation objectives supporting document -woodland habitats. Version 1. July 2012.
- River Blackwater (Cork/Waterford) SAC (site code 2170) Conservation objectives supporting document - marine habitats. Version 1. January 2012.
- River Blackwater (Cork/Waterford) SAC (site code 2170) Conservation objectives supporting document - coastal habitats. Version 1. February 2012.

Management plans were not available for any sites.

All conservation objectives together with other designated site information are available through the NPWS protected sites portal https://www.npws.ie/protected-sites.

4.4.2 Ballard, Co. Wicklow

Site specific conservation objectives were available for the following sites:

- Wicklow Mountains SAC (Site Code: 002122) published on the 31st of July 2017
- Buckroney-Brittas Dunes and Fens SAC (Site Code: 000729) published on the 27th March 2017
- Slaney River Valley SAC (Site Code: 000781) published on the 21st October 2011

Generic Conservation Objectives were available for the following sites:

- Vale of Clara (Rathdrum Wood) SAC (Site Code: 000733) published on the 21st February 2018
- Deputy's Pass Nature Reserve SAC (Site Code: 000717) published on the 21st February 2018
- Wicklow Mountains SPA (Site Code: 004040) published on the 21st February 2018

The following conservation objectives supporting documents have been produced for Wicklow Mountains SAC (Site Code: 002122):

- Wicklow Mountains SAC (site code 002122) Conservation objectives supporting document - blanket bogs and associated habitats [Version 1] – Published 2017

The following conservation objectives supporting documents have been produced for Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729):

- Buckroney-Brittas Dunes and Fen SAC (site code: 000729) objectives supporting document – Coastal habitats [Version 1] – Published 2017

The following conservation objectives supporting documents have been produced for Slaney River Valley SAC (Site Code: 000781):

- River Slaney Valley SAC (site code 781) Conservation objectives supporting document woodland habitats [Version 1] – Published 2011
- River Slaney Valley SAC (site code 781) Conservation objectives supporting document – marine habitats and species [Version 1] – Published 2011

A management plan is available for Wicklow Mountains SAC (002122) and SPA (004040):

- Wicklow Mountains National Park Management Plan - 2005

All conservation objectives together with other designated site information are available through the NPWS protected sites portal https://www.npws.ie/protected-sites.

Potential Cumulative Effects

4.4.3 Moneygorm, Co. Cork

In considering whether the proposed replanting, by itself or in combination with other plans and projects, has the potential to affect the conservation objectives of the designated sites within 15km of the proposed replant lands, the following were considered:

- Permitted and existing projects in the vicinity of the replant lands
- Proposed projects in the vicinity of the replant lands
- Land use in the vicinity of the replant lands
- Cork County Development Plan 2014.

A planning search limited to applications submitted within the townlands overlapping and surrounding the replant lands during the previous 5 years was conducted on 23rd September 2020. The relevant townlands are:

- Moneygorm
- Toorgarrif
- Bunaglanna
- Ardarou
- Lackendarragh North
- Knockdoorty.

A number of permitted one-off domestic and agricultural developments including new houses and agricultural sheds and infrastructure are permitted in the townlands overlapping and abutting the replant lands.

In addition, the retention of an existing 24 m tall communications mast in the townland of Lackendarragh North is permitted.

Forestry and farming are common within the wider environs of the site. The large volume of coniferous forestry of various ages in the landscape surrounding the replant lands must be considered to have the potential to result in cumulative effects due to the negative environmental effects (silt, nutrient and acid inputs to watercourses) associated with commercial forestry operations (particularly in upland areas). In addition, ongoing farming operations may contribute to cumulative effects on water quality.

The proposed Coom Green Energy Park is located at a distance of 1.07 km east from the proposed replanting area; this project could result in cumulative effects together with the proposed afforestation.

4.4.4 Ballard, Co. Wicklow

In considering whether the proposed replanting, by itself or in combination with other plans and projects, has the potential to affect the conservation objectives of the designated sites within 15km of the proposed replant lands.

The following were considered:

- Permitted and existing projects in the vicinity of the replant lands
- Proposed projects in the vicinity of the replant lands
- Land use in the vicinity of the replant lands
- Wicklow County Development Plan.

A planning search limited to applications submitted within the townlands overlapping and surrounding the replant lands during the previous 5 years was conducted on 23rd September 2020.

The relevant townlands are:

- Ballard
- Ballyshane
- Ballymoney
- Ballinatone Lower
- Ballycarrigeen
- Ballinaclash
- Ballyknockan lower
- Bahana (King)

A number of permitted one-off domestic and agricultural developments including new houses and agricultural sheds and infrastructure are permitted in the townlands overlapping and abutting the replant lands.

A water supply well along with ancillary works, entrance and treatment plant development within Ballard was noted in 2016.

The development of a 19ha solar farm consisting of photovoltaic panels on ground mounted steel frames, a site substation, 3 no inverter / transformer stations, underground cables and ducts was granted permission under condition in the townland of Ballymoney in 2019 (19627).

Forestry and farming are common within the wider environs of the site. The large volume of coniferous forestry of various ages in the landscape surrounding the replant lands must be considered to have the potential to result in cumulative effects due to the negative environmental effects (silt, nutrient and acid inputs to watercourses) associated with commercial forestry operations (particularly in upland areas). However, given the lack of connectivity between the site and European sites, cumulative effects are not envisaged.

4.5 Screening Matrix

Throughout this section the line items in *italics* refer to suggested instructions for information to be contained in a screening assessment, and in an appropriate assessment from the guidance document '*Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC'*, (European Commission, 2001). The standard 'Screening Matrix' and 'Finding of No Significant Effects Report Matrix' in Annex 1 of this guidance document are also followed.

As set out in NPWS guidance (DoEHLG, 2010), the task of establishing whether a plan or project is likely to have an effect on a European site(s) is based on an evaluation using available information and data (e.g. water quality data), supplemented as necessary by local site information and ecological surveys. This results in a determination by the competent authority as to whether there may be a significant effect on the designated site. A precautionary approach is required.

Some examples given in the NPWS guidance (DoEHLG, 2010) of effects that are likely to be significant are:

1. Any effects on an Annex I habitat,
2. A reduction in the area of a habitat of conservation interest in a European site or a reduction in the area of a European site,
3. Direct or indirect damage to the physical quality of the environment (e.g. water quality and supply, soil compaction) in the European site,
4. Serious or ongoing disturbance to species or habitats for which the European site is selected (e.g. increased noise, illumination and human activity),
5. Direct or indirect damage to the size, characteristics or reproductive ability of populations in the European site,
6. Interference with mitigation measures put in place for other plans or projects.

Table 4-3: Screening Matrix for Moneygorm, Co. Cork

Assessment Criteria	Discussion of Potential Effects
Brief description of project or plan	Tree Planting: • Sitka Spruce (34.02 ha) • Additional Broadleaved Species (6 ha) Additional Details: • Drainage • Ground preparation: Mounding • Planting Method: Angle Notch • Access: Existing Track • Fertilizer [Zero Phosphate] • Herbicide Control (years 0 – 2) • Manual Control (years 3 - 4) Upgrade existing fence to deer & sheep-proof specification
Brief description of the Natura 2000 (European) Site	There are two European sites within the potential zone of influence (15km radius): • Blackwater River (Cork/Waterford) SAC (002170) (380m overland / 565m in-stream) • Blackwater Callows SPA (004094) (13.9 km)

Assessment Criteria	Discussion of Potential Effects
	An indirect hydrological connection in the form of existing field/forestry drains linking the replant lands and Blackwater River (Cork/Waterford) SAC (Bunnaglanna River) is present. The distance between Blackwater Callows SPA (004094) and the replant lands (13.9 km), in addition to the particular sensitivities of the SCI species for which the SPA is designated mean that there is no potential for an appreciable effect to this site. In addition, the species for which Blackwater Callows SPA is designated do not frequent upland habitats such as those in the vicinity of the replant lands.
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 sites.	Sediment, nutrient and/or herbicide inputs to Blackwater River (Cork/Waterford) SAC (002170), potentially effecting spawning beds, aquatic macroinvertebrate composition, habitat quality and ecological processes. These potential effects are considered to apply to salmon, river, brook and sea lamprey, and otter (in terms of the SAC's conservation interests). No records of freshwater pearl mussel or white-clawed crayfish, or suitable habitat for either species were recorded from the Bride (as per the conservation objectives mapping), or anywhere downstream of the replant lands. The higher reaches of river systems are not used by twaite and allis shad. Stage 1 FPM surveys, following the NPWS standard survey methods (Anon, 2004) were completed at 2 locations within the River Bride in 2018. No records of this species were identified and generally, instream habitat for this species was evaluated as unsuitable or sub-optimal. Aquatic surveys in 2020 also confirmed the absence of freshwater pearl mussel and white-clawed crayfish, and the lack of suitable habitat for either species. No fish were recorded at the survey site on the Bunnaglanna stream. The shallow, upland nature of the small channel with heavily bedded substrata (heavy siltation) reduced its viability for salmonids albeit populations were present further downstream in higher order reaches. Lamprey habitat was absent. The stream may be utilised seasonally by migratory European eel during periods of higher flow (e.g. autumn, winter) although the site's overall fisheries value was considered low. Atlantic salmon and brown trout were the only two species recorded from site B15 on the River Bride. The site was evidently an excellent salmonid nursery and also exhibited good spawning habitat locally, as reflected by the stock demographic captured during the survey. Holding habitat was also good moving upstream where pool habitat existed below large instream boulders. However, the River Bride was of too high energy at site B15 to support lamprey species. Some suitability existed as an eel nursery in the boulder and cobble areas although none were recorded during the survey. No otter signs were recorded at Bunnaglanna stream. There were no otter signs recorded in the vicinity of the survey site B15 River Bride, although there was good potential throughout. None of the habitats for which the SAC is designated are present in the vicinity of the replant lands site.
Describe any likely direct, indirect or secondary	**Size and scale, land-take and distance from Natura 2000 sites**

Assessment Criteria	Discussion of Potential Effects
impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of: ▪ *Size and scale;* ▪ *Land-take;* ▪ *Distance from Natura 2000 site or key features of the site;* ▪ *Resource requirements;* ▪ *Emissions;* ▪ *Excavation requirements;* ▪ *Transportation requirements;* ▪ *Duration of construction, operation etc.;* ▪ *Other.*	**Potential Effects:** *Pollutant/contaminant inputs* The close proximity (380m overland / 565m in-stream) of Blackwater River (Cork/Waterford) SAC (002170) and hydrological connectivity with the replant lands means effects could occur. In addition, susceptible conservation interest species which could occur nearby/downstream (salmon, river, brook and sea lamprey, and otter) to be effected by potential sediment, herbicide and/or nutrient inputs means significant effects or effects of unknown magnitude could occur to the Blackwater River (Cork/Waterford) SAC. There will be no land-take from any European site and no direct effect on the size and scale of any site, as a result of the proposed works. **Resource requirements and Excavation requirements** **Potential Effects:** *None* There will be no resource requirements or excavation requirements from any European site as a result of the proposed works. **Emissions** **Potential Effects:** *Pollutant/contaminant inputs* The potential for inputs of sediment, nutrient and herbicides to Blackwater River (Cork/Waterford) SAC (002170) during the establishment phase exists. While lower, there is also the potential for sediment and nutrient input, in addition to acidification during the operational phase. There is a high risk of sediment input during and immediately following harvesting, and subsequent nutrient release from brash and dead root systems following harvesting. There is also potential for acidification of nearby watercourses to occur through the capture of airborne pollutants, which can be concentrated on needles and then washed off into the surrounding hydrological network. **Transportation requirements** **Potential Effects:** *None.* Transportation requirements will not affect any European site. **Duration of Construction and Operation** **Potential Effects:** *Pollutant and Contaminant inputs, Acidification* Duration of ground preparation, drainage works, and planting is expected to be completed within 2 months. Sitka spruce are considered to be ready for harvest at between 35-45 years of age; prior to this, thinning is usually carried out from 15-22 years onwards, every 4-5 years.

Assessment Criteria	Discussion of Potential Effects
	Cumulative effects **Potential Effects:** *Yes* A planning search was conducted on 23rd September 2020. No projects of a scale or nature that could act cumulatively with the proposed remedial works are permitted in the local area. The proposed Coom green energy park c. 1.07 km west of the proposed replant lands could contribute to cumulative effects. The large volume of coniferous forestry in the landscape surrounding the replant lands is considered to have the potential to result in cumulative effects in terms of sediment and nutrient inputs, and acidification. Agricultural activities in the surrounding area also have the potential to contribute to cumulative effects in terms of sediment and nutrient inputs.
Describe any likely changes to the site arising as a result of: ▪ *Reduction of habitat area;* ▪ *Disturbance of key species;* ▪ *Habitat or species fragmentation;* ▪ *Reduction in species density;* ▪ *Changes in key indicators of conservation value;* ▪ *Climate change.*	There will be no direct or indirect reduction in habitat area or habitat fragmentation within any European site as a result of the proposed afforestation. Disturbance or reduction of key species could occur as a result of the proposed afforestation. The general health of aquatic ecosystems in the Blackwater River (Cork/Waterford) SAC downstream of the replant lands could be affected as a result of the proposed afforestation prior to mitigation. Although unlikely to cause significant effects, the possibility for effects to occur is required to be considered based on the precautionary principal.
Describe any likely impacts on the Natura 2000 site as a whole in terms of: ▪ *Interference with the key relationships that define the structure of the site;* ▪ *Interference with key relationships that define the function of the site.*	<u>Structure</u> Siltation: interference with structure of gravel beds used by spawning fish (by blockage of interstices and reduction of oxygen levels). Eutrophication: excessive macrophyte growth resulting in flow reduction. <u>Function</u> Reduction in oxygen levels in spawning beds caused by siltation; reduced oxygen levels at night-time caused by over-production of plant material. Knock-on effects include potential alteration in macrofaunal assemblage resulting in reduction of fish prey, and reduction in fish numbers (caused by effects to prey and/or spawning grounds) affecting otter which rely on fish stocks. Potential toxic effects of herbicides on aquatic life.

Assessment Criteria	Discussion of Potential Effects
Provide indicators of significance as a result of the identification of effects set out above in terms of: ▪ *loss,* ▪ *fragmentation,* ▪ *disruption,* ▪ *disturbance,* ▪ *change to key elements of the site (e.g. water quality etc.).*	Significance of potential effects are difficult to predict. Could range from imperceptible to severe depending on volumes of sediment and nutrients entering SAC, and location of spawning habitats relative to replant lands.
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale of magnitude of impacts is not known.	Ground preparation, drainage works, fertiliser & herbicide application, harvesting works.

Table 4-4: Screening Matrix for Ballard, Co. Wicklow

Assessment Criteria	Discussion of Potential Effects
Brief description of project or plan	Tree Planting: • Sitka Spruce / Additional Broadleaved Species Integrated Mix (34.11 ha) • Alder / Silver Birch Integrated Mix (1.67 ha) • Alder (1.32 ha) Additional Details: • Drainage • Ground preparation: Mounding • Planting Method: Angle Notch • Access: Existing Track • Fertilizer [Zero Phosphate] • Herbicide Control (years 0 – 2) • Manual Control (years 3 - 4) • Upgrade existing fence to deer-proof specification
Brief description of the Natura 2000 (European) Site	There are six European sites within the potential zone of influence (15km radius): • Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733) is located 4.7 km north • Wicklow Mountains SPA (Site Code: 004040) is located 7.8 km northwest • Wicklow Mountains SAC (Site Code: 002122) is located 7.8 km northwest • Deputy's Pass Nature Reserve SAC (Site Code: 000717) is located 9 km northeast • Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729) is located 13.4 km east • Slaney River Valley SAC (Site Code: 000781) is located 14.7 km west There is no hydrological connection between the replant lands site and the Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733), Deputy's Pass Nature Reserve SAC (Site Code: 000717), Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729) and Slaney River Valley SAC (Site Code: 000781). Wicklow Mountains SAC (002122) and SPA (004040) are located >20 km upstream of the replant lands. Given the absence of a downstream hydrological connection no effects are envisaged on the Wicklow Mountains SAC.

Assessment Criteria	Discussion of Potential Effects
	The habitats on-site are considered unsuitable for breeding purposes for the SCI species for which the Wicklow Mountains SPA is designated (merlin and peregrine falcon). This SPA is located 7.8 km (straight line-distance) from the replant lands site. The core foraging range for merlin during the breeding season is within 5 km (SNH, 2016). The core foraging range during the breeding season for peregrine falcon is 2km (SHN, 2016). Therefore, given the intervening distance and lack suitable breeding habitat on-site no effects are envisaged on the Wicklow Mountains SPA (004040).
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 sites.	The replant lands site is not located within or adjacent to any European site. There is no downstream hydrological connection between the replant lands site and any European site. The habitats on-site are considered unsuitable for breeding purposes for the SCI species for which the Wicklow Mountains SPA (Site Code: 004040) is designated. Due to the scale and nature of the works, the absence of a hydrological connection and the intervening distances, no effects are envisaged to any European sites. Cherry laurel is a high-impact non-native invasive species present within a hedgerow at the proposed replant lands at Ballard, Co. Wicklow. Though remote, there is potential for interference with this species. However, there is no connection between the proposed replanting site and a European site, ecological nor hydrological.
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of: ▪ *Size and scale;* ▪ *Land-take;* ▪ *Distance from Natura 2000 site or key features of the site;* ▪ *Resource requirements;* ▪ *Emissions;* ▪ *Excavation requirements;* ▪ *Transportation requirements;* ▪ *Duration of construction, operation etc.;*	**Size and scale, land-take and distance from Natura 2000 sites** **Potential Effects:** *None.* The closest site (Vale of Clara (Rathdrum Wood) SAC) is located is 4.7 km from the proposed replant lands site. As the replant lands site is not located within or adjacent to any European site, no direct effects in terms of habitat loss or disturbance/displacement effects are predicted as a result of the proposed works. There are no downstream hydrological links between the replant lands site and European sites. Wicklow Mountains SPA (004040) is located 7.8 km from the replant land site. This SPA is designated for peregrine falcon and merlin. The habitats on-site are considered unsuitable with regards to breeding/nesting for these species. Suitable nesting sites restrict peregrines to areas where cliff-ledges, quarry faces, crags, or sea-cliffs are available, none of which are present within the proposed replant sites. Merlin typically nest on the ground on moorland, mountain and blanket bog. This species can also nest in woodland and has taken to nesting in forestry plantations adjacent to moorland. These habitats are not present within the replant lands site.

Assessment Criteria	Discussion of Potential Effects
▪ *Other.*	The core foraging range for merlin during the breeding season is within 5 km (SNH, 2016). The core foraging range during the breeding season for peregrine falcon is 2km (SHN, 2016). Therefore, given the intervening distance of 7.8 km no effects are envisaged on the Wicklow Mountains SPA (004040). There will be no land-take from any European site and no direct effect on the size and scale of any site, as a result of the proposed works. **Resource requirements and Excavation requirements** **Potential Effects:** *None* There will be no resource requirements or excavation requirements from any European site as a result of the proposed works. **Emissions** **Potential Effects:** *None* There is no downstream hydrological connection between the replant lands site and any European site. Wicklow Mountains SAC (002122) and SPA (004040) are located >20 km upstream of the replant lands, however given the absence of a downstream hydrological connection no effects are envisaged. **Transportation requirements** **Potential Effects:** *None.* Transportation requirements will not affect any European Site. **Duration of Construction and Operation** **Potential Effects:** *None* Duration of ground preparation, drainage works, and planting is expected to be completed within 2 months. Sitka spruce are considered to be ready for harvest at between 35-45 years of age; prior to this, thinning is usually carried out from 15-22 years onwards, every 4-5 years. **Cumulative effects** **Potential Effects:** *None* A planning search was conducted on 23rd September 2020. No projects of a scale or nature that could act cumulatively with the proposed works are permitted in the local area. While the coniferous forestry and agriculture are common in the surrounding landscape, given the absence of a downstream hydrological connection between the replant lands site and any European site, no cumulative effects are envisaged.

Assessment Criteria	Discussion of Potential Effects
Describe any likely changes to the site arising as a result of: ▪ *Reduction of habitat area;* ▪ *Disturbance of key species;* ▪ *Habitat or species fragmentation;* ▪ *Reduction in species density;* ▪ *Changes in key indicators of conservation value;* ▪ *Climate change.*	**Predicted Effects:** *No significant effects identified* There will be no direct or indirect reduction in habitat area or habitat fragmentation within any European site as a result of the proposed works. There is no potential for an effect via disturbance of key species or reduction of key species as a result of the proposed works. There is no potential for changes in key indicators of conservation value due to the proposed works. The proposed replant lands would ultimately have a positive effect on climate change as it will act as a reservoir for carbon sequestration.
Describe any likely impacts on the Natura 2000 site as a whole in terms of: ▪ *Interference with the key relationships that define the structure of the site;* ▪ *Interference with key relationships that define the function of the site.*	As already discussed, no effects will occur to European sites as a result of the proposed works during any phase of the development.
Provide indicators of significance as a result of the identification of effects set out above in terms of: ▪ *loss,* ▪ *fragmentation,* ▪ *disruption,* ▪ *disturbance,* ▪ *change to key elements of the site (e.g. water quality etc.).*	As already discussed, no effects will occur to European sites as a result of the proposed works during any phase of the development.
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale of magnitude of impacts is not known.	No effects will occur to any European site as a result of the proposed works either alone or in combination with other plans of projects.

4.6 Stage One Screening Conclusion

4.6.1 Moneygorm, Co. Cork.

There is no potential for direct, indirect or cumulative significant effects to Blackwater Callows SPA (Site Code 004094). This European site has been 'screened out' within the Stage 1: Appropriate Assessment Screening Report and does not require further study within a Stage 2: Natura Impact Statement.

See Appendix 1 for Findings of No Likely Significant Effects Report.

The Blackwater River (Cork/Waterford) SAC (Site Code 002170) could potentially be subject to effects caused by sediment and nutrient input, and acidification associated with commercial afforestation of the proposed replant lands, in the absence of mitigation. This European site therefore requires further study within a Stage 2: Natura Impact Statement.

4.6.2 Ballard, Co. Wicklow

There is no potential for direct, indirect or cumulative significant effects to the following sites:

- Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733)
- Wicklow Mountains SPA (Site Code: 004040)
- Wicklow Mountains SAC (Site Code: 002122)
- Deputy's Pass Nature Reserve SAC (Site Code: 000717)
- Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729)
- Slaney River Valley SAC (Site Code: 000781).

Pursuant to the provisions of Part XAB of the Planning and Development Act 2000, there is an obligation on the Board, as competent authority, to carry out screening for Appropriate Assessment before consent is given for this, or any, project. However, it is concluded that all the European sites located within 15 km of Ballard Replant Lands have been correctly screened out or excluded from further consideration on the basis of objective information that the proposed replant lands, individually or in-combination with other plans or projects, will have no, or no appreciable, effects on those sites.

See Appendix 1 for Findings of No Likely Significant Effects Report.

5. STAGE TWO – NATURA IMPACT ASSESSMENT

5.1 Moneygorm, Co. Cork

5.1.1 Introduction

This section addresses the possibility of there being significant effects on a European site which was identified during the Stage One screening process (Section 4) as follows

- Blackwater River (Cork/Waterford) SAC (Site Code 002170

5.1.2 Assessment of the Effects of the Project or Plan on the Integrity of the Sites

'Describe the elements of the project or plan (alone or in combination with other projects or plans) that are likely to give rise to significant effects on the site (from screening assessment)'

Due to the proximity of the proposed replant lands, and the hydrological link to the Blackwater River (Cork/Waterford) SAC (Site Code 002170), there could potentially be effects caused by sediment and nutrient input, and acidification associated with commercial afforestation of the proposed replant lands, in the absence of mitigation. This European site therefore requires further study within a Stage 2: Natura Impact Statement.

5.1.3 The Conservation Objectives of the Natura 2000 Sites

'Set out the conservation objectives of the site'.

The conservation objectives of the European sites concerned are to maintain or restore the favourable conservation status of the key species and habitats for which the sites have been designated. These are laid out in Table 5-1.

Table 5-1: Key Species and Habitats for Blackwater River (Cork/Waterford) SAC (002170) Potentially Effected by the Development

Designated Site	Conservation Objectives
Blackwater River (Cork/Waterford) SAC (002170)	Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] White-clawed crayfish (*Austropotamobius pallipes*) [1092] Sea lamprey (*Petromyzon marinus*) [1095] Brook lamprey *(Lampetra planeri*) [1096] River lamprey (*Lampetra fluviatilis*) [1099] Allis shad (*Alosa alosa*) [1102] Twaite shad (*Alosa fallax fallax*) [1103] Salmon (*Salmo salar*) [1106] Estuaries [1130]

Designated Site	Conservation Objectives
	Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonizing mud and sand [1310] Atlantic salt meadows (*Glauco- Puccinellietalia maritimae*) [1330] Otter (*Lutra lutra*) [1355] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Killarney fern (*Trichomanes speciosum*) [1421] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]* *Taxus baccata* woods of the British Isles [91J0] *

* Priority Habitat

5.1.4 Potential Effects on Key Species and Key Habitats

'Describe how the project or plan will affect key species and key habitats. Acknowledge uncertainties and any gaps in information' (European Communities, 2001).

Effects associated with water quality and habitat alternation

An indirect hydrological connection in the form of existing field/forestry drains linking the replant lands and Blackwater River (Cork/Waterford) SAC (Bunnaglanna River) is present. Sediment, nutrient and/or herbicide inputs to Blackwater River (Cork/Waterford) SAC (002170), potentially effecting spawning beds, aquatic macroinvertebrate composition, habitat quality and ecological processes.

These potential effects are considered to apply to salmon, river, brook and sea lamprey, and otter (in terms of the SAC's conservation interests).

Freshwater pearl mussel or white-clawed crayfish, or suitable habitat for either species is not recorded from the Bride (as per the conservation objectives mapping), or anywhere downstream of the replant lands. The higher reaches of river systems are not used by twaite and allis shad. Aquatic surveys carried out on Bunnaglanna stream and River Bride in 2020 (as outlined in section 2.3.1) confirmed the absence of freshwater pearl mussel and white-clawed crayfish, and the lack of suitable habitat for either species. The higher reaches of river systems are not used by twaite and allis shad.

Site B14 – Bunnaglanna Stream, Moneygorm

No fish were recorded during electro-fishing at site B14. The shallow, upland nature of the small channel with heavily bedded substrata (heavy siltation) reduced its viability for salmonids albeit populations were present further downstream in higher order reaches. Lamprey habitat was absent. The stream may be utilised seasonally by migratory European eel during periods of higher flow (e.g. autumn, winter) although the site's overall fisheries value was considered low.

Site B15 – River Bride, Old Bridge

Atlantic salmon and brown trout were the only two species recorded during electro-fishing from site B15 on the River Bride (Figure 5-1). Both species were recorded in similar numbers (*n*=22, *n*=21 respectively). A healthy range of juvenile and adult trout size classes were present along with two distinct Atlantic salmon size classes. With the exception of European eel, the same species assemblage was also recorded during a 2017 survey of this site (Triturus, 2017) although abundances of juvenile Atlantic salmon and brown trout were notably higher in 2020.

The site was evidently an excellent salmonid nursery and also exhibited good spawning habitat locally, as reflected by the stock demographic captured during the survey. The best nursery areas were in the faster riffle area near the bridge. Holding habitat was also good moving upstream where pool habitat existed below large instream boulders. However, the River Bride was of too high energy at site B15 to support lamprey species. Some suitability existed as an eel nursery in the boulder and cobble areas although none were recorded during the survey.

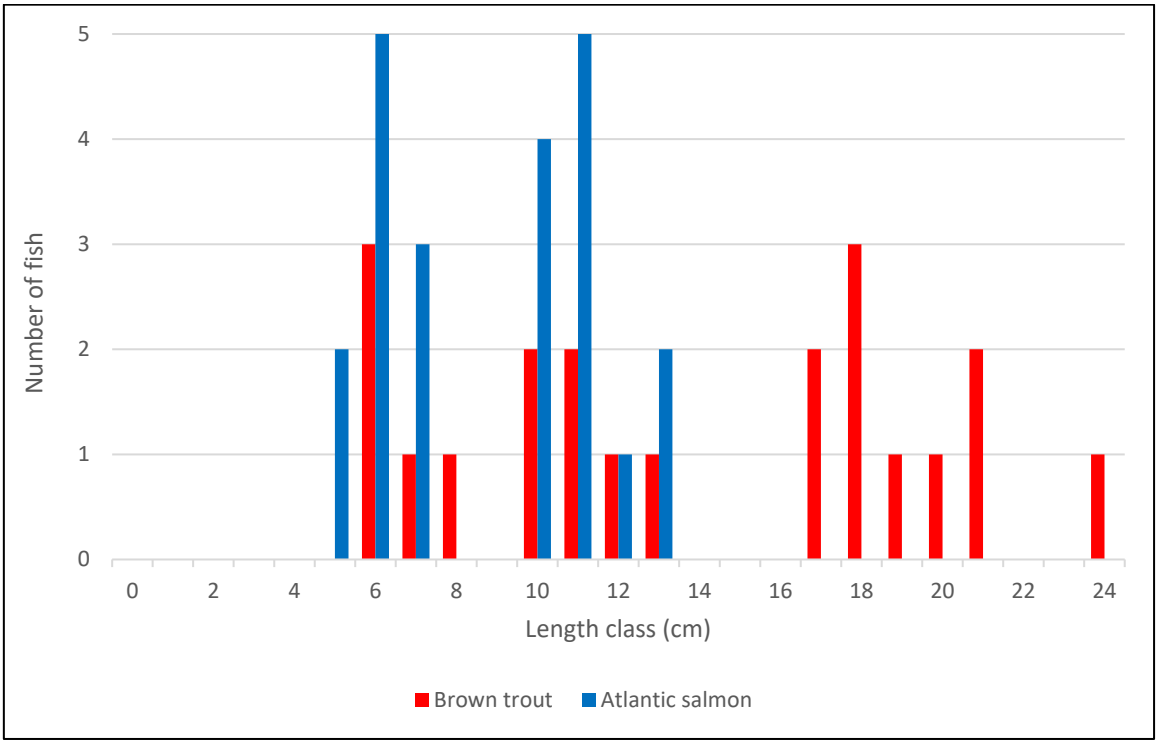

Figure 5-1: Fish stock length distribution recorded via electro-fishing at site B15 on the River Bride at Old Bridge, July 2020.

Plate 5-1: Adult brown trout and Atlantic salmon parr recorded from site B15 on the River Bride at Old Bridge, July 2020

Table 5-2: Fish species densities per m^2 recorded at sites in the vicinity of Moneygorm replant lands via electro-fishing in July 2020. Lamprey numbers are presented per $1m^2$ targeted quadrat unless otherwise stated

	Fish density (number fish per m^2)						
Site	**CPUE**	**Approx. area fished (m^2)**	**Brown trout**	**Atlantic salmon**	***Lampetra* sp.**	**European eel**	**Three-spined stickleback**
B14	10-minute	65	0	0	0	0	0
B15	10-minute	240	0.088	0.092	0	0	0

5.1.4.1 Fisheries habitat

5.1.4.1.1 Salmonid habitat

Salmonid habitat ranged from poor to excellent value across the survey sites (Table 5-3). B15 (River Bride) offered excellent quality salmonid habitat according to life Cycle Unit scores. B14 offered little or no value for salmonids and scored as 'poor' in terms of salmonid habitat.

Table 5-3: Life Cycle Unit scores for sites surveyed in the vicinity of the proposed Moneygorm replant lands, July 2020

Site	Salmonid habitat value	Spawning	Nursery	Pool (holding)	Total score
B14	Poor	4	4	4	**12**
B15	Excellent	2	1	2	**5**

5.1.4.1.2 Lamprey habitat

Lamprey habitat was typically of poor to moderate quality across the majority of the survey area based on Lamprey Habitat Quality Index (LHQI) scores (Table 5-4). B14 offered poor lamprey habitat whilst B15 offered moderate quality lamprey habitat.

Table 5-4: Lamprey Habitat Quality Index (LHQI) scores for sites surveyed in the vicinity of the proposed Moneygorm replant lands, July 2020

Site	Lamprey habitat value	Spawning	Nursery	Total score
B14	Poor	4	4	**8**
B15	Moderate	3	4	**7**

5.1.4.1.3 European eel habitat

European eel were not recorded at B14 Bunnaglanna stream, or B15 River Bride.

5.1.5 Potential Effects on the Integrity of the Site

'Describe how the integrity of the site (determined by structure and function and conservation objectives) is likely to be affected by the project and plan (e.g. loss of habitat, disturbance, disruption, chemical changes, hydrological changes and geological changes etc.). Acknowledge uncertainties and any gaps in information' (European Communities, 2001).

The close proximity (380m/565m in-stream) of Blackwater River (Cork/Waterford) SAC (002170) and hydrological connectivity with the replant lands means effects could occur. In addition, susceptible conservation interest species which could occur nearby/downstream (salmon, river, brook and sea lamprey, and otter) to be effected by potential sediment, herbicide and/or nutrient inputs means significant effects or effects of unknown magnitude could occur to the Blackwater River (Cork/Waterford) SAC.

There will be no land-take from any European site and no direct effects on the size and scale of any site, as a result of the proposed works.

The potential for inputs of sediment, nutrient and herbicides to Blackwater River (Cork/Waterford) SAC (002170) during the establishment phase exists. While lower, there is also potential for sediment and nutrient, in addition to acidification during the operational phase. There is a high risk of sediment input during and immediately following harvesting, and subsequent nutrient release from brash and dead root systems following harvesting.

5.2 Mitigation Measures to be Implemented

5.2.1 Summary of Mitigation Measures

'Describe what mitigation measures are to be introduced to avoid or reduce the adverse effects on the integrity of the site. Acknowledge uncertainties and any gaps in information'

- *List measures to be introduced*
- *Explain how the measures will avoid the adverse effects on the integrity of the site*
- *Explain how the measures will reduce the adverse effects on the integrity of the site*
- *Provide evidence of how they will be implemented and by whom.*

(European Communities, 2001)

Blackwater River (Cork/Waterford) SAC (002170)

The following mitigation measures will be implemented in order to avoid potential adverse effects on the integrity of the Blackwater River (Cork/Waterford) SAC (002170), having regard to the sites' respective conservation objectives. The mitigation measures are listed in Table 5-5, along with information on when they will be implemented, how the measures will avoid or reduce adverse effects on the European sites, who will implement the measures and the degree of confidence in their successful implementation.

Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods which will be applied at the replanting site.

These include:

The provision of collector drains which will disperse drainage water with low velocity through wide (20m) vegetated buffer zones increasing the efficacy of sediment and nutrient retention across the area. Silt fencing will be erected along the drainage ditch at the location of the proposed replanting to provide additional protection to the watercourses in this area.

Adherence to 'Forestry and Water Quality Guidelines[1]' (Forest Service, 2000) as required for approved afforestation plans.

There is a requirement in the Forest Service Code of Practice and in the FSC Certification Standard for the installation of buffer zones adjacent to aquatic zones at planting stage, and this will be implemented.

[1] Forestry and Water Quality Guidelines (Forest Service, 2000) available at: https://www.agriculture.gov.ie/media/migration/forestry/publications/water_quality.pdf

Site preparation for replanting will be carefully managed to prevent any loss of silt and sediment conveyed in surface water run-off to receiving waters.

This reduces potential sources of sediment and reduces the risk of sediment and sediment bound nutrient run-off from the site resulting in an imperceptible effect.

5.2.2 Mitigation Measures

The primary mechanism for implementation of mitigation measures is adherence to 'Forestry and Water Quality Guidelines' (Forest service, 2000) which is required as a condition of approval for afforestation.

Further measures considered to be standard water quality protection measures are also included here. These may overlap 'Forestry and Water Quality Guidelines' in some instances, however any measures listed here not included in these guidelines are required to be implemented in addition.

Table 5-5: Mitigation Measures for Afforestation

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
Mitigation Measures in Relation to Water Quality to be Implemented Prior to and During Planting			
Adherence to Forestry and Water Quality Guidelines	Comprehensive guidelines to protect water quality, including specifications for: • Conservations sites • Areas vulnerable to acidification • Areas vulnerable to erosion • Riparian buffer zones • Ground preparation and drainage • Fertiliser application and storage • Chemicals, fuel and machine oils • Roads • Bridges, culverts and fords • Harvesting	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. Adherence to guidelines is a requirement for approval by the Forest service. This is outlined in the CEMP, included in appendix 6.	Reporting to developer and communication and collaboration with contractor. Stop works authority for pollution events and failure to implement measures.

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
The Ecological Clerk of Works or Environmental Manager appointed by the developer to inspect the wind farm construction works will also inspect planting operations to ensure the effective operation and maintenance of drainage and other mitigation measures.	Ensure mitigation measures are implemented correctly and effectively.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	Reporting to developer and communication and collaboration with contractor. Stop works authority for serious incidents for pollution events and failure to implement measures.
Excavated subsoil material will be used for backfilling or removed off site to an appropriate facility.	Remove a potential source of siltation, reducing the probability of sediment being transported in surface water.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Temporary spoil heaps will be surrounded by silt fencing to filter sediment from the surface water run-off from excavated material.	Contain any silt mobilised by surface water runoff over temporary spoil heaps at source, preventing transport of silt into the drainage network and adjacent water bodies	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
		staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	
Drains around hard-standing areas will be shallow to minimise the disturbance to sub-soils.	Minimise the area of exposed soil, reducing the potential silt load.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Access track drainage will follow natural flow paths. Existing overland flow channels will be maintained, and cross-drains provided in the access road to allow continuity of flow.	Maintain existing drainage conditions. This will also reduce the potential for erosion and siltation, since established flow paths are less likely to erode and acquire sediment.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
All ditches adjacent to proposed planting areas will be protected by fencing, including any proposed stilling ponds.	Prevent machinery or other interference damaging ponds and drainage ditches, which could result in increased siltation.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
		competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	measures during the planting process.
All personnel working on site will be trained in pollution incident control response. Emergency Silt Control and Spillage Response Procedures contained within the Site Drainage Management Plan of the Construction Environmental Management Plan (CEMP) will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt.	Ensure site operatives are informed and equipped to deal pollution incidents such as spillages or silt containment failures.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
During the planting period, sandbags will be used during emergency events to control the discharge from the stilling pond	Reduce the risk of any accidental spillage on site affecting watercourses and adjacent waterbodies.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Any existing ditches will be protected by fencing	Prevent machinery or other interference damaging ponds and drainage ditches, which could result in increased siltation.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
		as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	and other mitigation measures during the planting process.
A regular review of weather forecasts of heavy rainfall will be undertaken, and a contingency plan will be prepared for before and after such events.	Ensure works are not carried out during periods of heavy rainfall and ensure potential sources of siltation are secured in advance of heavy rainfall.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
A record will be kept of daily visual examinations of watercourses which receive flows from the proposed development, during and for an agreed period after the installation phase.	Determine the effectiveness of mitigation measures and indicate whether extra measures or repair of existing measures are required.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Silt traps and silt fencing will be put in place in advance as planting progresses across the site.	Ensure erosion control and silt arrest measures are in place in advance of planting activities.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
		All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	operation and maintenance of drainage and other mitigation measures during the planting process.
The developer will ensure that the above erosion control measures are regularly maintained during the installation phase.	Ensure erosion control and silt arrest measures continue to function adequately during planting.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Access tracks will be capped as soon as practicably possible.	Cover exposed subsoils, thereby reducing the concentration of suspended solids in any run-off.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Where haul roads pass close to ditches, silt fencing will be used to protect the ditch at locations where runoff from the tracks flows towards existing ditches. Silt traps will be provided at outfalls from roadside	Prevent silt generated by road use entering drainage channels	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
swales to existing drains. Silt traps will be kept upstream of outfalls to allow a buffer zone to the outfall.		combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	measures during the planting process.
Additional silt fencing will be kept on site in case of an emergency break out of silt laden run-off.	Allow repair and strengthening of silt interception measures if and where necessary.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Refuelling of plant & machinery during planting will only be carried out at designated refuelling station locations on site. Each station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. Only emergency breakdown maintenance will be carried out on site. Drip trays and spill kits will be kept available on site, to ensure that any spills from the vehicle are contained and removed off site.	Prevent fuels, oils or other contaminants from entering the drainage network.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 6.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring scheme to prevent mitigation failure
Operational Phase Mitigation Measures in Relation to Water Quality			
The surface water run-off from the hardstanding areas will be attenuated in settlement ponds which will discharge to existing drainage ditches.	This will ensure that any potential increase in flooding downstream of the site is negligible.	Mitigation measures will be implemented directly by the developer or through the mechanism of its contract with any contractor responsible for operating the replant lands. This is outlined in the CEMP, included in appendix 6.	Reporting to Developer and communication and collaboration with Contractor.
The operations management of the replant lands will include the application of herbicide.	Ensure an approved and suitable herbicide is used, and operatives are certified in its use.	Mitigation measures will be implemented directly by the developer or through the mechanism of its contract with any contractor responsible for operating the replant lands. This is outlined in the CEMP, included in appendix 6.	Reporting to Developer and communication and collaboration with Contractor.

5.2.3 Mitigation for Cumulative Effects

Moneygorm, Co. Cork

A met mast and a number of small-scale domestic and agricultural developments are also permitted in the surrounding townlands. These are not predicted to result in cumulative effects together with the proposed afforestation.

The proposed Coom Green Energy Park is located at a distance of 1.07km east from the proposed replanting area; this project could result in cumulative effects together with the proposed afforestation.

There is coniferous forestry located to the west and east of the site, and the cumulative effect arising from the proposed replanting in conjunction with the existing forestry plantations and future development is assessed as a short-term, negative effect in the absence of mitigation measures.

Mitigation measures for the proposed development are detailed in Table 5-5. With the implementation of these mitigation measures, it is concluded beyond reasonable scientific doubt that the cumulative effect will **not be significant**.

5.2.4 Efficacy of the Proposed Mitigation Measures

Provide evidence of the degree of confidence in the likely success of the mitigation measures

Mitigation measures were devised in consideration of the following guidelines:

- Forest service (2000) Forestry and Water Quality Guidelines
- EPA, (2017). Guidelines on the information to be contained in Environmental Impact Assessment Reports: Draft. Environmental Protection Agency, Ireland.
- Revised Guidelines on the information to be contained in Environmental Impact Statements [Draft], EPA (2017);
- Advice Notes on Preparing Environmental Impact Statements [Draft], EPA (2015);
- Cork County Development Plan 2014
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a Framework for Community Action in the Field of Water Policy;
- The Planning System and Flood Risk Management - Guidelines for Planning Authorities - Department of Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW);
- Flood Mapping Website (http://www.floodmaps.ie);
- OPW preliminary flood risk assessment (PFRA) indicative mapping website (www.cfram.ie);
- CIRIA Environmental Good Practice on Site;
- Best Practice Guide BPGCS005, Oil Storage Guidelines:
    - CIRIA Control of Water Pollution from Linear Construction Sites. Technical Guidance (C648);
    - CIRIA Control of Water Pollution from Construction Sites. Guidance for Consultants and contractors (C532);
- CIRIA Sustainable Construction Procurement. A Guide to Delivering Environmentally Responsible Projects (C571);
- UK Pollution Prevention Guidelines (PPG):
    - PPG1: Understanding your environmental responsibilities – good environmental practice;
    - PPG2: Above Ground Oil Storage Tanks;
    - PPG3: Pollution Prevention Guidelines;
    - PPG4: The Disposal of Sewage where no Mains Drainage is Available;
    - PPG5: Works in, near or liable to affect Watercourses;
    - PPG6: Working at Construction and Demolition Sites;
    - PPG7: The Safe Operation of Refuelling Facilities;
    - PPG8: Safe Storage and Disposal of Used Oil;
    - PPG21: Pollution Incident Response Planning;
    - PPG22: Dealing with Spills; and
    - PPG26: Drums and intermediate bulk containers.
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (National Roads Authority, 2005);
- Design Manual for Roads and Bridges (2013);

- River Basin Management Plan for Ireland 2018-2021.;
- Biological River Water Quality Data, (Environmental Protection Agency (EPA);

Accordingly, given the provenance of the mitigation measures as set out above, those mitigation measures (when properly implemented) will be successful in ensuring that the European site is preserved at a favourable conservation status by ensuring the lasting preservation of the constitutive characteristics of the site. With the implementation of mitigation measures developed in light of the best scientific knowledge, it is concluded beyond reasonable scientific doubt that the integrity of the site will not be adversely affected.

5.2.5 Addressing Mitigation Failure

Explain how any mitigation failure will be addressed (European Communities, 2001)

A suitably qualified person will be appointed by the Client to ensure the effective management and maintenance of mitigation measures during the planting process. Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage. Procedures and contingency plans will be set up on-site to deal with emergency accidents or spills. An emergency spill kit (mats, pads, absorbent socks, disposal bags, PPE) is to be kept on site in the event of an accidental spill.

5.3 Conclusion

In summary, whilst it has been acknowledged that there is the potential for the project to have significant indirect effects on one European site, with the implementation of the detailed mitigation measures identified in this NIS, it is concluded beyond reasonable scientific doubt that the proposed replant lands shall not result in a significant effect to any European site.

This report has assessed the potential effects on the integrity of the Blackwater River (Cork/Waterford) SAC in light of the site's conservation objectives and mitigation measures have been developed to prevent such potential effects occurring.

On the basis of objective scientific information, the proposed replant lands will not, either alone or in combination with other plans or projects, have adverse effects on any of the constitutive interests of the Blackwater River (Cork/Waterford) SAC, in light of the site's conservation objectives.

Accordingly, it can be concluded as follows:

(i) All aspects of the proposed replant lands have been identified which, in the light of the best scientific knowledge in the field, can by themselves or in combination with other plans or projects, affect the European site in the light of its conservation objectives;

(ii) There are complete, precise and definitive findings and conclusions regarding the identified potential effects on any European site;

(iii) On the basis of those findings and conclusions, the Board is able to determine that no scientific doubt remains as to the absence of the identified potential effects; and

(iv) Thus, the Board may determine that the proposed replant lands will not adversely affect the integrity of any European site.

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FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 1

Finding of No Significant Effects Report

Finding of No Significant Effects Report – Moneygorm, Co. Cork	
Name and location of the Natura 2000 sites	There are two European sites within the potential zone of influence (15km radius): • Blackwater River (Cork/Waterford) SAC (002170) (380m/565m in-stream) • Blackwater Callows SPA (004094) (13.9 km) An indirect hydrological connection in the form of existing field/forestry drains linking the replant lands and Blackwater River (Cork/Waterford) SAC (Bunnaglanna River) is present.
Description of the project or plan	Tree Planting: • Sitka Spruce (34.2 ha) • Additional Broadleaved Species (6 ha) Additional Details: • Drainage • Ground preparation: Mounding • Planting Method: Angle Notch • Access: Existing Track • Fertilizer [Zero Phosphate] • Herbicide Control (years 0 – 2) • Manual Control (years 3 - 4) • Upgrade existing fence to deer & sheep-proof specification
Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?	No.
Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?	No. A planning search was conducted on 11th September 2019. No projects of a scale or nature that could act cumulatively with the proposed remedial works are permitted or proposed in the local area.

	The large volume of coniferous forestry in the landscape surrounding the replant lands is considered to have the potential to result in cumulative effects in terms of sediment and nutrient inputs, and acidification.
The Assessment of Significant Effects	
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site	Effects on Blackwater Callows SPA (004094) are considered highly unlikely.
Explain why these effects are not considered significant	Lack of downstream hydrological connectivity and distance between replant lands and Blackwater Callows SPA (almost 14 km). SCI species (whooper swan, black-tailed godwit, teal & wigeon) are unlikely to use or rely upon upland habitats including upland rivers, due to their preference for wetlands and coastal areas including lakes, lowland rivers & associated floodplains, mudflats, estuaries and shorelines. The Blackwater Callows SPA is made up of a wide, slow stretch of the Blackwater River and associated floodplains for this particular reason; conversely, the River network forming the part of the Blackwater River (Cork/Waterford) SAC (002170) in the vicinity of the replant lands does not contain suitable habitat for these species, or the general SCI group wetland & waterbirds, being made up of narrow, eroding upland rivers with narrow, shallow channels and fast-flowing water.
Name of Agency or Body Consulted	**Summary of Response**
National Parks and Wildlife Service (via DAU) Initial Consultation Letter: sent 17/08/2018 EIAR scoping report: sent 19/07/2019	No formal NPWS response to date. NPWS indicated construction-stage projects are being prioritised at present.
Inland Fisheries Ireland EIAR scoping report: sent 18/07/2019 On-site consultation with Andrew Gillspie SFEO: 22/08/2019 DAFM (Forest Service) consultation letter: sent 05/10/2018	<u>Response to forest service (see Appendix 4)</u>: No objections providing establishment in compliance with Forestry & Water Quality Guidelines for sensitive waters; highlights need for drainage works to be carried out in manner preventing erosion and deposition of solids in receiving waters. Also requests no aerial fertilisation be carried out, and broadleaf planting to be carried out in open areas of site bounded by watercourses.
Data Collected to Carry out the Assessment	

Finding of No Significant Effects Report – Moneygorm, Co. Cork			
Who carried out the assessment	*Sources of Data*	*Level of assessment completed*	*Where can the full results of the assessment be accessed and viewed*
This evaluation was completed by Fehily Timoney and Company	• Information on the designated nature conservation sites within 15 km of the study area was obtained from the NPWS website and metadata available online from the NPWS mapping system (http://webgis.npws.ie/npwsviewer/). • Information on the waterbody catchments in the development area was obtained from the Water Framework Directive Water Mapping Information System www.wfdireland.ie/maps.html • OSI Aerial photography and 1:50000 mapping. • Cork County Council online planning database http://maps.corkcoco.ie/planningenquiryv3/MainFrames.aspx • Data collected during site visits.	Appropriate Assessment Screening Report	An Bord Pleanála

Finding of No Significant Effects Report – Ballard, Co. Wicklow	
Name and location of the Natura 2000 sites	There are 6 European sites within the potential zone of influence (15km radius) • Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733) is located 4.7 km north • Wicklow Mountains SPA (Site Code: 004040) is located 7.8 km northwest • Wicklow Mountains SAC (Site Code: 002122) is located 7.8 km northwest • Deputy's Pass Nature Reserve SAC (Site Code: 000717) is located 9 km northeast • Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729) is located 13.4 km east • Slaney River Valley SAC (Site Code: 000781) is located 14.7 km west
Description of the project or plan	Tree Planting: • Sitka Spruce / Additional Broadleaved Species Integrated Mix (34.11 ha) • Alder / Silver Birch Integrated Mix (1.67 ha) • Alder (1.32 ha) Additional Details: • Drainage • Ground preparation: Mounding • Planting Method: Angle Notch • Access: Existing Track • Fertilizer [Zero Phosphate] • Herbicide Control (years 0 – 2) • Manual Control (years 3 - 4) • Upgrade existing fence to deer-proof specification. The technical approval document states that all applications must be developed in accordance with detailed procedures & standards as described in the current Forestry Schemes Manual, and also requires Adherence to Forestry & Water Quality Guidelines (included in Appendix 3).

Finding of No Significant Effects Report – Ballard, Co. Wicklow	
Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?	No.
Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?	No. A planning search was conducted on 4th November 2019. No projects of a scale or nature that could act cumulatively with the proposed replant works are permitted or proposed in the local area. While the coniferous forestry and agriculture are common in the surrounding landscape, given the absence of a downstream hydrological connection between the replant lands site and any European site, no cumulative effects are envisaged.
The Assessment of Significant Effects	
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site	No significant effects on the following site are envisaged. • Vale of Clara (Rahtdrum Wood) SAC (Site Code: 000733) • Wicklow Mountains SPA (Site Code: 004040) • Wicklow Mountains SAC (Site Code: 002122) • Deputy's Pass Nature Reserve SAC (Site Code: 000717) • Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729) • Slaney River Valley SAC (Site Code: 000781)
Explain why these effects are not considered significant	The closest site (Vale of Clara (Rathdrum Wood) SAC) located is 4.7 km from the proposed development). As the proposed works site is not located within or adjacent to any European site, no direct effects in terms of habitat loss or disturbance/displacement effects are predicted as a result of the proposed works. There are no downstream hydrological links between the replant lands site and European sites. Wicklow Mountains SPA (004040) is located 7.8 km from the replant land site. This SPA is designated for peregrine falcon and merlin. The habitats on-site are considered unsuitable with regards to breeding/nesting for these species. Suitable nesting sites restrict peregrines to areas where cliff-ledges, quarry faces, crags, or sea-cliffs are available, none of which are present within the proposed replant sites. Merlin typically nest on the ground on moorland, mountain and blanket bog.

	This species can also nest in woodland and has taken to nesting in forestry plantations adjacent to moorland. These habitats are not present within the replant land site. The core foraging range for merlin during the breeding season is within 5 km (SNH, 2016). The core foraging range during the breeding season for peregrine falcon is 2km (SHN, 2016). Therefore, given the intervening distance and lack suitable breeding habitat on-site no effects are envisaged on the Wicklow Mountains SPA (004040). There will be no land-take from any European site and no direct effect on the size and scale of any site, as a result of the proposed works. There will be no emissions to any European site.
Name of Agency or Body Consulted	**Summary of Response**
National Parks and Wildlife Service (via DAU) Initial Consultation Letter: sent 17/08/2018 EIAR scoping report: sent 19/07/2019	No formal NPWS response to date. NPWS indicated construction-stage projects are being prioritised at present.

Data Collected to Carry out the Assessment

Who carried out the assessment	*Sources of Data*	*Level of assessment completed*	*Where can the full results of the assessment be accessed and viewed*
This evaluation was completed by Fehily Timoney and Company	• Information on the designated nature conservation sites within 15 km of the study area was obtained from the NPWS website and metadata available online from the NPWS mapping system (http://webgis.npws.ie/npwsviewer/). • Information on the waterbody catchments in the development area was obtained from the Water Framework Directive Water Mapping Information System www.wfdireland.ie/maps.html • OSI Aerial photography and 1:50000 mapping. • Wicklow County Council Planning Enquiry System (http://www.eplanning.ie/WicklowCC/searchexact) • Data collected during site visits.	Appropriate Assessment Screening Report	An Bord Pleanála

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 2

Technical Approval for Afforestation

An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

MR DONAL KELLEHER
BALLYPHILIP
GLANMIRE
CO CORK

02/11/2018

Application for Technical Approval for an Afforestation Licence

Forest Owner	FO135956U
Contract Number	CN82229
Townland	Moneygorm
County	Cork
Approved Area (ha)	40.02
Fencing Length (lm)	1,960.00

This is technical approval for an afforestation licence only and is not grant approval. You should note that the project will not be eligible for grant aid unless prior financial approval has been given in writing in advance of commencement of planting. Also, to qualify for Afforestation grant and premiums applicants must own, lease or be in joint management of the lands proposed for planting. You should consult with your registered forester about applying for financial approval under the Scheme.

I refer to your application for an afforestation licence as described above and shown on the enclosed map. Your application has been assessed and a licence is hereby issued on the basis that the works will be undertaken in accordance with the prescription set out in Appendix A, attached herewith. You are now required to remove your site notice immediately.

This scheme is financed by the State and payment of the grant, if financial approval is given, is subject to the following conditions:

1. Availability of funds in each financial year.

2. Submission of a fully completed and signed Form 2 (Application for Payment) and the following documents to support this application.

Proof of Ownership (including removal of any constraints on ownership)
Valid Mandate
Current Tax Clearance Certificate(s)
C2 Certificate
Provenance Certificates
Fencing Map
Biodiversity Map
Certified Species Map

3. Satisfactory completion of the work not later than 30/10/2021.

4. Compliance with Operational Proposals and Specifications enclosed.

5. Compliance with Departmental guidelines and requirements for Landscape, Water Quality, Harvesting, Biodiversity and Archaeology.

An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

6. Compliance with Ecological Survey and Management Plan as submitted (if applicable).

7. The work is carried out by the registered company or forester specified on the original application. If it is intended to have a different company or forester undertake the work, it will be necessary to submit a new application (Form 1) to the Forest Service.

8. All applications are subject to the provisions of the penalty schedules as set out in the Afforestation Grant and Premium Scheme document.

9. All applications are subject to Cross Compliance checks with other grant schemes.

10. Grant payment may be subject to the netting policy of the Department of Agriculture, Food and the Marine.

11. This licence is issued subject to the terms and conditions of the Forestry Standards and Procedures Manual.

12. Your acceptance that the responsibility for the ultimate success of the plantation rests with you, the applicant. Plantations which fail to establish successfully will result in grant and premium recoupment.

13. Additional Environmental & Silvicultural Conditions

- Adhere to forestry & water quality guidelines,
- All guidelines to apply,
- Adhere to forestry & water quality guidelines

You are required to notify the Department of Agriculture, Food and the Marine in writing if any of the details of your application have changed. Changes to your application may invalidate this licence.

In order to allow for the possibility of appeals, you must not commence any works until 28 days from the date of this letter have elapsed. If an appeal is lodged, this licence will be suspended and no work may commence until the appeal process has concluded.

If you wish to appeal any condition attached to this licence, where applicable, you should do so in writing within 28 days of the date of this letter to the Forestry Appeals Committee. You must set out the grounds of your appeal and include a statement of the facts and contentions upon which you intend to rely along with any documentary evidence you wish to submit in support of your appeal. The appeal must be sent to the Forestry Appeals Committee, Kilminchy Court, Portlaoise, Co. Laois, Lo-Call 076 1064418 or 057 8631900.

Yours sincerely,

L. Chigara

LISA CHIGARA
Approval Section
Forestry Division

An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

APPENDIX A

Department of Agriculture, Food and the Marine

Operational Proposals for Technical Approval for an Afforestation Licence

Forest Owner Number	FO135956U
Contract Number	CN82229
Townland	Moneygorm
County	Cork
Area Approved	40.02(ha)
Fencing Length (LM)	1,960.00

All applications must be developed in accordance with detailed standards and procedures as described in the current Forestry Schemes Manual. Certain specific operational proposals particular to this application are described below. No change is permitted to these proposals and species approved unless approved in advance by the Department. The Department may insist that proposed changes constitutes a new application.

Operational Proposal Details

Agro Forestry (GPC 11)		
1.	Tree Shelters	Not Entered
2.	Plant Size and Stocking	Not Entered
Drainage		
1.	Drainage	Required
2.	Drainage Comment	500
Fertiliser		
1.	Zero	Yes
2.	350 Kg Granulated Rock Phosphate	Not Entered
3.	250 Kg Granulated Rock Phosphate	Not Entered
4.	Split Application	Not Entered
5.	Other Details	50
Firebreaks/Res.		
1.	Firebreaks/Res	Not Required
Forestry for Fibre (GPCs: 12a and 12b))		
1.	Is Land Free Drainage arable or pasture soils	Not Entered
2.	Are there surface water gleys without a peat layer	Not Entered
3.	Do you intend to use improved genetic material	Not Entered
4.	Details	500
Ground Prep.		
1.	Woody Weed Removal	Not Entered
2.	Ripping	Not Entered
3.	Pit Plant	Not Entered
4.	Mole Drainage	Not Entered
5.	Mounding	Yes
6.	Ploughing	Not Entered
9.	Other Details	50
Planting Method		
1.	Angle Notch	Yes
2.	Pit	Not Entered
3.	Machine	Not Entered

4.	Slit	Not Entered
5.	Other Details	50
Road Access		
1.	Road Access	Provided
Standard Stocking		
1.	Standard Stocking	Yes
2.	Details	50
Weed Control		
1.	Herbicide Control yr0	Yes
2.	Herbicide Control yr1	Yes
3.	Herbicide Control yr2	Yes
3.	Herbicide Control yr4	Not Entered
4.	Manual	Yes
4.	Herbicide Control yr3	Not Entered

Fencing Details (metres)				
	Stock	0	Stock-Sheep	960
	Stock-Rabbit	0	Upgrade to Deer	0
	Deer-Rabbit	0	Deer	1000
	Upgrade Existing Fence(s)	Y	Tree Shelter (Hectares)	0
	Upgrade Details: Deer fence 15% broadleaf section in SW section of site			

Species Approved

The species approved in this proposal relate to the digitised certified species map attached.

Species Approved for Afforestation

Plot	Area	GPC	Land Type	Species	Species Area	Yield Class	Mixture Type	Exclusion	Exclusion Type
1	40.02	GPC 3	CHF	SS	34.02	20	Groups		
				ADB	6	8			

Additional Silvicultural and Environmental Conditions

In addition to the Department's environmental and silvicultural guidelines the following specific conditions apply to this proposal:

Silvicultural and Environmental Conditions

Adhere to forestry & water quality guidelines,
All guidelines to apply,
Adhere to forestry & water quality guidelines

Certified Species Information

Contract Number CN82229
Townland Moneygorm

County Cork City
6" OS No: CK43

Plot No	GPC	Parcel No	GPC Area(H)	Land Use Type	Species Area	Species	Mixture Type	Excl Area(h)	Excl Type
1	3	47654323	40.02	CHF	40.02	ADB,SS	Groups	0	
		TOTALS	**40.02**		**40.02**			**0**	

Remarks:

Area Surveyed By: **Date:**

Species Certified By: **Date:**

Contract: **CN82229**

Scale 1: 5000

Contract: **CN82229**

Scale 1: 5000

Department of
Agriculture,
Food and the Marine
An Roinn
Talmhaíochta,
Bia agus Mara

COILLTE TEORANTA
ACCOUNTS PAYABLE
COILLTE TEORANTA, CEDAR HSE.,
MONEEN RD., CASTLEBAR
CO MAYO

08/08/2018

Licence for Non Grant Aided Forest Road

Forest Owner	FO101174V
Contract Number	CN77296
Townland	Ballard
County	Wicklow.
Approved Area (Ha)	37.1
Fencing Length (LM)	3,977.00

This is a preliminary technical approval only and is not a grant approval. If you wish to proceed with this project you must notify the undersigned in writing within four weeks of the proposed planting date in order to receive full approval to plant and to obtain financial grant approval if applicable. You should note that the project will not be eligible for grant aid unless prior financial approval has been given in writing in advance of commencement of planting.

I refer to your licence application requesting approval of Afforestation

You are required to notify the Department of Agriculture, Food and the Marine in writing if any of the details of your application have changed.

In order to allow for the possibility of appeals, you must not commence any works until 28 days from the date of this letter have elapsed. If an appeal is lodged, this licence will be suspended and no work may commence until the appeal process has concluded.

If you wish to appeal any condition attached to this licence, where applicable, you should do so in writing within 28 days of the date of this letter to the Forestry Appeals Committee. You must set out the grounds of your appeal and include a statement of the facts and contentions upon which you intend to rely along with any documentary evidence you wish to submit in support of your appeal. The appeal must be sent to the Forestry Appeals Committee, Kilminchy Court, Portlaoise, Co. Laois, Lo-Call 076 1064418 or 057 8631900.

Yours sincerely

COLIN GALLAGHER
Approval Section
Forestry Division

An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

Eastát Chaisleán Sheonach
Contae Loch Garman
Y35 PN52
Éire

Johnstown Castle Estate
Co. Wexford
Y35 PN52
Ireland

Telephone +353 (0)53 916 3400
Fax +353 (0)53 914 2839
info@agriculture.gov.ie
www.agriculture.gov.ie

Contract: **CN77296** Scale 1: 5000

Certified Species Information

Contract Number	CN77296
Townland	Ballard
County	Wicklow
6" OS No:	WW34

Plot No	GPC	Parcel No	GPC Area(H)	Land Use Type	Species Area	Species	Mixture Type	Excl Area(h)	Excl Type
1	3	42568105	22.89	CHF	22.89	ADB,SS	Integrated Mix	0	
2	8	42567868	1.67	BHF	1.67	ALD,SBI	Integrated Mix	0	
3	8	42589585	1.32	BHF	1.32	ALD	Pure	0	
4	3	42570542	11.22	CHF	11.22	ADB,SS	Integrated Mix	0	
		TOTALS	**37.1**		**37.1**			**0**	

Remarks:

Area Surveyed By: **Date:**

Species Certified By: **Date:**

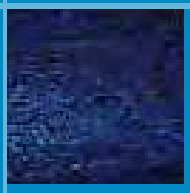
FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

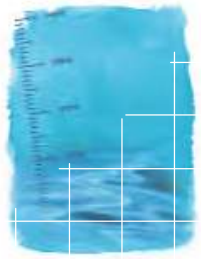
APPENDIX 3

Forestry & Water Quality Guidelines

Front Cover



CONTENTS



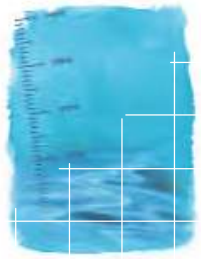
INTRODUCTION

The maintenance and enhancement of water quality is of utmost importance. Forestry activities have the potential to interact both positively and negatively with aquatic resources. Careful planning and management will mitigate against potential negative impacts while maximising the positive aspects of forestry, such as aquatic biodiversity enhancement and the creation of appropriate riparian ecosystems.

> An aquatic zone is defined as a permanent or seasonal river, stream or lake shown on an Ordnance Survey 6 inch map.

Each river or lake has a unique drainage basin or catchment area. Some catchments are more vulnerable than others to changes in water quality, due to their particular soils and underlying geology. The type of landuses and associated operations within the overall catchment area can also have a major bearing on the volume and quality of water flowing into that particular river or lake. All land owners, including forest owners, have a responsibility to play their role in conserving and enhancing overall catchment quality.

> The FORESTRY AND WATER QUALITY GUIDELINES have been developed through extensive consultation with a wide range of relevant parties. They set out sound and practical measures based on the principles of Sustainable Forest Management (SFM), and are firmly rooted in the best available scientific information. The guidelines will be kept under review to facilitate amendment in the light of new research findings.
>
> To ensure the successful implementation of SFM in Ireland, it is important that forest owners adhere to the guidelines and undertake all work in a way which is compatible with the protection of the environment.
>
> The guidelines describe a range of measures intended to cover all situations relating to forestry and water quality. Not all of the measures outlined will be applicable to every site. However, it is the responsibility of forest owners to identify and apply those measures which are appropriate to their particular forest.
>
> The FORESTRY AND WATER QUALITY GUIDELINES apply to all grant-aided projects and to all activities associated with a Felling Licence. Any breach may result in the forfeit of grant aid and premium payment or the withdrawal of a Felling Licence.
>
> It is essential that all forest workers and machine operators involved in any forest operation are made aware of and understand the guidelines, all relevant environmental issues relating to the site, and working practices which minimise environmental disturbance. All operators should have contact telephone numbers onsite for all relevant agencies (Local Authorities, Regional Fisheries Boards, Dúchas The Heritage Service, National Museum of Ireland, Garda Síochána, etc.) in case of accidental damage to aquatic zones, archaeological sites, important wildlife habitats and other environmental features.



SENSITIVE AREAS

SPECIAL AREAS OF CONSERVATION, SPECIAL PROTECTION AREAS AND PROPOSED NATURAL HERITAGE AREAS

Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are protected by European Union and national legislation. Proposed Natural Heritage Areas (pNHAs) have been identified by National Parks and Wildlife of Dúchas as areas of value in the national effort to conserve biodiversity.

- Planting is not permitted in SACs and SPAs.
- Approval for planting in pNHAs is dependent on formal consultation between the Forest Service and Dúchas The Heritage Service.

AREAS SENSITIVE TO ACIDIFICATION

The Forest Service recognises the importance of water acidification arising from atmospheric pollution. It will continue its ongoing policy of consultation with Regional Fisheries Boards and Local Authorities on whether or not to proceed with forestry applications in areas where there is a perceived risk of acidification. These sensitive areas are designated on the basis of the following criteria:

- the aquatic zone is part of a recognised salmonid fishery and is a spawning, nursery or angling area, **and**
- the geology is base-poor, **and**
- in water samples taken regularly between 1st February and 31st May, **either**
  - pH readings are equal to or less than 5.5, **or**
  - water hardness, in mg calcium carbonate/litre, is less than 12, **or**
  - water alkalinity, in mg calcium carbonate/litre, is equal to or less than 10.

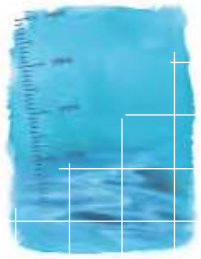
The Forest Service will also take account of new research findings as they become available.

AREAS SENSITIVE TO EROSION

Where certain soil types (e.g. peat, sandstone-derived soils) and steep slopes occur together, there is a greater risk of soil erosion and subsequent sedimentation. It should also be noted that subsoils may be more prone to erosion than the associated topsoil. In such areas, due care should be taken when

Left: Research and consultation are key elements in protecting water quality.

Right: Forest owners, as with all landowners, have a responsibility to play their role in conserving and enhancing overall catchment quality.



planning all forest operations. Correct buffer zone management will help reduce the risk of sedimentation. Sensitivity to acidification or erosion can be local or confined to a sub-catchment. These sub-catchments may be identified by their particular geology, soil and terrain.

BUFFER ZONE GUIDELINES

The buffer zone is an area adjacent to an aquatic zone and managed for the protection of water quality and aquatic ecosystems. A buffer zone includes the riparian zone, i.e. that area directly adjacent to an aquatic zone, representing the intermediate between the aquatic and terrestrial environments and having its own distinctive hydrological and ecological characteristics. The buffer zone may also occupy adjacent areas beyond the riparian zone. Within the buffer zone, natural ground vegetation is allowed to develop, with additional planting of suitable riparian tree species.

Within the buffer zone, ground preparation and other forest operations are curtailed in order to protect water quality. Furthermore, drainage channels leading from the site must taper out before entering the buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. Buffer zones further enhance and protect water quality by:

- physically stabilising banks;
- acting as a source of leaf litter input into aquatic zones, which represents an important food source for a number of aquatic animals;
- providing cover and dappled shade.

Buffer zones should be in place throughout the rotation, and have particular relevance to establishment, road construction and harvesting.

Table 1. Buffer zone widths.

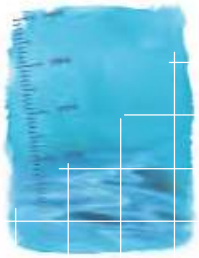
Average slope leading to aquatic zone	Buffer zone width on each side of the aquatic zone	Buffer zone width for highly erodable soils
Moderate (even to 1 in 7 / 0-15%)	10 m	15 m
Steep (1 in 7 to 1 in 3 / 15-30%)	15 m	20 m
Very steep (1 in 3 / >30%)	20 m	25 m

Buffer zone width is based on the following factors:

- the average slope of the area adjacent to the aquatic zone (buffer zone widths should be greater where slopes are steep);
- the sensitivity to erosion of the soil adjoining the aquatic zone.

- The width of the buffer zone may vary in certain situations, for example, to avoid straight edges for landscaping purposes. However, the minimum width, as set out above, must be maintained in all cases.
- Buffer zones should be actively managed to encourage sustainable vegetative growth and cover for the protection and enhancement of water quality. Well-vegetated banks are more resistant to undercutting and collapse. Vegetation shields the soil surface from rainfall impacts, slows run-off velocity and increases infiltration. Open and partially wooded conditions should be planned, so that bank vegetation thrives. Approximately half the length of a stream should be left open and the remainder kept under partial shade from trees and shrubs. Ground vegetation in buffer zones can be augmented by the planting of native tree species such as birch, willow and sally, with occasional alder, oak and ash. These species help to stabilise the riparian zone and protect it in times of flood. Such planting is permitted in the buffer zone and within 5 m of the aquatic zone, if this would, in the view of the Regional Fisheries Board, have a beneficial effect on that particular aquatic zone. On good fertile sites, natural regeneration of desirable species from local seed sources is likely to occur.

The development of natural riparian vegetation, including suitable tree species, will benefit water quality and aquatic life.



- All tree planting within the buffer zone should be carried out using pit planting only, except in wet areas where inverted mounding is allowed.
- Pruning and/or removal of undesirable trees should be carried out where required, inorder to maintain the riparian vegetation and aquatic conditions.

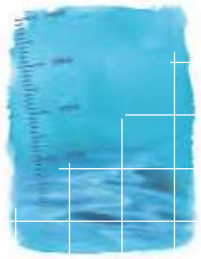
Afforestation plans should be made for all sites, regardless of size. Such plans should include the location and treatment of aquatic zones located on or adjacent to the site.

GROUND PREPARATION AND DRAINAGE

An essential element of protecting water quality is to ensure that sediment contained in water draining from the site does not enter the aquatic zone. Incorrect ground preparation and drainage can result in soil disturbance and subsequent sedimentation of nearby aquatic zones, particularly if ground preparation is followed by prolonged and heavy rainfall. For these reasons, ground preparation must be well-planned and drain layout/sediment traps correctly designed and installed. Mounding, moling, ripping and subsoiling will result in less soil disturbance than ploughing.

- Do not carry out ground preparation within the buffer zone. Where trees are being planted to restore or create riparian woodland, pit planting must be used, except in wet areas where inverted mounding is allowed. In general, trees should not be planted within 5 m of an aquatic zone.
- Where possible, ground preparation should be carried out when there is less of a risk of heavy rainfall.
- Where possible, do not disturb existing drains.
- Drains and sediment traps should be installed during ground preparation.
- Collector drains should be excavated at an acute angle to the contour (0.3%-3% gradient), to minimise flow velocities.
- Main drains to take the discharge from collector drains must be provided with waterdrops and rock armour where there are steep gradients, and should avoid being placed at right angles to the contour.
- Make sure that all drainage channels taper out before entering the buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodable soils, install sediment traps at the end of the drainage channels tothe outside of the buffer zone.

Buffer zones play a major role in underpinning water quality.



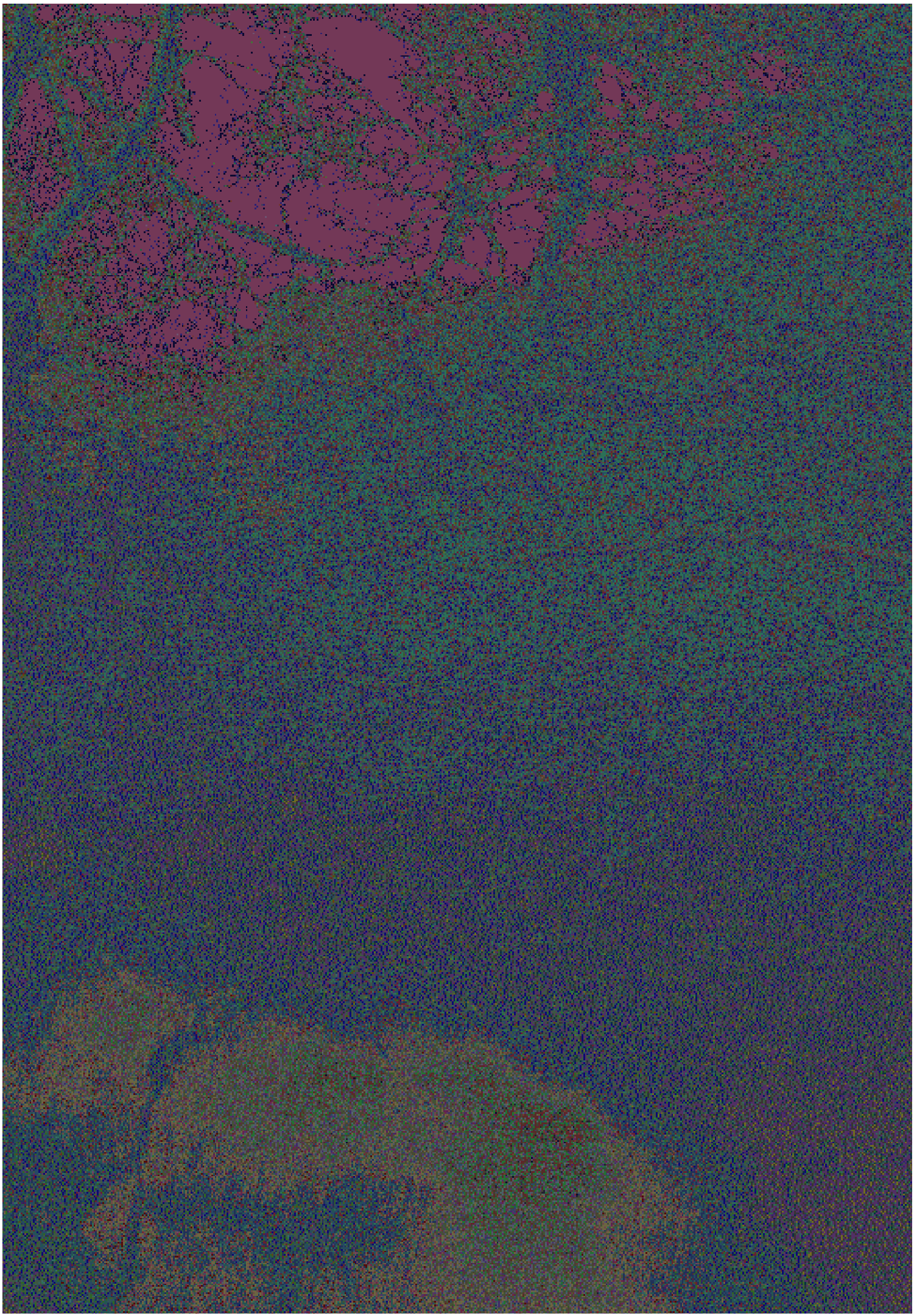
- Drains and sediment traps must be maintained throughout the rotation, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are controlled.
- Sediment traps should be sited outside the buffer zone and have no direct outflow into the aquatic zone. Their capacity can extend over the life of the forest or have limited storage. In the latter case, machine access is required to enable the accumulated sediment to be excavated. Sediment should be carefully disposed of away from all aquatic zones. Sediment traps must be clearly marked and securely fenced for safety.Where possible, sediment traps should be constructed on even ground and not onsloping ground.
- In areas particularly sensitive to erosion, it may be necessary to install double or triple sediment traps.

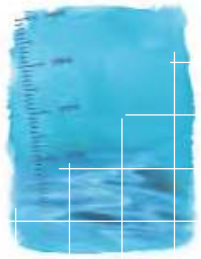
FERTILISER APPLICATION AND STORAGE

Complete all planting before fertiliser application takes place. Species selection together with site type and conditions determine fertiliser type and application rates. Phosphorus (P) is the main nutrient fertiliser applied, with nitrogen (N) and potassium (K) occasionally applied as remedial fertilisation. The following practices should be followed to minimise the risk of fertiliser run-off and transport to aquatic zones.

- Proposed fertiliser types and application rates should be included in the afforestation application.
- Fertiliser should not be applied within the buffer zone or within 20 m of an aquatic zone, whichever is greatest.
- Fertilisers should be prepared and securely stored under shelter on a dry, elevated site at least 50 m from the nearest aquatic zone.
- Granular fertiliser formulations should be used, with the exception of muriate of potash which is not available in granular form.

Care in the storage and application of fertilisers and chemicals will avoid risk to water quality and aquatic life.





Watercourses are a major component of the environment, and their protection is an essential element of sustainable forest management.

- Phosphate application rates on peat soils should be kept to a minimum in any single application.
- Apply fertiliser manually or by ground-based machine, wherever possible. Fertiliser must be applied by hand in the 20-50 m area adjacent to the aquatic zone.
- Do not, under any circumstances, discharge fertilisers into an aquatic zone, drain orsediment trap.
- Where later fertilisation is required to counteract nutrient deficiencies, aerial application using helicopter can be considered where branch growth and onsite vegetation prevent manual application. However, a 50 m wide corridor adjacent to aquatic zones must be left unfertilised. Never undertake aerial fertilisation during high winds.
- Do not apply fertiliser during or following prolonged rainfall or if heavy rain is forecast.
- Fertiliser should only be applied during the months of April to August, inclusive.
- Remove all empty fertiliser bags and other rubbish from the site during and after the operation, for environmentally-acceptable off-site disposal.

CHEMICALS, FUEL AND MACHINE OILS

The on-site use of chemicals (herbicides, pesticides and urea), fuel and machine oils (hydraulic, engine, gearbox, lubricant or cutting oils) should be kept to a minimum. Accidental spillage or leakage can be detrimental to aquatic flora and fauna and can impair water quality. Training and safety are of primary importance to avoid hazards and to ensure the correct use of herbicides and pesticides.

- Do not apply chemicals if heavy rainfall is forecast or during high winds.
- Do not apply chemicals within the buffer zone.
- Refer to *Guidelines for the Use of Herbicides in Forestry*[1].
- Prepare and securely store all chemicals, fuel and machine oils under shelter on a dry, elevated site at least 50 m from the nearest aquatic zone.
- Cleaning of equipment should not take place within 50 m of an aquatic zone. All wash waters must be disposed of carefully.
- Unused diluted herbicides must not be spread within the buffer zone.
- Remove all containers from the site and dispose of carefully.
- All maintenance and refuelling operations and machine repairs (if required and practical) should be carried out at least 50 m from the nearest aquatic zone on a dry, elevated site.
- Spent oil must be collected and retained for correct off-site disposal.
- Where possible, biodegradable oil should be used as a substitute for mineral oil.
- Do not, under any circumstances, discharge chemicals, fuel or machine oils into an aquatic zone.
- The relevant Local Authority must be informed promptly of any accidental chemical, fuel or machine oil spillage which threatens an aquatic zone.

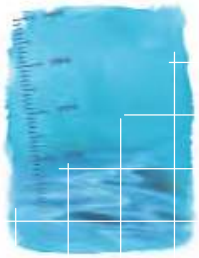
ROADS

Each stage of forest road construction has implications for water quality. Before road construction begins, the road network within the forest must be planned and outlined in the plan required by the FOREST HARVESTING AND THE ENVIRONMENT GUIDELINES. Key actions required for this plan include:

- inspection of the area and the preparation of a map containing a broad terrain classification and details of all aquatic zones;
- determination of the appropriate density and spacing of the road network, based on the size and shape of the area, machinery employed and the nature of the terrain;
- delineation of aquatic zones and associated buffer zones.

- The FOREST HARVESTING AND THE ENVIRONMENT GUIDELINES require a road and track network scheme as part of the harvesting plan. This plan should include a terrain classification which indicates all aquatic zones and buffer zones together with sources of public and private water supplies, access points, landings and, if

[1]Ward, D. (ed.) 1998. Guidelines for the Use of Herbicides in Forestry. 2nd Edition. Coillte, Forest Protection, Newtownmountkennedy, Co. Wicklow.



necessary, proposed stream crossings. The map will identify the site location and provide directions and distances to the nearest national road.

- Roads should be located at least 50 m from an aquatic zone, where possible. Road layout should aim to direct off-road traffic away from streams. If there is no other option but to cross an aquatic zone, construct an appropriate bridge or culvert.
- Where possible, roads should follow the natural contours of the terrain.
- All ancillary drainage associated with road construction should be designed to divert water away from buffer zones and should not be allowed to discharge directly into aquatic zones. Sediment traps will be necessary. Roadside drains should not directly intercept run-off from higher ground. Cut-off drains should be constructed to a flat gradient at least 5 m back from the upper edge of the road formation, to avoid erosion.
- Carry out construction during dry weather, ideally from April to October.
- Cement must not be discharged into the aquatic zone.
- Do not remove gravel from an aquatic zone. Gravel may be removed from a buffer zone only after consultation with the Regional Fisheries Board and fishery owner. The opening of a new quarry requires planning permission.
- The maintenance of roadside drains and sediment traps is essential. Inspect periodically to ensure that they are free of debris and sediment, undertaking remedial action if necessary.

BRIDGES, CULVERTS AND FORDS

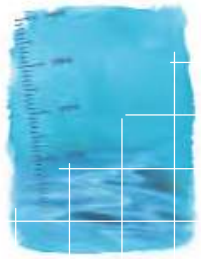
Aquatic zones may need to be crossed during forest operations. The construction of bridges and culverts, whether temporary or permanent, can cause soil and site disturbance, with subsequent soil erosion and the movement of sediment into the aquatic zone. The careful planning of these crossings is essential.

Where fish passage is important, e.g. spawning beds in the upper reaches of aquatic zones, bridge and culvert design should reflect this requirement. Fords are generally not appropriate, as their use can often result in the generation of considerable sediment and the restriction of fish passage.

Bridges are the most desirable structure as they allow unimpeded fish movement. Bridges also ensure that machines parts (and associated fuel and oils) are kept out of the aquatic zone.

Culverts can be open topped or embedded. In fish spawning aquatic zones, embedded culverts are favoured as they provide unrestricted passage for all fish sizes and retain the natural streambed and sediment. Embedded culverts are usually large diameter (greater than 1 m) culverts which aim to maintain the natural channel width, gradient and conditions.

- All water crossings should be marked and indicated in the road network plan.
- Minimise the number of crossings over a given aquatic zone. All crossings should be at right angles to the flow.
- Consult with the Regional Fisheries Board at the design stage of any crossing in a fish-bearing or potentially fish-bearing aquatic zone.
- Bridges should be constructed with minimum disturbance to the bank, channel or adjacent buffer zone.
- Do not build culverts or bridges over an aquatic zone in a way that would hinder fish passage.
- Use local stone for bridge kerbs and end treatments for culverts.
- Do not discharge cement into the aquatic zone. Uncured concrete can kill fish by altering water pH. When cast-in-place concrete is required, all work must be done in dry weather conditions and isolated from any water which may enter the aquatic zone, for a period sufficient to cure the concrete.
- Culvert ends should be tapered to match the embankment slope.
- Specifications for culvert design and size should reflect:
  - whether or not the aquatic zone is a spawning or fisheries watercourse;
  - the type of terrain;
  - the necessity to carry the ‘normal’ flow and to accommodate flash floods;
  - the requirement to embed culverts.



- Embedded culverts should be buried to a depth of 0.3 m or 20% of their height (whichever is greatest) below the streambed. The original bed material as well as boulder sized stones should then be placed in the culvert.
- Culverts should be maintained, removing debris which can cause clogging and eventual culvert failure.

HARVESTING

Harvesting (thinning and final harvesting) and associated activities such as extraction have the potential to adversely impact on water quality, through increased erosion rates, sedimentation and nutrient losses. These impacts can be mitigated through good planning and the implementation of the FORESTRY AND WATER QUALITY GUIDELINES. The factors that affect water quality at harvesting can be summarised as follows:

- soil type, sensitivity and slope;
- number and type of machine passes.

- All harvesting and extraction operations must be carried out in accordance with the FOREST HARVESTING AND THE ENVIRONMENT GUIDELINES. Consult with the Regional Fisheries Board and Dúchas before commencing harvesting operations in areas of importance to fisheries and wildlife.
- Prepare a forest harvesting plan as detailed in the FOREST HARVESTING AND THE ENVIRONMENT GUIDELINES, which will include:
  - a broad terrain classification detailing: the location of areas of potentially high erosion risk; the location of all aquatic zones and buffer zones; the identification of

A brash mat which has been used several times and now in need of renewal.

public/private water supplies; and existing and planned road network, landings, turntables, bridges and extraction routes;
- the identification of appropriate machines to minimise adverse impacts;
- the location of machine maintenance areas and storage areas for chemicals (herbicides, pesticides, urea), fuel and machine oils.

- Construct sediment traps prior to harvesting and maintain these traps throughout operations.
- Plan felling operations with the shortest possible extraction routes, designed to be compatible with the avoidance of sedimentation.
- Always fell trees away from the aquatic zone.
- Avoid machine extraction within the buffer zone.
- On sites where risk of erosion is high, brash mats must always be used to avoid soil damage, erosion and sedimentation. Brash mat renewal should take place when they become heavily used and worn. Provision should be made for brash mats along all off-road routes, to protect the soil from compaction and rutting.
- Where there is risk of severe erosion occurring, extraction should be suspended during periods of high rainfall. Cable extraction may be an alternative in these situations.
- Do not refuel or maintain machinery within 50 m of an aquatic zone.

	Classification	***Chlorophyll (mg/m³) Annual max.***	***Total P (µg P/litre) Annual mean***	***Phosphate (MRP) (µg P/litre) Annual median***
Lakes	Oligotrophic	Ž2.5 and <8	>5 and •10	
	Mesotrophic	Ž8 and <25	>10 and •20	
Rivers	Q5			15
	Q4-5 Q4			20
				30

S.I. 258 of 1998

- Do not pile logs within the buffer zone or on very low lying ground prone to water-logging. Select a dry area away from the aquatic zone.
- Do not allow branches, logs or debris to build up in aquatic zones. All such material should be removed when harvesting operations have been completed, but avoid removing natural debris deflectors.

APPENDIX
EXAMPLES OF WATER QUALITY INDICATORS

Catchment waters may be used for some or all of the following purposes: salmonid water; drinking water; or bathing water. Statutory Instruments are in place which set standards for each of these categories. The following water quality parameters may be measured by the Local Authority, depending on the intended use and the respective Statutory Instruments. The relevant Statutory Instrument for each indicator is quoted in brackets. Indicators marked with (*), although not mentioned in Statutory Instruments, denote the lowest standard *which current knowledge suggests* will not indicate damage to water quality.

The objective at all times is to ensure that forest operations do not cause a deterioration in water quality.

Eutrophication

Biological parameters

- *Phytoplankton/Cyanobacteria (lakes):* Critical limit: Composition and abundance consistent with those in unpolluted lakes(*).
- *Macrophytes (lakes and rivers):* Critical limit: Composition and abundance consistent with those in unpolluted lakes(*).
- *Macroinvertebrates (rivers):* Maintenance of existing EPA Quality (Q) rating, where it is Ž Q4 (Statutory Instrument 258 of 1998).
- *Fish:* Critical limit: Presence of 0+ salmonids(*).

Physico-chemical parameters

"The existing trophic status for any part of a lake shall be maintained" (S.I. 258 of 1998).

- *Nitrate (NO_3):* Critical limit: 11.3 mg N/litre (S.I. 81 of 1988).
- *Un-ionised ammonia:* Critical limit: <0.02 mg NH_3/litre (S.I. 293 of 1988).
- *Dissolved oxygen:* Critical limit: 80-120% saturation(*).

Acidification

Biological parameters

Production: Magner Communications

The Forest Service gratefully acknowledges the contribution of Dr Miriam G. Ryan, COFORD, National Council for Forest Research and Development, to the development of the FORESTRY AND WATER QUALITY GUIDELINES, made through the preparation of a commissioned report. Copies of this report can be obtained from the Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2.

Photos: All photos Forest Service, except COFORD, National Council for Forest Research and Development (pages 2 and 6) and T. Cummins, Forest Ecosystem Research Group, UCD (page 11).

Published by the Forest Service, Department of the Marine and Natural Resources
July, 2000

- *Macrophytes (lakes):* Critical limit: Presence of *Lobelia* and *Isoetes* spp.(*).
- *Macroinvertebrates:* Critical limit: Presence of several specimens of any or all of the following: *Baetis rhodani*, *Gammarus* spp., *Caenis* spp., *Centroptilum luteolum* and *Cloeon* spp. (Raddum,1999).
- *Fish:* Critical limit: Presence of 0+ salmonids(*).

Physico-chemical parameters

- *Total aluminium:* Critical limit: 0.2 mg Al/litre (S.I. 81 of 1988).
- *Labile monomeric aluminium:* Critical limit: 0.04 mg Al/litre (S.I. 293 of 1988).
- *pH:* pH Ž 6 and • 9 (S.I. 293 of 1988). pH between 5.5 and 8.5 (S.I. 294 of 1989).

Sedimentation

Parameter

- *Suspended solids:* Critical limit: <25 mg/litre (S.I. 293 of 1988).

Hydrology

Hydrological parameter

- *Flow:* Critical limit: Maintenance of base flow level throughout the catchment(*).

S.I. 81 of 1988 European Community (Quality of Water Intended for Human Consumption) Regulations 1988.
S.I. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988 (Note: List of relevant water bodies is included).
S.I 294 of 1989 European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989.
S.I. 258 of 1998 Local Government (Water Pollution) Act 1977 (Water Quality Standard for Phosphorus) Regulations 1998.
Raddum, G.G. 1999. Large scale monitoring of invertebrates: Aims, possibilities and acidification indexes. *In* Proceedings of Workshop on Biological Assessment and Monitoring, Evaluation and Models. Raddum, G.G., Rosseland, B.O. and Bowman, J. (eds.) Zakopane, Poland. ICPWaters Report 50/99, NIVA, Oslo.

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 4

IFI Consultation Response

Ms. Veronica Brennan,
Forest Service,
Approvals Section,
Department of Agriculture, Food & the Marine,
Johnstown Castle Estate,
Co. Wexford.

October 5th, 2018

Proposed Plantation at Moneygorm, Co. Cork
CN82229

Dear Ms Brennan,

Inland Fisheries Ireland (IFI) has no objections to the proposed development providing forestry establishment is in compliance with the Forestry and Water Quality Guidelines for sensitive waters. There is a need however to ensure that any drainage works are carried-out so as to prevent erosion and deposition of solids in receiving waters. Particular attention must be given to the length, fall and area catered for by any single drain as well as to the provision of appropriately positioned and size of cut-off drains and settlement ponds/traps.

To prevent losses of nutrients to waters, aerial fertilisation should not be carried out in areas that are as a result of ground preparation and planting liable to result in the release of nutrients to receiving waters.

IFI requests, where there is no existing bankside broadleaf cover, that broadleaves be planted (in the staggered pattern as shown on the attached figure) along those parts of the site bounded by watercourses. Such planting will greatly increase the diversity of insect life available as food for fish and provide cover for fish.

Yours sincerely,

A.T. Gillespie

Andrew Gillespie,
Senior Fisheries Environmental Officer.

IIE Maigh Chromtha, Teach Sunnyside, Maigh Chromtha, Co. Chorcaí, P12 X602
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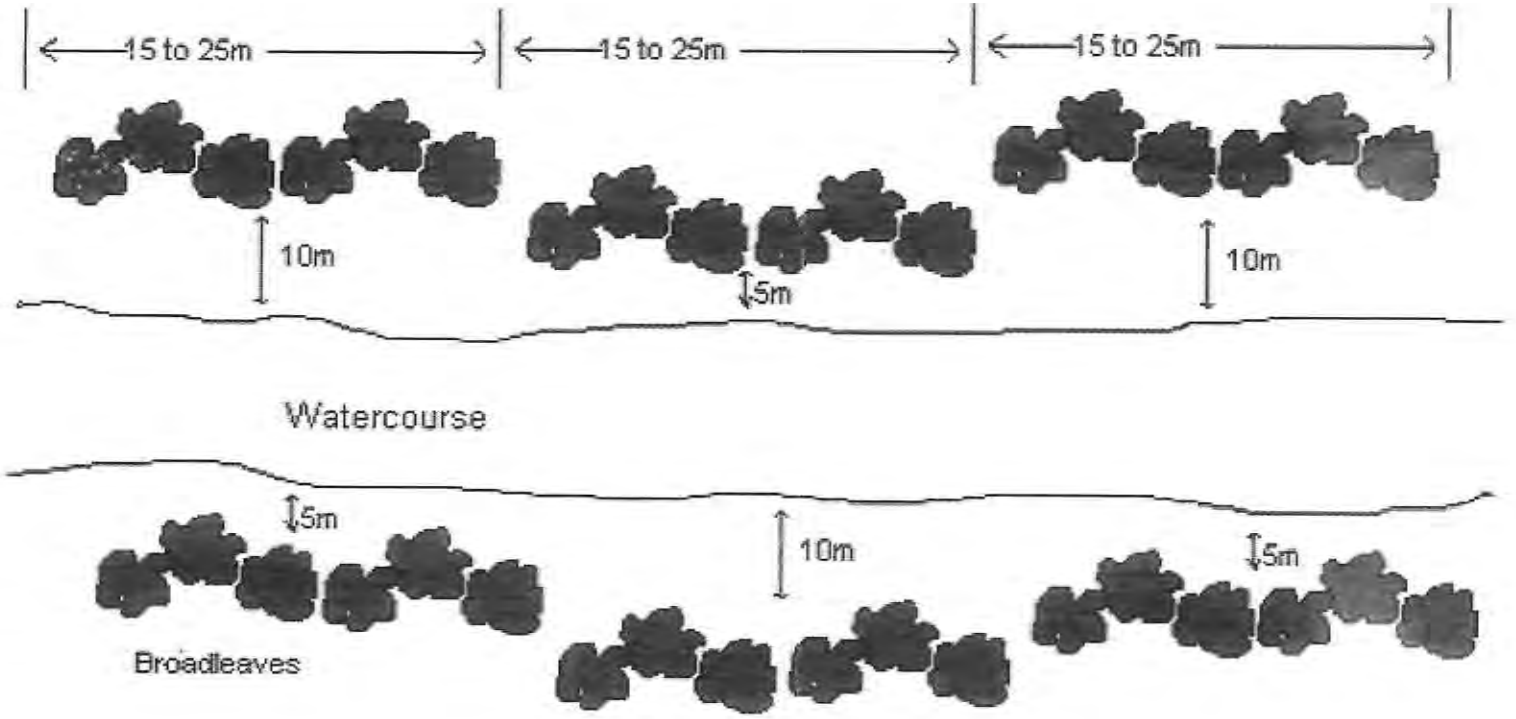

Ideal Planting Regime - Diagram not to scale.

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 5

NPWS Site Synopses for the Natura 2000 Sites within 15 km of the Proposed Development

SITE SYNOPSIS

Site Name: Blackwater River (Cork/Waterford) SAC

Site Code: 002170

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. In times of heavy rainfall the levels can fluctuate widely by more than 12 feet on the gauge at Careysville. The peaty nature of the terrain in the upper reaches and of some of the tributaries gives the water a pronounced dark colour. The site consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, the tidal stretches as far as Youghal Harbour and many tributaries, the larger of which include the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun. The portions of the Blackwater and its tributaries that fall within this SAC flow through the counties of Kerry, Cork, Limerick, Tipperary and Waterford. Nearby towns include Rathmore, Millstreet, Kanturk, Banteer, Mallow, Buttevant, Doneraile, Castletownroche, Fermoy, Ballyduff, Rathcormac, Tallow, Lismore, Cappoquin and Youghal.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1130] Estuaries
[1140] Tidal Mudflats and Sandflats
[1220] Perennial Vegetation of Stony Banks
[1310] *Salicornia* Mud
[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[3260] Floating River Vegetation
[91A0] Old Oak Woodlands
[91E0] Alluvial Forests*
[1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
[1092] White-clawed Crayfish (*Austropotamobius pallipes*)
[1095] Sea Lamprey (*Petromyzon marinus*)
[1096] Brook Lamprey (*Lampetra planeri*)
[1099] River Lamprey (*Lampetra fluviatilis*)
[1103] Twaite Shad (*Alosa fallax*)
[1106] Atlantic Salmon (*Salmo salar*)
[1355] Otter (*Lutra lutra*)
[1421] Killarney Fern (*Trichomanes speciosum*)

The Blackwater rises in boggy land in east Kerry, where Namurian grits and shales build the low heather-covered plateaux. Near Kanturk the plateaux enclose a basin of productive Coal Measures. On leaving the Namurian rocks the Blackwater turns eastwards along the northern slopes of the Boggeragh Mountains before entering the narrow limestone strike vale at Mallow. The valley deepens as first the Nagles Mountains and then the Knockmealdowns impinge upon it. Interesting geological features along this stretch of the Blackwater Valley include limestone cliffs and caves near the villages and small towns of Killavullen and Ballyhooly; the Killavullen caves contain fossil material from the end of the glacial period. The associated basic soils in this area support the growth of plant communities which are rare in Cork because in general the county's rocks are acidic. At Cappoquin the river suddenly turns south and cuts through high ridges of Old Red Sandstone. The Araglin valley is predominantly underlain by sandstone, with limestone occurring in the lower reaches near Fermoy.

Wet woodlands are found where river embankments have broken down and channel edges are subject to daily inundation. This is particularly evident in the steep-sided valley of the River Bride, between Cappoquin and Youghal. The river side of the embankments was often used for willow growing in the past (most recently at Cappoquin) so that the channel is lined by narrow woods of White and Almond-leaved Willow (*Salix alba* and *S. triandra*), with isolated Crack Willow (*S. fragilis*) and Osier (*S. viminalis*). Rusty Willow (*S. cinerea* subsp. *oleifolia*) spreads naturally into the sites and occasionally, as at Villierstown on the Blackwater and Sapperton on the Bride, forms woods with a distinctive mix of woodland and marsh plants, including Gypsywort (*Lycopus europaeus*), Guelder-rose (*Viburnum opulus*), Bittersweet (*Solanum dulcamara*) and various mosses and algae. These wet woodlands form one of the most extensive tracts of the wet woodland habitat in the country.

A small stand of Yew (*Taxus baccata*) woodland occurs within the site. This is on a limestone ridge at Dromana, near Villierstown. While there are some patches of the wood with a canopy of Yew and some very old trees, the quality is generally poor due to the dominance of non-native and invasive species such as Sycamore (*Acer pseudoplatanus*), Beech (*Fagus sylvatica*) and Douglas Fir (*Pseudotsuga menzsisii*). However, it does have the potential to develop into a Yew dominated stand in the long term and the site should continue to be monitored.

Marshes and reedbeds cover most of the flat areas beside the rivers and often occur in mosaic with the wet woodland. Common Reed (*Phragmites australis*) is ubiquitous and is harvested for thatching. There is also much Marsh-marigold (*Caltha palustris*) and, at the edges of the reeds, the Greater and Lesser Pond-sedge (*Carex riparia* and *C. acutiformis*). Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Reed Canary-grass (*Phalaris arundinacea*), Meadowsweet (*Filipendula ulmaria*), Common Nettle (*Urtica dioica*), Purple Loosestrife (*Lythrum salicaria*), Common Valerian (*Valeriana officinalis*), Water Mint (*Mentha aquatica*) and Water Forget-me-not (*Myosotis scorpioides*) are all also found.

At Banteer there are a number of hollows in the sediments of the floodplain where subsidence and subterranean drainage have created isolated wetlands, sunk below the level of the surrounding fields. The water rises and falls in these holes depending on the water table and several different communities have developed on the acidic or neutral sediments. Many of the ponds are ringed with Rusty Willow, rooted in the mineral soils but sometimes collapsed into the water. Beneath the densest stands are woodland herbs like Yellow Pimpernel (*Lysimachia nemorum*), with locally abundant Common Water-starwort (*Callitriche stagnalis*) and Marsh Ragwort (*Senecio aquaticus*). One of the depressions has Silver Birch (*Betula pendula*), Ash (*Fraxinus excelsior*), Crab Apple (*Malus sylvestris*) and a little Pedunculate Oak (*Quercus robur*) in addition to the willows.

Floating river vegetation is found along much of the freshwater stretches within the site. The species list is quite extensive, with species such as water-crowfoots, including Pond Water-crowfoot (*Ranunculus peltatus*), Canadian Pondweed (*Elodea canadensis*), pondweed species, including Broad-leaved Pondweed (*Potamogeton natans*), water-milfoil species (*Myriophyllum* spp.), Common Club-rush (*Scirpus lacustris*), water-starwort species (*Callitriche* spp.), Lesser Water-parsnip (*Berula erecta*) particularly on the Awbeg, Water-cress (*Nasturtium officinale*), Hemlock Water-dropwort, Fine-leaved Water-dropwort (*O. aquatica*), Common Duckweed (*Lemna minor*), Yellow Water-lily (*Nuphar lutea*), Unbranched Bur-reed (*Sparganium emersum*) and the moss *Fontinalis antipyretica* all occurring.

The grasslands adjacent to the rivers of the site are generally heavily improved, although liable to flooding in many places. However, fields of more species-rich wet grassland with species such as Yellow Iris (*Iris pseudacorus*), Meadowsweet, Meadow Buttercup (*Ranunculus acris*) and rushes (*Juncus* spp.) occur occasionally. Extensive fields of wet grassland also occur at Annagh Bog on the Awbeg. These fields are dominated by Tufted Hair-grass (*Deschampsia cespitosa*) and rushes.

The Blackwater Valley has a number of dry woodlands; these have mostly been managed by the estates in which they occur, frequently with the introduction of Beech and a few conifers, and sometimes of the invasive species Rhododendron (*Rhododendron ponticum*) and Cherry Laurel (*Prunus laurocerasus*). Oak woodland is well developed on sandstone about Ballinatray, with the acid oak woodland community of Holly (*Ilex aquifolium*), Bilberry (*Vaccinium myrtillus*), Great Wood-rush (*Luzula sylvatica*) and the ferns *Dryopteris affinis* and *D. aemula* occurring in one place. Irish Spurge (*Euphorbia hyberna*) continues eastwards on acid rocks from its headquarters to the west, but there are also many plants of richer soils, for example Wood Violet (*Viola reichenbachiana*), Goldilocks Buttercup (*Ranunculus auricomus*), Broad-leaved Helleborine (*Epipactis helleborine*) and Red Campion (*Silene dioica*). Oak woodland is also found in Rincrew, Carrigane, Glendine, Newport and Dromana. The spread of Rhododendron is locally a problem, as is over-grazing. A few limestone rocks stand over the river in places showing traces of a less acidic woodland type with Ash, False Brome (*Brachypodium sylvaticum*) and Early-purple Orchid (*Orchis mascula*).

In the vicinity of Lismore, two deep valleys cut in Old Red Sandstone join to form the Owenashad River before flowing into the Blackwater at Lismore. These valleys retain something close to their original cover of oak with Downy Birch (*Betula pubescens*), Holly and Hazel (*Corylus avellana*) also occurring. There has been much planting of Beech (as well as some of coniferous species) among the oak on the shallower slopes and here both Rhododendron and Cherry Laurel have invaded the woodland.

The oak wood community in the Lismore and Glenmore valleys is of the classic upland type, in which some Rowan (*Sorbus aucuparia*) and Downy Birch occur. Honeysuckle (*Lonicera periclymenum*) and Ivy (*Hedera helix*) cover many of the trees while Great Wood-rush, Bluebell (*Hyacinthoides non-scripta*), Wood-sorrel (*Oxalis acetosella*) and, locally, Bilberry dominate the ground flora. Ferns present on the site include Hard Fern (*Blechnum spicant*), Male Fern (*Dryopteris filix-mas*), the buckler-ferns *D. dilatata* and *D. aemula*, and Lady Fern (*Athyrium felix-femina*). There are many mosses present and large species such as *Rhytidiadelphus* spp., *Polytrichum formosum, Mnium hornum* and *Dicranum* spp. are noticeable. The lichen flora is important and includes 'old forest' species which imply a continuity of woodland here since ancient times. Tree Lungwort (*Lobaria* spp.) is the most conspicuous and is widespread.

The Araglin valley consists predominantly of broadleaved woodland. Oak and Beech are joined by Hazel, Wild Cherry (*Prunus avium*) and Goat Willow (*Salix caprea*). The ground flora is relatively rich, with Pignut (*Conopodium majus*), Ramsons (*Allium ursinum*), Garlic Mustard (*Alliaria petiolata*) and Wild Strawberry (*Fragaria vesca*). The presence of Ivy Broomrape (*Orobanche hederae*), a local species within Ireland, suggests that the woodland, along with its attendant Ivy, is long established.

Along the lower reaches of the Awbeg River, the valley sides are generally cloaked with mixed deciduous woodland of estate origin. The dominant species is Beech, although a range of other species are also present, e.g. Sycamore, Ash and Horse-chestnut (*Aesculus hippocastanum*). In places the alien invasive species Cherry Laurel dominates the understorey. Parts of the woodlands are more semi-natural in composition, being dominated by Ash, with Hawthorn (*Crataegus monogyna*) and Spindle (*Euonymus europaea*) also present. However, the most natural areas of woodland appear to be the wet areas dominated by Alder and willows (*Salix* spp.). The ground flora of the dry woodland areas features species such as Pignut, Wood Avens (*Geum urbanum*), Ivy and Soft Shield-fern (*Polystichum setiferum*), while the ground flora of the wet woodland areas contains characteristic species such as Remote Sedge (*Carex remota*) and Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*).

In places along the upper Bride, scrubby, semi-natural deciduous woodland of willow, oak and Rowan occurs, with abundant Great Wood-rush in the ground flora.

The Bunaglanna River passes down a very steep valley, flowing in a north-south direction to meet the Bride River. It flows through blanket bog to heath and then scattered woodland. The higher levels of moisture here enable a vigorous moss and

fern community to flourish, along with a well-developed epiphyte community on the tree trunks and branches.

At Banteer a type of wetland occurs near the railway line which offers a complete contrast to the others. Old turf banks are colonised by Royal Fern (*Osmunda regalis*) and Eared Willow (*Salix aurita*), and between them there is a sheet of Bottle Sedge (*Carex rostrata*), Marsh Cinquefoil (*Potentilla palustris*), Bogbean (*Menyanthes trifoliata*), Marsh St. John's-wort (*Hypericum elodes*) and the mosses *Sphagnum auriculatum* and *Aulacomnium palustre*. The cover is a scraw (i.e. floating vegetation) with characteristic species like Marsh Willowherb (*Epilobium palustre*) and Early Marsh-orchid (*Dactylorhiza incarnata*).

The soil high up the Lismore valleys and in rocky places is poor in nutrients but it becomes richer where streams enter and also along the valley bottoms. In such sites Wood Speedwell (*Veronica montana*), Wood Anemone (*Anemone nemorosa*), Enchanter's-nightshade (*Circaea lutetiana*), Barren Strawberry (*Potentilla sterilis*) and shield-fern (*Polystichum* sp.) occur. There is some Ramsons, Three-nerved Sandwort (*Moehringia trinervia*) and Early-purple Orchid (*Orchis mascula*) locally, with Opposite-leaved Golden-saxifrage, Meadowsweet and Bugle (*Ajuga reptans*) in wet places. A stand of Hazel woodland at the base of the Glenakeeffe valley shows this community well.

The area has been subject to much tree felling in the recent past and re-sprouting stumps have given rise to areas of bushy Hazel, Holly, Rusty Willow and Downy Birch. The ground in the clearings is heathy with Heather (*Calluna vulgaris*), Slender St John's-wort (*Hypericum pulchrum*) and the occasional Broom (*Cytisus scoparius*) occurring.

The estuary and the habitats within and associated with it form a large component of the site. Very extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. The main expanses occur at the southern end of the site, with the best examples at Kinsalebeg in Co. Waterford, and between Youghal and the main bridge north of it across the river in Co. Cork. Other areas occur along the tributaries of the Licky in east Co. Waterford, and Glendine, Newport, Bride and Killahaly Rivers in Waterford west of the Blackwater. There are also large tracts along the Tourig River in Co. Cork. There are narrow bands of intertidal flats along the main river as far north as Camphire Island. Patches of green filamentous algae (*Ulva* sp. and *Enteromorpha* sp.) occur in places, while fucoid algae are common on the more stony flats, even as high upstream as Glenassy or Coneen.

The area of saltmarsh within the site is small. The best examples occur at the mouths of the tributaries and in the townlands of Foxhole and Blackbog. Those found are generally characteristic of Atlantic salt meadows. The species list at Foxhole consists of Common Saltmarsh-grass (*Puccinellia maritima*), small amounts of Greater Sea-spurrey (*Spergularia media*), glasswort (*Salicornia* sp.), Sea Arrowgrass (*Triglochin maritima*), Annual Sea-blite (*Suaeda maritima*) and Sea Purslane (*Halimione*

portulacoides) - the latter a very recent coloniser. Some Sea Aster (*Aster tripolium*) occurs, generally with Creeping Bent (*Agrostis stolonifera*). Sea Couch (*Elymus pycnanthus*) and small isolated clumps of Sea Club-rush (*Scirpus maritimus*) are also seen. On the Tourig River additional saltmarsh species found include sea-lavenders (*Limoniun* spp.), Thrift (*Armeria maritima*), Red Fescue (*Festuca rubra*), Common Scurvygrass (*Cochlearia officinalis*) and Sea Plantain (*Plantago maritima*). Oraches (*Atriplex* spp.) are found on channel edges. Species such as Saltmarsh Rush (*Juncus gerardi*) and Sea Rush (*J. maritimus*) are found in places in this site also, and are indicative of Mediterranean salt meadows. Areas of *Salicornia* mud are found at the eastern side of the townland of Foxbole above Youghal, at Blackbog, along the Tourig and Kinsalebeg esturaies.

The shingle spit at Ferrypoint supports a good example of perennial vegetation of stony banks. The spit is composed of small stones and cobbles and has a well developed and diverse flora. At the lowest part, Sea Beet (*Beta vulgaris* subsp. *maritima*), Curled Dock (*Rumex crispus*) and Yellow Horned-poppy (*Glaucium flavum*) occur, while at a slightly higher level Sea Mayweed (*Matricaria maritima*), Cleavers (*Galium aparine*), Rock Samphire (*Crithmum maritimum*), Sea Sandwort (*Honkenya peploides*), Spear-leaved Orache (*Atriplex prostrata*) and Babington's Orache (*A. glabriuscula*). Other species present include Sea Rocket (*Cakile maritima*), Herb-Robert (*Geranium robertianum*), Red Fescue and Kidney Vetch (*Anthyllis vulneraria*). The top of the spit is more vegetated and supports lichens and bryophytes, including *Tortula ruraliformis* and *Rhytidiadelphus squarrosus*.

The site supports several Red Data Book plant species, i.e. Starved Wood-sedge (*Carex depauperata*), Killarney Fern (*Trichomanes speciosum*), Pennyroyal (*Mentha pulegium*), Bird's-nest Orchid (*Neottia nidus-avis*), Golden Dock (*Rumex maritimus*) and Bird Cherry (*Prunus padus*). The first three of these are also protected under the Flora (Protection) Order, 2015, while the Killarney Fern is also listed on Annex II of the E.U. Habitats Directive. The following plants, relatively rare nationally, are also found within the site: Toothwort (*Lathraea squamaria*) - associated with woodlands on the Awbeg and Blackwater; Summer Snowflake (*Leucojum aestivum*) and Flowering Rush (*Butomus umbellatus*) on the Blackwater; Common Calamint (*Calamintha ascendens*), Red Campion, Sand Leek (*Allium scorodoprasum*) and Wood Club-rush (*Scirpus sylvaticus*) on the Awbeg.

The site is also important for the presence of several E.U. Habitats Directive Annex II animal species, including Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*L. fluviatilis*), Twaite Shad (*Alosa fallax fallax*), Freshwater Pearl Mussel (*Margaritifera margaritifera*), Otter (*Lutra lutra*) and Salmon (*Salmo salar*). The Awbeg supports a population of White-clawed Crayfish (*Austropotamobius pallipes*). This threatened species has been recorded from a number of locations and its remains are also frequently found in Otter spraints, particularly in the lower reaches of the river. The freshwater stretches of the Blackwater and Bride Rivers are designated salmonid rivers. The Blackwater is noted for its enormous run of salmon over the years. The river is characterised by significant pools, streams, glides, and generally, a good push of water coming through except in

very low water. Spring salmon fishing can be carried out as far upstream as Fermoy and is highly regarded especially at Careysville. The Bride, main Blackwater upstream of Fermoy, and some of the tributaries are more associated with grilse fishing.

The site supports many of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger and Irish Hare. The bat species Natterer's Bat, Daubenton's Bat, Whiskered Bat, Brown Long-eared Bat and Pipistrelle, can be seen feeding along the river, roosting under the old bridges and in old buildings.

Common Frog, a Red Data Book species that is also legally protected (Wildlife Act, 1976), occurs throughout the site. The rare bush cricket *Metrioptera roselii* (Order Orthoptera) has been recorded in the reed/willow vegetation of the river embankment on the Lower Blackwater River. The Swan Mussel (*Anodonta cygnea*), a scarce species nationally, occurs at a few sites along the freshwater stretches of the Blackwater.

Several bird species listed on Annex I of the E.U. Birds Directive are found on the site. Some use it as a staging area, others are vagrants, while others use it more regularly. Internationally important numbers of Whooper Swan (average peak 174, 1994/95-95/96) and nationally important numbers Bewick's Swan (average peak 5, 1996/97-2000/01) use the Blackwater Callows. Golden Plover occur in regionally important numbers on the Blackwater estuary (average peak 885, 1984/85-86/87) and on the River Bride (absolute maximum 2,141, 1994/95). Staging Terns visit the site annually, with >300 Sandwich Tern and >200 Arctic/Common Tern (average peak 1974-1994). The site also supports populations of the following: Red Throated Diver, Great Northern Diver, Barnacle Goose, Ruff, Wood Sandpiper and Greenland White-fronted Goose. Three breeding territories for Peregrine Falcon are known along the Blackwater Valley. This, the Awbeg and the Bride River are also thought to support at least 30 pairs of Kingfisher. Little Egret breed at the site (12 pairs in 1997, 19 pairs in 1998).

The site holds important numbers of wintering waterfowl. Both the Blackwater Callows and the Blackwater Estuary Special Protection Areas (SPAs) hold internationally important numbers of Black-tailed Godwit (average peak 847, 1994/95-95/96 on the callows, average peak 845, 1974/75-93/94 in the estuary). The Blackwater Callows also hold Wigeon (average peak 2,752), Teal (average peak 1,316), Mallard (average peak 427), Shoveler (average peak 28), Lapwing (average peak 880), Curlew (average peak 416) and Black-headed Gull (average peak 396) (counts from 1994/95-95/96). Numbers of birds using the Blackwater Estuary, given as the mean of the highest monthly maxima over 20 years (1974-94), are Shelduck (137 +10 breeding pairs), Wigeon (780), Teal (280), Mallard (320 + 10 breeding pairs), Goldeneye (11-97), Oystercatcher (340), Ringed Plover (50 + 4 breeding pairs), Grey Plover (36), Lapwing (1,680), Knot (150), Dunlin (2,293), Snipe (272), Black-tailed Godwit (845), Bar-tailed Godwit (130), Curlew (920), Redshank (340), Turnstone (130), Black-headed Gull (4,000) and Lesser Black-backed Gull (172). The greatest

numbers (75%) of the wintering waterfowl of the estuary are located in the Kinsalebeg area on the east of the estuary in Co. Waterford. The remainder are concentrated along the Tourig estuary on the Co. Cork side.

The river and river margins also support many Heron, non-breeding Cormorant and Mute Swan (average peak 53, 1994/95-95/96 in the Blackwater Callows). Heron occurs all along the Bride and Blackwater Rivers: 2 or 3 pairs at Dromana Rock; approximately 25 pairs in the woodland opposite; 8 pairs at Ardsallagh Wood and around 20 pairs at Rincrew Wood have been recorded. Some of these are quite large and significant heronries. Significant numbers of Cormorant are found north of the bridge at Youghal and there are some important roosts present at Ardsallagh Wood, downstream of Strancally Castle and at the mouth of the Newport River. Of note are the high numbers of wintering Pochard (e.g. 275 individuals in 1997) found at Ballyhay quarry on the Awbeg, the best site for Pochard in Co. Cork.

Other important species found within the site include Long-eared Owl, which occurs all along the Blackwater River, and Barn Owl, a Red Data Book species, which is found in some old buildings and in Castlehyde, west of Fermoy. Reed Warbler, a scarce breeding species in Ireland, was found for the first time in the site in 1998 at two locations. It is not known whether or not this species breeds on the site, although it breeds nearby to the south of Youghal. Dipper occurs on the rivers.

Land use at the site is mainly centred on agricultural activities. The banks of much of the site and the callows, which extend almost from Fermoy to Cappoquin, are dominated by improved grasslands which are drained and heavily fertilised. These areas are grazed and used for silage production. Slurry is spread over much of this area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the populations of E.U. Habitats Directive Annex II animal species within it. Many of the woodlands along the rivers belong to old estates and support many non-native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the Blackwater and its tributaries, and there are a number of angler associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. Other recreational activities such as boating, golfing and walking are also popular. Water skiing is carried out at Villierstown. Parts of Doneraile Park and Anne's Grove are included in the site: both areas are primarily managed for amenity purposes. There is some hunting of game birds and Mink within the site. Ballyhay quarry is still actively quarried for sand and gravel. Several industrial developments, which discharge into the river, border the site.

The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, dredging of the upper reaches of the Awbeg, over-grazing within the woodland areas, and invasion by non-native species, for example Rhododendron and Cherry Laurel.

Overall, the River Blackwater is of considerable conservation significance for the occurrence of good examples of habitats and populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive respectively. Furthermore it is of high conservation value for the populations of bird species that use it. Two Special Protection Areas, designated under the E.U. Birds Directive, are also located within the site - Blackwater Callows and Blackwater Estuary. Additionally, the importance of the site is enhanced by the presence of a suite of uncommon plant species.

SITE SYNOPSIS

SITE NAME: BLACKWATER CALLOWS SPA

SITE CODE: 004094

The Blackwater Callows SPA comprises the stretch of the River Blackwater that runs in a west to east direction between Fermoy and Lismore in Counties Cork and Waterford, a distance of almost 25 km. The site includes the river channel and strips of seasonally-flooded grassland within the flood plain. Sandstone ridges, which run parallel to the river, confine the area of flooding to a relatively narrow corridor.

The river channel has a well-developed aquatic plant community, which includes such species as Pond Water-crowfoot (*Ranunculus peltatus*), Canadian Pondweed (*Elodea canadensis*) and a variety of pondweeds (*Potamogeton* spp.), water-milfoils (*Myriophyllum* spp.) and water-starworts (*Callitriche* spp.).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Teal and Black-tailed Godwit. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is of high ornithological interest on account of its wintering waterfowl populations. Whooper Swan occurs in numbers of international importance (212) - all figures are mean peaks for the five winters 1995/96 to 1999/2000. Bewick's Swan were regularly recorded at the site up to the mid-1990s; however, in the winters of 1997/98 and 1998/99 only four and two individuals respectively were recorded, and the species is no longer considered to be a regular visitor. This decline is in line with a national decrease and a marked contraction in range. The site supports nationally important populations of Wigeon (2,313), Teal (898) and Black-tailed Godwit (251). Other wintering species that occur include Mallard (398) Shoveler (26), Lapwing (191), Curlew (457) and Black-headed Gull (311).

Little Egret uses the site throughout the year as there is a nearby breeding colony downstream. The river system provides an important feeding area for these birds.

The Blackwater Callows SPA is of importance for its populations of wintering waterfowl, including an internationally important population of Whooper Swan and nationally important populations of Wigeon, Teal and Black-tailed Godwit. The presence of Whooper Swan, as well as Little Egret, is of particular note as these species are listed on Annex I of the E.U. Birds Directive. Part of the Blackwater Callows SPA is a Wildfowl Sanctuary.

31.10.2014

SITE SYNOPSIS

Site Name: Vale of Clara (Rathdrum Wood) SAC

Site Code: 000733

The Vale of Clara woodland is situated mostly on the east side of the Avonmore River, immediately north of Rathdrum in Co. Wicklow. It lies between 107 and 244 m above sea level, and forms an integral part of one of the most scenic valleys in Wicklow. The woodland is a remnant of the once extensive forests of east Wicklow, which may have occupied this site since the end of the last Ice Age. Unfortunately, the hardwoods have been replaced, or underplanted with conifers, since the 1940s. However, most of the site is now within the Vale of Clara Nature Reserve, ensuring that the future of the existing hardwoods.

The woods in the Vale of Clara are a mosaic of relatively pure oak woodland (Sessile Oak, *Quercus petraea*), mixed woodland and commercial plantations, growing on an acidic orange-brown, sandy loam over a schist bedrock. A distinct mor humus, often several centimetres thick, overlies the mineral soil.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[91A0] Old Oak Woodlands

The oak woods are good examples of the species-poor Blechno-Quercetum vegetation community, and are best developed in the Cronybyrne area. The understorey is mostly of Holly (*Ilex aquifolium*), Hazel (*Corylus avellana*) and Rowan (*Sorbus aucuparia*). The ground flora includes Great Wood-rush (*Luzula sylvatica*), Bilberry (*Vaccinum myrtillus*), Ivy (*Hedera helix*), Honeysuckle (*Lonicera periclymenum*), Wood-sorrel (*Oxalis acetosella*) and violets (*Viola* spp.).

The areas of mixed woodland contain a variety of underplanted conifers, as well as Beech (*Fagus sylvatica*) and other introduced deciduous species. The planted conifer compartments contain a wide range of conifer species. An area of wet woodland is well developed near Ballyhad Bridge. The Avonmore River, which flows through the site, creates further habitat diversity.

Narrow-leaved Helleborine (*Cephalanthera longifolia*), a rare plant species which is listed in the Irish Red Data Book, has been recorded from the locality, as has the scarce, Ivy-leaved Bellflower (*Wahlenbergia hederacea*). Narrow-leaved Helleborine is protected under the Flora (Protection) Order, 1999. Several rare species of Myxomycete fungus have also been recorded from the site, namely *Cribraria rufa*,

Diderma floriforme, *Stemonitis smithii* (only known Irish site) and *Trichia verrucosa* (in its only known Republic of Ireland site).

The woodland bird community includes the Jay, Long-eared Owl, Treecreeper, Woodcock and Blackcap. The Wood Warbler and Crossbill have also been recorded, while the Dipper and Grey Wagtail occur on the Avonmore River.

The Holly Blue (*Celastrina argiolus*) butterfly has been seen within the woods.

This site is a good example of what remains of the once extensive oak forests of east Wicklow, and is representative of the relatively dry, acid oak woods of eastern Ireland. The woodlands are of considerable conservation significance as they conform to a type listed on Annex I of the E.U. Habitats Directive. The historical record of land use within the woods adds to the interest of the site, as does the occurrence of a number of rare and scarce species.

SITE SYNOPSIS

SITE NAME: WICKLOW MOUNTAINS SPA

SITE CODE: 004040

This is an extensive upland site, comprising a substantial part of the Wicklow Mountains. Most of the site is in Co. Wicklow, but a small area lies in Co. Dublin. The underlying geology of the site is mainly of Leinster granites, flanked by Ordovician schists, mudstones and volcanics. The area was subject to glaciation and features fine examples of glacial lakes, deep valleys and moraines. Most of site is over 300 m, with much ground being over 600 m; the highest peak is Lugnaquillia (925 m). The substrate over much of site is peat, with poor mineral soil occurring on the slopes and lower ground. Exposed rock and scree are features of the site. The predominant habitats present are blanket bog, heaths and upland grassland.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Merlin and Peregrine.

A series of surveys of the Wicklow Mountains SPA indicates that up to 9 pairs of Merlin breed within the site in any one year. Traditionally a ground-nesting species, Merlin in the Wicklow Mountains are usually found nesting in old crows nests in conifer plantations. The open peatlands provide excellent foraging habitat for Merlin with small birds such as Meadow Pipit being their main prey. The cliffs and crags within the site also provide ideal breeding locations for Peregrine (20 pairs in 2002). Other birds of the open peatlands and scree slopes that have been recorded within the site include Ring Ouzel and Red Grouse.

The Wicklow Mountains SPA is of high ornithological importance as it supports nationally important populations of Merlin and Peregrine, both species that are listed on Annex I of the E.U. Birds Directive. Part of Wicklow Mountains SPA is a Statutory Nature Reserve.

7.7.2014

SITE SYNOPSIS

Site Name: Wicklow Mountains SAC

Site Code: 002122

Wicklow Mountains SAC is a complex of upland areas in Counties Wicklow and Dublin, flanked by the Blessington reservoir to the west and Vartry reservoir in the east, Cruagh Mountain in the north and Lybagh Mountain in the south. Most of the site is over 300 m, with much ground over 600 m. The highest peak is 925 m at Lugnaquilla. The Wicklow uplands comprise a core of granites flanked by Ordovician schists, mudstones and volcanics. The form of the Wicklow Glens is due to glacial erosion. The topography is typical of a mountain chain, showing the effects of more than one cycle of erosion. The massive granite has weathered characteristically into broad domes. Most of the western part of the site consists of an elevated moorland, covered by peat. The surrounding schists have assumed more diverse outlines, forming prominent peaks and rocky foothills with deep glens. The dominant topographical features are the products of glaciation. High corrie lakes, deep valleys and moraines are common features of this area. The substrate over much of the area is peat, usually less than 2 m deep. Poor mineral soil covers the slopes, and rock outcrops are frequent. The Wicklow Mountains are drained by several major rivers including the Dargle, Liffey, Dodder, Slaney and Avonmore. The river water in the mountain areas is often peaty, especially during floods.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[3110] Oligotrophic Waters containing very few minerals
[3160] Dystrophic Lakes
[4010] Wet Heath
[4030] Dry Heath
[4060] Alpine and Subalpine Heaths
[6130] Calaminarian Grassland
[6230] Species-rich *Nardus* Grassland*
[7130] Blanket Bogs (Active)*
[8110] Siliceous Scree
[8210] Calcareous Rocky Slopes
[8220] Siliceous Rocky Slopes
[91A0] Old Oak Woodlands

[1355] Otter (*Lutra lutra*)

The vegetation over most of Wicklow Mountains SAC is a mosaic of heath, blanket bog and upland grassland (mostly on peaty soil, though some on mineral soil), stands of dense Bracken (*Pteridium aquilinum*), and small woodlands mainly along the rivers. Mountain loughs and corrie lakes are scattered throughout the site.

The two dominant vegetation communities in the area are heath and blanket bog. Heath vegetation, with both wet and dry heath well represented, occurs in association with blanket bog, upland acid grassland and rocky habitats. The wet heath is characterised by species such as Heather (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*), cottongrasses (*Eriophorum* spp.), Tormentil (*Potentilla erecta*), Mat-grass (*Nardus stricta*), bent grasses (*Agrostis* spp.) and bog mosses (*Sphagnum* spp.). In places the wet heath occurs in conjunction with flush communities and streamside vegetation, and here species such as Heath Rush (*Juncus squarrosus*) and sedges (*Carex* spp.) are found. Dry heath at this site is confined to shallow peaty soils on steep slopes where drainage is better and particularly in sheltered conditions. It is characterised by species such as Heather, gorse (*Ulex* spp.), Bell Heather (*Erica cinerea*), Bilberry (*Vaccinium myrtillus*), Purple Moor-grass (*Molinia caerulea*) and lichens (*Cladonia* spp.). In places the heath grades into upland grassland on mineral soil.

Blanket bog is usually dominated by cottongrasses, Heather and bog mosses. On steeper slopes there is some flushing and here Purple Moor-grass, Heath Rush and certain *Sphagnum* species become more common. The Liffey Head blanket bog is among the best of its kind in eastern Ireland, with deep peat formations and an extensive system of dystrophic pools developed among the hummocks and hollows on the bog surface. The vegetation is largely dominated by Heather and Cross-leaved Heath, with cottongrasses (*Eriophorum vaginatum* and *E. angustifolium*), Deergrass (*Scirpus cespitosus*) and Bog Asphodel (*Narthecium ossifragum*). In drier areas, Bilberry and Cowberry (*Vaccinium vitis-idaea*) are common, while the scarce Bog-rosemary (*Andromeda polifolia*) is also found. Blanket bog occurs over extensive areas of deeper peat on the plateau and also on gentle slopes at high altitudes.

Due to the underlying rock strata, the water of the rivers and streams is acid rather than alkaline. The water is generally oligotrophic and free from enrichment. The lakes within the area range from the high altitude lakes of Lough Firrib and Three Lakes, to the lower pater-noster lakes of Glendalough, Lough Tay and Lough Dan. Spectacular corrie lakes, such as Loughs Bray (Upper and Lower), Ouler, Cleevaun, Arts, Kellys and Nahanagan, exhibit fine sequences of moraine stages. The deep lakes are characteristically species-poor, but hold some interesting plants including an unusual form of Quillwort (*Isoetes lacustris* var. *morei*), a stonewort (*Nitella* sp.) and Floating Bur-reed (*Sparganium angustifolium*).

Alpine vegetation occurs on some of the mountain tops, notably in the Lugnaquilla area, and also on exposed cliffs and scree slopes elsewhere in the site. Here alpine heath vegetation is represented with heath species such as Crowberry (*Empetrum nigrum*) and Cowberry, and others such as Dwarf Willow (*Salix herbacea*), the grey-green moss *Racomitrium lanuginosum,* and scarce species such as Mountain Clubmoss

(*Diphasiastrum alpinum*), Firmoss (*Huperzia selago*), and Starry Saxifrage (*Saxifraga stellaris*). Some rare arctic-alpine species have been recorded, including Alpine Lady's-mantle (*Alchemilla alpina*) and Alpine Saw-wort (*Saussurea alpina*).

Old lead mine workings at Glendasan support an estimated 3.6 hectares of Calaminarian Grassland, with a suite of rare metallophyte (metal-loving) bryophytes, including the moss *Ditrichum plumbicola* and the liverworts *Cephaloziella massalongi* and *C. nicholsonii*.

Small areas of old oakwood (Blechno-Quercetum petraeae type) occur on the slopes of Glendalough and Glenmalure, near Lough Tay and Lough Dan, with native Sessile Oak (*Quercus petraea*) trees, many of which are 100-120 years old. On wetter areas, wet broadleaved semi-natural woodlands occur which are dominated by Downy Birch (*Betula pubescens*). Mixed woodland with non-native tree species also occurs.

The site supports a range of rare plant species. Parsley Fern (*Cryptogramma crispa*), Marsh Clubmoss (*Lycopodiella inundata*), Lanceolate Spleenwort (*Asplenium billotii*), Small-white Orchid (*Pseudorchis albida*) and Bog Orchid (*Hammarbya paludosa*) are all legally protected under the Flora (Protection) Order, 2015. Greater Broomrape (*Orobanche rapum-genistae*), Alpine Saw-wort and Alpine Lady's-mantle are listed in the Irish Red Data Book. The rare Myxomycete fungus *Echinostelium colliculosum* has been recorded from the Military Road.

The Red Data Book fish species Arctic Char has been recorded from Lough Dan, but this population may now have died out.

Mammals and birds which occur are typical of the uplands. Deer are abundant, mainly hybrids between Red and Sika Deer. Other mammals include Hare, Badger and Otter, the latter being a species listed on Annex II of the E.U. Habitats Directive. Pine Marten has recently been confirmed as occurring within the site. Among the birds, Meadow Pipit, Skylark, Raven and Red Grouse are resident throughout the site. Wheatear, Whinchat and the scarce Ring Ouzel are summer visitors. Wood Warbler and Redstarts are rare breeding species of the woodlands. Dipper and Grey Wagtail are typical riparian species. Merlin and Peregrine, both Annex I species of the E.U. Birds Directive, breed within the site. Recently, Goosander has become established as a breeding species.

Large areas of the site are owned by the National Parks and Wildlife Service (NPWS) and are managed for nature conservation based on traditional land uses of upland areas. The most common land use is traditional sheep grazing, but others include turf cutting, mostly hand-cutting but some machine-cutting also occurs. These activities are largely confined to the Military Road, where there is easy access. Large areas which had been previously hand-cut and are now abandoned are regenerating. In the last 40 years, forestry has become an important land use in the uplands, and has affected both the wildlife and the hydrology of the area. Amenity use is very

high, with Dublin city close to the site. Peat erosion is frequent on the peaks. This may be a natural process, but is likely to be accelerated by activities such as grazing.

Wicklow Mountains is important as a complex, extensive upland site. It shows great diversity from a geomorphological and a topographical point of view. The vegetation provides examples of the typical upland habitats with heath, blanket bog and upland grassland covering large, relatively undisturbed areas. In all, twelve habitats listed on Annex I of the E.U. Habitats Directive are found within the site. Several rare or protected plant and animal species occur, adding further to its value.

SITE SYNOPSIS

Site Name: Deputy's Pass Nature Reserve SAC

Site Code: 000717

Deputy's Pass woodland is located on the northern spur of the Deputy's Pass near Glenealy in Co. Wicklow. It was designated a Nature Reserve in 1982.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[91A0] Old Oak Woodlands

The predominant vegetation community in Deputy's Pass Nature Reserve is Sessile Oak (*Quercus petraea*) woodland, referable to the Blechno-Quercetum petraeae association. The oak is of coppice origin, 70-80 years old, and forms a nearly closed canopy. Other tree species present are Rowan (*Sorbus aucuparia*), Holly (*Ilex aquifolium*), and Downy Birch (*Betula pubescens*), occurring mainly at the edges. In some areas Beech (*Fagus sylvatica*) also occurs. The understorey is formed of oak saplings, Holly and Hazel (*Corylus avellana*), while the ground flora of the wood is dominated by Great Wood-rush (*Luzula sylvatica*), Bilberry (*Vaccinium myrtillus*), Hard Fern (*Blechnum spicant*), and Bramble (*Rubus fruticosus* agg.). Heather (*Calluna vulgaris*) and Bracken (*Pteridium aquilinum*) are abundant in some areas. In some parts, Bluebells (*Hyacinthoides non-scripta*), Male Fern (*Dryopteris filix-mas*), Hay-scented Buckler-fern (*D. aemula*), Sanicle (*Sanicula europea*) and Wood-sorrel (*Oxalis acetosella*) occur commonly.

The regeneration of native trees and the good ground cover indicate an absence of grazing; there are no sheep in the site and deer very seldom occur.

Less than 10% of the site is occupied by conifers. Where they are present they consist of 20-30 years old plantations of Douglas Fir (*Pseudotsuga menziesii*), Sitka Spruce (*Picea sitchensis*), Norway Spruce (*P. abies*), European Larch (*Larix decidua*) and Scots Pine (*Pinus sylvestris*). Once mature these small stands will be removed, to allow native species to naturally replace them.

The site supports breeding populations of the Smooth Newt (*Triturus vulgaris*) and the Common Frog (*Rana temporaria*), amphibians protected by the Wildlife Act, 1976.

Deputy's Pass is managed as a Nature Reserve and is part of an internationally important series of oak woods in Co. Wicklow which are almost certainly natural in origin and which retain much of their original character and species composition (other examples include Glendalough, Clara Vale and Ballinacor).

SITE SYNOPSIS

Site Name: Buckroney-Brittas Dunes and Fen SAC

Site Code: 000729

Buckroney-Brittas Dunes and Fen is a complex of coastal habitats located about 10 km south of Wicklow town. It comprises two main sand dune systems, Brittas Bay and Buckroney Dunes, connected on the coast by the rocky headland of Mizen Head. The dunes have cut off the outflow of a small river at Mizen Head and a fen, Buckroney Fen, has developed. A further small sand dune system occurs south of Pennycomequick Bridge.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1210] Annual Vegetation of Drift Lines
[1220] Perennial Vegetation of Stony Banks
[1410] Mediterranean Salt Meadows
[2110] Embryonic Shifting Dunes
[2120] Marram Dunes (White Dunes)
[2130] Fixed Dunes (Grey Dunes)*
[2150] Decalcified Dune Heath*
[2170] Dunes with Creeping Willow
[2190] Humid Dune Slacks
[7230] Alkaline Fens

Along much of the higher parts of the beach at this site, typical annual strandline vegetation occurs. Species such as Sea Rocket (*Cakile maritima*), Prickly Saltwort (*Salsola kali*) and Spear-leaved Orache (*Atriplex prostrata*) are frequent in this zone, with the scarcer Yellow Horned-poppy (*Glaucium flavum*) present in places.

A shingle ridge occurs along the Buckroney dune system. The amount of exposed shingle is low, but it is likely that shingle underlies much of the sandy areas also. The vegetation on the shingle is similar in composition to that which occurs as part of the drift line and embryonic dune habitats. Sea Sandwort (*Honkenya peploides*) is characteristic, and other species include Sand Couch (*Elymus farctus*), Sand Sedge (*Carex arenaria*), Sea Rocket and Yellow Horned-Poppy.

An area of saline vegetation which conforms to 'Mediterranean salt meadows' occurs in the Buckroney dune system south of the inlet stream to the fen, and possibly in small areas elsewhere within the site. It is typically dominated by rushes (*Juncus* spp.), and of note is the presence of Sharp Rush (*J. acutus*). Sea Club-rush (*Scirpus*

maritimus) also occurs. The area is inundated by the tide only occasionally via the narrow inlet leading to Buckroney Fen.

Embryonic dune development occurs at the southern part of Brittas and more widely at Buckroney and Pennycomequick. Typical species are couch grasses (*Elymus* sp.), Sand Sedge and Sea Sandwort. The main dune ridges are dominated by Marram (*Ammophila arenaria*), with herbaceous species such Sea Spurge (*Euphorbia paralias*), Sea-holly (*Eryngium maritimum*) and Common Restharrow (*Ononis repens*) occurring throughout. The main dune ridges are well developed, reaching heights of 10 m at Brittas. The northern end of the Brittas system has fine examples of parabolic dunes.

Stable fixed dunes are well developed at Brittas and Buckroney. Marram is less frequent in these areas and is replaced by Red Fescue (*Festuca rubra*) as the most common grass species. A rich flora occurs, especially in the more open areas. Common species include Pyramidal Orchid (*Anacamptis pyramidalis*), Common Milkwort (*Polygala vulgaris*), Wild Pansy (*Viola tricolor* subsp. *curtisii*), Carline Thistle (*Carlina vulgaris*), Biting Stonecrop (*Sedum acre*), Wild Thyme (*Thymus praecox*) and Common Bird's-foot-trefoil (*Lotus corniculatus*). The mature areas of fixed dune also contain Burnet Rose (*Rosa pimpinellifolia*), Bracken (*Pteridium aquilinum*), Wood Sage (*Teucrium scordonia*) and Common Sorrel (*Rumex acetosa*). Mosses such as *Tortula ruralis* subsp. *ruraliformis, Rhytidiadelphus triquetris*, and *Homalothecium lutescens* are frequent, along with lichens (*Cladonia* spp., *Peltigera canina*).

This is one of the few Irish east coast sites to possess good examples of wet dune slacks and dunes with Creeping Willow (*Salix repens*). These areas of the dunes have a rich and varied flora, including species such as Creeping Willow, Water Mint (*Mentha aquatica*), Silverweed (*Potentilla anserina*), Meadowsweet (*Filipendula ulmaria*) and Meadow Thistle (*Cirsium dissectum*). The slacks are notably rich in rushes and sedges. Of particular interest is the presence of Sharp Rush (*Juncus acutus*), a scarce species in eastern Ireland and one that is indicative of a saline influence.

The site is also notable for the presence, at the back of the dunes, of areas of decalcified dune heath, a rare habitat type, and one which is listed with priority status in the E.U. Habitats Directive. Heath species present include Heather (*Calluna vulgaris*), Bell Heather (*Erica cinerea*) and Gorse (*Ulex europaeus*).

Buckroney Fen lies west of Mizen Head. It is backed to the west by a dense swamp of Common Reed (*Phragmites australis*). The fen is dominated by Tussock Sedge (*Carex paniculata*), with Water Mint, Purple Loosestrife (*Lythrum salicaria*), Marsh Pennywort (*Hydrocotyle vulgaris*), Greater Bird's-foot-trefoil (*Lotus uliginosus*), Water Horsetail (*Equisetum fluviatile*), small sedges (*Carex* spp.) and other flowering plants. An extensive stand of Blunt-flowered Rush (*Juncus subnodulosus*) is of note. Throughout this area the rare Marsh Fern (*Thelypteris palustris*) is frequent. There are also extensive areas of Rusty Willow (*Salix cinerea* subsp. *oleifolia*) scrub.

This site contains two rare plant species protected under the Flora (Protection) Order, 1999: Wild Asparagus (*Asparagus officinalis* subsp. *prostratus*), in its most northerly

Irish station, and Meadow Saxifrage (*Saxifraga granulata*). Other rare species which occur within the site include Green-flowered Helleborine (*Epipactis phyllanthes*), Bird's-foot (*Ornithopus perpusillus*) and Spring Vetch (*Vicia lathyroides*). All of these are Red Data Book species. The rare sedge hybrid *Carex riparia* x *C. vesicaria* (*Carex* x *csomadensis*) is only known from Mizen Head.

The invertebrate fauna of Buckroney fen has been investigated and some notable species have been recorded, including the beetle *Eurynebria complanata* and the following flies: *Machimus cowini, Anasimyia lunulata, Parhelophilus consimilis* and *Lejogaster splendia*.

Little Tern, a species listed on Annex I of the E.U. Birds Directive, has bred or attempted to breed at Buckroney strand in recent years. In 1992 between 7 and 10 pairs were present and in 1993 up to 8 pairs. Teal are regular in winter (119), as are Curlew (46), Lapwing (515) and Snipe (87). All figures are average peaks for 1994/95 - 1995/96.

The dune systems and beaches are subject to high amenity usage from day-trippers and several areas around the site have been developed as caravan parks, car parks and golf courses. The marginal areas of the fen have been reclaimed, especially at the south end, though these areas still flood in winter and attract waterfowl.

This site is important as an extensive sand dune/fen system with well developed plant communities. Several coastal habitats listed on the E.U. Habitats Directive, including two priority habitats - fixed dune and decalcified dune heath - are present. The area contains two legally protected plants, as well as a number of other rare or scarce plant species. The site provides habitat for some rare species of invertebrate and for the vulnerable Little Tern. A rich flora and fauna has persisted on this site despite extensive amenity use and adjacent farming. However, future land use practices will need to be managed to ensure the continued survival of this unique mosaic of coastal habitats.

SITE SYNOPSIS

Site Name: Slaney River Valley SAC

Site Code: 000781

This site comprises the freshwater stretches of the River Slaney as far as the Wicklow Mountains; a number of tributaries, the larger of which include the Bann, Boro, Glasha, Clody, Derry, Derreen, Douglas and Carrigower Rivers; the estuary at Ferrycarrig; and Wexford Harbour. The site flows through the Counties of Wicklow, Wexford and Carlow. Towns along the site but not within it include Baltinglass, Hacketstown, Tinahely, Tullow, Bunclody, Camolin, Enniscorthy and Wexford. The river is up to 100 m wide in places and is tidal at the southern end from Edermine Bridge below Enniscorthy. In the upper and central regions almost as far as the confluence with the Derry River the geology consists of granite. Above Kilcarry Bridge, the Slaney has cut a gorge into the granite plain. The Derry and Bann Rivers are bounded by a narrow line of uplands which corresponds to schist outcrops. Where these tributaries cut through this belt of hard rocks they have carved deep gorges, more than two miles long at Tinahely and Shillelagh. South of Kildavin the Slaney flows through an area of Ordovician slates and grits.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1130] Estuaries
[1140] Tidal Mudflats and Sandflats
[1330] Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
[1410] Mediterranean salt meadows (*Juncetalia maritimi*)
[3260] Floating River Vegetation
[91A0] Old Oak Woodlands
[91E0] Alluvial Forests*

[1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
[1095] Sea Lamprey (*Petromyzon marinus*)
[1096] Brook Lamprey (*Lampetra planeri*)
[1099] River Lamprey (*Lampetra fluviatilis*)
[1103] Twaite Shad (*Alosa fallax*)
[1106] Atlantic Salmon (*Salmo salar*)
[1355] Otter (*Lutra lutra*)
[1365] Common (Harbour) Seal (*Phoca vitulina*)

Floating river vegetation is found along much of the freshwater stretches within the site. Species present here include Pond Water-crowfoot (*Ranunculus peltatus*), other water-crowfoot species, Canadian Pondweed (*Elodea canadensis*), Broad-leaved Pondweed (*Potamogeton natans*), water-milfoils (*Myriophyllum* spp.), Common Club-rush (*Scirpus lacustris*), water-starworts (*Callitriche* spp.), Hemlock Water-dropwort (*Oenanthe crocata*), Fine-leaved Water-dropwort (*O. aquatica*), Common Duckweed (*Lemna minor*), Yellow Water-lily (*Nuphar lutea*), Unbranched Bur-reed (*Sparganium emersum*) and the moss *Fontinalis antipyretica*. Two rare aquatic plant species which are legally protected under the Flora (Protection) Order, 2015, have been recorded in this site: Short-leaved Water-starwort (*Callitriche truncata*), a very rare, small aquatic herb found nowhere else in Ireland, and Opposite-leaved Pondweed (*Groenlandia densa*).

Good examples of wet woodland are found associated with Macmine marshes, along the banks of the Slaney and its tributaries, and within reedswamps. Rusty Willow (*Salix cinerea* subsp. *oleifolia*) scrub and pockets of wet woodland dominated by Alder (*Alnus glutinosa*) have become established in places. Ash (*Fraxinus excelsior*) and Downy Birch (*Betula pubescens*) are common in the latter and the ground flora is typical of wet woodland, with Meadowsweet (*Filipendula ulmaria*), Wild Angelica (*Angelica sylvestris*), Yellow Iris (*Iris pseudacorus*), horsetails (*Equisetum* spp.) and occasional tussocks of Greater Tussock-sedge (*Carex paniculata*). These woodlands have been described as two types: one is quite eutrophic, dominated by willow and subject to a tidal influence; while the other is flushed or spring-fed, subject to waterlogging but not to flooding, and dominated by Alder and Ash.

Old oak woodlands are best represented at Tomnafinnoge, though patches are present throughout the site. At Tomnafinnoge the wood is dominated by mature, widely spaced Sessile Oak (*Quercus petraea*), which were planted around 1700, with some further planting in 1810. There is now a varied age structure with over-mature, mature and young trees. The open canopy permits light to reach the forest floor and encourages natural regeneration of Sessile Oak. As well as Sessile Oak, the wood includes occasional Beech (*Fagus sylvatica*), birch (*Betula* sp.), Rowan (*Sorbus aucuparia*) and Scots Pine (*Pinus sylvestris*).

The shrub layer is well-developed with Hazel (*Corylus avellana*) and Holly (*Ilex aquifolium*) occurring. The ground layer consists of Great Wood-rush (*Luzula sylvatica*) and Bilberry (*Vaccinium myrtillus*), with some Bracken (*Pteridium aquilinum*) and Bramble (*Rubus fruticosus* agg.). Herbaceous species in the ground layer include Primrose (*Primula vulgaris*), Wood-sorrel (*Oxalis acetosella*), Common Cow-wheat (*Melampyrum pratense*) and Bluebell (*Hyacinthoides non-scripta*). Many of the trees carry an epiphytic flora of mosses, Polypody (*Polypodium vulgare*), and lichens such as *Usnea comosa, Evernia prunastri, Ramalina* spp. and *Parmelia* spp.

Tomnafinnoge Wood is a remnant of the ancient Shillelagh oak woods, and it appears that woodland has always been present on the site. In the past, the wood was managed as a Hazel coppice with Oak standards, a common form of woodland management in England but not widely practised in Ireland. The importance of the

woodland lies in the size of the trees, their capacity to regenerate, their genetic continuity with ancient woodland and their historic interest. The nearest comparable stands are at Abbeyleix, Co. Laois and Portlaw, Co. Waterford.

Below Enniscorthy there are several areas of woodland with a mixed canopy of oak, Beech, Sycamore (*Acer pseudoplatanus*), Ash and generally a good diverse ground flora. Near the mouth of the river at Ferrycarrig is a steep south facing slope covered with oak woodland. Holly and Hazel are the main species in the shrub layer and a species-rich ground flora typical of this type of oak woodland has abundant ferns (*Dryopteris filix-mas, Polystichum setiferum* and *Phyllitis scolopendrium*) and mosses (*Thuidium tamariscinum, Mnium hornum* and *Eurynchium praelongum*). North of Bunclody, the river valley still has a number of dry woodlands though these have mostly been managed by the estates, with the introduction of Beech and occasional conifers. The steeper sides are covered in a thick scrub from which taller trees protrude.

At the southern end of the site, the Red Data Book species Yellow Archangel (*Lamiastrum galeobdolon*) occurs. Three more Red Data Book species have also been recorded from the site: Blue Fleabane (*Erigeron acer*), Basil Thyme (*Acinos arvensis*), and Small Cudweed (*Logfia minima*). Basil Thyme and Small Cudweed are protected under the Flora (Protection) Order, 2015. A nationally rare species, Summer Snowflake (*Leucojum aestivum*), is also found within the site.

Mixed woodlands occur at Carrickduff and Coolaphuca in Bunclody. Oak trees, which make up the greater part of the canopy, were originally planted and at the present time are not regenerating actively. In time, if permitted, the woodland will probably become dominated by Beech. A fair number of Yew (*Taxus baccata*) trees have also reached a large size and these, together with Holly, give to the site some of the appearance of a south-western oak wood.

The site is considered to contain a very good example of the extreme upper reaches of an estuary. Tidal reedbeds with wet woodland are present in places. The fringing reed communities support Sea Club-rush (*Scirpus maritimus*), Grey Club-rush (*S. tabernaemontani*) and abundant Common Reed (*Phragmites australis*). Other species occurring are Bulrush (*Typha latifolia*), Reed Canary-grass (*Phalaris arundinacea*) and Branched Bur-reed (*Sparganium erectum*). The reedswamp is extensive around Macmine, where the river widens and there are islands with swamp and marsh vegetation. Further south of Macmine are expanses of intertidal mudflats and sandflats and shingle shore often fringed with a narrow band of saltmarsh and brackish vegetation. Narrow shingle beaches up to 10 m wide occur in places along the river banks and are exposed at low tide. Upslope the shingle is sometimes colonised by Saltmarsh Rush (*Juncus gerardii*), Townsend's Cord-grass (*Spartina townsendii*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium),* Hemlock Water-dropwort and the non-native and invasive Himalayan Balsam (*Impatiens glandulifera*).

The salt marsh at Castlebridge is dominated by Mediterranean salt meadows. The main community is characterized by the presence of Sea Rush (*Juncus maritimus*). Red Fescue (*Festuca rubra*) and Creeping Bent-grass (*Agrostis stolonifera*) are both abundant within this vegetation type. Other species present include Autumn Hawkbit (*Leontodon autumnalis*), Sea Milkwort (*Glaux maritima*), Silverweed (*Potentilla anserina*), Long-bracted Sedge (*Carex extensa*), Parsley Water-dropwort (*Oenanthe lachenalii*), Curled Dock (*Rumex crispus*), Sea Arrowgrass (*Trigolchin maritima*), Smooth Sow-thistle (*Sonchus oleraceus*), Sea Plantain (*Plantago maritima*), Wild Celery (*Apium graveolens*), Spear-leaved Orache (*Atriplex prostrata*), White Clover (*Trifolium repens*), Sea Aster and Saltmarsh Rush. These species vary in cover values and Salt marsh Rush may occasionally be dominant. Species such as Hard-grass (*Parapholis strigosa*) and Common Saltmarsh-grass are found along some of the tracks, while Common Saltmarsh-grass is also more common around the mouths of the creeks and along some of the drainage channels.

The marsh is perched on ground that is bisected by a number of channels which extend a considerable distance inland. The site is notable for the presence of Borrer's Saltmarsh-grass (*Puccinnellia fasciculata*), which is found along the cattle tracks of the marsh. Another notable feature is the transition from saltmarsh to brackish marsh communities, which is quite extensive and diverse. The marsh is generally in good condition.

A significant area of Atlantic salt meadows also occurs at Castlebridge. This habitat is characterised by the presence of grassy upper saltmarsh vegetation communities dominated by Red Fescue and/or Creeping Bent-grass. Other species present include Saltmarsh Rush, Sea Milkwort (*Glaux maritima*), Sea Aster, Sea Arrowgrass (*Triglochin maritimum*), Sea Plantain, Common Scurvygrass (*Cochlearia officinalis*), and Curled Dock (*Rumex crispus*). Sea Rush may be present in this habitat and has cover values between 0-10%.

Wexford Harbour is an extensive, shallow estuary which dries out considerably at low tide exposing large expanses of mudflats and sandflats. Within these habitats four biological community complexes have been recorded: estuarine muds dominated by polychaetes and crustaceans community complex; sand dominated by polychaetes community complex; mixed sediment community complex; and fine sand with *Spiophanes bombyx* community complex. The harbour is largely sheltered by the Raven Point to the north and Rosslare Point in the south.

Other habitats present within the site include species-rich marsh in which sedges such as *Carex disticha, Carex riparia* and *Carex vesicaria* are common. Among the other species found in this habitat are Yellow Iris, Water Mint (*Mentha aquatica*), Purple Loosestrife (*Lythrum salicaria*) and Soft Rush (*Juncus effusus*). Extensive marshes occur to the west of Castlebridge associated with the tidal areas of the River Sow.

The site supports populations of several species listed on Annex II of the E.U. Habitats Directive, including Sea Lamprey, River Lamprey and Brook Lamprey, Otter, Salmon, small numbers of Freshwater Pearl Mussel, and in the tidal stretches,

Twaite Shad. A survey of the Derreen River in 1995 estimated the population of Freshwater Pearl Mussel at about 3,000 individuals. This is a significant population, especially in the context of eastern Ireland. The Slaney is primarily a spring salmon fishery and is regarded as one of the top rivers in Ireland for early spring fishing. The upper Slaney and tributary headwaters are very important for spawning. The site supports regionally significant numbers of Common Seal. This Annex II species occurs year-round in Wexford Harbour where several sandbanks are used for breeding, moulting and resting activity. At least 27 Common Seal regularly occur within the site.

The site is of high ornithological importance also, with internationally important populations of Mute Swan (300), Light-bellied Brent Goose (200), Bar-tailed Godwit (1,843) and Black-tailed Godwit (350) occurring – all figures are average peaks for the five winters, 1995/96-99/2000. There are at least a further 18 species of wintering waterfowl which occur in numbers of national importance, i.e. Great-crested Grebe (123), Cormorant (443), Shelduck (903), Teal (800), Scaup (416), Goldeneye (151), Red-breasted Merganser (226), Oystercatcher (1,800), Golden Plover (3,000), Grey Plover (1,412), Lapwing (5,000), Knot (566), Sanderling (262), Dunlin (3,037), Curlew (1,300), Redshank (535), Black-headed Gull (6,136) and Lesser Black-backed Gull (1,036). Several of the above populations represent substantial proportions of the national totals, especially Shelduck (6.1%), Scaup (5.9%), Red-breasted Merganser (5.6%), Grey Plover (18.8%, the top site in the country) and Black-headed Gull (6.1%).

A nesting colony of Little Egret has recently become established within the site (12+ pairs in 2003) and birds are present in the area throughout the year. The sheltered estuarine habitat to the west of Wexford Bridge is the favoured location. Another very localised breeding species, Reed Warbler, is well established within the swamp vegetation along the River Slaney and on the South Slob (estimated as at least 10 pairs). The River Slaney supports typical riparian species, including Dipper and Kingfisher.

The site supports many of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger, Irish Hare and Daubenton's Bat. Common Frog (*Rana temporaria*), another Red Data Book species, also occurs within the site.

Agriculture is the main land use. Arable crops are important. Improved grassland and silage account for much of the remainder. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the populations of E.U. Habitats Directive Annex II animal species within it. Run-off is undoubtedly occurring, as some of the fields slope steeply directly to the river bank. In addition, cattle have access to the river bank in places. Fishing is a main tourist attraction along stretches of the Slaney and its tributaries, and there are a number of Angler Associations, some with a number of boats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place. There are some gravel pits along the river below Bunclody and many of these are active. There is a

large landfill site adjacent to the river close to Hacketstown and at Killurin. Boating, bait-digging and fishing occur in parts of Wexford Harbour.

Waste water outflows, runoff from intensive agricultural enterprises, a meat factory at Clohamon, a landfill site adjacent to the river, and further industrial development upstream in Enniscorthy and in other towns could all have potential adverse impacts on the water quality unless they are carefully managed. The spread of exotic species is reducing the quality of the woodlands.

The site supports populations of several species listed on Annex II of the E.U. Habitats Directive, and habitats listed on Annex I of this Directive, as well as important numbers of wintering wildfowl including some species listed on Annex I of the E.U. Birds Directive. The presence of wet and broadleaved woodlands increases the overall habitat diversity and the occurrence of a number of Red Data Book plant and animal species adds further importance to the site. Overall it is of considerable conservation significance.

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE &
PLANNING

APPENDIX 6

CEMP

Please refer Appendix A
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Appendix C: CGEP Turbine Delivery Route AA and NIS

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

COOM GREEN ENERGY PARK

STAGE ONE APPROPRIATE ASSESSMENT SCREENING REPORT AND STAGE TWO NATURA IMPACT STATEMENT FOR COOM GREEN ENERGY PARK TURBINE DELIVERY ROUTE NODES

Prepared for: Coom Green Energy Park Limited

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1. INTRODUCTION

1.1 Fehily Timoney and Company

Fehily Timoney & Company (FT) were commissioned by Coom Green Energy Park Limited to provide consultancy services in respect of the turbine delivery routes for the proposed wind farm at Coom Green Energy Park at Bottlehill/Mullenaboree and Knockdoorty, Co. Cork. An Appropriate Assessment Screening Report and Natura Impact Statement have been prepared in respect of the proposed project.

The requirements for Appropriate Assessment (AA) are set out in Article 6 of the Habitats Directive (92/43/EEC) and Part XAB of the Planning and Development Act 2000, as amended. An AA is required of the implications for the European site concerned in view of the site's conservation objectives of any plan or project not directly connected with or necessary to the management of that site but likely to have a significant effect thereon, either individually or in combination with any other plans or projects.

European sites comprise both Special Protection Areas (SPAs) for birds and Special Areas of Conservation (SACs) for habitats and species. The Habitats Directive formed a basis for the designation of SACs. Similarly, SPAs are legislated for under the Birds Directive (Council Directive 79/409/EEC on the Conservation of Wild Birds). In general terms, European sites are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community.

The assessment procedure is based on a four-stage approach, where the outcome at each successive stage determines whether a further stage in the process is required.

The purpose of the screening stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone or in-combination with other plans or projects, could have significant effects on a Natura 2000 site in view of the site's conservation objectives. There is no necessity to establish such an effect; it is merely necessary for the competent authority to determine that there may be such an effect. The need to apply the precautionary principle in making any key decisions in relation to the tests of AA has been confirmed by the case law of the Court of Justice of the European Union (CJEU). Plans or projects that have no appreciable effect on a European site may be excluded.

An Appropriate Assessment:

(i) must identify, in the light of the best scientific knowledge in the field, all aspects of the project which can, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;
(ii) must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and
(iii)may only include a determination that the proposed development will not adversely affect the integrity of any relevant European site where the competent authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of the identified potential effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete.

If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three and, if necessary, stage four.

Article 6 of the Habitats Directive envisages a two-stage process, which is implemented in some detail by the provisions of sections 177U and 177V of the Planning and Development Act. Screening for appropriate assessment in accordance with section 177U is the first stage of the AA process (Stage One), in which the possibility of there being a significant effect on a European site is considered. Plans or projects that have no appreciable effect on a European site are thereby excluded, or screened out, at this stage of the process. Where screening concludes that there is the potential for significant effects, then it is necessary to carry out an AA (Stage Two) for the purposes of Article 6(3), and a Natura Impact Statement (NIS) is produced. The NIS, which forms the basis of the AA, considers the effect of a project or plan on the integrity of a European site and on its conservation objectives, and where necessary, draws up mitigation measures to avoid/minimise negative effects.

The competent authority, in this case An Bord Pleanála, in carrying out an AA, is required to make an examination, analysis, evaluation, findings, conclusions and a final determination as to whether or not the proposed development would adversely affect the integrity of the relevant European site in view of its conservation objectives.

This report comprises of the Stage One Screening Report (Section 4) and Stage Two Natura Impact Statement (Section 5), to evaluate the potential effect(s) of the turbine delivery routes for the proposed wind farm at Coom Green Energy Park at Bottlehill/Mullenaboree and Knockdoorty, Co. Cork on the European sites. The 19 'nodes' or constrictions along the routes where works or alterations will be required to facilitate the passage of turbine components were evaluated. To evaluate the potential effect(s) of the proposed development on the European sites, all European sites located within a 15 km radius of the development or those which are ecologically linked were considered. Please note that while a 15 km buffer is recommended for projects, there is no hard and fast rule for buffer size (DoEHLG, 2010). A 15 km buffer was used in line with standard industry practice; however, the potential zone of influence was considered to extend to European sites located outside the 15 km buffer where downstream hydrological links exist. No additional sites beyond the 15 km buffer were identified as being within the zone of influence.

The following European sites are within 15km of these nodes; the distances from each node and site list relevant to each node are detailed in Table 3-1 below:

- Blackwater River (Cork/Waterford) SAC* (Site Code 002170) is within 15km of all Nodes (closest 10m to node 2.3)
- Blackwater Callows SPA (Site Code 004094) is within 15km of Nodes [2.0 - 2.14] (closest 1.3km to node 2.1)
- Cork Harbour SPA (Site Code 004030) is within 15km of Nodes [1.3 & 1.4] (closest 0.005km to node 1.2.1)
- Great Island Channel SAC (Site Code 001058) is within 15km of Nodes [1.3 & 1.4] (closest 5.36km to node 1.0)
- Lower River Suir SAC (Site Code 002137) is within 15km of Node [2.0] (14 km to node 2.0)

** At present some SACs in Ireland are currently 'candidate' SACs and referred to as SACs. The relevant Statutory Instruments for the SACs in Ireland have not yet been made, however, these "candidate" sites must still be afforded the same level of protection as if they were SACs as designated in accordance with the EU Habitats Directive.*

1.2 Legislative Requirements

The requirements for an AA are set out in the Habitats Directive 92/43/EEC. Articles 6(3) and 6(4) of this Directive state:

> *6(3) Any plan or project not directly connected with or necessary to the management of the site (Natura 2000 sites) but likely to have significant effect thereon, either individually or in combination with other plans or projects, shall be subject to Appropriate Assessment of its implications for the site in view of the sites conservation objectives.*
>
> *In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*
>
> *6(4) If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*
>
> *Where the site concerned hosts a priority natural habitat type and/or a priority species the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.*

The statutory agency responsible for European sites is the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht (DAHG). In December 2010 '*Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*, Department of the Environment, Heritage and Local Government' was published (DoEHLG, 2010). This guidance document was prepared jointly by the NPWS and Planning Divisions of DoEHLG (now DCHG), with input from local authorities.

Previously, in 2001, the European Commission (EC) issued a guidance document '*Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC'*. An updated version of the EC document '*Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC*' was published in 2018.This Appropriate Assessment Screening Report has been prepared in accordance with the relevant Irish and European Commission Guidance.

1.2.1 Regulatory Context

In 1997, the Habitats Directive was transposed into Irish National Law by the European Communities (Natural Habitats) Regulations, SI 94/1997 (as amended by S.I. 233/1998 & S.I. 378/2005). The European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477/2011) revoked the 1997 Regulations (and amendments) as well as the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010. The purpose of the 2011 Regulations was to address transposition failures identified in the Court of Justice of the European Union (CJEU) judgements. Following additional amendments in 2013 (S.I. 499/2013) and 2015 (S.I. 355/2015) the regulations are now cited as the European Communities (Birds and Natural Habitats) Regulations 2011 to 2015.

The Regulations have been prepared to address several judgments of the CJEU against Ireland, notably cases C-418/04 (*Commission v Ireland*) and C-183/05 (*Commission v Ireland*), in respect of failure to transpose elements of the Birds Directive and the Habitats Directive into Irish law.

2. METHODOLOGY

2.1 Appropriate Assessment Methodology

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures to be addressed in the AA process. Firstly, a project should aim to avoid any negative effects on European sites by identifying possible effects early in the project and should design the project in order to avoid such effects.

There are four stages in an AA, as outlined in the European Commission Guidance document (2001). The following is a summary of these steps.

- Stage One - Screening: The purpose of the screening stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone or in-combination with other plans or projects, could have significant effects on a Natura 2000 site.
- Stage Two - Appropriate Assessment: The need for Stage Two AA arises where the first stage (or screening process) has either determined (or it was at least implicitly accepted) that the proposed development, alone or in combination with other plans or projects, is likely to have a significant effect on a European site. A Stage Two AA is a focused and detailed examination, analysis and evaluation carried out by the competent authority (in this case, the Board) of the implications of the plan or project, alone and in-combination with other plans and projects, on the integrity of a European site in view of that site's conservation objectives.
- Stage Three - Assessment of Alternative Solutions: This stage of the potential process arises where adverse effects on the integrity of a European site cannot be excluded and examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site. .
- Stage Four - This is the derogation process of Article 6(4), which examines whether there are imperative reasons of overriding public interest [IROPI] for allowing a project to proceed where adverse effects on the integrity of a European site have been predicted. Compensatory measures must be proposed and assessed as part of this stage. .

In the preparation of this assessment regard has been given to the relevant guidance, in particular:

- *Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*, European Commission 2001.
- European Commission (2018). *Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC.* Brussels, 21.11.2018 C (2018) 7621 final.
- *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin 2010.

2.1.1 Impact Assessment

The first step in the screening process is to develop a list of European sites potentially effected by the proposed development. Each European site is reviewed to establish whether or not the proposed development is likely to have a significant effect on the integrity of the site, as defined by its structure and function, and its conservation objectives.

The qualifying interests of each European site are identified and the potential threats are summarised into the following categories for the screening process, and described within the screening matrix as follows:

- Direct effects refer to habitat loss or fragmentation arising from land-take requirements for development or agricultural purposes. Direct effects can be as a result of a change in land use or management, such as the removal of agricultural practices that prevent scrub encroachment.
- Indirect and secondary effects do not have a straight-line route between cause and effect, and it is potentially more challenging to ensure that all the possible indirect effects of the plan (or project) – in combination with other plans and projects - have been established.

  These can arise when a development alters the hydrology of a catchment area, which in turn affects the movement of groundwater to a site, and the qualifying interests that rely on the maintenance of water levels. Deterioration in water quality can occur as both an indirect or direct consequence of development, which in turn changes the aquatic environment and reduces its capacity to support certain plants and animals. The introduction of invasive species can also be defined as an indirect effect, which results in increased movement of vectors (humans, fauna, surface water), and consequently the transfer of alien species from one area to another.
- Disturbance to fauna can arise directly through the loss of habitat (e.g. bat roosts) or indirectly through noise, vibration and increased activity associated with construction and operation.

2.2 Desktop Study

In order to complete the Screening for Appropriate Assessment certain information on the existing environment is required. A desk study was carried out to collate available information on the site's natural environment. This comprised a review of the following publications, data and datasets:

- Cork County Development Plan 2014
- Cork County Council Planning Enquiry System
- National Parks and Wildlife Service (NPWS) website and metadata available (www.npws.ie)
- OSI Aerial photography and 1:50,000 mapping
- National Biodiversity Data Centre (NBDC) (on-line map-viewer)
- Environmental Protection Agency (EPA) water quality data
- River Catchment & Sub-catchment WFD datasets.

2.3 Field Study

Ecological surveys were undertaken on 16th July 2019, 13th August 2019 and 19th August 2020. The objective of these visits was to obtain data on relevant node locations in regard to the presence of invasive plant species, and habitats or species that are protected and/or are qualifying interests of or potential connections to the European sites relevant to this report. Weather conditions were favourable for surveying.

The area surveyed was the oversail and/or load bearing area and immediate surroundings for each node, including drainage features.

An otter survey covering the Lisheen crossroads watercourse 150m up and down-stream of Node 2.12 was carried out on 13th August 2019.

This was carried out to ensure that no breeding or resting areas were recorded within 150m upstream or downstream of the crossing. A derogation license would be required for works within 150m of an otter holt.

Signs of otter such as prints, spraints, feeding remains and slides, in addition to holts and couching sites were searched for. The survey was carried out in accordance with the guidance document *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road-Schemes* (NRA, 2009). All watercourses which could be affected directly or indirectly by the proposed development were considered as part of the current baseline assessment. This included proposed cable route crossings of riverine watercourses or watercourses in close proximity to/draining the proposed wind turbine layout. The nomenclature for the watercourses surveyed is as per the Environmental Protection Agency's (EPA) online map viewer.

Site visits of the aquatic survey sites were conducted on Friday 24th, Saturday 25th and Wednesday 29th to Friday 31st July 2020 by Triturus Environmental Ltd. Survey sites were assessed in light of the proposed project with survey effort focused on both instream and riparian habitats at each location. Surveys at each aquatic site included a fisheries assessment (electro-fishing), fisheries habitat appraisal and white-clawed crayfish assessment. A freshwater pearl mussel assessment was undertaken across the wider catchment of the proposed development. Additionally, biological water quality (Q-sampling) was undertaken at *n*=12 sites. Rare, protected and or conservation interest aquatic species such as otter were also searched for at each survey site. This holistic approach informed the overall aquatic ecological evaluation of each site in context of the proposed development and onshore cable route.

A broad aquatic habitat assessment was conducted at each site utilising elements of the methodology given in the Environment Agency's *'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003'* (EA, 2003) and the Irish Heritage Council's *'A Guide to Habitats in Ireland'* (Fossitt, 2000). All sites were assessed in terms of:

- Stream width and depth and other physical characteristics.
- Substrate type, listing substrate fractions in order of dominance, i.e. bedrock, boulder, cobble, gravel, sand, silt etc.
- Flow type, listing percentage of riffle, glide and pool in the sampling area.
- In-stream macrophyte, bryophytes occurring and their percentage coverage of the stream bottom at the sampling sites.
- Riparian vegetation composition.

The watercourse at each aquatic survey site was described in terms of the important aquatic habitats and species. This helped to evaluate species and habitats of ecological value in the vicinity of the proposed development and watercourse crossings. The aquatic baseline prepared would inform mitigation if required for the Coom Green Energy Park development.

This survey confirmed the absence of freshwater pearl mussel and white-clawed crayfish, and the lack of suitable habitat for either species.

The higher reaches of river systems are not used by twaite and allis shad.

Vantage point (VP), hinterland, and transect surveys have been completed during both the winter and summer seasons between 2016 and 2019 for the proposed Coom Green Energy Park. The suitability of habitats for nesting birds at TDR node locations was evaluated in ecological surveys conducted. The survey was carried out in accordance with the guidance document Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road-Schemes (NRA, 2009).

3. TURBINE DELIVERY ROUTE DESCRIPTION

Two turbine delivery routes for the proposed windfarm at Coom Green Energy Park have been identified. Route 1 would service the western turbine cluster centered around the Bottlehill Landfill site (Bottlehill/Mullenaboree), while Route 2 would service the eastern cluster (Knockdoorty) to the south of the N72 near Ballyhooly. Both routes are shown in Figure 3-1 below.

Route 1 passes through Cork City via Tivoli, Mayfield and Blackpool before joining the N20 Cork-Mallow road to travel north as far as Rathduff, where the route turns northeast at Lissavoura Crossroads and continues along local roads to the Bottlehill Landfill site entrance.

Route 2 follows the M8 motorway north from the Dunkettle interchange as far as Junction 14 north of Fermoy, and then follows the R639 into Fermoy town where it turns west to join the N72 which runs parallel to the Blackwater River towards Mallow. The route leaves the N72 to turn south at Leacht crossroads near Ballyhooly and crosses the River Blackwater via Ballyhooly Bridge. After this the route travels along local roads to the access point for the northern cluster site.

Nodes 1.0, 1.1, 1.2, and 1.2.1 are located in urban locations and will require street furniture removal only. which will not result in any effects to European sites due to nature and limited scope of works, or lack of connectivity with European sites. Thus, they are omitted. Only those nodes with potential to affect European sites are covered here. These nodes are described in the text below, and summarised in Table 3-1 below.

Route 1 contains 4 relevant nodes; nodes 1.3 & 1.4 are at the slip road junction linking the R635 to the N8. The first of these (Nodes 1.0 - 1.2.1) will require street furniture removal only. Node 1.3 will require hedge/tree trimming, and ramping of an existing traffic splitter island. The next (Node 1.4) requires removal of a street light and may require extra load bearing along a section of road verge. Node 1.6 at the N20/L2950 junction requires scrub trimming for oversail.

Route 2 contains 15 nodes; these are at M8 Junction 14, R639/N72 Junction (Fermoy Town), immediately east of Fermoy Town, at Ballyhooly, near Bloomfield Crossroads to the south of Ballyhooly Bridge, and along the local road approaching the proposed windfarm site.

Node 2.0 at M8 Junction 14 will require removal of street furniture, hedge trimming, and extra load bearing on sections of grassed verges. Node 2.1 in Fermoy Town will require removal of street furniture and ramping of two splitter islands. Node 2.2 east of Fermoy will require tree trimming. Node 2.3 east of Fermoy will require removal of a low bank, and possibly also load bearing along the road verge. Node 2.4 which is in the same area will require removal of road signs, and load bearing along the road verge. Node 2.5 at Ballyhooly will require lowering of a section of hedgerow, removal of a section of wall, and load bearing in sections of verges. Node 2.6 at Ballyhooly will require lowering of a stone wall to ground level and regrading of the hillside behind the wall. Node 2.7 at Ballyhooly will require lowering of a section of wall and load bearing along the road verge. Node 2.8 to the south of Bloomfield Crossroads will require road widening and tree felling.

Nodes 2.9 and 2.10, will require road widening and tree felling. Road widening, lowering of hedge/bank and tree trimming is required at Node 2.11; tree trimming at Node 2.12; scrub trimming at Node 2.13.

See Figure 3-1 below for node locations and load-bearing/oversail areas.

3.1 Turbine Deliveries

A maximum of 15 turbines will be delivered along Route 1 to the western site (Bottlehill/Mullenaboree), while a maximum of 7 will be delivered via Route 2 to the eastern site (Knockdoorty). Deliveries will take place at night.

The components making up each turbine are blades, tower segments and nacelle. The TDR nodes have been designed to accommodate the delivery of wind turbines with a maximum rotor diameter of up to 139m and a tip height of up to 169m.

The actions and/or works required at each node are summarised in Table 3-1 below. Distances from nodes to European sites within 15km are also included.

Table 3-1: Works by Node, Relevant European Sites & Distances

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection
Route 1 Tivoli-Bottlehill				
1.0	Street furniture removal	Great Island Channel SAC (001058)	5.36km	No
		Cork Harbour SPA (004030)	0.40km	No
1.1	Street furniture removal	Great Island Channel SAC (001058)	5.70km	No
		Cork Harbour SPA (004030)	0.24km	No
1.2	Street furniture removal	Great Island Channel SAC (001058)	6.95km	No
		Cork Harbour SPA (004030)	2.06km	No
1.2.1	Street furniture removal	Great Island Channel SAC (001058)	5.73km	No
		Cork Harbour SPA (004030)	0.005km	No
1.3	Street furniture removal, hedge/tree trimming, ramping of existing traffic splitter island.	Cork Harbour SPA (004030)	1.6 km	No
		Great Island Channel SAC (001058)	5.6 km	
		Blackwater River (Cork/Waterford) SAC (002170)	14.3 km	
1.4	Removal of street light and extra load bearing along a section of road verge. Minimal vegetation trimming	Cork Harbour SPA (004030)	1.6 km	No
		Great Island Channel SAC (001058)	5.6 km	
		Blackwater River (Cork/Waterford) SAC (002170)	14.3 km	
1.6	Scrub clearance and furniture removal	Blackwater River (Cork/Waterford) SAC (002170)	4.4 km	No

Route 2 Dunkettle – Nagle's Mountains	Works / actions	EU Site	Distance from node	Hydrological Connection
2.0	Removal of street furniture, hedge trimming, extra load bearing on sections of grassed verges.	Blackwater River (Cork/Waterford) SAC (002170)	1.8 km	No
		Blackwater Callows SPA (004094)	1.8 km	
		Lower River Suir SAC (002137)	14 km	

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection
2.1	Removal of street furniture, ramping of two splitter islands (using asphalt wedges).	Blackwater River (Cork/Waterford) SAC (002170)	170 m	Potential connection via road drainage. Surface runoff drains into numerous grates uphill of Blackwater.
		Blackwater Callows SPA (004094)	1.3 km	
2.2	Hedge trimming; reduce to 3m over road level & 2.5m depth. Pole and streetlight removed/ relocated.	Blackwater River (Cork/Waterford) SAC (002170)	90 m	No
		Blackwater Callows SPA (004094)	2 km	
2.3	Removal of roadside bank and also load bearing along the road verge.	Blackwater River (Cork/Waterford) SAC (002170)	10 m	No direct connection (no drainage network). No potential for road verge runoff towards Blackwater.
		Blackwater Callows SPA (004094)	2.8 km	
2.4	Removal of road signs and load bearing along the road verge.	Blackwater River (Cork/Waterford) SAC (002170)	220 m	No direct connection (no drainage network). No potential for road verge runoff towards Blackwater.
		Blackwater Callows SPA (004094)	3 km	
2.5	Removal of pole and road signs, lowering of wall (south side) and bank (north side)	Blackwater River (Cork/Waterford) SAC (002170)	435 m	Potential indirect connection (drain inlet in road surface adjacent to wall)
		Blackwater Callows SPA (004094)	8.8 km	
2.6	Lowering of [retaining] wall and re-grading of slope.	Blackwater River (Cork/Waterford) SAC (002170)	130 m	No
		Blackwater Callows SPA (004094)	9 km	
2.7	Lowering of a section of wall. Load bearing to verge. Pole and street furniture to be removed/relocated.	Blackwater River (Cork/Waterford) SAC (002170)	65 m	Potential remote indirect connection via surface runoff.
		Blackwater Callows SPA (004094)	9.3 km	
2.8	Laying of temporary hardcore and tree felling	Blackwater River (Cork/Waterford) SAC (002170)	115 m	Potential remote indirect connection via surface runoff.
		Blackwater Callows SPA (004094)	9.7 km	
2.9	Laying of temporary hardcore to road verges for load-bearing surface and tree trimming.	Blackwater River (Cork/Waterford) SAC (002170)	355 m	Potential remote indirect connection via surface runoff.
		Blackwater Callows SPA (004094)	9.6 km	

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection
2.10	Laying of temporary hardcore to road verges for load-bearing surface and tree trimming.	Blackwater River (Cork/Waterford) SAC (002170)	720 m	Potential remote indirect connection via surface runoff.
		Blackwater Callows SPA (004094)	9.6 km	
2.11	Laying of temporary hardcore to road verges for load-bearing and hedgerow trimming. Pole to be removed/relocated.	Blackwater River (Cork/Waterford) SAC (002170)	1.3 km	No
		Blackwater Callows SPA (004094)	10.2 km	
2.12	Vegetation trimming. Street furniture to be removed/relocated.	Blackwater River (Cork/Waterford) SAC (002170)	2.8 km	Yes; node is at bridge over Lisheen Cross Roads Watercourse, c. *3.3 km upstream of Blackwater River (Cork/Waterford) SAC.*
		Blackwater Callows SPA (004094)	10.9 km	
2.13	Laying of temporary hardcore and hedge trimming. Tree trimming.	Blackwater River (Cork/Waterford) SAC (002170)	1.4 km	Yes; drainage ditch at node flows towards Lisheen Cross Roads Watercourse, c. *3.7 km upstream of Blackwater River (Cork/Waterford) SAC.*
		Blackwater Callows SPA (004094)	10.9 km	
Junction 1	Removal of road signage and street furniture within footprint of vehicle swept path. Removal of pole within footprint of vehicle swept path on south side of main road. Load bearing surface to be constructed in verges on south side of main road within wheel extents. Will consist of stripping and removal of topsoil, laying and compacting suitable aggregate to create running surface.	Blackwater River (Cork/Waterford) SAC (002170)	3.86km	No

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection
	Re-direct existing surface drain in verge on south side of main road through pipe culvert. Load bearing surface to be constructed in verge on NE side of junction within wheel extents. Remove section of concrete fence on north side of main road back as far as inner cattle gate.			
Junction 2	Minor vegetation trimming on east side of public road where oversail interacts with existing hedgerow at two locations.	Blackwater River (Cork/Waterford) SAC (002170)	3.71km	No
Offsite Turning and Transfer Area	Widening of existing bellmouth and upgrade and widening of existing access tracks in area shown. Removal of trees and construction of aggregate hard standing in area shown (same construction as wind farm hard standings)	Blackwater River (Cork/Waterford) SAC (002170)	5.87km	No

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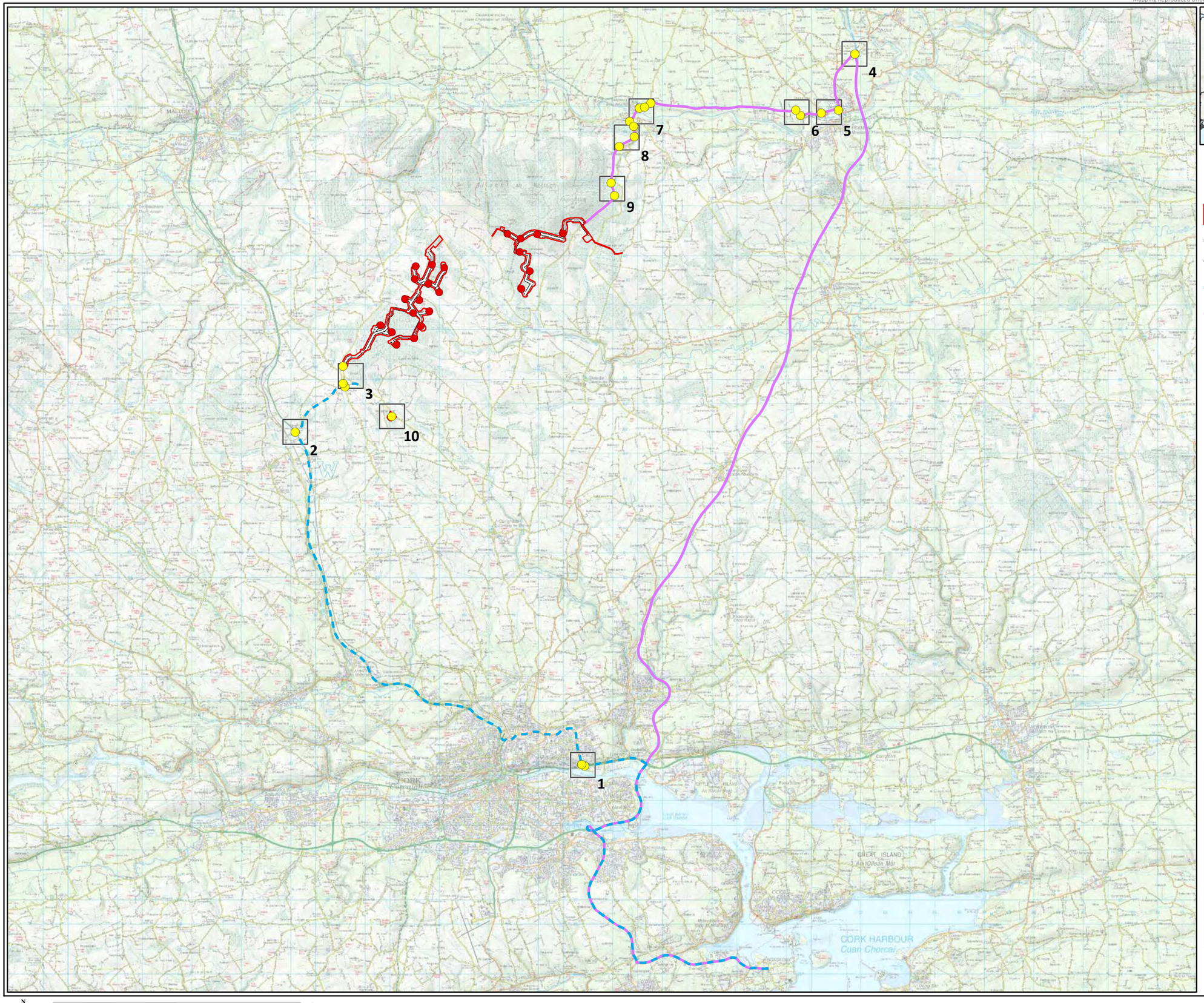

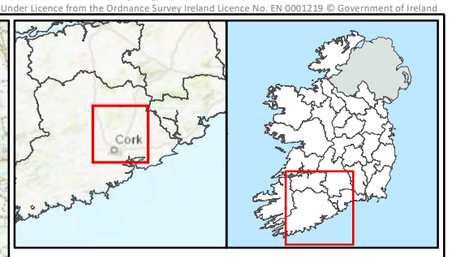

- TDR Nodes
- Proposed Turbine Layout
- Proposed Development Boundary
- Proposed Access Roads

Turbine Delivery Route Options

- Route 1
- Route 2

N W E S

0 2.5 5 10 Kilometers

TITLE:	Turbine Delivery Routes Overview		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:150000	**REVISION:**	0
DATE:	28/09/2020	**PAGE SIZE:**	A3

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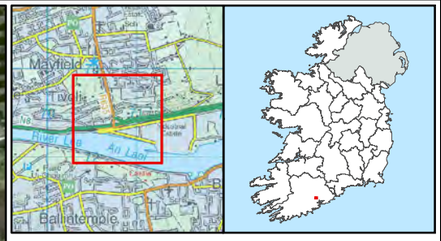

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 1

N W E S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 1		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.2		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:2500	**REVISION:**	0
DATE:	28/09/2020	**PAGE SIZE:**	A3

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TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 1

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 2		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.3		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3500	**REVISION:**	0
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TDR Nodes

Proposed Development Boundary

Proposed Nodes Upgrade Areas

Proposed Access Roads

Turbine Delivery Route Options

Route 1

TITLE:	Turbine Delivery Routes Submap 3		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.4		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3750	**REVISION:**	0
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N W E S

0 50 100 200 Meters

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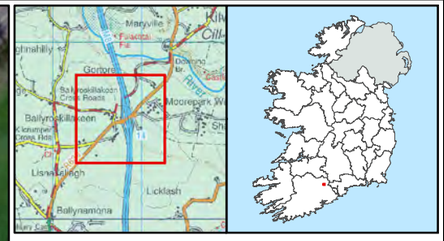

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 4		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.5		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:2500	**REVISION:**	0
DATE:	28/09/2020	**PAGE SIZE:**	A3

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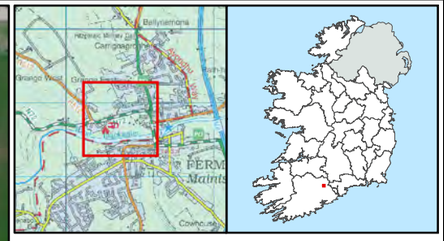

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 5		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.6		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3000	**REVISION:**	0
DATE:	28/09/2020	**PAGE SIZE:**	A3

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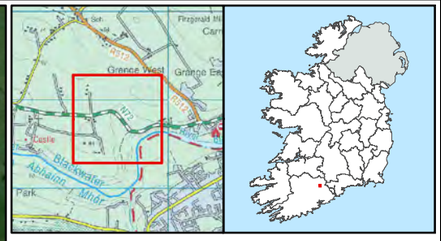

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 6		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.7		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:2500	**REVISION:**	0
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TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 7		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.8		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3500	**REVISION:**	0
DATE:	28/09/2020	**PAGE SIZE:**	A3

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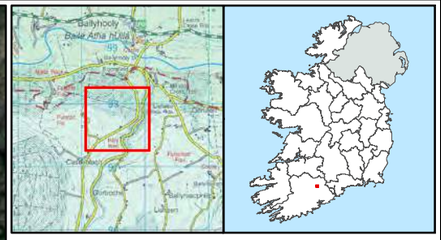

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 8		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.9		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3500	**REVISION:**	0
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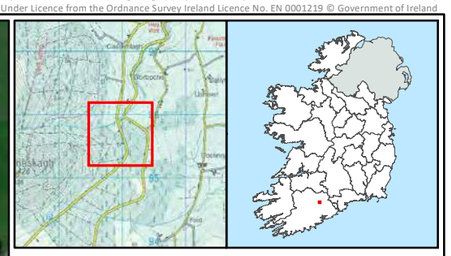

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 9		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.10		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3500	**REVISION:**	0
DATE:	28/09/2020	**PAGE SIZE:**	A3

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TDR Nodes

Proposed Nodes Upgrade Areas

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 10		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.3.11		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3500	**REVISION:**	0
DATE:	28/09/2020	**PAGE SIZE:**	A3

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4. STAGE ONE - SCREENING REPORT

4.1 Brief Description of Relevant Nodes

Load bearing areas will require lowering to existing road level and placement of aggregate. Oversail areas (unless otherwise specified) require all obstructions to be lowered to 300mm above road level. In a small number of instances (where rear oversail only is required) obstructions protruding to a height (e.g. trees and bushes) are required to be removed.

4.1.1 Node 1.0

Street furniture removal only.

BL3 Buildings and artificial surfaces

4.1.2 Node 1.1

Street furniture removal only.

BL3 Buildings and artificial surfaces

4.1.3 Node 1.2

Street furniture removal only.

BL3 Buildings and artificial surfaces
WS3 Ornamental / non-native shrub

4.1.4 Node 1.2.1

Street furniture removal only.

BL3 Buildings and artificial surfaces

4.1.5 Node 1.3

Oversail area (tree trimming; lower wall)

Atlantic cedar *Cedrus atlanica*, (GA2) Amenity Grassland underneath.

Load bearing area

(GS2/ED3) Grassy Verges/ Recolonising Bare Ground Mosaic.

One patch of non-native invasive species old man's beard *Clematis vitalba* (5 x 2m) is present within the load-bearing footprint (51.903399, -8.423718)

4.1.6 Node 1.4

Oversail 1 (behind Kevin O'Leary's garage).

(Removal of street light and extra load bearing along a section of road verge. Minimal vegetation trimming).

(ED3) Recolonising Bare Ground.

Oversail 2 (western boundary of Clayton Silversprings Hotel)

(lower wall & grassed bank; minimal tree trimming)

(GA2) Amenity Grassland; (WD1) Mixed Broadleaved Woodland and (BL3) Buildings and Artificial Surfaces.

Some creeping growths of the non-native invasive species old man's beard are present in trees crowns and lower branches.

Load bearing

(GS2) Grassy Verges; overhung by young horse chestnut tree.

Non-native invasive species cherry laurel *Prunus lauroceracus* is present adjacent to grassy verges , but not in load bearing footprint.

Non-native invasive species Japanese knotweed *Fallopia japonica* is present in area, but > 7m from load-bearing footprint.

4.1.7 Node 1.6

Oversail 1 (west side of N20) (rear oversail only)

(street furniture removal required; minimal shrub trimming).

(GS2/WS1) Grassy Verges/Scrub mosaic. Bramble-dominated scrub, trimming limited to 1 small protruding hazel *Corylus avellana.*

Oversail 2 (corner at N20/L2950 junction)

(street furniture removal required; minimal gorse scrub trimming)

(GS2/WS1) Grassy Verges/Scrub mosaic.

Although the Commons 19 stream (tributary of the Manin, tributary of Shounagh, tributary of River Lee) is located nearby, no hydrological link is present, due to the nature of the proposed works and the presence of a cattle underpass separating the nodes from the stream.

4.1.8 Node 2.0

Load bearing (eastern side of roundabout)

(lowering of sections of bank, minimal scrub clearance).

(GS2) Grassy Verges and (WS1) Scrub. Section of bank and minimal scrub clearance at edge of immature motorway planting.

Oversail (western side of roundabout)

(ED3/GS2) Recolonising Bare Ground/ Grassy Verges Mosaic, WS1 Scrub. Bank with young trees (motorway planting) on top.

The non-native invasive species winter heliotrope *Petasites fragrans* is present dominating the vegetation covering the bank. As this will be required to be lowered to 300mm, interaction with winter heliotrope will occur.

4.1.9 Node 2.1

Oversail areas (street furniture removal; ramping of splitter islands)

(BL3) Buildings and Artificial Surfaces; no vegetated habitats.

Ramping of traffic islands will be carried out using asphalt.

Numerous drain grates are present in the road surface between the River Blackwater which is located downhill to the south and the traffic islands. A path for direct surface runoff to the Blackwater exists via the carpark at the north-eastern corner of Kent Bridge. It is highly unlikely runoff would travel along this path however, due to the large number of drain grates/inlets between the traffic islands and the Blackwater.

Considering the above, an indirect hydrological connection between the traffic islands and the Blackwater River (Cork/Waterford) SAC (002170) 170m to the south is likely to exist.

4.1.10 Node 2.2

Oversail (west)

(street furniture only)

Oversail (east) (rear oversail only)

(bushy trees over/behind wall require trimming)

(BL1) Stone Walls and Other Stonework and (WD1) Mixed Broadleaved Woodland. Trees require trimming to height of 3m, depth 2.5m. Area near wall is lower, bushy, regularly trimmed; larger trees are set back several metres.

The non-native invasive species Himalayan honeysuckle *Leycesteria formosa* (1 small plant) is present immediately to the east of the swept path growing on top of the wall at 52.140778, -8.286207.

While it is present outside of the swept area, it is in close proximity to the vegetation-clearance footprint. Thus, there is a potential for interaction to occur.

4.1.11 Node 2.3

Oversail

(requires hedgerow/bank to be lowered to 300mm)

(GS2) Grassy Verges and (WL1) Hedgerows; tightly trimmed verge and ash/ivy hedgerow.

The non-native invasive species old man's beard is present in the hedgerow; an interaction with this species will occur as it is within the vegetation-clearance footprint.

No drainage ditches or direct drainage link to Blackwater are present; the node and river are separated by walls, banks, vegetation. An indirect connection via road surface runoff with the Blackwater River (Cork/Waterford) SAC (002170) 100m to the south may exist.

4.1.12 Node 2.4

Load bearing

(lowering of load bearing area to road level).

(GS2/BL2) Grassy Verges/Earth Banks Mosaic. Trimmed grassy verges bordered by bank covered in (GS2). One trimmed sessile oak *Quercus robur* is also present.

The verge rises above road level so earth required to be removed. The non-native invasive species winter heliotrope *Petasites fragrans* is present over large parts of verge and bank, so an interaction will occur.

No drainage ditches or direct drainage link to Blackwater are present; the node and river are separated by walls, banks, vegetation. An indirect hydrological connection with the Blackwater River (Cork/Waterford) SAC (002170) 220m to the south via road surface runoff may exist.

4.1.13 Node 2.5

Oversail/load bearing (north)

(levelling/lowering of hedgerow/bank)

(GA2) Amenity grassland and (GS2/BL2/WL1) Grassy Verges/Earth Banks/Hedgerow Mosaic

One section is bank with grass-dominated vegetation; this becomes a trimmed hawthorn and bramble hedge as the field boundary turns the corner.

Oversail/load bearing (south)

(levelling of section of wall)

(BL1/BL3) Stone Walls and Other Stonework/Buildings and Artificial Surfaces; old stone wall covered in ivy in parts, bordered by Grassy Verges (GS2). Part of wall is newer/re-pointed.

A drain grate is present adjacent to the wall, potentially providing an indirect hydrological connection with the Blackwater River (Cork/Waterford) SAC (002170), although this European site is located 480m to the south.

4.1.14 Node 2.6

Oversail

(levelling of wall & re-grading of hillside slope)

(BL1) Stone Walls and Other Stonework, (GS2) Grassy Verges and (GA1) Improved Agricultural Grassland. Densely vegetated retaining wall below steep hillside, grassy verges on both sides of wall, with agricultural grassland on hillside behind wall.

4.1.15 Node 2.7

Oversail/load bearing

(levelling/lowering of stone wall)

(BL1) Stone Walls and Other Stonework, (GS2) Grassy Verges and (GA1) Improved Agricultural Grassland. Old stone wall with heavy growths of ivy with grassy verges running alongside. The field behind the wall is GA1.

No direct drainage connection to the Blackwater is present; no direct runoff paths exist along the road, which is separated from the river by walls. Weep holes are likely to be in place at the bottom of the walls lining the road draining into adjacent fields. As such, a remote indirect hydrological connection with the Blackwater River (Cork/Waterford) SAC (002170) 180m to the south may exist via surface runoff.

4.1.16 Node 2.8

Load-bearing

(felling of area of mixed broadleaved woodland, levelling to match existing road)

(WD1) Mixed broadleaved woodland and (GS2) Grassy verges; The section of woodland proposed for clearing is mixed broadleaved woodland dominated by fully-grown beech *Fagus sylvatica* and Spanish chestnut *Castanea sativa* trees. Grassy verges border the woodland.

No drainage network providing a direct pathway to the Blackwater River (Cork/Waterford) SAC (002170) (260m to the north) is present; runoff along the road may occur, but walls are present along roadsides near river, so any potential pathway is through agricultural fields rather than directly from road/bridge surface.

4.1.17 Node 2.9

Load-bearing, oversail

(felling of area of mixed broadleaved woodland, levelling to match existing road & 300mm above existing ground level).

(WD1) Mixed Broadleaved Woodland (similar to 2.8 above).

Limited potential for surface runoff along road towards the Blackwater River (Cork/Waterford) SAC (002170) as in node 2.8 above; lower potential due to greater distance (505m).

4.1.18 Node 2.10

Load-bearing, oversail

(felling of area of mixed broadleaved woodland, levelling to match existing road & 300mm above existing ground level)

(WD1) Mixed Broadleaved Woodland (similar to node 2.8 above).

Limited potential for surface runoff along road towards the Blackwater River (Cork/Waterford) SAC (002170) as in nodes 2.8 & 2.9 above; limited potential due to greater distance (895m).

4.1.19 Node 2.11

Load-bearing, oversail

(lowering of section of wall to road level, lowering remainder to 300mm)

(BL1/WL1) Stone Walls and Other Stonework/Hedgerows. Vegetated stone wall with occasional hawthorn trees.

4.1.20 Node 2.12

Oversail

(scrub trimming, lowering of bridge parapet)

(WS1) Scrub, (GS2) Grassy Verges, (BL3) Stone Walls and Other Stonework; willow scrub bordered by grassy verge; bridge parapet.

The bridge at this location spans the Lisheen Crossroads river, which runs in a north-easterly direction for c. 3.3 km before joining the Blackwater River (Cork/Waterford) SAC (002170) at Ballyhooly. The channel in the vicinity of the bridge is bordered by riparian woodland, which forms a dense canopy.

No signs of otter or holts were recorded during the survey 150m up and down-stream of the bridge.

4.1.21 Node 2.13

Oversail

(scrub trimming)

(WS1) Scrub, (HH1/GS2) Dry Siliceous Heath/Grassy Verges Mosaic. Willow-dominated scrub bordering sitka spruce plantation. The road verge supports dry heath species including tormentil *Potentilla erecta*, bilberry *Vaccinium myrtilus*, and ling *Calluna vulgaris*, while a number of species commonly found in roadside verges including silverweed *Potentilla anserina* lesser stitchwort *Stellaria graminea* and Herb-Robert.

A drainage channel carrying flowing water is present along the western side of the road within the swept area from 52.110507, -8.408371, flowing in a northerly direction into the Lisheen crossroads stream, c. 480m north, which is a tributary of the Blackwater (see Node 2.12 above).

4.1.22 Junction 1

Load bearing area

Hedgerow (WL1) (GS2)

Hedgerow is comprised of an ornamental species of beech *Fagus* sp., with intermittent immature elder *Sambucus nigra* trees.

Dry meadows and grassy verges.

Common sorrel *Rumex acetosa,* creeping buttercup *Ranuculus repens,* annual meadow grass *Poa annua*, broad-leaved dock *Rumex obtusifolius,* and yarrow *Achillea millefolium*. One patch of non-native invasive species Montbretia *Crocosmia x crocosmiiflora* (1m^2) at 52.040251, -8.566234. There will be an interaction with this non-native invasive species as it is within the load-bearing footprint.

A 1st order stream, Slievedotia_19 (IE_SW_19M010300) was visible on EPA map viewer. However, this was not observed on site as it has since been culverted underground during previous roadworks. There will be no interference with this during the proposed works. As such, there is no hydrological connection to designated sites.

4.1.23 Junction 2

Habitat Type

Oversail area

Hedgerow (WL1) x Treeline (WL2)

This habitat is dominated by hawthorn *Crataegus monogyna*, and abundant ash *Fraxinus excelsior*.

Dry meadows and grassy verges (GS2)

There is an area of this habitat at the junction. It is comprised of common species, such as creeping buttercup *Ranuculus repens,* annual meadow grass *Poa annua*, broad-leaved dock *Rumex obtusifolius,* and yarrow *Achillea millefolium*.

No invasive species were recorded.

4.1.24 Offsite Turning and Transfer Area

Scrub (WS1) x Dry meadows and grassy verges (GS2) matrix

This habitat is present as narrow strips at the entrance of the turning area, and either side of the forestry track. The scrub is dominated by willow *Salix caprea*, and willowherb *Epilobium hirsutum.* Alder *Alnus glutinosa* is also abundant. Lower vegetation is dominated by knapweed *Centaurea nigra* and ribwort plantain *Plantago lanceolata*. Common hogweed is the most dominant species recolonising bare ground. Nettles *Urtica dioica*, dock *Rumex acetosa*, and hogweed *Heracleum sphondylium* are also frequent.

Drainage ditch (FW4)

Narrow drainage ditches (c.a. 1m wide) run along either side of the forestry track. These were wet during the survey, though not flowing.

Buildings and artificial surfaces (BL3)

The access track and forestry road is comprised of an artificial surface.

Conifer plantation (WD4)

A dense, mature conifer plantation (c.a. 15-20m high) comprised mainly of sitka spruce *Picea sitchensis* is present. No invasive species were recorded.

4.2 Non-native Invasive Plant Species

The non-native invasive plants recorded at and in the vicinity of nodes are summarised in Table 4-1; their risk of invasiveness effect and legal status are outlined, and an indication whether or not they will interact with proposed works is given.

The only legally restricted species recorded was Japanese knotweed, which is outside the zone of influence. Cherry laurel, winter heliotrope and old man's beard are present within the footprint of a number of nodes. Himalayan honeysuckle is present adjacent to the vegetation clearance footprint at Node 2.2.

Table 4-1: Invasive Plant Species summary

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection	Invasive species	Impact / Legal restriction	Proximity to works	Invasive species details	Mode of spread
Route 1 Tivoli-Bottlehill									
1.0	Street furniture removal	Cork Harbour SPA (004030) Great Island Channel SAC (001058)	0.40km 5.36km	No	No	No impact; no legal restriction.	N/A	No	N/A
1.1	Street furniture removal	Cork Harbour SPA (004030) Great Island Channel SAC (001058)	0.24km 5.70km	No	No	No impact; no legal restriction.	N/A	No	N/A
1.2	Street furniture removal	Cork Harbour SPA (004030) Great Island Channel SAC (001058)	2.06km 6.95km	No	No	No impact; no legal restriction.	N/A	No	N/A
1.2.1	Street furniture removal	Cork Harbour SPA (004030) Great Island Channel SAC (001058)	0.005km 5.73km	No	No	No impact; no legal restriction.	N/A	No	N/A
1.3	Street furniture removal, hedge/tree trimming,	Cork Harbour SPA (004030) Great Island Channel SAC (001058)	1.6 km 5.6 km 14.3 km	No	Old man's beard	Medium impact; no legal restriction	In load-bearing footprint In vegetation	5x2m patch in load bearing area	Seed or vegetative (stem fragments)

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection	Invasive species	Impact / Legal restriction	Proximity to works	Invasive species details	Mode of spread
	ramping of existing traffic splitter island	Blackwater River (Cork/Waterford) SAC (002170)					clearance footprint		
1.4	Removal of street light and extra load bearing along a section of road verge	Cork Harbour SPA (004030) Great Island Channel SAC (001058) Blackwater River (Cork/Waterford) SAC (002170)	1.6 km 5.6 km 14.3 km	No	Cherry laurel	High impact; no legal restriction	None	Immediately adjacent to load bearing footprint	Vegetative (suckering) or by berries/seed
					Japanese knotweed	High impact; Schedule III listed species*	None	1x 40m^2 growth, 12.5m south-west of load bearing footprint. Separated by concrete footpath. 1 x 25m^2 growth, 16m west of load bearing footprint. Separated by road.	Vegetative (stem fragments or rhizomes transported in soil)
1.6	Scrub clearance and furniture removal	Blackwater River (Cork/Waterford) SAC (002170)	4.4 km	No	No	No	No	N/A	N/A
Route 2 Dunkettle – Nagle's Mountains									
2.0	Removal of street furniture, hedge trimming, extra load bearing on sections of grassed verges	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094) Lower River Suir SAC (002137)	1.8 km 1.8 km 14 km	No	Winter heliotrope	Low impact; no legal restriction	In bank re-grading footprint	Covers 1 bank which is required to be re-graded for oversail.	Vegetative (rhizome fragments transported in soil)

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection	Invasive species	Impact / Legal restriction	Proximity to works	Invasive species details	Mode of spread
2.1	Removal of street furniture, ramping of two splitter islands (using asphalt wedges)	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	170 m 1.3 km	Potential connection via road drainage. Surface runoff drains into numerous grates uphill of Blackwater.	No	No	No	N/A	N/A
2.2	Hedge trimming; reduce to 3m over road level & 2.5m depth	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	90 m 2 km	No	Himalayan honeysuckle	Medium impact; no legal restriction	Potential-adjacent to vegetation clearance footprint	1 x small plant growing on top of wall. Swept path analysis makes shows node interaction will not occur.	Fruits/seeds
2.3	Removal of roadside bank and also load bearing along the road verge	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	10 m 2.8 km	No direct connection (no drainage network).	Old man's beard	Medium impact; no legal restriction	In vegetation clearance footprint	Present in most sections of hedge within oversail footprint.	Seed or vegetative (stem fragments)
2.4	Removal of road signs and load bearing along the road verge.	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	220 m 3 km	No direct connection (no drainage network).	Winter heliotrope	Low impact; no legal restriction	In load-bearing footprint	Infests bank along entire length of load bearing footprint and also extends into verge in places.	Vegetative (rhizome fragments transported in soil)
2.5	Removal of pole and road signs, lowering of wall (south	Blackwater River (Cork/Waterford) SAC (002170)	435 m 8.8 km	Potential indirect connection (drain inlet in road surface adjacent to wall)	No	No	No	N/A	N/A

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection	Invasive species	Impact / Legal restriction	Proximity to works	Invasive species details	Mode of spread
	side) and bank (north side)	Blackwater Callows SPA (004094)							
2.6	Lowering of [retaining] wall and re-grading of slope	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	130 m 9 km	No	No	No	No	N/A	N/A
2.7	Lowering of a section of wall and load bearing along road verge	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	65 m 9.3 km	Potential remote indirect connection via surface runoff.	No	No	No	N/A	N/A
2.8	Laying of temporary hardcore and tree felling	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	115 m 9.7 km	Potential remote indirect connection via surface runoff.	No	No	No	N/A	N/A
2.9	Laying of temporary hardcore and tree felling	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	355 m 9.6 km	Potential remote indirect connection via surface runoff.	No	No	No	N/A	N/A
2.10	Laying of temporary	Blackwater River (Cork/Waterford) SAC (002170)	720 m 9.6 km	Potential remote indirect connection via surface runoff.	No	No	No	N/A	N/A

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection	Invasive species	Impact / Legal restriction	Proximity to works	Invasive species details	Mode of spread
	hardcore and tree felling	Blackwater Callows SPA (004094)							
2.11	Laying of temporary hardcore and hedge trimming	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	1.3 km 10.2 km	No	No	No	No	N/A	N/A
2.12	Tree trimming	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	2.8 km 10.9 km	Yes; node is at bridge over Lisheen Cross Roads Watercourse, c. *3.3 km upstream of Blackwater River (Cork/Waterford) SAC.*	No	No	No	N/A	N/A
2.13	Hedge/scrub trimming	Blackwater River (Cork/Waterford) SAC (002170) Blackwater Callows SPA (004094)	1.4 km 10.9 km	Yes; drainage ditch at node flows towards Lisheen Cross Roads Watercourse, c. *3.7 km upstream of Blackwater River (Cork/Waterford) SAC.*	No	No	No	N/A	N/A

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection	Invasive species	Impact / Legal restriction	Proximity to works	Invasive species details	Mode of spread
Junction 1	Removal of road signage and street furniture within footprint of vehicle swept path. Removal of pole within footprint of vehicle swept path on south side of main road. Load bearing surface to be constructed in verges on south side of main road within wheel extents. Will consist of stripping and removal of topsoil,	Blackwater River (Cork/Waterford) SAC (002170)	3.86km	6.45km	No	Montbretia	No legal restriction	Yes. In load-bearing footprint.	Vegetative (by corms which could be transported in soil) or by seed

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection	Invasive species	Impact / Legal restriction	Proximity to works	Invasive species details	Mode of spread
	laying and compacting suitable aggregate to create running surface. Re-direct existing surface drain in verge on south side of main road through pipe culvert. Load bearing surface to be constructed in verge on NE side of junction within wheel extents. Remove section of concrete fence on								

Node	Works/actions	European Sites	Distance from Node	Hydrological Connection	Invasive species	Impact / Legal restriction	Proximity to works	Invasive species details	Mode of spread
	north side of main road back as far as inner cattle gate.								
Junction 2	Minor vegetation trimming on east side of public road where oversail interacts with existing hedgerow at two locations.	Blackwater River (Cork/Waterford) SAC (002170)	3.71km	6.29km	No	No	No	No	N/A
Offsite Turning and Transfer Area	Widening of existing bellmouth and upgrade and widening of existing access tracks in area shown Removal of trees and construction of aggregate hard standing in area shown.	Blackwater River (Cork/Waterford) SAC (002170)	5.87km	7.96km	No	No	No	No	N/A

4.3 European sites within 15 km

There are 5 European sites within the potential zone of influence (15km radius), (see Figure 4-1). Table 4-2 lists these sites, including their qualifying interests, conservation objectives and known threats and pressures (according to information provided by the NPWS).

Table 4-2: European Sites Within 15km of Nodes

Designated Site (Site Code)	Distance from Closest Node	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
Blackwater River (Cork/Waterford) SAC (002170)	10 m (Node 2.3)	To maintain/restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected	• Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] • White-clawed crayfish (*Austropotamobius pallipes*) [1092] • Sea lamprey (*Petromyzon marinus*) [1095] • Brook lamprey *(Lampetra planeri*) [1096] • River lamprey (*Lampetra fluviatilis*) [1099] • Allis shad (*Alosa alosa*) [1102] • Twaite shad (*Alosa fallax fallax*) [1103] • Salmon (*Salmo salar*) [1106] • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Perennial vegetation of stony banks [1220]	• E02 Industrial or commercial areas (medium, outside) • A08 Fertilisation (high, outside) • A03 Mowing/ cutting of grassland (high, inside) • C01.01 Sand and gravel extraction (low, outside) • J02.01 Landfill, land reclamation and drying out, general (medium, outside) • E01 Urbanised areas, human habitation (medium, outside) • B Sylviculture, forestry (low, inside) • D01.04 Railway lines, TGV (low, inside)	Given the close proximity to nodes 2.1, 2.3, and 2.7, the nature of works in these areas, and the remote hydrological link; there is a potential effect of sediment input to occur. Invasive species: Works will progress from node to node in a sequential manner and the same equipment / machinery shall be used throughout. Excavation works will be required in areas where invasive species are located. This along with

Designated Site (Site Code)	Distance from Closest Node	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
			• *Salicornia* and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Otter (*Lutra lutra*) [1355] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Killarney fern (*Trichomanes speciosum*) [1421] • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] • Old sessile oak woods with *Ilex* and *Blechnum* in British Isles [91A0] • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] • *Taxus baccata* woods of the British Isles [91J0]	• A04 Grazing (high, inside) • E03.01 Disposal of household / recreational facility waste (low, inside) • I01 Invasive non-native species (medium, outside) • G02 Sport and leisure structures (low, outside) • I01 Invasive non-native species (medium, inside) • A08 Fertilisation (high, inside) • J02.01 Landfill, land reclamation and drying out, general (low, inside) • K01.01 Erosion (low, inside) • G01.01 Nautical sports (low, inside) • B Sylviculture, forestry (medium, outside) • F02.03 Leisure fishing (medium, inside) • A04 Grazing (high, outside)	trimming could potentially result in these species spreading from node to node and colonising areas closer to the Blackwater River SAC.

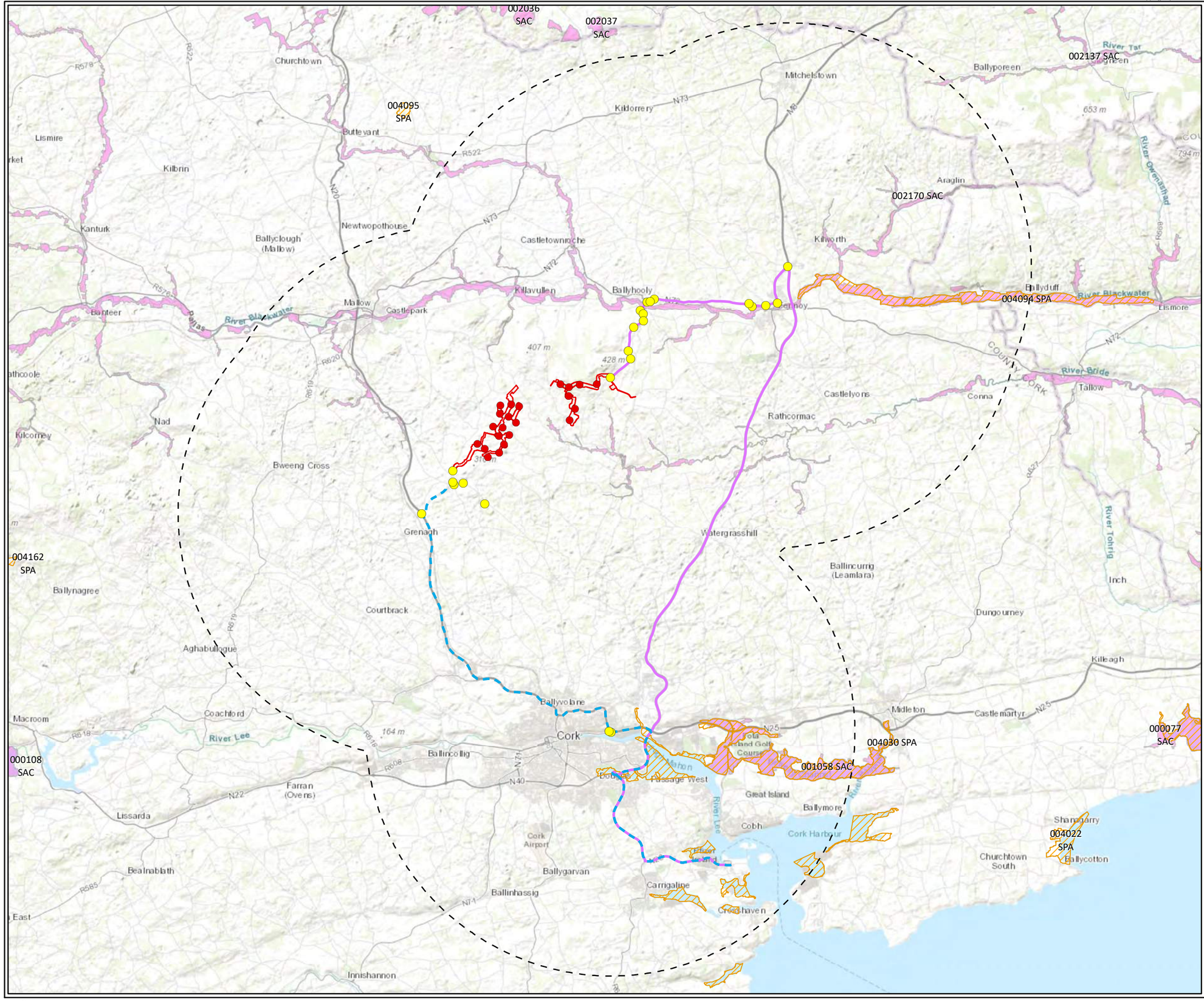
Designated Site (Site Code)	Distance from Closest Node	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
				• D01.02 Roads, motorways (low, inside).	
Blackwater Callows SPA (004094)	1.3 km (Node 2.1)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the SPA	• Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Black-tailed Godwit (*Limosa limosa*) [A156] • Wetlands & Waterbirds [A999]	• A04 Grazing (medium, inside) • A08 Fertilisation (high, outside) • F02.03 Leisure fishing (medium, inside) • E01 Urbanised areas, human habitation (high, outside) • A08 Fertilisation (high, inside)	There is no potential for significant effects to this European site for the following reasons: Potential sediment input: No potential for significant effects due to limited excavation works required and distance from SPA. Invasive species: spread of these species to this site is can be excluded due to limited scale of proposed works the distance to the European site (the closest node 2.1 is located 1.3km.
Cork Harbour SPA (004030)	0.005km (node 1.2.1)	To maintain or restore the favourable conservation condition of the bird species	• Little Grebe (*Tachybaptus ruficollis*) [A004] • Great Crested Grebe (*Podiceps cristatus*) [A005]	• G01.01 Nautical sports (medium, inside)	There is no potential for significant effects to this European site for

Designated Site (Site Code)	Distance from Closest Node	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
		listed as Special Conservation Interests for the SPA	• Cormorant (*Phalacrocorax carbo*) [A017] • Grey Heron (*Ardea cinerea*) [A028] • Shelduck (*Tadorna tadorna*) [A048] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Pintail (*Anas acuta*) [A054] • Shoveler (*Anas clypeata*) [A056] • Red-breasted Merganser (*Mergus serrator*) [A069] • Oystercatcher (*Haematopus ostralegus*) [A130] • Golden Plover (*Pluvialis apricaria*) [A140] • Grey Plover (*Pluvialis squatarola*) [A141] • Lapwing (*Vanellus vanellus*) [A142] • Dunlin (*Calidris alpina*) [A149] • Black-tailed Godwit (*Limosa limosa*) [A156] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Common Gull *(Larus canus*) [A182] • Lesser Black-backed Gull (*Larus fuscus*) [A183] • Common Tern (*Sterna hirundo*) [A193] • Wetlands & Waterbirds	• D03.02 Shipping lanes (medium, inside) • A08 Fertilisation (medium, outside) • F02.03 Leisure fishing (medium, inside) • F01 Marine and Freshwater Aquaculture (high, inside) • G01.02 Walking, horseriding and non-motorised vehicles (medium, inside) • E01.03 Dispersed habitation (low, outside) • G01.06 Skiing, off-piste (medium, inside) • E02 Industrial or commercial areas (high, outside) • D01.02 Roads, motorways (high, outside) • E01 Urbanised areas, human habitation (high, outside) • D03.01 Port areas (high, outside)	the following reasons: Nature of activities will not result in effects on conservation objectives; estuarine section of River Lee not sensitive to sediment input; no habitats of value to SCI species at nodes; invasive species Japanese knotweed, old man's beard & cherry laurel will not affect SPA habitats & SCI species.

Designated Site (Site Code)	Distance from Closest Node	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
Great Island Channel SAC (001058)	5.36km (nodes 1.0)	To maintain/restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected	• Mudflats and sandflats not covered by seawater at low tide [1140] • Atlantic salt meadows* (*Glauco-Puccinellietalia maritimae*) [1330]	• A04 Grazing (medium, inside) • I01 Invasive non-native species (medium, inside) • J02.01.02 Reclamation of land from sea, estuary or marsh (high, inside) • A08 Fertilisation (medium, outside) • D01.02 Roads, motorways (high, inside) • E01 Urbanised areas, human habitation (high, outside) • F01 Marine and Freshwater Aquaculture (high, inside) • K02.03 Eutrophication (natural) (medium, inside)	There is no potential for significant effects to this European site for the following reasons: Nature of activities will not result in effects on conservation objectives; distance between nodes and SAC; designated habitats not sensitive to sediment input; invasive species old man's beard Japanese Knotweed will not establish in tidal & saline habitats for which SAC is designated.
Lower River Suir SAC (002137)	14 km (Node 2.0)	To maintain/restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected	• Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] • White-clawed crayfish (*Austropotamobius pallipes*) [1092] • Sea lamprey (*Petromyzon*	• J02.01.02 Reclamation of land from sea, estuary or marsh (low, inside) • B Sylviculture, forestry (low, outside)	There is no potential for significant effects to this European site for the following reasons:

Designated Site (Site Code)	Distance from Closest Node	Conservation Objectives	Qualifying Interests	Threats	Screening Rationale
			marinus) [1095] • Brook lamprey (*Lampetra planeri*) [1096] • River lamprey (*Lampetra fluviatilis*) [1099] • Allis shad (*Alosa alosa*) [1102] • Twaite shad (*Alosa fallax fallax*) [1103] • Salmon (*Salmo salar*) [1106] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Otter (*Lutra lutra*) [1355] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	• E03 Discharges (high, both) • D03.01 Port areas (low, both) • H01 Pollution to surface waters (limnic, terrestrial, marine & brackish) (high, both) • A08 Fertilisation (high, outside) • J02.01 Landfill, land reclamation and drying out, general (medium, both) • J02.12.02 Dykes and flooding defence in inland water systems (high, inside) • A01 Cultivation (low, inside) • I01 Invasive non-native species (low, inside) • E01 Continuous urbanisation (high, both).	Distance and lack of connectivity to Node 2.0 (14km). Invasive species: spread of winter heliotrope to this site will not occur due to limited scale of proposed works, the distance to the European site (14km at it closest point) and the lack of a hydrological connection.

Path: R:\Map Production\2020\P20-099\Workspace\TDR AA\P20-099_Fig4-1_EuropeanSitesWithin15km_A3.mxd



TDR Nodes

Proposed Turbine Layout

15km Buffer of TDR Nodes Upgrade Areas

Proposed Development Boundary

Turbine Delivery Route Options

Route 1

Route 2

Special Protection Area (SPA)

Site Code, Site Name, Distance (m)

004030, Cork Harbour SPA, 1493

004094, Blackwater Callows SPA, 1284

Special Area of Conservation (SAC)

Site Code, Site Name, Distance (m)

001058, Great Island Channel SAC, 5473

002137, Lower River Suir SAC, 14129

002170, Blackwater River (Cork/Waterford) SAC, 9

TITLE: European Sites within 15km of TDR Nodes			
PROJECT: Coom Green Energy Park, Co. Cork			
FIGURE NO:	4.1		
CLIENT: Brookfield Renewable Ireland Ltd. & Coillte			
SCALE:	1:230000	**REVISION:**	0
DATE:	18/09/2020	**PAGE SIZE:**	A3

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4.4 Conservation Objectives

According to the Habitats Directive, the *conservation status of a natural habitat* will be taken as 'favourable' within its biogeographic range when:

- its natural range and areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable as defined below.

According to the Habitats Directive, the conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' within its biogeographic range when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The specific conservation objectives for each site are available on www.npws.ie. These have been accessed for the sites listed in Table 4-2 above on the 18th November 2020.

Site specific conservation objectives were available for the following sites:

- Blackwater River (Cork/Waterford) SAC (Site Code 002170) published on the 31st of July 2012
- Lower River Suir SAC (Site Code 002137) published on the 28th March 2017
- Great Island Channel SAC (001058) produced on the 6th June 2014
- Cork Harbour SPA (004030) produced on the 16th Dec 2014.

Generic Conservation Objectives were available for the following site:

- NPWS (2020) Conservation objectives for Blackwater Callows SPA [004094]. Generic Version 7.0. Department of Culture, Heritage and the Gaeltacht.

The following conservation objectives supporting documents have been produced for the Great Island Channel SAC (site code 1058):

- Great Island Channel SAC (site code 001058) Conservation Objectives Supporting Document - Coastal Habitats NPWS [Version 1] - May 2014
- Great Island Channel SAC (site code: 001058) Conservation Objectives Supporting Document - Marine Habitats NPWS [Version 1] - May 2014
- (McCorry and Ryle (2009) Saltmarsh Monitoring Project 2007-2008 Volume 2 (unpublished report)

The following conservation objectives supporting documents have been produced for Cork Harbour SPA (site code 004030):

- Cork Harbour SPA (004030) Conservation Objectives Supporting Document - [Version 1] - November 2014.

The following conservation objectives supporting documents have been produced for the Blackwater River (Cork/Waterford) SAC (Site Code 002170):

- River Blackwater (Cork/Waterford) SAC (site code 2170) Conservation objectives supporting document -woodland habitats. Version 1. July 2012.
- River Blackwater (Cork/Waterford) SAC (site code 2170) Conservation objectives supporting document - marine habitats. Version 1. January 2012.
- River Blackwater (Cork/Waterford) SAC (site code 2170) Conservation objectives supporting document - coastal habitats. Version 1. February 2012.

The following conservation objectives supporting documents have been produced for Lower River Suir SAC (Site Code 002137):

- Lower River Suir SAC (Site Code 002137) Conservation objectives supporting document - Coastal habitats. Version 1. March 2017.
- Benthic Biotope classification of subtidal sedimentary habitats in the Lower River Suir candidate Special Area of Conservation and the River Nore and River Barrow Candidate Special Area of Conservation. July 2008.

Management plans were not available for any sites.

All conservation objectives together with other designated site information are available through the NPWS protected sites portal https://www.npws.ie/protected-sites.

4.5 Potential Cumulative Effects

A planning search limited to the previous 5 years (from 18th November 2020) was carried out through the Cork County Council online enquiry system at http://maps.corkcoco.ie/PlanningEnquiryV3/MainFrames.aspx to search for proposed, permitted or operational developments in the townlands overlapping and abutting those nodes in close proximity to and/or with potential connectivity to European Sites at which proposed activities (due to their nature) have potential to result in effects on the same European Sites.

Those nodes for which a planning search to assess potential for cumulative effects in conjunction with other projects was not necessary are listed below in Table 4-3 along with corresponding reasons for omission.

Table 4-3: TDR Nodes not requiring planning search (scope of work for each node outlined in section 4.1)

Node	Rationale
1.0	The scope of works at this node have no potential to result in effects on conservation objectives; no invasive species present.
1.1	The scope of works at this node have no potential to result in effects on conservation objectives; no invasive species present.
1.2	The scope of works at this node have no potential to result in effects on conservation objectives; no invasive species present.
1.2.1	The scope of works at this node have no potential to result in effects on conservation objectives; no invasive species present.
1.3	The scope of works at this node have no potential to result in effects on conservation objectives due to the distance from European sites. Invasive species will not spread to European sites given the distance (closest European site is Cork Harbour SPA at 1.6km which is maritime in nature, and the habitats within this SPA are not suitable for colonisation by these invasive species). The estuarine section of River Lee is not sensitive to sediment input.
1.4	The scope of works at this node has no potential to result in effects on conservation objectives due to the distance from European sites. no interference with invasive species; estuarine section of River Lee is not sensitive to sediment input.
1.6	The scope of works at this node have no potential to result in effects on conservation objectives due to the distance from European sites and no interference with invasive species.
2.0	The scope of works at this node have no potential to result in effects on conservation objectives due to the distance from European sites.
2.11	The scope of works at this node have no potential to result in effects on conservation objectives; distance from European sites; no invasive species present.
2.13	The scope of works at this node have no potential to result in effects on conservation objectives due to the distance from European sites and no invasive species are present.
Junction 1	The scope of works at this node, have well as a lack of connectivity and distance from European sites means invasive species will not be spread from this site.
Junction 2	The scope of works at this node, have well as a lack of connectivity and distance from European sites; no invasive species present.
Offsite Turning and Transfer Area	The scope of works at this node, as well as a lack of connectivity and distance from European sites; no invasive species present.

Planning searches were carried out for the remainder of nodes due to the nature of activities proposed and/or their close proximity and potential connectivity to European sites; results are detailed below (Table 4-4) and an assessment included in Table 4-5:

Table 4-4: TDR Node Planning Searches

Node	Relevant Townlands	Permitted/proposed Developments
2.1	Carrignagrohera Rathealy Grange East	[Permitted] small—scale domestic developments; extension to club house and erection of pitch lighting at football club; retirement & demolition of 38kV ESB substation building. (Grange East). [Permitted] dwelling house extension (Rathealy). No permitted or proposed developments in Carrignagrohera during previous 5 years.
2.3	Grange West Grange East Castlehyde East	Grange East: as above. Grange West: [permitted] Extensions & alterations to existing domestic properties. Castlehyde East: [permitted] a number of extensions/alterations, demolitions & new structures associated with Castlehyde Stud Farm
2.4	Grange West Castlehyde East Castlehyde	Grange West & Castlehyde East: as above Castlehyde: [permitted] alterations to domestic properties
2.5	Kilathy Ballyhooly South Conva Ballyhooly North	Ballyhooly South: [permitted] several new dwelling houses to be constructed on serviced sites; extension to existing GAA clubhouse; [new application] removal of 16 partially constructed houses and construction of 20 semi-detached 2 storey houses. NIS to be submitted along with application. Conva: [permitted] domestic developments including one-off houses, extensions & wastewater treatment unit upgrades. Ballyhooly North: [permitted] one-off domestic developments; 2 single storey extensions to national school; removal of 7 no. partially constructed house bases and construction of 6 no semi-detached 3 storey houses and 8 no. residential serviced sites and associated site works. [proposed] 10-unit housing development. No permitted or proposed developments in Kilathy during previous 5 years.
2.6	Kilathy Ballyhooly south Conva Ballyhooly North	As for 2.5 above
2.7	Kilathy Ballyhooly south Conva Ballyhooly North	As for 2.5 & 2.6 above

Node	Relevant Townlands	Permitted/proposed Developments
2.8	Castleblagh Gortroche	Castleblagh: [permitted] 1 new dwelling house Gortroche: [further information] demolition of former creamery and construction of detached dwelling house and all associated site works. [permitted] one-off domestic developments; new vehicular access to facilitate forestry works; livestock underpass
2.9	Castleblagh Gortroche	As above
2.10	Castleblagh Gortroche	As above
2.12	Castleblagh Gortroche	As above

4.6 Screening Matrix

Throughout this section the line items in *italics* refer to suggested instructions for information to be contained in a screening assessment, and in an appropriate assessment from the guidance document '*Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*', (European Commission, 2001). The standard 'Screening Matrix' and 'Finding of No Significant Effects Report Matrix' in Annex 2 of this guidance document are also followed.

Table 4-5: Assessment of the Potential effect of the Proposed Project either Alone or in Combination with Other Plans or Projects on European (Natura 2000) Sites

Assessment criteria	
Brief description of project or plan	Vegetation clearance, temporary road widening consisting levelling of ground to match existing road and placement of aggregate, removal of obstructions such as walls and street furniture from swept path (mid and rear oversail), ramping of traffic island at Node 2.1 using asphalt. Mid oversail requires obstructions to be lowered to 300mm above ground level; rear oversail is 3m over road. The above measures are required in isolation or in combination depending on conditions at each node; the measures as required for each node are listed in Table 3-1 and described in detail in section 4.1 *Brief description of relevant Nodes.*
Brief description of the Natura 2000 (European) Sites	• Blackwater River (Cork/Waterford) SAC (Site Code 002170) is within 15km of [all] Nodes (closest is Node 2.3: 10 m) • Blackwater Callows SPA (Site Code 004094) is within 15km of Nodes [2.0 - 2.13] (closest is Node 2.1: 1.3 km)

Assessment criteria	
	• Cork Harbour SPA (Site Code 004030) is within 15km of Nodes [1.3 & 1.4] (Nodes 1.3 & 1.4: 1.6 km) • Great Island Channel SAC* (Site Code 001058) is within 15km of Nodes [1.3 & 1.4] (Nodes 1.3 & 1.4: 5.6 km) • Lower River Suir SAC (Site Code 002137) is within 15km of Node [2.0] (14 km) *See* Table 3-1 *for distances between each node and European sites within 15km.*
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts [effects] on the Natura 2000 sites.	Potential effects assessed in the following section include: • Potential for sediment inputs arising from node upgrade works to result the alteration or degradation of water quality within Cork Harbour SPA (004030), Great Island Channel SAC (001058), Blackwater River (Cork/Waterford) SAC (002170) and/or Blackwater Callows SPA (004094). • Potential for asphalt runoff (Node 2.1 only) to have effects on aquatic species within the Blackwater River (Cork/Waterford) SAC (002170). • Potential for the spread of non-native invasive plant species to Cork Harbour SPA (004030), Great Island Channel SAC (001058), Blackwater River (Cork/Waterford) SAC (002170), Lower River Suir SAC (002137) and/or Blackwater Callows SPA (004094) caused by node upgrade works (transport of vector material such as seeds, vegetative reproductive material or contaminated soil).
Describe any likely direct, indirect or secondary effects of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of: ▪ *Size and scale;* ▪ *Land-take;* ▪ *Distance from Natura 2000 site or key features of the site;* ▪ *Resource requirements;* ▪ *Emissions;* ▪ *Excavation requirements;* ▪ *Transportation requirements;* ▪ *Duration of construction, operation etc.;* ▪ *Other.*	**Size and scale, land-take and distance from Natura 2000 (European) sites** **Predicted Effects:** *None* None of the nodes are located within any European site. Thus, there will be no land-take or reduction in the size of any European site. While the number (19) and extensive distribution of the nodes means the project is of a moderate-medium scale, the nodes themselves are of a small size (largest individual footprint is 10,398 m^2 : turning area), being limited to tight corners and bends along both routes. The distances of nodes from European sites range from 10m to 14 km; while a number of nodes are in close proximity [particularly to the Blackwater River (Cork/Waterford) SAC (002170)]. The closest node to Cork Harbour SPA (004030) is 1.6km (node 1.3), and all nodes lack a hydrological connection to the site. The closest node to Great Island Channel SAC (001058) is 5.6km (Nodes 1.3 and 1.4) from the site and lack a hydrological connection. Lower River Suir SAC (002137) is 14km from the closest node (2.0) and lacks a hydrological connection.

Assessment criteria	
	The closest node to Blackwater River (Cork/Waterford) SAC (002170) is 10m (node 2.3). While there is no direct hydrological connection, there is limited potential for road-verge runoff towards the Blackwater river. The closest node to Blackwater Callows SPA (004094) is 1.3km and lacks a hydrological connection. **Resource requirements and Excavation requirements** **Predicted Effects:** *None* There will be no resource requirements or excavation requirements from any European site as a result of the proposed development. **Emissions** **Predicted Effects:** *Potential spread of invasive species* The close proximity and hydrological connectivity of a number of nodes has the potential to result in significant effects on European sites through sediment input or introduction of invasive species. The spread of these species to Cork Harbour SPA (004030) will not occur due to the habitats making up the SPA providing unsuitable substrates for these species. The closest node is 1.6km (node 1.3), and all nodes lack a hydrological connection to the site. Given the distance, and lack of hydrological connection, input of deleterious matter will not occur. The closest node to Great Island Channel SAC (001058) is 5.6km (Nodes 1.3 and 1.4) from the site, and lack a hydrological connection. The qualifying features are maritime in nature, and will provide unsuitable substrates for invasive species present at the nodes (old man's beard, cherry laurel). Thus, no effect on the SAC will occur. Given the distance, and lack of hydrological connection, input of deleterious matter is will not occur. Lower River Suir SAC (002137) is 14km from node 2.0 and lacks a hydrological connection. Given the distance, and lack of hydrological connection, input of deleterious matter will not occur. The closest node to Blackwater River (Cork/Waterford) SAC (002170) is 10m (node 2.3). While there is no direct hydrological connection, there is limited potential for road-verge runoff towards the Blackwater river. There may also be a potential risk of sediment input due to the close proximity to the SAC. Sediment inputs to the Blackwater River (Cork/Waterford) SAC (002170), potentially affecting spawning beds, aquatic macroinvertebrate composition, habitat quality and ecological processes. These potential effects are considered to apply to salmon, river, brook and sea lamprey, and otter (in terms of the SAC's conservation interests). The works will progress from node to node in a sequential manner and the same equipment / machinery shall be used throughout. Excavation works will be required in areas where invasive species are located.

Assessment criteria	
	This along with trimming could potentially result in these species spreading from node to node and colonising areas closer to the Blackwater River SAC. While there is the potential for sediment input from nodes 2.2 -2.10, 2.12-2.13), the potential for significant effects to Blackwater Callows SPA (004094) can be excluded due to the limited excavation works required and the distance from SPA (closest node is 1.3km and lacks a hydrological connection). Invasive species: spread of these species to this site will not occur due to limited scale of proposed works the distance to the European site (the closest node 2.1 is located 1.3km away). Given the distance, and lack of hydrological connection, input of deleterious matter will not occur. While the potential for input of substances such as polycyclic aromatic hydrocarbons (PAHs) which can be toxic to aquatic life arising from surface runoff from asphalt used to ramp the traffic island at Node 2.1 into the Blackwater River (Cork/Waterford) SAC (002170) exists, the quantities which could be transported are negligible due to the small amount of asphalt required (c. 73m^2). In addition, it should be noted that most case studies (e.g. Mahler et. *al*, 2015; Scoggins et. *al,* 2007) demonstrating toxic effects of coal-tar on aquatic life relate to the use of concentrated coal-tar based pavement sealants which contain high levels of PAHs; asphalt "concrete" which would be used at Node 2.1 contains c. 5 % petroleum based binder material, with the remainder being made up of aggregates, in comparison to pavement sealants which are concentrated. As such, there is no potential for significant effects in terms of sediment input or toxicity. The use of vehicles and machinery during upgrade works and turbine deliveries shall result in some minimal emissions to air via exhausts. However, these emissions to air will not result in significant effect to a European site. **Transportation requirements** **Predicted Effects:** *None.* Site access will not traverse any European Site. **Duration of Construction and Operation** **Predicted Effects:** *None.* Duration of upgrade and re-instatement works is anticipated to be three weeks; duration of operation is anticipated to be 2 weeks. **Cumulative** effect: **Predicted Effects:** *No cumulative* effect *has been identified*

Assessment criteria	
	A planning search was conducted on 18th September 2020. No other projects of a scale or type which could act cumulatively with the proposed upgrade works are proposed or permitted in the vicinity of any Node.
Describe any likely changes to the site arising as a result of: ▪ *Reduction of habitat area;* ▪ *Disturbance of key species;* ▪ *Habitat or species fragmentation;* ▪ *Reduction in species density;* ▪ *Changes in key indicators of conservation value;* ▪ *Climate change.*	There will be no direct reduction in habitat area or habitat fragmentation within any European site as a result of the proposed works. There is the potential for invasive species, sediment and pollutants to be introduced to Blackwater River (Cork/Waterford) SAC (Site Code 002170) as a result of the proposed works which could lead to an indirect reduction in habitat area. There is no predicted effect via disturbance of key species or reduction of key species as a result of the proposed works. The route is an existing road which already experiences regular traffic. There are no predicted changes in key indicators of conservation value due to the proposed works. The proposed wind farm will ultimately have a positive effect on climate change as it will generate renewable energy.
Describe any likely impacts [effects] on the Natura 2000 (European) site as a whole in terms of: ▪ *Interference with the key relationships that define the structure of the site;* ▪ *Interference with key relationships that define the function of the site.*	There is the potential for invasive species to be introduced to Blackwater River (Cork/Waterford) SAC (Site Code 002170) as a result of the proposed works; Himalayan honeysuckle at node 2.2, old man's beard at node 2.3, and winter heliotrope at node 2.4. There may also be a potential risk of sediment and other pollutant inputs due to the close proximity to the SAC.
Provide indicators of significance as a result of the identification of effects set out above in terms of: ▪ *loss,* ▪ *fragmentation,* ▪ *disruption,* ▪ *disturbance,* ▪ *change to key elements of the site (e.g. water quality etc.).*	There is the potential for invasive species to be introduced to Blackwater River (Cork/Waterford) SAC (Site Code 002170) as a result of the proposed works which could lead to an indirect reduction in habitat area. There may also be a potential risk of sediment and other pollutant inputs due to the close proximity to the SAC.
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts	There is the potential for invasive species to be introduced to Blackwater River (Cork/Waterford) SAC (Site Code 002170) as a result of the proposed works which could lead to an indirect reduction in habitat area. There may also be a potential risk of sediment and other pollutant inputs due to the close proximity to the SAC.

Assessment criteria	
[effects] are likely to be significant or where the scale of magnitude of impacts [effects] is not known.	

4.7 Stage One Screening Conclusion

Nodes 1.0, 1.1, 1.2, and 1.2.1 are located in urban locations and will require street furniture removal only which will not result in any effects to European sites due to the nature and limited scope of works, or lack of connectivity with European sites. There is the potential for invasive species to be spread to Blackwater River (Cork/Waterford) SAC (Site Code 002170) at nodes 2.2, 2.3, 2.4 and 2.7 all located less than 100m from the SAC. While the potential for significant effects to the SAC due to the ingress of pollutants and sediments arising from the proposed works is considered extremely unlikely given the scale of works. It is considered prudent to include measures to further reduce the potential for effects.

It is concluded beyond reasonable scientific doubt that there is no potential for direct, indirect or in-combination significant effects to the following European sites (or any other European sites) to occur:

- Cork Harbour SPA (Site Code 004030)
- Great Island Channel SAC (Site Code 001058)
- Lower River Suir SAC (Site Code 002137)
- Blackwater Callows SPA (Site Code 004094)

These European sites have therefore been ‘screened out’ within the Stage 1: Appropriate Assessment Screening Report and do not require further study within a Stage 2: Natura Impact Statement.

5. STAGE TWO – NATURA IMPACT ASSESSMENT

5.1 Introduction

In the circumstances set out above, it has been concluded that there is one European site in respect of which there may be the possibility of a significant effect from the proposed TDR and which, therefore, generate the need for an Appropriate Assessment (AA). The site is as follows:

- Blackwater River (Cork/Waterford) SAC (Site Code 002170)

In carrying out an AA under Article 6(3) of the Habitats Directive and Part XAB of the Planning and Development Act 2000, An Bord Pleanála (the Board) is obliged to make a determination as to whether or not the proposed project would adversely affect the integrity of this European site, in view of its conservation objectives.

5.1.1 Assessment of the Effects of the Project or Plan on the Integrity of the Sites

'Describe the elements of the project or plan (alone or in combination with other projects or plans) that are likely to give rise to significant effects on the site (from screening assessment) ' (European Commission, 2001).

The works will progress from node to node in a sequential manner and the same equipment / machinery shall be used throughout. Excavation works will be required in areas where invasive species are located. This along with trimming could potentially result in these species spreading from node to node and colonising areas closer to the Blackwater River SAC. There is the potential for invasive species to be spread and the ingress of pollutants to Blackwater River (Cork/Waterford) SAC (Site Code 002170) at nodes 2.2, 2.3, 2.4 and 2.7 all located less than 100m from the SAC in the absence of mitigation. This European site therefore requires further study within a Stage 2: Natura Impact Statement.

5.1.2 The Conservation Objectives of the Natura 2000 Sites

'Set out the conservation objectives of the site' (European Commission, 2001).

The conservation objectives of the European site concerned are to maintain or restore the favourable conservation status of the qualifying interest species and habitats for which the site has been designated. These are set out in Table 5-1:

Table 5-1: Qualifying Interests for the Blackwater River (Cork/Waterford) SAC (002170)

Designated Site	Conservation Interests
Blackwater River (Cork/Waterford) SAC (002170)	Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] White-clawed crayfish (*Austropotamobius pallipes*) [1092] Sea lamprey (*Petromyzon marinus*) [1095] Brook lamprey *(Lampetra planeri*) [1096] River lamprey (*Lampetra fluviatilis*) [1099] Allis shad (*Alosa alosa*) [1102]

Designated Site	Conservation Interests
	Twaite shad (*Alosa fallax fallax*) [1103] Salmon (*Salmo salar*) [1106] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonizing mud and sand [1310] Atlantic salt meadows (*Glauco- Puccinellietalia maritimae*) [1330] Otter (*Lutra lutra*) [1355] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Killarney fern (*Trichomanes speciosum*) [1421] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]* *Taxus baccata* woods of the British Isles [91J0] *

* Priority Habitat

5.1.3 Potential Effects on Key Species and Key Habitats

'Describe how the project or plan will affect key species and key habitats. Acknowledge uncertainties and any gaps in information' (European Commission, 2001).

There is a potential indirect hydrological connection in the form of road run-off linking the nodes (see Table 3-1) and Blackwater River (Cork/Waterford) SAC. While there is no direct hydrological connection, there is limited potential for road-verge runoff towards the Blackwater river. There may also be a potential risk of sediment input due to the close proximity to the site. Sediment inputs to the Blackwater River (Cork/Waterford) SAC (002170), potentially affecting spawning beds, aquatic macroinvertebrate composition, habitat quality and ecological processes. These potential effects are considered to apply to salmon, river, brook and sea lamprey, and otter (in terms of the SAC's conservation interests).

Freshwater pearl mussel or white-clawed crayfish, or suitable habitat for either species is not recorded downstream of the nodes according to NBDC and NPWS records.

There is the potential for invasive species to be spread to Blackwater River (Cork/Waterford) SAC (Site Code 002170) at nodes 2.2, 2.3, 2.4 and 2.7 all located less than 100m from the SAC in the absence of mitigation.

5.1.4 Potential Effects on the Integrity of the Site

'Describe how the integrity of the site (determined by structure and function and conservation objectives) is likely to be affected by the project and plan (e.g. loss of habitat, disturbance, disruption, chemical changes, hydrological changes and geological changes etc.). Acknowledge uncertainties and any gaps in information' (European Commission, 2001).

The close proximity (10m to node 2.3) of Blackwater River (Cork/Waterford) SAC (002170) to the nodes means effects could occur through the introduction of non-native invasive species.

There will be no land-take from any European site and no direct effects on the size and scale of any site, as a result of the proposed works.

The potential for inputs of sediment to Blackwater River (Cork/Waterford) SAC (002170) during works is considered extremely unlikely given the scale of the proposed works at each node.

5.2 Mitigation Measures to be Implemented

5.2.1 Summary of Mitigation Measures

'Describe what mitigation measures are to be introduced to avoid or reduce the adverse effects on the integrity of the site. Acknowledge uncertainties and any gaps in information

- *List measures to be introduced*
- *Explain how the measures will avoid the adverse effects on the integrity of the site*
- *Explain how the measures will reduce the adverse effects on the integrity of the site*
- *Provide evidence of how they will be implemented and by whom.'*

(European Commission, 2001).

Blackwater River (Cork/Waterford) SAC (002170)

The following mitigation measures will be implemented in order to avoid potential adverse effects on the integrity of the Blackwater River (Cork/Waterford) SAC (002170), having regard to the sites' respective conservation objectives. The mitigation measures are listed on Table 5-2, along with information on when they will be implemented, how the measures will avoid or reduce adverse effects on the European sites, who will implement the measures and the degree of confidence in their successful implementation.

Mitigation measures which will reduce the risk of the spread of invasive species comprise best practice methods which will be applied at the nodes.

These include:

- Prevention of the spread of non-native invasive species will be achieved by:
    - The invasive species management plan
    - Raising awareness of site workers via tool box talks given by a suitably qualified person as part of site introduction; informing workers what to look out for and the what procedure to follow if they observe an invasive species.
    - Only planting or sowing of native species within the proposed development will be allowed.
    - Ensure good hygiene practices:
        - Thorough cleaning of all equipment and machinery at each node before moving to the next node.
        - Inspections of equipment and machinery by an invasive species specialist following cleaning to ensure that this measure has been fully implemented.

5.2.1.1 Implementation of mitigation measures and likely success

Mitigation measures will be implemented by the Client through the mechanism of its contract with the Contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent environmental managers experienced in the successful implementation of invasive species measures overseeing the works. In addition, an experienced ecologist will be appointed to monitor the efficacy of mitigation measures. High probability of success is anticipated due to the employment of competent environmental manager and an ecologist to oversee the implementation of these measures.

5.2.1.2 Monitoring scheme to prevent mitigation failure

A suitably qualified environmental manager with experience in the implementation of water quality measures, will be appointed by the Client to ensure the effective operation and maintenance of mitigation measures. In addition, an experienced ecologist will be appointed to monitor the efficacy of water quality related mitigation measures (see Table 5-3).

5.2.2 General Measures for Preventing the Spread of Non-Native Invasive Species

Please note these measures provide an overview of the process and should be read as such and in full with the species specific measures. Species specific measures are provided in the table below. Please note that the measures proposed are different for each species.

5.2.2.1 Communication

- Informing all site staff through toolbox talks as part of site inductions;
- Raising awareness of site workers through tool box talks given by a suitably qualified person as part of site introduction; informing workers what to look out for and the procedure to follow if they observe an invasive species.

5.2.2.2 Advance planning and incorporation into works schedule

- Constraints and invasive species mapping will be consulted at the planning stage for works to be undertaken in each area, to ensure all parties are aware of the species present, their locations and extents and the measures required to eradicate, control and/or prevent the spread of each species.
- Treatment measures will be incorporated into the construction programme where treatment will progress in conjunction with works.
- Where treatment will progress independent of other works, the same consultation and advance planning will also be required.

5.2.2.3 Pre-works survey and establishment of exclusion zones

- A preconstruction/pre-treatment confirmatory survey of each area will be undertaken prior to implementation of treatment measures and/or construction works to confirm the locations of invasive species and communicate these to supervisors and operatives involved in treatment and works.

- Exclusion zones will be established where necessary at this stage. Fencing, clear signage and good housekeeping within the site to prevent spread.
- No machinery or personnel will be allowed within exclusion zones, other than where necessary to undertake treatment measures. Similarly, there will be no storage of materials within or adjacent to exclusion zones.

5.2.2.4 Disposal of cut material

- Where mechanical control by cutting has been undertaken, the mulching of wood will be carried out where re-growth from vegetative material will not take place.
- All other plant material arising from mechanical control will be stored in a controlled manner on-site, or disposed of appropriately off-site,
- If retention on-site is required, material will be kept in a secure area onsite for composting and herbicide treatment where necessary.
- This material will be monitored for re-growth, which will trigger targeted herbicide application where necessary. No vehicles or operatives other than those involved in invasive species management will enter this area and no other materials will be stored here.
- Where off-site disposal is used, material will be transported off site by an appropriately licensed waste contractor and disposed of properly at a suitably licenced facility at a depth of >0.5m. Licenced facilities in the surrounding are outlined in table 3-5 of chapter 3 of the EIAR: Description of the Proposed Development.

5.2.2.4.1 Re-vegetation

- Where invasive species have been physically removed and disturbed soil, this soil will be seeded or replanted (including 5cm deep mulch) with native plant species. This will prevent the easy colonisation of bare soil by invasive species in the area.

5.2.2.4.2 Good hygiene

- Ensure good hygiene practices when working with invasive species:
  - Remove the build-up of soil on equipment
  - Keep equipment clean
  - Do not move fouled equipment from one site to another.
- Where necessary a pressure washer will be used to wash the build-up of soil, clean equipment and vehicles. The water arising from washing will be contained to avoid the further spread of species along the route.
- Biosecurity measures required for working near water (intertidal areas) within the site. These include cleaning, disinfection, and drying of all equipment between watercourses**.**
- These are outlined in the invasive species management plan.

Table 5-2: Species-specific invasive species mitigation measures

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
Japanese Knotweed (*Fallopia japonica*)	A confirmatory survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey. The roots can be 1-3 m deep and up to 7 m lateral spread. While the stand is >7m outside of the proposed works footprint and will not be interfered with, a buffer of 7m around the stand will be put in place to demarcate this and ensure there is no interference with the area. This will be put in place prior to construction.	By clearly marking the area to avoid, it will avoid accidental interference with the area, and the risk of spreading the species along the TDR and into the Blackwater River (Cork/Waterford) SAC (002170).	An invasive species specialist will be appointed by the Client to ensure the effective implementation of this buffer.
Winter Heliotrope (*Petasites fragrans*)	A confirmatory survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey. As this species spreads vegetatively via rhizomes, the risk of spread through unregulated soil movements is high. Where the infested area can be retained in situ, burial under minimum 1.5m of soil is sufficient to dispose of the plant without the risk of regrowth. Areas which will be required to be excavated will require treatment with herbicide prior to movement. Following treatment, soil from these areas can be re-used, but not as topsoil and will be required to be buried at a depth of minimum 1.5m.	The species covers a bank at node 2.0 and 2.4 and is within the bank regrading footprint and load-bearing footprint of these nodes. Implementing this mitigation will prevent the spread of the species along the TDR and into the Blackwater River (Cork/Waterford) SAC (002170).	A invasive species specialist will be appointed by the Client to ensure the effective implementation of this mitigation.

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	Spraying will be carried out using glyphosate-based herbicide after flowering in February to March or midsummer or later but before the foliage begins to die back (NRA, 2010). The following general recommendations will be adhered to: • Establishment of a 1m buffer zone around all growths prior to operations; staff shall be made aware of this buffer zone when working within infested areas. • Construction works will not be allowed within exclusion zones until treatment procedures have been followed. • No treatment measures to take place in these areas without supervision and agreement by appointed ecologist/eradication specialist. • All machinery and vehicles operating within areas of infestation will be thoroughly checked and if necessary, cleaned prior to leaving the area to protect against further spreading of Winter Heliotrope. • No material shall be taken from areas of infestation except in accordance with the measures outlined above.		

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	All material will be either deep buried (1.5m) or transported by an appropriately licensed waste contractor and received by an appropriately licensed facility. • Wheel washes shall be put in place at infected areas. Waste water from these facilities will be stored and treated to avoid further spread. • If operating within an area of known infestation all machinery, vehicles, equipment, foot ware and clothing will be cleaned thoroughly using steam cleaners in a contained area to avoid further contamination. • The contractor must dispose of winter heliotrope plant material and soil containing plant material in accordance with the NRA (2010) guidelines, to ensure where cut, pulled or mown non-native invasive plant material arises, its disposal will not lead to a risk of further spread of the plants. Care will be taken near watercourses as water is a fast medium for the dispersal of plant fragments and seeds. Material that contains flower heads or seeds will be disposed of either by composting or burial at a depth of no less than 1.5m, or by incineration (having regard to relevant legislation, including:		

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	Section 32 of the Waste Management Act, 1996 to 2008; Section 4 of the Air Pollution Act, 1987; and relevant local authority byelaws) or disposal to licensed landfill. All disposals will be carried out in accordance with the Waste Management Acts.		
Old Man's Beard /Traveller's Joy (*Clematis vitalba*)	A confirmatory survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey. Two options for the treatment of Old Man's Beard at the site have been proposed. These options shall be used to eradicate Old Man's Beard from the footprint of works and avoid the spread of the species. The following general recommendations will be adhered to as part of the plan: ***Option 1*** – Physical removal Seedlings can be pulled out of the ground and larger plants can be cut to the stem (and foliage will die) and roots and stem removed. Roots can then be grubbed out with material stored above the ground, so plants cannot take root again. For more mature plants, the stem can be cut near ground level and herbicide applied to the outer rim of the stem.	The species is present in a 5x2m patch within the load-bearing and vegetation clearance footprint at node 1.3, as well as within sections of hedge at node 2.3 adjacent to the vegetation clearance footprint. Implementing this mitigation will prevent the spread of the species along the TDR and into the Blackwater River (Cork/Waterford) SAC (002170).	An invasive species specialist will be appointed by the Client to ensure the effective implementation of this mitigation.

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	The stem is likely to produce regrowth in the next growing season and herbicide will be applied to this growth. Glyphosate can be used in late spring and summer and Triclopyr can be applied in summer. This is the preferred option where plants infest the crowns of trees. ***Option 2*** – Chemical control Growths at ground level can be treated with herbicide, using spray application where native species are not present, or targeted application using a weed wiper where there is a risk of damage to non-target species. Re-survey to check for re-growth will be required in both cases. The contractor must dispose of Old Man's Beard plant material and soil containing plant material in accordance with the NRA (2010) guidelines, to ensure where cut, pulled or mown non-native invasive plant material arises, its disposal will not lead to a risk of further spread of the plants. Care will be taken near watercourses as water is a fast medium for the dispersal of plant fragments and seeds. Material that contains flower heads or seeds will be disposed of either by composting or burial at a depth of 2m, or by incineration (having regard to relevant		

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	legislation, including: Section 32 of the Waste Management Act, 1996 to 2008; Section 4 of the Air Pollution Act, 1987; and relevant local authority byelaws) or disposal to licensed landfill. All disposals will be carried out in accordance with the Waste Management Acts.		
Himalayan honeysuckle (*Leycesteria formosa*)	A confirmatory survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey. Two options for the treatment of Himalayan honeysuckle at the site are proposed. These options can be used to eradicate Himalayan honeysuckle from the site and avoid the spread of the species: **Option 1** – hand pulling of seedlings Seedlings and/or small plants can be pulled out of the ground along with the root system (BMCC, 2015). **Option 2** – cut to base and treated with herbicide. More established plants can be cut to near ground level and the freshly cut wound immediately painted with herbicide (BMCC, 2015).	There is a single plant growing on top of a wall at node 2.2. While the latest swept-path analysis shows it is unlikely to be interfered with, the aforementioned mitigation will be included to prevent the spread of the species along the TDR route and into the Blackwater River (Cork/Waterford) SAC (002170).	A invasive species specialist will be appointed by the Client to ensure the effective implementation of this mitigation.
Cherry laurel (*Prunus laurocerasus*)	A confirmatory survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey.	The species spreads vegetatively by suckering, or by seed. These measures will prevent the spread of the species.	

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	Cherry laurel is spread vegetatively only and a buffer of 1m will be left to prevent damage to the plant which can result in the production of new stems which can make the plant more difficult to treat. Staff shall be made aware of this buffer zone when working within areas of infestation. Where the plant cannot be avoided, one of the following methods will be implemented: **Option 1** – Cut to stump and digging out stump This method involves cutting the main stem of the plant down near ground level and digging out the stump and any visible roots. This option is not practical in areas where there are other invasive plants present as the disturbed soil can allow for the setting of seeds or the spread of rhizomes of adjacent species (ISI, 2012b). **Option 2** – Cut to stump and treat stump with herbicide. This method involves cutting the main stem of the plant down near ground level and applying herbicide to the freshly cut wound.		

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	The herbicide concentrations used, and timings of applications vary according to which chemical is used. When treating many stems, vegetable dye added to herbicide is useful for highlighting the stems that have and haven't been treated. The use of a brush or other such applicator will provide an accurate application and prevent damaging adjacent non-target plants via spray drift. ***Option 3*** – Cut to main stem and inject stem with glyphosate. This method involves the 'drill and drop' method where the main stem is cut, and a hole drilled into the cut. This provides a targeted application of glyphosate (25% solution). The main drawback to this technique is that the plant is left in place to rot away; which can take a decade or more. ***Option 4*** – Cut back to stump and spray regrowth with chemicals. This application involves cutting a main stem down near ground level and then treating the new stems with herbicide.		

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	This method is the least effective as some stems may be missed and not treated. Also, the application of herbicide is generally via spraying which can result in adjacent non-target plants being killed off. The contractor must appropriately dispose of excavated waste, including soils containing cherry laurel plant material in accordance with the NRA (2010) guidelines, to ensure where cut, pulled or mown non-native invasive plant material arises, its disposal will not lead to a risk of further spread of the plants. Care will be taken near watercourses as water is a fast medium for the dispersal of plant fragments and seeds. Material that contains flower heads or seeds will be disposed of either by composting or burial at a depth of no less than 2m, or by incineration (having regard to relevant legislation, including: Section 32 of the Waste Management Act, 1996 to 2008; Section 4 of the Air Pollution Act, 1987; and relevant local authority byelaws) or disposal to licensed landfill. All disposals will be carried out in accordance with the Waste Management Acts.		

Table 5-3: Mitigation measures to prevent negative effects to watercourses

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring Scheme to Prevent Mitigation Failure
All personnel working on site will be trained in pollution incident control response. Emergency Silt Control and Spillage Response Procedures contained within the Construction Environmental Management Plan (CEMP) will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt. This is included in appendix 3.	Ensure site operatives are informed and equipped to deal pollution incidents such as spillages or silt containment failures.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 3.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation of mitigation measures during works. These are outlined in the CEMP (appendix 3).
A regular review of weather forecasts of heavy rainfall will be undertaken, and a contingency plan will be prepared for before and after such events.	Ensure works are not carried out during periods of heavy rainfall and ensure potential sources of siltation are secured in advance of heavy rainfall.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 3.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation of mitigation measures during works. These are outlined in the CEMP (appendix 3).
Silt traps and silt fencing will be put in place in advance of excavation works at each node.	Ensure erosion control and silt arrest measures are in place in advance of works.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. This is outlined in the CEMP, included in appendix 3. All required mitigation measures will be included as a contractual obligation	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation of mitigation measures during works. These are outlined in the CEMP (appendix 3).

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring Scheme to Prevent Mitigation Failure
		on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 3.	
Nodes requiring temporary hardcore shall be capped.	Cover exposed subsoils, thereby reducing the concentration of suspended solids in any run-off.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. This is outlined in the CEMP, included in appendix 3.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation of mitigation measures during works. These are outlined in the CEMP (appendix 3).
Additional silt fencing will be kept on site in case of an emergency break out of silt laden run-off.	Allow repair and strengthening of silt interception measures if and where necessary.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 3.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation of mitigation measures during works. These are outlined in the CEMP (appendix 3).
Refuelling of plant & machinery during planting will only be carried out at designated refuelling station locations TDR site. Each station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. Only emergency	Prevent fuels, oils or other contaminants from entering the drainage network.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation of mitigation measures during works. These are outlined in the CEMP (appendix 3).

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring Scheme to Prevent Mitigation Failure
breakdown maintenance will be carried out on site.		This is outlined in the CEMP, included in appendix 3.	
Drip trays and spill kits will be kept available on site (i.e. at the works area of each node), to ensure that any spills from the vehicle are contained and removed off site.	Prevent fuels, oils or other contaminants from entering the drainage network.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 3.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation of mitigation measures during works. These are outlined in the CEMP (appendix 3).
Refuelling of plant & machinery during planting will only be carried out at designated refuelling station locations TDR site. Each station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. Only emergency breakdown maintenance will be carried out on site (i.e. at the works area of each node).	Prevent fuels, oils or other contaminants from entering the drainage network.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. This is outlined in the CEMP, included in appendix 3.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation of mitigation measures during works. These are outlined in the CEMP (appendix 3).
Drip trays and spill kits will be kept available on site, to ensure that any spills from the vehicle are contained and removed off site (i.e. at the works area of each node).	Prevent fuels, oils or other contaminants from entering the drainage network.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation of mitigation measures during works. These are outlined in the CEMP (appendix 3).

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring Scheme to Prevent Mitigation Failure
		staff overseeing the works. This is outlined in the CEMP, included in appendix 3.	

5.2.3 Efficacy of the Proposed Mitigation Measures

Provide evidence of the degree of confidence in the likely success of the mitigation measures

Mitigation measures were devised in consideration of the following guidelines:

- EPA, (2017). Guidelines on the information to be contained in Environmental Impact Assessment Reports: Draft. Environmental Protection Agency, Ireland.
- Advice Notes on Preparing Environmental Impact Statements [Draft], EPA (2015);
- Cork County Development Plan 2014
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a Framework for Community Action in the Field of Water Policy;
- The Planning System and Flood Risk Management - Guidelines for Planning Authorities - Department of Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW);
- Flood Mapping Website (http://www.floodmaps.ie);
- OPW preliminary flood risk assessment (PFRA) indicative mapping website (www.cfram.ie);
- CIRIA Environmental Good Practice on Site;
- Best Practice Guide BPGCS005, Oil Storage Guidelines:
    - CIRIA Control of Water Pollution from Linear Construction Sites. Technical Guidance (C648);
    - CIRIA Control of Water Pollution from Construction Sites. Guidance for Consultants and contractors (C532);
- CIRIA Sustainable Construction Procurement. A Guide to Delivering Environmentally Responsible Projects (C571);
- UK Pollution Prevention Guidelines (PPG):
    - PPG1: Understanding your environmental responsibilities – good environmental practice;
    - PPG2: Above Ground Oil Storage Tanks;
    - PPG3: Pollution Prevention Guidelines;
    - PPG4: The Disposal of Sewage where no Mains Drainage is Available;
    - PPG5: Works in, near or liable to affect Watercourses;
    - PPG6: Working at Construction and Demolition Sites;
    - PPG7: The Safe Operation of Refuelling Facilities;
    - PPG8: Safe Storage and Disposal of Used Oil;
    - PPG21: Pollution Incident Response Planning;

  - PPG22: Dealing with Spills; and
  - PPG26: Drums and intermediate bulk containers.
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (National Roads Authority, 2005);
- Design Manual for Roads and Bridges (2013);
- River Basin Management Plan for Ireland 2018-2021.;
- Biological River Water Quality Data, (Environmental Protection Agency (EPA).

Accordingly, given the provenance of the mitigation measures as set out above, those mitigation measures (when properly implemented) will be successful in ensuring that the European site is preserved at a favourable conservation status by ensuring the lasting preservation of the constitutive characteristics of those sites.

With the implementation of the mitigation measures developed in light of the best scientific knowledge, it is concluded beyond reasonable scientific doubt that the integrity of those sites will not be adversely affected.

5.2.4 Addressing Mitigation Failure

Explain how any mitigation failure will be addressed

A suitably qualified person will be appointed by the Client to ensure the effective management and maintenance of mitigation measures during works. Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage. Procedures and contingency plans will be set up on-site to deal with emergency accidents or spills. An emergency spill kit (mats, pads, absorbent socks, disposal bags, PPE) is to be kept on site in the event of an accidental spill.

A planning search was conducted on 18th November 2020. No other projects of a scale or type which could act cumulatively with the proposed upgrade works are proposed or permitted in the vicinity of any Node. Thus, in-combination effects are not envisaged.

5.3 Conclusion

In summary, whilst it has been acknowledged that there is the potential for the project to have significant indirect effects on one European site, with the implementation of the detailed mitigation measures identified in this NIS, it is concluded beyond reasonable scientific doubt that the TDR works shall not result in a significant effect to any European site.

This report has assessed the potential effects on the integrity of the Blackwater River (Cork/Waterford) SAC in light of the site's conservation objectives and mitigation measures have been developed to prevent such potential effects occurring.

On the basis of objective scientific information, the proposed TDR works will not, either alone or in combination with other plans or projects, have adverse effects on the Blackwater River (Cork/Waterford) SAC, in light of the site's conservation objectives.

Accordingly, it can be concluded as follows:

(i) All aspects of the proposed TDR works have been identified which, in the light of the best scientific knowledge in the field, can by themselves or in combination with other plans or projects, affect the European site in the light of its conservation objectives;

(ii) There are complete, precise and definitive findings and conclusions regarding the identified potential effects on any European site;

(iii) On the basis of those findings and conclusions, the Board is able to determine that no scientific doubt remains as to the absence of the identified potential effects; and

(iv) Thus, the Board may determine that the proposed development will not adversely affect the integrity of any European site.

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FEHILY TIMONEY
30 YEARS

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APPENDIX 1

Finding of No Significant Effects Report

Name and location of the Natura 2000 sites	• Blackwater Callows SPA (Site Code 004094) is within 15km of Nodes [2.0 - 2.13] (closest 1.3 km) • Cork Harbour SPA (Site Code 004030) is within 15km of Nodes [1.3 & 1.4] (closest 1.6 km) • Great Island Channel SAC (Site Code 001058) is within 15km of Nodes [1.3 & 1.4] (closest 5.6 km) • Lower River Suir SAC (Site Code 002137) is within 15km of Node [2.0] (14 km) • *See Table 3-1 for distances between each node and European sites within 15 km.*
Description of the project or plan	Vegetation clearance, road widening consisting levelling of ground to match existing road and placement of aggregate, removal of obstructions such as walls and street furniture from swept path (mid and rear oversail), ramping of traffic island at Node 2.1 using asphalt. Mid oversail requires obstructions to be lowered to 300mm above ground level; rear oversail is 3m above ground level. The above measures are required in isolation or in combination depending on conditions at each node; the measures as required for each node are listed in Table 3-1 and described in detail in section 4.1 *Brief description of relevant Nodes.*
Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?	No.
Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?	No. The majority of granted planning applications at relevant nodes are residential, with 2 larger developments (20 and 6-house developments at Ballyhooly). Outside of residential developments, a number of extensions/alterations, demolitions & new structures associated with Castlehyde Stud Farm, and the extension of a club house and erection of pitch lighting at a football club and retirement & demolition of 38kV ESB substation building in Grange East are permitted. A cumulative effect in terms of pollutant/contaminant inputs in conjunction with these developments is considered unlikely for all European Sites within 15 km, due to significant effects in this category being ruled out; a cumulative effect in terms of introduction of invasive species to Cork Harbour SPA (004030) is considered unlikely since the species and habitats within this site are not considered to be susceptible in this regard at a significant level.

The Assessment of Significant Effects	
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site	• Potential for sediment inputs arising from node upgrade works to result the alteration or degradation of water quality within Cork Harbour SPA (004030), Great Island Channel SAC (001058)) and/or Blackwater Callows SPA (004094) • Potential for the spread of non-native invasive plant species to Cork Harbour SPA (004030), Great Island Channel SAC (001058), Lower River Suir SAC (002137) and/or Blackwater Callows SPA (004094)

Explain why these effects are not considered significant	None of the nodes are located within any European site. While the number (19) and extensive distribution of the nodes means the project is of a moderate-medium scale, the nodes themselves are of a small size (largest individual footprint is 10,398 m^2: turning area), being limited to tight corners and bends along both routes. The spread of these species to Cork Harbour SPA (004030) is extremely unlikely to occur due to the habitats making up the SPA providing unsuitable substrates for these species. The closest node is 1.6km (node 1.3), and all nodes lacks a hydrological connection to the site. The closest node to Great Island Channel SAC (001058) is 5.6km (Nodes 1.3 and 1.4) from the site, and lack a hydrological connection. The qualifying features are maritime in nature, and unlikely to provide unsuitable substrates for invasive species present at the nodes (old man's beard, cherry laurel). Thus an effect on the SAC is unlikely to occur. Lower River Suir SAC (002137) is 14km from node 2.0 and lacks a hydrological connection. Thus, an impact is not likely to occur to the site. While there is the potential for sediment input from nodes 2.2 -2.10, 2.12-2.13), significant effects to Blackwater Callows SPA (004094) are not considered likely due to the limited excavation works required and the distance from SPA (closest node is 1.3km and lacks a hydrological connection). Invasive species: spread of these species to this site is unlikely to occur due to limited scale of proposed works the distance to the European site (the closest node 2.1 is located 1.3km.

Name of Agency or Body Consulted	**Summary of Response**
National Parks and Wildlife Service (via DAU) Initial Consultation Letter: sent 17/08/2018 EIAR scoping report: sent 19/07/2019	No formal NPWS response to date. NPWS indicated construction-stage projects are being prioritised at present.
Inland Fisheries Ireland EIAR scoping report: sent 18/07/2019 On-site consultation with Andrew Gillspie SFEO: 22/08/2019	No observations on TDR route; concerns raised relate to wind farm development site and grid connection cable route.

Data Collected to Carry out the Assessment			
Who carried out the assessment	*Sources of Data*	*Level of assessment completed*	*Where can the full results of the assessment be accessed and viewed*
This evaluation was completed by Fehily Timoney and Company	• Information on the designated nature conservation sites within 15 km of the study area was obtained from the NPWS website and metadata available online from the NPWS mapping system (http://webgis.npws.ie/npwsviewer/). • Information on the waterbody catchments in the development area was obtained from the Water Framework Directive Water Mapping Information System www.wfdireland.ie/maps.html • OSI Aerial photography and 1:50000 mapping. • Cork County Council online planning database http://maps.corkcoco.ie/planningenquiryv3/MainFrames.aspx • Data collected during site visits	Appropriate Assessment Screening Report	An Bord Pleanála website

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APPENDIX 2

Site Synopses

SITE SYNOPSIS

SITE NAME: CORK HARBOUR SPA

SITE CODE: 004030

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay, Ringabella Creek and the Rostellan and Poulnabibe inlets.

Owing to the sheltered conditions, the intertidal flats are often muddy in character. These muds support a range of macro-invertebrates, notably *Macoma balthica*, *Scrobicularia plana*, *Hydrobia ulvae*, *Nepthys hombergi*, *Nereis diversicolor* and *Corophium volutator*. Green algae species occur on the flats, especially *Ulva* spp. Cordgrass (*Spartina* spp.) has colonised the intertidal flats in places, especially where good shelter exists, such as at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site and these provide high tide roosts for the birds. Some shallow bay water is included in the site. Rostellan Lake is a small brackish lake that is used by swans throughout the winter. The site also includes some marginal wet grassland areas used by feeding and roosting birds.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Mallard, Pintail, Shoveler, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl. Of particular note is that the site supports internationally important populations of Black-tailed Godwit (1,896) and Redshank (2,149) - all figures given are five year mean peaks for the period 1995/96 to 1999/2000. Nationally important populations of the following 19 species occur: Little Grebe (57), Great Crested Grebe (253), Cormorant (521), Grey Heron (80), Shelduck (2,009), Wigeon (1,791), Teal (1,065), Mallard (513), Pintail (57), Shoveler (103), Red-breasted Merganser (121), Oystercatcher (1,809), Golden Plover (3,342), Grey Plover (95), Lapwing (7,569), Dunlin (9,621), Bar-tailed Godwit (233), Curlew (2,237) and Greenshank (46). The Shelduck population is the largest in the country (over 10% of national total). Other species using the site include Mute Swan (38), Whooper Swan (5), Pochard (72), Gadwall

(6), Tufted Duck (64), Goldeneye (21), Coot (53), Ringed Plover (73), Knot (26) and Turnstone (113). Cork Harbour is an important site for gulls in winter and autumn, especially Black-headed Gull (3,640), Common Gull (1,562) and Lesser Black-backed Gull (783), all of which occur in numbers of national importance. Little Egret and Mediterranean Gull, two species which have recently colonised Ireland, also occur at this site.

A range of passage waders occurs regularly in autumn, including such species as Ruff (5-10), Spotted Redshank (1-5) and Green Sandpiper (1-5). Numbers vary between years and usually a few of each of these species over-winter.

Cork Harbour has a nationally important breeding colony of Common Tern (102 pairs in 1995). The birds have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges and the roof of a Martello Tower. The birds are monitored annually and the chicks are ringed.

Cork Harbour is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and also for its populations of Black-tailed Godwit and Redshank. In addition, it supports nationally important wintering populations of 22 species, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Little Egret, Golden Plover, Bar-tailed Godwit, Ruff, Mediterranean Gull and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it. Cork Harbour is also a Ramsar Convention site and part of Cork Harbour SPA is a Wildfowl Sanctuary.

SITE SYNOPSIS

Site Name: Blackwater River (Cork/Waterford) SAC

Site Code: 002170

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. In times of heavy rainfall the levels can fluctuate widely by more than 12 feet on the gauge at Careysville. The peaty nature of the terrain in the upper reaches and of some of the tributaries gives the water a pronounced dark colour. The site consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, the tidal stretches as far as Youghal Harbour and many tributaries, the larger of which include the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun. The portions of the Blackwater and its tributaries that fall within this SAC flow through the counties of Kerry, Cork, Limerick, Tipperary and Waterford. Nearby towns include Rathmore, Millstreet, Kanturk, Banteer, Mallow, Buttevant, Doneraile, Castletownroche, Fermoy, Ballyduff, Rathcormac, Tallow, Lismore, Cappoquin and Youghal.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1130] Estuaries
[1140] Tidal Mudflats and Sandflats
[1220] Perennial Vegetation of Stony Banks
[1310] *Salicornia* Mud
[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[3260] Floating River Vegetation
[91A0] Old Oak Woodlands
[91E0] Alluvial Forests*
[1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
[1092] White-clawed Crayfish (*Austropotamobius pallipes*)
[1095] Sea Lamprey (*Petromyzon marinus*)
[1096] Brook Lamprey (*Lampetra planeri*)
[1099] River Lamprey (*Lampetra fluviatilis*)
[1103] Twaite Shad (*Alosa fallax*)
[1106] Atlantic Salmon (*Salmo salar*)
[1355] Otter (*Lutra lutra*)
[1421] Killarney Fern (*Trichomanes speciosum*)

The Blackwater rises in boggy land in east Kerry, where Namurian grits and shales build the low heather-covered plateaux. Near Kanturk the plateaux enclose a basin of productive Coal Measures. On leaving the Namurian rocks the Blackwater turns eastwards along the northern slopes of the Boggeragh Mountains before entering the narrow limestone strike vale at Mallow. The valley deepens as first the Nagles Mountains and then the Knockmealdowns impinge upon it. Interesting geological features along this stretch of the Blackwater Valley include limestone cliffs and caves near the villages and small towns of Killavullen and Ballyhooly; the Killavullen caves contain fossil material from the end of the glacial period. The associated basic soils in this area support the growth of plant communities which are rare in Cork because in general the county's rocks are acidic. At Cappoquin the river suddenly turns south and cuts through high ridges of Old Red Sandstone. The Araglin valley is predominantly underlain by sandstone, with limestone occurring in the lower reaches near Fermoy.

Wet woodlands are found where river embankments have broken down and channel edges are subject to daily inundation. This is particularly evident in the steep-sided valley of the River Bride, between Cappoquin and Youghal. The river side of the embankments was often used for willow growing in the past (most recently at Cappoquin) so that the channel is lined by narrow woods of White and Almond-leaved Willow (*Salix alba* and *S. triandra*), with isolated Crack Willow (*S. fragilis*) and Osier (*S. viminalis*). Rusty Willow (*S. cinerea* subsp. *oleifolia*) spreads naturally into the sites and occasionally, as at Villierstown on the Blackwater and Sapperton on the Bride, forms woods with a distinctive mix of woodland and marsh plants, including Gypsywort (*Lycopus europaeus*), Guelder-rose (*Viburnum opulus*), Bittersweet (*Solanum dulcamara*) and various mosses and algae. These wet woodlands form one of the most extensive tracts of the wet woodland habitat in the country.

A small stand of Yew (*Taxus baccata*) woodland occurs within the site. This is on a limestone ridge at Dromana, near Villierstown. While there are some patches of the wood with a canopy of Yew and some very old trees, the quality is generally poor due to the dominance of non-native and invasive species such as Sycamore (*Acer pseudoplatanus*), Beech (*Fagus sylvatica*) and Douglas Fir (*Pseudotsuga menzsisii*). However, it does have the potential to develop into a Yew dominated stand in the long term and the site should continue to be monitored.

Marshes and reedbeds cover most of the flat areas beside the rivers and often occur in mosaic with the wet woodland. Common Reed (*Phragmites australis*) is ubiquitous and is harvested for thatching. There is also much Marsh-marigold (*Caltha palustris*) and, at the edges of the reeds, the Greater and Lesser Pond-sedge (*Carex riparia* and *C. acutiformis*). Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Reed Canary-grass (*Phalaris arundinacea*), Meadowsweet (*Filipendula ulmaria*), Common Nettle (*Urtica dioica*), Purple Loosestrife (*Lythrum salicaria*), Common Valerian (*Valeriana officinalis*), Water Mint (*Mentha aquatica*) and Water Forget-me-not (*Myosotis scorpioides*) are all also found.

At Banteer there are a number of hollows in the sediments of the floodplain where subsidence and subterranean drainage have created isolated wetlands, sunk below the level of the surrounding fields. The water rises and falls in these holes depending on the water table and several different communities have developed on the acidic or neutral sediments. Many of the ponds are ringed with Rusty Willow, rooted in the mineral soils but sometimes collapsed into the water. Beneath the densest stands are woodland herbs like Yellow Pimpernel (*Lysimachia nemorum*), with locally abundant Common Water-starwort (*Callitriche stagnalis*) and Marsh Ragwort (*Senecio aquaticus*). One of the depressions has Silver Birch (*Betula pendula*), Ash (*Fraxinus excelsior*), Crab Apple (*Malus sylvestris*) and a little Pedunculate Oak (*Quercus robur*) in addition to the willows.

Floating river vegetation is found along much of the freshwater stretches within the site. The species list is quite extensive, with species such as water-crowfoots, including Pond Water-crowfoot (*Ranunculus peltatus*), Canadian Pondweed (*Elodea canadensis*), pondweed species, including Broad-leaved Pondweed (*Potamogeton natans*), water-milfoil species (*Myriophyllum* spp.), Common Club-rush (*Scirpus lacustris*), water-starwort species (*Callitriche* spp.), Lesser Water-parsnip (*Berula erecta*) particularly on the Awbeg, Water-cress (*Nasturtium officinale*), Hemlock Water-dropwort, Fine-leaved Water-dropwort (*O. aquatica*), Common Duckweed (*Lemna minor*), Yellow Water-lily (*Nuphar lutea*), Unbranched Bur-reed (*Sparganium emersum*) and the moss *Fontinalis antipyretica* all occurring.

The grasslands adjacent to the rivers of the site are generally heavily improved, although liable to flooding in many places. However, fields of more species-rich wet grassland with species such as Yellow Iris (*Iris pseudacorus*), Meadowsweet, Meadow Buttercup (*Ranunculus acris*) and rushes (*Juncus* spp.) occur occasionally. Extensive fields of wet grassland also occur at Annagh Bog on the Awbeg. These fields are dominated by Tufted Hair-grass (*Deschampsia cespitosa*) and rushes.

The Blackwater Valley has a number of dry woodlands; these have mostly been managed by the estates in which they occur, frequently with the introduction of Beech and a few conifers, and sometimes of the invasive species Rhododendron (*Rhododendron ponticum*) and Cherry Laurel (*Prunus laurocerasus*). Oak woodland is well developed on sandstone about Ballinatray, with the acid oak woodland community of Holly (*Ilex aquifolium*), Bilberry (*Vaccinium myrtillus*), Great Wood-rush (*Luzula sylvatica*) and the ferns *Dryopteris affinis* and *D. aemula* occurring in one place. Irish Spurge (*Euphorbia hyberna*) continues eastwards on acid rocks from its headquarters to the west, but there are also many plants of richer soils, for example Wood Violet (*Viola reichenbachiana*), Goldilocks Buttercup (*Ranunculus auricomus*), Broad-leaved Helleborine (*Epipactis helleborine*) and Red Campion (*Silene dioica*). Oak woodland is also found in Rincrew, Carrigane, Glendine, Newport and Dromana. The spread of Rhododendron is locally a problem, as is over-grazing. A few limestone rocks stand over the river in places showing traces of a less acidic woodland type with Ash, False Brome (*Brachypodium sylvaticum*) and Early-purple Orchid (*Orchis mascula*).

In the vicinity of Lismore, two deep valleys cut in Old Red Sandstone join to form the Owenashad River before flowing into the Blackwater at Lismore. These valleys retain something close to their original cover of oak with Downy Birch (*Betula pubescens*), Holly and Hazel (*Corylus avellana*) also occurring. There has been much planting of Beech (as well as some of coniferous species) among the oak on the shallower slopes and here both Rhododendron and Cherry Laurel have invaded the woodland.

The oak wood community in the Lismore and Glenmore valleys is of the classic upland type, in which some Rowan (*Sorbus aucuparia*) and Downy Birch occur. Honeysuckle (*Lonicera periclymenum*) and Ivy (*Hedera helix*) cover many of the trees while Great Wood-rush, Bluebell (*Hyacinthoides non-scripta*), Wood-sorrel (*Oxalis acetosella*) and, locally, Bilberry dominate the ground flora. Ferns present on the site include Hard Fern (*Blechnum spicant*), Male Fern (*Dryopteris filix-mas*), the buckler-ferns *D. dilatata* and *D. aemula*, and Lady Fern (*Athyrium felix-femina*). There are many mosses present and large species such as *Rhytidiadelphus* spp., *Polytrichum formosum, Mnium hornum* and *Dicranum* spp. are noticeable. The lichen flora is important and includes 'old forest' species which imply a continuity of woodland here since ancient times. Tree Lungwort (*Lobaria* spp.) is the most conspicuous and is widespread.

The Araglin valley consists predominantly of broadleaved woodland. Oak and Beech are joined by Hazel, Wild Cherry (*Prunus avium*) and Goat Willow (*Salix caprea*). The ground flora is relatively rich, with Pignut (*Conopodium majus*), Ramsons (*Allium ursinum*), Garlic Mustard (*Alliaria petiolata*) and Wild Strawberry (*Fragaria vesca*). The presence of Ivy Broomrape (*Orobanche hederae*), a local species within Ireland, suggests that the woodland, along with its attendant Ivy, is long established.

Along the lower reaches of the Awbeg River, the valley sides are generally cloaked with mixed deciduous woodland of estate origin. The dominant species is Beech, although a range of other species are also present, e.g. Sycamore, Ash and Horse-chestnut (*Aesculus hippocastanum*). In places the alien invasive species Cherry Laurel dominates the understorey. Parts of the woodlands are more semi-natural in composition, being dominated by Ash, with Hawthorn (*Crataegus monogyna*) and Spindle (*Euonymus europaea*) also present. However, the most natural areas of woodland appear to be the wet areas dominated by Alder and willows (*Salix* spp.). The ground flora of the dry woodland areas features species such as Pignut, Wood Avens (*Geum urbanum*), Ivy and Soft Shield-fern (*Polystichum setiferum*), while the ground flora of the wet woodland areas contains characteristic species such as Remote Sedge (*Carex remota*) and Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*).

In places along the upper Bride, scrubby, semi-natural deciduous woodland of willow, oak and Rowan occurs, with abundant Great Wood-rush in the ground flora.

The Bunaglanna River passes down a very steep valley, flowing in a north-south direction to meet the Bride River. It flows through blanket bog to heath and then scattered woodland. The higher levels of moisture here enable a vigorous moss and

fern community to flourish, along with a well-developed epiphyte community on the tree trunks and branches.

At Banteer a type of wetland occurs near the railway line which offers a complete contrast to the others. Old turf banks are colonised by Royal Fern (*Osmunda regalis*) and Eared Willow (*Salix aurita*), and between them there is a sheet of Bottle Sedge (*Carex rostrata*), Marsh Cinquefoil (*Potentilla palustris*), Bogbean (*Menyanthes trifoliata*), Marsh St. John's-wort (*Hypericum elodes*) and the mosses *Sphagnum auriculatum* and *Aulacomnium palustre*. The cover is a scraw (i.e. floating vegetation) with characteristic species like Marsh Willowherb (*Epilobium palustre*) and Early Marsh-orchid (*Dactylorhiza incarnata*).

The soil high up the Lismore valleys and in rocky places is poor in nutrients but it becomes richer where streams enter and also along the valley bottoms. In such sites Wood Speedwell (*Veronica montana*), Wood Anemone (*Anemone nemorosa*), Enchanter's-nightshade (*Circaea lutetiana*), Barren Strawberry (*Potentilla sterilis*) and shield-fern (*Polystichum* sp.) occur. There is some Ramsons, Three-nerved Sandwort (*Moehringia trinervia*) and Early-purple Orchid (*Orchis mascula*) locally, with Opposite-leaved Golden-saxifrage, Meadowsweet and Bugle (*Ajuga reptans*) in wet places. A stand of Hazel woodland at the base of the Glenakeeffe valley shows this community well.

The area has been subject to much tree felling in the recent past and re-sprouting stumps have given rise to areas of bushy Hazel, Holly, Rusty Willow and Downy Birch. The ground in the clearings is heathy with Heather (*Calluna vulgaris*), Slender St John's-wort (*Hypericum pulchrum*) and the occasional Broom (*Cytisus scoparius*) occurring.

The estuary and the habitats within and associated with it form a large component of the site. Very extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. The main expanses occur at the southern end of the site, with the best examples at Kinsalebeg in Co. Waterford, and between Youghal and the main bridge north of it across the river in Co. Cork. Other areas occur along the tributaries of the Licky in east Co. Waterford, and Glendine, Newport, Bride and Killahaly Rivers in Waterford west of the Blackwater. There are also large tracts along the Tourig River in Co. Cork. There are narrow bands of intertidal flats along the main river as far north as Camphire Island. Patches of green filamentous algae (*Ulva* sp. and *Enteromorpha* sp.) occur in places, while fucoid algae are common on the more stony flats, even as high upstream as Glenassy or Coneen.

The area of saltmarsh within the site is small. The best examples occur at the mouths of the tributaries and in the townlands of Foxhole and Blackbog. Those found are generally characteristic of Atlantic salt meadows. The species list at Foxhole consists of Common Saltmarsh-grass (*Puccinellia maritima*), small amounts of Greater Sea-spurrey (*Spergularia media*), glasswort (*Salicornia* sp.), Sea Arrowgrass (*Triglochin maritima*), Annual Sea-blite (*Suaeda maritima*) and Sea Purslane (*Halimione*

portulacoides) - the latter a very recent coloniser. Some Sea Aster (*Aster tripolium*) occurs, generally with Creeping Bent (*Agrostis stolonifera*). Sea Couch (*Elymus pycnanthus*) and small isolated clumps of Sea Club-rush (*Scirpus maritimus*) are also seen. On the Tourig River additional saltmarsh species found include sea-lavenders (*Limoniun* spp.), Thrift (*Armeria maritima*), Red Fescue (*Festuca rubra*), Common Scurvygrass (*Cochlearia officinalis*) and Sea Plantain (*Plantago maritima*). Oraches (*Atriplex* spp.) are found on channel edges. Species such as Saltmarsh Rush (*Juncus gerardi*) and Sea Rush (*J. maritimus*) are found in places in this site also, and are indicative of Mediterranean salt meadows. Areas of *Salicornia* mud are found at the eastern side of the townland of Foxbole above Youghal, at Blackbog, along the Tourig and Kinsalebeg esturaies.

The shingle spit at Ferrypoint supports a good example of perennial vegetation of stony banks. The spit is composed of small stones and cobbles and has a well developed and diverse flora. At the lowest part, Sea Beet (*Beta vulgaris* subsp. *maritima*), Curled Dock (*Rumex crispus*) and Yellow Horned-poppy (*Glaucium flavum*) occur, while at a slightly higher level Sea Mayweed (*Matricaria maritima*), Cleavers (*Galium aparine*), Rock Samphire (*Crithmum maritimum*), Sea Sandwort (*Honkenya peploides*), Spear-leaved Orache (*Atriplex prostrata*) and Babington's Orache (*A. glabriuscula*). Other species present include Sea Rocket (*Cakile maritima*), Herb-Robert (*Geranium robertianum*), Red Fescue and Kidney Vetch (*Anthyllis vulneraria*). The top of the spit is more vegetated and supports lichens and bryophytes, including *Tortula ruraliformis* and *Rhytidiadelphus squarrosus*.

The site supports several Red Data Book plant species, i.e. Starved Wood-sedge (*Carex depauperata*), Killarney Fern (*Trichomanes speciosum*), Pennyroyal (*Mentha pulegium*), Bird's-nest Orchid (*Neottia nidus-avis*), Golden Dock (*Rumex maritimus*) and Bird Cherry (*Prunus padus*). The first three of these are also protected under the Flora (Protection) Order, 2015, while the Killarney Fern is also listed on Annex II of the E.U. Habitats Directive. The following plants, relatively rare nationally, are also found within the site: Toothwort (*Lathraea squamaria*) - associated with woodlands on the Awbeg and Blackwater; Summer Snowflake (*Leucojum aestivum*) and Flowering Rush (*Butomus umbellatus*) on the Blackwater; Common Calamint (*Calamintha ascendens*), Red Campion, Sand Leek (*Allium scorodoprasum*) and Wood Club-rush (*Scirpus sylvaticus*) on the Awbeg.

The site is also important for the presence of several E.U. Habitats Directive Annex II animal species, including Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*L. fluviatilis*), Twaite Shad (*Alosa fallax fallax*), Freshwater Pearl Mussel (*Margaritifera margaritifera*), Otter (*Lutra lutra*) and Salmon (*Salmo salar*). The Awbeg supports a population of White-clawed Crayfish (*Austropotamobius pallipes*). This threatened species has been recorded from a number of locations and its remains are also frequently found in Otter spraints, particularly in the lower reaches of the river. The freshwater stretches of the Blackwater and Bride Rivers are designated salmonid rivers. The Blackwater is noted for its enormous run of salmon over the years. The river is characterised by significant pools, streams, glides, and generally, a good push of water coming through except in

very low water. Spring salmon fishing can be carried out as far upstream as Fermoy and is highly regarded especially at Careysville. The Bride, main Blackwater upstream of Fermoy, and some of the tributaries are more associated with grilse fishing.

The site supports many of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger and Irish Hare. The bat species Natterer's Bat, Daubenton's Bat, Whiskered Bat, Brown Long-eared Bat and Pipistrelle, can be seen feeding along the river, roosting under the old bridges and in old buildings.

Common Frog, a Red Data Book species that is also legally protected (Wildlife Act, 1976), occurs throughout the site. The rare bush cricket *Metrioptera roselii* (Order Orthoptera) has been recorded in the reed/willow vegetation of the river embankment on the Lower Blackwater River. The Swan Mussel (*Anodonta cygnea*), a scarce species nationally, occurs at a few sites along the freshwater stretches of the Blackwater.

Several bird species listed on Annex I of the E.U. Birds Directive are found on the site. Some use it as a staging area, others are vagrants, while others use it more regularly. Internationally important numbers of Whooper Swan (average peak 174, 1994/95-95/96) and nationally important numbers Bewick's Swan (average peak 5, 1996/97-2000/01) use the Blackwater Callows. Golden Plover occur in regionally important numbers on the Blackwater estuary (average peak 885, 1984/85-86/87) and on the River Bride (absolute maximum 2,141, 1994/95). Staging Terns visit the site annually, with >300 Sandwich Tern and >200 Arctic/Common Tern (average peak 1974-1994). The site also supports populations of the following: Red Throated Diver, Great Northern Diver, Barnacle Goose, Ruff, Wood Sandpiper and Greenland White-fronted Goose. Three breeding territories for Peregrine Falcon are known along the Blackwater Valley. This, the Awbeg and the Bride River are also thought to support at least 30 pairs of Kingfisher. Little Egret breed at the site (12 pairs in 1997, 19 pairs in 1998).

The site holds important numbers of wintering waterfowl. Both the Blackwater Callows and the Blackwater Estuary Special Protection Areas (SPAs) hold internationally important numbers of Black-tailed Godwit (average peak 847, 1994/95-95/96 on the callows, average peak 845, 1974/75-93/94 in the estuary). The Blackwater Callows also hold Wigeon (average peak 2,752), Teal (average peak 1,316), Mallard (average peak 427), Shoveler (average peak 28), Lapwing (average peak 880), Curlew (average peak 416) and Black-headed Gull (average peak 396) (counts from 1994/95-95/96). Numbers of birds using the Blackwater Estuary, given as the mean of the highest monthly maxima over 20 years (1974-94), are Shelduck (137 +10 breeding pairs), Wigeon (780), Teal (280), Mallard (320 + 10 breeding pairs), Goldeneye (11-97), Oystercatcher (340), Ringed Plover (50 + 4 breeding pairs), Grey Plover (36), Lapwing (1,680), Knot (150), Dunlin (2,293), Snipe (272), Black-tailed Godwit (845), Bar-tailed Godwit (130), Curlew (920), Redshank (340), Turnstone (130), Black-headed Gull (4,000) and Lesser Black-backed Gull (172). The greatest

numbers (75%) of the wintering waterfowl of the estuary are located in the Kinsalebeg area on the east of the estuary in Co. Waterford. The remainder are concentrated along the Tourig estuary on the Co. Cork side.

The river and river margins also support many Heron, non-breeding Cormorant and Mute Swan (average peak 53, 1994/95-95/96 in the Blackwater Callows). Heron occurs all along the Bride and Blackwater Rivers: 2 or 3 pairs at Dromana Rock; approximately 25 pairs in the woodland opposite; 8 pairs at Ardsallagh Wood and around 20 pairs at Rincrew Wood have been recorded. Some of these are quite large and significant heronries. Significant numbers of Cormorant are found north of the bridge at Youghal and there are some important roosts present at Ardsallagh Wood, downstream of Strancally Castle and at the mouth of the Newport River. Of note are the high numbers of wintering Pochard (e.g. 275 individuals in 1997) found at Ballyhay quarry on the Awbeg, the best site for Pochard in Co. Cork.

Other important species found within the site include Long-eared Owl, which occurs all along the Blackwater River, and Barn Owl, a Red Data Book species, which is found in some old buildings and in Castlehyde, west of Fermoy. Reed Warbler, a scarce breeding species in Ireland, was found for the first time in the site in 1998 at two locations. It is not known whether or not this species breeds on the site, although it breeds nearby to the south of Youghal. Dipper occurs on the rivers.

Land use at the site is mainly centred on agricultural activities. The banks of much of the site and the callows, which extend almost from Fermoy to Cappoquin, are dominated by improved grasslands which are drained and heavily fertilised. These areas are grazed and used for silage production. Slurry is spread over much of this area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the populations of E.U. Habitats Directive Annex II animal species within it. Many of the woodlands along the rivers belong to old estates and support many non-native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the Blackwater and its tributaries, and there are a number of angler associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. Other recreational activities such as boating, golfing and walking are also popular. Water skiing is carried out at Villierstown. Parts of Doneraile Park and Anne's Grove are included in the site: both areas are primarily managed for amenity purposes. There is some hunting of game birds and Mink within the site. Ballyhay quarry is still actively quarried for sand and gravel. Several industrial developments, which discharge into the river, border the site.

The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, dredging of the upper reaches of the Awbeg, over-grazing within the woodland areas, and invasion by non-native species, for example Rhododendron and Cherry Laurel.

Overall, the River Blackwater is of considerable conservation significance for the occurrence of good examples of habitats and populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive respectively. Furthermore it is of high conservation value for the populations of bird species that use it. Two Special Protection Areas, designated under the E.U. Birds Directive, are also located within the site - Blackwater Callows and Blackwater Estuary. Additionally, the importance of the site is enhanced by the presence of a suite of uncommon plant species.

SITE SYNOPSIS

Site Name: Lower River Suir SAC

Site Code: 002137

Lower River Suir SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary. The Suir and its tributaries flow through the counties of Tipperary, Kilkenny and Waterford.

Upstream of Waterford city, the swinging meanders of the Suir criss-cross the Devonian sandstone rim of hard rocks no less than three times as they leave the limestone-floored downfold below Carrick-on-Suir. In the vicinity of Carrick-on-Suir the river follows the limestone floor of the Carrick Syncline. Upstream of Clonmel the river and its tributaries traverse Upper Palaeozoic Rocks, mainly the Lower Carboniferous Visean and Tournaisian. The freshwater stretches of the Clodiagh River in Co. Waterford traverse Silurian rocks, through narrow bands of Old Red Sandstone and Lower Avonian Shales, before reaching the carboniferous limestone close to its confluence with the Suir. The Aherlow River flows through a Carboniferous limestone valley, with outcrops of Old Red Sandstone forming the Galtee Mountains to the south and the Slievenamuck range to the north. Glacial deposits of sands and gravels are common along the valley bottom, flanking the present-day river course.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[3260] Floating River Vegetation
[6430] Hydrophilous Tall Herb Communities
[91A0] Old Oak Woodlands
[91E0] Alluvial Forests*
[91J0] Yew Woodlands*

[1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
[1092] White-clawed Crayfish (*Austropotamobius pallipes*)
[1095] Sea Lamprey (*Petromyzon marinus*)
[1096] Brook Lamprey (*Lampetra planeri*)
[1099] River Lamprey (*Lampetra fluviatilis*)

[1103] Twaite Shad (*Alosa fallax*)
[1106] Atlantic Salmon (*Salmo salar*)
[1355] Otter (*Lutra lutra*)

Alluvial wet woodland is a declining habitat type in Europe as a result of drainage and reclamation. The best examples of this type of woodland in the site are found on the islands just below Carrick-on-Suir and at Fiddown Island. Species occurring here include Almond Willow (*Salix triandra*), White Willow (*S. alba*), Rusty Willow (*S. cinerea* subsp. *oleifolia*), Osier (*S. viminalis*), with Yellow Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Pendulous Sedge (*Carex pendula*), Meadowsweet (*Filipendula ulmaria*) and Common Valerian (*Valeriana officinalis*). The terrain is littered with dead trunks and branches and intersected with small channels which carry small streams to the river. The bryophyte and lichen floras appear to be rich. A small plot is currently being coppiced and managed by the National Parks and Wildlife Service. In the drier areas species such as Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*) occur.

Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the floodplain of the river is intact. Characteristic species of the habitat include Meadowsweet, Purple Loosestrife (*Lythrum salicaria*), Marsh Ragwort (*Senecio aquaticus*), Ground Ivy (*Glechoma hederacea*) and Hedge Bindweed (*Calystegia sepium*).

Old oak woodlands are also of importance at the site. The best examples are seen in Portlaw Wood which lies on both sides of the Clodiagh River. On the south-facing side the stand is more open and the oaks (mainly Pedunculate Oak, *Quercus robur*) are well grown and spreading. Ivy (*Hedera helix*) and Bramble (*Rubus fruticosus* agg.) are common on the ground, indicating relatively high light conditions. Oak regeneration is dense, varying in age from 0-40 years and Holly (*Ilex aquifolium*) is fairly common but mostly quite young. Across the valley, by contrast, the trees are much more closely spaced and though taller, are poorly grown on average. There are no clearings; large oaks extend to the boundary wall. In the darker conditions, Ivy is much rarer and Holly much more frequent, forming a closed canopy in places. Oak regeneration is uncommon since there are as yet few natural clearings. The shallowness of the soil on the north-facing slope probably contributes to the poor tree growth there. The acid nature of the substrate has induced a 'mountain' type oakwood community to develop. The site is quite species-rich throughout, including an abundance of mosses, liverworts and lichens. The rare lichen *Lobaria pulmonaria,* an indicator of ancient woodlands, is found here.

Inchinsquillib Wood consists of three small separate sloping blocks of woodland in a valley cut by the young Multeen River and its tributaries through acidic Old Red Sandstone and Silurian rocks. Two blocks, both with an eastern aspect, located to the north of the road, are predominantly of Sessile Oak (*Quercus petraea*) and Hazel, with Downy Birch (*Betula pubescens*), Ash and Holly. The ground flora is quite mixed with,

for example, Wood-sedge (*Carex sylvatica*), Bluebell (*Hyacinthoides non-scripta*), Primrose (*Primula vulgaris*), Wood-sorrel (*Oxalis acetosella*), Pignut (*Conopodium majus*) and Hard Fern (*Blechnum spicant*). The base poor nature of the underlying rock is to some extent masked by the overlying drift. The third block, to the south of the road, and with a northern aspect, is a similar although less mature mixture of Sessile Oak, Birch and Holly. Here the influence of the drift is more marked, with the occurrence of Wood Anemone (*Anemone nemorosa*) amongst the ground flora.

Two stands of Yew (*Taxus baccata*) woods, a rare habitat in Ireland and the E.U., occur within the site. These are on limestone ridges at Shanbally and Cahir Park. Both are in woods planted with non-native species, including conifers. However, the area at Cahir Park is fairly substantial in size and includes some relatively undisturbed patches of wood and some very old trees. Regeneration of the Yew trees is mostly poor, due to competition from species such as Sycamore (*Acer pseudoplatanus*) and, at Shanbally, due to heavy grazing by goats. Other native species which occur with the Yew trees include Ash, Pedunculate Oak, Hazel and Spindle (*Euonymus europaeus*). Future prospects for these Yew woods are good as the sites are proposed for restoration under a Coillte E.U. LIFE programme.

Floating river vegetation is evident in the freshwater stretches of the River Suir and along many of its tributaries. Typical species found include Canadian Pondweed (*Elodea canadensis*), water-milfoils (*Myriophyllum* spp.), Fennel Pondweed (*Potamogeton pectinatus*), Curled Pondweed (*P. crispus*), Perfoliate Pondweed (*P. perfoliatus*), Pond Water-crowfoot (*Ranunculus peltatus*), other crowfoots (*Ranunculus* spp.) and the moss *Fontinalis antipyretica.* At a couple of locations along the river Opposite-leaved Pondweed (*Groenlandia densa*) occurs. This species is protected under the Flora (Protection) Order, 1999.

The Aherlow River is fast flowing and mostly follows a natural unmodified river channel. Submerged vegetation includes the aquatic moss *Fontinalis antipyretica* and Stream Water-crowfoot (*R. pencillatus*), while shallow areas support species such as Reed Canary-grass (*Phalaris arundinacea*), Brooklime (*Veronica beccabunga*) and Water Mint (*Mentha aquatica*). The river bank is fringed in places with Alder (*Alnus glutinosa*) and willows (*Salix* spp.).

The Multeen River is fast flowing, mostly gravel-bottomed and appears to follow a natural unmodified river channel. Water-crowfoots occur in abundance and the aquatic moss *Fontinalis antipyretica* is also common. In sheltered shallows, species such as Water-cress (*Nasturtium officinale*) and water-starworts (*Callitriche* spp.) occur. The river channel is fringed for most of its length with Alder, Willow and a narrow strip of marshy vegetation.

Salt meadows occur below Waterford City in old meadows where the embankment is absent, or has been breached, and along the tidal stretches of some of the in-flowing rivers below Little Island. There are very narrow, non-continuous bands of this habitat along both banks. More extensive areas are also seen along the south bank at Ballynakill, the east side of Little Island, and in three large salt meadows

between Ballynakill and Cheekpoint. The Atlantic and Mediterranean sub-types are generally intermixed. The species list is extensive and includes Red Fescue (*Festuca rubra*), oraches (*Atriplex* spp.), Sea Aster (*Aster tripolium*), Sea Couch (*Elymus pycnanthus*), frequent Sea Milkwort (*Glaux maritima*), occasional Wild Celery (*Apium graveolens*), Parsley Water-dropwort (*Oenanthe lachenalii*), English Scurvygrass (*Cochlearia anglica*) and Sea Arrowgrass (*Triglochin maritima*). These species are more representative of the Atlantic sub-type of the habitat. Common Cord-grass (*Spartina anglica*), is rather frequent along the main channel edge and up the internal channels. The legally protected (Flora (Protection) Order, 1999) Meadow Barley (*Hordeum secalinum*) grows at the landward transition of the saltmarsh. Sea Rush (*Juncus maritimus*), an indicator of the Mediterranean salt meadows, also occurs.

Other habitats at the site include wet and dry grassland, marsh, reedswamp, improved grassland, coniferous plantations, deciduous woodland, scrub, tidal river, stony shore and mudflats. The most dominant habitat adjoining the river is improved grassland, although there are wet fields with species such as Yellow Iris, Meadowsweet, rushes (*Juncus* spp.), Meadow Buttercup (*Ranunculus acris*) and Cuckooflower (*Cardamine pratensis*).

Cabragh marshes, just below Thurles, lie in a low-lying tributary valley into which the main river floods in winter. Here there is an extensive area of Common Reed (*Phragmites australis*) with associated marshland and peaty fen. The transition between vegetation types is often well displayed. A number of wetland plants of interest occur, in particular the Narrow-leaved Bulrush (*Typha angustifolia*), Bottle Sedge (*Carex rostrata*) and Blunt-flowered Rush (*Juncus subnodulosus*). The marsh is naturally eutrophic but it has also the nutritional legacy of the former sugar factory which discharged into it through a number of holding lagoons, now removed. Production is high, which is seen in the size of such species as Celery-leaved Buttercup (*Ranunculus sceleratus*), as well as in the reeds themselves.

Throughout the Lower River Suir site are small areas of woodland other than those described above. These tend to be a mixture of native and non-native species, although there are some areas of semi-natural wet woodland with species such as Ash and willow. Cahir Park Woodlands is a narrow tract of mixed deciduous woodland lying on the flat-lying floodplain of the River Suir. This estate woodland was planted over one hundred years ago and it contains a large component of exotic tree species. However, due to original planting and natural regeneration there is now a good mix of native and exotic species. About 5 km north-west of Cashel, Ardmayle pond is a long, possibly artificial water body running parallel to the River Suir. It is partly shaded by planted Lime (*Tilia* hybrids), Sycamore and the native Alder. Growing beneath the trees are shade tolerant species such as Remote sedge (*Carex remota*).

The site is of particular conservation interest for the presence of a number of Annex II animal species, including Freshwater Pearl Mussel (both *Margaritifera margaritifera* and *M. margaritifera* subsp. *durrovensis* occur), White-clawed Crayfish, Salmon, Twaite Shad (*Alosa fallax fallax*), three species of Lampreys - Sea Lamprey, Brook

Lamprey and River Lamprey, and Otter. This is one of only three known spawning grounds in the country for Twaite Shad.

The site also supports populations of several other animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat, Natterer's Bat, Pipistrelle Bat, Pine Marten, Badger, Irish Hare, Smelt and Common Frog. Breeding stocks of Carp are found in Kilsheelan Lake. This is one of only two lakes in the country which is known to have supported breeding Carp. Carp require unusually high summer water temperatures to breed in Ireland. As the site is therefore unusual in this regard, it may also support interesting invertebrate populations.

Parts of the site have also been identified as of ornithological importance for a number of Annex I (E.U. Birds Directive) bird species, including Greenland White-fronted Goose (10), Golden Plover (1,490), Whooper Swan (7) and Kingfisher. Figures given in brackets are the average maximum counts from four count areas within the site for the three winters 1994-1997. Wintering populations of migratory birds use the site. Flocks are seen in Coolfinn Marsh and also along the reedbeds and saltmarsh areas of the Suir. Coolfinn supports nationally important numbers of Greylag Goose on a regular basis, with numbers between 600 and 700 recorded. Other species occurring include Mallard (21), Teal (159), Wigeon (26), Tufted Duck (60), Pintail (4), Pochard (2), Little Grebe (2), Black-tailed Godwit (20), Oystercatcher (16), Lapwing (993), Dunlin (101), Curlew (195), Redshank (28), Greenshank (4) and Green Sandpiper (1). Nationally important numbers of Lapwing (2,750) were recorded at Faithlegg in the winter of 1996/97. In Cabragh marshes there is abundant food for surface feeding wildfowl which total approximately 1,000 in winter. Widgeon, Teal and Mallard are numerous, and the latter has a large breeding population, with up to 400 in summer. In addition, less frequent species like Shoveler and Pintail occur and there are records for both Whooper and Bewick's swans. Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive, occurs along some of the many tributaries throughout the site.

Land use at the site consists mainly of agricultural activities including grazing, silage production, fertilising and land reclamation. The grassland is intensively managed and the rivers are therefore vulnerable to pollution from run-off of fertilisers and slurry. Arable crops are also grown. Fishing is a main tourist attraction on stretches of the Suir and some of its tributaries, and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. The Aherlow River is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other recreational activities such as boating, golfing and walking are also popular. Several industrial developments, which discharge into the river, border the site including three dairy related operations and a tannery.

The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. The site also supports populations of several important animals species, some listed on Annex II of the Habitats Directive or listed in the Irish Red Data Book. The presence of two

legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the site adds further to the ecological interest and importance.

SITE SYNOPSIS

Site Name: Great Island Channel SAC

Site Code: 001058

The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. Geologically, Cork Harbour consists of two large areas of open water in a limestone basin, separated from each other and the open sea by ridges of Old Red Sandstone. Within this system, Great Island Channel forms the eastern stretch of the river basin and, compared to the rest of Cork Harbour, is relatively undisturbed. Within the site is the estuary of the Owennacurra and Dungourney Rivers. These rivers, which flow through Midleton, provide the main source of freshwater to the North Channel.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1140] Tidal Mudflats and Sandflats
[1330] Atlantic Salt Meadows

The main habitats of conservation interest in Great Island Channel SAC are the sheltered tidal sand and mudflats and the Atlantic salt meadows. Owing to the sheltered conditions, the intertidal flats are composed mainly of soft muds. These muds support a range of macro-invertebrates, notably *Macoma balthica*, *Scrobicularia plana*, *Hydrobia ulvae*, *Nepthys hombergi, Nereis diversicolor* and *Corophium volutator*. Green algal species occur on the flats, especially *Ulva lactua* and *Enteromorpha* spp. Cordgrass (*Spartina* spp.) has colonised the intertidal flats in places, especially at Rossleague and Belvelly.

The saltmarshes are scattered through the site and are all of the estuarine type on mud substrate. Species present include Sea Purslane (*Halimione portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Plantain (*Plantago maritima*), Greater Sea-spurrey (*Spergularia media*), Lax-flowered Sea-lavender (*Limonium humile*), Sea Arrowgrass (*Triglochin maritimum*), Sea Mayweed (*Matricaria maritima*) and Red Fescue (*Festuca rubra*).

The site is extremely important for wintering waterfowl and is considered to contain three of the top five areas within Cork Harbour, namely North Channel, Harper's Island and Belvelly-Marino Point. Shelduck is the most frequent duck species with 800-1,000 birds centred on the Fota/Marino Point area. There are also large flocks of Teal and Wigeon, especially at the eastern end. Waders occur in the greatest density

north of Rosslare, with Dunlin, Godwit, Curlew and Golden Plover the commonest species. A population of about 80 Grey Plover is a notable feature of the area. All the mudflats support feeding birds; the main roost sites are at Weir Island and Brown Island, and to the north of Fota at Killacloyne and Harper's Island. Ahanesk supports a roost also but is subject to disturbance. The numbers of Grey Plover and Shelduck, as given above, are of national importance.

The site is an integral part of Cork Harbour which is a wetland of international importance for the birds it supports. Overall, Cork Harbour regularly holds over 20,000 waterfowl and contains internationally important numbers of Black-tailed Godwit (1,181) and Redshank (1,896), along with nationally important numbers of nineteen other species. Furthermore, it contains large Dunlin (12,019) and Lapwing (12,528) flocks. All counts are average peaks, 1994/95 – 1996/97. Much of the site falls within Cork Harbour Special Protection Area, an important bird area designated under the E.U. Birds Directive.

While the main land use within the site is aquaculture (oyster farming), the greatest threats to its conservation significance come from road works, infilling, sewage outflows and possible marina developments.

The site is of major importance for the two habitats listed on Annex I of the E.U. Habitats Directive, as well as for its important numbers of wintering waders and wildfowl. It also supports a good invertebrate fauna.

SITE SYNOPSIS

SITE NAME: BLACKWATER CALLOWS SPA

SITE CODE: 004094

The Blackwater Callows SPA comprises the stretch of the River Blackwater that runs in a west to east direction between Fermoy and Lismore in Counties Cork and Waterford, a distance of almost 25 km. The site includes the river channel and strips of seasonally-flooded grassland within the flood plain. Sandstone ridges, which run parallel to the river, confine the area of flooding to a relatively narrow corridor.

The river channel has a well-developed aquatic plant community, which includes such species as Pond Water-crowfoot (*Ranunculus peltatus*), Canadian Pondweed (*Elodea canadensis*) and a variety of pondweeds (*Potamogeton* spp.), water-milfoils (*Myriophyllum* spp.) and water-starworts (*Callitriche* spp.).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Teal and Black-tailed Godwit. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is of high ornithological interest on account of its wintering waterfowl populations. Whooper Swan occurs in numbers of international importance (212) - all figures are mean peaks for the five winters 1995/96 to 1999/2000. Bewick's Swan were regularly recorded at the site up to the mid-1990s; however, in the winters of 1997/98 and 1998/99 only four and two individuals respectively were recorded, and the species is no longer considered to be a regular visitor. This decline is in line with a national decrease and a marked contraction in range. The site supports nationally important populations of Wigeon (2,313), Teal (898) and Black-tailed Godwit (251). Other wintering species that occur include Mallard (398) Shoveler (26), Lapwing (191), Curlew (457) and Black-headed Gull (311).

Little Egret uses the site throughout the year as there is a nearby breeding colony downstream. The river system provides an important feeding area for these birds.

The Blackwater Callows SPA is of importance for its populations of wintering waterfowl, including an internationally important population of Whooper Swan and nationally important populations of Wigeon, Teal and Black-tailed Godwit. The presence of Whooper Swan, as well as Little Egret, is of particular note as these species are listed on Annex I of the E.U. Birds Directive. Part of the Blackwater Callows SPA is a Wildfowl Sanctuary.

31.10.2014

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 3

CEMP

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

COOM GREEN ENERGY PARK LTD.

CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

COOM GREEN ENERGY PARK

Prepared for: Coom Green Energy Park Limited

coom green energy

Date: December 2020

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CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN (CEMP) FOR COOM GREEN ENERGY PARK

User is responsible for Checking the Revision Status of This Document

Rev. No.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
0	Issue for Planning	EOS/EH/TB/MG	TB	JH	07/12/20

Client: Coom Green Energy Park Limited (CGEP), Brookfield Renewable Ireland Limited (BRIL)., Coillte

Keywords: CEMP, Construction and Environmental Management Plan, Coom Green Energy Park, Wind Farm, Grid Connection, Turbine Delivery Route

Abstract: This document is a Construction and Environmental Management Plan (CEMP) for Coom Green Energy Park. The document sets out the key environmental management issues associated with the construction, operation and decommissioning of the proposed development, to ensure that during these phases of the development, the environment is protected and impacts on the environment are minimised. The CEMP will be developed further at the post-planning and construction stages by the client and on the appointment of the main contractor to the project.

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1. INTRODUCTION

1.1 General Introduction and Purpose

This document is the Construction and Environmental Management Plan (CEMP) for the proposed Coom Green Energy Park and has been prepared by Fehily Timoney and Company (FT) on behalf of Coom Green Energy Park Limited (CGEP).

The CEMP will be updated prior to construction to take account of any amendments arising during the consenting process and relevant conditions attached to the planning permission and will be implemented for the duration of the construction phase of the project. The CEMP will be a live document and will be reviewed and updated as required. For the avoidance of doubt, that all measures stipulated in this CEMP will be implemented in full.

The CEMP sets out the key construction and environmental management issues associated with the proposed project and will be developed further at the post-planning and construction stages by the client and on the appointment of the main contractor to the project. Any adjustments to the CEMP will be carried out on the basis that they do not increase the impacts as addressed in the EIAR.

In the case of any ambiguity or contradiction between this CEMP and the EIAR, the EIAR shall take precedence.

This CEMP sets out the key environmental management issues associated with the construction, operation and decommissioning of the proposed project, to ensure that during these phases of the project, the environment is protected and impacts on the environment are minimised.

The document is divided into six sections:

Section 1: *Introduction* provides an overview of the existing site and the proposed project

Section 2: *Existing Site Environmental Conditions* provides details of the main existing geotechnical, hydrological, ecological and archaeological conditions onsite. These conditions are to be considered by the contractor in the construction, operation and decommissioning of this proposed project.

Section 3: *Overview of Construction Works*, this section provides an overview of the construction works proposed, including drainage and sediment controls to be installed.

Section 4: *Environmental Management Plan (EMP)*, this section outlines the main requirements of the EMP and outlines operational controls for the protection of the environment including soil management, habitat and species, site drainage control, archaeology, construction traffic, site reinstatement and decommissioning, waste management.

Section 5: *Safety & Health Management Plan,* this section defines the work practices, procedures and management responsibilities relating to the management of safety and health during the design, construction and operation of the Coom Green Energy Park.

Section 6: *Emergency Response Plan* contains predetermined guidelines and procedures to ensure the safety, health and welfare of everybody involved in the project and to protect the environment during the construction phase of Coom Green Energy Park.

1.2 The Applicant

The applicant for the proposed project is Coom Green Energy Park Limited.

1.3 The Site

The proposed energy park is located south of the Nagle Mountains. The main towns and villages within the vicinity of the proposed project include Mallow, Fermoy, Castletownroche, Rathcormac, Watergrasshill, Glenville, Carrignavar, Grenagh, Drommahane. Other settlements in the vicinity are Killavullen, Monanimy, Ballyhooly, Bottlehill, Glashaboy, Burnfort, Ballyknockane, Grange, Kilworth, Glanworth, Castlelyons / Bridebridge.

The site spans across the southern and southwestern extents of the Nagle Mountains, south of the Blackwater River Valley. Both the Nagle Mountains and the Blackwater River valley are the most prominent landscape features within the central study area and its wider surrounds with the Nagle Mountains reaching a height of approximately 420m AOD.

The site is located in a predominantly agricultural area, with elevations within the site ranging from 190m to 390m above sea level. The landcover is classified in Corine as pastures; coniferous forest, transitional woodland shrub and mineral extraction sites.

The energy park site is divided into three distinct areas identified as Bottlehill, Mullanboree and Knockdoorty.

The location of the project is shown on Figure 1-1.

1.4 The Project

The proposed project consists of three main elements:

- The Main Energy Park site;
- Turbine delivery route (TDR);
- Grid connection (GCR).

The proposed project will primarily consist of a wind farm of up to 22 no. wind turbine generators (WTG's), 2 no. meteorological masts, opening of 3 no. onsite borrow pits and up to 2 no. substation compounds with battery storage units along with ancillary civil and electrical infrastructure.

The 110kV grid connection cable will consist of underground cable and will connect the on-site substations to an existing substation at Barrymore, within the townland of Farran South near Rathcormac. The Grid connection route will be ca.24.4km in length and will run for the most part along the public road. Horizontal directional drilling (HDD) will be used at 4 no. locations to cross existing watercourse crossings and the M8 motorway. Sections of the cable at the energy park site will run through private lands.

It is expected that large components associated with the wind farm construction will be transported to site via two separate turbine delivery routes (TDR's), approaching from the east and west of the site.

A detailed description of the proposed project is provided in Section 3.1.A detailed description of the proposed construction works is outlined in Section 4.

A site layout plan of the proposed project is shown in Figure 1-2.

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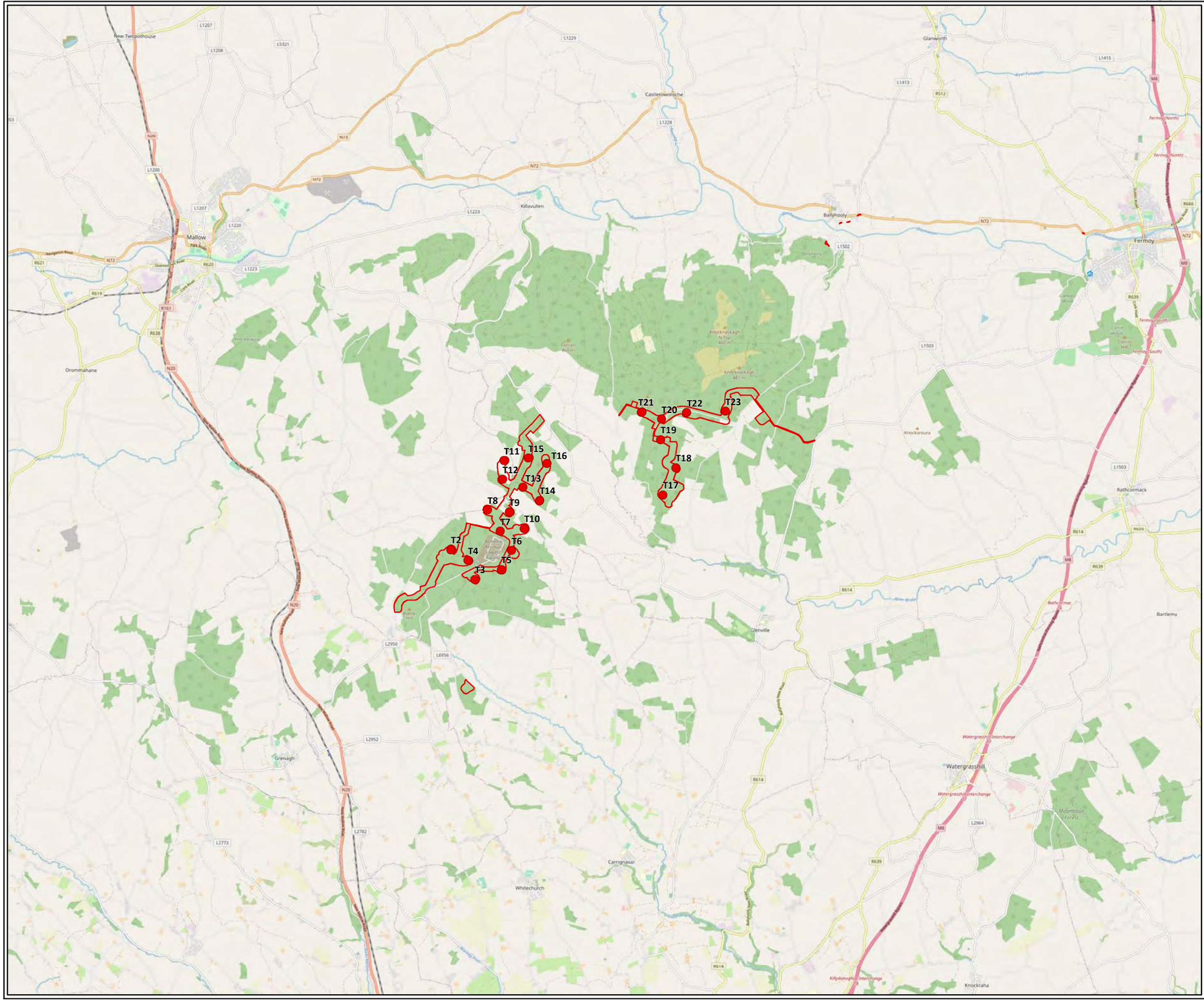

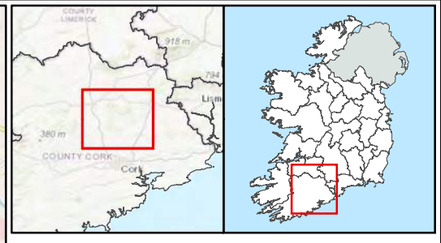

Proposed Turbine Layout

Proposed Development Boundary

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PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1.1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:100000	**REVISION:**	0
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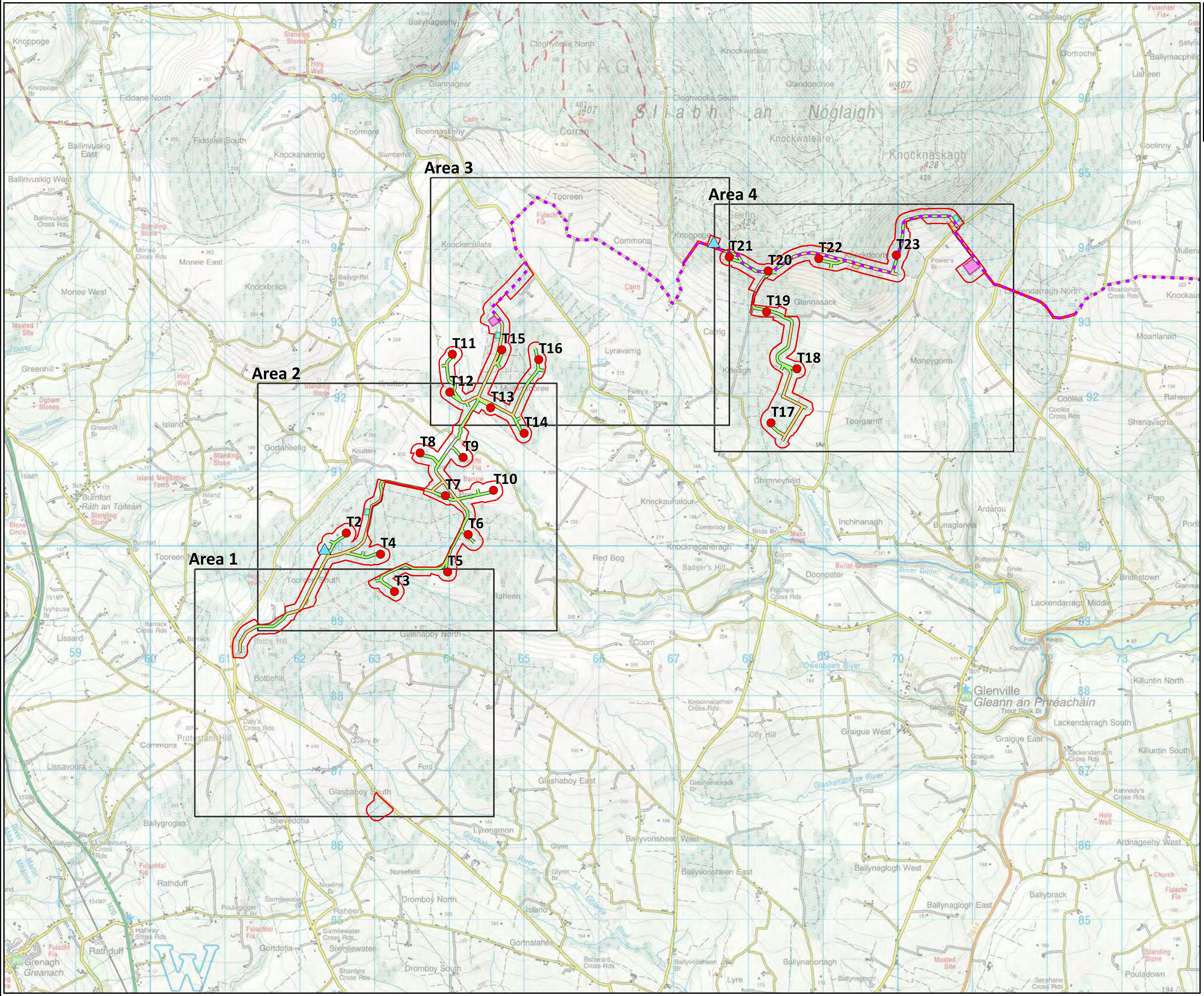

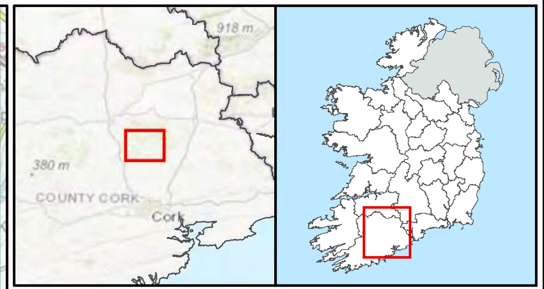

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Proposed Cable Route
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Borrow Pit
- Proposed Temporary Compound
- Proposed Substation

TITLE: Proposed Site Layout Overview	
PROJECT: Coom Green Energy Park, Co. Cork	
FIGURE NO: 1.2.1	
CLIENT: Coom Green Energy Park Ltd.	
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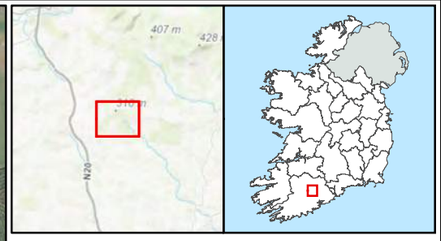

- Proposed Turbine Layout
- Proposed Development Boundary
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Temporary Compound

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TITLE:	Proposed Site Layout Area 1		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1.2.2		
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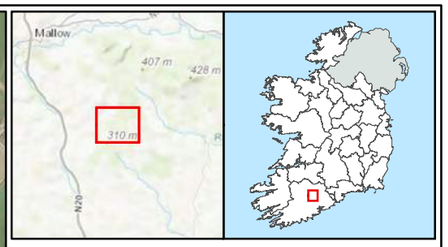

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Temporary Compound

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	Proposed Site Layout Area 2		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1.2.3		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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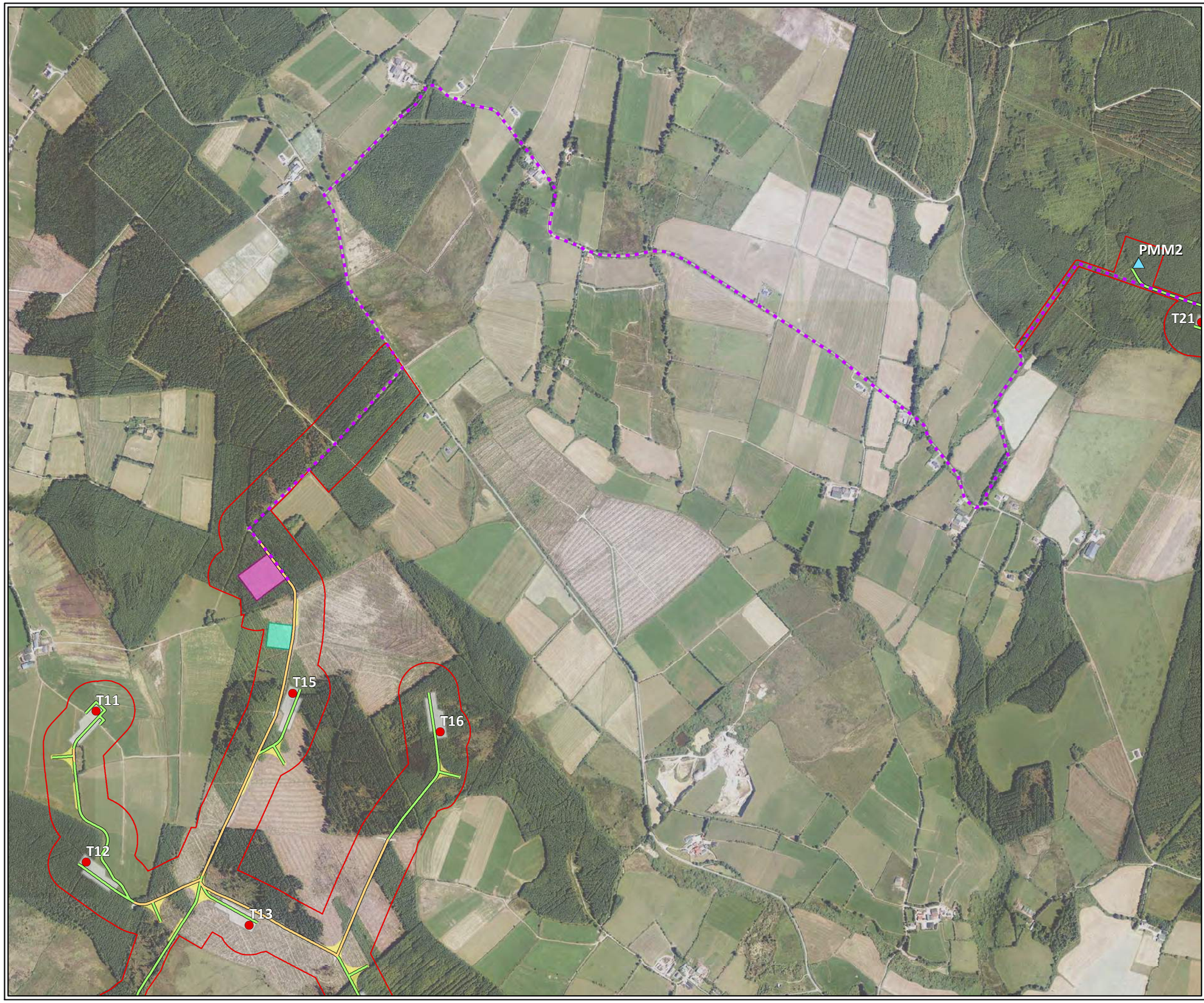

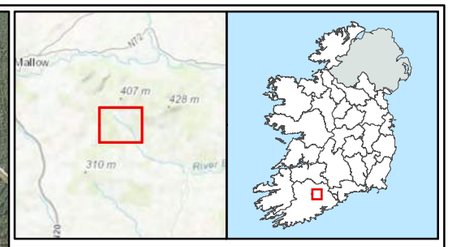

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Proposed Cable Route
- Proposed Development Boundary
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Substation

N W E S

0 0.25 0.5 1 Kilometers

TITLE: Proposed Site Layout Area 3

PROJECT: Coom Green Energy Park, Co. Cork

FIGURE NO:	1.2.4		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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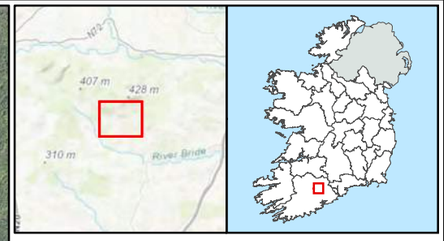

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Proposed Cable Route
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Temporary Compound
- Proposed Substation

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	Proposed Site Layout Area 4		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1.2.5		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
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2. EXISTING ENVIRONMENT

2.1 Energy Park Site

The proposed CGEP site includes lands contained within the following townlands: Glashaboy North, Coom (Hudson), Tooreen South, Killeagh, Coom (Fitzgerald) , Knuttery, Mullenaboree, Knockacullata, Knoppoge, Carrig, Glensack, Glannasack, Knockdoorty, Lackendarragh North, Glashaboy South and Toorgarrif, County Cork.

The energy park site is divided into three distinct areas identified as Bottlehill, Mullanboree and Knockdoorty.

The site is accessed from both the east and west via the N72 and N20 national roads respectively and local road network. From the east the site is accessed is via the M8 motorway and N72 national road through the village of Ballyhooly, with the route then travelling along the local road network for approximately 9.0 km. From the east, the site is accessed via the N20 and a local road which travels to the entrance of the Bottlehill Landfill Facility.

The site is located in a predominantly agricultural area, with elevations within the site ranging from 190m to 390m above sea level. The landcover is classified in Corine as pastures; coniferous forest, transitional woodland shrub and mineral extraction sites (landfill facility).

Surface runoff from the site drains to the Toor River, Coom River, Inchinanagh and Bunnaglanna watercourses, and the Bride River. The Toor River is a tributary of the Coom River. The Coom River and Inchinanagh and Bunnaglanna watercourses are tributaries of the Bride River.

A detailed description of the existing site environment can be found in Chapter 3 of the EIAR.

2.2 Turbine Delivery Route (TDR)

Turbines will be delivered to Ringaskiddy Port. From there they will be delivered to the site along two distinct routes. One route to the west of the site, servicing the Bottlehill and Mullenaboree areas and a second route servicing the eastern site at Knockdoorty.

Temporary accommodation works to facilitate turbine deliveries are proposed at lands contained within the following townlands: Grange West, Ballyhooly South, Glashaboy South and Castleblagh, Shanacloon, Grange east, Castlehyde, Gortroche, Ballygrogan, Slievedotia, Tooreen South and Carrignagohera, Co. Cork.

The turbine delivery routes are illustrated in Figure 2-1. Further details on the proposed turbine delivery routes can be found in Section 3.

2.3 Grid Connection

It is anticipated that the project will connect via underground cable to Barrymore 110kV substation in the townland of Farran South.

The cable will be installed along the public road and shall feature horizontal directional drilling at up to 4 no. locations to cross existing watercourse crossings and the M8 Motorway. No overhead lines are required for this connection.

The proposed grid connection route will cross agricultural lands and will follow the existing road to the substation at Barrymore.

The underground grid route connecting the wind farm to the national grid at Barrymore substation traverses the following townlands; Knockacullata, Tooreen, Commons, Knoppoge, Carrig, Killeagh, Glannasack, Knockdoorty, Lackendarragh North, Moanlahan, Knockauncorrin, Mullentaura, Glanakip, Rathcormack-mountain, Coolnakilla, Knockananig, Coolmucky, Ballynahina, Corrin, Farran North, Farran South, Kill-Saint-Anne-North, Co. Cork..

The proposed grid connection route is shown on Figure 2-2.

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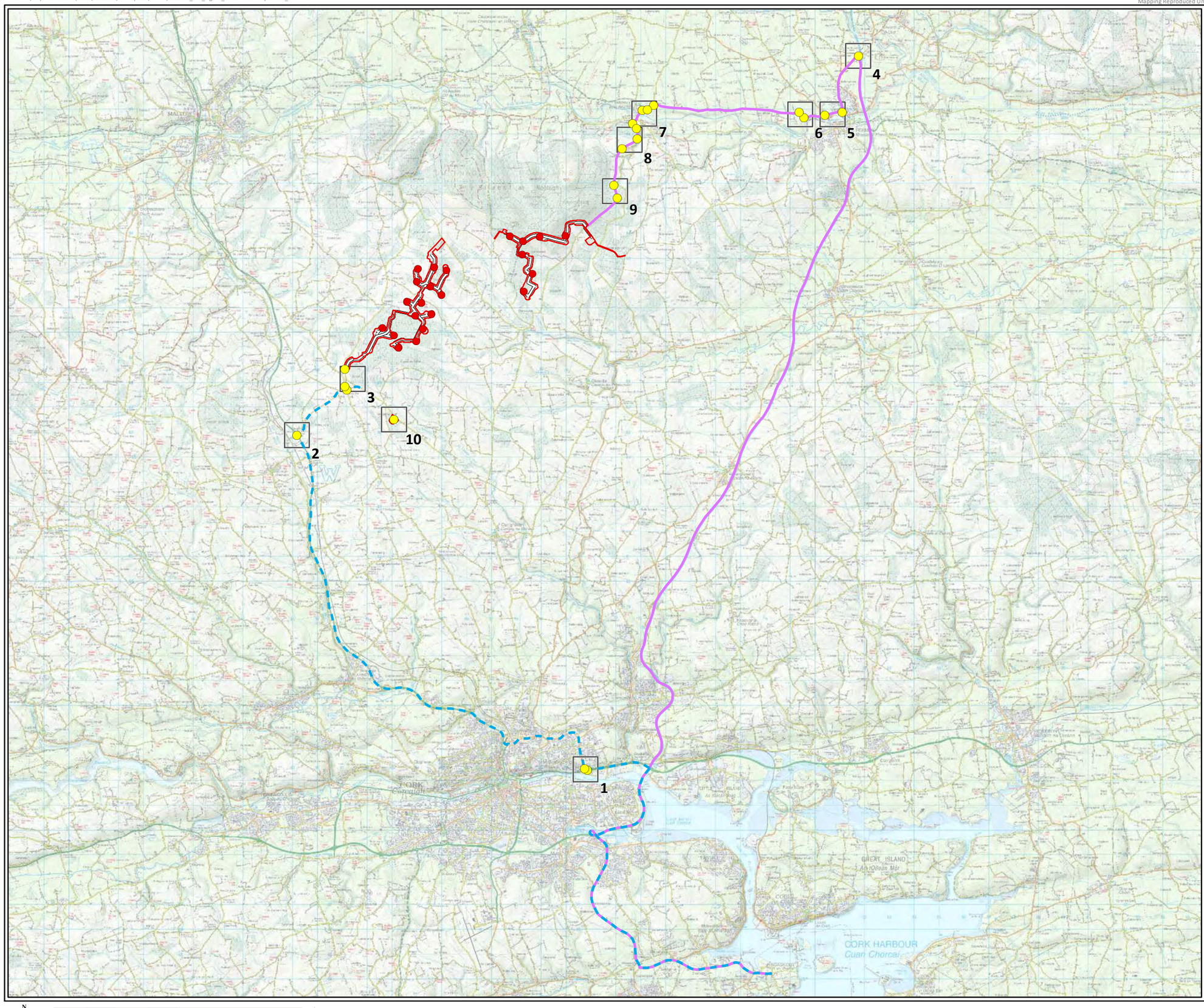

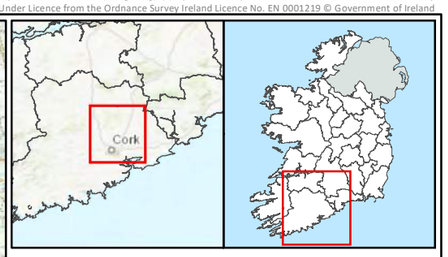

TDR Nodes

Proposed Turbine Layout

Proposed Development Boundary

Proposed Access Roads

Turbine Delivery Route Options

Route 1

Route 2

N W E S

0 2.5 5 10 Kilometers

TITLE:	Turbine Delivery Routes Overview		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:150000	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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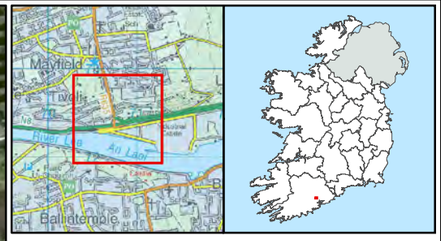

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 1

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 1		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.2		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:2500	**REVISION:**	0
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TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 1

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 2		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.3		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3500	**REVISION:**	0
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TDR Nodes

Proposed Development Boundary

Proposed Nodes Upgrade Areas

Proposed Access Roads

Turbine Delivery Route Options

Route 1

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 3		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.4		
CLIENT:	Coom Green Energy Park Ltd.		
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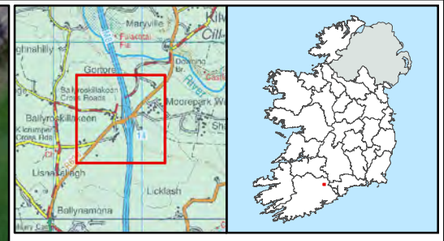

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 4		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.5		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:2500	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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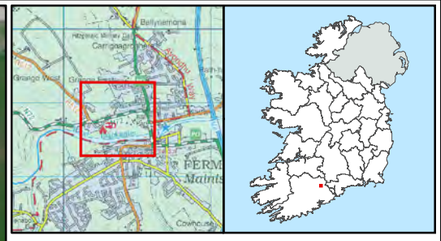

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 5		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.6		
CLIENT:	Coom Green Energy Park Ltd.		
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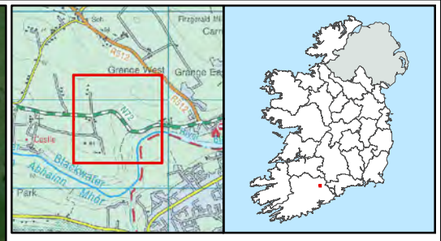

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 6		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.7		
CLIENT:	Coom Green Energy Park Ltd.		
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TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 7		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.8		
CLIENT:	Coom Green Energy Park Ltd.		
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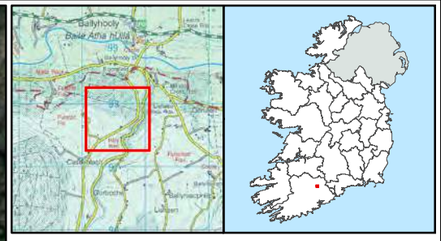

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 8		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.9		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3500	**REVISION:**	0
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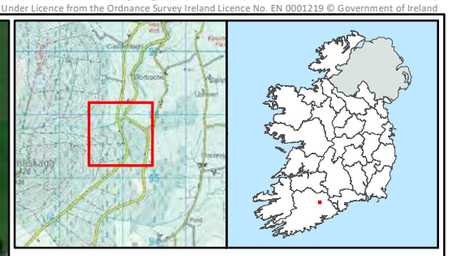

TDR Nodes

Proposed Nodes Upgrade Areas

Turbine Delivery Route Options

Route 2

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 9		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.10		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3500	**REVISION:**	0
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TDR Nodes

Proposed Nodes Upgrade Areas

N
W E
S

0 50 100 200 Meters

TITLE:	Turbine Delivery Routes Submap 10		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.1.11		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:3500	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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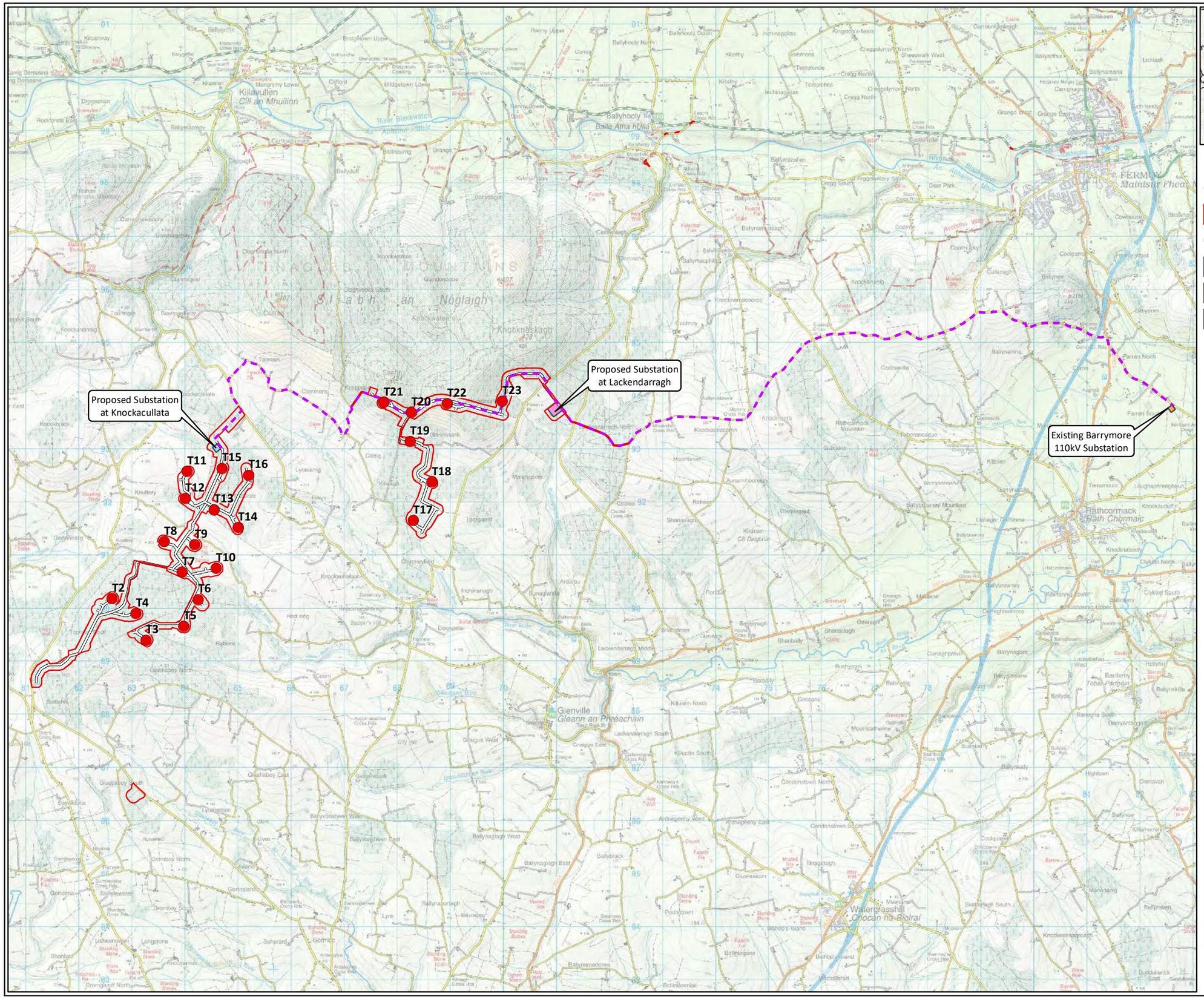

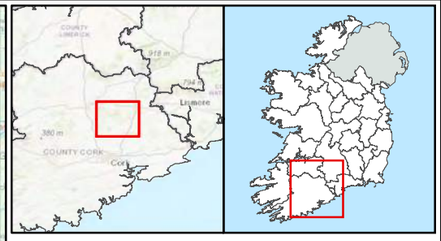

- Proposed Turbine Layout
- Proposed Cable Route
- Proposed Development Boundary
- Proposed Access Roads
- Existing Barrymore 110kV Substation
- Proposed Substation at Knockacullata
- Proposed Substation at Lackendarragh

TITLE:	Grid Connection General Arrangement		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.2		
CLIENT:	Coom Green Energy Park Ltd.		
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2.4 Biodiversity

2.4.1 European Sites of Importance

European designated sites can be sensitive to hydrological changes to groundwater and surface water quality which may affect water dependant ecosystems. Within individual Designated Sites (both SAC's and SPA's), specific species may be sensitive to disturbance, displacement, habitat loss or accidental mortality, which could reduce their favourable conservation status. Designated sites are also sensitive to encroachment by invasive species.

European Designated Sites (SAC and SPA) sites within 15km of CGEP and Grid Connection Route are described in Table 2-1.

Table 2-1: European Designated Sites (SAC and SPA) sites within 15km of CGEP and Grid Connection Route

Site	Code	Summary Description	Distance (CGEP development boundary or GCR nearest works location)
Blackwater Callows SPA	004094	Contains a stretch of the River Blackwater, running west to east for a 25km distance between Fermoy, Co. Cork and Lismore, Co. Waterford. Site is comprised of the river channel and a flood plain containing areas of seasonally-flooded grassland.	4.17km
Blackwater River (Cork/Waterford) SAC	002170	One of Ireland's largest rivers, the River Blackwater drains a major part of Co. Cork and five mountain ranges. The river's surrounding peaty terrain give it a distinctively dark appearance. The river is surrounded by areas of hollows, wetlands, species-rich wet grasslands and woodlands.	0.6km
Cork Harbour SPA	004030	The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Mallard, Pintail, Shoveler, Redbreasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Blackheaded Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.	19.2km

Site	Code	Summary Description	Distance (CGEP development boundary or GCR nearest works location)
Great Island Channel SAC	001058	The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest.	20.4km

Table 2-2: European Designated Sites (SAC and SPA) sites within 15km of the Turbine Delivery Route

Site	Code	Summary Description	Distance (nearest works or activity location)
Blackwater Callows SPA	004094	Contains a stretch of the River Blackwater, running west to east for a 25km distance between Fermoy, Co. Cork and Lismore, Co. Waterford. Site is comprised of the river channel and a flood plain containing areas of seasonally-flooded grassland.	within 15km of Nodes [2.0 - 2.14] (closest 1.3 km)
Blackwater River (Cork/Waterford) SAC	002170	One of Ireland's largest rivers, the River Blackwater drains a major part of Co. Cork and five mountain ranges. The river's surrounding peaty terrain give it a distinctively dark appearance. The river is surrounded by areas of hollows, wetlands, species-rich wet grasslands and woodlands.	within 15km of [all] Nodes (closest 10m)
Cork Harbour SPA	004030	The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Mallard, Pintail, Shoveler, Redbreasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Blackheaded Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.	Within 15km of Nodes [1.3 & 1.4] (closest 1.6 km)

Site	Code	Summary Description	Distance (nearest works or activity location)
Great Island Channel SAC	001058	The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest.	within 15km of Nodes [1.3 & 1.4] (closest 5.6 km)
Lower River Suir SAC	002137	The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. The site also supports populations of several important animals species, some listed on Annex II of the Habitats Directive or listed in the Irish Red Data Book. The presence of two legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the site adds further to the ecological interest and importance.	within 15km of Node [2.0] (14 km)

2.4.2 Existing Habitats

Nineteen habitats were recorded within the CGEP study area. Conifer plantation (WD4) is the dominant habitat type covering 74.6% of the total 364.3ha study area. This is followed, in order of abundance, by Recently felled woodland (WS5) at 9.1%, Improved agricultural grassland (GA1) at 5.5%, Scrub (WS1) at 3.9%, Spoil and bare ground (ED2) at 3.9%, and Wet grassland at 1.2% of the wind farm study area. Other habitats detailed in Table 8-26 make up less than 3.5% of the study area i.e. are very minor in extent.

Seven linear habitat types were identified within CGEP study area. The dominant linear habitat (7159m) has no ecological value and consists of existing hard surfaces (BL2/ ED2) i.e. tracks, hardcore surfaces etc. Other linear habitats within the windfarm study area with some ecological value comprise; 299m of Hedgerows (WL1), 633m linear scrub (WS1), 570m of Eroding/upland rivers (FW1), 340m of Earth banks (BL2), 755m of recolonising bare ground (ED3) and 249m of Treelines (WL2) occur.

Twenty-six non-linear habitat types (or habitat mosaics) make up the 244.6ha grid connection study area (i.e. the 50m buffer of the ca.17km of grid connection outside the subject development planning application boundary). The most abundant habitat is Improved agricultural grassland (39.7%). Buildings and artificial surfaces (BL3) occupy 8.5% of the study area, followed by GS4 (2.8%), GA2 (1.7%), WS5 (1.5%), WS1 (1.5%), BL3/GA2 (1.3%), ED2 (1.1%). The remaining 18 habitats, each covering less than 1% individually make up the remaining 4.7% of the total study area.

Terrestrial Habitats are sensitive to direct land take, pollution, and environmental changes resulting from modification such as increased drainage. Groundwater dependant habitats such wetlands and peatland habitats may be sensitive to changes in groundwater regimes or changes in ground water quality. The diversity of habitats is particularly sensitive to encroachment from invasive species which may out-compete local native species. Habitats are also sensitive to Human activities such as burning and recreational use.

See Chapter 8 of the EIAR for more information on the existing ecological environment.

2.4.3 Invasive Species Records

Table 2-3, outlines the records of Invasive species found during the Desktop study within the 10km grid squares within which the development is located. The CGEP and CGEP grid connection route study area occupies four 10km grid squares comprising W69, W79, W89 and W68.

Table 2-3: Invasive Species records from Desktop Review (Source: NBDC)

Common Name	Scientific Name	Year of Last Record	Location of Record (10km Grid Square)	Invasive Impact
Blackcurrant	*Ribes nigrum*	2007	W69	Medium
Himalayan Knotweed	*Persicaria wallichii*	2018	W69	High
Indian Balsam	*Impatiens glandulifera*	2009	W69	High
Japanese Knotweed	*Fallopia japonica*	2007	W69	High
Rhododendron	*Rhododendron ponticum*	2018	W69	High
Sycamore	*Acer pseudoplatanus*	2005	W69	Medium
Douglas Fir	*Pseuotsuga menziesii*	2006	W79	Medium
American Skunk-cabbage	*Lysichiton americanus*	2017	W79	Medium
Blackcurrant	*Ribes nigrum*	2006	W79	Medium
Cherry Laurel	*Prunus laurocerasus*	2006	W79	High
Indian Balsam	*Impatiens glandulifera*	2009	W79	High
Japanese Knotweed	*Fallopia japonica*	2006	W79	High
Rhododendron	*Rhododendron ponticum*	2019	W79	High
Sycamore	*Acer pseudoplatanus*	2009	W79	Medium
Canadian Waterweed	*Elodea canadensis*	2009	W89	High
Cherry Laurel	*Prunus laurocerasus*	2004	W89	High
Giant Hogweed	*Heracleum mantegazzianum*	2018	W89	High
Indian Balsam	*Impatiens glandulifera*	2017	W89	High
Japanese Knotweed	*Fallopia japonica*	2018	W89	High
Rhododendron	*Rhododendron ponticum*	1997	W89	High
Sycamore	*Acer pseudoplatanus*	2009	W89	Medium
Traveller's-joy	*Clematis vitalba*	2015	W89	Medium
Butterfly-bush	*Buddleja davidii*	2017	W68	Medium

Common Name	Scientific Name	Year of Last Record	Location of Record (10km Grid Square)	Invasive Impact
Cherry Laurel	*Prunus laurocerasus*	2017	W68	High
Japanese Knotweed hybrid	*Fallopia japonica* x *sachalinensis* = *F.* x *bohemica*	2017	W68	High
Himalayan Knotweed	*Persicaria wallichii*	2015	W68	Medium
Indian Balsam	*Impatiens glandulifera*	2015	W68	High
Japanese Knotweed	*Fallopia japonica*	2018	W68	High
Nuttall's Waterweed	*Elodea nuttallii*	2008	W68	High
Sycamore	*Acer pseudoplatanus*	2017	W68	Medium
Three-cornered Garlic	*Allium triquetrum*	2017	W68	Medium

Terrestrial Habitats are sensitive to direct land take, pollution, and environmental changes resulting from modification such as increased drainage. Groundwater dependant habitats such wetlands and peatland habitats may be sensitive to changes in groundwater regimes or changes in ground water quality. The diversity of habitats is particularly sensitive to encroachment from invasive species which may out-compete local native species. Habitats are also sensitive to Human activities such as burning and recreational use.

2.5 Soils, Geology and Hydrogeology

The land use across the site is predominantly made up of agricultural lands and coniferous forestry at various stages of their lifecycle.

The subsoils across the site comprise predominantly glacial till derived from Devonian sandstones, bedrock outcrop or subcrop, and a limited extent of blanket peat.

The slopes of the southern portion of the proposed energy park site (Bottlehill) is characterised by elevated lands with typical elevations of between 270m to 290m AOD with steep to moderate slopes to the west of the site boundary. Slopes within the proposed energy park site and at proposed infrastructure locations generally comprise gentle slopes of between 1.7 to 3.4 degrees.

The central portion of the site (Mullenaboree) is also characterised by elevated lands with gentle slopes within the proposed energy park site boundary of between 1.7 to 3.4 degrees.at turbine locations T11 to T16. Elevations at this portion of the proposed energy park site are generally lower than those at the south with typical elevations of between 220m to 260m AOD.

The northern portion of the proposed energy park site (Knockdoorty) which includes turbine locations T17 to T23, proposed borrow pit BP03 and the proposed Lackendarragh North sub-station comprises elevated lands sloping steeply to the south. A ridge feature at the extreme northern boundary of the proposed energy park site trends east-west and reaches maximum elevations of between 424m and 428m AOD to the north of turbines T21 and T23 respectively.

Slopes at proposed turbine locations in this portion of the energy park site range from gentle (3.4 degrees) to moderate to steep where maximum slope angles of 10.2 degrees at turbines T20 and T22 to 14.5 degrees at T21. These turbines are located along the east-west ridge at the north of the proposed energy park site .Slopes at the proposed borrow pit BP03 are typically in the order of 6 degrees sloping the south-east.

The Groundwater Vulnerability within the proposed wind farm site boundary and the majority of the proposed grid connection route is classified by the GSI as ranging from 'High' to 'Extreme' with areas of exposed bedrock also present in these areas. At the eastern extent of the proposed grid connection the vulnerability classification is reduced to 'Moderate'.

Based on the GSI aquifer vulnerability mapping, overburden deposits are generally between 3 and 10 m deep in the central portion of the site; generally, 3 to 5 m deep in the north, east and south-east of the site; and <3m deep in the extreme west and north east of the site.

From a review of the GSI Landslide Susceptibility database, the proposed energy park site is generally located in areas of 'Low' susceptibility to landslides. The exceptions are T20 and T21 (Moderately High) and T22 (Low to Moderately Low). However, no evidence of slope instability was observed at the site following investigation and there are no historical records of landslide activity within or close to the site.

Detailed information on soils, land and geology is provided in Chapter 9 of EIAR.

2.6 Hydrology & Water Quality

Coom Energy Green Park is located within Hydrometric Area No. HA 18, Blackwater (Munster), of the Irish River Network System. It is situated in the South Western River Basin District (SWRBD). The average annual rainfall in period 1981-2010 in the area of energy park site is 1,437 mm.

CGEP is situated within eight sub-basins as defined by the Water Framework Directive (WFD). These waterbodies are known as:

- Clyda_030-IE_SW_18C020300
- Coom_010 - IE_SW_18C030400
- Bride (Blackwater)_010 - IE_SW_18B050050
- Bride (Blackwater)_020 – IE_SW_18B050320
- Ross (Killavullen)_010 – IE_SW_18R020500
- Bride (Blackwater)_180 – IE_SW_18B022100
- Blackwater (Munster)_190-IE_SW_18B022300
- Bride (Blackwater)_030 – IE_SW_18B050400

Surface runoff from turbines T2, T3, T4 and T5 drains to the Coom River. The Coom River rises to an elevation of 270 m OD approximately 90 m west of the turbine T4. The river flows in an easterly direction for approximately 6.4 km, where it joins the Bride River.

Surface runoff from turbines T6, T7, T8, T9, T10, T11, T12, T13 and T14 drains to the Toor River. The Toor River rises to an elevation of 245 m OD approximately 110 m east of the turbine T11.

From there it flows to the south for approximately 0.85 km before Mullenaboree stream joins, it then flows south-easterly for approximately 3.4 km, where it joins the Coom River.

The runoff from turbines T15 and T16 drain to the Lyravarrig stream which is a tributary of the Bride River. The Lyravarrig stream rises to an elevation of 190 m OD approximately 0.70 km south east of the turbine T16. The Lyravarrig stream flows in an easterly direction for 1.3 km, before joining Bride River.

The surface runoff from turbines T17, T18, T19, T20, T21 and T22 drain to the Bride River which is a tributary of the Blackwater River. The Bride River rises to an elevation of 240 m OD approximately 2.60 km west of the turbine T21. The river flows in a south-easterly direction for 5.1 km before Coom river joins it. Bride River continues to flow in easterly direction for approximately 41.7 km where it joins Blackwater River.

The runoff from turbine T23 drains to the Bunnaglanna River which is also a tributary of the Bride River. The river rises to an elevation of 260 m OD approximately 0.4 km south east of the turbine T23. The river flows in a southerly direction for 4.1 km before joining the Bride River.

The site entrance for TDR-West is in the sub-basin Clyda_030. The existing access road connecting the site entrance and CGEP will be widened. Approximately 465m of a new road will be constructed in the sub-basin Clyda_030. A temporary compound and a met-masts are planned in this sub-basin.

The OPW has produced indicative flood mapping to assist in a preliminary flood risk assessment (PFRA). The indicative flood mapping for Coom Green Energy Park is shown on Figure 2-3. The national flood hazard mapping (available at www.floodmaps.ie), does not indicate any record of historical flooding along the tributaries of the Bride River running through the site.

According to flood mapping the proposed turbines, hardstanding areas and substations are not within flood zone. However, the access road between turbine T9 and T13 and grid route approximately 740 m northwest of the existing 110kV Barrymore substation crosses indicative floodplain 'Flood Zone A'

Existing hydrological features recorded within the site area shown on Figure 2-4.

WFD water quality status and river waterbody risk within the study area is provided in Table 2-4:

Table 2-4: WFD River Status and River Waterbody Risk[1]

Waterbody	EPA CODE	River Status	Waterbody Risk
Tooreen North	18T33	Good	Not at Risk
Coom_010	18C03	Good	Not at Risk
Toor River	18T51	Good	Not at Risk
Lyravarrig	18L66	Good	Not at Risk
Bride (Waterford)	18B05	Good	Not at Risk
Bunnaglanna	18B07	Good	Review
Inchinanagh	18I16	Good	Review

Detailed information on hydrology and water quality is provided in Chapter 10 of EIAR.

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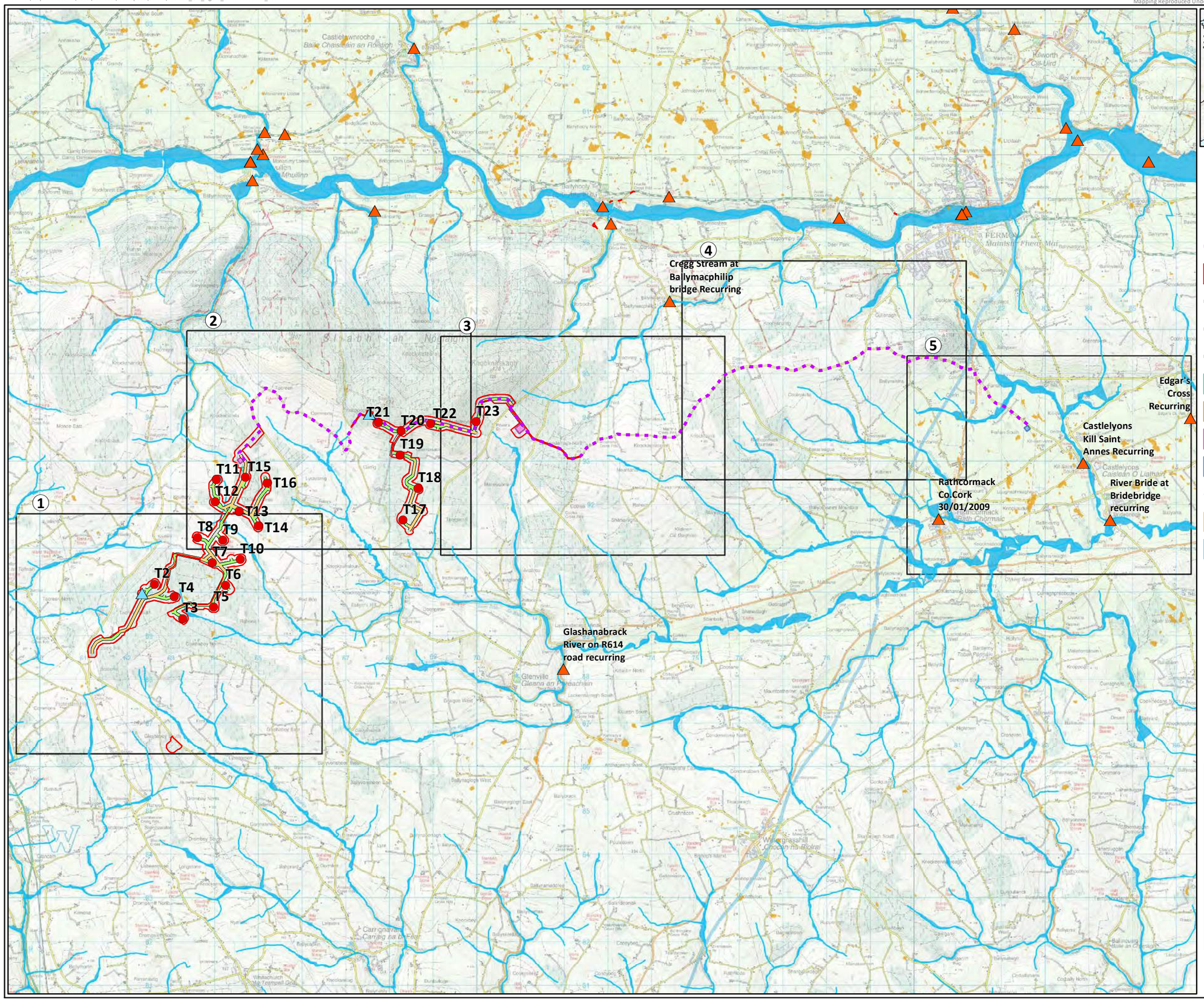

- OPW Historic Flood Points
- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Proposed Cable Route
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Borrow Pit
- Proposed Temporary Compound
- Proposed Substation
- Existing Barrymore 110kV Substation
- Rivers
- PFRA/CFRAMS 1% AEP Pluvial Flood Extent
- PFRA/CFRAMS 1% AEP Fluvial Flood Extent

N W E S

0 0.5 1 2 Kilometers

TITLE:	OPW Flood Data Overview		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.3.1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:85000	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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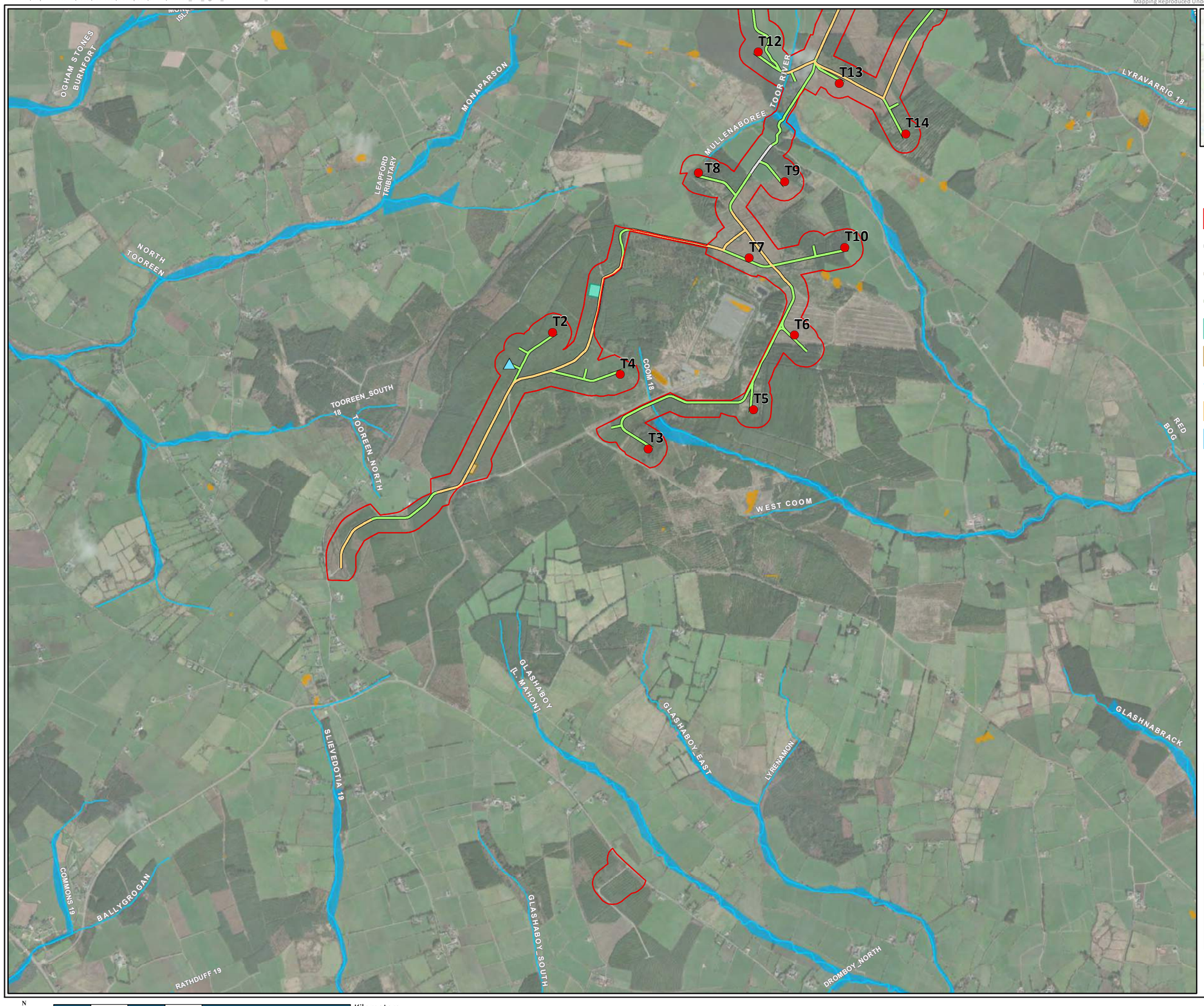

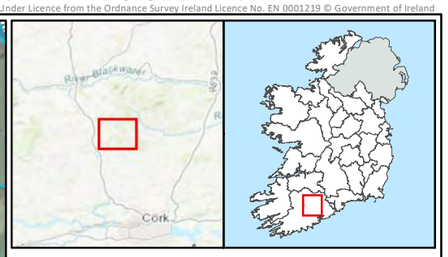

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Borrow Pit
- Proposed Temporary Compound
- Rivers
- PFRA/CFRAMS 1% AEP Pluvial Flood Extent
- PFRA/CFRAMS 1% AEP Fluvial Flood Extent

N W E S

0 0.5 1 2 Kilometers

TITLE:	OPW Flood Data Submap 1/5		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.3.2		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:25000	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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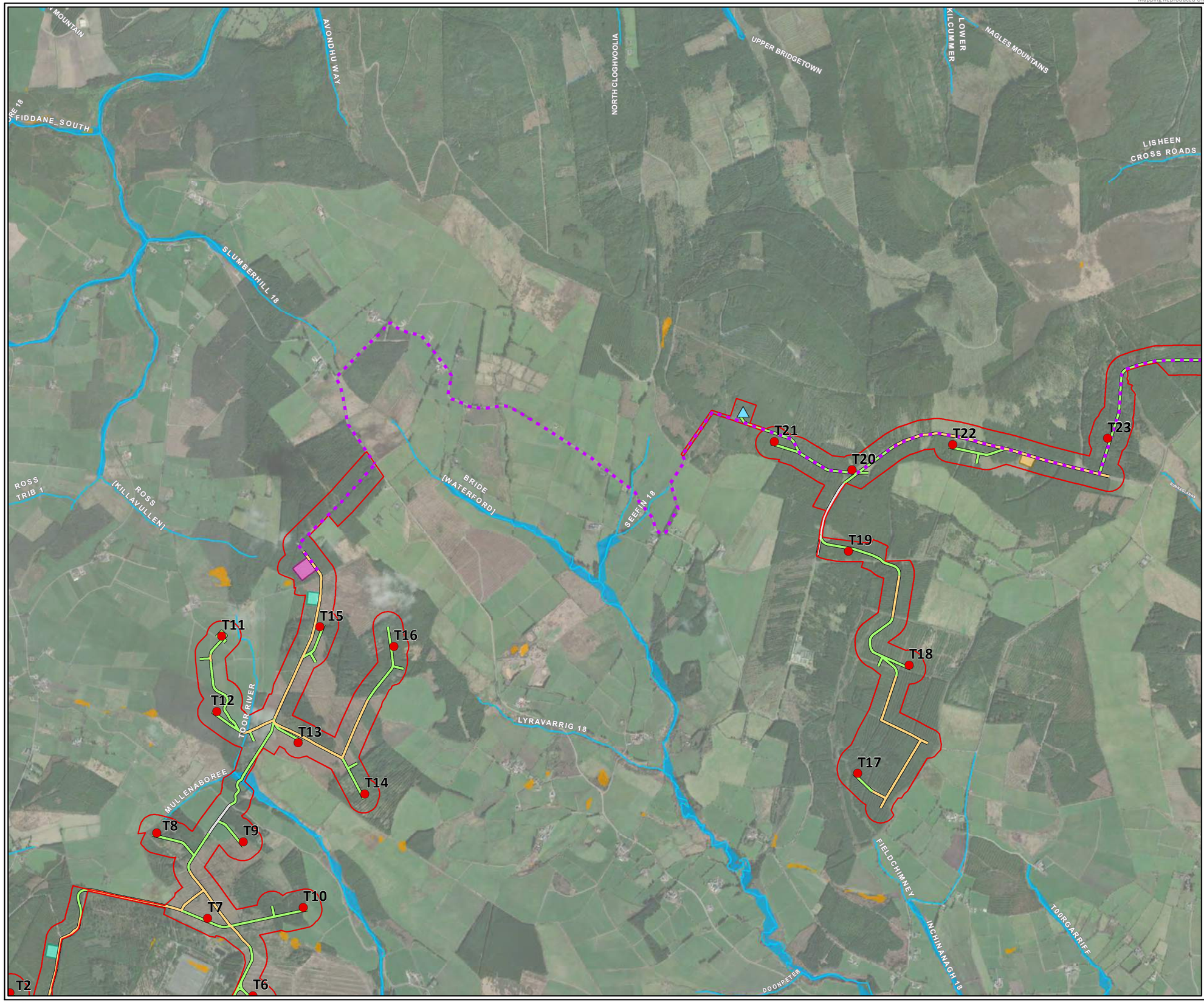

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PROJECT:	Coom Green Energy Park, Co. Cork
FIGURE NO:	2.3.3
CLIENT:	Coom Green Energy Park Ltd.
SCALE:	1:25000
REVISION:	0
DATE:	03/10/2020
PAGE SIZE:	A3

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- OPW Historic Flood Points
- Proposed Turbine Layout
- Proposed Cable Route
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Borrow Pit
- Proposed Temporary Compound
- Proposed Substation
- Rivers
- PFRA/CFRAMS 1% AEP Fluvial Flood Extent
- PFRA/CFRAMS 1% AEP Fluvial Flood Extent

N W E S

0 0.5 1 2 Kilometers

TITLE:	OPW Flood Data Submap 3/5		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.3.4		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:25000	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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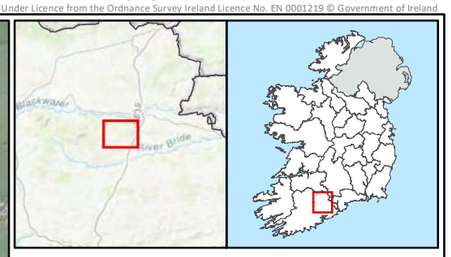

OPW Historic Flood Points

Proposed Cable Route

Rivers

PFRA/CFRAMS 1% AEP Pluvial Flood Extent

PFRA/CFRAMS 1% AEP Fluvial Flood Extent

N
W E
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0 0.5 1 2 Kilometers

TITLE:	OPW Flood Data Submap 4/5		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.3.5		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:25000	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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N W E S

0 0.5 1 2 Kilometers

TITLE:	OPW Flood Data Submap 5/5		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.3.6		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:25000	**REVISION:**	0
DATE:	03/10/2020	**PAGE SIZE:**	A3

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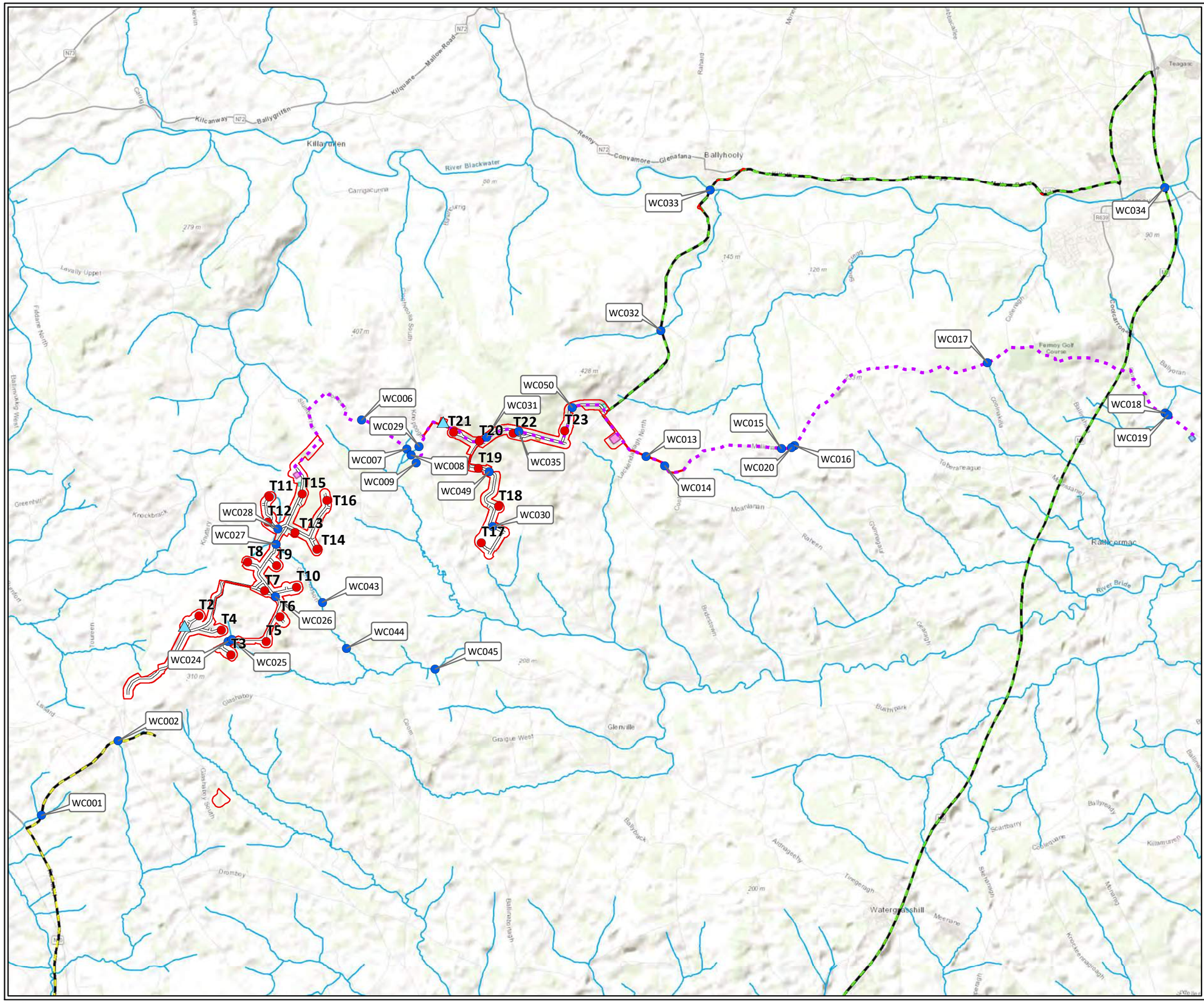

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PROJECT:	Coom Green Energy Park, Co. Cork
FIGURE NO:	2.4
CLIENT:	Coom Green Energy Park Ltd.
SCALE:	1:75000
REVISION:	0
DATE:	03/10/2020
PAGE SIZE:	A3

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2.7 Archaeological, Architectural and Cultural Heritage

There are no recorded archaeological sites located on the footprint of the proposed energy park site while there are six examples ranging from the late prehistoric to post-medieval periods located within the surrounding 1km study area (Table 14-4 in Chapter 14 of the EIAR). The Sites and Monuments Record does not indicate any unlocated archaeological sites within the townlands in this study area. There are no designated architectural heritage structures located within the 1km study area.

The proposed CGEP will have no impact on any UNESCO World Heritage sites or candidate sites. It is anticipated that there will be a slight low negative impact on 1no. National Monument, Island wedge tomb (CO042-056001-) which is situated 2.4km to the west of Turbine 2. The monument is included in the Record of Monuments and Places.

There is one existing recorded archaeological site located within the 100m wide corridor centred on the grid connection route. This comprises a levelled enclosure (CO035-042----) within a forestry plantation in Glanakip townland. Its recorded location is 30m to the east of the section of road that will carry the cable. No visible surface traces of the enclosure were observed during the inspection. There were no potential unrecorded archaeological sites noted during the inspection of the road margins. There are no designated architectural heritage structures located within the 100m study area centred on the grid route connection and it does not extend into any Architectural Conservation Areas.

Various archaeological sites and designated architectural structures are located in proximity to the turbine delivery routes. No impacts on these cultural heritage assets are predicted through the use of the existing roads.

3. OVERVIEW OF CONSTRUCTION WORKS

3.1 Description of the Proposed Project

3.1.1 Overall Project

The proposed project consists of three main elements:

- Main energy park;
- Turbine delivery route (TDR);
- Grid connection;

In summary the proposed project will consist of the following:

- Erection of up to 22 no. wind turbines with a tip height of up to 169m;
- Construction of turbine foundations and crane pad hardstanding areas;
- Construction of approximately 15 km of new site tracks and associated drainage infrastructure;
- Upgrading of approximately 10 km of existing tracks and associated drainage infrastructure where necessary;
- 3no. on site borrow pits and associated ancillary infrastructure. (New access tracks serving borrow pits shall be reinstated following completion of construction);
- All associated drainage and sediment control;
- Installation of new watercourse or drain crossings consisting of pre-cast concrete box culverts.
- Re-use or upgrading of existing internal watercourse and drain crossings;
- Construction of up to 2 no. onsite electrical substations and associated compounds including:
    - Welfare facilities;
    - Electrical infrastructure;
    - Parking;
    - Waste water holding tanks;
    - Rainwater harvesting
    - All associated infrastructure, services and site works including landscaping;
- 20 no. of Battery storage units and associated compound;
- Temporary accommodation works associated with the Turbine Delivery Routes to facilitate the delivery of turbine components;
- 3 no. Temporary construction site compounds and associated ancillary infrastructure including parking;
- Tree felling and associated replanting;
- Installation of approximately 30 km of medium voltage (20/33kV) underground cabling between the proposed turbines and the proposed on-site substations and associated ancillary works;

- Installation of approximately 7.7km of high voltage (up to 110kV) underground cabling between the proposed 2no. on site substations and ancillary works within private lands and public roads including up to 7 no. pre-cast joint bays;
- Installation of approximately 16.7km of high voltage (up to 110kV) underground cabling between the proposed on-site substations and the existing Barrymore substation and associated ancillary works within private lands and public roads. The proposed grid connection cable works will include 14 no. existing watercourse and drain crossings and the installation of up to 17 no. pre-cast joint bays.
- Communication cables and associated infrastructure;
- Erection of 2 no. permanent meteorological masts;

The proposed WTG's will have a maximum tip height of up to 169m above existing ground level, and a maximum rotor diameter of up to 138m.

The project shall include the opening of 3no. borrow pits on site. The locations of the proposed extraction pits are shown in Figure 1-2. There are no groundwater supply wells recorded in the immediate vicinity of the proposed borrow pit locations, therefore any dewatering of excavations is not likely to impact on water supplies.

3.1.2 Main Energy Park Site Layout

The proposed energy park site layout is shown in Figure 1-2. The co-ordinates of each turbine are detailed in Table 3-1 in Irish Transverse Mercator (ITM).

Table 3-1: Proposed Coom Green Energy Park Turbine Coordinates

TURBINE ID	X_(ITM)	Y_(ITM)
T2	562583	590234
T3	563227	589449
T4	563039	589951
T5	563936	589713
T6	564212	590214
T7	563907	590734
T8	563567	591306
T9	564146	591247
T10	564550	590806
T11	564002	592625
T12	563969	592119
T13	564515	591909
T14	564961	591567

TURBINE ID	X_(ITM)	Y_(ITM)
T15	564661	592686
T16	565156	592556
T17	568267	591705
T18	568612	592430
T19	568206	593193
T20	568229	593738
T21	567708	593928
T22	568905	593906
T23	569943	593950

3.1.3 Turbine Delivery Route

Large components associated with the wind farm construction will be transported to site via two separate turbine delivery routes (TDR's).

3.1.3.1 Turbine Delivery to the West

The port of entry is Ringaskiddy where the turbine components will be offloaded and transported to the site, via the N28 and the N40 to the Dunkettle Interchange. At the Dunkettle Interchange, the components will take the N8 to Silversprings and then take the R635 (north ring road) around the north side of Cork City. At Blackpool, the components will join the N20 and turn off at the junction with the L-1217 towards Bottlehill Landfill.

In order to access the site via the existing Coillte entrance point on the L-1219-0, turbine delivery vehicles shall pass the final junction to the site entrance between the L-1217 and L-1219-0, turn at a temporary hard standing in Coillte land at Glashaboy South which is located approximately 2km south-east of the proposed site entrance and make their final approach to the site from the east and south. At the temporary turning area, wind turbine blade components shall be transferred via crane from standard extendable trailers to 'Superwing' blade lifting trailers which will allow them to negotiate the L-1217/L-1219-0 junction.

3.1.3.2 Turbine Delivery to the East

The port of entry is the same as above and the turbine components will take the same route to Dunkettle Interchange. At the Dunkettle Interchange, the turbine components will travel north along the M8 motorway. At Junction 14 on the M8, the turbine components will exit the motorway and travel south into Fermoy. Once the turbines reach Fermoy, they will travel west along the N72 and turning south just east of Ballyhooley. From there they will follow local roads across the Blackwater River and to the site entrance at Lackendarragh North.

3.1.3.3 Site Entrances

The Coom Green Energy Park will be served by four site entrances. Two entrances are required to the west to access the Bottlehill and Mullenaboree areas of the proposed development.

Two site entrances will be required to the east. One of these is required for access to the turbines and associated infrastructure in the Knockdoorty area and the other is required for access to construct the substation at Lackendarragh North.

One of the western (Bottlehill) access points is located at the Bottlehill Landfill site (off the L-1217 local road) and is already constructed to TII guidelines (DN-GEO03060). The site entrance here will accommodate access to the Bottlehill part of the site for standard construction vehicles. Vehicles entering the site at this point shall only have the right to access turbines T2 – T7.

Access to the remaining turbines in the Bottlehill and Mullenaboree parts of the site shall be via the main site access off the L-1219-0. The main site access serving the Bottlehill and Mullenaboree parts of the site is an existing Coillte forestry access located on the L-1219-0 which will be upgraded to facilitate oversize loads associated with wind turbine component deliveries. All oversize turbine delivery vehicles for the Bottlehill and Mullenaboree areas of the site shall use this entrance.

The existing forestry access from the L-1504 local road at Mullenaboree shall not be used during the construction phase but shall remain as an access point for forestry operations and operational access to the proposed substation at Knockacullata.

The main Knockdoorty site entrance to the east is an existing Coillte forestry entrance which will be upgraded to facilitate the wind farm construction and operations in the Knockdoorty area. This will be a dedicated site entrance located along the L-1501 Ballyhooly to Chimneyfield road. This site entrance has been designed in accordance with TII guidelines and shall be upgraded to achieve sightlines of 160m in both directions at a setback distance of 3m. The Cork County Council requirements for local roads here are 90m sight lines in both directions.

A new entrance will also be located near the Knockdoorty site entrance to facilitate access for the construction of the proposed Lackendarragh North substation off the L-1501 local road. The new site entrance to the proposed Lackendarragh North substation will be constructed in line with Cork County Council requirements.

3.1.3.4 Temporary Accommodation Works

In some cases, accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening. Any accommodation works will be carried out in advance of the turbine deliveries, following further consultation and agreement with the local authority.

5 no. locations have been identified where more extensive works will be required and are described below. The full extent of accommodation works are identified in Appendix 2. The locations requiring additional works are as follows:

- Local widening near Castlehyde along the N72 between Fermoy and Ballyhooly in the townlands of Grange West and Castlehyde (Node 2.3);
- Local widening at the junction of the N72 and the Ballyhooly North Road east of Ballyhooly in the townland of Ballyhooly South (Node 2.5);
- Local widening at the approach road to the Blackwater Bridge south of Ballyhooly in the townland of Ballyhooly South (Nodes 2.6 & 2.7);

- Removal of trees and construction of an aggregate hard standing at Castleblagh south of Ballyhooly in the townlands of Castleblagh (Node 2.8);
- Widening of existing forestry access, tree felling and construction of an off-site turning area at Glashaboy South (Temporary turning and transfer area).

The general location of accommodation works identified as “TDR Nodes”.

3.1.4 Grid Connection

Electricity generated from wind turbines at the Bottlehill and Mullenaboree parts of the site shall be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks. This circuit shall be terminated at a proposed onsite substation at Knockacullata in the Mullanboree part of the site. The power from this western part of the site shall be transferred to the onsite substation at Lackendarragh via a buried 110kV cable through private lands and a section of public road as shown on Figure 3-4. Electricity generated from wind turbines at the Knockdoorty part of the site shall also be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks and terminated directly into the on-site substation at Lackendarragh and exported to the grid via a 110kV buried cable to the existing Barrymore substation.

The proposed 110 kV grid connection route will cross private lands and will follow the existing road to the substation at Barrymore.

Connection works will involve the installation of ducting, joint bays, drainage and ancillary infrastructure and the subsequent running of cables along the existing road network. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches.

It is expected that full road closures will be put in place to facilitate cabling works rather than partial road closures or stop/go systems. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. These would be undertaken on a rolling basis with short sections closed for short periods before moving onto the next section.

3.1.4.1 Onsite Electricity Substations

It is proposed to construct 2 no. onsite electricity substations within the proposed development site as shown in Figure 3-1. These will provide a connection point between the wind farm and the proposed grid connection point at the existing Barrymore substation.

As described in Section 3.5.6, electricity generated from wind turbines at the Bottlehill and Mullenaboree parts of the site shall be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks. This circuit shall be terminated at a proposed onsite substation at Knockacullata in the Mullanboree part of the site. The power from this western part of the site shall be transferred to the onsite substation at Lackendarragh North via a buried 110kV cable through private lands and a section of public road as shown on Figure 3-4. Electricity generated from wind turbines at the Knockdoorty part of the site shall also be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks and terminate at the on-site substation at Lackendarragh North and transformed to 110 kV. Electricity from Bottlehill, Mullenaboree and Knockacullata circuits will be exported from Lackendarragh North substation to the existing grid via a 110kV buried cable to the existing Barrymore substation.

The dimensions of the proposed substation compounds will be approximately 178m x 153m and 124m x 104m at Lackendarragh North and Knockacullata respectively and will include a substation control building and electrical components necessary to export the electricity generated from the wind farm to the national grid. The substation compounds will be surrounded by a ca. 2.5 metre high steel palisade fence and internal fences will also be provided to segregate different areas within the main substation compound.

Lighting will be required on site and this will be provided by lighting poles located around the substation and exterior wall mounted lights on the control buildings.

At each of the locations, two control buildings will be located within the substation compound and will measure approximately 20m by 10m and approximately 6m in height. The control building will include the Independent Power Production (IPP) and grid operator control rooms, an office space and welfare facilities for staff during the operational phase of the wind farm. Due to the nature of the project there will be a small water requirement for occasional toilet flushing/hand washing with a rainwater harvesting tank adjacent to the control building.

A wastewater holding tank will be provided outside the substation compound fence line so that it can be maintained where required without requiring access to the substation compound. The wastewater holding tank will be a sealed storage tank with all wastewater tankered off site as required by an authorised waste collector to a wastewater treatment plant. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007, will be employed to transport wastewater away from the site. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. This approach for managing wastewater on site has become standard practice on wind farm sites, which are often proposed in areas where finding the necessary percolation requirements for on-site treatment can be challenging and has been accepted by numerous Planning Authorities and An Bord Pleanála as an acceptable proposal.

Battery energy storage system (BESS) units, to facilitate on site energy storage and to provide ancillary services to the electricity grid, will be situated next to the main onsite substation compound at Lackendarragh. They will be housed in glass reinforced plastic (GRP) units or modified shipping containers.

The units will be mounted on shallow concrete plinths within a gravel hard standing and shall be bounded in the same fashion as the substation compounds using a galvanised steel security palisade fencing.

3.1.4.2 Electrical Cabling

As described in Section 3.5.6, electricity generated from wind turbines at the Bottlehill and Mullenaboree parts of the site shall be collected at medium voltage by an internal circuit of buried cables which will follow on-site access tracks. This circuit shall be terminated at a proposed onsite substation at Knockacullata in the Mullanboree part of the site. The power from this western part of the site shall be transferred to the onsite substation at Lackendarragh via a buried 110kV cable through private lands and a section of public road as shown on Figure 3-4. Electricity generated from wind turbines at the Knockdoorty part of the site shall also be collected at medium voltage by an internal circuit of buried cables which will follow on-site access tracks and terminated directly into the on-site substation at Lackendarragh before being exported to the grid via a 110kV buried cable to the existing Barrymore substation. The proposed grid connection is shown in Figure 2-2.

Internal collector circuit cable routes are shown on the planning application drawings and will generally follow the alignment of the internal access tracks.

The electricity will be transmitted as a three-phase power supply so there will be three individual conductors (or individual cables) in each cable circuit. The three conductors will each be laid in separate ducts which will usually be laid in a trefoil formation but may also be laid in a flat formation. The specification for the cables and cable-laying will be in accordance with ESBN requirements.

The width of a cable trench with a trefoil formation will be 600mm, a flat formation would require a wider trench width. The depth of cover to the ducts carrying the cables will usually be 950mm cover to the top of the upper duct in public roadways and grassed areas. The depth of trench for the cables will be approximately 1220mm and the depth of cover for the cables will usually be 950mm. However, in certain instances, for example when crossing a bridge with shallow cover, a shallower depth of 450-950mm could be utilised. In those circumstances, the particular design will be agreed with Eirgrid and additional cable protection measures such as steel plates or reinforced concrete cover may be required. Cables laid within the site will be laid to a depth of up to 1100mm to the top of the upper duct in field locations.

The diameter of the ducting will be selected to suit the range of cross-sectional areas of electrical cables and is likely to fall between 100mm and 200mm diameter.

3.1.4.3 Crossing of the M8 Motorway

Where the grid connection route crosses the M8 motorway, horizontal directional drilling (HDD) will be used, namely a 110kV duct crossing at Corrin View Estate to the South of Junction 15 as shown on Plate 4-1..

The locations of the launch and reception pits will be adequately spaced from the carriageway to ensure the bore is at such depth as not to conflict with the drainage or surface of the motorway or associated embankments.

Consideration was given to trying to accommodate the cables in the over-bridge which spans the motorway at this location however following consultation with TII, Direct Route, and Cork County Council, it was deemed preferable to employ the proposed crossing technique.

There is sufficient room available to accommodate the necessary equipment. The cables will be laid at sufficient depth below the motorway to stay below the motorway drainage and without impacting on the road foundations. There will be a detailed consultation and agreement with TII and the PPP Company, Direct Route in advance of completing the works.

The locations of start and finish points for the HDD have been identified following desktop assessments, site visits and consultation with both the local authority, TII and Direct Route. Detailed designs for the motorway embankment and bridge crossing as well as site investigation records were reviewed by FT's geotechnical engineers to confirm the suitability of the proposed crossing method at this location.

3.1.5 Watercourse Crossings

3.1.5.1 Internal Access Track Watercourse Crossings

The proposed development layout will have 9 stream crossings within the site boundary. These crossings are listed in Table 3-2 and shown on
Figure 2-4.

Existing crossing WC028 will be replaced with box culvert of minimum 1200 mm width and 400 mm height, with additional height required for embedment and freeboard. There will be one new proposed watercourse crossing WC024 over the unnamed tributary of the Coom River and one new proposed crossings WC025 over the Coom River required as a result of the development. There will be one new proposed watercourse crossing WC027 over the Toor River required as a result of the development.

Table 3-2: Onsite Access Watercourse Crossings

Feature ID	ITM_X	ITM_Y	Existing/ Proposed	Feature/Activity	Proposed Method of Crossing
WC024	563175.65	589720.58	Pro	Grid cable crossing and proposed new access track crossing over the unknown tributary of the Coom River	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert
WC025	563250.25	589754.30	Pro	Grid cable crossing and proposed new access track crossing over the tributary of the Coom River	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert
WC027	564133.20	591667.40	Prop	Grid cable crossing and proposed new access track crossing over the Toor River	New Crossing. Box culvert 2000mmx1100mm + freeboard + embedment, cable over the culvert
WC028	564171.10	591981.30	Ext	Grid cable and proposed new access track crossing over the Toor River	Replace existing pipe with a box culvert of min 1200mmx400mm + freeboard + embedment, cable over the culvert
WC030	568492.90	592029.20	Ext	Grid cable and existing forestry track crossing over the forestry ditch, tributary of the Inchinanagh stream	Standard trench crossing above or below existing culvert.
WC031	568375.20	593820.90	Ext	Grid cable and existing forestry track crossing over the forestry ditch, in the proximity of the turbine T35	Standard trench crossing under existing service. Pipe to be extended to facilitate widening of existing access road or replaced with suitable pipe of same or greater diameter
WC035	569019.61	593940.22	Ext	Grid cable and existing forestry track crossing over the forestry ditch, in the proximity of turbine T20	Standard trench crossing under existing service. Pipe to be extended to facilitate widening of existing access road or

Feature ID	ITM_X	ITM_Y	Existing/ Proposed	Feature/Activity	Proposed Method of Crossing
					replaced with suitable pipe of same or greater diameter
WC049	568425.66	593132.46	Prop	Grid cable and proposed new access track crossing over drain east of turbine T19	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert
WC050	570093.25	594420.14	Prop	Grid cable and proposed new access track crossing over drain north of turbine T23	New Crossing. Box culvert 900mm x 900mm. Cable over the culvert

A description of construction methodologies for watercourse crossings is presented in Section 3.3.

3.1.5.2 Watercourse Crossings Along the GCR

The following table summarises existing watercourse and service crossing locations and the proposed method for crossing same along the 110kV grid connection route.

Table 3-3: Summary of Watercourse and Buried Service Crossings Along GCR

Feature ID	ITM_X	ITM_Y	Feature Type	Proposed Crossing Method
WC006	565856.78	594166.05	Watercourse Crossing	HDD under structure within public road corridor. Alternative: Concrete bridge beam in road deck with ducts in flat profile. Reinstate bridge surface to same level as existing.
WC007	566767.03	593590.72	Watercourse Crossing	HDD under structure within public road corridor.
WC008	566855.33	593463.30	Watercourse Crossing	Trench in road above structure and reinstate road surface to existing levels.
WC009	566953.13	593308.63	Drain Crossing	Standard trench crossing under existing service
WC013	571579.31	593438.66	Drain Crossing	Standard trench crossing under existing service
WC014	571953.73	593251.56	Drain Crossing	Standard trench crossing under existing service
WC015	574302.28	593592.15	Drain Crossing	Standard trench crossing under existing service

Feature ID	ITM_X	ITM_Y	Feature Type	Proposed Crossing Method
WC016	574563.28	593659.12	Drain Crossing	Standard trench crossing under existing service
WC017	578448.83	595314.38	Watercourse Crossing	Standard trench crossing under existing service
WC018	582024.33	594307.32	Watercourse Crossing	Replace existing stone culvert with an RC box culvert and bring ducts underneath.
WC019	582076.81	594271.41	Watercourse Crossing	HDD under structure within public road corridor. Alternative: Concrete bridge beam in road deck with ducts in flat profile. Reinstate bridge surface to approximately 100mm above existing.
WC020	574506.00	593616.00	Drain Crossing	Standard trench crossing under existing service.
WC029	567015.50	593633.90	Drain Crossing	Standard trench crossing above or below existing culvert.

3.1.5.3 Turbine Delivery Route (TDR) Watercourse Crossings

There are 3no. existing watercourse crossings along the TDR between the M8 and the site at the locations shown in the table below. No works are expected to be required at any of these locations.

There are 2no. existing watercourse crossings between the N20 and Bottlehill Area site entrance. No works are expected to be required at either of these locations.

The locations of the above crossings are shown on Figure 2-4.

Table 3-4: TDR Existing Watercourse Crossings

Feature ID	ITM_X	ITM_Y	Route	Water Framework Directive (WFD) Waterbody Designation
WC001	559419.37	586219.49	TDR West	MARTIN_010
WC002	560960.04	587718.62	TDR West	MARTIN_020
WC032	571881.00	595965.50	TDR East	BLACKWATER (MUNSTER)_180
WC033	572870.50	598793.70	TDR East	BLACKWATER (MUNSTER)_170
WC034	582013.97	598842.80	TDR East	BLACKWATER (MUNSTER)_190

3.2 Construction Period

The construction period for the entire project is estimated to take between 18-24 months.

The layout of the site lends itself to clearly defined phases (civil construction, cables, turbines, on-site substation) where the various work elements can overlap without a significant increase in local traffic movements or congestion on site.

It is expected that the civil and electrical works will include the following;

- Temporary site compound;
- Site entrances;
- New stream crossings;
- New site roads & drainage;
- Upgrade to local roads;
- Turbine foundations and hardstands;
- Electrical compound and substation building;
- Cable trenching and ducting (internal cables only);
- Cable pulling (internal cables only);
- Turbine delivery and installation;
- Grid connection cable ducting;
- Grid connection cable pulling;
- Testing, commissioning and energisation.

3.3 Overview of the Construction Sequence (Preliminary Only)

The construction of a wind farm project is a major infrastructural project. The construction of this project will involve many inter-related, inter-dependent and overlapping elements of a complex nature.

The following section outlines the construction methodology for the proposed project. Upon mobilisation for the construction of the project, enabling earthworks and peat excavation (where required), upgrading of existing site tracks and the provision of new site tracks will precede all other activities. Drainage infrastructure will be constructed in parallel with the track construction. Typically, this will be followed by the construction of the turbine foundations and the provision of the hardstanding areas. In parallel with these works the on-site electrical works; sub-station and internal cable network are constructed. The proposed grid connection cable route works will take place in parallel with the main energy park construction works.

3.3.1 Overview of the Construction Methodology (Preliminary Only)

Method statements are presented below for the key elements of the construction process. Please note that the contractor for the main construction works will, following appointment, take ownership, expand upon and generally develop these method statements to the required detail.

The proposed construction methodology is summarised under the following headings:

- Site Entrance
- Temporary Site Compound
- Concrete Washout Area and Wheel Washing
- New Site Access Tracks
- Upgrade of Existing Internal Access Tracks
- Cable Works
- Borrow Pit Construction
- Crane Hardstands
- Turbine Foundations
- Substation Compound
- Electrical Works
- Turbine Erection
- Grid Connection works
- Horizontal Directional Drilling

3.4.1.1 Site Entrances

Prior to the commencement of any other works, the Site Entrance layouts will be constructed. The site entrances shall be designed in accordance with TII design standard DN-GEO-03060: Geometric Design of Junctions.

Site entrances will be secured and locked when not in use. Where required, the entrances will be controlled by flagmen to assist traffic movements. The locations of the site entrances are illustrated in Figure 2-1. It should be noted that the main site entrance for the Bottlehill/Mullenaboree part of the site shares an access with an existing residential property. Access to this property will be maintained at all times. Plate 3-1 below indicates the location of the proposed site access gate.

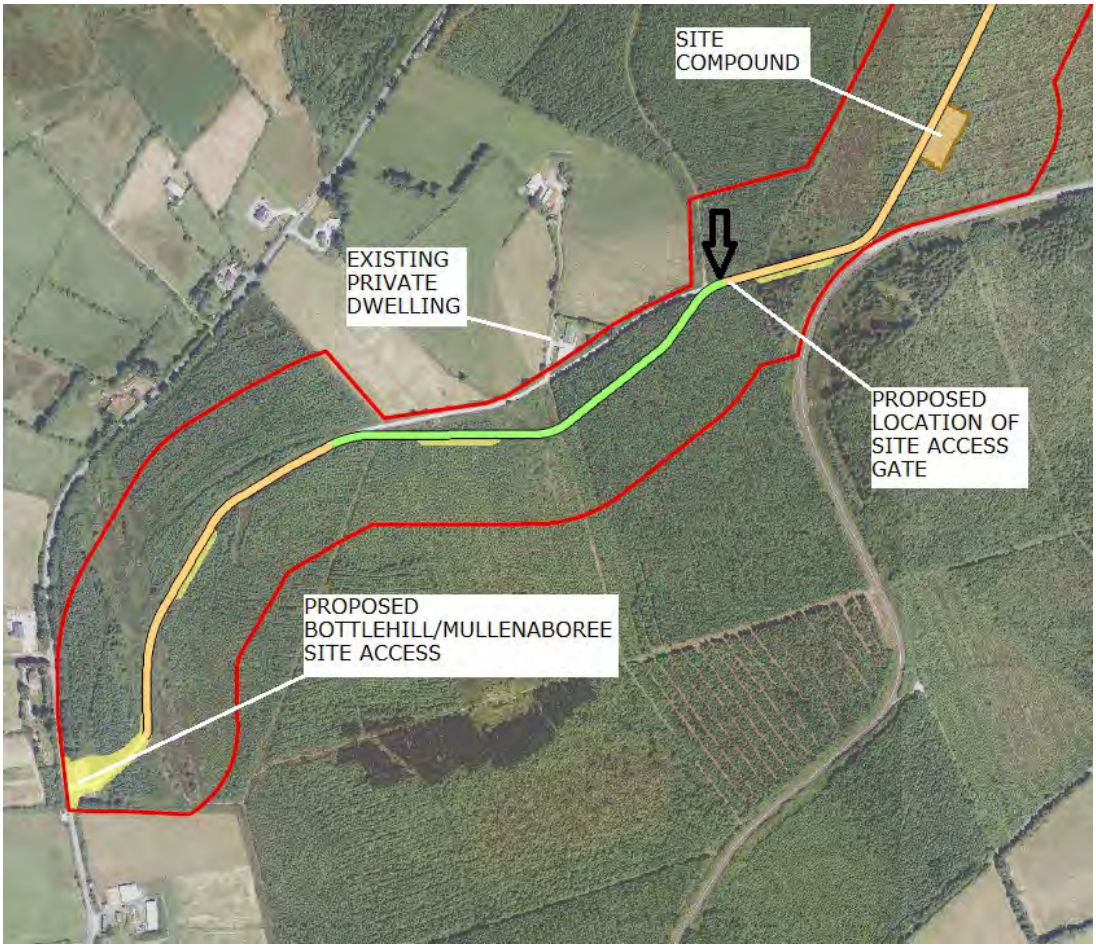


Plate 3-1: Bottlehill and Mullenaboree Site Access: Proposed Gate Location

3.4.1.2 Temporary Site Compounds

During the construction phase, it will be necessary to provide temporary facilities for construction personnel. The location of the temporary site compounds are illustrated in Figure 1-2. There are three temporary compounds. Two located at the eastern cluster and one located at the western cluster.

Facilities to be provided in the temporary site compound will include the following:

- Site office, of Portacabin type construction
- Portaloo
- Bottled water for potable supply
- A water tanker to supply water used for other purposes
- Employee parking
- Bunded fuel storage
- Contractor lock-up facility
- Diesel generator

The main compound will also include the following:

- Canteen facilities
- Aggregate stores
- Storage shed

During the construction of the grid connection, the contractor will utilise the CGEP Wind Farm site compound for the duration of the proposed works. The temporary facilities will be removed on completion of the construction phase.

The compound will be constructed as follows:

- The area to be used as the compound will be marked out at the corners using ranging rods or timber posts.
- Drainage runs and associated settlement ponds will be installed around the perimeter.
- A layer of geo-grid will be installed, and layers of suitable material will be spread and compacted to provide a hard area to site offices and storage containers.
- Temporary, modular, containerised offices welfare units will be delivered to site using articulated lorry and lifted into place using a suitable crane.
- Waste water and sewage connections will be set up in such a way that they can be emptied regularly and removed from site under licence.
- A concrete bunded area with an associated oil interceptor will be provided within the main compound for the storage of lubricants, oils and site generators and coalescing media oil water separator will be installed to mitigate against any hydrocarbon spillages.
- The compound will be fenced all round and secured with locked gates.
- Self-contained portaloos with an integrated wastewater holding tank will be used maintained by the providing contractor and removed from site on completion of the construction works. These will be located in the temporary compound, as well as in several areas throughout the site due to the dispersed nature of the site.
- Potable water will be delivered to site in suitable canisters on a daily basis for drinking.

Upon completion of the project the compound will be decommissioned and material will be removed off-site for recovery or disposal by a licenced waste contractor. The hardcore stone and geo-grid will be removed from site and the area will be reinstated by backfilling with the material arising during excavation, landscaping with topsoil as required.

3.4.1.3 Concrete Washout Area and Wheel Washing

All concrete will be delivered to site via ready-mix trucks from a local supplier.

Concrete washout will be carried out in a dedicated area of the temporary compound or at a designated washout pit on site. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement lagoon provided to receive all run-off.

The concrete wash-out area will be constructed as follows:

- The topsoil and subsoil, if necessary, will be stripped out and placed adjacent to the temporary compound area.

- An impermeable membrane will be installed directly onto the subsoil, and or subsoil, to form the impermeable concrete wash-out settlement lagoon.
- A designated truck wash-down concrete apron shall be constructed next to this settlement lagoon.
- Impermeable lined drains will direct the wash-out flow to the wash-out settlement lagoon.
- The residual liquids and solids will be disposed of off-site at an appropriate licenced waste facility.

Upon completion of the projects the concrete wash-out area and settlement lagoon will be decommissioned by removing the impermeable membrane and backfilling the area with the material arising during excavation. The removed material will be recovered or disposed of off-site at an appropriate facility.

Wheel wash facilities will be located at the site entrance to reduce construction traffic fouling public roads. Each wheel wash will come with an additional water tank which will be filled regularly. These units will be self-contained and will filter the waste for ease of disposal. Waste will be removed from each unit and from site by a proposed contractor.

3.4.1.4 New Site Access Tracks

All site tracks will be designed taking account of the loadings required by the turbine manufacturer and will consist of a compacted stone structure. Suitable granular fill material for the sub-base of the track will be sourced from the borrow pits within the site with suitable class 6 structural fill imported from a licensed quarry as required to meet the requirements of the detailed design. Class 6F2 and clause 804 granular material for track base course and running surface will be imported from a licensed quarry. All delivery truck movements from external sources will follow predefined haul routes as agreed with Cork County Council. The proposed haul routes are illustrated in Figure 3-1.

All tracks on the site will be constructed using the traditional track construction and best practice construction methods from suitable load bearing strata. This system will consist of either one or two layers of stone depending on the load bearing capacity of the base layer. Where the underlying layer is mineral subsoil, two layers of stone are used; a stone capping layer and running layer. In areas where the load bearing layer is rock, the capping layer is omitted, and the running layer is installed directly onto the rock surface. Drainage runs and associated settlement ponds will be installed.

Track construction shall be as follows:

- Establish alignment of the new site tracks from the construction drawings and mark out the centrelines with ranging rods or timber posts.
- The access tracks will be of single-track design with an overall width of approximately 4.5m. There will be some local widening on the bends, junctions and around Turbine Foundations for the safe passage of large vehicles. All bends have been designed to suit the requirements of the delivery vehicles.
- All machinery shall work within the construction corridors that will be indicated on the contract drawings. Vehicle movement will be restricted to site access tracks and agreed haul routes.
- Topsoil/subsoil will be stripped back to required levels. All material will be bunded and stored separately. Section 4.3.4 contains a Soil Management Plan which details the storage and movement of materials on site.
- The soil will be excavated down to a suitable formation layer of either firm subsoil or rock.

- Well-graded granular fill will be spread and compacted in layers to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be decided by the Site Manager based on the characteristics of the material and the compaction plant to be used.
- Batters will have a slope of between 1:1 and 1:5 (depending on depth and type of material) and will be left as cut to re-vegetate naturally with local species.

3.4.1.5 Upgrade of Existing Internal Access Tracks

It is proposed to utilise the existing road and forestry track network as much as possible within the site, with some additional local widening at bends in the tracks. This will involve the slight re-location of existing roadside swales to allow for widening.

Existing agricultural and forestry drains will be retained along their existing routes and only slight diversions are anticipated to be required to provide for track widening.

Existing track upgrades shall follow the same outline methodology as for new access tracks.

The typical road construction details of new and upgrades to existing access tracks are detailed on drawing P20-099-0300-0025 which can be found in Appendix 3.

3.4.1.6 Watercourse Crossings

Culverts will be sized to take the 1 in 100 year flood flow with a 20% allowance for Climate Change. Concrete or HDPE pipes/boxes may be used depending on the size of the watercourse to be crossed.

For a typical drain/minor watercourse crossing using a culvert, the following outline methodology will be used.

- The access track construction will finish at least 10m from the nearside bank of the drain.
- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in Section 4 of this CEMP.
- Pipe/box culvert installation will only take place during dry periods.
- The bed of the drain will be prepared using a mechanical digger and hand tools to the required levels accordance with the design.
- A bedding layer will be laid in the base of the watercourse using Class 6 aggregate material and blinding to the desired levels in accordance with the design.
- The pipe/box is laid in one lift or in sections using a crane in accordance with an approved lift plan.
- Bedding material is placed and compacted around the pipe/box to the desired levels in accordance with the design.
- Where appropriate an 500mm of suitable bedding material in the form of clean round gravel between 10-100mm diameter, shall be laid in the base of the pipe/box in accordance with the recommendations set out in *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses from* Inland Fisheries Ireland.
- The pipe/box is covered using compacted Class 6N fill material in accordance with the design up to the levels required by the access track sub formation.

- Rock armour headwalls will be constructed where necessary to protect pipe/box ends and the base of slope embankments on either side of the track.
- The access track construction continues over the crossing in accordance with the methodology outlined in Section 3.4.1.4.
- For small drain crossings, pipes/boxes of suitable diameter will be laid directly into the bed of the drain.

3.4.1.7 Cable Works

The specification for cable trenches will vary slightly depending on cable voltage, location and existing land use. Typical cable trench construction details can be found on drawing P20-099-0300-021 contained in Appendix 3, which shows typical construction details for electricity cables in public roads and beside internal site access tracks.

All electrical and fibre-optic cabling on site between the wind turbines and the substation building will be buried in trenches approximately 0.6m wide by 1m deep located directly adjacent to the internal tracks. Internal site cables will be direct buried or ducted as per the typical specification outlined in Appendix 3.

The following describes the outline construction methodology for cable installation works inside the wind farm site.

For direct buried cables, the following outline methodology shall apply:

- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in Section 4 of this CEMP.
- The line of the cable trench will run beside the site access tracks until it exits to the public road.
- The ground will be excavated using a mechanical digger. The top layer of soil will be removed and placed to one side. It will be used for landscaping the top of the backfilled cable trench following the laying of the cables. The remaining subsoil, excavated to the required depth, will be placed separately and used as backfill.
- Safe ladder access/egress to trenches will be provided into the trench.
- The cables will be laid directly onto a bed of suitable material, free from sharp stones and debris*****.
- A suitable material will be placed over the top of the cables to protect them during backfilling*****.
- Warning tape and plates will be installed by hand in accordance with the trench design and ESBN specifications and the engineer's design.
- On completion, the ground will be reinstated, and marker posts will be positioned at agreed centres to the side of the trench highlighting the presence of cables below.
- Trenches will vary in width depending on the number of cables in the circuit. Where there is more than one set of cables they will be separated as per cable manufacturers and ESB/ EirGrid requirements.
- Where cables need to cross access tracks, suitable cable ducts will be used to protect the cables. The typical method of construction involves the contractor initially excavating the trench to the specified depth and laying high density polyethylene (HDPE) ducting in the trench in a surround of CBM (cement bound material). A rope will be inserted into the ducts to facilitate cable-pulling later. The as-constructed detail of the cable duct locations will be carefully recorded. Cable marker strips will be placed at a specified distance above the ducts and the two communication ducts will also be laid.

An additional layer of cable marker strips will be laid above the communication ducts and the trench back-filled.

- Small jointing pits will be located along the route of the trench which will be left open until jointing takes place. A protective handrail/ barrier will be placed around each pit for health and safety reasons.
- Once the cables are joined and sealed the jointing container will be removed and the cables at the joint-bay locations will be back-filled in the same manner as the rest of the cable trench.
- The cables will be terminated on the switchgear terminals at each turbine location and at the substation switchboard. Ducts will be cast into each foundation to provide access for the cables into the turbine. Likewise, at the substation, ducts will be cast through the building foundation to provide access for the cables.
- There are no existing buried services expected within the site however the appointed contractor will be responsible for carrying out pre-construction survey ahead of construction.
  Prior to commencement of the works, records of services such as watermains, sewers, gas mains and other power cables will be obtained from the relevant service providers. Cable detection tools, ground penetrating radar and slit trenches will be used, as appropriate, to find the exact locations of existing services. The final locations of the cable trenches will be selected to minimise conflicts with other services.
- Trenches where ducts are laid will be back filled every evening. During excavation works signage will be erected local to the works warning of the dangers.

Where ducting is required within the wind farm site, tasks marked by an asterisk (*) in the above methodology will be replaced by the following steps:

- Ducts will be placed into trench manually, having been delivered to road side embankment/verge areas by way of tractor and pipe trailer and then offloaded by hand.
- Approved bedding material will be used to surround the ducts and delivered straight from a concrete truck or by skid steer at tight points along the route.
- Approved fill material will be compacted at the base, again above the power cable ducting as per the engineer's design.
- Exposed duct ends will be capped.
- A 12mm Draw rope will be blown through the ducting at later date.

3.4.1.8 Borrow Pit Construction

3 no. onsite borrow pits will be used, where possible, to source suitable fill material for the construction of the various tracks, turbine bases and hardstanding areas. The location of the proposed borrow pits are shown on Figure 1.2.

The borrow pits will be developed in line with the following outline methodology, which may be subject to change following the appointment of the contractor for the main construction works:

- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in Section 4 of this CEMP.

- Traffic management measures will be implemented prior to works commencing in accordance with the construction stage TMP and measures outlined in Section 4 of this CEMP.
- The access tracks will be prepared to the borrow pit locations in line with the methodology described in Section 3.4.1.
- The extent of the works areas shall be accurately delineated using stakes and rope to prevent works being carried out outside the agreed areas.
- Stock proof fencing shall be installed around the borrow pits in advance of any works taking place.
- A bespoke method statement shall be drawn up by the contractor for the main construction works shortly before the works take place.
- After drainage and temporary dewatering infrastructure has been put in place, the main excavation works will commence by stripping the topsoil material.
- Topsoil will be stockpiled to be used for reinstatement of the borrow pits and used for local landscaping of the wind farm site.
- Excavation works will be carried out by the following means at the borrow pits:
    - Conventional excavators (using buckets) to excavate and load dumper trucks
    - Rippers mounted on conventional excavators to 'rip' the rock where appropriate
    - Rock breakers (where required)
- Excavated material will be processed by mechanical crusher and screened as necessary.
- Excavated rock will be loaded onto dumper trucks and transported to the required area for tipping and placement e.g. when building the access tracks.
- When the borrow pits have been exploited, they shall be closed and reinstated using surplus mineral soil or rock excavated from elsewhere on the site as described in accordance with an approved project reinstatement plan.
- Generally, the borrow pits, once reinstated, shall be covered with topsoil and allowed to re-vegetate naturally. However, appropriate measures will be taken if it is found that natural re-vegetation is too slow or if the area is being taken over by inappropriate species.
- Noise, dust and site drainage mitigation measures shall be implemented as described in Section 4 of this CEMP.

There are no groundwater supply wells recorded in the immediate vicinity of the proposed borrow pit locations, therefore any dewatering of excavations is not likely to impact on water supplies.

To monitor groundwater during the construction phase groundwater monitoring wells will be installed between areas of deeper excavations and sensitive groundwater receptors. The wells will be used to monitoring groundwater levels and quality to assess any potential impacts during the construction works.

3.3.1.1 Crane Hardstands

All crane pads and associated splays will be designed taking account of the loadings provided by the turbine manufacturer and will consist of a compacted stone structure in accordance with the detailed engineering designs and employer's requirements.

All crane pads will be formed from a suitably stiff layer and the finished crane pad surface will provide a minimum bearing capacity of up to 260kN/m^2. Where excavations beyond 5m below ground level are required to reach a suitable bearing, pile foundations may be required. Piles used for turbine foundations are either pre-cast driven piles or bored piles. Pile length is site-specific but tend to be approximately 12 m to 20 m long.

Crane pad and associated splay formation will consist of either 1 or 2 layers of suitable fill material depending on the properties of the underlying load bearing layer. Where the underlying layer is soft soil, 2 layers of suitable fill formation are used and the stone capping layer. In areas where the load bearing layer is rock, the capping layer is omitted, and the running layer is installed directly onto the rock surface however it is not likely this will be the case at this site.

The crane hardstands will be constructed in one of two following ways:

- Typical excavation method;
- Piled hardstand method.

It is highly unlikely based on site investigation information to date that a piled construction method will be required for the hard standings.

The typical excavation method can be summarised as follows:

Typical Excavation Method:

All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in Section 4 of this CEMP.

- Establish alignment of the hardstands from the construction drawings and mark out the corners with ranging rods or timber posts.
- Drainage runs and associated settlement ponds will be installed.
- The excavated material will be stored close to the hardstand or taken back to the borrow pit. Topsoil and subsoil stockpiles will be formed and the side compacted to prevent silt run off during heavy rain or air bourn dust during dry periods.
- The soil will be excavated down to a suitable formation layer of either firm clay or rock.
- Suitable granular fill will be spread and compacted in layers to provide a homogeneous running surface.
- Batters to have a slope of between 1:1 and 1:5 (depending on depth and type of material) and will be left as cut to re-vegetate naturally with local species.

Piled Hardstand Method:

This system involves:

- Construction of the founded hard standing as per the above methodology.
- Piles will be positioned to match the outrigger pads of the turbine crane and as agreed with the turbine supplier.

Geotechnical analysis of the site investigation information will dictate the type of pile to be used. There are several methods however the most likely will either be pre-cast driven piles and auger bored piles.

- A reinforced concrete pad will be constructed on top of the piles. Shuttering will be used lined with polythene and an antibleeding admixture used to prevent any concrete leachate.

3.4.1.9 Turbine Foundations

The wind turbine foundations will be constructed using standard reinforced concrete construction techniques and will be designed as either:

- Submerged foundation design.
- Non-Submerged Foundation design.

Turbine foundations will be designed to Eurocode Standards. Foundation loads will be provided by the wind turbine supplier, and factors of safety will be applied to these in accordance with European design regulations. The turbine will be anchored to the foundation as per the turbine manufacturer's guidelines which will be incorporated in the civil foundation design. The shape and size of the foundation can vary in size and shape to approximately 22m in diameter.

Ideally, a suitable bearing stratum is encountered within 3 m from ground surface so that the turbine foundation can be finished at / near existing ground level.

The turbine foundations will be constructed as follows:

Standard Excavated Reinforced Concrete Base:

a) The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter.

b) The excavated material will be stored at agreed locations close to the base. Topsoil and subsoil stockpiles will be formed, and the side compacted to prevent silt run off during heavy rain or air bourn dust during dry periods. The subsoil material will be used as backfill and the topsoil will be used for landscaping around the finished turbine post construction.

c) No material will be removed from site and storage areas will be stripped of vegetation prior to stockpiling in line with best working practises.

d) Around the perimeter of the foundation formation a shallow drain will be formed to catch ground water entering the excavation. The drain will direct the water to a sump if required where it will be pumped out to a settlement pond away from the excavation.

e) A layer of concrete blinding will be laid approximately 75mm thick directly on top of the newly exposed formation, tamped and finished with a screed board to leave a flat level surface. If required, geogrid and soil replacement will be laid according to the foundation design, followed by placement of the concrete blinding layer.

f) If soil replacement is required, the aggregate used must be tested and approved by the project geotechnical engineer.

g) High tensile steel reinforcement will be fixed in accordance with the designer's drawings & schedules. The foundation anchorage system will be installed, levelled and secured to the blinding using steel box section stools.

h) Ductwork will be installed as required, and formwork erected around the steel cage and propped from the backside as required.

i) The foundation anchorage system will be checked both for level and line prior to the concrete being installed in the base.

j) Concrete will be placed using a concrete pump and compacted using vibrating pokers to the levels and profile indicated on the construction drawings.

k) Upon completion of the concreting works the foundation base will be covered from the elements that could cause hydration cracking and or delay setting in any way.

l) Steel shutters will be used to pour the upper plinth section.

m) The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation and landscaped using the top-soil set-aside during the excavation. The suitability of backfill material is to be approved by the project geotechnical engineer.

n) A gravel footpath will be formed from the access track to the turbine door and around the turbine for maintenance.

Reinforced Concrete Piled Foundations:

It is envisaged that an allowable ground bearing pressure to comply with the design and specification of the standard shallow turbine foundation design should be attained however, should piling be required the following will apply.

Follow Items (a) to (c) as above then for piled foundations:

Auger bored piles will be used for piled foundations.

- A piling platform for the piling rig will be constructed. This can be done in two ways depending on the bearing capacity of the underlying soil.
    - The first method is to lay geo-textile on the existing surface and a stone layer will then be placed on top of the geo-textile by an excavator and compacted in order to give the platform sufficient bearing capacity for the piling rig.
    - The second method is to excavate the soils to a suitable intermediate mineral subsoil and backfill to the formation level.
- The piling rig, fitted with an auger, will then bore through the soft material with a sleeve fitted around the auger to prevent the sidewalls of the peat from collapsing. The borehole is then extended to a suitable depth into the subsoil/bedrock.
- When the auger and the sleeve are removed high tensile steel cages will be lowered into the boreholes. These steel cages will extrude above the level of the top of the concrete pile.
- As the auger is removed concrete is pumped into the borehole.
- Reinforcing steel on the top of the pile will tie to the foundation base steel.

Base construction is then undertaken as per items (e) to (n) above.

3.4.1.10 Substation Compounds

Two substation compounds will be constructed within the CGEP site as indicated in Figure 1-2. A substation will be constructed at Knockacullata at the western section of the site, and at Lackendarragh North at the eastern section of the site. The substation compounds will measure 124m x 104m at Knockacullata and 178m x 153m at Lackendarragh North. The substation compounds are detailed in 0300 series planning drawings.

The compound will include a substation building which will be divided into the wind farm control building and the switchgear housing. The buildings main functions is to provide housing for switchgear, control equipment and monitoring equipment necessary for the proper functioning of the substation and wind farm. The buildings will be constructed by the following methodology:

- The area of the control buildings and compound will be marked out using ranging rods or wooden posts and the vegetable soil stripped and removed to the nearby storage area for later use in landscaping. No material will be removed from site and storage areas will be stripped of vegetation prior to stockpiling in line with best working practises.
- Drainage runs and associated settlement ponds will be installed
- The dimensions of the Building and Compound area will be set to meet the requirements of EirGrid/ ESB and the necessary equipment to safely and efficiently operate the wind farm.
- The foundations will be excavated down to the level indicated by the designer and concreted.
- The blockwork walls will be built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors.
- The blockwork will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation.
- The concrete roof slabs will be lifted into position using an adequately sized mobile crane.
- The wooden roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.

The remainder of the substation compounds will be brought up to the agreed formation and approved stone imported and graded to the correct level as per the detail design. Equipment plinths will be marked out, excavated and constructed using in-situ reinforced concrete or pre-cast concrete. Provision will be made in each plinth for earth connection.

Following the construction of the equipment plinths an earth mat will be installed throughout the compound. This will be connected to each plinth and the buildings as per the electrical earth protection design.

Battery Storage

Battery energy storage system (BESS) units, to facilitate on site energy storage and to provide ancillary services to the electricity grid, will be situated next to the main onsite substation compound at Lackendarragh North. They will be housed in glass reinforced plastic (GRP) units or modified shipping containers.

The units will be mounted on shallow concrete plinths within a gravel hard standing and shall be bounded in the same fashion as the substation compounds using a galvanised steel security palisade fencing. Battery containers, inverters, transformers and HVAC units will be lifted into place using a suitably sized crane, telehandler or HIAB. Any lifting operations will adhere to a specific lift plan, issued by the contractor responsible for the installation. Up to 20. No battery storage units will be installed at the Lackendarragh North Compound.

3.4.1.11 Electrical Works

Substation Fit Out and Switchgear Installation

The substations will have a domestic electrical system including lights, sockets, fire alarm and intruder alarm. The high voltage switchgear is typically installed through the following method.

- The switchboard units are delivered to site on a truck and unloaded using a forklift, front end loader or HIAB crane.
- Suitable task specific RAMS and lifting plans will be in place prior to the commencement of all works.
- The switchgear will be unloaded on to a concrete plinth directly outside the substation building.
- The units will be moved inside the substation building using a hand driven forklift and positioned over the internal trench supports, prepared previously.
- The switchgear is then secured as per manufacturer's instructions, typically by bolting directly to steel support bars over the trench.
- The building is fitted out with small light and power and ancillary wind farm control equipment such as SCADA computer, remote telemetry units, metering etc.
- All equipment and fittings are then connected, wired tested and commissioned in accordance with the Electrical Contractor's commissioning plan.

The equipment will be decommissioned in the reverse of the above, removed from site, dismantled and disposed of in an approved manner.

Transformers

- The turbine transformers will be placed directly onto the turbine foundation upon delivery to site, prior to the installation of the turbine towers.
- The transformers will be of the sealed type and will be inspected for any damage prior to offloading. It is likely that the units will be installed using a small mobile all-terrain crane and will be tested, commissioned and energised by suitably trained and authorised persons.
- The accessible sections of the transformer will be protected within an enclosure which shall be locked at all times and displaying appropriate warning signs. The units will be decommissioned in the same manner, removed from site and disposed of by a company certified to handle such materials. This specialist company will also dispose of any oil or residual waste products.
- Transformers and ancillary plinth-mounted equipment required in the substation compound will be delivered to site and unloaded directly in place by HIAB crane or similar.

- Suitable task specific RAMS and lifting plans will be in place prior to the commencement of all works and adequate hard standings will be provided prior to delivery to facilitate safe unloading.

3.4.1.12 Turbine Erection

A lift plan will be developed for each turbine location detailing the storage positions for each component, crane size and lifting sequence. It is anticipated that each turbine will take 3 to 4 days to erect with two cranes set up at each turbine. One main crane and a tailing/ support crane. The support crane will assist in the assembly of the main crane and also in the initial lift of the tower sections and hub and blade assembly. Components will be delivered using specially adapted heavy load trailers set up specific to the turbine supplier requirements. Upon completion of the erection, all sections will be tightened to the correct torque and the internal fit out of the turbine undertaken. Finally, the turbines will be commissioned and tested.

3.4.1.13 Grid Connection Works

The following describes the outline construction methodology for cable installation works along the grid connection route between the wind farm onsite substation and the Barrymore substation.

The proposed grid connection route is shown on Figure 2-2 and described in Section 2.1.3.

- Agreement will be sought from local authorities with respect to the location of trenches on roads to ensure no damage is caused to storm-water drains, water-mains or other services. All drain and culverts affected by the works are to be re-instated to the satisfaction of the Local Authorities. Particular care will be taken in order to minimise disruption to local residents and public road users.
- The location of the cable route will be set out by GPS (RTK enabled) equipment in accordance with the design drawings prepared for the site.
- Prior to any construction works commencing, a pre-commencement road survey will be carried out on the public roads in the vicinity of the works. The area where excavations are planned will be surveyed with a cable-avoiding scanning tool, by a person trained in Location of Underground Services. Location equipment to be calibrated within the previous 12 months.
- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in Section 4 of this CEMP.
- Traffic management measures will be implemented prior to works commencing accordance with the construction stage TMP and measures outlined in Section 4 of this CEMP.
- Overhead lines will be identified and overhead clearance limiting measures will be put in place at the start of each day. Machinery will also include automatic limiters to safeguard against interaction with overhead lines.
- Underground services may be encountered during the trenching works the locations and depth of these underground services the locating of these services will include the reviewing of service drawings, investigations along the trenching route, and consultation with the various service providers.
- All environmental buffer zones shall be identified and set out prior to construction works advancing. Where necessary a stock proof timber post and wire fence shall be erected to establish these areas and thus prevent the entry of contractor's plant within these buffers during construction works. It is noted that given the presence of large sections of the cable route on public roads, extensive adherence to buffer zones is unlikely.

- The cable infrastructure will follow the existing road infrastructure where possible. Cables will be laid underground using standard trenches, with pre-excavation drainage works in place prior to trench excavation.
- Where possible, trenching will take place outside the carriageway in public road verges and private land. In areas where the cable trench route runs within a public road carriageway, temporary reinstatement of the road surface will be carried out at the end of the working day to allow safe re-opening of the road for public traffic. See below for sequence of works for temporary road reinstatement.
- A 360-degree excavator will first remove the top layer from the route along the roadside and load onto a haulage truck, this material will be recycled, then the excavation of trench will commence and a trained spotter will be used to assist machine operators while reversing or when their visibility becomes restricted.
- Trench to be dug to agreed drawing specifications. All plant and stored material will be kept a safe distance back from the trench edges.
- No open trench will be left unattended. Pedestrian barriers will be erected to prevent unintentional entry occurring by the open trench. Cones and or barriers will be used on rural roads to maintain a safety zone in proximity to the trench.
- Safe ladder access/egress to trenches will be provided into the trench.
- Ducts will be placed into trench manually, having been delivered to roadside embankment/verge areas by way of tractor and pipe trailer and then offloaded by hand.
- Approved bedding material will be used to surround the ducts and delivered straight from a concrete truck or by skid steer at tight points along the route.
- Approved fill material will be compacted at the base, again above the power cable ducting as per the engineer's design.
- Warning tape and plates will be installed by hand in accordance with the trench design and ESBN specifications.
- Backfill materials will be delivered to site in tipper trucks and offloaded at agreed designated set down areas where it will be either loaded into site dumpers or a stoning cart then brought to trench area that requires being backfilled. Main material deliveries such as ducting and pre-cast joint bay sections will be to the temporary site compound and moved to the work area as required.
- Backfill materials will be compacted using suitable compaction equipment to prevent future settlement as per NRA Specification for Roadworks.
- Hand digging will be used when within 500mm of any known existing services.
- Trenches where ducts are laid will be back filled every evening. During excavation works signage will be erected local to the works warning of the dangers.
- Exposed duct ends will be capped.
- Spoil will be disposed of at a licenced facility
- Unauthorised access will be monitored and prevented.
- A 12mm draw rope will be blown through the ducting at a later date.
- The trench and the working strip will be reinstated to the satisfaction of the local authority and TII standards for public roads.

- Where the trench strip passes through agricultural land, the surface will be reinstated to the area's pre-existing condition.

Installation of Joint Bays and Link Box Chambers

- Setting out and location of services will be carried out in the same manner as for trench excavations.
- Traffic management to be set up as per the construction stage traffic management plan.
- A tracked excavator will be used for the excavation of the joint bay pits in accordance with detailed design drawings.
- Tractor/dump trailer and or tipper truck shall be used to remove excavated spoil from the work area. Spoil shall be removed to a licensed waste facility.
- A watchman will be used to assist machine operators while reversing or when their visibility is restricted.
- Where joint bays are located, the excavation shall be adequately protected with fencing with signage erected, warning of deep excavation.
- Safe ladder access/egress to excavation shall be in place, ladder to be footed at the base and tied at the top.
- Base materials will be placed by the excavator from a truck in the base of the excavation.
- Precast chamber sections will arrive on site via articulated lorries accompanied by a crane truck. The crane truck will load each unit separately from the articulated truck.
- The precast units will be transported to site and a flatbed trailer and a truck mounted crane will lift the section into position.
- A lift plan /DJSP will be required for all Joint Bay installations.
- When the joint bays are in place, the sections will be back filled using approved fill material and the road surface will be reinstated using cold tar/surface dressing.
- Unauthorised access will be monitored and prevented.

Further details of standard 110kV trenches can be found in standard 110kV cable drawings contained in Appendix 3.

Plate 3-2: Typical Installation and Temporary Reinstatement of Joint Bay

Watercourse Crossings

A detailed in section 3.4.1.6, the grid connection route will consist of 13 no. watercourse crossings. 3 no. watercourse crossings will be installed with horizontal directional drilling (HDD) as described in section 3.4.1.15. Crossing WC018 will consist of the replacement of an existing stone culvert with an RC box culvert. Crossing WC008 will be installed in the existing road and reinstated to the existing level. Standard trench crossings will be used at 8 no. crossings as detailed in Table 3-3.

The methodology for this watercourse crossing is set out as follows:

- Location of services will be carried out in the same manner as for trench excavations.
- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in Section 4 of this CEMP.
- Traffic management measures will be implemented prior to works commencing accordance with the construction stage TMP and measures outlined in Section 4 of this CEMP.
- The road surface along the route will be milled by road plainer and skid steer.
- A 360-degree excavator will first remove the top layer from the route along the roadside and load onto a haulage truck. This material will be recycled, then the excavation of trench will commence and a trained spotter will be used to assist machine operators while reversing or when their visibility becomes restricted.
- Excavator to run at low revs to avoid damage by sudden movement.

- A banksman to dig trial holes after each layer of the road surface is removed. The maximum depth will be exposed to allow for the greatest cover to be achieved.
- Where necessary as per the engineer's design, protective steel plates will be placed at the base of the excavation such as over the top of bridge key stones.
- Ducts will be placed into trench manually, having been delivered to roadside embankment/verge areas by way of tractor and pipe trailer and then offloaded by hand.
- Concrete is then poured between and over the ducts maintaining the required spacing's as per the engineer's design.
- A protective steel plate is placed to the sides and over the newly laid ducts as per the engineer's design.
- Cable marker strips in accordance with ESBN requirements are placed on top of the steel plates.
- Additional concrete is then placed over the marker tape followed by steel reinforcing mesh.
- Additional concrete is then placed on top of the mesh to the required finished level.
- Depending on the finished levels, if the finish level is below ground level than the remaining depth will be filled with approved fill material the following day after the concrete has set.
- Warning tape will be placed above the concrete beam. The top level will be finished as per the Local Authority Requirements.
- If the beam detail is higher than the finished road level, than the beam will be finished as a footpath type/rubbing strip, with a design agreed with Cork County Council.

Further details of standard 110kV cable duct crossings can be found in standard 110kV cable drawings contained in Appendix 3.

Culvert Crossings

The installation of the grid connection will require the crossing of 8 no. streams and drains. For such crossings, the following outline methodology will apply:

- The general method of construction for these crossings will follow the procedure outlined above for Installation of cable ducting.
- Within 500mm of the top of the existing culvert, which will be located by a scanning tool, hand digging will be employed to uncover the pipe.
- It is desirable that a minimum separation distances in accordance with the detailed design will be maintained with existing services where the cables are to be laid near or crossing existing services. This is typically 300mm.
- Cable ducts will be laid below existing services where possible.

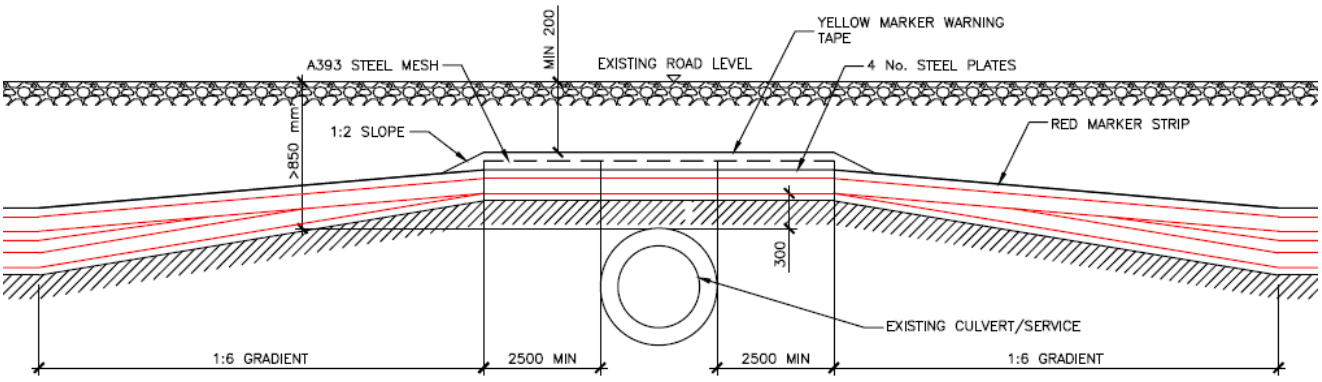


Plate 3-3: Typical Existing Culvert Crossing Profile

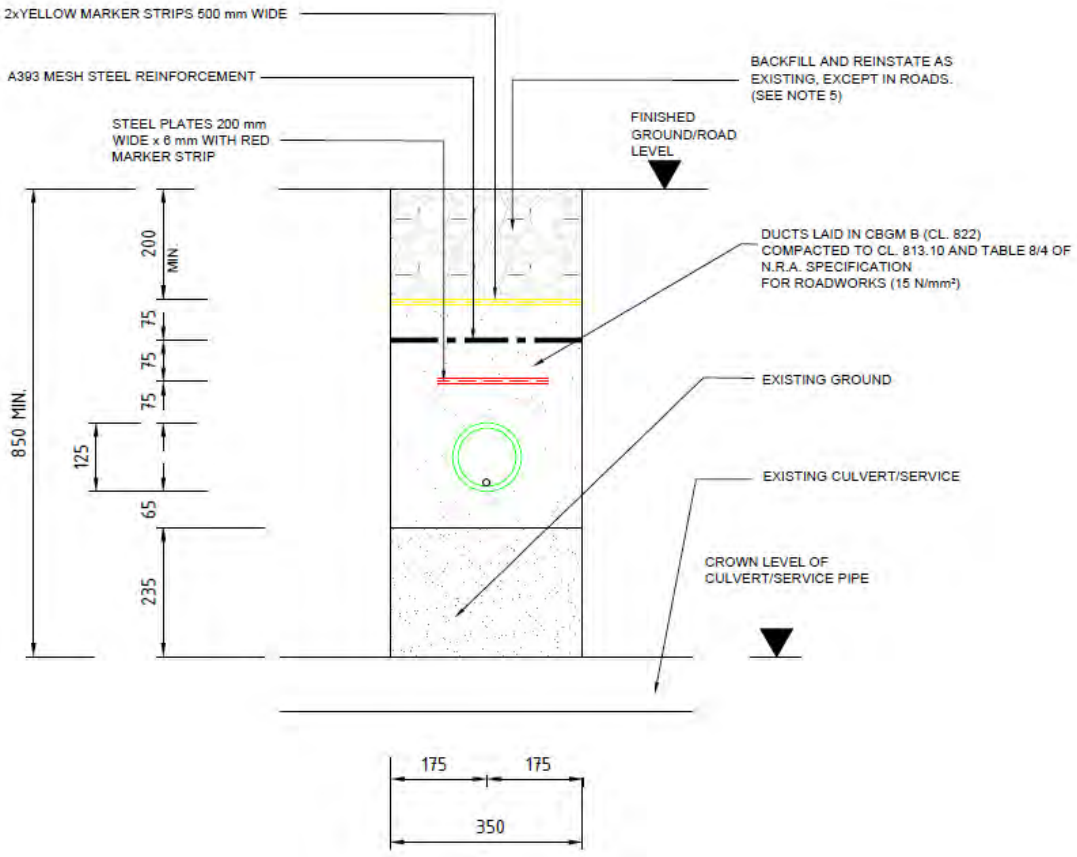


Plate 3-4: Typical Existing Culvert Crossing Section

Further details of standard 110kV cable duct crossings can be found in standard 110kV cable drawings contained in Appendix 3.

Temporary Reinstatement of Excavations

- Hot works permit to be issued for the area of works for the area to be reinstated.
- A grader (if required), Roller and mini-patch plainer will be delivered to site by low-loader, 2 - in - 1 Tar - and Chipper or patch sprayer will be driven to site.

- A mini patch plainer will be attached to a skid steer and will plane a fresh cut line along the verge of the trench.
- The trench fill material will be graded to shape the trench to match the existing camber of the carriageway and compacted using a drum roller.
- The Tar - and - Chipper will make first pass, of one meter wide.
- Once the bitumen emulsion and chips have been dispensed from the 2- in 1 Tar and chipper and the drivers cab is clear of the area, the roller will follow and compact the chips into the emulsion.
- If the 2 - in - 1 - Tar - and - Chipper is not been used, a towable emulsion sprayer will be used. This process involves the towable sprayer been towed by a pickup truck, and an operative spraying the trench area by means of a lance from the unit.
- The emulsion is heated up to 70°C, the operator will wear protective overalls, heat resistant gloves and eye protection.
- The emulsion is sprayed out to cover the existing trench fill where a follow up crew will spread surface dressing chips over the sprayed area at a safe distance of 5m from the lance.
- Compaction will then take place by a drum roller.
- Both the 2 - in - 1 - Tar - and - Chipper and towable sprayer will have internal diesel burners, with no exposed naked flame.
- Delay set macadam may also be required on busier roads, 75mm of delay set shall be placed within the trench at the end of each working day, by means of skid steer and trench reinstatement bucket and compacted.

Plate 3-5: Towable Sprayer for Temporary Reinstatement

3.4.1.14 Horizontal Directional Drilling (HDD)

Horizontal directional drilling (HDD) method of duct installation will be carried out at 4 no. locations. HDD will be carried out at 3 no. stream crossings including WC006, WC007 and WC019 as indicated in Table 3-3. The locations of these points are illustrated in Figure 2-4. HDD will also be carried out to install ducting beneath the M8 motorway.

HDD will be carried out using Vermeer D36 x 50 Directional Drill, or similar plant. The launch and reception pits will be approximately 0.55 m wide, 2.5 m long and 1.5 m deep. The pits will be excavated with a suitably sized excavator and shall employ the same mitigation measures outlined herein for trenching and joint bay excavations.

The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator shall commence to drill into the launch pit to a suitable angle which will enable the excavation to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore shall continue with the addition of 3.0 m long drill rods, mechanically loaded and connected into position.

During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ (environmentally friendly product (not toxic to aquatic organisms)) and water is pumped through the centre of the drill rods to the reamer head and is forced into void and enables the annulus which has been created to support the surrounding sub soil and thus prevent collapse of the reamed length. Depending on the prevalent ground conditions, it may be necessary to repeat the drilling process by incrementally increasing the size of the reamers. When the reamer enters the launch pit, it is removed from the drill rods which are then passed back up the bore to the reception pit and the next size reamer is attached to the drill rods and the process is repeated until the required bore with the allowable tolerance is achieved.

The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to negate any adverse effects arising from the use of other, traditional polymer-based drilling fluids and will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the reception or drilling pits, it will be contained and removed from the site in the same manner as other subsoil materials associated with the drilling process to an approved disposal site. Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches and joint bays.

In addition to the above, the following mitigation measures shall be implemented for HDD:

- HDD operations to be limited to daytime hours and conditions when low levels of rainfall are forecast.
- The depth of the bore shall be at least 3m below the bed of the watercourse.
- Visual inspection to take place at all times along the bore path of the alignment.
- On-site training shall be provided for all monitors, and names and phone numbers provided to site supervisors.
- Upon completion of each drill rod, the monitoring person/team will be provided with information in relation to position of entry and exit of drilling head, amount of fluid utilized or pumped, equipment breakdowns or repairs, any abnormal drilling pressures recorded and any change of drilling fluid contents.
- A field response plan to minimize loss of returns of drilling fluid (non-frac out) and actions to restore returns shall be provided.

- Prior to any works taking place near watercourse Inland Fisheries Ireland will be consulted.
- Equipment required to clean up and contain a frac out will be available at the work site or at an offsite location within 10 mins of the bore site.
- In the event of frac-out release; the directional boring will stop immediately. The bore stem shall be pulled back to relieve pressure and the site supervisor notified to ensure adequate actions are taken and notifications made. In addition, terrestrial releases shall be cleaned up using on site equipment and a terrestrial berm may be constructed around any terrestrial frac-out release.
- Silt fences will be constructed around proposed work areas prior to commencement of works.
- No refueling will take place within 50m of the stream zone or any sensitive habitats.
- A qualified biological monitor will be onsite for the duration of the drilling operation.
- During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid will be used.

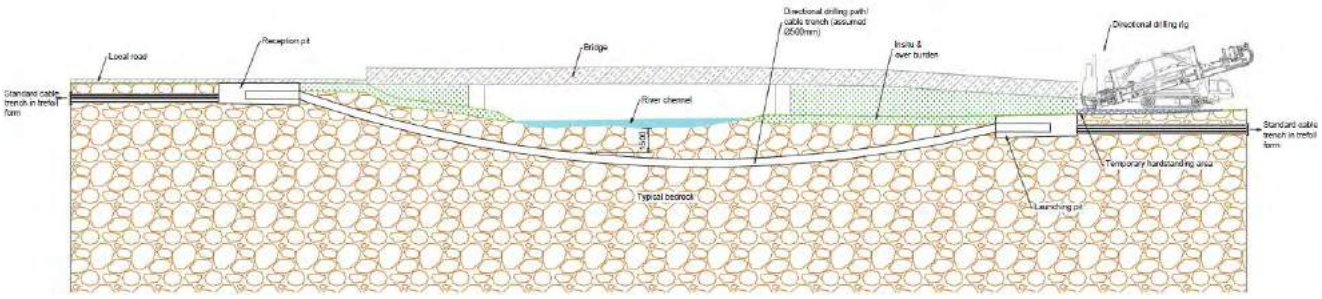


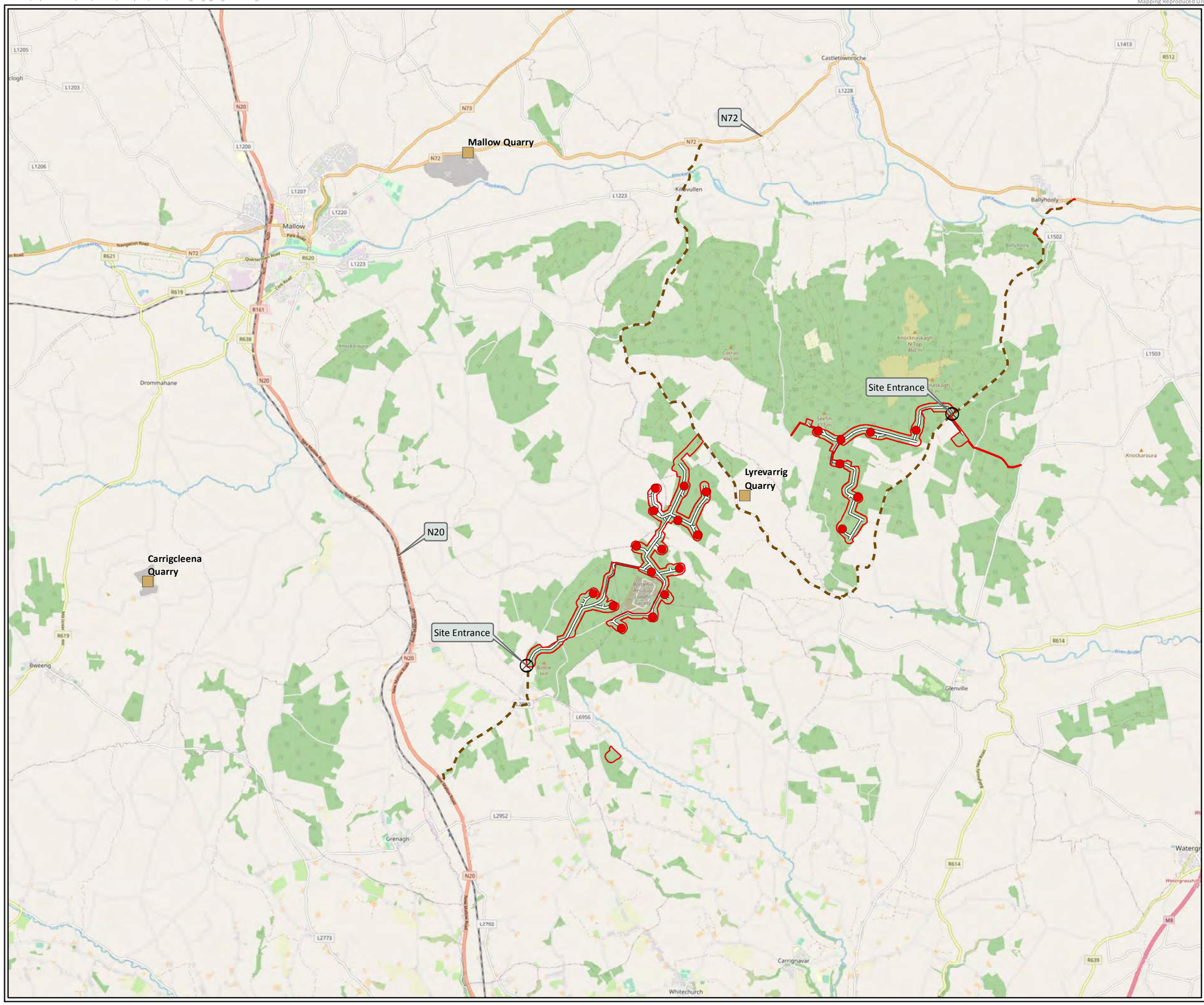
Plate 3-6: Typical HDD Activity Profile

3.4 Construction Working Hours

The hours of construction activity will avoid unsociable hours and will be agreed with the planning authority in advance of site start. It is anticipated that this will restrict working hours at the site during the installation phase to be limited to 07:00 to 19:00 Monday to Saturday inclusive. Work on Sundays or public holidays will only be conducted in exceptional circumstances and subject to prior permission from the local authority and notification insofar as practicable of the local community.

Any complaints received relating to construction works will be entered into the site complaints log and the relevant site environmental officer will arrange to meet with those affected. A public complaints/observations procedure is included in Appendix 4 of this CEMP. The situation will be acted upon immediately and reviewed by the Project Manager. If nuisance is occurring, then the project manager will decide what action is necessary to reduce to acceptable levels or eliminate the disturbance.

Path: R:\Map Production\2020\P20-099\Workspace\CEMP\P20-099_GIS_Fig3-1_HaulRoutes_A3.mxd



- Active Quarries
- Site Entrance
- Proposed Turbine Layout
- Proposed Haul Routes
- Proposed Internal Roads
- Proposed Development Boundary

TITLE:	Haul Routes		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:85000	**REVISION:**	0
DATE:	05/10/2020	**PAGE SIZE:**	A3

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4. ENVIRONMENTAL MANAGEMENT PLAN

4.1 Introduction

This Environmental Management Plan (EMP) defines the work practices, environmental management procedures and management responsibilities relating to the construction of the proposed Coom Green Energy Park.

This EMP describes how the Contractor for the main construction works will implement a site Environmental Management System (EMS) on this project to meet the specified contractual, regulatory and statutory requirements and environmental impact statement mitigation measures. This plan will be further developed and expanded following the grant of planning permission and appointment of the Contractor for the main construction works. Please note that some items in this plan can only be finalised with appropriate input from the Contractor who will carry out the main construction works and once the planning conditions attached to any grant of planning are known. It is the Contractor's responsibility to implement an effective environmental management system to ensure that environmental requirements for the construction of this project are met.

All site personnel will be required to be familiar with the environmental management plan's requirements as related to their role on site. The plan describes the project organisation, sets out the environmental procedures that will be adopted on site and outlines the key performance indicators for the site.

- The EMP is a controlled document and will be reviewed and revised as necessary.
- A copy of the EMP will be located on the site H&S notice board.
- All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of the EMP and its contents.

This section includes the mitigation measures to be employed by the contractor and client during the construction, operation and decommissioning of the proposed project as per the Environmental Impact Statement.

4.2 Project Obligations

In the construction of the proposed Coom Green Energy Park there are a number of environmental management obligations on the developer and the contractor. As well as statutory obligations, there are several specific obligations set out in the CGEP EIAR. These obligations are set out below. The final CEMP which will be produced by the main contractor following appointment will incorporate these obligations. The contractor and all of its sub-contractors are to be fully aware of and in compliance with these environmental obligations.

4.2.1 EIA Obligations

The EIAR identified mitigation measures that will be put in place to mitigate the potential environmental impacts arising from construction of the project.

4.2.2 Planning Permission Obligations

All planning conditions associated with the project's planning permission shall be adhered to. All pre-commencement planning conditions shall be discharged fully by the project owner prior to site start.

4.2.3 Felling Licence

Tree felling and vegetation clearance will be carried out outside of the bird nesting season (March 1st to August 31st inclusive). The estimated maximum area of coniferous tree felling required is ca. 62.8ha, which will be subject a felling licence application to the Forestry Service prior to construction. Felling will be in accordance with the conditions of such a licence.

A Limited Felling Licence will be in place prior to any felling works commencing on site. The licence will include the provision of relevant replant lands to be planted in lieu of the proposed tree felling on the site, which are proposed to be located at Moneygorm, Co. Cork and Ballard, Co. Wicklow.

To ensure a tree clearance method that reduces the potential for sediment and nutrient runoff, the construction methodology will follow the specifications set out in the Forest Service Forestry and Water Quality Guidelines (2000) and Forest Harvesting and Environmental Guidelines (2000).

Before any harvesting works commence on site all personnel, particularly machine operators, will be made aware of the following and will have copies of relevant documentation, including:

- The felling plan, surface water management, construction management, emergency plans and any contingency plans;
- Environmental issues relating to the site;
- The outer perimeter of all buffer and exclusion zones;
- All health & safety issues relating to the site.

To increase the diversity of woodland cover within this site some planting of native tree species is proposed. These species will, in time, form areas of low-growing scrubby woodland, which will add to the overall habitat diversity of the site. Planting along the well-drained margins of roads will ensure a relatively high level of soil fertility and better drainage which is most conducive to tree growth.

4.2.4 Other Obligations

The developer and/or contractor for the main construction works will liaise directly with the County Council and An Garda Síochána in relation to securing any necessary permits to allow the works to take place including for example (non-exhaustive list):

1. Commencement notice
2. Special Permits in relation to oversized vehicles on public roads
3. Temporary Road Closures (if required)
4. Road Opening Licence (if required)

The developer will also liaise closely with the local residents, especially homeowners and landowners along the local access routes in relation to works and all reasonable steps will be taken to minimise the impact of the project on such persons. Local farmers will be consulted should any of the works affect the integrity of fencing or other assets or practices, and appropriate and sensible mitigation measures will be agreed.

4.3 Environmental Management Programme

4.3.1 Air Quality

Construction Stage Impacts

The principal source of potential air emissions during the construction of the proposed wind farm will be dust arising from earthworks, tree felling activities, trench excavation along cable routes, construction of the new access tracks, excavation and backfill of the borrow pit, the temporary storage of excavated materials, the movement of construction vehicles, loading and unloading of aggregates/materials and the movement of material around the site.

Applying the NRA Assessment Criteria, the overall construction of the proposed energy park would be considered a major construction site. This would result in soiling effects which have the potential to occur up to 100m from the source, with PM_{10} deposition and vegetation effects occurring up to 25m from the source.

Construction vehicles and plant emissions have the potential to increase concentrations of compounds such as NO_2, Benzene and PM_{10} in the receiving environment. Plant and machinery such as generators, excavators etc. will be required at various stages of the construction works. These will be relatively small units which will be operated on an intermittent basis. Although there will be an emission from these units, given their scale and the length of operation time, the impacts of emissions from these units will be negligible.

Construction Stage Mitigation Measures

Construction stage mitigation measures to minimise dust and emissions are as follows:

- The internal access roads will be constructed prior to the commencement of other major construction activities. These roads will be finished with graded aggregate;
- A water bowser will be available to spray work areas (wind turbine area and grid connection route) and haul roads, especially during periods of excavations works coinciding with dry periods of weather, in order to suppress dust migration from the site;
- All loads which could cause a dust nuisance will be covered to minimise the potential for fugitive emissions during transport;
- Gravel will be used at the site exit point to remove any dirt from tyres and tracks before travelling along public roads;
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- The access and egress of construction vehicles will be controlled to designated locations, along defined routes, with all vehicles required to comply with onsite speed limits;
- Construction vehicles and machinery will be serviced and in good working order;
- Wheel washing facilities will be provided at the entrance/exit point of the proposed energy park site;

- Sensitive receptors within 100m of the proposed energy park and along haulage routes entering the site; and dwellings directly adjacent to the grid connection route construction that experience dust soiling, where appropriate, and with the agreement of the landowner, will have the facades of their dwelling cleaned if required should soiling have taken place;
- Ensure all vehicles switch off engines when stationary – no idling vehicles; and
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised through regular servicing of machinery.

4.3.2 Dust Management Plan

4.3.2.1 Introduction

This Dust Management Plan (DMP) for the construction and decommissioning works at the proposed Coom Green Energy Park outlines the sources of dust during the works, identifies measures to minimise dust during the works and the complaints procedure for dust.

4.3.2.2 Dust generation and control

4.3.2.2.1 Dust generation

The amount of dust generated and emitted from a working site and the potential impact on the surrounding areas varies according to:

- The type and quantity of material and working methods
- Distance between site activities and sensitive receptors
- Climate/local meteorology and topography.

Dust and particulate matter arising from construction works can affect nearby residents, land uses, soils and flora.

Dust emission is when dust and particulate matter become airborne mostly via windblow. Once dust becomes airborne, the air currents disperse it.

The prevailing wind in Ireland is from the south-west and so dust will most frequently disperse towards the north-east.

The proposed works associated with the proposed project that have the potential to cause dust include:

- Site clearance activities including felling of forestry
- Soil excavations
- Movement of dump trucks containing soils/subsoils within the site (use of berms)
- Stockpiling of soils.

The decommissioning works would have lower potential to generate dust, as the tracks are likely to remain in situ, upon agreement with landowners and Cork County Council. The turbines will be dismantled, however the foundations will remain in place and will be infilled and seeded.

During construction, the vegetation will be cleared from the site. For agricultural lands, this will include the removal of grasses and topsoil prior to the construction of the hardstanding for the turbines. Excavations will be required for the construction of the internal access tracks and hard standings which are expected to be founded. Excavations will be required also for the cabling within the site.

In areas of forestry, tree felling will be required. In total, 62.8ha of forestry will require felling. This activity also has the potential to release dust. However, the remaining forestry within the area will screen most of the dust and prevent fugitive dust from impacting on receptors.

Excavations for the 22no. turbine bases and hardstands also has the potential for the release of dust.

Soils being moved within the site on dumper trucks also has the potential to release dust as the travel across the site. Much of the soils excavated within the site will be used to form berms around the turbine hardstands and along access tracks.

Where soils are stockpiled for later use, the surfaces of the piles have the potential to release dust.

4.3.2.2.2 Dust control

The following dust control measures will be put in place during construction and decommissioning works:

- The internal access roads will be constructed prior to the commencement of other major construction activities. These roads will be finished with graded aggregate;
- A water bowser will be available to spray work areas and haul roads, especially during periods of excavations works coinciding with dry periods of weather, in order to suppress dust migration from the site;
- All loads which could cause a dust nuisance will be covered to minimise the potential for fugitive emissions during transport;
- Gravel surface will be used on the construction road at the site exit point to remove any dirt from tyres and tracks before travelling along public roads;
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- The access and egress of construction vehicles will be controlled to designated locations, along defined routes, with all vehicles required to comply with onsite speed limits, which shall be reduced in periods of dry, windy weather;
- Wheel washing facilities will be provided at the entrance/exit point of the proposed project site.

4.3.2.3 Complaints Procedure

At the main site entrance, the contact details for the site will be available so that local residents are encouraged to contact the site in the event of an off-site dust impact.

The contractor on site will need to be immediately informed of the incident so that fugitive dust complaints can be substantiated.

In all instances, a complaint will be logged by the environmental manager and each complaint should be assigned a discrete complaint number in the Environmental Log.

The environmental manager will maintain the complaints register and any complaints received will be investigated and the dust suppression methods employed will be reviewed. Suitable remedial action will be undertaken as necessary.

4.3.3 Noise and Vibration

Construction Stage Impacts

A detailed study of noise and vibration generated as a result of project activities has been carried out as part of the EIAR. The construction noise model assessed several tasks with the potential to generate noise. These tasks included: deliveries and/or removal of material to and from site, preparation of access roads, excavation of material from borrow pits, preparation of hardstands and drainage, pouring of foundations, installation of wind turbines and works associated with grid connection.

In relation to site traffic, the noise impact from construction personnel movements to and from the site is expected to be low. During turbine erection and foundation pours, an extension to the working day may be required, i.e. 05:00 to 21:00, but this would be necessary only on a relatively small number of occasions. Late night turbine deliveries are likely to occur and may cause noise impact on local roads.

The noise associated with the borrow pit activity is expected to have a slight impact and temporary in duration. The preparation of access roads, hardstands and drainage are expected to have a slight impact and temporary in duration. The construction works associated with the preparation of the turbine foundations are expected to have a slight impact and temporary in duration. The construction works associated with the installation of the wind turbines are expected to have a slight impact and temporary in duration. The works associated with the construction of the substation are expected to have a slight impact and temporary in duration. The predicted noise levels at the nearest noise sensitive location for each of these construction activities is below the daytime noise limit of 65 dB $L_{Aeq,1hr.}$

Elevated noise limits along the grid connection route may be above the noise limit of 65 dB $L_{Aeq,1hr}$. However, these elevated noise levels will only occur for short durations at a limited number of dwellings.

The potential for vibration at neighbouring sensitive locations was scoped out due to the low levels of vibration generated and the distant between construction activities and sensitive locations.

A detailed description of the potential construction stage impacts can be found in Chapter 7 of the EIAR.

Construction Stage Mitigation Measures

The predicted noise levels from onsite activity from the proposed main energy park site are generally below the noise limits in BS 5228-1. Nonetheless, several mitigation measures will be employed to minimise any potential impacts from the proposed project.

The noise impact for construction works traffic will be mitigated by generally restricting movements along access routes to the standard working hours and exclude Sundays, unless specifically agreed otherwise. For example, during turbine erection, an extension to the working day may be required, i.e. 05:00 to 21:00, but this would be necessary only on a relatively small number of occasions. If turbine deliveries are required at night it will be ensured that vehicles on local roads do not wait outside residential properties with their engines idling, and that the local residents will be informed of any activities likely to occur outside of normal working hours.

Consultation with the local community is important in minimising the impacts and therefore construction will be undertaken in consultation with the local authority as well as the local residents being informed of construction activities through the Community Liaison Officer.

The construction works on site will be carried out in accordance with the guidance set out in BS 5228:2009+A1:2014. Proper maintenance of plant will be employed to minimise the noise produced by any site operations.

All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the project. Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.

The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 07:00 hours and 19:00 hours Monday to Saturday. However, to ensure that optimal use is made of fair-weather windows, or at critical periods within the programme, it could occasionally be necessary to work outside these hours. Any such out of hours working would be agreed in advance with the local planning authority.

With mitigation measures, the construction and decommissioning noise levels are likely to be below the relevant noise limit of 65 dB $L_{Aeq,1hr}$ for operations exceeding one month, and therefore construction noise impacts are not considered to be significant. However, there is potential for temporary elevated noise levels due to the grid connection works. However, the impact of these works at any particular receptor will be for a short duration (i.e. typically less than 3 days). where the works at elevated noise levels are required over an extended period, a temporary barrier or screen will be used to reduce noise levels below the noise limit where required. The noise impact will also be minimised by limiting the number of plant items operating simultaneously where reasonably practicable.

4.3.4 Biodiversity / Flora and Fauna Management Plan

This Biodiversity / Flora and Fauna Management Plan outlines the measures that will be put in place to protect species and natural and semi-natural habitats at the main energy park site and describes how these areas will be managed during the lifetime of the project. The management plan shall be finalised in accordance with this outline plan following the appointment of the contractor for the main construction works. This plan should be read in conjunction with the EIAR.

4.3.4.1 Objectives

The primary objectives of the management plan over the construction, operation and reinstatement phases of the project are as follows:

- Promote the conservation of habitats on site through the establishment of management and/or mitigation;

- Provide management and mitigation for aquatic habitats and water quality;
- Provide management and mitigation for avifauna;
- Provide management and mitigation for bats and terrestrial mammals;
- Monitor the usage of the wind farm site by birds post construction;
- Monitor for any collision by birds at the wind farm site post construction;
- Monitor for any collision by bats at the wind farm site post construction.

4.3.4.2 Mitigation Measures – CGEP and GCR

4.3.4.2.1 Mitigation Measures during Construction

Project Ecologist and Monitoring

The implementation of all mitigation presented in this section will be overseen by a suitably qualified Project Ecologist during the construction stage of the proposed CGEP development. An onsite Ecological Clerk of Works (ECoW) will be present to oversee construction works where required, to ensure that all agreed mitigation measures are carried out by the appointed contractor(s). Ongoing monitoring of the efficacy of said mitigation measures will be carried out throughout the construction stage.

Invasive Species

Measures to control the spread of invasive species will follow as relevant the manual '*The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*' by NRA (2010); and Cognisance will be made of 'The Best Practice Management Guidelines' produced by Invasive Species Ireland (Maguire et al, 2008). This shall include measures as detailed in the guidance above to preclude the spread of invasive species through excavation of and/or backfilling of borrow pits.

Wheel washes draining to silt traps will be implemented at site entrances to prevent the possible spread of any invasive species.

Removal of Vegetation

All works on trees, scrub or hedgerows, including internal roads, entrances and the proposed Turbine Delivery Route shall adhere to NRA guidelines for the protection of trees, hedgerows and scrub prior to, during and post construction of national road scheme.

In accordance with Section 40 of the Wildlife Acts 1976-2012, woody vegetation removal will be conducted outside the bird breeding season which runs from the 1st of March to the 31st of August inclusive. It should be noted that the provisions of Section 40 do not relate solely to birds, but a range of biodiversity that contributes to food chains and wider ecosystems. Where sections of hedgerow/ treeline are removed, these will be reinstated with native hedge/ tree species which are indigenous to the local area.

General Site Remediation

- Where feasible the areas around the turbine bases and other disturbed areas should be allowed to re-vegetate naturally. Larger trees as they grow over time will be trimmed back on an ongoing basis (every 2 – 3 years outside bird breeding season) if required. Woody material will be left in situ (deadwood) as an ecological habitat for invertebrates.

- It is important to note that the proposed reinstatement and planting regime will have a long-term goal to ensure that recolonisation of disturbed ground in keeping with the existing on-site semi natural scrub/ heath type vegetation. Therefore, natural regeneration of onsite flora will be encouraged where appropriate. If this is deemed unsuccessful, further action will be taken in the form of reseeding with local species in keeping with the natural character of the surrounding environs.
- Replacement of harvested vegetated sod to disturbed bare areas post construction should encourage re-vegetation and avoid erosion in the vicinity of turbines, hardstands, access roads, drainage structures and all other associated infrastructure.
- Where applicable the harvested surface vegetation sods will be maintained in a moist state during construction in preparation for re-use at locations where the non-vegetative layer has been exposed.
- Harvested turves should be reused in the restoration of all bare/exposed surfaces around turbines, exposed peat/soil, borrow pits, and on peat berms adjacent to access tracks.
- Where applicable, excavated peat should not be spread on ecologically sensitive habitats or areas adjacent to watercourses;
- Some areas of bare/exposed surface may remain following the completion of construction works, however if these areas remain stable, natural re-colonisation should eventually occur. No action is needed from the contractor in this case.
- Bare surfaces on slopes greater than 2° should be stabilised or re-vegetated as soon as possible to minimise the risk of erosion which may result from sustained rainfall.
- Natural re-vegetation is the preferred method of recovery. However, where required (for example, where adequate quantities of vegetated peat are not available or natural re-vegetation processes are insufficient), bare material and/or reinstated peat should be secured using vegetation blankets such as Greenfix Embankment Mat, Geojute or similar approved product. An appropriately pre-seeded CoirMesh is also suitable, if required.

Access Track Reinstatement

- Soil and peat excavated during the course of the access track construction works should be reused on-site in the form of landscaping roadside peat berms in areas of minimal peat cover and as backfill at other locations on site (e.g. areas of exposed soil and bedrock, landscaping around turbine bases and hardstands etc).
- Harvested vegetative layers will be placed on the berms where required. This will provide resistance against rainfall events, and will minimise sediment and nutrient release until natural re-vegetation is established.
- As part of the appointed Ecological Clerk of Works recommendations, the re-vegetation of access tracks an berms will be monitored on an on-going basis.

Cable Trench Reinstatement

- Where trenching is to be carried out off-road, the excavated material will be laid alongside the trench for use in reinstatement following the laying of cables; vegetated surface layers will be stored separately.
- Once cable laying work has been completed the excavated material should be backfilled and compacted to a suitable standard.
- The refilled trenches should then be capped with harvested surface layers which will be encouraged to re-vegetate naturally.
- The appointed Ecological Clerk of Works will monitor the on-site reinstatement of trenches and will survey the progress of plant recolonisation on an on-going basis.

Borrow Pit Reinstatement

- The stored soil overburden will be replaced and graded to reflect the surrounding landscape.
- This will be capped with the surface layer of sod to encourage rapid re-establishment of indigenous vegetation.
- In all cases disturbed ground will be allowed to naturally re-vegetate initially and this progression will be assessed post construction by the appointed Ecological Clerk of Works.
- Should reinstatement result in a surface root-zone composed of a mix of subsoil and topsoil, it is possible that vegetation will quickly succeed to a European gorse cover within 10 years of restoration.
- Should this occur, alternative land management will be carried out in consultation (and monitored) by an ecologist to ensure maintenance as suitable forage habitat for Hen Harriers. The Site Ecologist will monitor this succession as part of the site management plan over the lifetime of the project.

Settlement Pond Reinstatement

- Settlement ponds will be in-filled, reinstated and managed as per borrow pit reinstatement.

Protection of Aquatic and groundwater dependant habitats

Material stockpiles will be kept to a minimum size, covered and located at least 10m from the drainage system

The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary site compounds. All fuel will be stored in bunded, locked storage containers. The designated storage location will be greater than 100m from a watercourse.

Works will be avoided during prolonged periods of very heavy rainfall. Refuelling of machinery shall be carried out at designated areas on the site. Safe-guards such as drip-trays for refuelling of machinery, machine servicing, concrete mixing, etc. shall be utilised.

Any existing pools or aquatic areas will be fenced off and protected from disturbance during the construction phase.

The use of wet concrete and cement in or close to any watercourses and semi-natural habitats will be carefully controlled, particularly from shuttered structures or the washing of equipment. The cleaning and wash-out of chutes of concrete batching plant or ready-mix lorries should be carried out in a dedicated, contained area as far from sensitive habitats and watercourses as practical. This will be for the wash-out of the chutes only— after the pour. Concrete trucks will then exit the site and return to the supply plant to wash out the mixer itself.

Project Component-Specific Mitigation Measures

Mitigation measures are outlined below specific to each/all identified potential significant effects which will avoid/reduce/offset to not significant.

Invasive Species

CGEP

Pheasant Berry

The 2 no invasions of Pheasant berry located along the existing access road to the Bottlehill Landfill facility will be resurveyed by an invasive species specialist 3-4 weeks prior to the commencement of works. If disturbance is required, than all Pheasant Berry plants will be dug out by hand and left in-situ to rot.

Digging out is the selected method of treatment for this species as stumps can re-sprout following cutting back and treatment with herbicide. Digging out will not be carried out during the fruiting period for this species (October and November) as Pheasant berry spreads primarily by seed dispersal.

Japanese Knotweed

Three Japanese knotweed infestations were recorded during habitat assessments on the CGEP Grid Connection, two of which occur within the CGEP Grid Connection study area. The two Knotweed infestations occurring within the study area are located within 7m of the proposed works and will therefore require treatment. The introduction and spread of these invasive plant species will be avoided during the construction phase of the project by ensuring that appropriate precautionary measures are in place. Guidelines produced by the NRA (2010) on 'The management of noxious weeds and non-native invasive plant species on national roads' will be adhered to. It is of particular importance that excavated material from the areas where Japanese Knotweed is known to be present be appropriately managed.

The two Japanese knotweed infestations are located on the grid connection route at roadside locations in the townland of Cullenagh adjacent to Fermoy Golf Course. As the installation of the UGC will require excavation at this location, there is potential for spread of viable plant material to other areas during construction. The following specific mitigation measures will be applied at these infestations:

- Pre-Construction confirmatory surveys will be completed by an invasive species specialist, 3 – 4 weeks before construction begins. Mapping, showing the most up to date distribution and extent of Knotweed at the previously identified infestation locations, and also for any potential new infestations within the zone of influence of the construction works;
- Based on the updated surveys a Biosecurity Management Plan will be prepared prior to the commencement of site works to minimise risk of spread of high impact invasive species. This will incorporate mitigation detailed herein.
- A toolbox talk will be provided by the invasive species specialist with the Contractors construction site engineers and general operatives to explain about all invasive species identified along the route and the restrictions that will apply for the full construction period. The toolbox talk will cover all pertinent topics including all relevant invasive species close to construction works and the biosecurity measures to be implemented while working The invasive species toolbox talk will cover the full lifecycle of every construction activity including, but not limited to, all onsite construction activities, mechanical excavation, transportation and disposal of all material from excavations, through to the backfilling of excavations, and reinstatement of the construction works area;
- Where works are being carried out within 7m of a Japanese Knotweed infestation, the covering of infestations will be completed on sections seven days in advance of works. The infestations will be covered so that their full extent plus 1 metre is covered entirely and no vegetation is visible;
- The covering of vegetative knotweed infestations will be carried out using high density polyethylene grass carpet terram at all identified locations prior to any works commencing. When taking the terram off an infestation area, the construction team will need to ensure that all adherent material has been removed and placed within the adjacent infestation i.e. it will be important not to spread the infestation;
- The covering of knotweed infestations will only be carried out by the invasive species specialist i.e. this work will not be carried out by any general construction staff. No posts will be used to secure the coverings i.e. there will be no uncontrolled ground interference within 7 meters of any infestation during any of these operations;
- Once each knotweed infestation has been covered, works can begin at that location, an invasive species specialist will be present to provide supervision of all works adjacent to infestations;
- The site Environmental Clerk of Works will ensure that the Contractor engages a suitable waste disposal company with the requisite license for handling any hazardous waste (i.e. invasive species material). The Contractor will maintain records of all wastes arising, and the documentation will include the waste contractors local authority license and proof of appropriate haulage license per individual haulage vehicle.

Himalayan Balsam

Himalayan Balsam is most invasive in damp habitats particularly along river corridors, where it out-competes native vegetation in summer and dies back in winter, exposing river banks to erosion. It spreads rapidly downstream in river catchments due to its prolific seed production. Himalayan Balsam was recorded at a single location at a proposed watercourse crossing on the CGEP grid connection, where it was found to be growing on the riverbank upstream and downstream of the crossing location.

Prior to the commencement of works at this location on the Grid Connection Route, the infestation will be re-surveyed by an appropriately qualified invasive species expert to establish the extent of the infestation. Should the proposed woks at this location come into contact with vegetative material, control measures will be required. A range of methods are recommended for the treatment of *I. glandulifera* (Invasive Species Ireland, 2015; Inland Fisheries Ireland, 2015; Cabi, 2015), one of which is manual control. Manual control is carried out by physically pulling the plants by hand. If deemed necessary, manual control will be carried in late spring/early summer when newly germinated plants are distinguishable from surrounding vegetation, but prior to plants setting seed. Vegetative material will be left in-situ to rot, and not removed from site to avoid spreading viable material in transport. All operators must be trained in biosecurity protocol, control methodology, and in the identification of Himalayan Balsam at all stages of growth. At least one successive visit is recommended as Himalyan Balsam can germinate throughout the growing season. Manual control has been applied successfully in Ireland e.g. within the River Allow catchment in Co. Cork (IRD Duhallow Ltd., 2015). Works at the watercourse crossing can only commence upon successful removal of Himalyan Balsam from the works area.

Habitat Loss

Habitat disturbance in areas of semi-natural habitat during construction work should be strictly confined to within the direct land-take of the proposed wind farm and associated infrastructure. A working corridor will be set out in advance of the works, identified by low impact markers. The extent of construction activities will be controlled to limit vegetation removal and the exposure and/or compaction of soils. The setting out of the corridor will be preceded by a site walkover by an appropriately qualified ecologist to ensure that the working area is reduced to the minimum required for the works, taking account of minimising rutting and compaction by vehicles. A suitably qualified Ecological Clerk of Works will be appointed to oversee environmental protection measures during the construction phase of the proposed site works to ensure full compliance with environmental protection measures which have been set out here. Excess peat or soil excavated to create the access road and other infrastructure shall not be side Cast or spread over existing habitats of local ecological value such as scrub, wet heath and wet grassland.

A total of 1.65ha of scrub will be permanently removed during the construction of the windfarm. This loss of scrub habitat will be compensated through allowing approximately 30.4ha of lands around turbines to develop a semi natural wet grassland / low scrub habitat as a result of mature tree clearance within a buffer around each turbine.

Hedgerow loss

During the construction of the project there will be a loss of 206m of hedgerow/ linear scrub habitat. Planting of a new hedgerow of equal length is proposed around the new substations using native woody species of local provenance only. Replanting should be carried out using native species only and species chosen should reflect the character of the locality and should consist of appropriate species for the receiving soil conditions.

CGEP and GCR

Water protection measures will prevent water pollution events and thus prevent negative impacts on Otter.

- The CEMP will be in place prior to the start of the construction phase.
- Machinery and materials will be parked/stored in the specified compound areas to minimise disturbance. Wherever possible, vehicles will be refuelled off-site in designated areas. This will be the case for regular, road-going vehicles.

- On-site refuelling of machinery will be carried out using a mobile double skinned fuel bowser at dedicated locations away from watercourses.
- The fuel bowser, a double-axle custom-built refuelling trailer will be towed around the site by a four-wheel drive jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the proposed wind farm. The jeep will also carry fuel absorbent material and pads in the event of any accidental spillages.
- The fuel bowser will be parked on a level area in the construction compound when not in use.
- Refuelling operations will be carried out only by designated trained and competent operatives.
- Mobile anti-pollution measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Materials excavated (e.g. peat, soil, gravel or rock) during construction of the turbine bases, electrical sub-station, or during construction of new roadways or the upgrading works on existing roadways will be reused within the site.
- Re-use of these materials within the site will occur under conditions where there is no possibility of the material becoming mobile in the environment and entering into either surface or ground waters.
- The CEMP also provides for the appointment of a Site Supervisor/Construction Manager and/or Environmental Manager to maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. In addition, an Environmental Clerk of Works or Project Ecologist, Project Hydrologist, Project Geotechnical engineer will visit the site regularly and report to the Site Environmental Office. This structure will provide a “triple lock” review/interaction by external specialists during the construction phase.

Project Component-Specific Mitigation Measures

CGEP

Project design measures will involve conducting all construction work during daylight hours where possible. This will minimise the likelihood of disturbing and displacing mammal which are exclusively nocturnal or are most active at dawn and dusk, such as Badgers, Pine Marten, Otter and Stoat. In the event that lighting is required cowled lighting will be employed to minimise potential disturbance in mammals due to light-spill.

In accordance with NRA Guidance, to account for the passage of time between the aforementioned mammal surveys and the commencement of construction activities/ clear felling in suitable habitat confirmatory surveys will be undertaken pre-construction to re-confirm the presence/absence of Badger setts, Otter holts, Pine Marten resting places or Red squirrel drays. Should new resting/breeding places of protected mammals be discovered then appropriate mitigation will be undertaken in agreement with NPWS and following NRA Guidance where applicable to prevent significant negative effects of the species. For example, any identified Badger setts will be protected by following NRA guidance, which states that no heavy machinery should be used within 30m of badger setts outside of the breeding season, and 50m during the breeding season (unless carried out under licence).

Construction work will be supervised by an on-site ECoW with stop works authority. This will further reduce the likelihood of destruction of the resting places of protected mammals.

GCR

Confirmatory surveys of the grid route connection will be undertaken prior to commencement of construction works. Should any resting/breeding places of protected mammals be discovered then appropriate mitigation will be undertaken in agreement with NPWS and following NRA Guidance where applicable to prevent significant negative effects of the species. For example, any identified Badger setts will be protected by following NRA guidance such as no heavy machinery should be used within 30m of badger setts (unless carried out under licence). Therefore, any effects are evaluated as negligible.

Water protection measures will be used when works are within 50 metres of a water body, thus the impact on Otter as a result of water pollution is considered as imperceptible. Given the design of the development and the construction methodologies and best practice, disturbance/displacement related impacts are also considered to be Imperceptible.

Bats

Generic Mitigation Measures and Best Practice

It is anticipated that the majority of construction works will be carried out during daylight hours, but some works may be carried out at night. In these cases, all lighting will be cowled in order to prevent light spill. Lights will be operational when work is taking place, but will be switched off when no long required; no lighting will be left turned on overnight. In the site compound, lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.

Project Component-Specific Mitigation Measures

The ground around turbine bases up to 92 M from Turbines will be cleared of mature conifer trees in order to reduce bat activity in the vicinity of turbines, and hence reduce risk of collision. Clearance works will be carried out in the construction phase, but the rationale for this measure is outlined in the operational section.

Avifauna

Generic Mitigation Measures and Best Practice

Ahead of any works to be undertaken, a confirmatory survey will be undertaken by the Project Ecologist, or experienced Ornithologist, to assess the presence of birds nests, irrespective of the time of the year. Beyond any clear felling works to be avoided until the end of the bird breeding season (i.e. March to August, inclusive), in the event of nests being found within the study area, works will cease. The survey findings will be reported to the competent authority and an application for a derogation license will be made to NPWS.

Pre construction monitoring surveys will be conducted from early March and prior to any site clearance, enabling or forest clearance works focussed on breeding status determination of Goshawk and hen harrier relative to proposed works areas. No works will take place where evidence of possible nesting is recorded and a minimum 500m buffer will be retained between all works areas and possible nest areas or subject to advice from a competent adequately experienced ornithologist (minimum 10 years' experience). In this regard a wider or possibly narrower buffers may be required/ appropriate. Given risks of disturbance to these specific bird species no licencing will be sought as no works will be conducted between March 1st and August 31st within buffers identified or as advised by the site ornithologist and depending on breeding status. NPWS will be informed of breeding status and monitoring audits will be conducted and full disclosure provided to NPWS.

Project Component-Specific Mitigation Measures

CGEP and GCR

In order to avoid the potential impacts to breeding birds , tree removal and clearance of any other vegetation likely to hold nesting birds will be undertaken outside of the bird breeding season, i.e. not during the period of March to August, inclusive. In the eventuality of this not being possible, these works/activities will not take place before a confirmatory survey of the affected area (i.e. aerial and ground-based nests) is undertaken by the Project Ecologist. This includes hedgerow and scrub removal in addition to hedgerow trimming along turbine delivery routes and proposed cable routes. In the event of any nests being found, the works will immediately cease, the survey findings will be reported to the competent authority and an application for a derogation license will be made to NPWS. Any license requirements shall be facilitated by a complete confirmatory re-survey prior to works commencing and all future works associated with the derogation license will be supervised by the Project Ecologist.

Any works to be undertaken on existing culverts or other types of water-crossings must be preceded by a confirmatory nest survey by the Project Ecologist or an experienced Ornithologist. The survey will determine presence or absence of nests of riparian birds (e.g. Kingfisher) or birds that can use these habitats to nest (e.g. Grey Wagtail, Dipper). In the event of any nests being found that may be at risk of disturbance, than works will immediately cease, the survey findings will be reported to the competent authority and an application for a derogation license will be made to NPWS. Any license requirements shall be facilitated by a complete confirmatory re-survey prior to works commencing and all future works associated with the derogation license will be supervised by the Project Ecologist.

Sections of hedgerow/ treelines scheduled for removal and/or trimming and containing mature trees suitable for nesting Barn Owls will be surveyed prior to construction for occupancy by Owls. Should Owls be present then minimum protection zones as outlined in published guidance will be adhered to for the period of construction (Shawyer, 2011).

Toolbox talks shall be held with construction staff on disturbance to key species during decommissioning. This will help minimise disturbance. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).

Any re-instated habitats will include native species where possible to enhance diversity of birds. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).

Other Species

CGEP and GCR

Reptiles and Amphibians

As Viviparous lizards are widespread in Ireland and can be found in a range of habitat types such as in bog, heath, the margins of coniferous woodlands, in addition to being common in a range of grassland habitats, particularly those not subject to heavy grazing pressure, a confirmatory survey will be conducted within these habitats prior to the commencement of construction activities to confirm the presence/absence of individuals. Capture and relocation operations for this species can be extremely labour-intensive and, in most cases, the most efficient approach is to cut down and rake-off vegetation during warm weather, with the intention of displacing the resident lizards prior to earthworks or other activities that could result in their incidental mortality (NRA, 2009). Whether or not reptile-proof fencing is then required to exclude the animals will need to be reviewed on a location-specific basis by the ECoW.

Should construction activities be proposed and scheduled for areas proximal to habitat suitable for breeding common frog or smooth newt during the species' respective breeding seasons (frogs: January-March and newts: March-May), confirmatory surveys following standardised methodologies will be required at those locations to confirm the presence/absence of breeding adults and/or spawn. If evidence of frog or newts is confirmed proximal to the work locations, it is essential the areas are fenced off with appropriate signage in order to protect these areas during construction activities.

Fisheries and Aquatic Ecology

Project Component-Specific Mitigation Measures

- **Instream works**
  - Instream works shall only take place during the period July to September (as required by IFI for instream works). However, as stated above, all instream works shall take place in written agreement with the IFI;
  - Operation of machinery in-stream should be kept to an absolute minimum. All construction machinery operating in-stream should be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery should be checked prior to commencement of in-stream works. Furthermore, machinery should be steam cleaned and appropriate measures for the spread of, amongst others, the crayfish plague shall be carried:
    - Before contact with water is made, any equipment or machinery that will be used in the water, including Personal Protective Equipment (e.g. footwear, gloves), will be sprayed and cleaned with a 1% solution of Virkon® Aquatic (or other proprietary disinfectant);
    - Upon completion of the work or moving the equipment or machinery from the water, these will be visually inspected for any possible sources of contamination and any attached plant or animal material or debris will be removed. The equipment and machinery will be further sprayed and cleaned with a 1% solution of Virkon® Aquatic (or other proprietary disinfectant); and
    - Any observations of mass mortality of Crayfish will be reported to the relevant authorities within 1 hour of evidence being found.
  - As the river water bodies hold fish species protected under the Wildlife Act and/or the EU Habitats Directive (e.g. Atlantic salmon, Brown trout, European eel), a pre-construction electrofishing survey will be conducted, in agreement with IFI, in the water bodies affected by the proposed CGEP Development watercourse crossings. This survey results, in addition with the results presented in the EIAR will inform about the significance of the fish abundances in relation to the local populations. If deemed significant by the IFI, dewatering of these water bodies will not be employed. If IFI considers the fish abundances not significant and authorises dewatering of the water body reach as part of the instream works, a fish salvage operation shall be undertaken. The fish salvage operation shall be authorised and licensed by the IFI and carried out by either the IFI or by fully qualified, licensed and authorised freshwater ecologists.
  - If temporary diversion channels are necessary as part of the instream works, they should provide for fish passage, be non-eroding, and be of similar width to the natural stream channel. The channel diversion should be compliant with the following 1) to 28) measures:
    - Diversion of water to and from temporary channels should only take place during the period July to September (as required by IFI for instream works) and in accordance with the IFI;
    - Consultation with the NPWS should also be carried out as species protected under the Wildlife Act, EU Habitats Directive and the EU Freshwater Fish Directive occur within the river water bodies affected by the instream works;
    - The works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
    - A minimum 10 meter vegetative buffer zone will be maintained between disturbed areas and the water body. There will be no storage of material/equipment, excavated material or overnight parking of machinery inside the 10m buffer zone;
    - Double silt fencing will be placed upslope of the buffer zone on each side of the water body. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement overnight or during periods of heavy

rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location;

- Bog mats will be used underneath the excavator inside the 10 meter vegetative buffer zone to prevent soil erosion and potential water quality impacts from localised surface water runoff;
- Temporary storage of excavated overburden from the diversion channel will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the water body;
- The water body dam (in the stream to be diverted) will be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment (the dam will be installed once the diversion channel is in place);
- The banks and bottom of the diversion channel will be lined with impermeable geotextile to prevent erosion and surface water quality impacts. A layer of clean course gravel will be placed over the geotextile on the bed of the channel to keep it in place;
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the water body bed and opposing bank of the receiving water body downstream of the diversion channel. This will prevent scouring and erosion of the water body bed and bank at the outfall during diversion;
- Water body bed trench excavation works will commence once stream flow is fully diverted from the crossing excavation area;
- Temporary storage of excavated material from the crossing trench will be undertaken separately to the material from the diversion channel. All storage areas will be outside the 10m buffer zone. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the water body;
- Sediment laden water from trench dewatering will be discharged onto a well vegetated, dry, flat area at least 50m from a water body via a straw bale dewatering structure or geotextile filter bag. The outfall will also be surrounding by silt fencing;
- If there is no suitable area for discharge onto ground, settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Any water from trench dewatering will not be discharged directly to a water body;
- Clay bunds will be placed within the trench backfill on either side of the water body to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;
- Once the lean mix concrete is in place in the trench, a layer of fine sand (5–10cm) will be over the cement prior to backfilling. This will prevent release of cement into the water body when flow is restored;
- Upon completion of the in-stream works, the stream crossing will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required (Project Design Measure);
- The diversion channel will be backfilled and reinstated to its original level and rock armour will be placed at the stream banks where the inflow and outflow of the diversion channel previously existed;
- The ground surface along the reinstated diversion channel will be re-seeded at the soonest opportunity to prevent soil erosion;
- The silt fencing on either side of the stream buffer will be left in place and maintained until the disturbed ground has re-vegetated;

- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and stream sediments will be restricted to the minimum required for the cable laying process to avoid unnecessary impact on the stream morphology;
- There will be no batching or storage of cement allowed at the stream crossing;
- There will be no refuelling allowed within 100m of the stream crossing;
- All plant will be checked for purpose of use prior to mobilisation at the stream crossing;
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted; and
- Once construction of the structure is completed, reconnection to the existing water body can be made and this should only occur within the approved operational window for in-stream works.

- **Culverts**
  - Construction/Replacing of culverts will only be done over a dry period between July and September (as required by IFI);
  - Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;
  - Work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies;
  - Where there is a requirement to disturb either the bed or bank as a result of the construction/replacement works, the watercourse will be dammed upstream and pumped prior to work commencing;
  - A temporary berm (i.e. sandbags and/or rectangular straw bales) will placed along the edge of the track/road to prevent loose material being dislodged or washed into the water body;
  - All culverts to be installed as part of the works, new and replacements, shall be of the open-bottomed type. These should be oversized, so that they can be set a minimum of 500 mm below bed-level, with a minimum diameter of 900mm regardless of the anticipated flood flow;
  - The culverts should be of similar width to that of the natural low-flow channel;
  - The culverts should be laid at a level and grade which allows the upstream invert to remain drowned (by back-watering) under low-flow conditions, to a depth suitable for the easy passage of the largest species frequenting the stream (150mm for salmon);
  - The effective slope of the culvert should not exceed 5%. If a higher slope is necessary, a site specific design is required;
  - Pools should be formed at each end of the culvert to provide for transition from the shape of the culvert to the shape of the river downstream;
  - Culvert screening shall not be adopted in any circumstance;
  - Where culvert widening has been completed, only clean, well-sorted fill or hardcore will be used to widen the road/track at the crossing location. Poorly sorted material will not be used as it would be a potential source of fine sediment;
  - Before the road/track surface layer is put in place, a layer of geotextile will be placed over the fill to prevent wash down of fines into the fill and potentially into the water body;
  - If high levels of silt or other contamination is noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
  - All disturbed ground will be re-seeded at the soonest opportunity to prevent erosion;

- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refuelling allowed within 100m of the watercourse crossing; and
- All plant will be checked for purpose of use prior to mobilisation at the water body crossing.

Excavation works within the proximity (<50m) of surface water bodies

To prevent river water quality impacts from sediment runoff during excavation works within the proximity of surface water bodies (<50m), the following measures shall be put in place:

- Weather forecasting resources will be used, and works will be planned when a dry spell of weather is forecasted;
- Where the cable trench/access track/road/ works area is running within the 50m of a surface water body, a minimum 5m buffer will be maintained between the works area and the water body wetted width limit, except where works at existing culverts required, see above;
- Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m water body buffer;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;
- Additional silt fencing or temporary straw bales (rectangular bales, pinned down firmly with stakes) will be placed across any natural surface depressions/channels that slope towards a local water body;
- Where the cable trench/access track/road route slopes down perpendicular towards a water body (i.e. base of stream valley), regularly spaced, temporary bunds or shallow swales will also be put in place perpendicular across the route corridor to dissipate surface water runoff from the works area and onto adjacent vegetated ground. Additional silt fencing will be put at the outfall location of the bunds/swales;
- Temporary check dams/silt fencing arrangements will be placed in any drainage ditches within 30m of the works corridor (this will also include existing road drains along the haul route works);
- The check dams/silt fencing arrangements will be placed every 10m;
- Bog mats will be used in wet/boggy areas zone to prevent ground rutting and soil erosion which could lead to potential water quality impacts. All ground rutted by vehicles/machinery will be levelled or backfilled to prevent their progression as preferential pathways for surface water runoff;
- If high levels of silt or other contaminants are noted in any local water body, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies;
- All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion;
- All temporary surface water control/protection measures, such as silt fencing and check dams, will be kept in place until disturbed ground has vegetated and stabilised. Regular daily checks will be undertaken;
- Where the cable trench route runs downslope for long distances (>50m) towards a water body or drainage ditch, regular spaced impermeable bunds will be placed within the trench backfill to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts from surface water drainage within the trench;

- There will be no refuelling allowed within 100m of a water body/drainage ditch; and
- All plants will be checked for purpose of use prior to mobilisation.

Management of invasive alien species

To avoid the introduction, establishment and spread of invasive species in and to the proposed CGEP Development during the construction phase, the following measures shall be attended to:

- Prior to arrival of vehicles that will be kept on the site for extended periods e.g. earth moving machinery, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water >65 °C, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic);
- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. The level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site;
- The flagmen, which will be present at each active site access points, will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the site, and will receive training in the correct techniques;
- Each flagman will be equipped with a 'disinfection box'. This will contain Virkon® Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution;
- Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and which has come into contact with water or soils) for evidence of attached plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site, securely stored away from traffic for removal to the waste storage area in the Temporary Compound at the end of the work day;
- No removed material or run-off will be allowed to enter a water body of any sort;
- Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually;
- Records of supplies and cleaning of delivery vehicles will be kept by the flagmen and will be regularly inspected by the Environmental Clerk of Works; and
- Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.
- The above measures may not apply for vehicles that require regular on and offsite movements e.g. deliveries of cement during construction. These vehicles are highly unlikely to be at risk of contamination/ contact with aquatic habitats or invasive species. Before deliveries start the site EcoW/ Environmental Manager will review quarries supplying cement to confirm if the above disinfectant measure applies.

4.3.4.2.2 Mitigation Measures during Operation

Project Ecologist and Monitoring

A Project Ecologist will be appointed to oversee all works and mitigation measures during construction, operational and decommissioning phases.

Vegetation Clearance

Using the maximum potential dimensions of the proposed turbines and feature heights of 20m (based on the height of the forestry), it was calculated that buffer zones of up to 92 m are required around all turbines. During the site clearance phase, all trees and shrubs will be cleared within this radius. The buffer zone will be kept clear throughout the operational period of the proposed development.

Operational Curtailment

Turbines 11, 18 and 21 will be curtailed in April, May and June, throughout the night (starting 30 minutes prior to sunset, and ending 30 minutes after sunrise), when wind speeds are below 6 m/s, and when air temperatures are above 9°C. This will apply when all of the above conditions are met, but will not apply when one of the conditions is not met, i.e. turbines will operate as normal between April and June when wind speeds exceed 6 m/s. Similarly, turbines may operate as normal during daylight hours during these days, and in all other months of the year.

It is important to note that this is an initial curtailment strategy, based on pre-construction data. Spatial patterns of bat activity are likely to change after construction works (due to the felling of trees), which may affect the way that bats use the site. Therefore, post-construction monitoring will be undertaken, and based on the results, this curtailment strategy may be adapted.

Restrictions on Lighting

Where artificial lighting is required during the construction, operation and/or decommissioning phases, 'bat-sensitive' lighting techniques will be implemented. Site-specific advice will be given by the Ecological Clerk of Works, but the design principles will be in accordance with the Bats and Lighting guidelines (Stone 2013), as follows:

- Low-UV LEDs or low / high pressure sodium lamps will be the preferred bulb type, as they have least effect on bats. Mercury or metal halide bulbs will not be used.
- All outdoor lights will be fitted with directional hoods and/or luminaires to direct the light onto targeted areas and to prevent unnecessary light-spill.
- No lights will be directed towards any of the bat roosts, or towards any linear habitat features.
- Where lighting is required for staff safety (e.g. at site compounds), lights will be installed at a low level, e.g. on lighting poles of 1 - 2 metres height. Lux levels will be the minimum required for pedestrian safety.
- Where feasible, lights will be fitted with motion sensors and timers in order to provide light only when required. Constant, overnight lights will not be permitted.

Monitoring

Due to the clearance of forestry around wind turbines, it is highly likely that bat activity will change following the construction of the proposed development. The mitigation strategy outlined above adopts a precautionary approach based on pre-construction bat activity data, but post-construction monitoring will be required to confirm that it is effective.

The monitoring strategy will involve two components: surveys of bat activity using automated detectors (allowing comparison of activity with pre-construction levels), and searches for bat carcasses around the base of each turbine. This will be carried out during the first three years of operation, using standardised methods outlined in the SNH (2019) guidance, and/or other relevant guidelines available at the time.

The monitoring strategy will include the following:

- Monitoring of bat activity at ground level using automated detectors for periods of at least ten nights during spring (April, May), mid-summer (June, July) and autumn (August, September). Bat activity will be compared with the baseline levels.
- Searches for bat carcasses around the base of each turbine using trained search dogs, carried out twice per month between May and October (inclusive), i.e. a total of twelve occasions.
- Depending on the results of the monitoring, the initial mitigation strategy may be revised, for example by optimising curtailment parameters at some turbines, or by employing curtailment at additional locations. Annual monitoring reports will be provided to relevant statutory bodies (where required), and if significant bat fatalities are recorded, avoidance or mitigation measures will be proposed, such as the curtailment and feathering of turbines during periods of high bat activity, and/or other approaches that may be developed in the future.

Avifauna

Project Component-Specific Mitigation Measures

CGEP

A post construction monitoring programme is to be implemented at the subject site in order to confirm the efficacy of the bird diverters. The results of this programme are to be submitted annually to the competent authority and NPWS. Published guidance on assessing the impacts of wind farms on birds from English Nature and the Royal Society (Drewitt & Langston, 2006) for the protection of birds recommends the implementation of an agreed post development monitoring programme as a best practice mitigation measure.

In addition, published recommendations on swans and wind farms (Rees, 2012) suggests that systematic post construction monitoring adapted to quantify collision, barrier and displacement to be conducted over a period of sufficient duration to allow for annual variation or in combination effects. The following individual components are proposed:

1) Fatality Monitoring: A comprehensive fatality monitoring programme is to be undertaken following published best practice; the primary components are as follows:
    a. Initial carcass removal trials to establish levels of predator removal of possible fatalities. This is to be done following best recommended practice and with due cognisance to published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results (Smallwood, *et al*., 2010). No turbines which are used for carcass removal trials are to be used for subsequent fatality monitoring.
    b. Turbine searches for fatalities are to be undertaken following best practice (Fijn, Krijgsveld & Tijsen, 2012; Grunkorn, 2011) in terms of search area (minimum radius hub height) and at intervals selected to effectively sample fatality rates based on carcass removal rates (e.g. 2 per month). To be conducted for an initial period of 7 years to allow for annual variation and cumulative effects. Dependant on results, further monitoring to be agreed with NPWS.
    c. The large scale of the proposed wind development allows for a standardised approach with a possible control group of Turbines and/or variation in search techniques, such as straight line transects/ randomly selected spiral transects/ dog searches as a means of robustly estimating the post construction impact in terms of fatality.
    d. Recorded fatalities to be calibrated against known predator removal rates to provide an estimate of overall fatality rates.

An annual report will be submitted to the competent authority and copied to NPWS for each of the first three years of operation.

Following the first 7 years, a report shall be disseminated publicly via publication in a recognised journal. Although post-construction mortality is considered unlikely to be significant, in the event of significant fatalities during *post-construction monitoring*, the following adaptive management techniques shall be considered and an appropriate approach implemented. The approach implemented will be based on the survey findings and recommendations of an experienced ornithologist (>10 years relevant experience) in consultation with Bird Experts in NPWS:

- Curtailment or feathering of turbine blades at specific time periods dependent on target species affected[2].
- Use of Bird Deterrent Systems such as DTBird[3].
- Use of on the ground observers to determine feathering requirement during periods of peak bird activity[4].
- Use of DeTect MERLIN Avian Radar system or similar as a control mechanism for specific turbine operation[5].

2) Flight Activity Survey: A flight activity survey is to be undertaken during the to:
    a. Record any barrier effect, i.e. the degree of avoidance exhibited by species approaching or within the wind farm (Rees, 2012). Target species to be ...
    b. Record changes in flight heights of key receptors post construction.

An annual report will be submitted to the competent authority and copied to NPWS. To be conducted for an initial period of 7 years to allow for annual variation and cumulative effects. A review will be conducted after 4 years to determine if the level of survey is warranted. Dependant on results, further monitoring to be agreed with NPWS. Following the first 7 years, a report shall be disseminated publicly via publication in a recognised journal.

3) Breeding Hen Harrier and Goshawk survey: A breeding Hen Harrier and Goshawk survey, following methods used in the baseline survey to be repeated yearly March – July (inclusive). This aims to:
    a. Assess any displacement effects such as those recorded in the literature (Pearce-Higgins *et al*., 2009, 2012; Reichenbach & Steinborn, 2011). Overall density of these species to be annually recorded.
    b. To be conducted for an initial period of 7 years to allow for annual variation and cumulative effects. A review will be conducted after 4 years to determine if the level of survey is warranted. Dependant on results further monitoring to be agreed with NPWS. Following the first 7 years a report shall be disseminated publicly via publication in a recognised journal.

[2] An example would be feathering at dawn and dusk for a minimal period to avoid collision risk to roding woodcock during the summer months.

[3] DTbird is a self-working system that detects flying birds in real time and takes programmed actions such as dissuasion of birds in collision risk with turbines or controlled stopping of the turbine. It can also be used to monitor collisions if occurring.

[4] Studies in Spain, at an operational wind farm site, have found that controlled stopping of turbines based on observation reduced mortality of certain species by up to 48% (Munoz Gallejo *et al*., 2011).

[5] The DeTect MERLIN Avian Radar System can precisely track targets within avian size ranges and then provide deterrent techniques such as laser, or interface with the wind farm control system to curtail turbines.

Fisheries and Aquatic Ecology

Generic Mitigation Measures and Best Practice

The operation of the development will incorporate effective maintenance of the drainage system and the permanent mitigation measures detailed. The maintenance regime will include inspection and servicing of:

- Drains, cross-drains and culverts for any blockages
- Outfalls to existing field drains and watercourses
- Existing roadside swales for any obstructions
- Swales
- Progress of the re-establishment of vegetation.

Project Component-Specific Mitigation Measures

In order to prevent the spread of invasive alien species that are already established within the proposed CGEP Development or may become established, the following measures shall be conducted:

- Monitoring in the form of confirmatory surveys will be carried out by the Project Ecologist to accurately determine the current status of invasive species locations identified during baseline studies; and identify any other infestations close to the construction works areas or operational stage maintenance works areas;
- Surveying will be carried out each year of operation and this survey information will be used to inform any construction works/operational stage maintenance activities. Surveys will focus always on the works area plus 7m;
- The results of this will be made available to Project Team, and any bodies as agreed at the consenting stage; and
- The measures included in the Invasive Species Management Plan will be implemented.

4.3.4.2.3 Mitigation Measures during Decommissioning

Project Ecologist and Monitoring

A Project Ecologist will be appointed to oversee all works and mitigation measures during construction, operational and decommissioning phases. The project ecologist will monitor the baseline ecology prior to decommissioning and provide mitigation measures at this time based on what biodiversity receptors are relevant.

Habitats and Flora

Project Component-Specific Mitigation Measures

The introduction of invasive species has been identified as a significant potential impact during the decommissioning stage of the CGEP Development. To avoid the introduction, establishment and spread of invasive species in and to the proposed CGEP Development during the construction phase, the following measures shall be attended to:

- Prior to arrival of vehicles that will be kept on the site for extended periods e.g. earth moving machinery, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water >65 °C, in addition to the removal of all

vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic);

- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. The level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site;
- The flagmen, which will be present at each active site access points, will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the site, and will receive training in the correct techniques;
- Each flagman will be equipped with a 'disinfection box'. This will contain Virkon® Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution;
- Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and which has come into contact with water or soils) for evidence of attached plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site, securely stored away from traffic for removal to the waste storage area in the Temporary Compound at the end of the work day;
- No removed material or run-off will be allowed to enter a water body/drainage ditch of any sort;
- Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually; and
- Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.
- The above measures may not apply for vehicles that require regular on and offsite movements e.g. deliveries of cement during construction. These vehicles are highly unlikely to be at risk of contamination/ contact with aquatic habitats or invasive species. Before deliveries start the site EcoW/ Environmental Manager will review quarries supplying cement to confirm if the above disinfectant measure applies.

Terrestrial Mammals (excluding bats)

Generic Mitigation Measures and Best Practice

A project ecologist will be on site during the decommissioning phase.

Project Component-Specific Mitigation Measures

CGEP & Grid Connection Route

No significant impacts are likely on terrestrial mammals as no decommissioning is likely for the grid connection which will be operated by ESBN and EirGrid

Avifauna

Project Component-Specific Mitigation Measures

CGEP

Decommissioning operations will take place predominantly during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species.

This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006). Limited operations, such as turbine removal, may require night time operating hours.

Toolbox talks shall be held with construction staff on disturbance to key species during decommissioning. This will help minimise disturbance. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).

Any re-instated habitats will include native species where possible to enhance diversity of birds. This is line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).

Project Component-Specific Mitigation Measures

CGEP and GCR

During decommissioning phase, all mitigation measures indicated for the construction phase with regards to excavation works within the proximity (<50m) of surface water bodies and Management of alien invasive species shall be implemented, namely:

- Where the cable works or vehicle/machinery movement is within the 50m of a surface water body, a minimum 5m buffer will be maintained between the works area/access track and the water body wetted width limit;
- Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m water body buffer;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;
- Additional silt fencing or temporary straw bales (rectangular bales, pinned down firmly with stakes) will be placed across any natural surface depressions/channels that slope towards a local water body;
- Where the access tracks/road routes slopes down perpendicular towards a water body (i.e. base of stream valley), regularly spaced, temporary bunds or shallow swales will also be put in place perpendicular across the route corridor to dissipate surface water runoff from the works area and onto adjacent vegetated ground. Additional silt fencing will be put at the outfall location of the bunds/swales;
- Temporary check dams/silt fencing arrangements will be placed in any drainage ditches within 30m of the works corridor (this will also include existing road drains along the haul route works);
- The check dams/silt fencing arrangements will be placed every 10m;
- Bog mats will be used in wet/boggy areas zone to prevent ground rutting and soil erosion which could lead to potential water quality impacts. All ground rutted by vehicles/machinery will be levelled or backfilled to prevent their progression as preferential pathways for surface water runoff;
- If high levels of silt or other contaminants are noted in any local water body, all works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;

- Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies;
- All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion; and
- All temporary surface water control/protection measures, such as silt fencing and check dams, will be kept in place until disturbed ground has vegetated and stabilised. Regular daily checks will be undertaken.

Management of invasive alien species

To avoid the introduction, establishment and spread of invasive species in and to the proposed CGEP Development during the construction phase, the following measures shall be attended to:

- Prior to arrival of vehicles that will be kept on the site for extended periods e.g. earth moving machinery, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water >65 °C, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic);
- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. The level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site;
- The flagmen, which will be present at each active site access points, will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the site, and will receive training in the correct techniques;
- Each flagman will be equipped with a 'disinfection box'. This will contain Virkon® Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution;
- Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and which has come into contact with water or soils) for evidence of attached plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site, securely stored away from traffic for removal to the waste storage area in the Temporary Compound at the end of the work day;
- No removed material or run-off will be allowed to enter a water body of any sort;
- Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually;
- Records of supplies and cleaning of delivery vehicles will be kept by the flagmen and will be regularly inspected by the Environmental Clerk of Works; and
- Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.
- The above measures may not apply for vehicles that require regular on and offsite movements e.g. deliveries of cement during construction. These vehicles are highly unlikely to be at risk of contamination/ contact with aquatic habitats or invasive species. Before deliveries start the site EcoW/ Environmental Manager will review quarries supplying cement to confirm if the above disinfectant measure applies.

4.3.4.3 Mitigation Measures – TDR

Mitigation Measures for Invasive Species

Detailed mitigation measures to manage invasive species in particular Japanese Knotweed will follow similar approaches for minimising risk of invasive spread, as outlined above for CGEP and GCR.

Prior to the clearing of vegetation or trees, confirmatory surveys will be conducted to ensure that no resting/breeding places of protected mammals are within the area of clearance.

Sections of hedgerow scheduled for removal and/or trimming and containing mature trees suitable for nesting Barn Owls will be surveyed prior to construction for occupancy by Owls. Should Owls be present then minimum protection zones as outlined in published guidance will be adhered to for the period of construction (Shawyer, 2011).

The TDR will be used during the decommissioning phase, to remove the turbines from sites. Trees and vegetation may be required to be trimmed back or possibly removed in certain locations (nodes) similar to the construction phase.

The TDR may be used during the decommissioning phase, to remove the turbines from sites. Trees and vegetation may be required to be removed.

General Measures for Preventing the Spread of Non-Native Invasive Species

Communication

- Informing all site staff through toolbox talks as part of site inductions;
- Raising awareness of site workers through tool box talks given by a suitably qualified person as part of site introduction; informing workers what to look out for and the what procedure to follow if they observe an invasive species.

Advance planning and incorporation into works schedule

- Constraints and invasive species mapping will be consulted at the planning stage for works to be undertaken in each area, to ensure all parties are aware of the species present, their locations and extents and the measures required to eradicate, control and/or prevent the spread of each species as applicable.
- Treatment measures will be incorporated into the construction programme where treatment will progress in conjunction with works.
- Where treatment will progress independent of other works, the same consultation and advance planning will also be required.

Pre-works survey and establishment of exclusion zones

- A preconstruction/pre-treatment survey of each area will be undertaken prior to implementation of treatment measures and/or construction works to confirm the locations of invasive species and communicate these to supervisors and operatives involved in treatment and works.
- Exclusion zones will be established where necessary at this stage. Fencing, clear signage and good housekeeping within the site to prevent spread.

- No machinery or personnel will be allowed within exclusion zones, other than where necessary to undertake treatment measures. Similarly, there will be no storage of materials within or adjacent to exclusion zones.

Disposal of cut material

- Where mechanical control by cutting has been undertaken, it may be possible to mulch wood where re-growth from vegetative material will not take place.
- All other plant material arising from mechanical control may be stored in a controlled manner on-site, or disposed of appropriately off-site,
- If retention on-site is required, material will be kept in a secure area onsite for composting and herbicide treatment where necessary.
- This material will be monitored for re-growth, which will trigger targeted herbicide application where necessary. No vehicles or operatives other than those involved in invasive species management will enter this area and no other materials will be stored here.
- Where off-site disposal is used, material will be transported off site by an appropriately licensed waste contractor and disposed of properly at a suitably licenced facility.

Re-vegetation

- Where invasive species have been physically removed and disturbed soil, this soil will be seeded or replanted (including 5cm deep mulch) with native plant species. This will prevent the easy colonisation of bare soil by invasive species in the area.

Good hygiene

- Ensure good hygiene practices when working with invasive species:
  - Remove the build-up of soil on equipment
  - Keep equipment clean
  - Do not move fouled equipment from one site to another.
- Where necessary a pressure washer will be used to wash the build-up of soil, clean equipment and vehicles. The water arising from washing will be contained to avoid the further spread of species within the site.
- Biosecurity measures required for working near water (intertidal areas) and protected species within the site e.g. receptor sites for rare plants, the pNHA, etc.

Table 4-1: Species-specific invasive species

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
Japanese Knotweed (*Fallopia japonica*)	A survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey. While the stand is >7m outside of the proposed works footprint and will not be interfered with, a buffer of 7m around the stand will be put in place to demarcate this and ensure there is no interference with the area. This will be put in place prior to construction. Roots 1-3 m deep and up to 7 m lateral spread.	By clearly marking the area to avoid, it will avoid accidental interference with the area, and the risk of spreading the species along the TDR route	A suitably qualified person will be appointed by the Client to ensure the effective implementation of this buffer.
Winter Heliotrope (*Petasites fragrans*)	A survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey. As this species spreads vegetatively via rhizomes, the risk of spread through unregulated soil movements is high. Where the infested area can be retained in situ, burial under minimum 1.5m of soil is sufficient. Areas which will be required to be excavated will require treatment with herbicide prior to movement. Following treatment, soil from these areas can be re-used, but not as topsoil and will be required to be buried at a depth of minimum 1.5m.	The species covers a bank at node 2.0 and 2.4 and is within the bank regrading footprint and load-bearing footprint of these nodes. Implementing this mitigation will prevent the spread of the species along the TDR route	A suitably qualified person will be appointed by the Client to ensure the effective implementation of this mitigation.

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	Spraying will be carried out using glyphosate-based herbicide after flowering in February to March or midsummer or later but before the foliage begins to die back (NRA, 2010). The following general recommendations will be adhered to: • Establishment of a 1m buffer zone around all growths prior to operations; staff shall be made aware of this buffer zone when working within infested areas. • Construction works will not be allowed within exclusion zones until treatment procedures have been followed. • No treatment measures to take place in these areas without supervision and agreement by appointed ecologist/eradication specialist. • All machinery and vehicles operating within areas of infestation will be thoroughly checked and if necessary, cleaned prior to leaving the area to protect against further spreading of Winter Heliotrope. • No material shall be taken from areas of infestation except in accordance with the measures outlined above. All material will be either deep buried (1.5m) or transported by		

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	an appropriately licensed waste contractor and received by an appropriately licensed facility. • Wheel washes shall be put in place at infected areas. Waste water from these facilities will need to be stored and treated to avoid further spread. • If operating within an area of known infestation all machinery, vehicles, equipment, foot ware and clothing will need to be cleaned thoroughly (if necessary using steam cleaners) in a contained area to avoid further contamination. • The contractor must appropriately dispose of winter heliotrope plant material and soil containing plant material in accordance with the NRA (2010) guidelines, where cut, pulled or mown non-native invasive plant material arises, its disposal will not lead to a risk of further spread of the plants. Care will be taken near watercourses as water is a fast medium for the dispersal of plant fragments and seeds. Material that contains flower heads or seeds will be disposed of either by composting or burial at a depth of no less than 1.5m, or by incineration (having regard to relevant		

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	legislation, including: Section 32 of the Waste Management Act, 1996 to 2008; Section 4 of the Air Pollution Act, 1987; and relevant local authority byelaws) or disposal to licensed landfill in the case of non-native invasive species. All disposals will be carried out in accordance with the Waste Management Acts.		
Old Man's Beard /Traveller's Joy (*Clematis vitalba*)	A survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey. Two options for the treatment of Old Man's Beard at the site have been proposed. These options shall be used to eradicate Old Man's Beard from the site and avoid the spread of the species. The following general recommendations will be adhered to as part of the plan: ***Option 1*** – Physical removal Seedlings can be pulled out of the ground and larger plants can be cut to the stem (and foliage will die) and roots and stem removed. Roots can then be grubbed out with material stored above the ground, so plants cannot take root again. For more mature plants, the stem can be cut near ground level and herbicide	The species is present in a 5x2m patch within the load-bearing and vegetation clearance footprint at node 1.3, as well as within sections of hedge at node 2.3 adjacent to the vegetation clearance footprint. Implementing this mitigation will prevent the spread of the species along the TDR route	A suitably qualified person will be appointed by the Client to ensure the effective implementation of this mitigation.

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	applied to the outer rim of the stem. The stem is likely to produce regrowth in the next growing season and herbicide will need to be applied to this growth. Glyphosate can be used in late spring and summer and Triclopyr can be applied in summer. This is the preferred option where plants infest the crowns of trees. ***Option 2*** – Chemical control Growths at ground level can be treated with herbicide, using spray application where native species are not present, or targeted application using a weed wiper where there is a risk of damage to non-target species. Re-survey to check for re-growth will be required in both cases. The contractor must appropriately dispose of Old Man's Beard plant material and soil containing plant material in accordance with the NRA (2010) guidelines, where cut, pulled or mown non-native invasive plant material arises, its disposal will not lead to a risk of further spread of the plants. Care will be taken near watercourses as water is a fast medium for the dispersal of plant fragments and seeds. Material that contains		

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	flower heads or seeds will be disposed of either by composting or burial at a depth of 2m, or by incineration (having regard to relevant legislation, including: Section 32 of the Waste Management Act, 1996 to 2008; Section 4 of the Air Pollution Act, 1987; and relevant local authority byelaws) or disposal to licensed landfill in the case of non-native invasive species. All disposals will be carried out in accordance with the Waste Management Acts.		
Himalayan honeysuckle (*Leycesteria formosa*)	A survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey. Two options for the treatment of Himalayan honeysuckle at the site are proposed. These options can be used to eradicate Himalayan honeysuckle from the site and avoid the spread of the species: **Option 1** – hand pulling of seedlings Seedlings and/or small plants can be pulled out of the ground along with the root system (BMCC, 2015). **Option 2** – cut to base and treated with herbicide. More established plants can be cut to near ground level and the freshly cut wound immediately painted with herbicide (BMCC, 2015).	There is a single plant growing on top of a wall at node 2.2. While the latest swept-path analysis shows it is unlikely to be interfered with, the aforementioned mitigation will be included to prevent the spread of the species along the TDR route	A suitably qualified person will be appointed by the Client to ensure the effective implementation of this mitigation.

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
Cherry laurel (*Prunus laurocerasus*)	A survey will be carried out prior to construction to confirm if the extent of the species has changed since the previous survey. Cherry laurel is spread vegetatively only and a buffer of 1m will be left to prevent damage to the plant which can result in the production of new stems which can make the plant more difficult to treat. Staff shall be made aware of this buffer zone when working within areas of infestation. Where the plant cannot be avoided, one of the following methods will be implemented: **Option 1** – Cut to stump and digging out stump This method involves cutting the main stem of the plant down near ground level and digging out the stump and any visible roots. This option is not practical in areas where there are other invasive plants present as the disturbed soil can allow for the setting of seeds or the spread of rhizomes of adjacent species (ISI, 2012b). **Option 2** – Cut to stump and treat stump with herbicide This method involves cutting the main stem of the plant down near ground level and applying herbicide to the freshly cut wound.	There are three young bushes present within the vegetation-clearance footprint at node 1.7. The species spreads vegetatively by suckering, or by seed.	

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	The herbicide concentrations used, and timings of applications vary according to which chemical is used. When treating many stems, vegetable dye added to herbicide is useful for highlighting the stems that have and haven't been treated. The use of a brush or other such applicator will provide an accurate application and prevent damaging adjacent non-target plants via spray drift. Please see table below for best treatment time (ISI, 2012b). ***Option 3*** – Cut to main stem and inject stem with glyphosate This method involves the 'drill and drop' method where the main stem is cut, and a hole drilled into the cut. This provides a targeted application of glyphosate (25% solution). The main drawback to this technique is that the plant is left in place to rot away; which can take a decade or more. Please see table below for best treatment time (ISI, 2012b). ***Option 4*** – Cut back to stump and spray regrowth with chemicals This application involves cutting a main stem down near ground level and then treating the new stems with herbicide. This method is the least effective as some stems may be missed and not		

Invasive species	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success
	treated. Also, the application of herbicide is generally via spraying which can result in adjacent non-target plants being killed off. The contractor must appropriately dispose of excavated waste, including soils containing cherry laurel plant material in accordance with the NRA (2010) guidelines, where cut, pulled or mown non-native invasive plant material arises, its disposal will not lead to a risk of further spread of the plants. Care will be taken near watercourses as water is a fast medium for the dispersal of plant fragments and seeds. Material that contains flower heads or seeds will be disposed of either by composting or burial at a depth of no less than 2m, or by incineration (having regard to relevant legislation, including: Section 32 of the Waste Management Act, 1996 to 2008; Section 4 of the Air Pollution Act, 1987; and relevant local authority byelaws) or disposal to licensed landfill in the case of non-native invasive species. All disposals will be carried out in accordance with the Waste Management Acts.		

Mitigation measures for the protection of watercourses

The following mitigation measures are proposed for the protection of watercourses:

Table 4-2: Mitigation Measures for the Protection of Watercourses

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring Scheme to Prevent Mitigation Failure
All personnel working on site will be trained in pollution incident control response. Emergency Silt Control and Spillage Response Procedures contained within the Construction Environmental Management Plan (CEMP) will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt.	Ensure site operatives are informed and equipped to deal pollution incidents such as spillages or silt containment failures.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
A regular review of weather forecasts of heavy rainfall will be undertaken, and a contingency plan will be prepared for before and after such events.	Ensure works are not carried out during periods of heavy rainfall and ensure potential sources of siltation are secured in advance of heavy rainfall.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring Scheme to Prevent Mitigation Failure
Silt traps and silt fencing will be put in place in advance of excavation works at each node.	Ensure erosion control and silt arrest measures are in place in advance of works.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Nodes requiring temporary hardcore shall be capped as soon as practicably possible.	Cover exposed subsoils, thereby reducing the concentration of suspended solids in any run-off.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Additional silt fencing will be kept on site in case of an emergency break out of silt laden run-off.	Allow repair and strengthening of silt interception measures if and where necessary.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.

Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Likely Success	Monitoring Scheme to Prevent Mitigation Failure
Refuelling of plant & machinery during planting will only be carried out at designated refuelling station locations within the wind farm site. Each station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. Only emergency breakdown maintenance will be carried out on site.	Prevent fuels, oils or other contaminants from entering the drainage network.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.
Drip trays and spill kits will be kept available on site, to ensure that any spills from the vehicle are contained and removed off site.	Prevent fuels, oils or other contaminants from entering the drainage network.	Mitigation measures will be implemented by the developer through the mechanism of its contract with the contractor. All required mitigation measures will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works.	A suitably qualified Ecological Clerk of Works (ECoW) or Environmental Manager will be appointed by the Client to ensure the effective operation and maintenance of drainage and other mitigation measures during the planting process.

4.3.5 Soil Management Plan

This Soil Management Plan has been prepared for the development of the proposed CGEP. This plan should be read in conjunction with the CGEP EIAR. The Soil Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works.

It is intended where possible, to maintain an earthworks balance on site, with all excavated material re-used within the site where possible and minimising the need for removal of any materials for off-site disposal. This will minimise the amount of construction traffic on local roads and reduce the need for off-site disposal. This will in turn lead to the reduction of noise and dust associated with construction traffic.

There are 3 proposed borrow pits within the site that will provide general fill for construction. Where aggregate (structural fill) required for construction cannot be sourced from the onsite borrow pits it shall be imported from a licensed quarry.

Site Risk Assessment

The preliminary site-specific hazards have been identified for this site in Table 4-3. The hazards should be re-assessed prior to the commencement of construction on the site and these hazards should be communicated to all personnel entering the site. No site personnel should enter lands outside the scope of the project. The construction areas must be secured from public access at all times.

Table 4-3: Site Specific Ground Hazards – Soil Management

Site Specific Hazards	
Coom Green Energy Park	• Excavations (risk of falling) • Ground stability • Materials storage

Daily Preparation during the Implementation of the Soil Management Plan

The Geotechnical Engineer appointed by the contractor should conduct regular meetings with the Construction Management Team to discuss the phasing of soil management as the work progresses. The focus of these meetings will be on establishing an operational drainage system in advance of the progression of the works.

Particular regard will be taken of daily weather conditions and long-range forecasts. The Drainage Engineer should have the authority to suspend the works if weather conditions are deemed too extreme for the effective protection of receiving watercourses. Mitigation measures to protect receiving watercourses will be put in place as directed by the Drainage Engineer in advance of extreme forecasts.

Personnel Qualifications and Key Contacts

All those carrying out work on site must have a Solas/FÁS Safe Pass Card. All works must be supervised by a competent supervisor. Workers must be adequately trained in the tasks they are required to carry out. The key contact names and contact details should be supplied to all personnel entering the site. All site staff should be informed of the emergency procedures for the site. The Geotechnical Engineer should be contacted if there are any issues with soil/rock stability or other materials management issues.

Construction Stage Impacts

The main characteristics of the proposed Coom Green Energy Park that could impact on land, soils and geology are:

- Construction of wind turbine foundations and hardstanding areas
- Construction of access tracks
- Construction of on-site substation
- Cable trench and grid connection construction
- Soil and rock excavation/reuse

- Borrow pits excavation
- Temporary Material storage areas
- Drainage
- Vehicular movement
- Construction of temporary site compound

Construction Stage Mitigation Measures

Long range weather forecasts should be examined, and the construction phases planned taking cognisance of expected weather conditions. Regular meetings should be held to re-assess construction phases with weather conditions as the project progresses.

The works areas will be set out by the contractor and excavation plant will stay within the works corridor – to minimise tramping and compaction.

Regular meetings should be held between the Geotechnical Engineer appointed by the contractor and the contractor's Project Manager. The planning of traffic routes through the site should be agreed in advance, in order to plan appropriate soil management. The following soil management elements are to be implemented in advance of construction:

- Materials excavated during the construction phase will preferably be use for landscaping on an ongoing basis. Soils excavated for turbine foundations will be stored adjacent to those excavations for reuse as ballast, berms and landscaping.
- The soils will be stored in an environmentally safe manner that will not result in the pollution of waters or the smothering of ecologically sensitive habitats.

The following measures will be implemented to ensure this occurs:

- All materials will be stockpiled at low angles (< 10°) to ensure their stability.
- If necessary, mineral soils will be covered while stored to minimise run-off.
- Sediment management systems, such as silt fencing, will be provided around the storage areas where necessary.
- Drainage systems will also be utilised in mineral storage areas where necessary.

Topsoil / peat will not be transported across land ownership boundaries – as a disease control measure.

Excavated material will be mostly used to reinstate the turbine foundations. The balance of excavated material will be used to reinstate the borrow pit and for general landscaping. Turbine foundations will be reinstated during and upon completion of the construction works.

Natural re-vegetation is the preferred method of restoration, however, if this is not possible, the re-vegetation process can be encouraged with the use of native grass seed or other suitable planting measures during the growing season. No spoil stockpiles will be left on site after construction is completed. Areas disturbed during construction will be landscaped using locally recovered topsoil to merge with the contours of the existing topography.

Excavations will be carried out from access tracks, where possible, in order to reduce the compaction of topsoil. All excavations will be constructed and backfilled as quickly as possible. Open excavations will be made safe with adequate signage and barriers where necessary and excavation work will not take place before, during and immediately after heavy rainfall.

Due to the possibility of soil-borne diseases, all topsoil excavated at a farm property will remain on the same property. Topsoil will be used for landscaping berms alongside existing and new access tracks where suitable and will also be used for reinstatement purposes around turbine bases and hardstandings. Where a property also includes a borrow pit, some of the topsoil will also be used to help in the reinstatement and revegetation of the borrow pit.

The contractor's project manager will be responsible for ensuring that the earthworks are done in accordance with the requirements of this plan. The temporary storage areas and the restoration of vegetative material will be inspected regularly from an ecological and water quality perspective.

With regard to slope stability issues, detailed design best practice will be implemented as follows:

- The works will be designed and supervised by a suitably qualified and experienced geotechnical engineer or engineering geologist, and hydrologist or drainage engineer.
- Drainage infrastructure will be put in place in advance of turbine excavations. Drains will divert surface water and groundwater away from excavations into the proposed surface drainage network. Uncontrolled, direct and concentrated discharges of water onto the ground surface will be avoided.
- Loading or stockpiling on the surface of soft ground will be avoided. Loading or stockpiling on other deposits will not be undertaken without first establishing the adequacy of the ground to support loads by an appropriately qualified geotechnical engineer experienced in construction within upland conditions.
- Turbines located in areas adjacent to peat deposits will incorporate drainage measures such that surface water will be drained away from the peat and will not be allowed to collect adjacent to the peat mass.
- Excavation will be carried out from access roads or hardstanding areas to avoid tracking of construction plant across areas of soft ground/peat.
- A detailed assessment of the stability of conditions at proposed infrastructure locations will be undertaken by a suitably qualified and experienced geotechnical engineer prior to the commencement of all excavations to ensure these activities do not result in or contribute to slope failure.
- Blasting of rock will not be permitted.
- Excavations which could have the potential to undermine the up-slope component of an existing slope will be sufficiently supported to resist lateral slippage and careful attention will be given to the existing drainage.
- Where possible, earthworks will not be commenced when heavy or sustained rainfall is forecast. A rainfall gauge will be installed on site to provide a record of rainfall intensity. An inspection of site stability and drainage by the Geotechnical Engineer will be carried out on site when a daily rainfall of over 25mm is recorded on site, works will only recommence after heavy rain with the prior approval of the Geotechnical Engineer following their inspection.
- An emergency plan will be developed at pre-construction stage outlining the action plan which would be implemented in the unlikely event of a landslide/slope failure. Should a landslide/slope failure occur or if signs of instability/ground movement are observed, work will cease immediately.

4.3.6 Surface Water Management Plan

A Surface Water Management Plan (SWMP) has been prepared for the project and is contained in Appendix 1 of this CEMP.

The Surface Water Management Plan should be read in conjunction with the EIAR. The Surface Water Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works.

4.3.7 Waste Management Plan

It will be the objective of the Developer in conjunction with appointed contractor to prevent, reduce, reuse and recover as much of the waste generated on site as practicable and to ensure the appropriate transport and disposal of residual waste off site. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

Any waste generated during the development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary compound during construction.

This Construction Waste Management Plan has been prepared for the proposed CGEP in line with the ”Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects” (2006) as published by the Department of the Environment, Community and Local Government and supported by the Eastern-Midlands Region Waste Management Plan 2015-2021.

The Waste Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works and will take cognisance of the replacement plan for the Southern Region. This plan should be read in conjunction with the EIAR.

Assignment of Responsible Personnel

It will be the responsibility of the contractor for the main construction works (when appointed) to nominate a suitable site representative such as a Project Manager, Site Manager or Site Engineer as Waste Manager who will have overall responsibility for the management of waste. The waste manager will have overall responsibility to instruct all site personnel including sub-contractors to comply with on-site requirements. They will ensure that at an operational level that each crew foreman is assigned direct responsibility.

Waste Generated

It is envisaged that the following categories of waste will be generated during the construction of the project:

- municipal solid waste (MSW) from the office and canteen
- construction and demolition waste
- waste oil/hydrocarbons
- paper/cardboard
- timber
- steel

A fully authorised waste management contractor will be appointed prior to construction works commencing. This contractor will provide appropriate receptacles for the collection of the various waste streams and will ensure the regular emptying/and or collection of these receptacles.

Waste Minimisation/Reduction

All efforts will be made by site management to minimise the creation of waste throughout the project. This will be done by:

- material ordering will be optimised to ensure only the necessary quantities of materials are delivered to site
- material storage areas will be of a suitable design and construction to adequately protect all sorted materials to ensure no unnecessary spoilage of materials occurs which would generate additional waste
- all plant will be serviced before arriving on site. This will reduce the risk of breakdown and the possible generation of waste oil/hydrocarbons on site
- all operators will be instructed in measures to cut back on the amount of wastage for trimming of materials etc. for example cutting of plywood, built into the amount ordered
- educating foremen and others to cut/use materials such as ply wisely for shutters etc.
- prefabrication of design elements will be used where suitable to eliminate waste generation on site
- where materials such as concrete are being ordered, great care will be practiced in the calculation of quantities to reduce wastage.

Waste Reuse

When possible, materials shall be re used onsite for other suitable purposes e.g.

- re-use of shuttering etc. where it is safe to do so
- re-use of rebar cut-offs where suitable
- re-use of excavate materials for screening, berms etc.
- re-use of excavated material etc. – where possible will be used as suitable fill elsewhere on site for the new site tracks, the hardstanding areas and embankments where possible.

Waste Recycling & Recovery

In accordance with national waste policy, source separation of recyclable material will take place. This will include the provision of receptacles for the separation and collection of dry recyclables (paper, cardboard, plastics etc.), biological waste (canteen waste) and residual waste.

Receptacles will be clearly labelled, signposted and stored in dedicated areas.

The following sourced segregated materials container will be made available on site at a suitable location:

- timber
- ferrous metals

- aluminium
- dry mixed recyclables
- packaging waste
- food waste.

The materials will be transported off-site by a licensed contractor to a proposed recovery centre and these materials will be processed through various recovery operations.

Waste Disposal

Residual waste generated on-site may require disposal. This waste will be deposited in dedicated receptacles and collected by the licensed waste management contractor and transported to an appropriate facility. All waste movements will be recorded, of which records will be held by the waste manager on-site. Nearby waste facilities and the types of waste they accept are listed in Table 4-4.

Table 4-4: Nearby Licensed Waste Facilities

Facility	Type of wasted accepted
McGill-Glenville	Compostable waste
Red Fox	Recyclables, non-recyclables, wood, metal, rubble, junk removal
Ashgrove recycling	Construction waste, metal, wood, soil, rubble, plastic
Munster waste management	Domestic, commercial, industrial, agricultural
Enva	Construction waste, general waste, hazardous waste
Raffeen civic amenity site dump	Paper, cardboard, metal, green waste, plastic, waste oil, glass, timber

Contaminated Material

Any contaminated soils will be handled, removed and disposed of in accordance with statutory requirements for the handling, transportation and disposal of waste. In particular, the following measures will be implemented:

- Contaminated material will be left in-situ and covered, where possible until such time as WAC (Waste Acceptance Criteria) testing is undertaken in accordance with recommended standards and in-line with the acceptance criteria at a suitably licenced landfill or treatment facility. This will determine firstly the nature of the contamination and secondly the materials classification i.e. inert, non-hazardous or hazardous,

- If the material is deemed to be contaminated, consultation will take place with the respective local authority and/or EPA on the most appropriate measures.
  Such materials will be excavated, transported by a contractor with a valid waste collection permit and recovered/disposed of at an appropriate facility.

Training

Copies of the project waste management plan will be made available to all relevant personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the Plan and informed of the responsibilities that fall upon them as a consequence of its provisions.

It will be the responsibility of the contractors appointed (Waste Manager) to ensure that all personnel are made aware of their responsibilities under the plan via a toolbox talk or otherwise.

4.3.8 Traffic Management Plan

This document is the Construction Traffic Management Plan (TMP) for the proposed Coom Green Energy Park, Co. Cork. The Construction Traffic Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works and the turbine supply contract.

Please note that some items in this plan can only be finalised with appropriate input from the contractor who will actually carry out and schedule the works. Furthermore, it is appropriate that the Project Supervisor Construction Stage (PSCS), when appointed, should have an active role in the preparation/review of the Traffic Management Plan.

This plan should be read in conjunction with Chapter 13 of the EIAR.

The contractor is required to prepare the necessary Site-Specific Traffic Management Plans prior to the construction works commencing in accordance with Chapter 8 of the Traffic Signs Manual and subject to load permits.

The contractor will be responsible for the implementation of all agreements between the developer and the County Council with the objective that the transportation needs for the proposed project will have a minimal impact on the road network and local communities.

As with any construction development project, the transport of materials onto the site will give rise to increased traffic and associated impacts. However due to the very nature of construction these impacts will be temporary.

Construction traffic will require regular access to the site at varying times throughout the construction phase. The aim of this TMP is to put in place procedures to manage traffic effectively on site and in the immediate vicinity of the main energy park site, to ensure the continued movement of traffic on the public roads and to minimise disturbance during transportation of materials particularly oversize loads. The correct implementation of this TMP will ensure that appropriate procedures are in place to minimise any effects on the safety and movement of the general public.

Prior to the commencement of construction, the TMP will be reviewed by the main contractor (and any sub-contractors) and will be updated as necessary.

General Traffic Management Measures

General traffic management measures for the project are set out as follows:

1. **Traffic Management Coordinator** - A dedicated competent Traffic Management Coordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management on the project.
2. **Road to be used and not used** - The final TMP will clearly identify those roads that will be used to access this project and those roads that are not to be used. In some cases, the An Garda Síochána and the roads authority may direct/agree that certain roads cannot be used for laden HGV's but can be used for LGV's or unladen HGV's.
3. **Proposals for one way systems on local roads –** in acknowledgement of the fact that some of the local roads are relatively narrow and generally not conducive to 2-way construction traffic movements, a system of one way construction traffic movements will be implemented for sub-sections of the wind farm construction works which will temporarily use the local road network. Confirmatory details of these traffic plans will be agreed in advance of construction of these sub-sections of the wind farm with the roads authority.
4. **Road Pre-and Post-Construction Condition Survey** - A pre-condition survey will be carried out on all public roads that will be used in connection with the works to record the condition of the road before the works commence. A post construction survey will also be carried out after the works are completed. The specification and timing of the surveys will be agreed with the roads authority. Joint surveys shall be undertaken if the roads authority so requires/agrees.
5. **Road Reinstatement –** As agreed with Cork County Council, all roads will, upon completion of the construction works, be expeditiously reinstated to their pre-works condition or better and to the satisfaction of the relevant roads authority. If, during the course of the construction works, some of the roads used in connection with the development are damaged then these roads will be made good to the satisfaction of the roads authority without delay.
6. **Site Inductions** - All workers will receive a comprehensive site induction which will include, as appropriate, a section on traffic management and clear guidance on the routes to be used/not used.
7. **24 Hour Emergency Phone Number** - A 24-hour emergency phone number will be maintained for the duration of the construction works and the number will be noted on temporary signage at each works area (for cable works) and at t site entrance and borrow pit road crossing at a minimum.
8. **Orderly Traffic Management** - All necessary temporary traffic management will be planned and executed in accordance with best practice, including Chapter 8 of the Traffic Signs Manual as published by the NRA/Department of Transport.
9. **Letter Drops** - Subject to agreement with the planning authority, a letter drop will be carried out to notify members of the public living near the proposed site/route/roadworks where necessary, to advise them of any particularly significant upcoming traffic related matters e.g. temporary lane/road closure (if required) or delivery of turbine components at night.
10. **Clear signage** - A system of clear signage relating to the project, both temporary and permanent will be agreed with the planning authority. These signs will also identify those roads to be used (and not to be used) for accessing the site in line with the objectives of the TMP.
11. **Wheel washing facilities** - temporary wheel washing facilities will be located at the site entrance, subject to agreement with the planning authority, to prevent soil/dirt from being transported onto the public road network.

12. **Road sweepers** will be utilised where required to maintain the public roads in a clear condition, and this will apply especially during the earthworks stages of the project.
13. **Site Entrances** will be secured and locked when not in use. Where required, the entrance will be controlled by flagmen to assist traffic movements.
14. **Temporary Road Crossing Points –** Where the internal wind farm track crosses the local road network, this junction will be managed appropriately to allow the safe passage of construction vehicles in, out and across these junctions. Priority at these crossings will be maintained for public traffic. These crossing points will be gated and locked each evening. Where access roads cross existing roads, a concrete apron will be provided during the construction phase, constructed 40mm below road level and overlaid with surface course material on completion of the works. Following the completion of the construction phase the crossing point will be removed i.e. through traffic will not be permitted. For the borrow pit haul road crossing, the above mitigation measures will apply however upon completion of the works the road verges and hedgerow breaks will be reinstated and permanently closed off.
15. **Abnormal Load Deliveries:** Abnormal loads will require an abnormal load permit prior to delivery and will be delivered at times and frequencies directed by An Garda Siochána.

Mitigation measures specific to grid connection works include:

Road Opening Licence: The road works associated with the grid connection cabling will be completed in line with the requirements of a road opening licence as agreed with the local authority.

Route Proofing: In advance of the main grid connection works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. This will include slit trenching with the aim of minimising the construction impacts and avoiding existing services in the road.

Maintaining Local Access: reasonable access to local houses, farms and businesses will be maintained at all times during any road closures associated with the grid connection works. The details of this will be agreed with the roads authority in advance of the grid connection works commencing.

Road Cleanliness: Appropriate steps such as wheel washing and regular maintenance of internal access road surfaces will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used if necessary, to ensure that the public road network remains clean.

Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the roads authority.

Surface Overlay after Trench Reinstatement: following temporary reinstatement of trenches on public roads, sections of the public roads will receive a surface overlay. Details to be agreed with the roads authority At a minimum they will be reinstated to their pre-works condition or better and to the satisfaction of the roads authority.

Haul Route Interface: aggregate imported to the wind farm site from local quarries will be managed to ensure they do not conflict with the grid connection works. Grid connection works will be planned to avoid conflicts with other major activities on the main construction site such as concrete foundation pours and large component deliveries. Measures contained within the construction stage CEMP and TMP will ensure no conflicts occur between felling and construction operations.

On the local road from Knockacullata to Knoppoge, it is anticipated that grid cable installation will involve short rolling temporary road closures over approximately 7km. A diversion route will be used via the Knockacullata to Slumberhill Road.

As described in Section 13.4 Horizontal directional drilling operations will be required at a number of locations along the grid connection route between Knockacullata and Barrymore. These activities are isolated and carried out in under a day at each location. It is expected that a temporary road closure will be required for 2 no. of these locations where the cable will cross existing watercourses by this method.

Where the grid connection route crosses the M8 motorway, horizontal directional drilling (HDD) will be used. The locations of the launch and reception pits will be adequately spaced from the carriageway to ensure the bore is at such depth as not to conflict with the drainage, foundations or surface of the motorway. Locations of proposed launch and reception pit locations are shown in Plate 4-1.

Plate 4-1: Launch and Exit Locations for HDD Operations under M8 Motorway

The existing structures will be protected, and adequate separation will be maintained from and under the existing structures. Traffic management and licensing will be required to install these ducts which will likely take place during one mobilisation ahead of the grid trenching work.

Mitigation measures proposed for the turbine delivery route include:

- **Programme of Deliveries**: a programme of deliveries will be submitted to the roads authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken.

- Turbine component deliveries will be carried out at night during off-peak times and will be done using a convoy and a specialist heavy haulage company.
- **Garda Escort**: Turbine deliveries will be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.
- **Reinstatement**: Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition unless agreed otherwise.
- **Consultation**: Consultation with the local residents and Cork County Council are included in the traffic management plan to manage turbine component deliveries.

Decommissioning Phase

The traffic impact associated with the decommissioning phase will be significantly less than the construction phase.

All decommissioning works are to be carried out in accordance with a decommissioning plan to be agreed with the planning authority in advance of the decommissioning works. Traffic management measures identified will be included in the decommissioning plan for the wind farm.

Infrastructure associated with the grid connection will form part of the national transmission network and will be left in-situ. Therefore, no impacts are envisaged upon decommissioning of the main energy park development and no mitigation is required.

Traffic and transportation impact mitigation for decommissioning of the energy park will be the same as those identified here for construction stage works and will be tailored to suit the existing environment conditions of the day and technology available.

Construction Staging

The approximate period of construction for completion of the total scheme is estimated to take 24 months. Once the bulk civil works are completed, grid connection works will take place, followed by an element of testing and commissioning of the energy park and substation. It is anticipated that traffic associated with this element of the works will be minimal, with between 2 and 4 crew vans accommodating the movement of staff to and from the different sites within the Coom Green Energy Park.

The construction of Coom Green Energy Park will generally include a sequence of distinct construction activities:

- Construction of main road access and site entrances.
- Initial installation of on-site access tracks and fence lines.
- Development of the construction compounds and other temporary works.
- On-site tracks and drainage.
- Preparation of crane hard standings.
- Construction of foundations.
- Installation of cabling within the site
- Installation of Wind Turbine Generators (WTGs).
- Installation of cabling, substation and control building.

- Installation of cabling, substation and control building.
- Grid connection works.
- Land reinstatement.

Construction Plant and Vehicles

The typical construction plant and vehicles used as part of the construction of a green energy park are as follows (non-exhaustive):

- Hydraulic Excavators
- Dump Trucks
- General construction delivery vehicles (e.g. steel reinforcement bar, electrical components etc.)
- Concrete trucks and pumps
- Cranes of various lifting capacities (up to 1000 tonnes)
- Oversized articulated delivery vehicles (for turbine component transport)
- Site Jeeps (off-road 4x4 all purpose vehicles)
- Private vehicles of those employed on site for the construction phase.

It should be noted however that final selection of construction plant and vehicles may vary depending on suitability, availability, contractor's choice, etc.

Plant operators will be responsible for the upkeep and maintenance of construction plant and vehicles, ensuring good working order prior to use. Should emergency maintenance need to be carried out on site, this will be carried out at a designated area away from sensitive receptors and will ensure that a spill kit is nearby.

The hours of construction activity will be limited to avoid unsociable hours as per Section 8.5 (d) of the code of practice for BS 5228: Part 1: 1997. Construction operations shall generally be restricted to between 08:00 hours and 19:00 hours Monday to Saturday. It should be noted that it may be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Work on Sundays or public holidays will only be conducted in exceptional circumstances or in an emergency. Additional emergency works may also be required outside of normal working hours as quoted above.

Construction commencement dates are yet to be confirmed at this stage; these will be made known to the Planning Authority by way of formal Commencement Notice.

Construction Compound

The locations of the construction compounds are shown on the site layout, Figure 1-2.

Consultation and Notification

An Garda Síochána

Following the appointment of the successful contractor for this project, this Traffic Management Plan shall be finalised following the appointment of the contractor for the main construction works. The contractor will liaise directly with An Garda Síochána in relation to the plan and any concerns/requirements they have will be incorporated in to the plan. This may include details in relation to the escorting of oversized loads.

The necessary permits (including approved route permits) will be applied for and obtained from An Garda Síochána.

Cork County Council

The contractor will liaise directly with the County Council in relation to the plan and any concerns/requirements they have will be incorporated into the plan. The contractor will also liaise with other local authorities, as necessary, along the final turbine delivery route.

The necessary permits (including standard permits) will be applied for and obtained from the relevant local authorities.

Local Residents

The following measures will be used to communicate the necessary information to the households along the local road to be used as a haul road:

(a) Information signs will be erected in advance of the construction/transportation works.

(b) A flyer drop will be carried out to advise households along the local road leading to the site in relation to the programme of construction works and especially in relation to oversized load movements.

(c) Contact details for a Liaison Officer will be provided so that any concerns can be easily channelled to the Developer.

Complaints will be entered into the site complaints log and the relevant site environmental officer will arrange to meet with those affected. The situation will be acted upon immediately and reviewed by the Project Manager.

Key Personnel and Responsibility

Once prepared and agreed with the local County Council and An Garda Síochána the contractor will implement the project specific Traffic Management Plan (TMP).

Please note that some items in this plan can only be finalised with appropriate input from the contractor who will carry out and schedule the works. Furthermore, it is appropriate that the Project Supervisor Construction Stage (PSCS), when appointed, should have an active role in the preparation/review of the Traffic Management Plan.

Typically, the following members of the contractors' staff will have responsibility for adherence to the TMP as follows:

Traffic Management Coordinator

The Traffic Management Coordinator will be responsible for maintaining regular contact with An Garda Síochána, The local County Council, the statutory bodies and the client concerning traffic control, interference with services and co-ordination of crossings at roads, rivers and railways.

The Transport Officer will contact the relevant bodies in relation to method statements prior to the work taking place. The Transport Officer will be responsible for instructing the Construction Manager, Foreman and all other personnel on the information in the agreed method statement prior to the work commencing and ensuring that the method statement is adhered to.
The Transport Officer will be responsible for ensuring that the Traffic Management Plan will be implemented in full.

Safety Officer

The Safety Officer will be responsible for implementing all safety requirements detailed in the Project Safety Plan. Ensure that all operatives receive site safety induction prior to commencing work on site. He will ensure that all plant, particularly lifting equipment, on site has the relevant certification and are checked regularly by a competent person. The Safety Officer will carry out safety audits and checks on a regular basis and amend procedures where necessary.

Construction Manager

The Construction Manager will be responsible for overall supervision of the operations to ensure they are constructed in a safe and efficient manner. He will ensure that sufficient resources are available to meet the programme and that the necessary information is provided to the appropriate staff.

Foreman

The Foreman is responsible for ensuring that the crew carry out the work in accordance with the method statement and contract specifications and drawings using good working practices in a safe manner. He will supervise construction personnel ensuring their competence. He will check all plant and equipment on a regular basis ensuring it is maintained and in good working order.

Wind Turbine Generator Deliveries

The components of up to 22 no. Wind Turbine Generators (WTG's) will be transported by road to the main energy park site for on-site assembly, using the access route outlined in the above Turbine Delivery Route Assessment Report.

Wind turbine component deliveries, cranes and all large plant associated with turbine installations will use the turbine delivery route.

It is expected that the turbines will be delivered in sections to the site as follows:

- Foundation anchors x 1
- Towers x 3/4
- Blades x 3
- Hub x 1
- Nacelle x 1
- Switchgear Components x 1

Restricted Public Road Use by Construction Traffic

The local authority may impose restrictions on the use of some local roads. These will be agreed in liaison with Cork County Council prior to construction and will be outlined in this section, as well as specific signage requirements for construction works.

Some of the existing local roads are narrow, and to this effect, one-way delivery and access route systems may be employed to mitigate against unsuitable two-way construction traffic. Using local roads is unavoidable, however, introducing a one-way system where necessary and restricting construction traffic access to a small number of roads will minimise disruption to the local community.

Materials will be delivered to site via the haul routes shown in Figure 3-1.

Road Closures, Diversions and Safety Measures for Road Crossings

It is envisaged that road closures will be necessary for the carrying out portions of the cable trenching, with the majority of the proposed cable trenching taking place on existing local roads. The consent of Cork County Council will be required and the necessary road diversions together with the appropriate signage will be put in place. As there is a good network of local roads, it is anticipated that there are a number of options available for diverting traffic which will allow flexibility during this process of construction and maintain local access at all times during this element of the works.

It is proposed to maintain local access at all times during this element of the works. It is proposed that all access points (domestic, business, farm) are considered when finalising the temporary road closures and diversions. Diversion signage should also be included.

Safety measures for road users adjacent to deep excavations, such as temporary concrete barriers should be detailed for Trenchless Road Crossings in advance of construction and agreed with Cork County Council.

Road Cleaning

Public roads shall be kept free of mud, dust, spillages and debris from the construction site, construction plant or haulage vehicles. Any necessary measures shall be put in place at the site entry/exit points.

Carriageway/ Road Reinstatement

It is anticipated that the proposed haul routes will be capable of accommodating the construction traffic associated with the project. After the main contractor is appointed and the haul routes are agreed with Cork County Council. In the event that there are concerns around the structural capacity of a road on a proposed haul route, a structural survey shall be carried out to determine suitability of the existing roads to carry the loading. Where the structural survey indicates that a proposed haul route is not in a suitable condition, details of any upgrading works required shall be submitted to Cork County Council for approval. The developer shall upgrade the road or junction in advance of haulage operations.

A pre-condition survey of haul routes, consisting of a video survey and photographs shall be carried out and a copy submitted to Cork County Council. Any damage caused to the road shall be repaired to its previous condition, to the satisfaction of Cork County Council. Any defects that appear during the haulage period shall be rectified by the project owner.

Additional Information and Mitigation Measures

There is potential that other developments could create cumulative traffic and transportation related impacts with CGEP if not adequately planned for. The above measures set out in this TMP will insure conflicts with these developments will be avoided.

Cumulative existing and proposed developments include the following:

Bottlehill Landfill

One of the western access points for CGEP is located at the Bottlehill Landfill site (off the L-1217 local road). The site entrance here will accommodate access to the Bottlehill part of the site for standard construction vehicles. Vehicles entering the site at this point shall only have the right to access turbines T2 – T7.

While the first phase of the landfill has been constructed, it is currently not operational. At the time of writing it is unknown when the landfill will begin receiving waste.

It is not expected that landfill operations would conflict with turbine deliveries or construction of the grid connection route as there would be insufficient interaction to create a cumulative impact.

Existing Forestry Activities

Existing forestry operations consist of low numbers of HGV's periodically entering and leaving the site with the average number of HGV trips associated with these activities amounting to approximately 32 loads per week or up to 13 HGV trips per day.

The following sawmills are located in the vicinity of the proposed development.

- Duhallow Sawmills Limited, Dromagh, Co. Cork;
- Walsh Sawmills, Kildorrery, Co. Cork;
- Sheehan Patrick Sawmills Ltd., Ballyporeen, Co. Tipperary;
- Graingers Sawmills .GP, Enniskeane, Ballymoney, Co. Cork;

- Enniskeane, Timber Products Ltd., Ballineen, Co. Cork;
- Glennon brothers Cork Ltd, Farran South, Fermoy Co. Cork;
- GP Wood, Lissarda, Co. Cork.

All of the above sawmills are located close to national routes and area easily accessible from the project haul main transport routes via the N20, N72 and M8.

Replant Lands

Replanting works will take place at Moneygorm which is located adjacent to the proposed wind farm site. Works associated with replanting are expected to be very low. HGV traffic associated with replanting works involve the mobilisation of an excavator for drainage works (if required) and delivery of tree saplings by truck. The works can be carried out by a small team.

M20 Motorway Project

The M20 motorway project from Limerick to Cork is currently at feasibility stage. In the highly unlikely scenario that this project commences during the construction phase of CGEP there is the potential for a direct cumulative negative effect on the receiving environment in the form of increased construction traffic and disruption, especially on local roads near the proposed CGEP development site during construction of the section of motorway near the turn off for Bottlehill Landfill. It should be noted that expected impacts associated with the M20 development would have a considerably greater adverse effect on the existing road network than CGEP and would form vast majority of the overall cumulative impact.

M28 Motorway Project

The M28 Cork to Ringaskiddy Project is the upgrade of approximately 12.5km of the N28 National Primary Route from the N40 South Ring Road, at Bloomfield Interchange, to Ringaskiddy, Co. Cork.

Transport Infrastructure Ireland is the proponent of this project and the project has been included in the government's Infrastructure and Capital Investment Plan 2016 – 2021.

Construction is expected to take between 30 and 36 months and traffic impacts associated with the M28 development would have a considerably greater adverse effect on the existing road network in comparison to CGEP.

This project is over 20km from the proposed CGEP site. In the highly unlikely scenario that this project commences during turbine delivery for CGEP, the proposed roads scheme may result in a cumulative impact due to its interaction with the proposed TDR between Ringaskiddy and Dunkettle where the scheme terminates.

Dunkettle Interchange Upgrade Project

Transport Infrastructure Ireland (TII) has developed proposals to improve the Dunkettle Interchange which is located approximately 6km to the east of Cork City, just north of the Jack Lynch Tunnel.

The Interchange is strategically important as it is the intersection of a number of key national routes:

- The M8/N8 Dublin to Cork Road;
- The N25 Cork to Waterford Road; and
- The N40 Southern Ring Road (through the Jack Lynch Tunnel).

Construction of preliminary phases of the project has already commenced and the total duration of the construction works is expected to be 2.5 years. The construction of the interchange project will be carried out over several phases with traffic management measures in place to ensure continuous traffic flows in all directions through the junction during the construction works. A review of proposed designs for the revised junction indicates that the turbine delivery route and proposed mitigations outlined here will not be impacted by the new layout.

This project is over 18km from the proposed CGEP site. In the unlikely scenario that this project commences during turbine delivery for CGEP, the proposed roads scheme may result in a cumulative impact due to its interaction with the proposed TDR between Ringaskiddy and Silversprings where the scheme extends.

Consented Wind Turbine at Glannasack

A planning consent exists for a single wind development 1km from the site near Glannasack (planning ref. 11/06168). This consists of a single wind turbine of a smaller scale to those proposed at CHEP.

4.4 Environmental Management Team - Structure and Responsibility

A preliminary organisation chart is included in Figure 4-1. Revisions to the project organisation chart shall be controlled independently of this plan following the appointment of the Contractor for the main construction works.

The Contractor's Project Manager will be responsible for the delivery of all elements of the Environmental Management Plan.

The Contractor's Project Manager will retain all responsibility for issuing, changing and monitoring the Environmental Management Plan throughout.

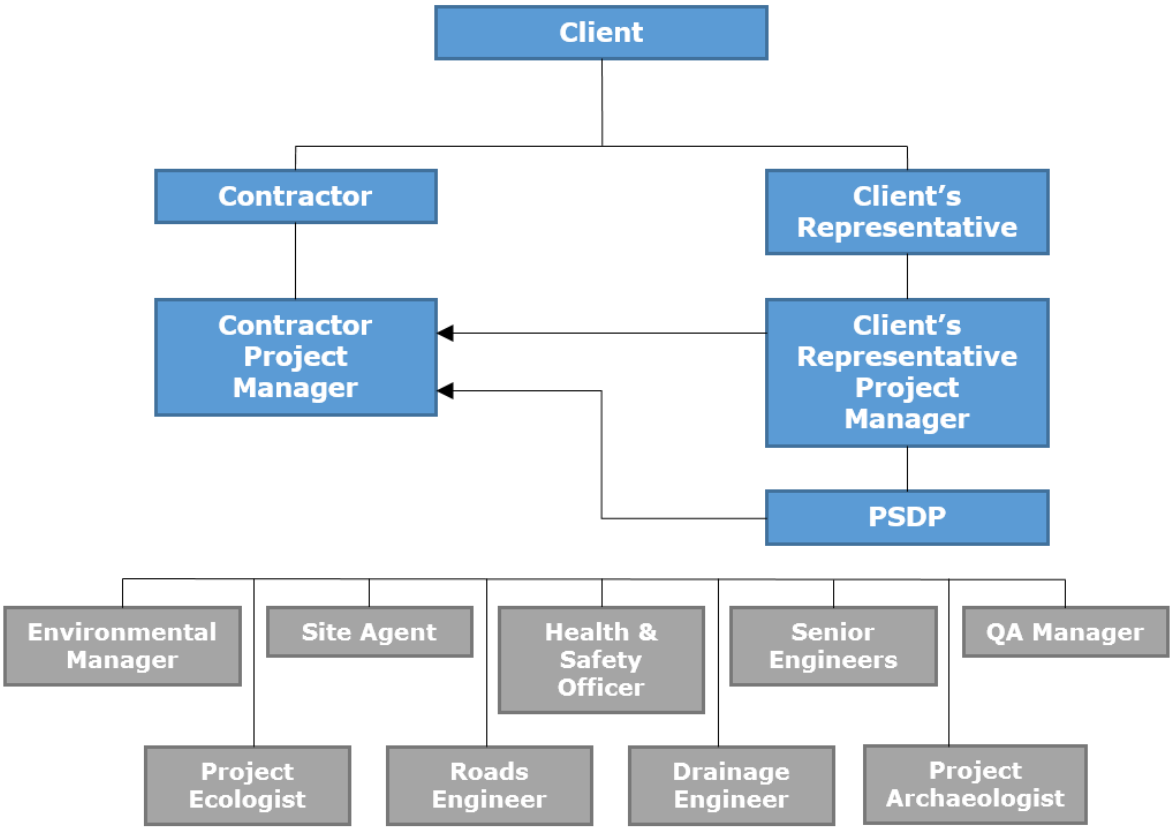

Figure 4-1: Project Management Team Organogram

4.5 Training, Awareness and Competence

All site personnel will receive environmental awareness information as part of their initial site briefing. The detail of the information should be tailored to the scope of their work on site.

The contractor for the main construction works may decide to conduct the environmental awareness training at the same time as Health and Safety Training (often referred to as Site Inductions).

This will ensure that personnel are familiar with the environmental aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures.

The CEMP will be posted on the main site notice board during the project. The environmental performance at the site is on the agenda of the monthly project management meetings for the project.

Elements of the CEMP will be discussed at these meetings including objectives and targets, the effectiveness of environmental procedures etc. Two-way communication will be encouraged by inviting all personnel to offer their comments on environmental performance at the site.

4.6 Environmental Policy

The contractor is responsible for preparing and maintaining an Environmental Policy for the site. The policy should be appropriate to the project, commit to continuous improvement and compliance with legal requirements and provide a framework for objectives and targets. This will be communicated to all site personnel and will be available on site notice boards.

4.7 Register of Environmental Aspects

The contractor is responsible for preparing and maintaining a *Register of Environmental Aspects* pertaining to the site. This register will identify the environmental aspects associated with activities onsite and determine which aspects have or can have a significant impact on the environment.

4.8 Register of Legislation

The contractor is responsible for preparing and maintaining a register of key environmental legislation pertaining to the site. This register will reference all current environmental legislation and will be inspected, reviewed and updated regularly to ensure compliance.

4.9 Objectives and Targets

Objectives and targets are required to be set to ensure that the project can be constructed and operated in full accordance with the EIAR, planning conditions and legislative requirements, with minimal impact on the environment.

Environmental objectives are the broad goals that the contractor must set in order to improve environmental performance. Environmental targets are set performance measurements (key performance indicators or KPI's) that must be met in order to realise a given objective.

The contractor will set objectives based on each significant environmental impact. Key objectives are likely to include the following:

- To ensure that the rivers and streams are not negatively impacted by construction works.
- To ensure that humans are not negatively impacted by dust generated by construction works.
- To ensure that humans are not negatively impacted by noise or vibration generated by construction works.
- To ensure that impacts to habitats and wildlife are minimised during works.
- To ensure that a waste management plan for this site will be fully implemented.
- To ensure that the visual impact during the construction work is minimised.
- To ensure Coom Green Energy Park is constructed in compliance with the EIAR.

Performance in relation to each of these objectives will be reviewed on a regular basis by means of inspections, audits, monitoring programmes, etc.

4.10 Non-Conformance, Corrective and Preventative Action

Non-Conformance Notices will be issued where there is a situation where limits associated with activities on the project are exceeded, or there is an internal/external complaint associated with environmental performance.

Non-Conformance is the situation where essential components of the EMS are absent or dysfunctional, or where there is insufficient control of the activities and processes to the extent that the functionality of the EMS in terms of the policy, objectives and management programmes, is compromised. A Non-Conformance register should be controlled by the contractor.

The EMS and all its components must conform to the EMP, objectives and targets and the requirements of the ISO 14001 management standard.

In the event of non-conformance with any of the above, the following must be undertaken:

- Cause of the non-compliance;
- Develop a plan for correction of the non-compliance;
- Determine preventive measures and ensure they are effective;
- Verify the effectiveness of the correction of the non-compliance;
- Ensure that any procedures affected by the corrective action taken are revised accordingly.

Responsibility must be designated for the investigation, correction, mitigation and prevention of non-conformance.

4.11 EMS Documentation

The Contractor is required to keep the following documentation in relation to the environmental management of the project (as a minimum):

- Construction Environmental Management Plan for Coom Green Energy Park
- Register of Environmental Impacts
- Register of Planning Conditions
- Monitoring Records
- Minutes of Meetings
- Training Records
- Audit and Review Records

All these documents and records are to be available for inspection in the site office. The documentation shall be to date and shall be reviewed on a regular basis with revisions controlled in accordance with the site quality plan.

4.12 Control of Documents

The Contractor will establish, implement and maintain a procedure to control CEMP documents and records so they are clearly identifiable, organised, current, easily located and revised when necessary.

5. SAFETY & HEALTH MANAGEMENT PLAN

5.1 Introduction

This Safety and Health Management Plan (SHMP) defines the work practices, procedures and management responsibilities relating to the management of health and safety during the design, construction and operation of the Coom Green Energy Park and shall be read in conjunction with the Preliminary Safety & Health Plan prepared for the project by the Project Supervisor for the Design Process. The Safety and Health Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works.

This SHMP describes how the contractor for the main construction works will implement a site safety management system (SMS) on this project to meet the specified contractual, regulatory and statutory requirements, environmental impact statement mitigation measures and planning conditions. It is the contractor's responsibility to implement an effective safety management system to ensure that the developer's safety requirements for the construction of this project are met.

All site personnel will be required to be familiar with the requirements of the safety management plan as related to their role on site. The plan describes the project organisation and sets out the health and safety procedures that will be adopted on site.

- The Safety and Health Plan is a controlled document and will be reviewed and revised as necessary.
- A copy of the Safety and Health Plan will be located on/near the site H&S notice board.
- All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of the SHMP and its contents.

5.2 Project Obligations

The construction of the Coom Green Energy Park will impose numerous safety management obligations on the developer, designer and contractor. As well as statutory obligations, there are several specific obligations set out in the EIAR and in the planning conditions for the proposed wind farm. These obligations are set out below. The contractor for the main construction works and all its sub-contractors are to ensure that they are fully aware of and in compliance with these safety obligations.

5.2.1 EIA Obligations

EIAR obligations are described in Section 4.2.1.

5.2.2 Planning Permission Obligations

Planning permission obligations will be fully outlined in the Contractor's CEMP.

5.2.3 Statutory Obligations

The Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction) Regulations 2013 place a responsibility on the Developer as the "Client", the Designer, the Project Supervisors and the Contractor.

The Client must:

- Appoint a competent and adequately resourced Project Supervisor for the Design Phase (PSDP)
- Appoint a competent and adequately resourced Supervisor for the Construction Stage (PSCS)
- Be satisfied that each designer and contractor appointed has adequate training, knowledge, experience and resources for the work to be performed
- Co-operate with the project supervisor and supply necessary information
- Keep and make available the safety file for the completed structure
- Provide a copy of the safety and health plan prepared by the PSDP to every person tendering for the project
- Notify the Authority of the appointment of the PSDP.

Designers must:

- Identify any hazards that their design may present during construction and subsequent maintenance
- Eliminate the hazards or reduce the risk
- Communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the safety and health plan
- Co-operate with other designers and the PSDP or PSCP
- Take account of any existing safety and health plan or safety file
- Comply with directions issued by the PSDP or PSCS.

The PSDP must:

- Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project
- Where possible, eliminate the hazards or reduce the risks
- Communicate necessary control measure, design assumptions or remaining risks to the PSCS so they can be dealt with in the safety and health plan
- Ensure that the work of designers is coordinated to ensure safety
- Organise co-operation between designers
- Prepare a written safety and health plan for any project and deliver it to the client prior to tender
- Prepare a safety file for the completed structure and give it to the client.

The PSCS must:

- Co-ordinate the identification of hazards, the elimination of the hazards or the reduction of risks during construction
- Develop the Safety and Health Plan initially prepared by the PSDP before construction commences
- Co-ordinate the implementation of the construction regulations by contractors
- Organise cooperation between contractors and the provision of information
- Co-ordinate the reporting of accidents to the Authority
- Notify the Authority before construction commences
- Provide information to the site safety representative
- Co-ordinate the checking of sage working procedures
- Co-ordinate measures to restrict entry on to the site
- Co-ordinate the provision and maintenance of welfare facilities
- Co-ordinate arrangements to ensure that craft, general construction workers and security workers have a Safety Awareness card, e.g. Safe Pass and a Construction Skills card where required
- Co-ordinate the appointment of a site safety representative where there are more than 20 persons on site
- Appoint a safety adviser where there are more than 100 on site
- Provide all necessary safety file information to the PSDP
- Monitor the compliance of contractors and others and take corrective action where necessary;
- Notify the Authority and the client of non-compliance with any written directions issued.

The Contractor must:

- Co-operate with the PSCS
- Promptly provide the PSCS with information required for the safety file
- Comply with directions of the project supervisors
- Report accidents to the Authority and to the PSCS where an employee cannot perform their normal work for more than 3 days
- Comply with site rules and the safety and health plan and ensure that your employees comply
- Identify hazards, eliminate the hazards or reduce risks during construction
- Facilitate the site safety representative
- Ensure that relevant workers have a safety awareness card and a construction skills card where required
- Provide workers with site specific induction
- Appoint a safety officer where there are more than 20 on site or 30 employed
- Consult workers with site specific induction
- Monitor compliance and take corrective action.

Consequently, at all stages of the project there are statutory requirements for the management of safety, health and welfare of all involved in or affected by the development. As previously outlined this CEMP and specifically the Safety and Health Management Plan addresses key construction management issues associated with the proposed wind farm. This plan will be developed further at the construction stage, on the appointment of the Contractor for the main construction works.

5.2.4 The Management of Health and Safety during the Design Process

Fehily Timoney & Company (FTC) has been appointed Project Supervisor for the Design Process (to prepare the Environmental Impact Statement and planning application for the proposed Coom Green Energy Park development) and is competent to fulfil this role in accordance with the Safety, Health and Welfare at Work (Construction) Regulations, 2013. Health and safety are a major priority for FTC and FTC adopts health and safety practices that are an inherent part of a safe and sustainable business. FTC's objective is to provide a safe and healthy work environment for all and to meet our duties to clients, contractors and members of the public.

It is FTC's policy to comply fully with all health and safety legislation, in particular the Safety, Health and Welfare at Work Act, 2005, Safety, Health and Welfare at Work (General Application) Regulations 2007, and the Safety, Health and Welfare at Work (Construction) Regulations 2013.

FTC has developed in-house procedures to ensure, so far as is reasonably practicable, that all projects:

- are designed to be capable of being constructed to be safe/ without risk to health;
- can be operated and maintained safely and without risk to health during use; and
- comply in all respects, as appropriate, with the relevant statutory enactments and instruments.

These procedures include effective risk management procedures involving the identification and evaluation of risks and the development of mitigation measures to eliminate (where possible) or reduce those risks during the life-cycle of the project. The FTC team is committed to health and safety and shares responsibility for managing risk at all stages of a project.

All work by FTC is undertaken in a competent and efficient manner taking account of the general principles of prevention to safeguard the safety, health and welfare of construction & maintenance workers and other third parties.

The FTC procedures for the management of safety during the design process are outlined in the in-house procedure PP09 "Health and Safety Requirements in Design Projects" and is adhered to on all design projects.

The purpose of this procedure is to define the requirements for the management of health & safety during design projects, to ensure compliance with The Safety, Health and Welfare at Work (Construction) Regulations 2013.

The procedure includes standard forms which are used to communicate health and safety considerations within the design team and also guidelines which develop the company's health and safety procedure and outline the company's responsibilities for health and safety during the design process.

The procedure addresses health and safety issues at all stages of a project, from the preliminary design through to commissioning and operation.

By establishing a chain of responsibility each party is clear on their role and obligations from a health and safety perspective. Risk assessments are carried out, at preliminary and detailed design stages by every discipline involved in the design. Each risk assessment is prepared by the designers and reviewed by the Health and Safety Facilitator for the project.

Risk assessments are used to identify hazards and assess risk at all stages during the life of the project including the construction & maintenance stages.

A Health and Safety Facilitator for the Design Process (HSF) is appointed on all projects where FTC are the Project Supervisor for the Design Process (PSDP).

Health & Safety Facilitators are selected from the senior ranks of FTC design staff to ensure they have the required knowledge, experience and training to carry out the role.

Meetings will be held between the HSF and relevant design personnel to collate all the risk assessments and other pertinent information and to discuss any issues relating to health and safety and ensure the constructability of the designs. The minutes of these meetings are circulated to the entire design team complete with actions allocated to the designers as appropriate. At such a meeting a "Construction Risk Analysis" form is completed which forms the basis for the Preliminary Safety & Health Plan. This document outlines the particular, significant and residual risks and in addition specific construction methods or sequences assumed during the design. Special requirements for maintenance envisaged at design stage are also included.

A Designers Safety File shall be kept and maintained during the design. All design criteria adopted, and safety & health information required for the Safety File shall be kept in this file which is maintained by the HSF and is the pre-cursor to the Safety File. The information required from the Contractor/ PSCS for inclusion in the Safety File is specified at tender stage in the Preliminary Safety and Health Plan.

This information from the PSCS & Contractor(s) and the Designers Safety File is used to compile the Safety File in the latter stages of a contract and formally issued to the Client on completion of the contract.

FTC promotes a collaborative approach to health and safety on site where the Client, PSDP, Designers, Contractors and PSCS co-operate with each other and share information. Joint site safety audits and/or walk-downs are carried out as part of this collaboration and safety is monitored and addressed on site on an ongoing basis. The regular safety meetings are held to document this ongoing co-operation, get an over-view of works currently in hand onsite and about to commence and share information.

5.2.5 The Preliminary Safety and Health Plan

In accordance with the requirements of the Safety, Health & Welfare at Work (Construction) Regulations 2013 a Preliminary Safety & Health Plan will be required as part of the design process. This plan will be further developed by the PSCS on appointment and maintained as a live document during construction and commissioning of the development.

The safety and health plan is required to include the following information:

- a general description of the project;
- details of other work activities taking place on site;
- works involving particular risks;

- the timescale for the project and the basis on which the time frame was established;
- conclusions drawn by designers and the PSDP having taken into account the General Principles of Prevention and any relevant Safety and Health Plan or Safety File;
- the location of electricity water and sewage connections so as to facilitate early establishment of welfare facilities.

In accordance with the PSDP's procedures the Preliminary Safety & Health Plan for the proposed Coom Green Energy Park development should include the following sections and subsections to ensure the PSCS is aware of the health and safety issues at tender stage and enable them to price accordingly:

Preamble:

1 General Project Information:
- 1.1 Title
- 1.2 Description of Project
- 1.3 Employer
- 1.4 Designers / Other Consultants
- 1.5 Project Supervisor Design Process
- 1.6 Drawings, Specifications and Other Documents
- 1.7 Intended Contract Commencement Date
- 1.8 Intended Contract Completion Date
- 1.9 Basis for Contract Duration
- 1.10 Restrictions on Working Hours
- 1.11 Notification of Project
- 1.12 Termination of the PSCS Appointment

2 The Existing Environment:
- 2.1 Site Location
- 2.2 Relevant Adjoining Land Uses
- 2.3 Site Restrictions
- 2.4 Restrictions on Access
- 2.5 Hazardous Area Classification
- 2.6 Existing Services
- 2.7 Ground Conditions
- 2.8 Existing Hazards
- 2.9 Liaison with Statutory Bodies

3 Other Work Activities:
- 3.1 Other Contracts Which May Affect Work
- 3.2 Occupation of Site
- 3.3 Building Activities
- 3.4 Other Work Activities
- 3.5 Emergency Procedures in Place on Site

4 Particular and Residual Risks:
- 4.1 Works Which Puts Persons at Work at risk
- 4.2 Work Which Puts Persons at Risk from Chemical or Biological Substances
- 4.3 Work with Ionising Radiation
- 4.4 Work near High Voltage Power Lines
- 4.5 Work Exposing Persons at Work to the Risk of Drowning
- 4.6 Work on Wells, Underground Earthworks and Tunnels
- 4.7 Work Carried Out by Divers at Work Having a System of Air Supply
- 4.8 Work Carried Out in a Caisson with a Compressed Air Atmosphere
- 4.9 Work Involving the Use of Explosives
- 4.10 Work Involving the Assembly or Dismantling of Heavy Prefabricated Components
- 4.11 Work Involving Hazardous Material
- 4.12 Residual Risks

5 Additional Information:
- 5.1 Existing Documents
- 5.2 Site Possession
- 5.3 Site Rules
- 5.4 Site Specific Safety Objectives
- 5.5 Phasing of Works
- 5.6 Permits / Authorisation Required
- 5.7 Maintenance
- 5.8 Continuing Liaison
- 5.9 Specific Recommendations

6 Information Required for Safety File:
- 6.1 Information Required for Safety File from PSCS

5.2.6 The Management of Health and Safety during the Construction Phase

The selection criteria for the Contractor for the works will be based on the ability to construct the works in a manner that will not endanger the safety, health and welfare of any parties and competence to fulfil the role of PSCS.

The contract will be awarded on the basis of assessment of the candidates against relevant health and safety criteria including experience of similar projects, knowledge of the construction processes involved and training of their management and staff who will be involved in carrying out the works.

5.2.7 The Construction Stage Safety and Health Plan

In accordance with the requirements of the Safety, Health & Welfare at Work (Construction) Regulations 2013 the preliminary Safety & Health Plan prepared by the PSDP will be further developed by the PSCS before the commencement of the construction work and updated on a regular basis during the construction phase of the project.

The document will include the following sections and subsections to ensure the management of health and safety during the construction phase of the project:

1. Description of Project:
    - project description and programme details
    - details of client, PSDP and PSCS, designers
    - main contractor and other consultants
    - extent and location of existing records and plans
    - arrangements for communicating with Contractors, PSDP and others as appropriate

2. Communication and Management of the Work:
    - management structure and responsibilities
    - safety and health goals for the project and arrangements for monitoring and review of safety and health performance
    - arrangements for:
        - regular liaison between parties on site
        - consultation with the workforce
        - the exchange of design information between the Client, Designers, Project Supervisor for the Design Process, Project Supervisor Construction Stage and Contractors on site
        - handling design changes during the project
        - the selection and control of contractors
        - the exchange of safety and health information between contractors
        - security, site induction, and on-site training
        - welfare facilities and first aid
        - the production and approval of risk assessments and method statements
        - the reporting and investigation of accidents and other incidents (including near misses)
    - site rules
    - fire and emergency procedures

3. Arrangements for Controlling Significant Site Risks:
    - safety risks
        - services, including temporary electrical installations
        - preventing falls
        - work with or near fragile materials
        - control of lifting operations
        - dealing with services (water, electricity and gas)
        - the maintenance of plant and equipment
        - poor ground conditions
        - traffic routes and segregation of vehicles and pedestrians
        - storage of hazardous materials
        - dealing with existing unstable structures

- accommodating adjacent land use
- other significant safety risks

- Health risks:
  - removal of asbestos
  - dealing with contaminated land
  - manual handling
  - use of hazardous substances
  - reducing noise and vibration
  - other significant health risks

The construction stage safety and health plan will be maintained on site by the PSCS and will be communicated to all relevant parties on an ongoing basis through inductions, site safety meetings and tool box talks etc. as required.

6. EMERGENCY RESPONSE PLAN

6.1 Introduction

This chapter of the CEMP presents an Emergency Response Plan for the proposed project. The Emergency Response Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works and following detailed design development.

This Emergency Response Plan contains predetermined guidelines and procedures to ensure the safety, health and welfare of everybody involved in the project and to protect the environment during the construction phase of Coom Green Energy Park. This outlines the immediate response to an emergency or disaster situation and will be developed by the main construction works contractor and PSCS as part of their construction stage Safety and Health Plan.

An emergency is any disruptive or harmful event that endangers people, environment, property or assets. Emergencies can be small, as in a fire contained by employees using firefighting equipment or large, as in a disaster resulting from a storm.

In the context of the Coom Green Energy Park, examples of Emergency Response Plan emergency events are:

- medical emergency
- explosion
- overheated equipment
- chemical and fuel spill
- fire
- loss of power
- vehicle incidents

Example sources of emergency or disaster events are:

- unstable/inappropriate stockpiles on site
- faulty or incorrect use of equipment
- falls from height
- smoking
- storm/adverse weather
- power failure
- fuel spill
- road failure
- serious vehicle collisions or overturning

6.2 Emergency Response Plan

An emergency response plan deals with the immediate physical effects of a disaster and outlines the initial response.

6.2.1 Emergency Response Liaison

The contractor/PSCS will designate an individual to serve as the Emergency Response Liaison for this project. The emergency response liaison will coordinate the emergency response for the duration of any emergency at or nearby the project site.

The local County Council, An Garda Síochána and the HSE Ambulance Co-ordinator will be provided with the construction programme and the onsite contact information from the Emergency Response Liaison prior to construction.

The Emergency Response Liaison will be immediately reachable at all times during project construction. The Liaison will coordinate with the above agencies to establish emergency procedures for access to and within the site in the event of an emergency.

6.2.2 Reporting Emergencies

In the event of fire, storm, flood, serious injury or other emergency, contact:

ALL ON SITE EMERGENCIES DIAL 999

6.2.3 Designated Responder

A map depicting tower locations with the emergency meeting point will be furnished to Cork County Council Fire Department and HSE ambulance co-ordinators.

Upon arrival on the scene, the senior EMS Officer will set up the incident command structure. The Emergency Response Liaison and all contractor's personnel will cooperate with directions of the incident commander and assist as directed.

The nearest emergency services, ambulance and Accident & Emergency (A&E) facilities are:

Service:	Contact Details:	
Accident & Emergency (A&E)	Mallow General Hospital	(022) 21251
Accident & Emergency (A&E)	Cork University Hospital	(021) 492 2000
Ambulance Service	Dial 112 or 999	

Service:	Contact Details:	
Fire Services	Dial 112 or 999	
Garda Station	Glanmire Garda Station	+353 21 4821002
District HQ:	Mayfield Garda Station	+353 21 4558517
Divisional HQ:	Anglesea Street Garda Station	+353 21 4522011

Each member of the contractor's site team who are First-Aid and Cardiopulmonary Resuscitation (CPR) trained personnel will be identifiable with a hard hat sticker indicating their training.

6.2.4 Emergency Alarm

The emergency alarm will be raised on site as soon as an emergency situation is detected, the alarm will be identified (contractor to check those that apply):

	Air Horn		Radio		Voice		Hand Signals		Siren

6.2.5 Emergency Reporting

In the event of an emergency the nearest supervisor with radio equipment/mobile phone will be notified. The degree of emergency will be reported to the Emergency Response Liaison who will contact the Emergency Services and request the appropriate emergency service.

6.2.6 Medical Protocol

In the event of a major medical emergency, the emergency centre (999) will be notified and an ambulance and emergency medical team will respond to the scene. All major medical cases require professional (ambulance) transportation. In the event of a minor medical case, the affected employee can be transported via company vehicle in the escort of a foreman or site engineer (with first aid training).

6.2.7 Emergency Response

Upon notification, the Emergency Response Liaison will respond to the emergency scene and manage emergency operations:

1. Assess hazards and make the area safe – If you cannot enter the area without risking your safety, don't do it, call the Emergency Services immediately and wait for them. If you think you can safety enter the area, look around the emergency scene for anything that can be dangerous or hazardous to you, the casualty, or anyone else at the scene. Bystanders can help with making the area safe.

First aid kits will be available on site. Operators that have been first aid/CPR/AED trained will be listed on site and easily identifiable by a hard hat sticker.

2. Take charge of the situation – if you are the first-aid provider on the scene act fast. If someone is already in charge, briefly introduce yourself and see if that person needs any help. If there is any chance the casualty could have a head or spinal injury, tell them not to move.

3. Get Consent – always identify yourself as a first-aid provider and offer to help. Always ask for consent before touching a conscious adult casualty and always ask for consent from a parent or guardian before touching an unconscious or conscious child or infant. With an unconscious adult casualty consent is implied as it is generally accepted that most people want to live. Remember to protect yourself first by wearing gloves and eye protection.

4. Assess Responsiveness – is the casualty conscious or unconscious? Note their response while you are asking them for their consent. If they respond, continue with the primary survey, and if they don't respond, be aware that an unconscious casualty is or has the potential of being a breathing emergency.

5. Call out for help – this will attract bystanders. Help is always useful in an emergency situation. Someone can be called over to phone for medical help. Others can bring blankets if needed, get water, etc. a bystander can help with any of the following:

- Make the area safe.
- Find all the casualties.
- Find the first aid kit, or any useful medical supplies.
- Control the crowd.
- Call for medical help.
- Help give first aid, under your direction.
- Gather and protect the casualty's belongings.
- Take notes, gather information, be a witness.
- Reassure the casualty's relatives.
- Lead the ambulance attendants to the scene of the emergency.
- Notify Emergency Services as soon as you can. Either send a bystander or call yourself.

In the event of a major medical emergency the Emergency Response Liaison, as the person-in-charge of the emergency scene, will dispatch someone to the site access point nearest the emergency scene to direct and lead arriving outside responders to the emergency scene. The designated meeting point will be agreed prior to the commencement of construction. Emergency personnel will be met at this meeting point communicated by management during the 999 call. The emergency personnel escort will use the hazard lights on their vehicle so they are easily identified.

6.2.8 Escape and Evacuation Procedure

Dependent upon the degree of the emergency and if safe to do so, employees will evacuate to the designated assembly area where the designated wardens shall account for all employees and determine if anyone still remains within the emergency scene.

Should a wild land fire or peat slippage occur, and the designated assembly area is compromised other locations will be designated as secondary assembly areas.

6.2.9 Tower Rescue Procedure

In the event personnel are trapped or injured in an elevated tower position the following protocol will be initiated:

1. The Emergency protocol will be initiated
2. Emergency Response Liaison will be notified
3. Tower Rescue Team will be activated and respond to the scene
4. Outside medical and Rescue Teams will be notified and respond to the scene.

Tower Rescue Procedure:

1. Upon learning of an emergency, the on-scene foreman shall assess the emergency and ascertain its degree, location and the extent of any injuries.
2. Upon confirming that an emergency exists the on-scene foreman notifies the Emergency Response Liaison and the project Office.
3. Upon notification of the emergency the Emergency Response Liaison shall notify senior project supervision and the local emergency centre (999) of the emergency.
4. The Emergency Response Liaison shall inform the dispatcher of the location, tower number, the degree of the emergency and the extent of injuries.

6.2.10 Prevention of Illness/Injury Due to Weather/Elements

1. All employees will have access to shelter and heat in the event of inclement weather.
2. Employees will have access to at least a litre of water at all times.
3. High wind warnings and weather forecast will be discussed every morning with the crews. Weather conditions and forecast will be monitored regularly by management.
4. No Employee will work alone. A buddy system will be used so employees can contact a supervisor in case of an emergency.

6.2.11 Environmental Emergency Procedure

An emergency preparedness and response procedure is required to prevent environmental pollution incidents. Emergency Silt Control and Spillage Response Procedures are included in Section 4.3.3 of this CEMP.

Suitable spill kits and absorbent material for dealing with oil spills will be maintained on site. In the event of pollution or potential risk of pollution the Local Authority should be informed immediately.

In the case of water pollution in addition to the Local Authority, Inland Fisheries Ireland should also be informed immediately.

6.2.12 Emergency Response Plan – Haul Routes

Emergency Response Procedure relating to transportation of plant, equipment and materials to site to be developed by the main contractor during the construction phase of the wind farm

6.2.13 Catastrophic Events – Wind Turbines and Battery Energy Storage Systems

Potential catastrophic events associated with operational wind turbines and battery energy storage systems include:

- Wind turbine toppling (due to foundation or tower failure);
- Wind turbine rotational failure in extreme wind conditions (due to control system or rotor break failure);
- Fire.

The primary mitigation against a catastrophic event that may endanger the health and safety of the public implemented at design stage through adequate siting of wind turbines which provide sufficient set back distances from occupied buildings and other infrastructure to avoid the risk of impact in the event of wind turbine collapse.

The maximum tip height for wind turbines at this site 169m. No wind turbine is located within 750m of a residential dwelling or 400m of the nearest commercial building No turbines have been located within 2 x tip height of the proposed on-site substations in accordance with Eirgrid general functional specifications. A minimum setback distance of 3.5 x rotor diameter has been imposed between wind turbines and existing HV overhead lines in accordance with Eirgrid general functional specifications.

Wind turbines shall be fitted with fire suppression systems and will have emergency escape procedures in place for operational staff in the event of fire in a wind turbine.

The proposed battery energy storage system units shall include the following minimum safety measures:

- A battery management system (BMS) shall be capable of detecting problems using cell and module voltage measurements and select temperature measurements within the batteries. Automatic disconnect of the batteries will occur if any unusual parameters are measured;
- The BMS shall maintain strict control of charging and discharging of the batteries. Voltage, current, temperature and state of charge are all measured and controlled to ensure safe charging and discharging to prevent electrical abuse of the system;
- Cells shall be kept at an optimal operating temperature and will not exceed safe temperature ranges. An automatic trigger system will be incorporated to foldback power if safe temperature ranges are exceeded;
- A fire suppression system shall be incorporated into the facility's design. The system shall include the following elements at a minimum:
    - Battery storage containers shall have dedicated fire detection and suppression system;
    - The system shall include ionization smoke sensors and a linear heat sensor cable to detect presence of a fire;

  - The system shall include strobe light/horn to provide indication of smoke and fire detection for personnel inside the container, and external warning lights for personnel outside the container;
  - The system shall use a gaseous, clean firefighting agent to suppress fire;
- Regular visual inspections and testing of battery system equipment shall be incorporated into the project's operation and maintenance schedule as per manufacturers requirements;
- Fire safety measures and equipment in the facility must be kept in effective working order. This includes all fixtures and fittings such as fire doors, staircases, corridors, fire detection and alarm systems, fire-fighting equipment, notices and emergency lighting. Regular checks, periodic servicing and maintenance must be carried out, whatever the size of the workplace. Any defects should be put right as quickly as possible;
- A nominated competent person shall carry out checks and routine maintenance work to ensure the reliability and safe operation of fire-fighting equipment and installed systems such as fire alarms and emergency lighting. A record of the work carried out on such equipment and systems will kept on site at all times;
- The system shall include an abort switch that can be operated at any time with overriding manual abort system.

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 1

Surface Water Management Plan

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

COOM GREEN ENERGY PARK

SURFACE WATER MANAGEMENT PLAN

Prepared for: Coom Green Energy Park Limited

coom green energy

Date: December 2020

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1. SITE DRAINAGE MANAGEMENT PLAN

This Site Drainage Management Plan should be read in conjunction with the EIAR. The Site Drainage Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works.

1.1 Daily Preparation during the Implementation of the Surface Water Management Plan

The Drainage Engineer appointed by the contractor should conduct regular meetings with the Construction Management Team to discuss the phasing of construction and drainage as the work progresses. The focus of these meetings will be on establishing an operational drainage system in advance of the progression of the works. Particular regard will be taken of daily weather conditions and long-range forecasts.

The Drainage Engineer will have the authority to suspend the works if weather conditions are deemed too extreme for the effective protection of receiving watercourses. Mitigation measures to protect receiving watercourses will be put in place as directed by the Drainage Engineer in response to extreme forecasts.

1.1.1 Personnel Qualifications and Key Contacts

All those carrying out work on site must have a Fás/Solas Safe Pass Card. All works must be supervised by a competent supervisor. Workers must be adequately trained in the tasks they are required to carry out. The key contact names and contact details should be supplied to all personnel entering the site. All site staff should be informed of the emergency procedures for the site.

1.2 Construction Stage Impacts

During the construction period, the development has the potential to lead to impacts on hydrology and water quality unless appropriate mitigation is applied.

Tree felling, new site access roads, turbine hard-standing areas, the on-site sub-station and other new, hard surfaces have the potential to contribute to an increase in run-off and release of sediments in the watercourses.

No modifications are proposed at stream crossings to facilitate the turbine delivery route and therefore no potential hydrological impacts are expected from the Turbine Delivery Route.

Modifications along the TDR involves the temporary removal of street furniture and removal of some vegetation in addition to the temporary local widening at bends using hardcore material. Inappropriate management of the carrying out of these modifications could result in blockages of existing roadside drainage.

During construction, the transport of both dissolved and sediment-bound nutrients from soil to water could deleteriously affect water quality downstream, in the absence of mitigation measures. Nutrient transport from soil to water, may lead to eutrophication in waters receiving drainage from the site.

A detailed description of the potential construction stage impacts on hydrology and water quality can be found in Chapter 10 of the EIAR.

1.3 Operational Phase Impacts

The main hydrological impact of the development is the increase in runoff. Due to the insignificance of the increase in runoff from the development, the grassing over the drainage swales, and the non-intrusive nature of site operations, there is a negligible risk of sediment release to the watercourses during the operational stage.

1.4 Decommissioning Stage Impacts

The potential impacts associated with decommissioning will be similar in nature to those associated with construction of the Coom Green Energy park.

It is proposed that turbine foundations and hardstanding areas are left in place and covered with local topsoil and revegetated. Removal of this infrastructure would result in considerable disruption to the local environment in terms of an increased possibility of sedimentation. It is considered that leaving the turbine foundations hardstanding areas in-situ will cause less environmental damage than removing them.

Grid connection cables will be left in the ground, therefore no potential impacts during decommissioning stage are likely to occur.

It is proposed that the internal site access tracks will be left in place, subject to agreement with Cork County Council and the relevant landowners.

1.5 Drainage of Wind Farm during the Construction and Operation Phases

Sustainable Drainage Systems (SuDS)

Where possible, sustainable drainage systems, in the form of grassed swales will be used to drain the permitted development. The grassed swales will serve to slow down the velocities of flows draining the hardcore surfaces of the hardstanding areas and the access tracks. The proposed layout of the drainage system for CGEP is provided in Appendix 1.

The grassed swales will also treat the surface water run-off, removing some of the sediment borne contaminants. These grassed swales will serve to detain flows and reduce the velocities of surface water flows. The swales will be 0.3 m in depth with a bottom width of 0.5 m and side slopes of 1 in 3. A grassed swale is shown on Figure 1.

The swales will be constructed in accordance with CIRIA C698 Site Handbook for the Construction of SUDS. Swale draining to settlement pond is shown on Figure 2.

76 settlement ponds will be put in place in advance as construction progresses across the site. Settlement ponds will have a diffuse stone filled outflow which will encourage the diffuse spread of flows overland and back into natural drains down slope of the settlement ponds. Drainage stone will be placed at the inlet to the ponds to filter the flows before they enter the ponds.

After passing through the settlement ponds, the concentration of suspended solids in the surface water run-off due to the excavations will be reduced to within acceptable levels in accordance with Directive 2006/44/EC – European Communities (Quality of Fresh Waters Needing Protection or Improvement to Support Fish Life).

In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow from these ponds for a limited period. The settlement ponds will be fenced off for safety. Erosion control and retention facilities, including settlement ponds will be regularly maintained during the construction phase.

Figure 1: Grassed Swale along access track

The drainage system will remain operational and will be utilised for the decommissioning phase to treat any surface water from exposed areas as a result of decommissioning at the site. During the decommissioning of the turbine base, hardstanding areas and access tracks should remain in place and be covered with local soil/topsoil to minimise disturbance to soils. Removal of this infrastructure would result in considerable disruption to the local environment in terms of increased sedimentation, erosion, dust, noise, traffic and an increased possibility of contamination of the local water table. However, if removal is deemed to be required all infrastructure will be removed with mitigation measures in line to those during construction being employed.

The drainage system outlined below provides for a multi-stage treatment train of the discharges from the development, as recommended in the SUDS manual:

- grassed swales removing some of the sediment borne contaminants
- settlement ponds providing retention and treatment of discharges
- diffuse outflow from settlement ponds providing for further retention and settlement of suspended solids by reducing the velocities of flows and increasing the flow path of discharges
- continuation of flows by natural flow paths over vegetated areas before entering the watercourse, providing further retention and treatment of discharges.

Figure 2: Swale draining to Settlement pond

Drainage of Temporary Site Compound

The compound will be set back a minimum of 50m from streams. Drains around the hard-standing areas of the site compound will be in the form of shallow grassed swales to minimise the disturbance to sub-soils.

Filter drains may be used where trafficking by site staff is required to access the temporary site compound. The filter drains/swales will drain to a suitably designed settlement pond. The settlement pond will be backfilled at the temporary compound following the construction period and the vacation of the temporary site compound.

Refuelling of plant during construction will be carried out at the temporary compound. The station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. In addition to the above, onsite re-fuelling of machinery will be carried out 100m from watercourses using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site or at the designated refuelling area and will be towed by a 4x4 jeep to designated re-fuelling areas near to where machinery is located but at distances of greater than 100m from watercourses. Drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.

Concrete washout will be carried out in a dedicated area of the temporary compound or at a designated washout pit on site. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement lagoon provided to receive all run-off.

Any diesel or fuel oils stored at the temporary site compound will be bunded. The bund capacity will be sufficient to contain 110% of the tank's maximum capacity. Where there is more than one tank within the bund, the capacity will be sufficient to accommodate 110% of the largest tank's maximum capacity or 25% of the total maximum capacities of all tanks, whichever is the greater. Design and installation of fuel tanks will be in accordance with best practice guidelines BPGCS005 (Oil Storage Guidelines).

Portaloos and/ or containerised toilets and welfare units with storage tanks will be used to provide toilet facilities for site personnel during construction. The sanitary waste will be removed from site by a licensed waste disposal contractor.

All portaloo units located on site during the construction phase will be operated and maintained in accordance with the manufacturer's instructions, and will be serviced under contract with the supplier. All such units will be removed off-site following completion of the construction phase.

Temporary petrol and oil interceptors will be installed at the site compound and at all locations dedicated for plant repairs/storage of fuel/temporary generator installation. Surface water run-off from the compound will be directed through a Class 1 Full Retention Oil Interceptor before discharge to the surface water drainage system for the site. This surface water drain flows to a settlement pond before final discharge over land. A trained and dedicated environmental and fuel spill emergency response team will be set up on site before commencement of construction on-site. An example of Oil Interceptor Class 1 is provided in the Appendix 2.

Drainage of Overland Flows

Existing overland flow channels will be maintained, and cross-drains provided in the access tracks to allow continuity of flow. Where required, on the upslope side of new sections of access track and hardstanding areas, overland flows will be intercepted in channels. The flow will then be discharged diffusely over vegetated areas. Cross-drains will be provided where required at a minimum of 200m intervals. The roadside drains will therefore only carry the site access track runoff. This will ensure that there will be no mixing of 'clean' and 'dirty' water and will avoid a large concentration of flows. Thus, erosion risks will be reduced and the quantity of water requiring treatment will be minimised.

Drainage of Site Access Tracks

The permitted new site access tracks will be drained via roadside grassed swales with settlement ponds at the end of the swale run. At slopes greater than 2%, check dams will be required in the swales and interceptor drains to slow down the velocities of flows and prevent erosion occurring, as shown in Figure 3. These check dams will be in stone of minimum size 37.5 mm and will be laid at a spacing of between 9 and 30 m dependent on the slope.

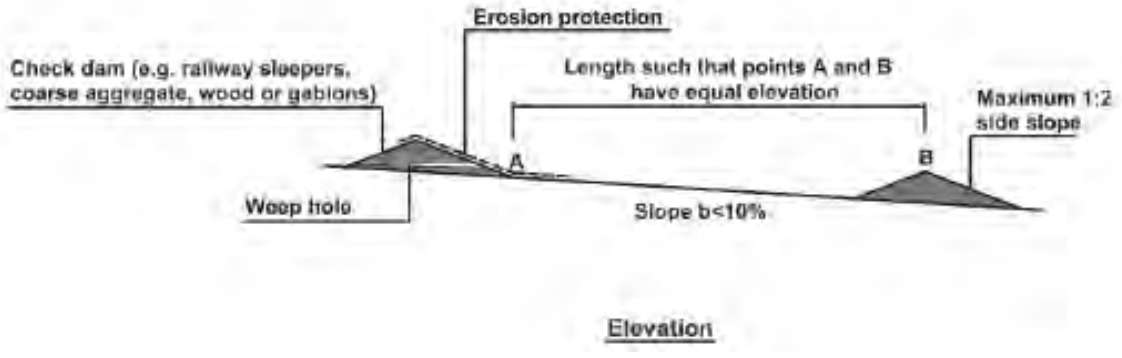

Figure 3: Check Dam Details

The roadside swales will drain to settlement ponds before discharging diffusely overland. The settlement ponds will remain in place following the construction period.

Silt traps will be provided in swales which will consist of geotextile staked across the swale at regular intervals. The geotextile will be weighed down on the upstream side with clean filter stone to provide further filtration and stability to the silt trap, as shown in Figure 4 to Figure 6.

Silt fencing will be kept on site and erected as required during construction to provide further protection to prevent the ingress of silt into the watercourses. The silt fencing will be kept in place until the natural vegetation has been re-established.

Site drainage, including silt traps and settlement ponds, will be put in place in parallel with or ahead of construction, such that excavation for new infrastructure will have a functioning drainage system in place.

Figure 4: Silt Trap across Grassed Swale

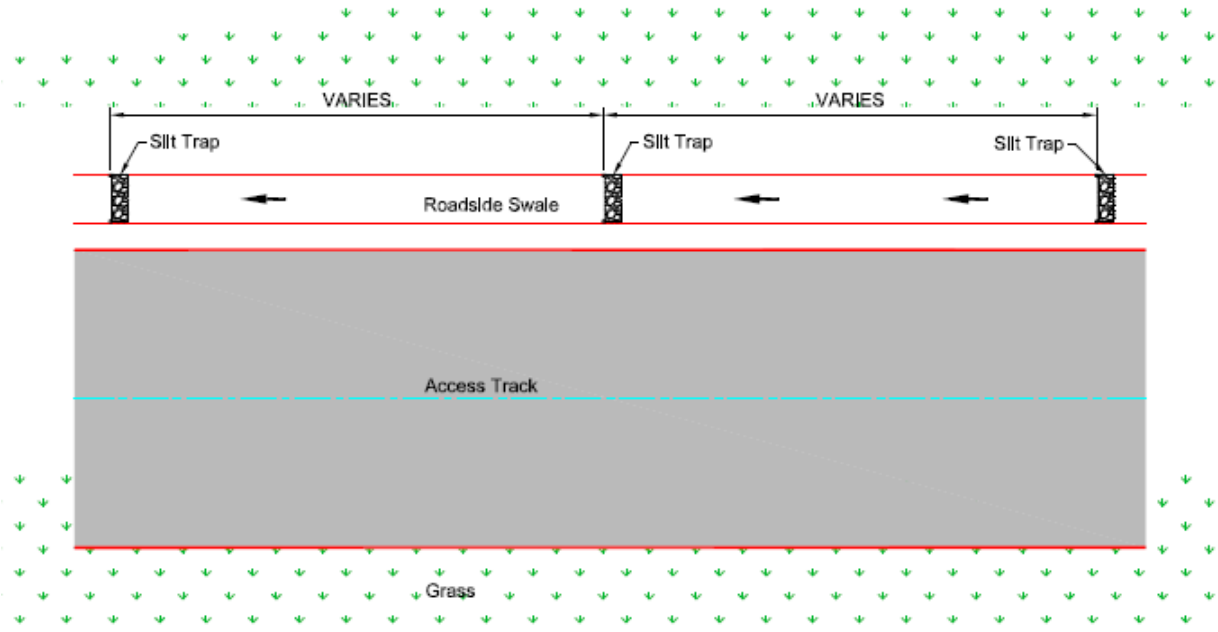

Figure 5: Plan of Silt Trap in Swale

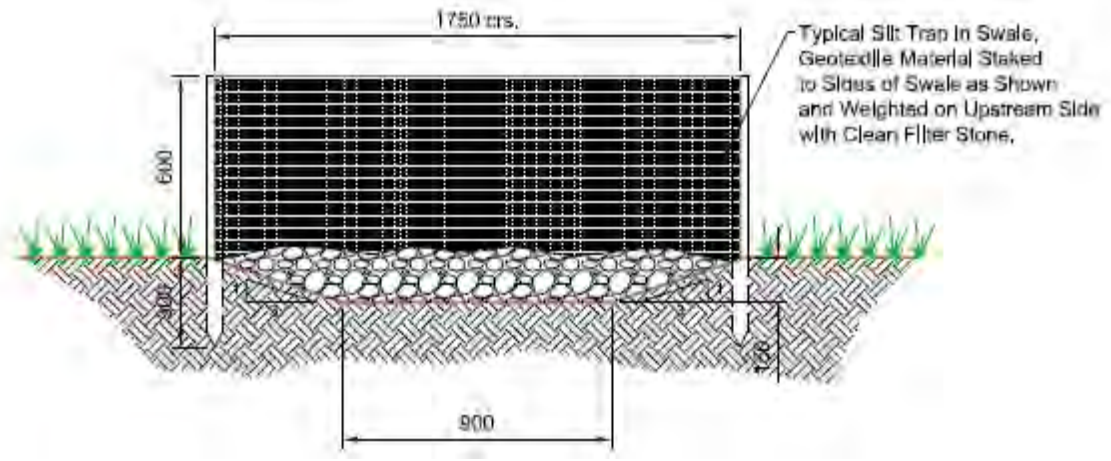

Figure 6: Silt Trap Details

Drainage of Turbine Bases and Hardstanding

The excavations for turbines will be pumped into the site drainage system (including settlement ponds), which will be constructed at site clearance stage, in advance of excavations for the turbine bases.

As discussed above, the new turbine hard-standing areas will be drained via shallow swales with suitably designed settlement ponds. The settlement ponds will remain in place following the construction period.

If cross-drains are required to convey the drainage across the hardstanding area, the diameters will be suitably designed in advance.

Drainage of Cable Trenches

Cables running throughout the wind farm site will be installed in trenches adjacent to site access tracks, where possible. Cable trenches will be excavated using a mechanical excavator and the excavated materials placed in small bunds adjacent to the trenches for back filling, as shown in Figure 7.

The seed bank is to be retained for placing back as the top layer of backfill to the trench, to aid successful restoration of vegetation in disturbed areas.

Cable trenches will be excavated during dry periods where possible, in short sections and left open for minimal periods, to avoid acting as a conduit for surface water flows. Clay bunds will be constructed at up to 10m intervals within the cable trench.

Figure 7: Backfill over Cable Trench

Procedure for Dewatering of Excavations

Standing water, which could arise in excavations, has the potential to contain an increased concentration of suspended solids as a result of the disturbance to soils. Water in the excavations for turbines will be pumped into the site drainage system which will be constructed at site clearance stage, in advance of excavations for the turbine bases.

Drainage of Substation

The permitted on-site substation will be drained using shallow swales, with a suitably designed settlement pond. The settlement pond will remain in place following the construction period. At the upslope side of the sub-station overland flows will be intercepted in channels and discharged diffusely over vegetated areas.

A suitable permanent petrol and oil interceptor shall be installed to deal with all substation surface water drainage.

Permanent sanitary facilities will be provided at the substation.

The runoff from roofs will be collected to water harvesting tanks. Waste water will drain to a tank which will be regularly emptied and maintained.

Drainage of Stockpiled Material

During the construction period, the excavated material will be used to reinstate the turbine bases.

All excavations shall be constructed and backfilled as quickly as possible. Excavation will stop during or immediately after heavy rainfall.

Excavation will precede the turbine base construction, cable trench and access track construction. Soil will be excavated and replaced with granular fill where required. Excavation will be carried out from access tracks where possible in order to reduce the compaction of topsoil.

During the construction period, spoil heaps from the excavations for the turbine bases will be stored temporarily. These temporary spoil heaps will be covered if required and surrounded by silt fences to filter sediment from the surface water run-off from excavated material. The silt fences will be inspected regularly and after rainfall events by Environmental Clerk of Works (ECOW).

Surplus soil or rock excavated during the course of the works will be used on site in the form of landscaping including low berms, where appropriate. No spoil stockpiles will be left on site after construction is completed.

It should be noted that any stockpiling will be short-term and temporary and will occur only within the site boundary as the construction proceeds. The site drainage system will be put in place prior to excavation, therefore the discharge routes from any temporary stockpiling will be via the site drainage system. A minimum buffer of 50m will be provided between temporary stockpiles and the nearest watercourse.

Watercourse Crossings

Existing stream crossings will be protected using silt fencing.

Minor drains such as manmade agricultural and bog drains will be crossed using suitably designed pipe culverts.

Turbine delivery will not take place during extreme weather conditions.

Climate Change

To accommodate the effect of future climate change in Ireland, the 100-year peak flow values for stream crossing designs should be multiplied by 1.2 to obtain the design 100-year flood value for the crossing.

Wash Down from Concrete Trucks and Cement Mixers

Concrete washout will be carried out in a dedicated area of the temporary compound. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement lagoon provided to receive all run-off.

An adequately designed settlement lagoon will be provided to receive all runoff from the concrete wash down area, similar to that shown in Figure 8. Regular inspections of the wash down areas and associated settlement lagoons shall be carried out and adequate records kept.

The settlement lagoon shall be lined using a 1mm LLDPE impermeable liner. A sump will be provided at this location which will collect the wash water from the concrete trucks. The excavated material will be kept on site for reinstatement following the construction period.

Figure 8: Lined Settlement Lagoon for Concrete Washout Facility

During construction, wash water and any solids in the sump will be removed periodically to an appropriate licensed facility. The sump can be emptied daily if required. Following construction, any solids, the liner, and any remaining wash water in the sump will all be removed to an appropriate licensed facility for disposal. The sump will then be reinstated.

1.6 Mitigation Measures for Flooding

Settlement ponds are to be provided as part of the drainage system for the development. The settlement ponds, together with the swales, will serve to reduce velocities in the surface water runoff draining from the access tracks and hardstanding areas and will provide retention of the flows. This will also mitigate any increase in the risk of flooding.

No construction personnel, operation or maintenance personnel will be permitted on site during extreme flood events. Landowners will carry on their normal activities in the vicinity of the development and will take the usual precautionary measures as far as practicable during flood events.

1.7 Mitigation Measures for Pollution Control to Protect Water Quality in Downstream Receptors

All personnel working on site will be trained in pollution incident control response. An emergency response procedure is prepared herein which will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt.

Silt Protection Controls (SPCs) are proposed at the location of watercourse crossings and where haul roads pass close to watercourses, silt fencing will be used to protect the streams.

Silt traps will also be provided at outfalls from roadside swales. Silt traps will be kept upstream of outfalls to allow a buffer zone to the outfall. Additional silt fencing will be kept on site in case of an emergency break out of silt laden run-off.

Settlement ponds will be put in place in advance as construction progresses across the site. The settlement ponds with a diffuse outflow detail will mitigate any increase in runoff and treat suspended solids in the surface water runoff. Erosion control and retention facilities, including settlement ponds will be regularly maintained during the construction phase.

All stockpile material will be bunded adequately and protected from heavy rainfall to reduce silt runoff, where necessary. Adequate security will be provided to prevent spillage as a result of vandalism.

Drains around hardstanding areas will be shallow to minimize the disturbance to sub-soils.

Suitably sized cross-drains will be provided for drainage crossings to convey flows from agricultural drains and forestry drains across the access tracks, to prevent a risk of clogging.

Tracks will be capped as soon as practicably possible to cover exposed subsoils and as such reduce the concentration of suspended solids in the run-off.

All open water bodies adjacent to proposed construction areas will be protected by fencing, including the proposed settlement ponds.

Additional protection will be provided in the form of silt fencing downslope where required and at existing stream crossings during construction, to further ensure that there is no impact from the development to streams and rivers crossing the site.

Where haul roads pass close to watercourses, silt fencing will be used to protect the streams. Silt traps will also be provided at outfalls from roadside swales. Silt traps will be kept upstream of outfalls to allow a buffer zone to the outfall.

Refuelling of plant during construction will be carried out at the temporary compound, which will be located a minimum of 50m from any watercourse. The station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. In addition to the above, onsite re-fuelling of machinery will be carried out 100m from watercourses using a mobile double skinned fuel bowser.

The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site or at the designated refuelling area and will be towed by a 4x4 jeep to designated re-fuelling areas near to where machinery is located but at distances of greater than 100m from watercourses. Drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.

Concrete washout will be carried out in a dedicated area of the temporary compound. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement lagoon provided to receive all run-off. During construction concrete will be kept out of all watercourses and drains.

Any diesel, fuel or hydraulic oils stored at the temporary site compound will be bunded. The bund capacity will be sufficient to contain 110% of the tank's maximum capacity.

Vehicles entering the site should be in good working order, free from leakage of fuel or hydraulic fluid.

A wheel wash will be provided at the site entrance draining to a silt trap to avoid any silt laden run-off flowing on to the public road and entering roadside drains.

Portaloos and/or containerised toilets and welfare units will be used to provide toilet facilities for site personnel during construction. Sanitary waste will be removed from site via a licenced waste disposal contractor.

Silt fencing will be erected at the location of stream crossings along the cable route.

1.8 Emergency Silt Control and Spillage Response Procedures

All personnel working on site will be trained in pollution incident control response. An emergency response plan will be prepared which will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt. A regular review of forecasts of heavy rainfall is required and a contingency plan will be prepared for before and after such events. A record will be kept of daily visual examinations of watercourses which receive flows from the permitted development, during and for an agreed period after the construction phase. Procedures for particular accidental spillages, from leaking or damaged fuel lines or a break out of silt are outlined below.

Oils, Fuels and Site Vehicles

Refuelling of plant during construction will be carried out at the temporary compound. The station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. In addition to the above, onsite re-fuelling of machinery will be carried out 100m from watercourses using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site or at the designated refuelling area and will be towed by a 4x4 jeep to designated re-fuelling areas near to where machinery is located but at distances of greater than 100m from watercourses.

Details of tests to be carried out on Storage tanks to a recognized standard together with a secondary containment system to provide at least 110% of the maximum tank capacity are as follows:

All tank and drum storage areas shall, as a minimum, be bunded, either locally or remotely, to a volume not less than the greater of the following:

a. 110% of the capacity of the largest tank or drum within the bunded area; or

b. 25% of the total volume of substance which could be stored within the bunded area.

Accidental spillage from leaking or damaged fuel lines

Emergency drip trays and spill kits will be kept available on site for use in emergencies to ensure that any spills from vehicles are contained and removed off site. Each refuelling station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site.

In the case of water pollution in addition to the Local Authority, Inland Fisheries Ireland should also be informed immediately.

In the event of an accidental spillage from leaking or damaged fuel lines, the spillage will be cleaned up with absorbent material e.g. sand or turf mould and placed in a designated bunded location while awaiting removal offsite to a licensed facility.

In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow from these ponds for a limited period.

Accidental break out of silt

Following an accidental break out of silt, emergency measures will be put in place. During the construction period an emergency facility will be provided with sand bags to block off the outlet in the sedimentation ponds to prevent discharge from the sedimentation ponds in the event of a break out of the silt.

Additional silt fencing will be available on site for use in emergencies.

The drainage engineer should be contacted if there is an accidental spillage or break out of silt on the site.

1.9 Maintenance of Site Drainage Systems

The drainage system for the development should be maintained regularly to keep it operating effectively. The maintenance should include the following:

- inspection and maintenance of swales;
- inspecting cross-drains for any blockages;
- inspecting settlement ponds and outfalls;
- inspecting the stream crossings and piped crossings for obstructions;
- inspecting the progress of the re-establishment of vegetation;
- implementing appropriate remedial measures as required after the above inspections.

1.10 Construction Stage Mitigation Measures

Long range weather forecasts should be examined, and the construction phases planned taking cognisance of expected weather conditions. Regular meetings should be held to re-assess construction phases with weather conditions as the project progresses.

Regular meetings should be held between the Drainage Engineer appointed by the contractor and the contractor's Project Manager. The planning of traffic routes through the site should be agreed in advance, in order to plan appropriate construction drainage management.

The proposed mitigation measures are listed in Chapter 10 of EIAR.

A detailed water quality monitoring programme will be undertaken during the construction phase of the proposed development, in addition to the visual inspections outlined above, so as to ensure the effective implementation of the proposed mitigation measures. A water quality monitoring plan is detailed below.

1.11 Water Quality Monitoring Plan

A monitoring programme will be established to ensure that the water quality is maintained. This programme will ensure that designed measures are working to ensure water quality is not affected. The details of this programme are outlined below.

Daily visual inspections of drains and outfalls will be performed during the construction period to ensure suspended solids are not entering the streams and rivers of the site, to identify any obstructions to channels, and to allow for appropriate maintenance of the drainage regime. If excessive suspended solids are noted, construction work will be stopped, and remediation measures will be put in place immediately.

Visual inspections will be continued during the operational period until vegetation is established on site at intervals to be agreed with Cork County Council/IFI.

A detailed water quality monitoring programme will be undertaken during the construction phase of the proposed development, in addition to the visual inspections outlined above, so as to ensure the effective implementation of the proposed mitigation measures. Field measurements and grab samples will be taken at suitable locations, which will be decided prior to the construction phase commencing. The field measurements will be recorded at the site and will include measurement of the following parameters, electrical conductivity (µs/cm), pH, temperature (ºC), suspended solids (mg/l) and dissolved oxygen (mg/l). The field measurements will be taken on a weekly basis during the site clearance and earthworks stage of the construction period. An ECOW will compare the results with the pre work levels and ensure that designed mitigation measures are working. An ECOW will propose new mitigation measures if results exceed pre work levels.

1.12 Operational Phase Mitigation Measures

It is not envisaged that the operation of the wind farm will result in significant impacts on the hydrological regime or water quality of the area, as there will be no further disturbance of soils post-construction, and only a minimum of traffic movement.

Oil used in transformers (at the substation and within each turbine) and storage of oils in tanks at the substation could leak during the operational phase and impact on groundwater quality. The substation transformer and oil storage tanks will be in a concrete bunded capable of holding 110% of the oil in the transformer and storage tanks. Turbine transformers are located within the turbines, so any leaks would be contained.

Visual inspections will be continued during the operational period until satisfactory vegetation is established on site at intervals to be agreed with Cork County Council/IFI.

It is not envisaged that the maintenance period will involve any significant impacts on the hydrological regime of the area. The maintenance of the development will incorporate effective maintenance of the drainage system. Visual inspections will be undertaken during the maintenance period in accordance with maintenance schedule in CIRIA C753. The maintenance regime will include inspecting the following:

- Drains, cross-drains and culverts for any blockages
- Outfalls to existing field drains and watercourses
- Existing roadside swales for any obstructions
- Swales
- Progress of the re-establishment of vegetation.

The maintenance regime will also include implementing appropriate remedial measures as required after the above inspections and testing the water quality at the outfalls at appropriate intervals.

1.13 Decommissioning Stage and Mitigation Measures

As in the construction phase silt protection controls would again be put in place. The drainage system will remain operational during the decommissioning phase and will serve to treat any sediment laden surface water runoff due to a renewed disturbance of soils. Revegetation following the backfilling of hardstanding areas will be monitored. If it is deemed necessary, erosion control matting will be used to assist in the re-establishment of vegetation.

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30 YEARS

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APPENDIX 1

Proposed Drainage Layout

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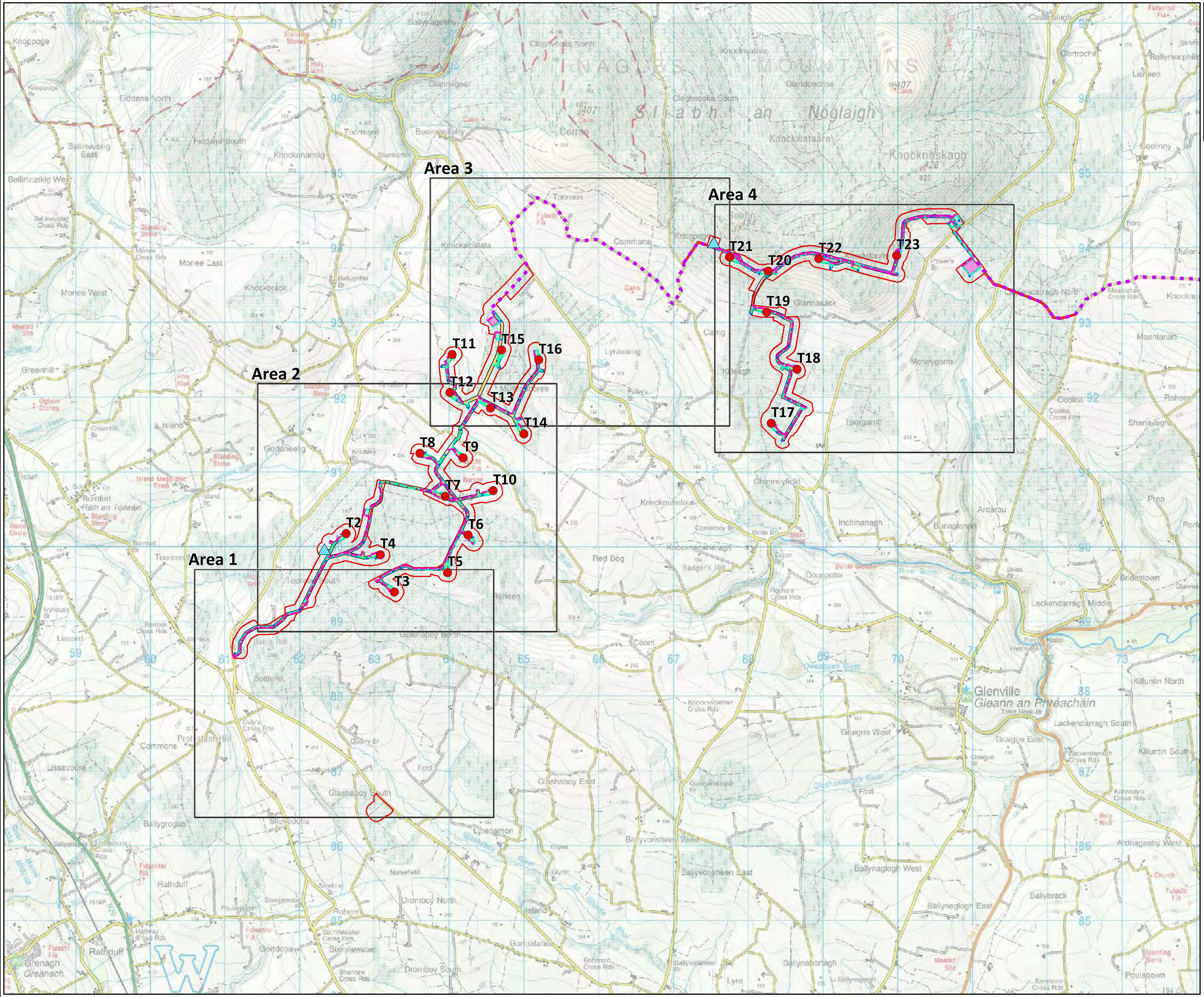

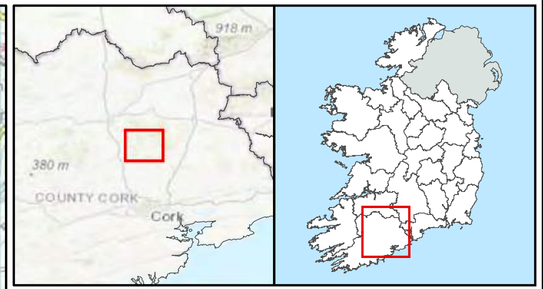

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Stilling Ponds
- Interceptor Ditch
- Swales
- Proposed Cable Route
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Borrow Pit
- Proposed Temporary Compound
- Proposed Substation
- P1306_DDPages_DevelopmentBoundary

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	Proposed Drainage Layout Overview		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:50000	**REVISION:**	0
DATE:	08/12/2020	**PAGE SIZE:**	A3

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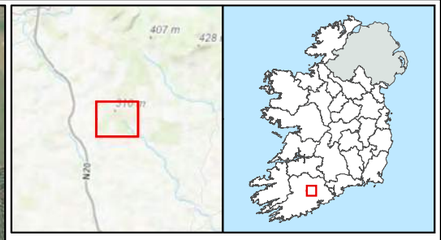

- Proposed Turbine Layout
- Stilling Ponds
- Interceptor Ditch
- Swales
- Proposed Development Boundary
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Temporary Compound

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	Proposed Drainage Layout Area 1		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
DATE:	08/12/2020	**PAGE SIZE:**	A3

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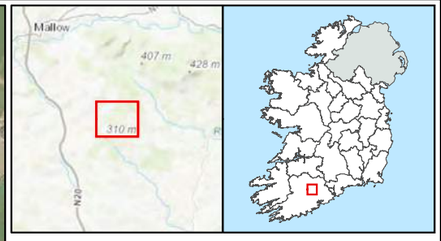

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Stilling Ponds
- Interceptor Ditch
- Swales
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Temporary Compound

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	Proposed Drainage Layout Area 2		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
DATE:	08/12/2020	**PAGE SIZE:**	A3

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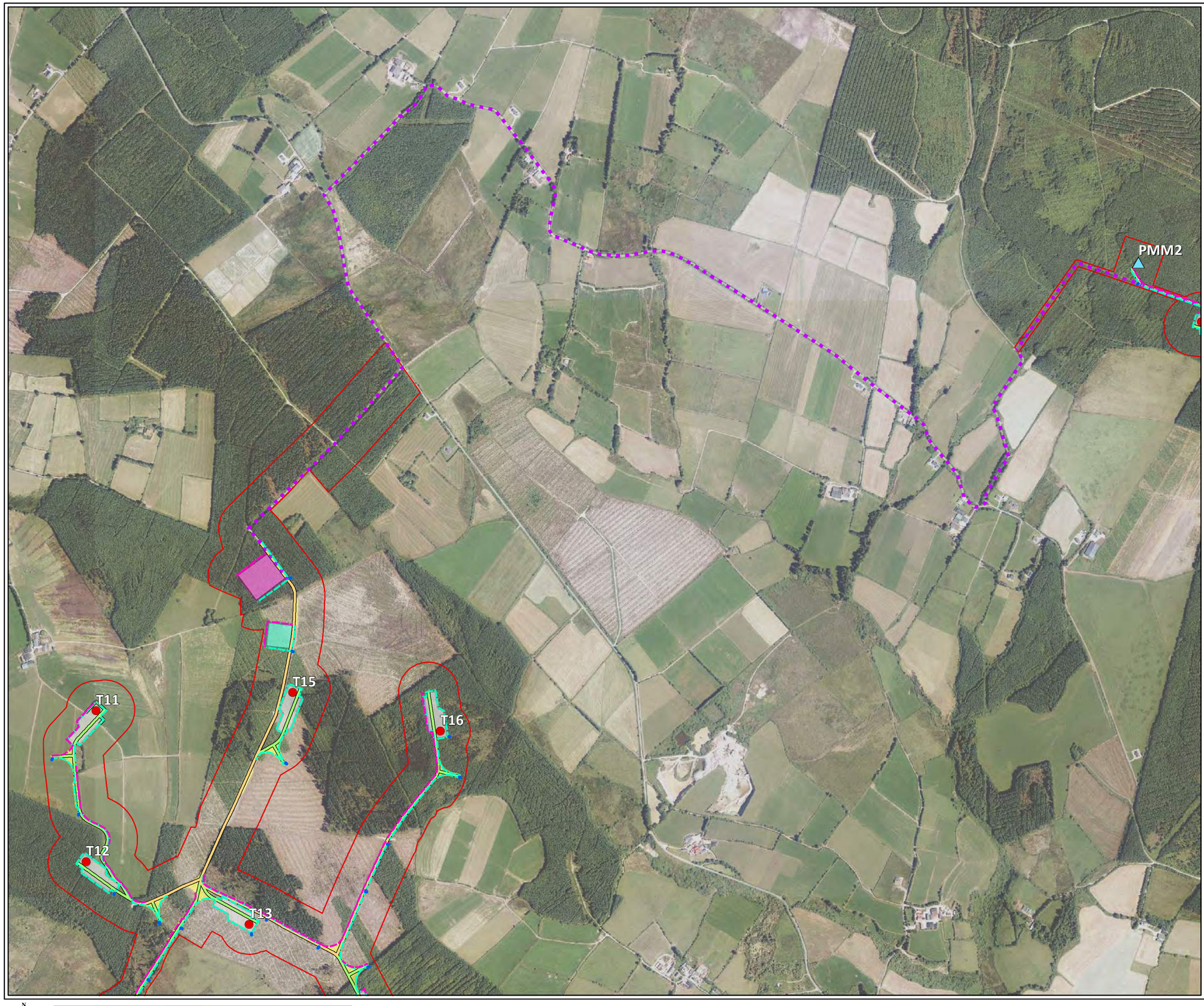

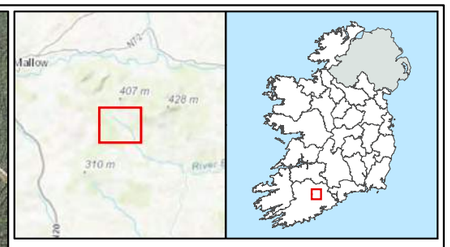

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Stilling Ponds
- Interceptor Ditch
- Swales
- Proposed Cable Route
- Proposed Development Boundary
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Substation

N W E S

0 0.25 0.5 1 Kilometers

TITLE: Proposed Drainage Layout Area 3

PROJECT: Coom Green Energy Park, Co. Cork

FIGURE NO:	1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
DATE:	08/12/2020	**PAGE SIZE:**	A3

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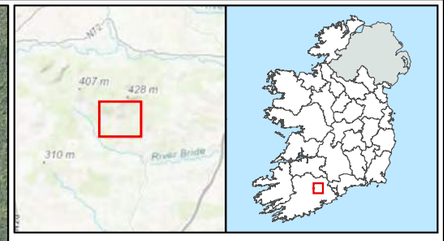

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Stilling Ponds
- Interceptor Ditch
- Swales
- Proposed Cable Route
- Proposed Development Boundary
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- Proposed Existing Road Upgrade
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- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Temporary Compound
- Proposed Substation

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	Proposed Drainage Layout Area 4		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
DATE:	08/12/2020	**PAGE SIZE:**	A3

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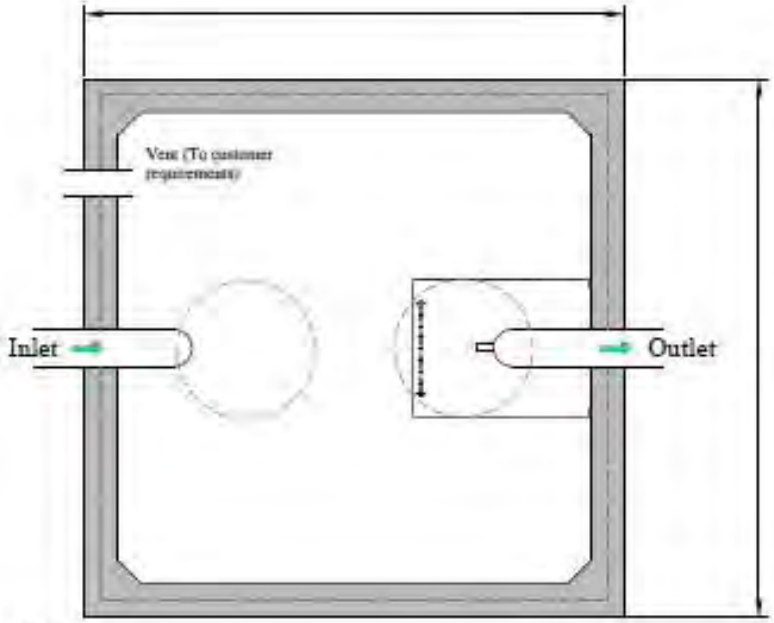
APPENDIX 2

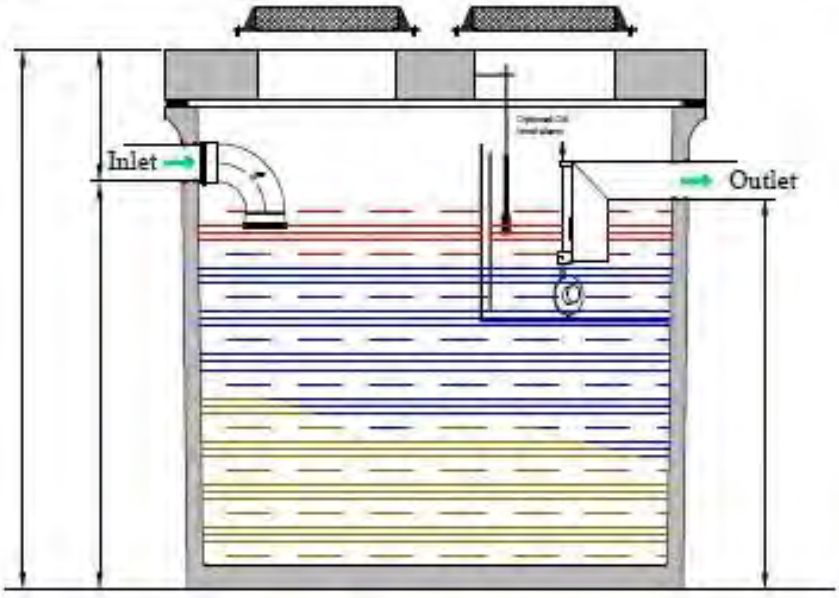
Class 1 Oil Interceptor – Example

Full Retention Interceptor Class 1



All the tanks must be placed on a perfectly level and firm suitable base.
Typical layout, variations as required per customer.

An anti-syphon vent is required for long run outflows



MOLLOY
PRECAST
Environmental Solutions
Clara Road, Tullamore, Co. Offaly, Ireland
Tel: 057 9328000 Info@molloyprecast.com
Fax: 057 9328080 www.molloyprecast.com

Note: Observe all safety regulations in regard to excavation and lifting requirements. Never leave opening uncovered or unattended at any time.
Note: Specify any specific requirements prior to ordering. All civil works by customer.
Note: Do not scale from this drawing. Only for illustration purposes.

Tank Type: C Full Retention Interceptor	**Title:**
Tank Size:	Full Retention Interceptors
Height:	**Date:**
Volume:	**Drg. No.:**
Weight:	**Drawn By:**

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APPENDIX 2

Turbine Delivery Route Report
(TDR Report)

Coom Green Energy Park

Route Survey Report

October 2018

Exceptional Load Services Ltd, Ballymoyle, Arklow, Co Wicklow, Ireland

T: +353-402-31229. E. permits@wide-loads.com

Customer	Fehily Timony & Company
Site Address	Coom Green Energy Park Bottlehill Co Cork
Survey Date	05/09/2018
Survey Personnel	Edwin Sunderland, ELS John Webb, ELS
Survey Criteria	To select most suitable route from Cork Harbour (Ringaskiddy) to site entrances. For the purpose of the survey the following route options were considered Site Entrance #1: Ringaskiddy – N28 – Bloomfield – N40 – Lynch Tunnel – N8 (Lower Glanmire Road) – Tivoli – R635 (Northlink) – Blackpool – N20 – L6955 – L6956. Site Entrance #2: No Workable route found. Site Entrance #3: Not Surveyed. Site Entrances #4,(5,6 & 7 included): Ringaskiddy – N28 – Bloomfield – N40 – M8 – (J14) – R639 – N72 – L1506 – L1507 – L1501.
Surveyed Dimensions	For this survey the following components were considered Blade: 65m It is assumed tower sections would be delivered on tower adaptors

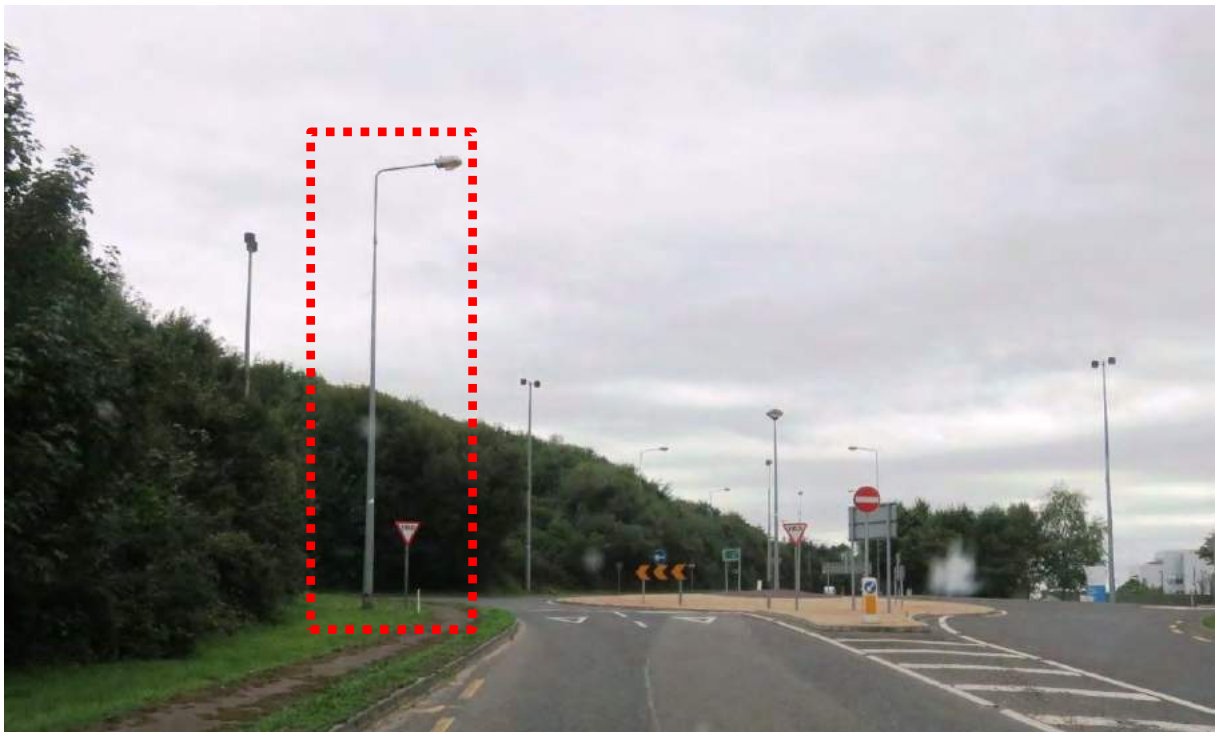
Revision Record

Revision/Version	Date	Author	Description
Issue R.0	03/12/18	Edwin Sunderland	Report.
Revision R1	18/07/19	Edwin Sunderland	Update for 70m blades

Location Map

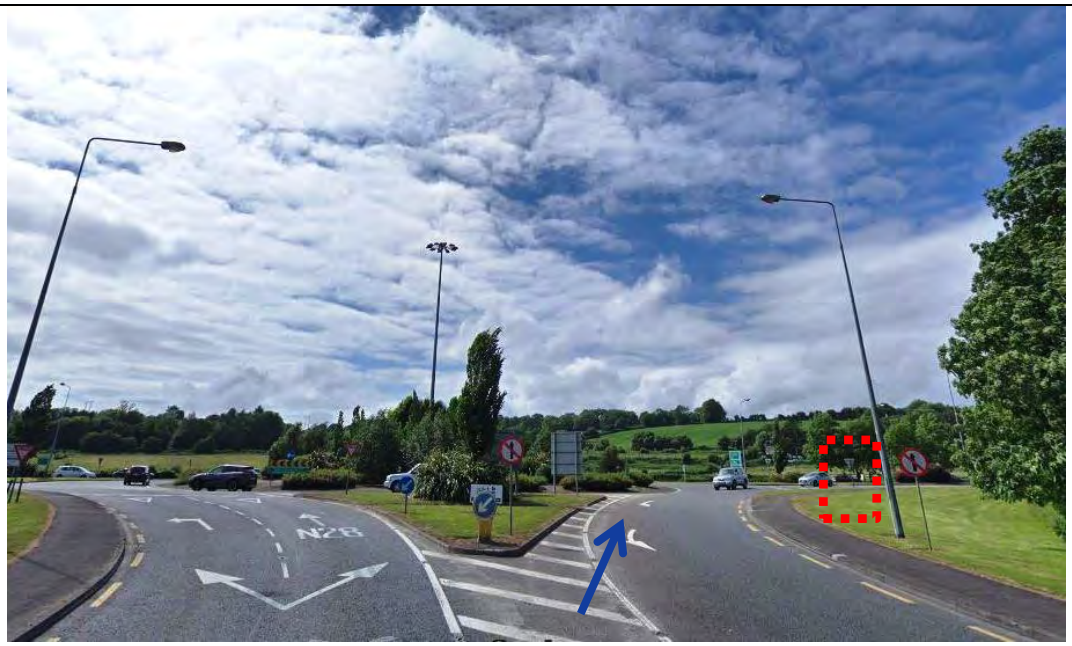
Route Option 1 & 2

Node 1.0. (All Routes) Pfizer Roundabout
Street furniture should be removed to allow rear oversail

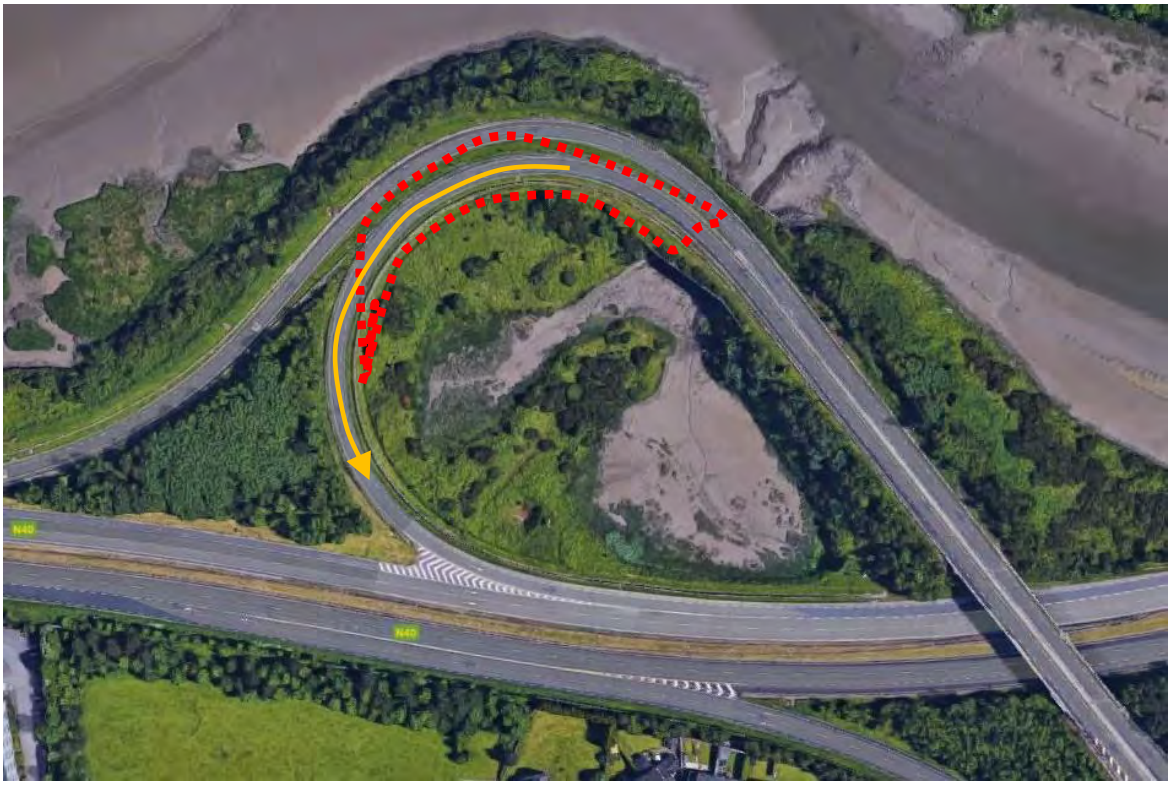


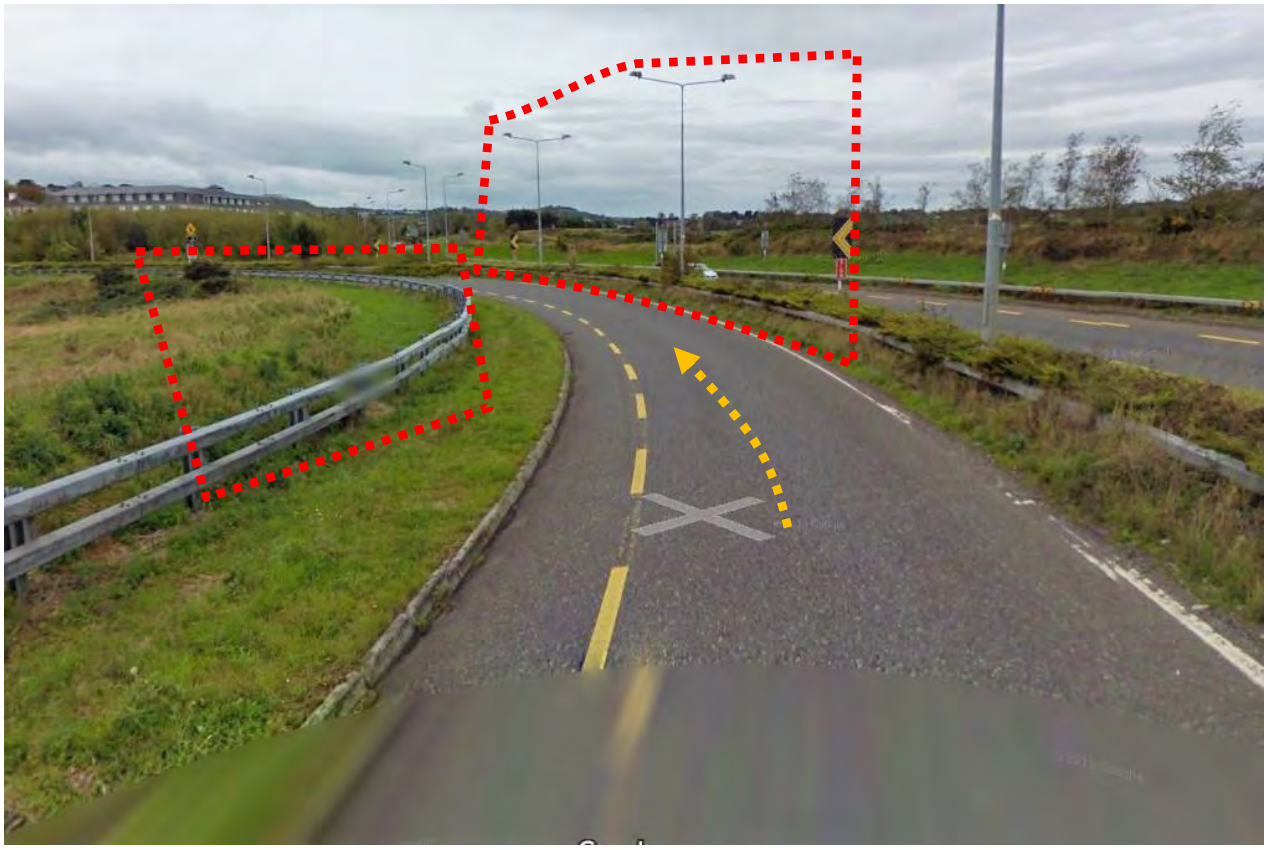
Node 1.1. (All Routes) Shanbally Roundabout
This roundabout will be travelled by contraflow. Upgrade works have been carried out on this roundabout and may require further investigation.

Node 1.2 Carrigaline Roundabout (Contra flow)
This roundabout will also be contra-flow and will require street furniture removal (YIELD sign)



Node 1.2.1 Bloomfield Interchange
This Ramp may need safety barrier on inside of curve (left side) to be removed. Also street lighting on right may need to be removed.

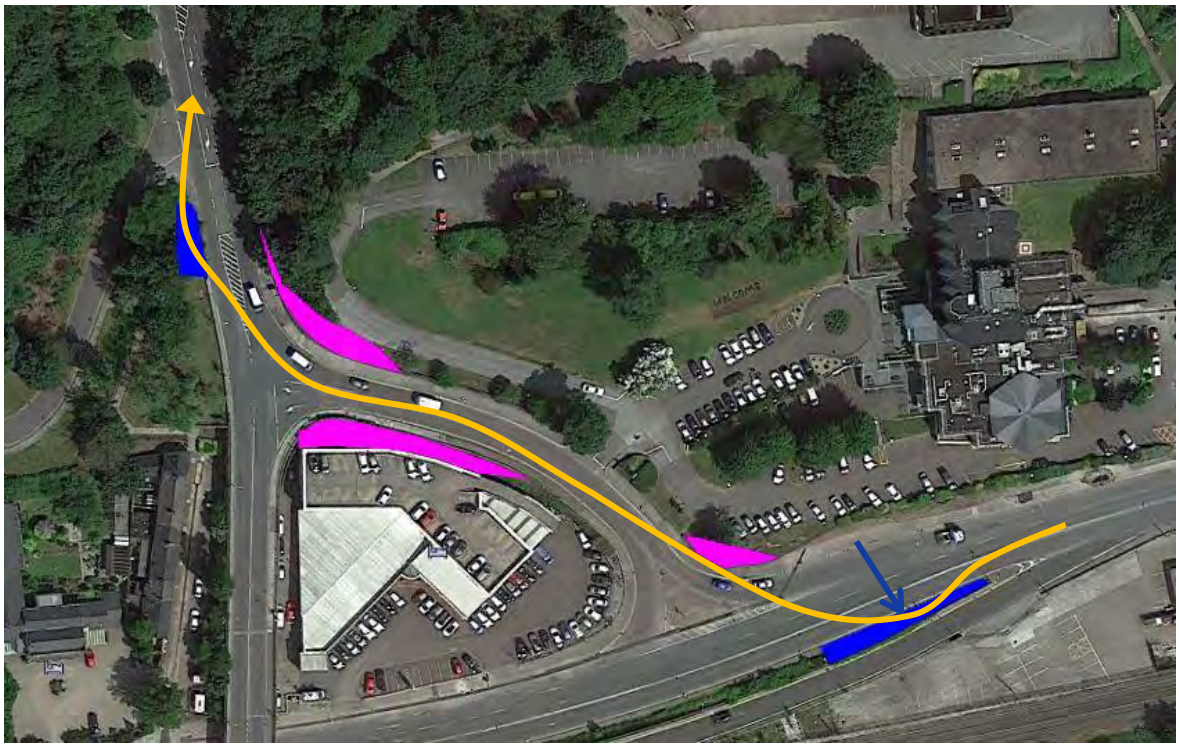




Node 1.3. Tivoli/Silversprings (Contraflow)

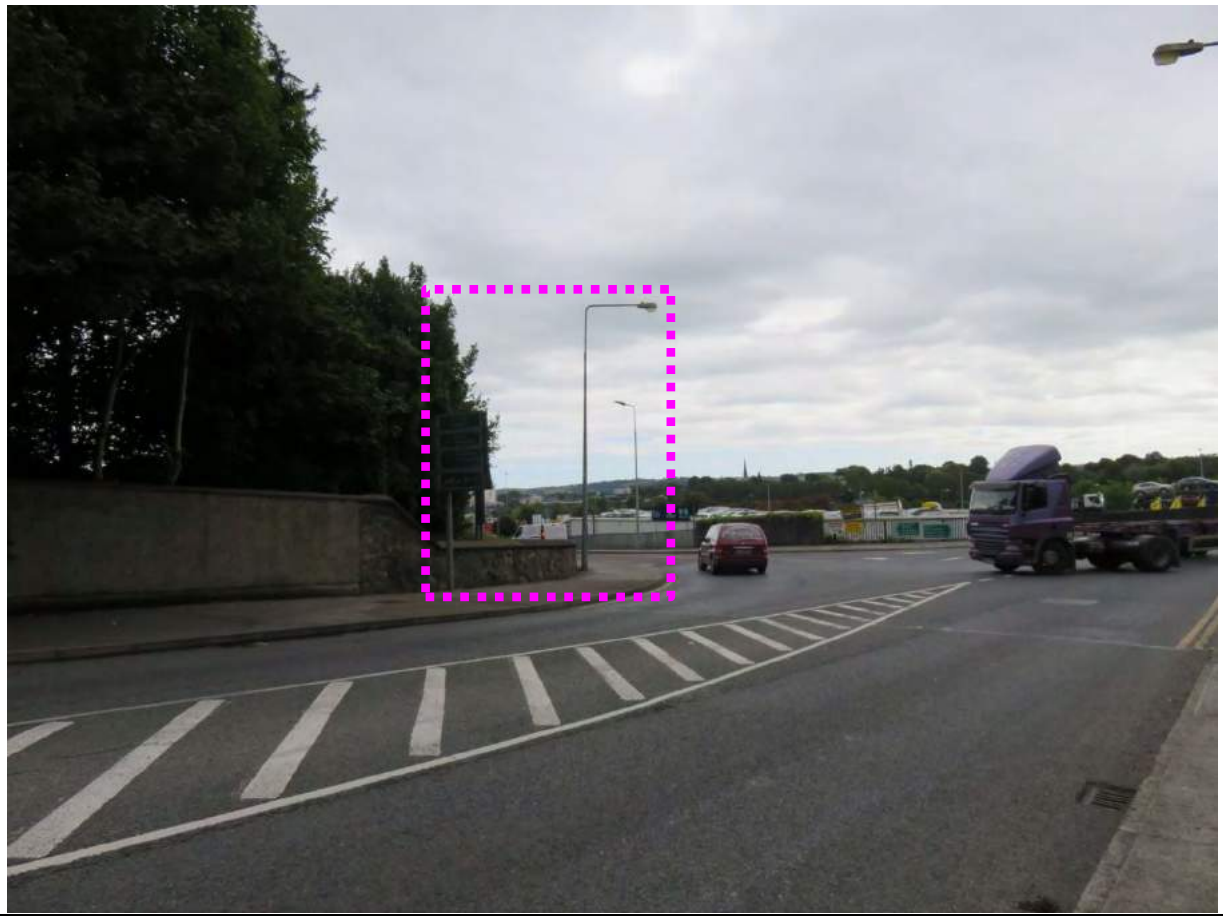
All towers, blades and nacelles will have to access the North Ring via the Silversprings slip road. Street furniture removal and tree/hedge trimming will be required. Land take and oversail will be required. Splitter island should be ramped and checked for load bearing capacity.

Blue areas are load bearing and Magenta are for mid or rear oversail .



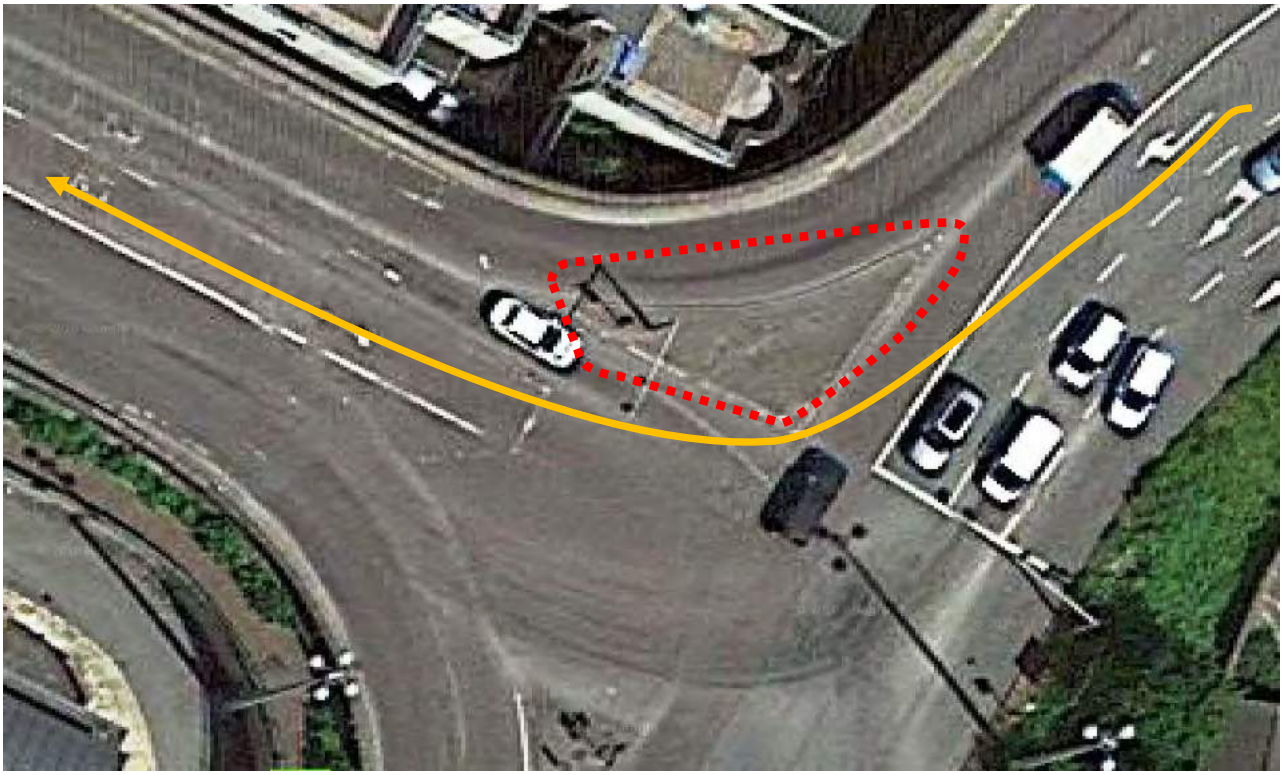
Node 1.4 Tivoli - Contraflow

This junction (right turn) will require works for blade deliveries. Street light should be removed . Oversail will be required behind street light. Mid oversail will also be required on the right side. A segment of load bearing may also be required near the entrance to Tivoli Woods.

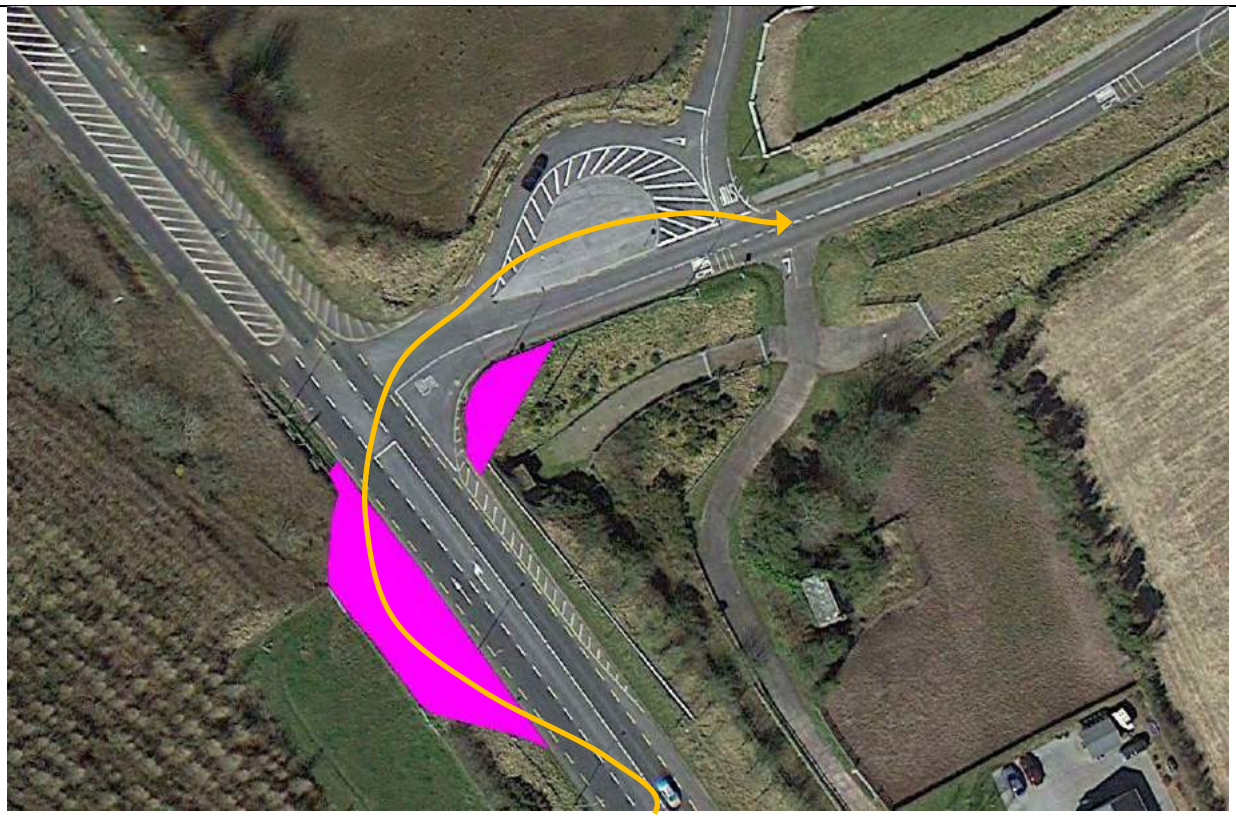


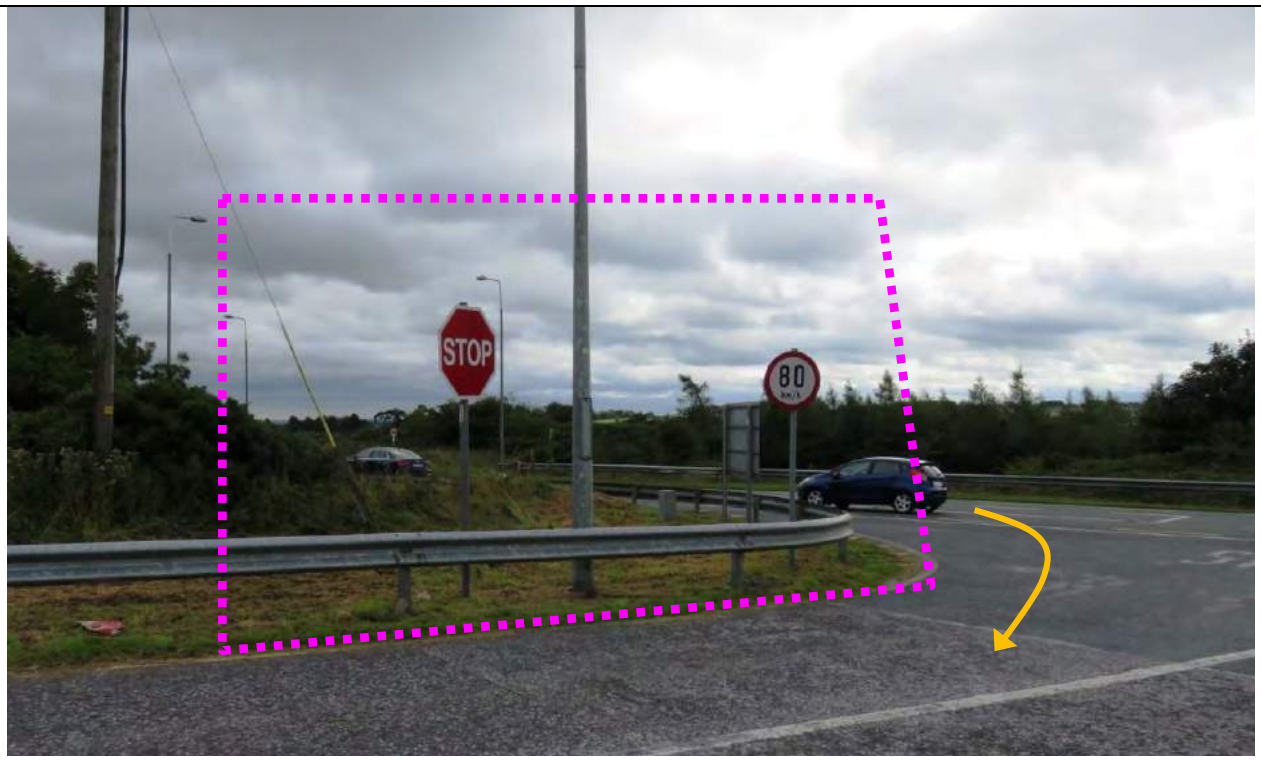
Node 1.5. Blackpool. N20 Junction - Contraflow

This right turn will require travelling in contra flow over the inbound splitter island. Traffic lights should be removed and all kerbing on the splitter island should be ramped with tarmac.



Node 1.6. N20/L6955
This right turn off the N20 will require land on left and right for overrsail and the removal of street furniture as marked.

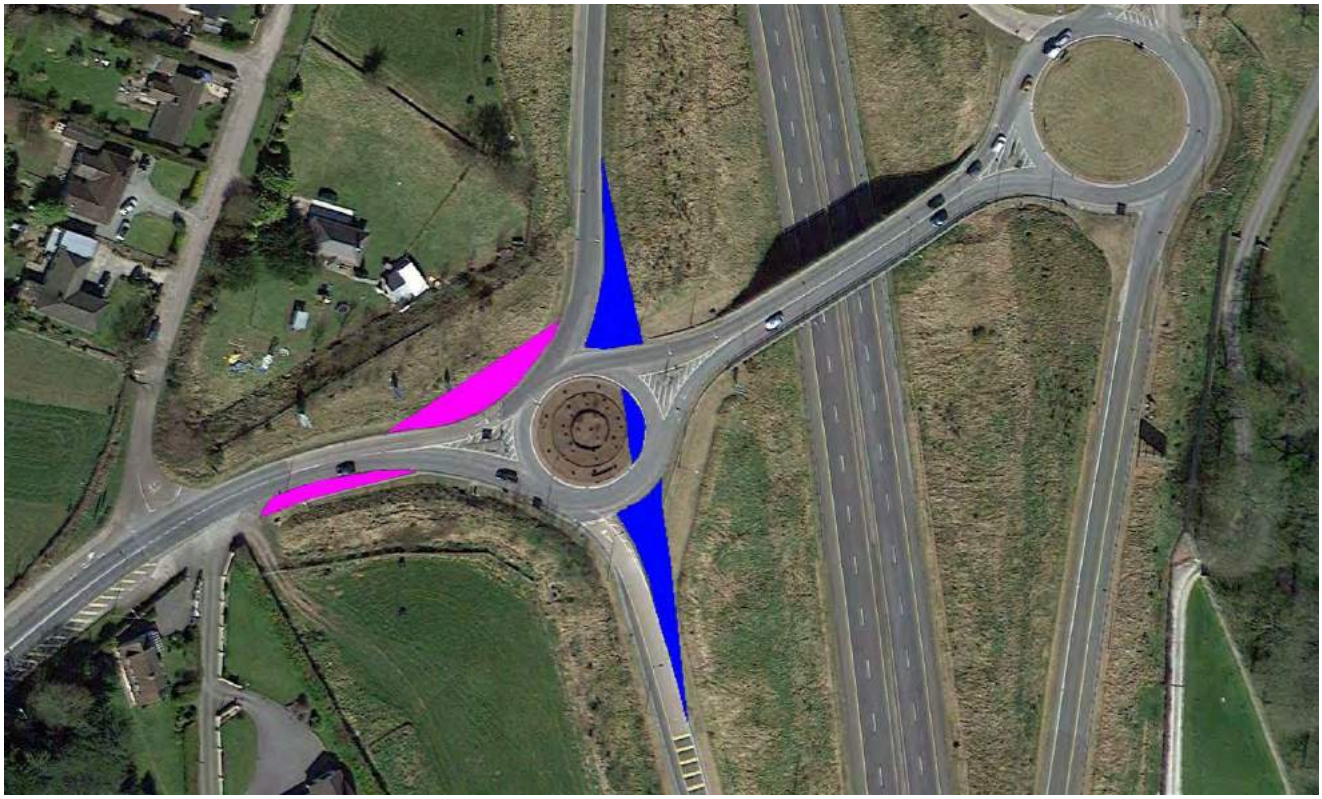


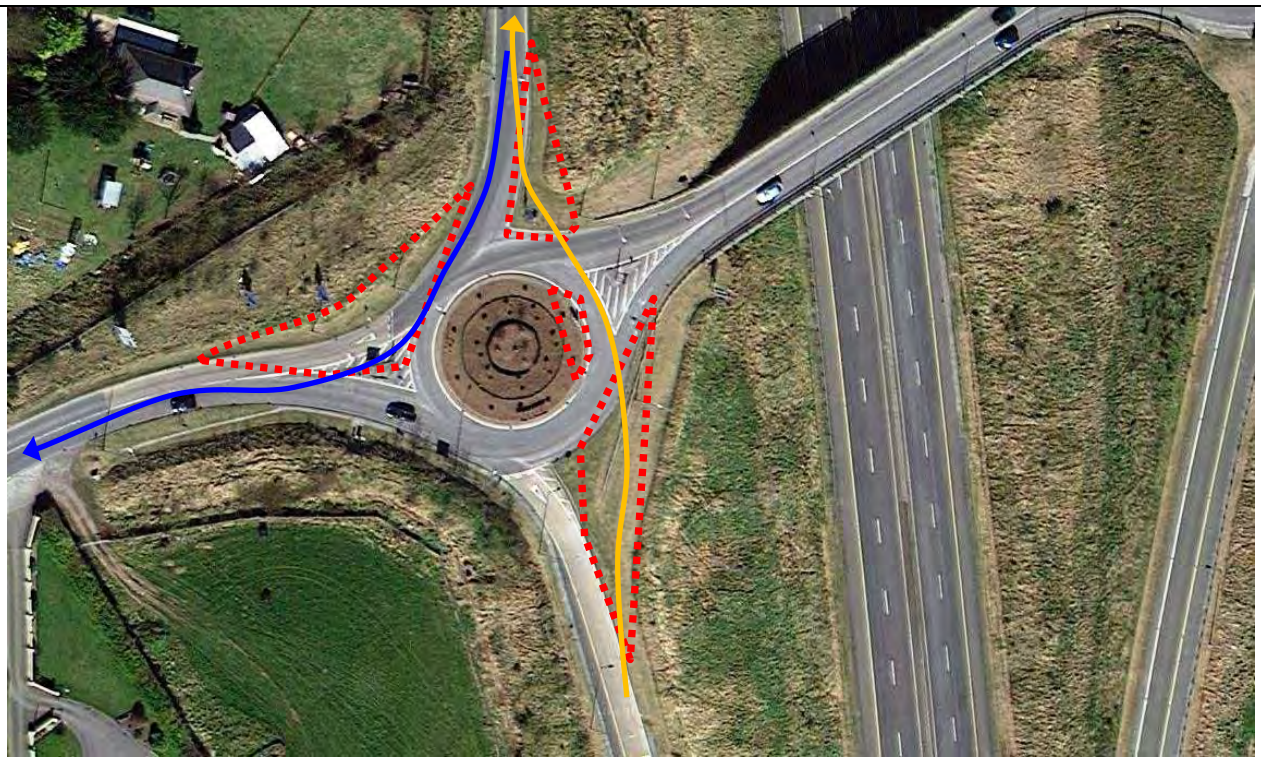


Node 1.7. L6955
This left turn onto site road will require land take for both load bearing and oversail.

Node 2.0. M8 Junction 14.

As blades will not be able to make a direct turn onto the N72 in Fermoy town the loads will need to reverse from this point into the town. Travel is contraflow. There is a combination of load bearing and oversail requirements – all within road boundary. Enabling works on the R639 Splitter island will be sufficient to accommodate a direct turn for tower sections.

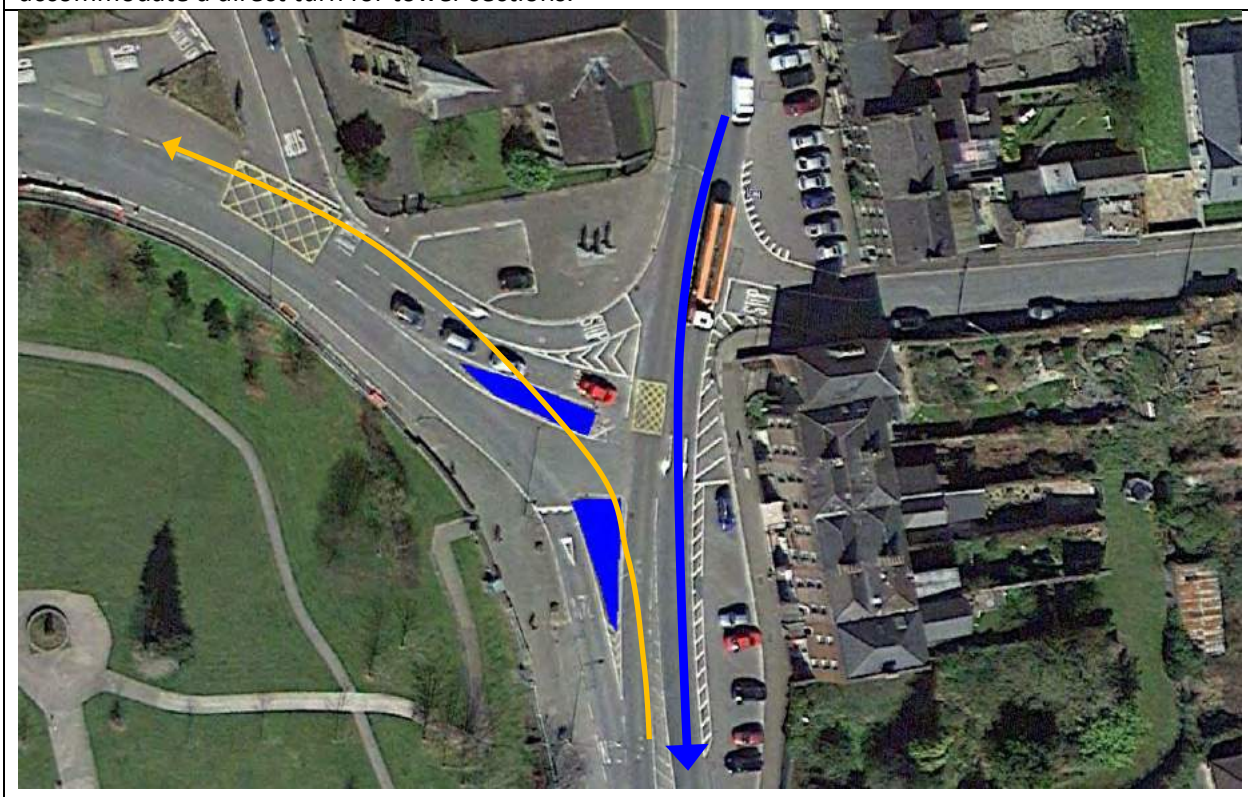




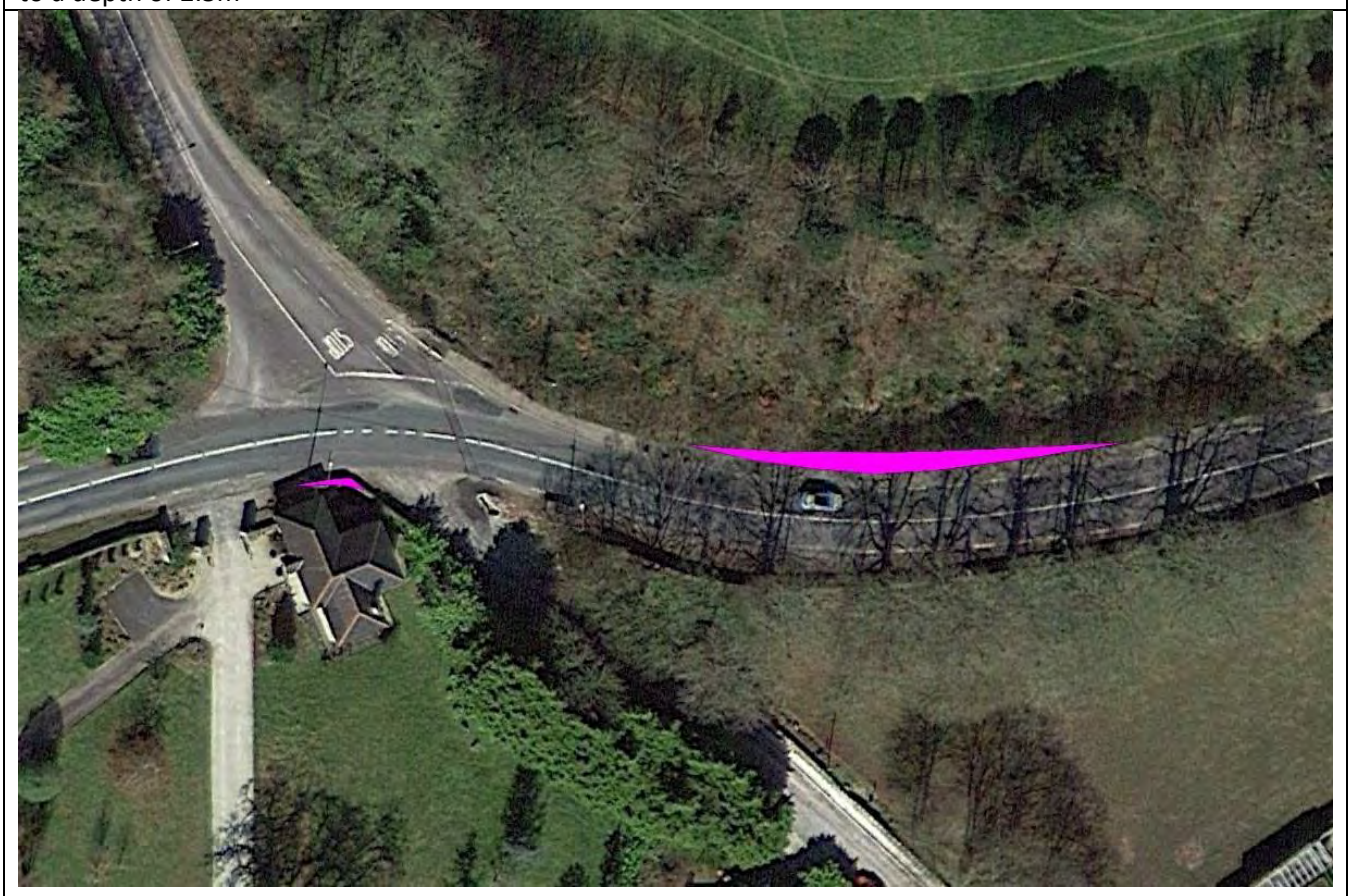
Node 2.1 Fermoy Town. R639/N72 Junction

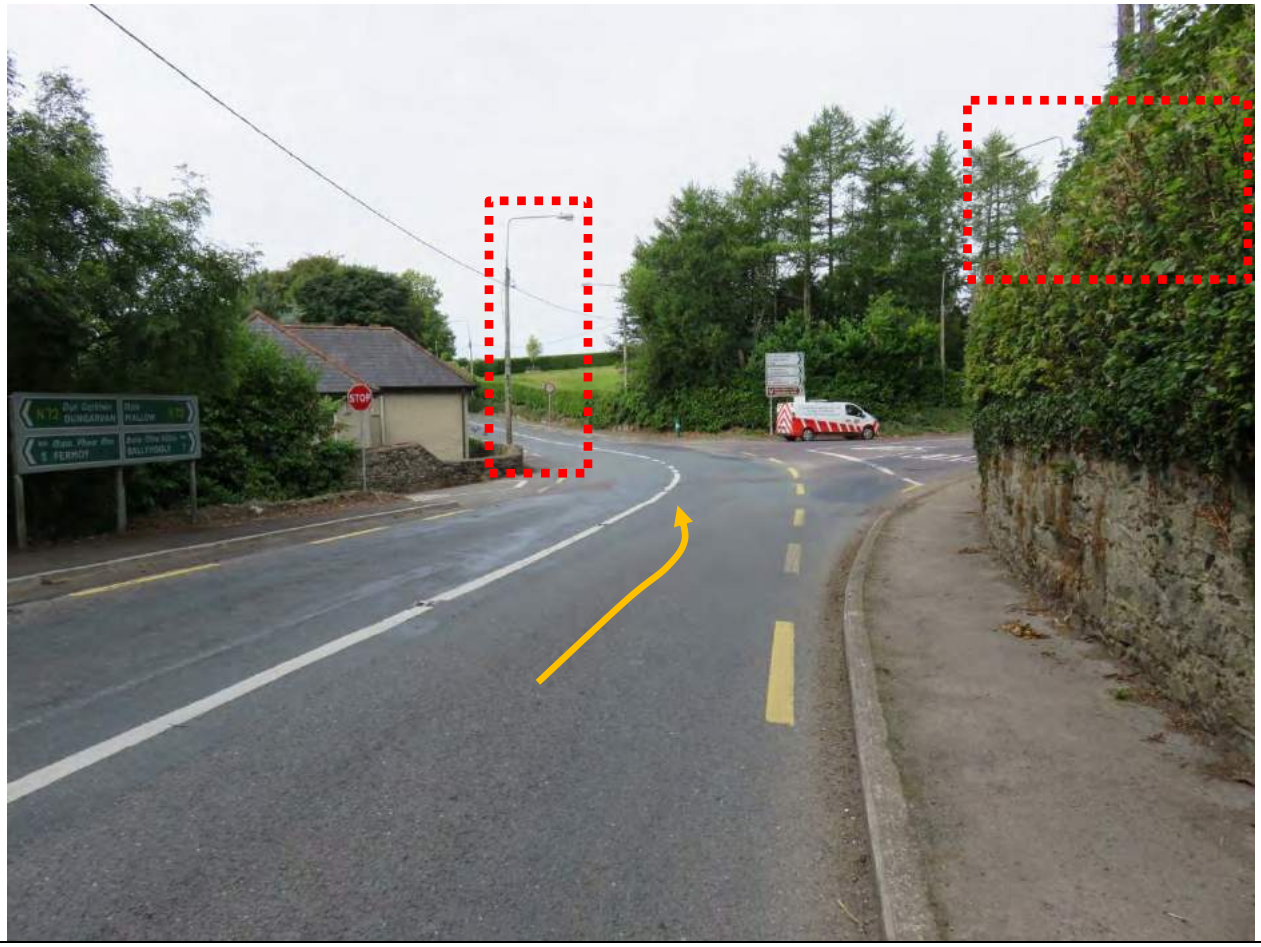
This junction will require removal of all street furniture on both splitter islands.

Both islands should be ramped with tarmac. Enabling works on the Splitter islands will be sufficient to accommodate a direct turn for tower sections.

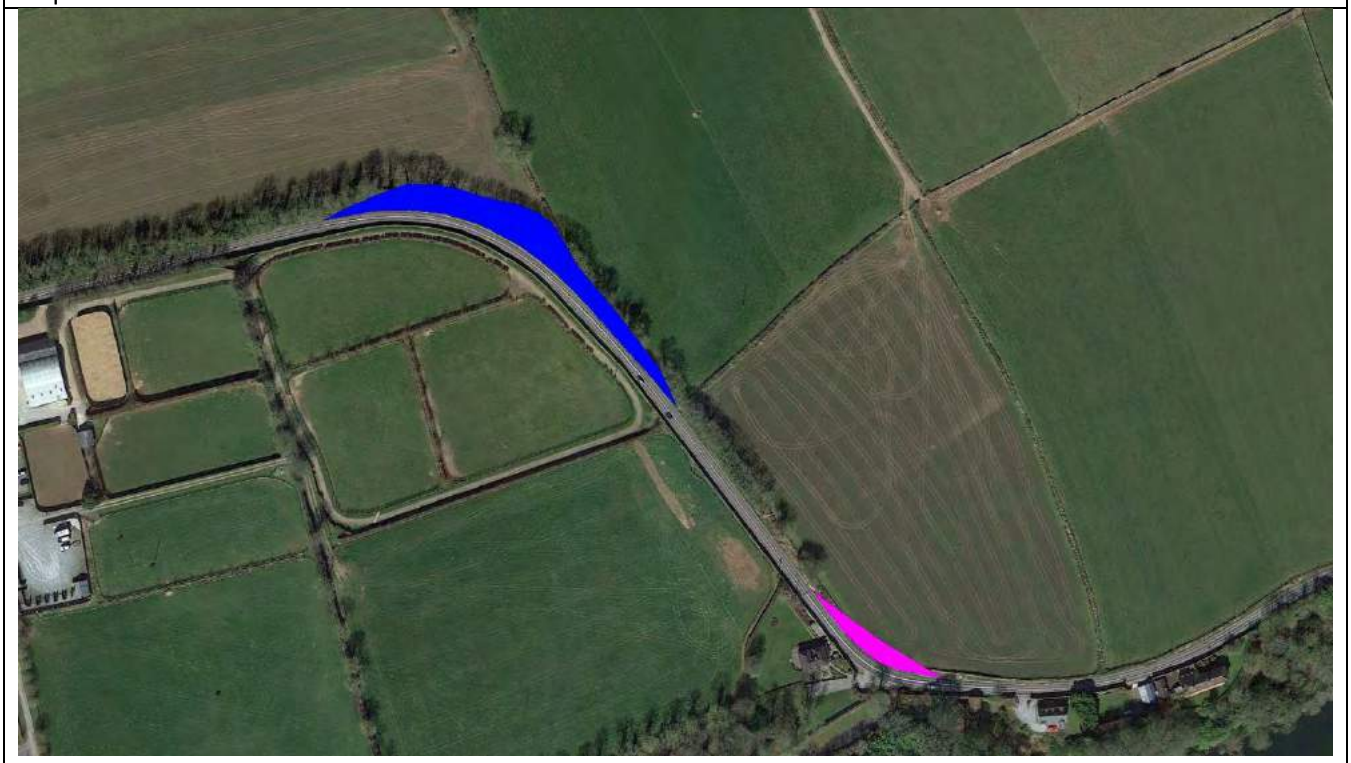


Node 2.2. N72/
Pole and street light should be removed/re-located. Hedge on right should be reduced to 3m over road level to a depth of 2.5m

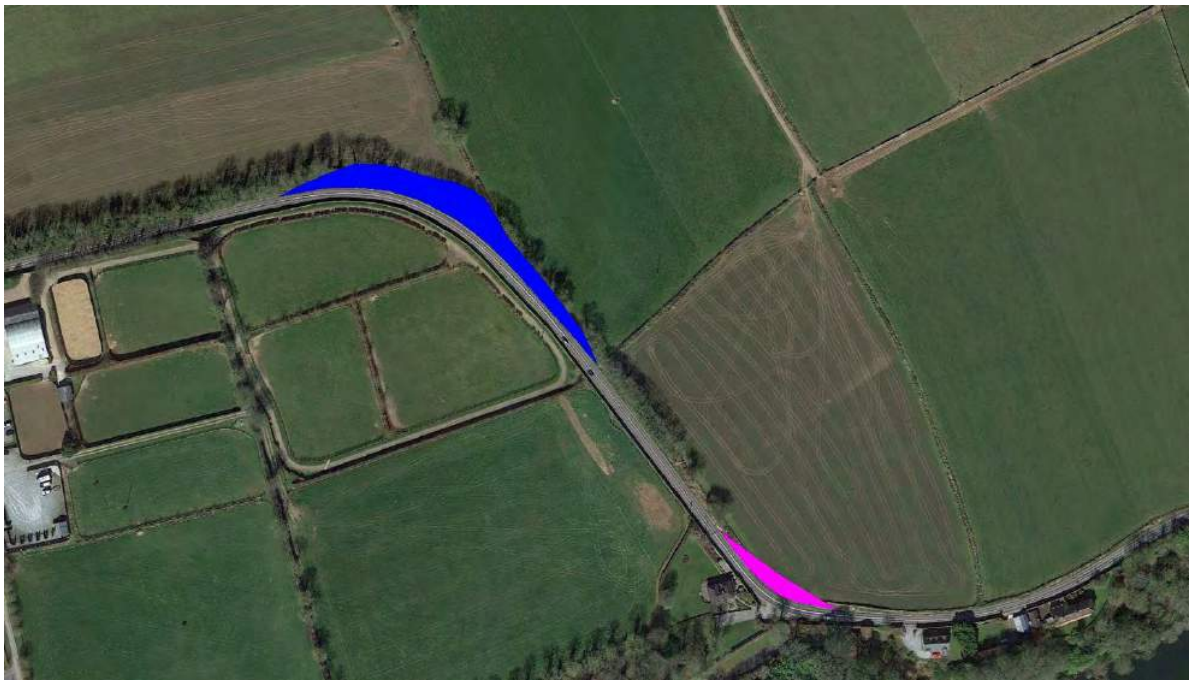




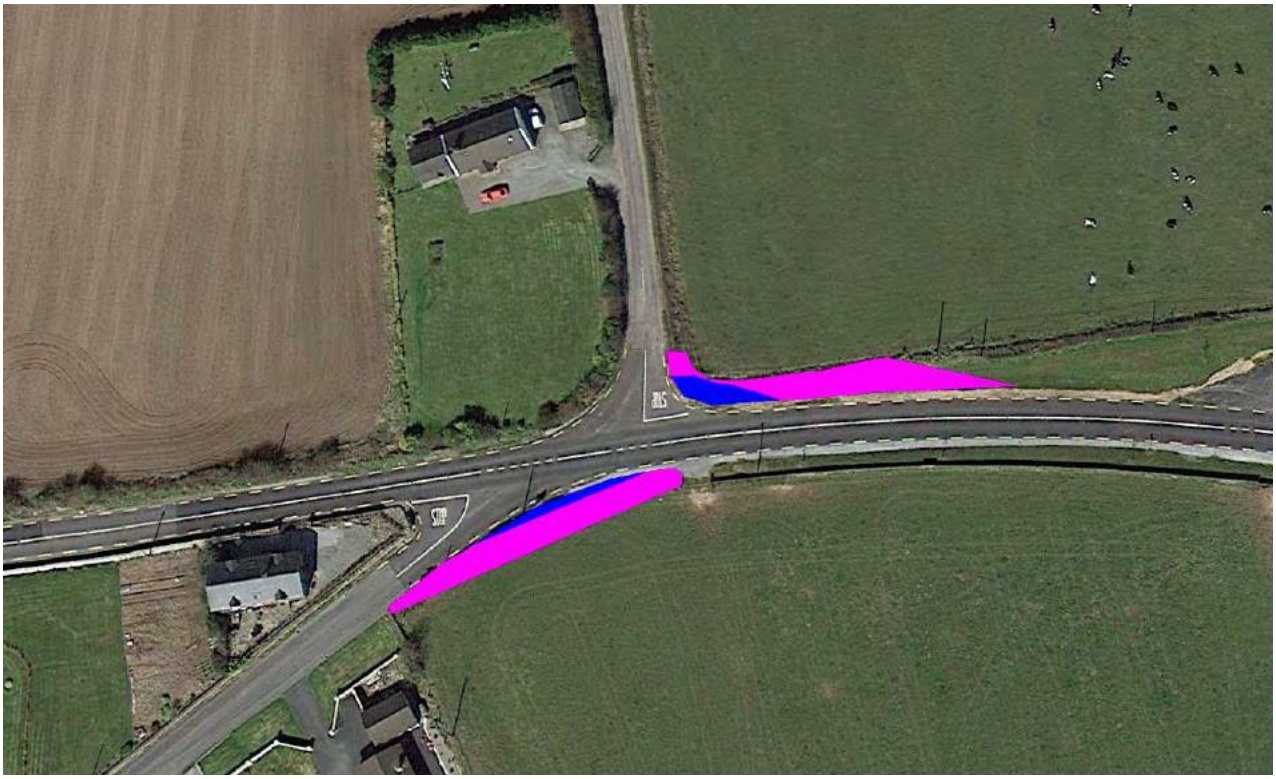
Node 2.3. N72 (579545, 598702)
Bank on right should be removed for mid oversail. Depending on rear overhang some load bearing may be required.

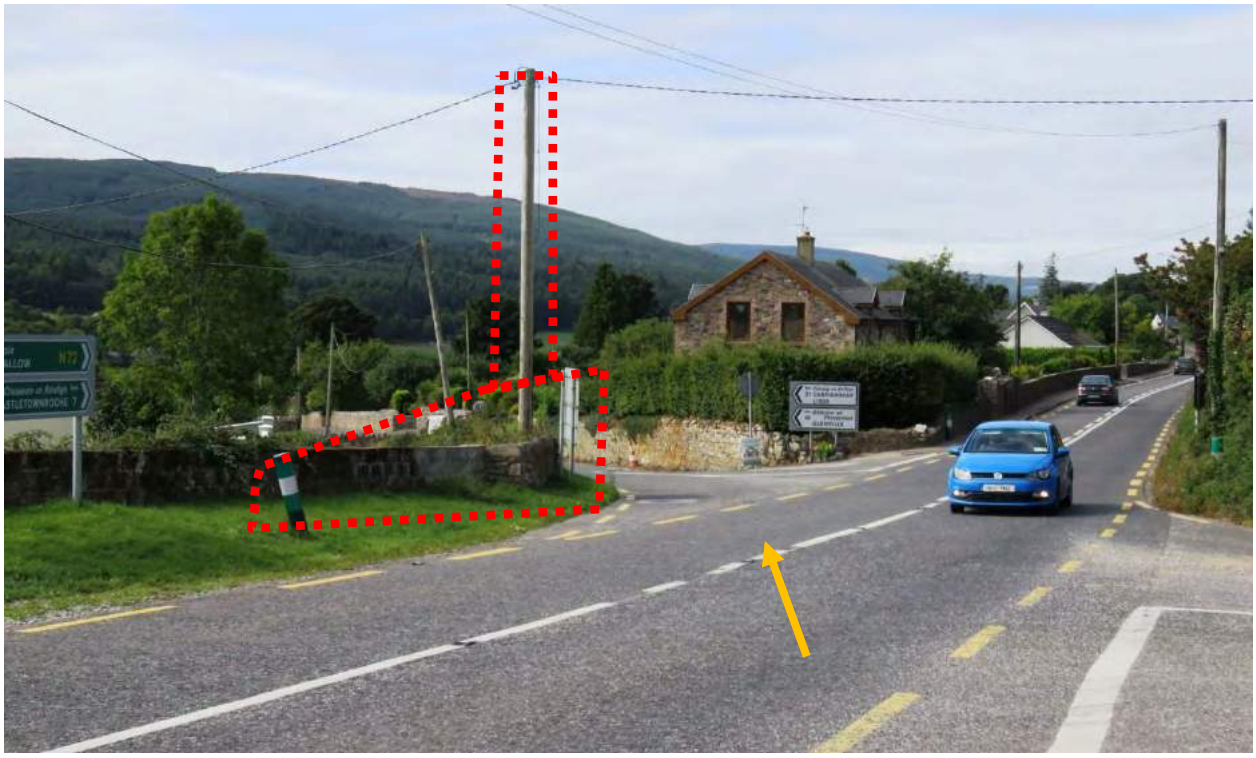


Node 2.4. N72 (579323, 598922)
Road should be widened to load bearing up to boundary. 180m – 200m. All signs should be removed.

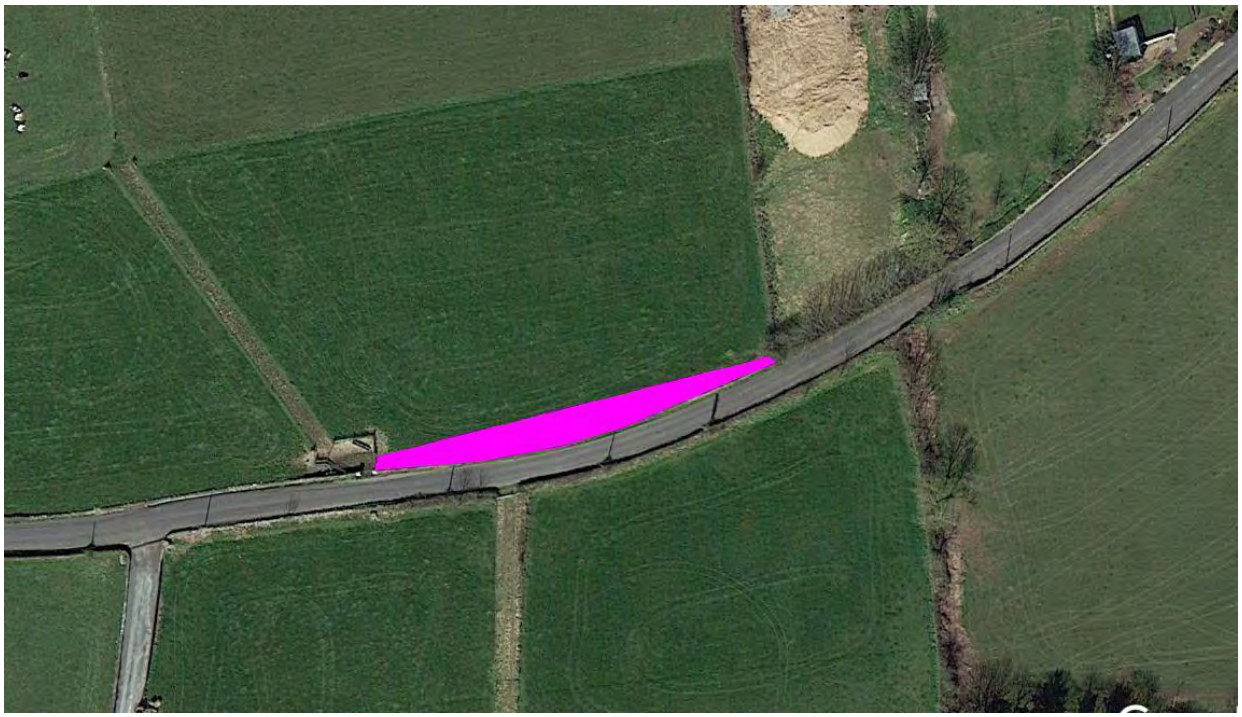


Node 2.5. N72 (580323, 598800)
Wall should be lowered to ground level. Pole and signs to be removed.
Bank on right should be lowered for rear oversail.

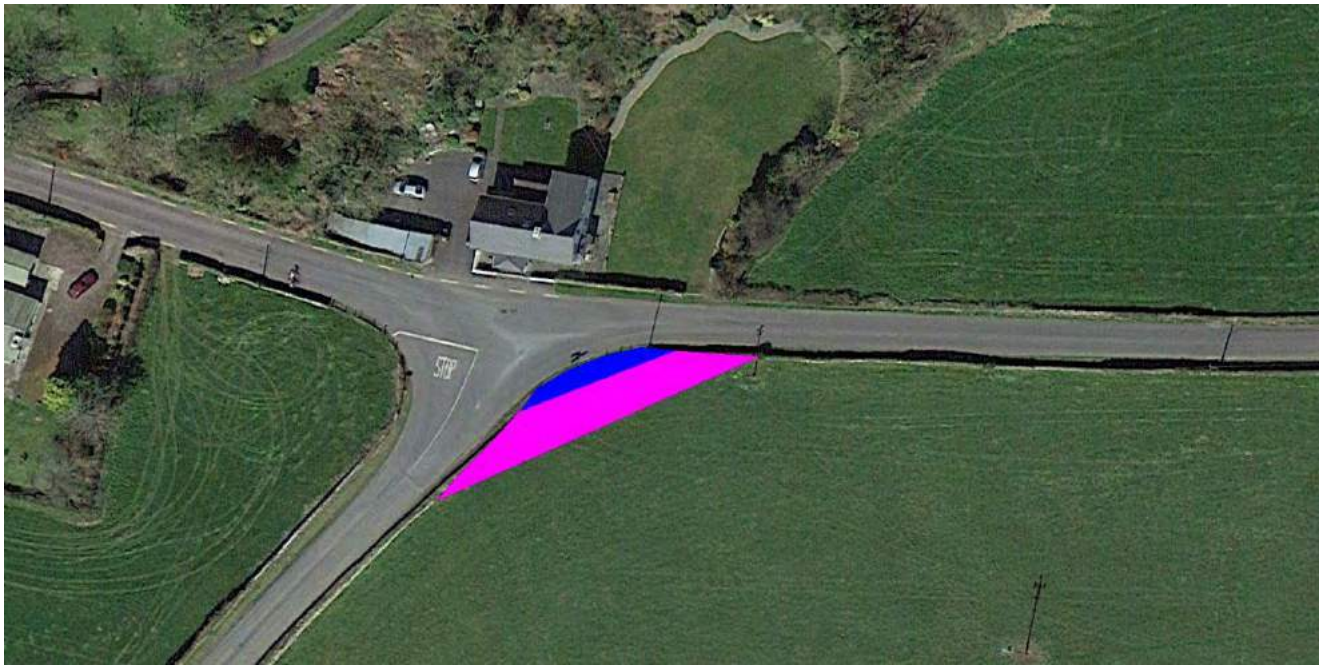




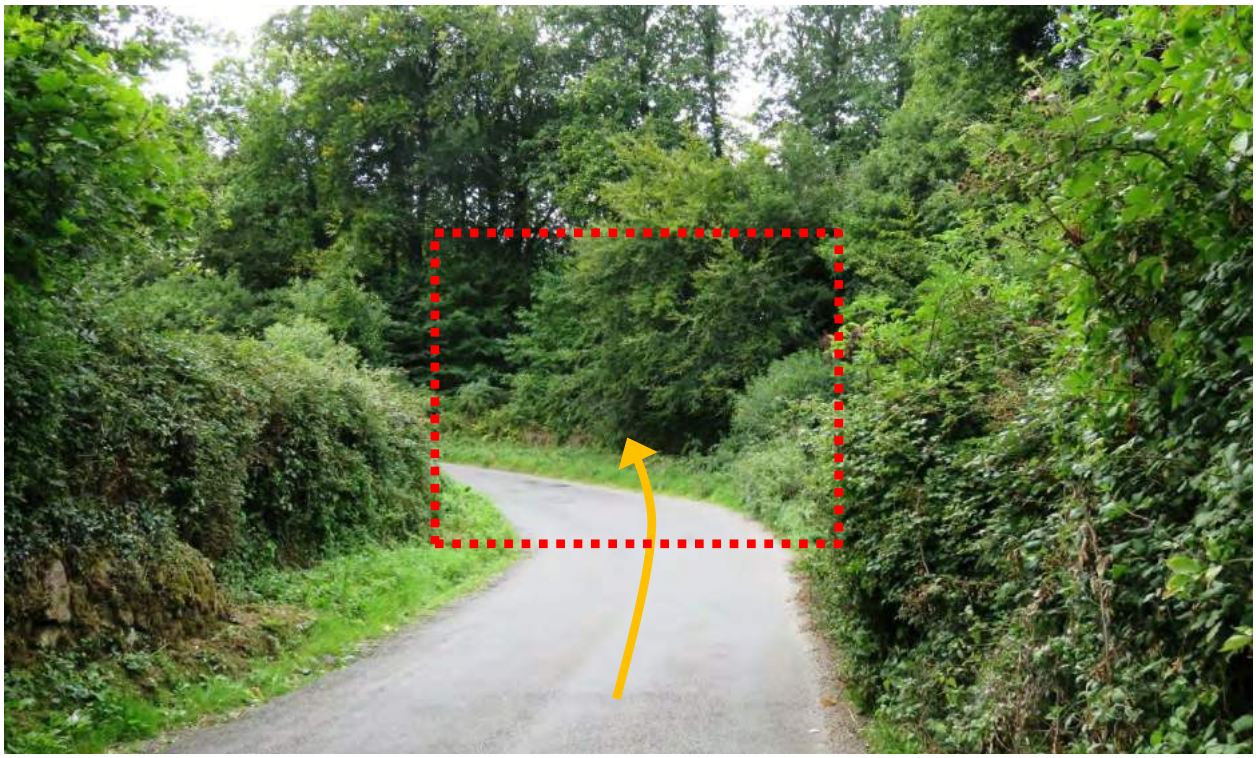
Node 2.6.
Depending on final rear overhang, telephone poles may have to be removed. A sweptpath analysis and early trial run are recommended. (This section could decide optimum overhang)



Node 2.7.
A section of wall should be lowered to road level for mid oversail. Depending on rear overhang some load bearing may be required

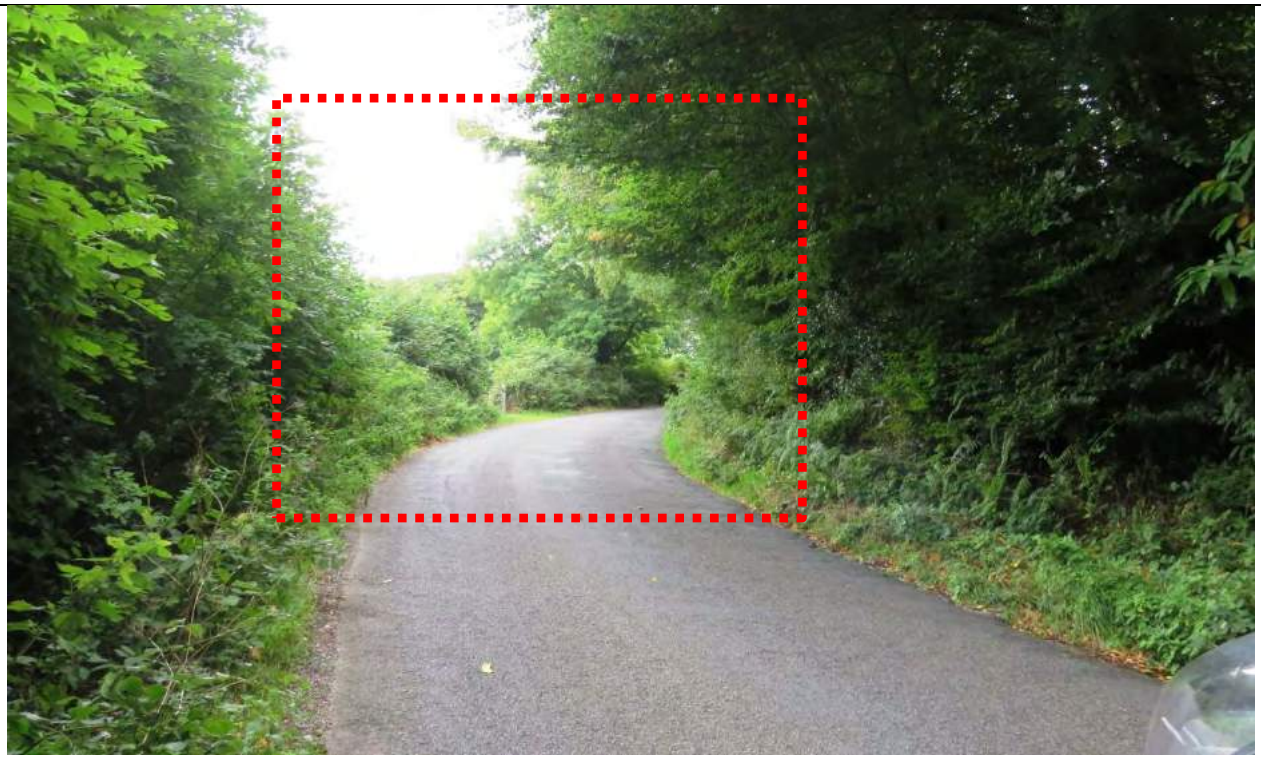


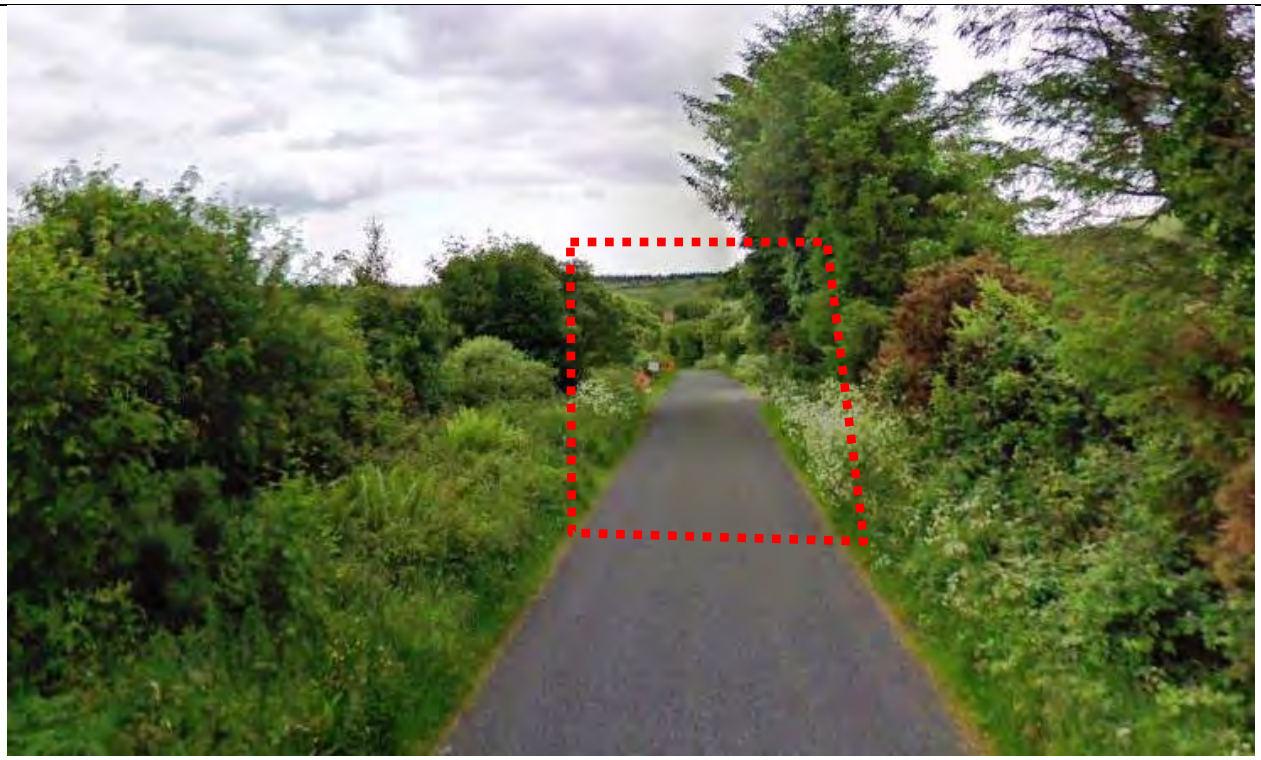
Node 2.8. Castlebagh
This left bend will require land take straight ahead



Node 2.9 Castlebagh to Site entrance

Site approach road will require land take for widening and tree trimming as per Turbine Suppliers/Hauliers requirements





Other Route Options	Route options for each proposed entrance are limited to the options shown.
Conclusions	The route options shown are the only available for each entrance Bridge and other structure capacities have not been assessed. Tree canopy and overhead cables have not been surveyed as part of this survey A trial run should be carried out prior to delivery to verify works carried out. An early test run is recommended to establish passage and rear overhang through Node 2.6.
	Edwin Sunderland 03/12/18

Pell Frischmann

Coom Wind Farm

Swept Path Assessment Results

August 2020

Revision Record					
Rev	**Description**	**Date**	**Originator**	**Checker**	**Approver**
A	Draft	24/08/20	T Lockett	G Buchan	G Buchan

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FEHILY TIMONEY
30 YEARS

Pell Frischmann

Contents

Figures

Tables

Appendices

1 Introduction

1.1 Purpose of the Report

Pell Frischmann (PF) has been commissioned by Fehily Timoney and Company (FTC) to undertake swept path assessments at a number of FTC identified locations to demonstrate the mitigation requirement to facilitate the use of blade lifting technology.

The detailed designs of any remedial works are beyond the agreed scope of works between PF and FTC at this point in time.

No site visit had been undertaken at this time. A site visit will be required to confirm the results of this report.

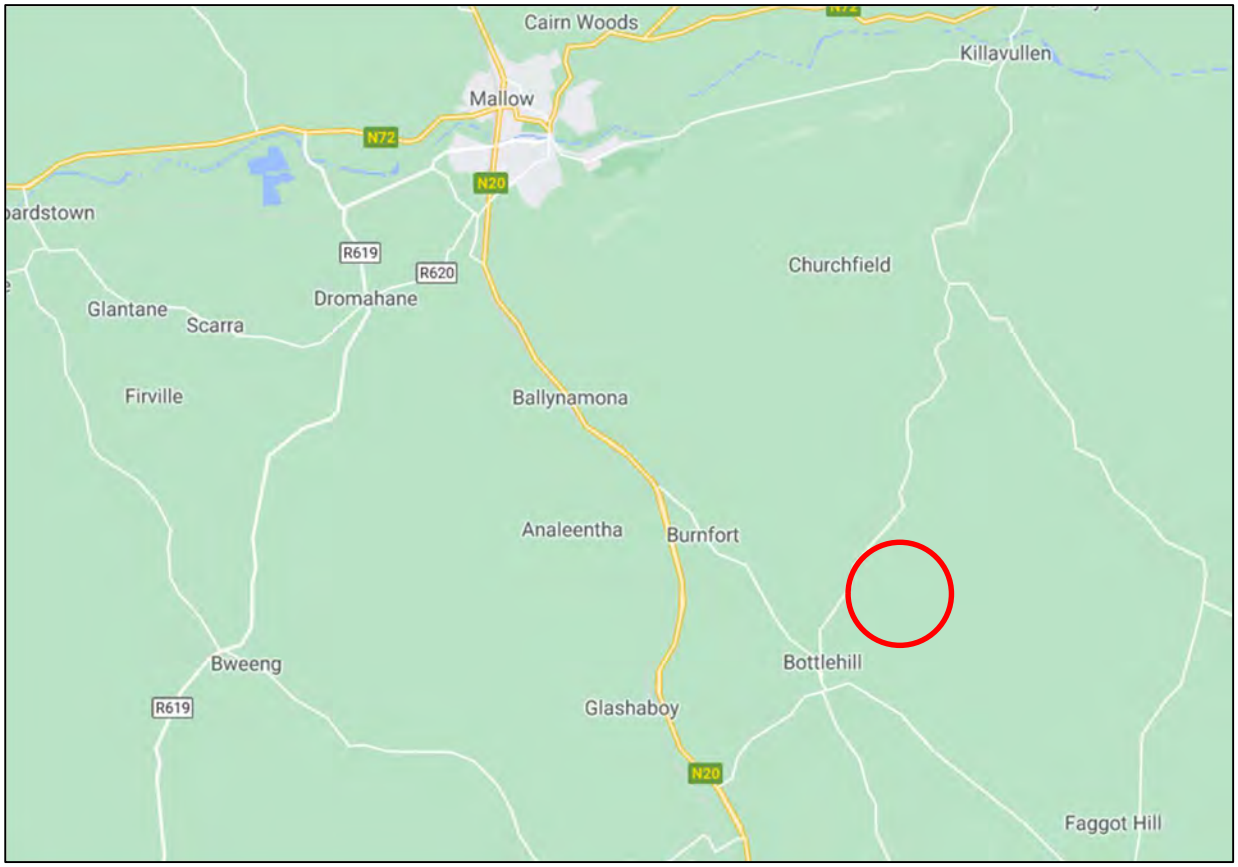
It is the responsibility of the wind turbine supplier to ensure that the entirety of the proposed access route is suitable and meets with their satisfaction. The turbine supplier will be responsible for ensuring that the finalised proposals meet with the appropriate levels of health and safety consideration for all road users, in line with the relevant legislation at the time of delivery.

2 Site Background

2.1 Site Location

The development site is located to the south-east of Mallow, County Cork. Figure 1 illustrates the general site location.

Figure 1: Site Location Plan



2.2 Candidate Turbines

FTC has indicated that they wish to consider the 'worst case scenario' components from the Vestas V136, Nordex N133, Enercon E138 or Enercon E136 turbines at a tip height of 169m.

The swept path assessment will be based on the following 'worst case scenario' components;

- 67.7m Blade; and
- 24.03m x 4.3m x 4.02m tower carried in 4 x 7 clamp trailer.

2.3 Proposed Delivery Equipment

The assessment has assumed the blade will utilise a standard superwing carrier for the route to the proposed transfer point.

It is proposed that the blade would be transferred onto a Goldhofer blade lifting trailer for onward movement to the site. This trailer has the ability to lift blades up to a maximum angle of 60 degrees, lifting blades over potential constraints and shortening the length plan view.

All overhead utilities and obstructions should be removed at any locations that the blades are raised on the blade lifting trailer.

Tower sections would be carried in a 4+7 clamp adaptor trailer.

Examples of the types of trailers proposed are provided in Figures 3, 3 and 4.

Figure 2: Superwing Carrier Trailer

Figure 3: Blade lifter

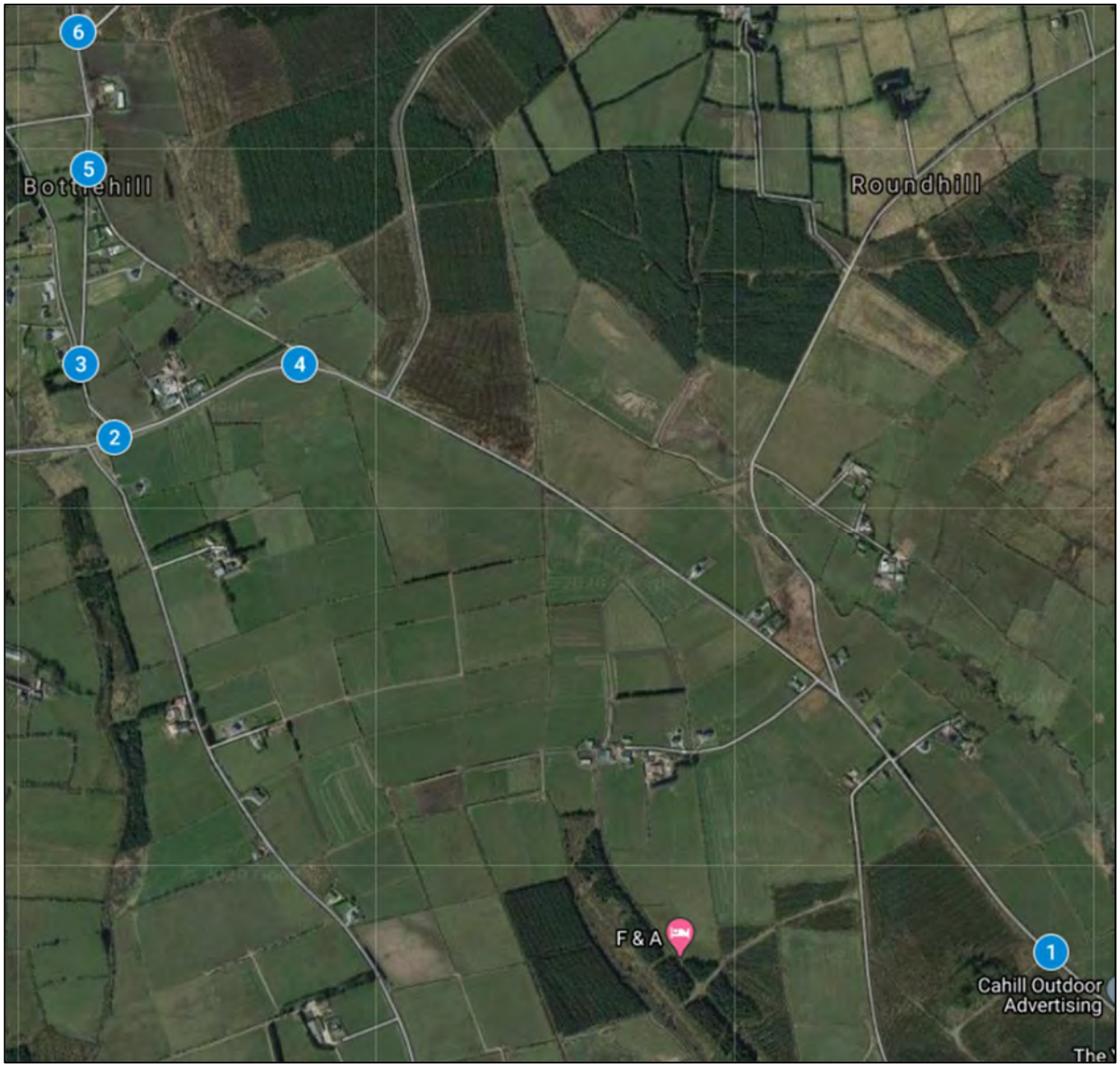
Figure 4: Tower Trailer

3 Access Route Review

3.1 Access Route

PF have been commissioned to undertake swept path assessments at the locations shown in Figure 5 below. No assessment of the wider route to this point has been undertaken as part of this study.

Figure 5: Requested Swept Path Locations



3.2 Swept Path Assessment Results

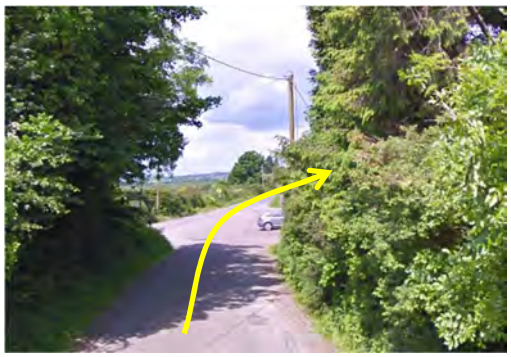
The constraints noted in Figure 5 are detailed in Table 1. No consideration of the transport issues within the port, the development site or the route to this point have been undertaken and this includes the design of the site access junction, which are addressed by others.

Where the blade lifting trailer is utilised all overhead utilities and obstructions should be removed at any location where the blade is in the raised position.

Table 1: Constraint Points and Details

POI	Key Constraint	Details
1	**Potential Turning Location** 	FTC have provided an indicative design for a blade transfer point at this location. Loads arriving at the site will be carried on a superwing carrier. They will then transfer to the blade lifting trailer for onward transportation to the site. All assessments from this point to the site have been undertaken with the blade in the raised position. *All overhead utilities and obstructions should be removed where the blade is carried in the raised position.* The swept path indicates that locations will oversail and overrun into **third party land** on the inside of the right turn into the junction where a load bearing surface should be laid. Trees and vegetation should be removed. The swept path assessment can be found in SK01 of Appendix A.

POI	Key Constraint	Details
2	**Junction 1 SPA** 	Loads will turn right at the junction from the L6957 onto the Tooreen North road. All overhead utilities and obstructions should be removed. The swept path assessment indicates that loads will overrun and oversail the southern verge on approach to the bend where a load bearing surface should be laid and one traffic sign removed. It is recommended that a land search is completed to confirm the extent of adopted road boundary at this location. Loads will overrun and oversail the verge on the inside of the bend where a load bearing surface should be laid and three traffic signs removed. Existing utilities should be protected. Loads will overrun and oversail the western verge of Tooreen North Road where a load bearing surface should be laid. Loads will continue to oversail both verges through the following right bend where vegetation should be cleared. The swept path assessment can be found in SK02 of Appendix A.
3	**Junction 2 SPA** 	Loads will turn right at the junction and continue on the Tooreen North Road. All overhead utilities and obstructions should be removed. The swept path assessment indicates that loads will oversail the western verge where vegetation should be trimmed. The proximity to a utility pole should be confirmed during the test run. The swept path assessment can be found in SK03 of Appendix A.

POI	Key Constraint	Details
4	**Junction 4 SPA** 	Loads would turn right from the L6956 onto the unclassified road leading north west. All overhead utilities and obstructions should be removed. The swept path assessment indicates that loads will oversail the southern verge of the L6956 on approach to the junction. Loads will overrun and oversail into **third party land** on the inside of the right turn where a load bearing surface should be laid and the drainage ditch culverted. The fence should be removed along with one road sign, one bollard and vegetation. Loads will overrun and oversail both verges through the following left bend where load bearing surfaces should be laid and one road sigh and a number of traffic bollards should be removed. The vegetation should be trimmed and the ditch culverted. The swept path assessment can be found in SK04 of Appendix A.
5	**Junction 3 SPA** 	Loads will continue north through the junction to the access junction. All overhead utilities and obstructions should be removed. The swept path assessment indicates that loads will loads will oversail the western verge where vegetation should be trimmed. Vegetation on the eastern verge should also be cut back. The swept path assessment can be found in SK05 of Appendix A.
6	**Potential Site Entrance Location (Option 1)** 	Loads would turn right into the proposed site entrance. In order to remain within the Coillte property boundary that was provided by FTC, the swept path assessment indicates that the existing junction will need to be upgraded to the allow loads to leave the road and continue north east until they are within the site to begin their turn. The junction should be designed to meet turbine manufacturer guidelines and Cork County Council standards. The swept path assessment can be found in SK06 of Appendix A.

3.3 Swept Path Assessment Results and Summary

The detailed swept path drawings for the locations assessed are provided in Appendix A for review. The drawings in Appendix A illustrate tracking undertaken for the worst case loads at each location.

The colours illustrated on the swept paths are:

- Grey / Black – OS / Topographical Base Mapping;
- Green – Vehicle body outline (body swept path);
- Red – Tracked pathway of the wheels (wheel swept path); and
- Purple – The over-sail tracked path of the load where it encroaches outwith the trailer (load swept path).

Where mitigation works are required, the extents of over-run and over-sail areas are illustrated on the swept path drawings.

Please note that where assessments have been undertaken using Ordnance Survey Ireland (OSI) base mapping or available CAD based aerial mapping, there can be errors in this data source.

Where provided by the client, aerial mapping has been utilised. Please note that PF cannot accept liability for errors on the data source, be that OSI base mapping or client supplied aerial mapping and data.

3.4 Access Junction Considerations

The access junction into the site would need to be built to accommodate the proposed physical size of loads and the number of trips predicted during the construction phase.

The design and form of the junction would need to be discussed with Cork County Council. The design of the junctions should take into account the requirement for provision of visibility splays which should be defined by the road authority.

The junctions would also need to be built in accordance with the turbine supplier design criteria.

3.5 Summary Issues

It is strongly suggested that following a review of the SPAs, FTC should undertake the following prior to the delivery of the first abnormal loads, to ensure load and road user safety:

- That a full site visit is completed and a route survey report prepared to ensure that all constraints have been noted;
- Negotiations with land owners where identified as being required should commence as a priority;
- A revised review of axle loading on structures along the entire access route with the various road agencies is undertaken immediately prior to the loads being transported in case of last minute changes to structures;
- A review of clear heights with utility providers and the transport agencies along the route to ensure that there is sufficient space to allow for loads plus sufficient flashover protection (to electrical installations);

- That any verge vegetation and tree canopies which may foul loads is trimmed prior to loads moving;

- That a review of potential roadworks and or closures is undertaken once the delivery schedule is established in draft form;

- That a test run is completed to confirm the route and review any vertical clearance issues; and

- That a condition survey is undertaken to ascertain the extents of road defects prior to loads commencing to protect the developer from spurious damage claims.

4 Summary

4.1 Summary of Access Review

PF has been commissioned by FTC to prepare a series of swept path assessments at locations identified by FTC in order to examine the issues associated with the transport of AIL turbine components to the development site.

This report identifies the issues associated with the identified locations and outlines the issues that will need to be considered for successful delivery of components.

The access review has been based upon a 67.7m blade and worst case tower components.

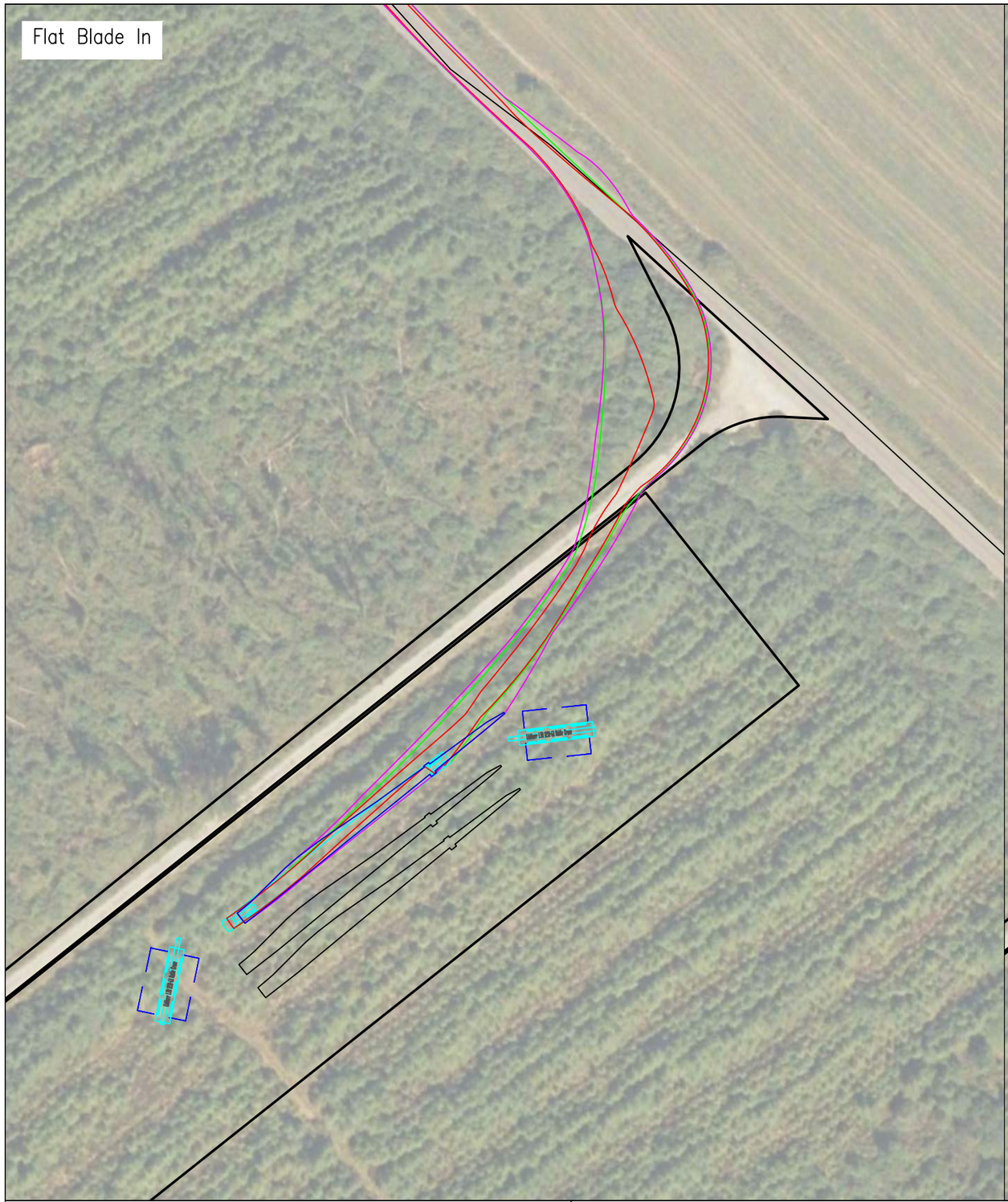
The report is presented for consideration to FTC. Various third party land arrangements, road modifications and interventions are required to successfully negotiate the identified points.

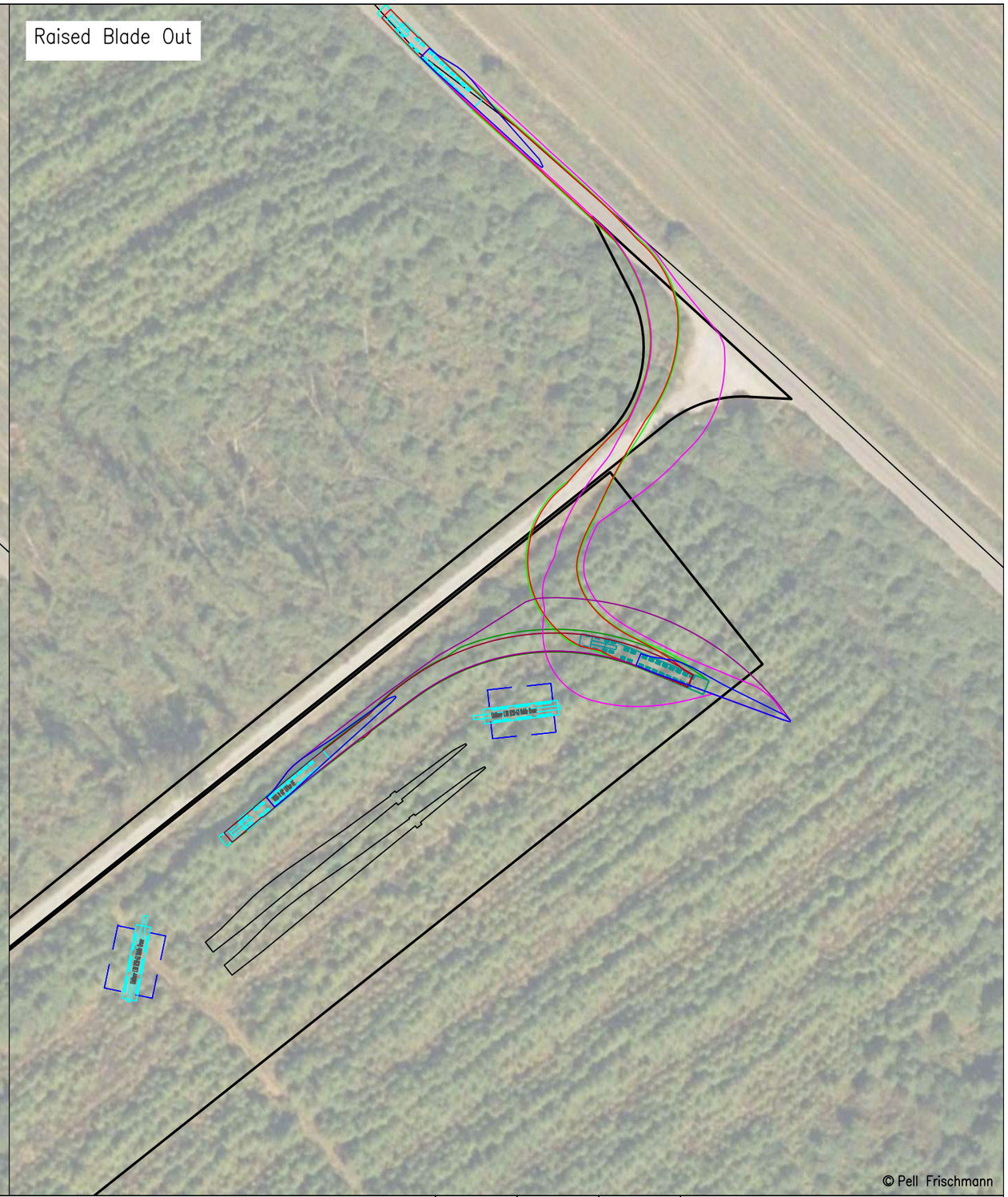
4.2 Further Actions

The following actions are recommended to pursue the transport and access issues further:

- Undertake a full site visit and route survey report for the proposed site;
- Prepare detailed mitigation design proposals to help inform the land option / consultee discussions;
- Obtain the necessary land options;
- Undertake discussion with the affected utility providers and roads agencies;
- Obtain the necessary statutory licences to enable the mitigation measures; and
- Develop a detailed operational Transport Management Plan to assist in transporting the proposed loads.

Appendix A
Swept Path Assessments





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Client: Fehily Timoney

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Potential Turning Location

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		1

Scale: 1:1000 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK01

Notes:
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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Junction 1 SPA

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		2

Scale: 1:500 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK02

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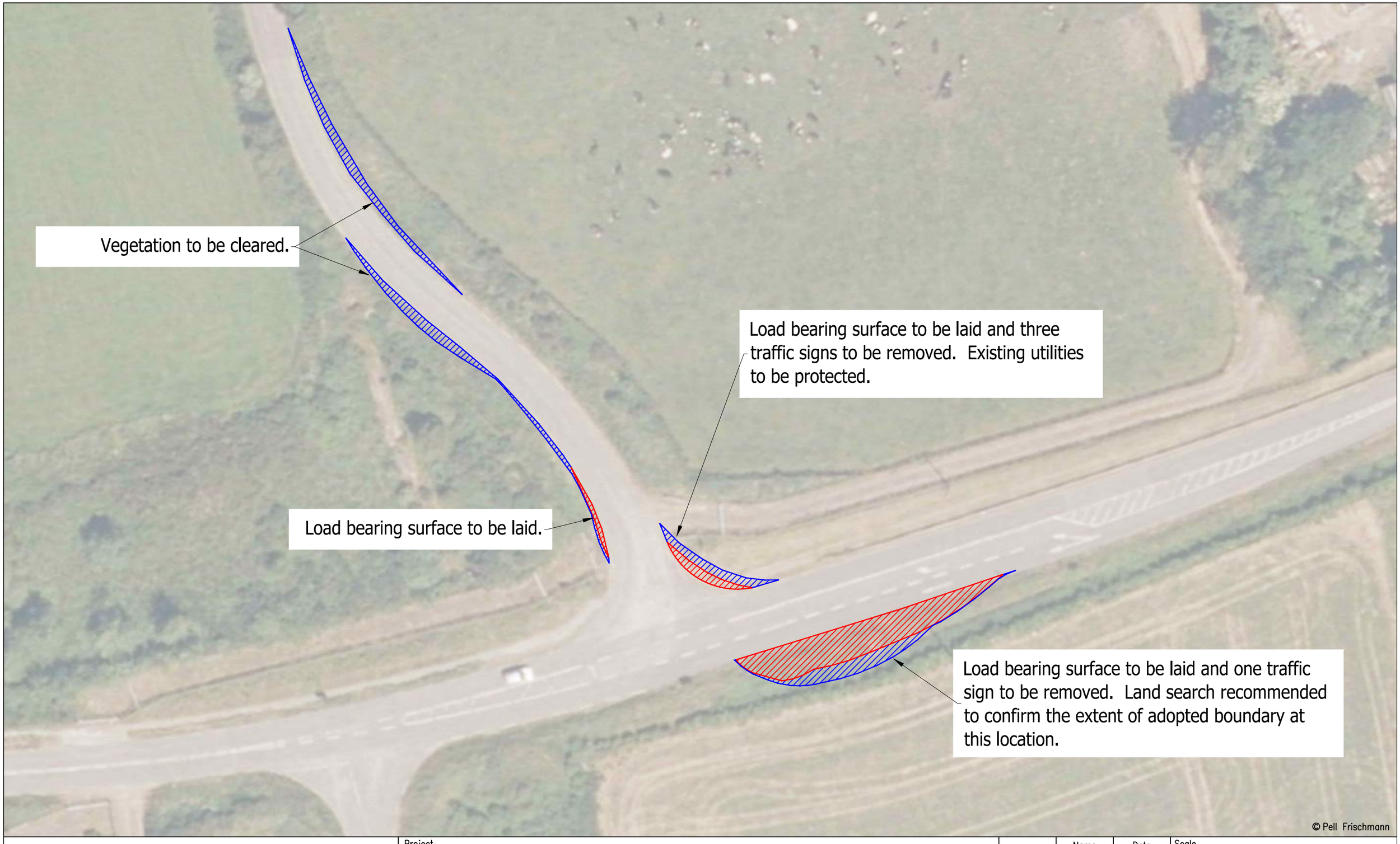

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Junction 1 SPA

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		2

Scale: 1:500 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK02A

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Junction 2 SPA

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		3

Scale: 1:500 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK03

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Junction 2 SPA

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		3

Scale: 1:500 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK03A

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Junction 4 SPA

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		4

Scale: 1:500 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK04

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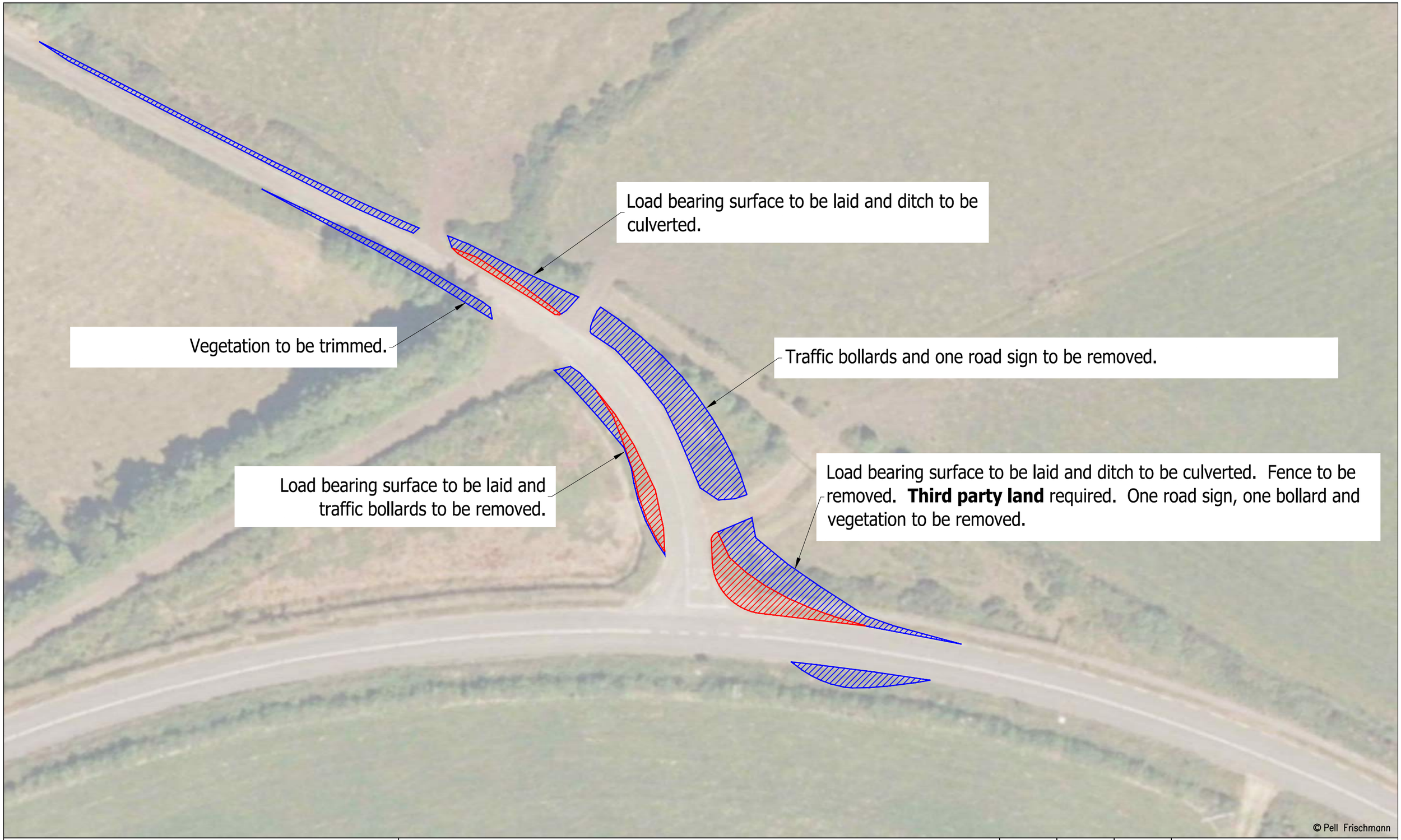

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Client: Fehily Timoney

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Junction 4 SPA

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		4

Scale: 1:500 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK04A

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Junction 3 SPA

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		5

Scale: Custom @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK05

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Client: Fehily Timoney

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Junction 3 SPA

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		5

Scale: 1:500 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK05A

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Client: Fehily Timoney

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Potential Site Entrance Location (Option 1)

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		6

Scale: 1:500 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK06

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Coom Wind Farm

Drawing Title: 67.7m Blade & 24.03x4.3x4.02m Tower

SPA Location: Potential Site Entrance Location (Option 1)

	Name	Date
Drawn	TL	25/08/2020
Designed	CN	21/08/2020
Checked	GB	25/08/2020
Point of Interest		6

Scale: 1:500 @ A3

File No.: Coom Tracking 210820.dwg

Drawing Status: Draft

Drawing No.: SK06A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.
3. PF accept no responsibility for the accuracy of the client provided aerial imagery.

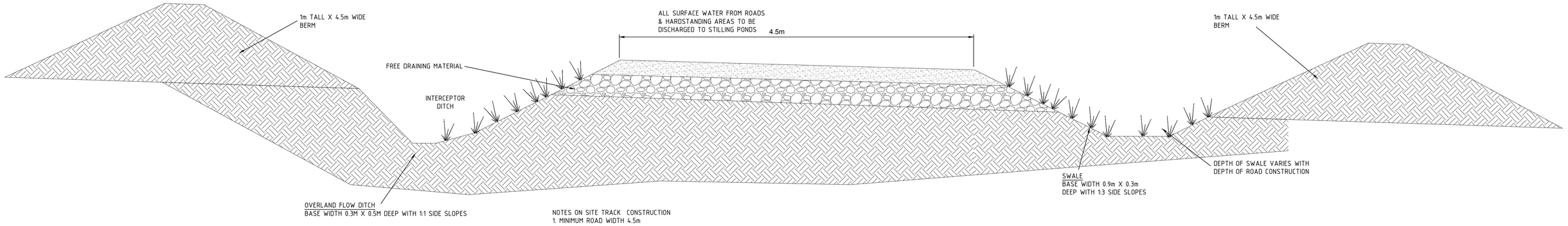
Revision: 1

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING

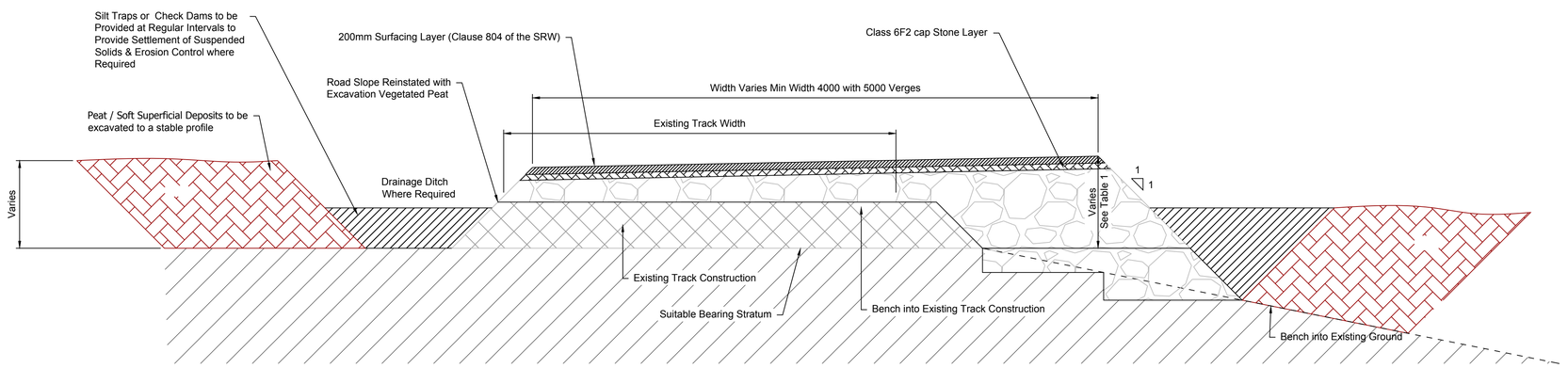
APPENDIX 3

Referenced Drawings



NEW ROAD DETAIL

Scale 1:25



UPGRADED ROAD DETAIL

Scale 1:25

0m 0.25m 0.50m 0.75m 1.00m 1.25m 1.50m 1.75m 2.00m 2.25m 2.50m

Scale 1:25

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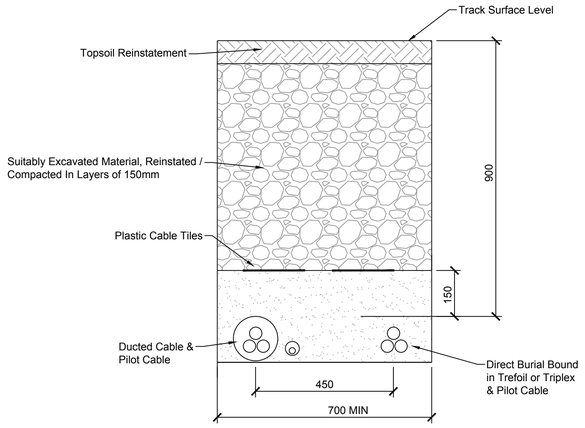
Rev.	Description	App By	Date
A	ISSUE FOR APPROVAL	JH	23.11.20

PROJECT: COOM GREEN ENERGY PARK	CLIENT: CROOM GREEN ENERGY PARK LIMITED		
SHEET: ROAD DETAILS	Date: 23.11.20	Project number: P20-099	Scale (@ A1-): 1:25
	Drawn by: SOC	Drawing Number: P20-099-0300-0025	Rev: A
	Checked by: CL		

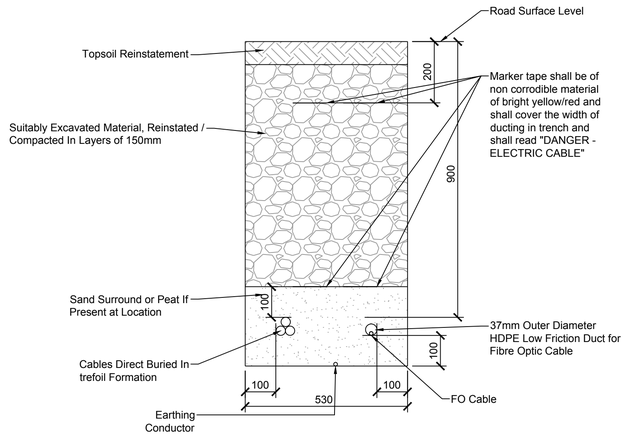
O:\ACAD\2020\P20-099\P20-099-0300-0025

02 December 2020



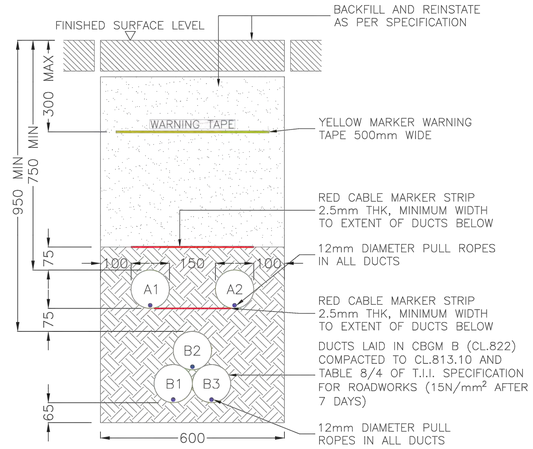
TRENCH CROSS SECTION - PILOT CABLES

Scale 1:10



COLLECTOR CIRCUIT VERGE (DIRECT BURY)

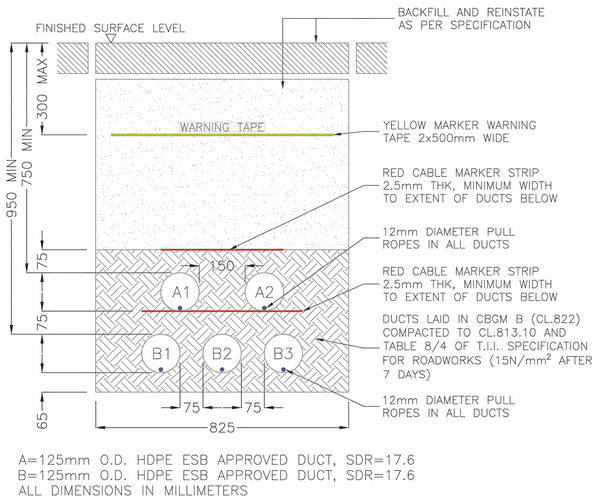
Scale 1:10



A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
B=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
ALL DIMENSIONS IN MILLIMETERS

110Kv SINGLE CIRCUIT TRENCH CROSS SECTION FOR POWER DUCTS IN TREFOIL FORMATION

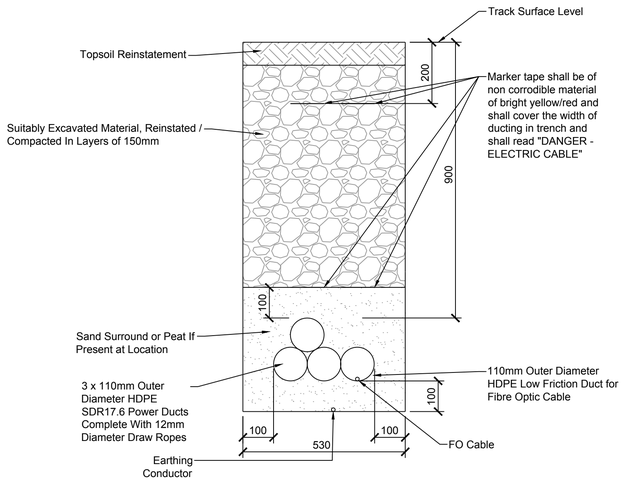
Scale 1:10



A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
B=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
ALL DIMENSIONS IN MILLIMETERS

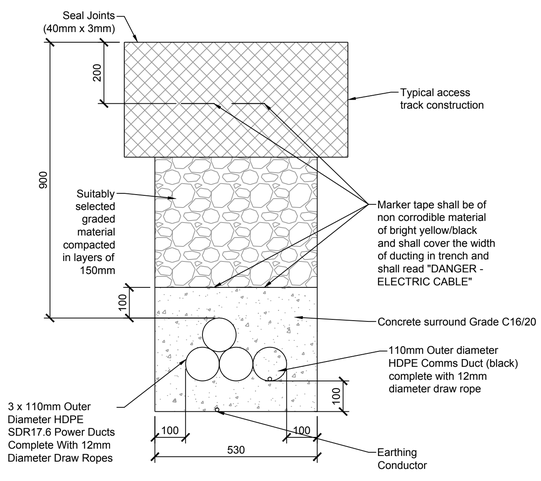
110Kv SINGLE CIRCUIT TRENCH CROSS SECTION FOR POWER DUCTS IN FLAT FORMATION

Scale 1:10



COLLECTOR CIRCUIT VERGE

Scale 1:10



COLLECTOR CIRCUIT CENTRE

Scale 1:10

0m 0.1m 0.2m 0.3m 0.4m 0.5m 0.6m 0.7m 0.8m 0.9m 1.0m

Scale 1:10

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Rev.	Description	App By	Date
A	ISSUE FOR COMMENT	JH	19.12.19

PROJECT
COOM GREEN ENERGY PARK

CLIENT
CROOM GREEN ENERGY PARK LIMITED

SHEET
TRENCH DETAILS FOR INTERNAL COLLECTOR CABLES & 110kV GRID CONNECTION CABLE

Date: 19.12.19	Project number: P20-099	Scale (@ A1-): 1:10	
Drawn by: SOC	Drawing Number: P20-099-0300-0021		Rev: A
Checked by: TB			

O:\ACAD\2020\P20-099\P20-099-0300-0021

02 December 2020

STANDARD 110kV CABLE DRAWINGS
STANDARD CROSSING ABOVE
3rd PARTY SERVICE FOR 125mm DUCTS

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-001	001	STANDARD 3rd PARTY CROSSING 125mm INDEX SHEET	00
XDC-CBL-STND-H-001	002	STANDARD 3rd PARTY CROSSING ABOVE IN FULL FLAT FORMATION 125mm HV DUCTS	00
XDC-CBL-STND-H-001	003	STANDARD 3rd PARTY CROSSING ABOVE IN TREFOIL FORMATION 125mm HV DUCTS	00

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
00	FIRST ISSUE	DA	DG	CF	09/03/2020

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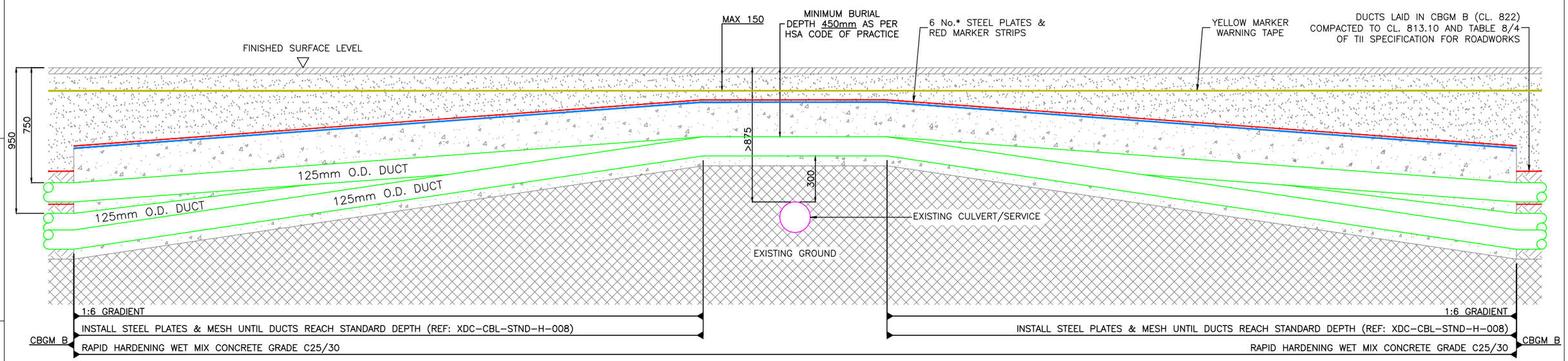
Web: www.eirgrid.com

STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING
125mm
INDEX SHEET

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-001	001	00

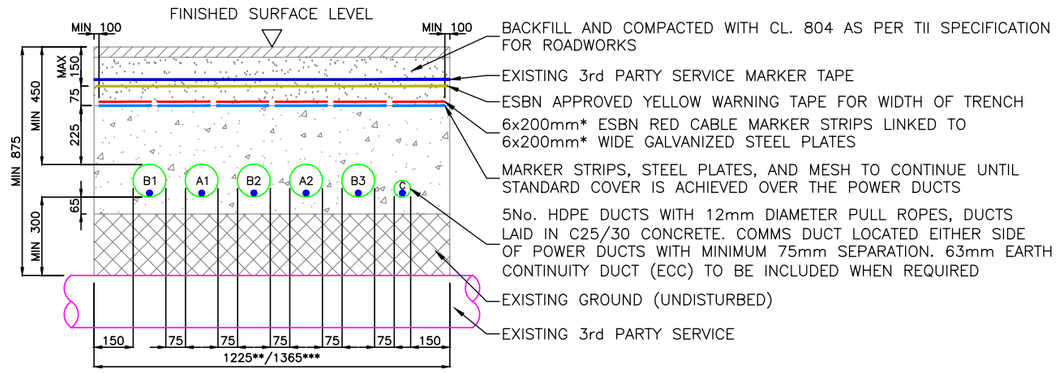


NOTES:

1. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, ESBN STANDARDS, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
2. 300mm MINIMUM VERTICAL AND HORIZONTAL CLEARANCES TO BE OBSERVED BETWEEN CABLE DUCTS AND THIRD PARTY SERVICES (e.g. GAS PIPES, WATER MAINS, CULVERTS, etc.) IN THE CASE OF HIGH RISK 3rd PARTY SERVICES, GREATER CLEARANCES MAY BE REQUIRED. DESIGNER TO CONSULT EIRGRID AND 3rd PARTY SERVICE OWNERS FOR GUIDANCE.
3. STEEL PLATES MUST COVER DUCTS. NO OVERLAP IS REQUIRED HOWEVER STANDARD DIMENSIONS MAY RESULT IN AN OVERLAP. SPACING OF 25mm TO BE MAINTAINED BETWEEN STEEL PLATES TO PREVENT THE TRANSFER OF STRAY CURRENT.
4. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS 75mm, BUT INCREASED SPACING MAY BE REQUIRED IN ORDER TO ACHIEVE THE CABLE RATING (TO BE CONFIRMED BY DESIGNER CABLE RATING CALCULATIONS).
5. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
6. TEMPLATES ARE TO BE USED AT 5m INTERVALS DURING DUCT INSTALLATION IN CBGM. PRE-MADE 75mm WIDE CONCRETE SPACERS TO BE USED DURING DUCT INSTALLATION IN WET CONCRETE.
7. MINIMUM BURIAL DEPTH IS 450mm.
8. HAND DIG WITHIN 500mm OF EXISTING SERVICE.
9. WHERE AN EARTH CONTINUITY CONDUCTOR (ECC) IS REQUIRED, A MIN 63mm DUCT TO BE INSTALLED OUTSIDE OF PHASE DUCT.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- EXISTING SERVICE MARKER STRIP
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- BACKFILL, COMPACTED (CL. 804)
- EXISTING GROUND

FULL FLAT FORMATION – REDUCED DEPTH FOR CROSSING OVER 3RD PARTY SERVICE



A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
B= 125mm O.D. HDPE DUCT FOR HV CABLE
C= 63mm O.D. HDPE DUCT FOR EARTH CONTINUITY CONDUCTOR

* 5x200mm STEEL PLATES AND RE MARKERS AND WHERE ECC IS NOT REQUIRED
** MIN 1225mm WHERE ECC NOT REQUIRED
*** SEE NOTE 9

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
00	FIRST ISSUE	DA	DG	CF	09/03/2020

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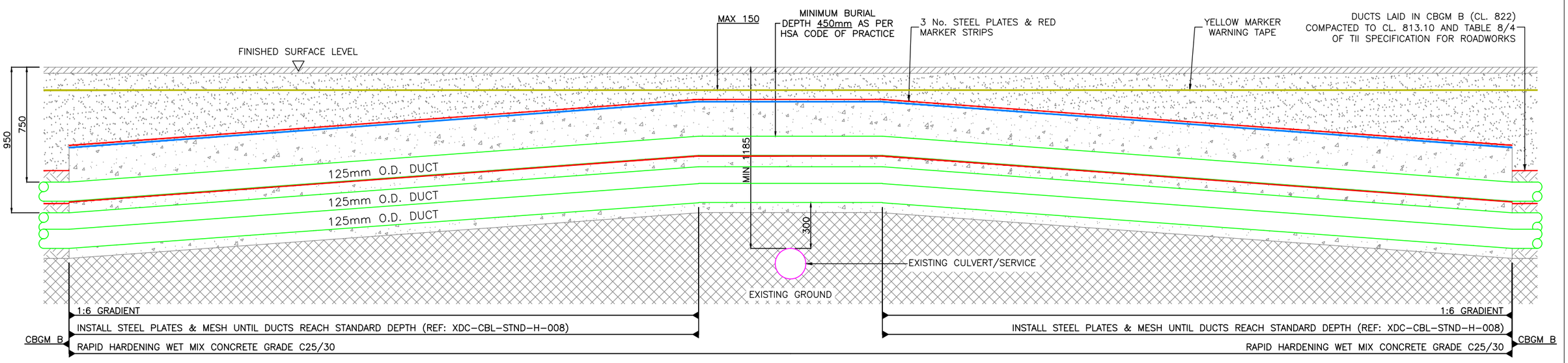
Web: www.eirgrid.com

STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING ABOVE IN FULL FLAT FORMATION 125mm HV DUCTS

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-001	002	00

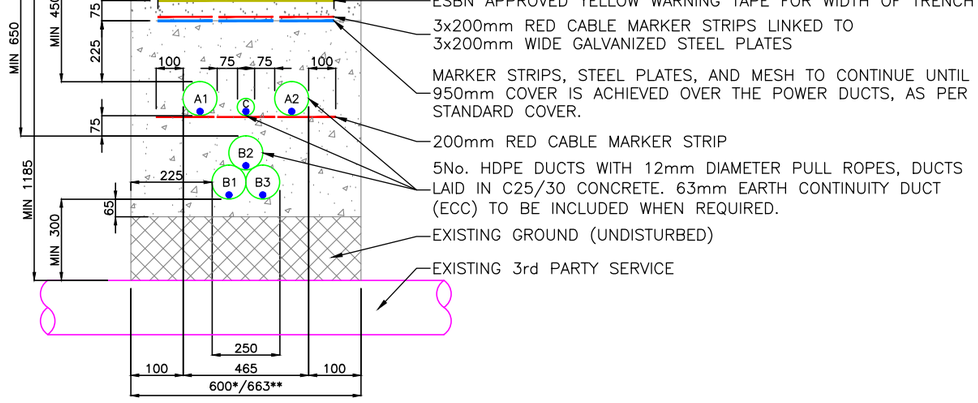


NOTES:

1. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, ESBN STANDARDS, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
2. 300mm MINIMUM VERTICAL AND HORIZONTAL CLEARANCES TO BE OBSERVED BETWEEN CABLE DUCTS AND THIRD PARTY SERVICES (e.g. GAS PIPES, WATER MAINS, CULVERTS, etc.) IN THE CASE OF HIGH RISK 3rd PARTY SERVICES, GREATER CLEARANCES MAY BE REQUIRED. DESIGNER TO CONSULT EIRGRID AND 3rd PARTY SERVICE OWNERS FOR GUIDANCE.
3. STEEL PLATES MUST COVER DUCTS. NO OVERLAP IS REQUIRED HOWEVER STANDARD DIMENSIONS MAY RESULT IN AN OVERLAP. SPACING OF 25mm TO BE MAINTAINED BETWEEN STEEL PLATES TO PREVENT THE TRANSFER OF STRAY CURRENT.
4. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS 75mm, BUT INCREASED SPACING MAY BE REQUIRED IN ORDER TO ACHIEVE THE CABLE RATING (TO BE CONFIRMED BY DESIGNER CABLE RATING CALCULATIONS).
5. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
6. TEMPLATES ARE TO BE USED AT 5m INTERVALS DURING DUCT INSTALLATION IN CBGM. PRE-MADE 75mm WIDE CONCRETE SPACERS TO BE USED DURING DUCT INSTALLATION IN WET CONCRETE.
7. MINIMUM BURIAL DEPTH IS 450mm.
8. HAND DIG WITHIN 500mm OF EXISTING SERVICE.
9. WHERE AN EARTH CONTINUITY CONDUCTOR (ECC) IS REQUIRED, A MIN 63mm DUCT TO BE INSTALLED OUTSIDE OF PHASE DUCT.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- EXISTING SERVICE MARKER STRIP
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- BACKFILL, COMPACTED (CL. 804)
- EXISTING GROUND

TREFOIL FORMATION – REDUCED DEPTH FOR CROSSING OVER 3RD PARTY SERVICE



A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
B= 125mm O.D. HDPE DUCT FOR HV CABLE
C= 63mm O.D. HDPE DUCT FOR EARTH CONTINUITY CONDUCTOR

* MIN 600mm WHERE ECC NOT REQUIRED
** SEE NOTE 9

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
00	FIRST ISSUE	DA	DG	CF	09/03/2020

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Email: info@eirgrid.com
Web: www.eirgrid.com

STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING ABOVE IN TREFOIL FORMATION 125mm HV DUCTS

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-001	003	00

STANDARD 110kV CABLE DRAWINGS
STANDARD CROSSING ABOVE
3rd PARTY SERVICE FOR 160mm DUCTS

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-002	001	STANDARD 3rd PARTY CROSSING 160mm INDEX SHEET	00
XDC-CBL-STND-H-002	002	STANDARD 3rd PARTY CROSSING ABOVE IN FULL FLAT FORMATION 160mm HV DUCTS	00
XDC-CBL-STND-H-002	003	STANDARD 3rd PARTY CROSSING ABOVE IN TREFOIL FORMATION 160mm HV DUCTS	00

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
00	FIRST ISSUE	DA	DG	CF	09/03/2020

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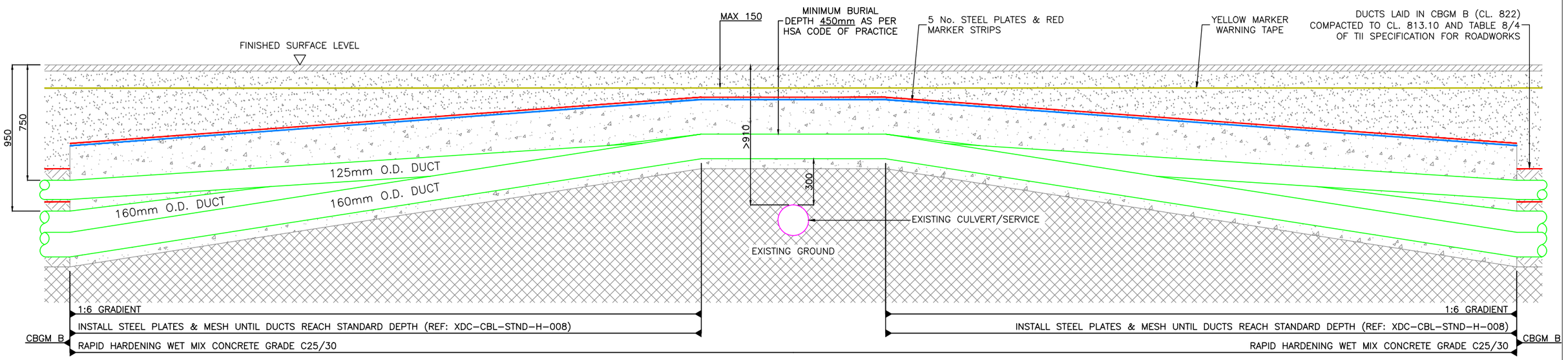
Web: www.eirgrid.com

STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING
160mm
INDEX SHEET

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-002	001	00



NOTES:

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2. 300mm MINIMUM VERTICAL AND HORIZONTAL CLEARANCES TO BE OBSERVED BETWEEN CABLE DUCTS AND THIRD PARTY SERVICES (e.g. GAS PIPES, WATER MAINS, CULVERTS, etc.) IN THE CASE OF HIGH RISK 3rd PARTY SERVICES, GREATER CLEARANCES MAY BE REQUIRED. DESIGNER TO CONSULT EIRGRID AND 3rd PARTY SERVICE OWNERS FOR GUIDANCE.
3. STEEL PLATES MUST COVER DUCTS. NO OVERLAP IS REQUIRED HOWEVER STANDARD DIMENSIONS MAY RESULT IN AN OVERLAP. SPACING OF 10mm TO BE MAINTAINED BETWEEN STEEL PLATES TO PREVENT THE TRANSFER OF STRAY CURRENT.
4. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS 75mm, BUT INCREASED SPACING MAY BE REQUIRED IN ORDER TO ACHIEVE THE CABLE RATING (TO BE CONFIRMED BY DESIGNER CABLE RATING CALCULATIONS).
5. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
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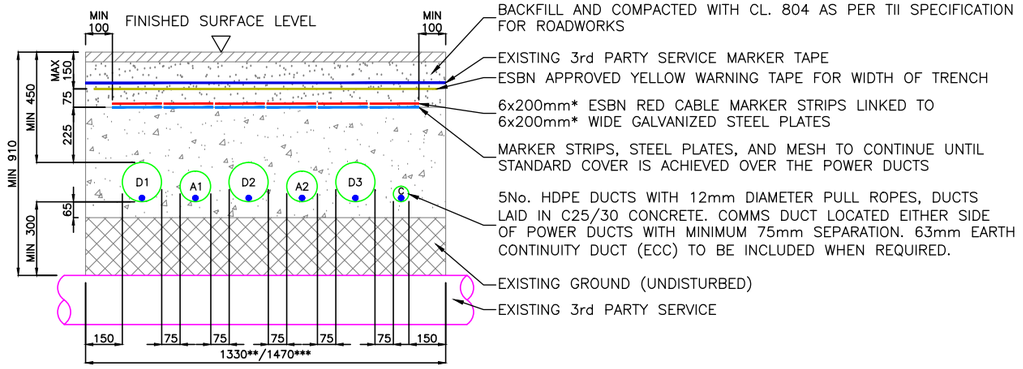
7. MINIMUM BURIAL DEPTH IS 450mm.
8. HAND DIG WITHIN 500mm OF EXISTING SERVICE.
9. WHERE AN EARTH CONTINUITY CONDUCTOR (ECC) IS REQUIRED, A MIN 63mm DUCT TO BE INSTALLED OUTSIDE OF PHASE DUCT.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- EXISTING SERVICE MARKER STRIP
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- BACKFILL, COMPACTED (CL. 804)
- EXISTING GROUND

FULL FLAT FORMATION – REDUCED DEPTH FOR CROSSING OVER 3RD PARTY SERVICE



A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
D= 160mm O.D. HDPE DUCT FOR HV CABLE
C= 63mm O.D. HDPE DUCT FOR EARTH CONTINUITY CONDUCTOR

* 5x200mm STEEL PLATES AND RED MARKER WHERE AND ECC IS NOT REQUIRED
** MIN 1225mm WHERE ECC NOT REQUIRED
*** SEE NOTE 9

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
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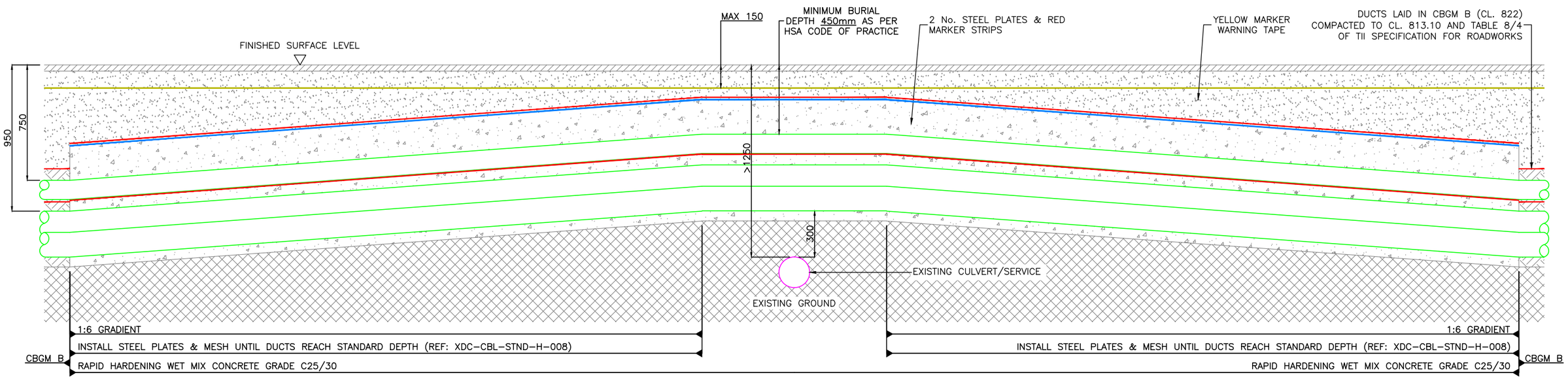
Web: www.eirgrid.com

STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING ABOVE IN FULL FLAT FORMATION 160mm HV DUCTS

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-002	002	00



NOTES:

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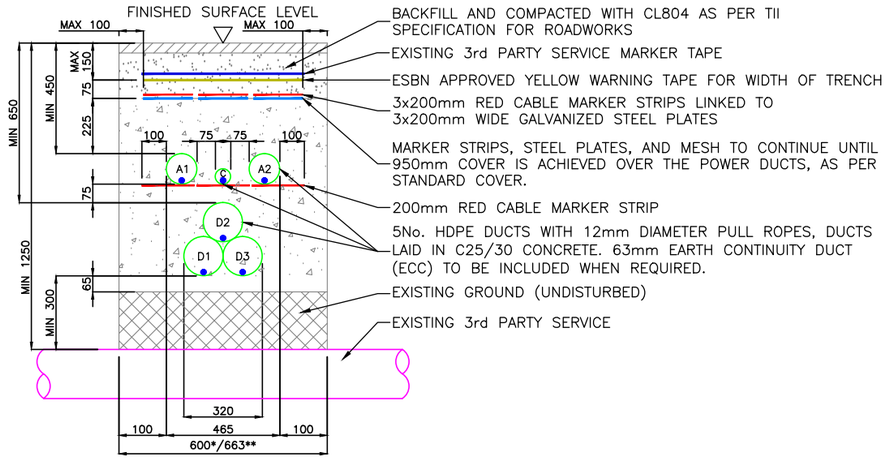
7. MINIMUM BURIAL DEPTH IS 450mm.
8. HAND DIG WITHIN 500mm OF EXISTING SERVICE.
9. WHERE AN EARTH CONTINUITY CONDUCTOR (ECC) IS REQUIRED, A MIN 63mm DUCT TO BE INSTALLED OUTSIDE OF PHASE DUCT.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- EXISTING SERVICE MARKER STRIP
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- BACKFILL, COMPACTED (CL. 804)
- EXISTING GROUND

TREFOIL FORMATION – REDUCED DEPTH FOR CROSSING OVER 3RD PARTY SERVICE



A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
D= 160mm O.D. HDPE DUCT FOR HV CABLE
C= 63mm O.D. PVC DUCT FOR EARTH CONTINUITY CONDUCTOR

* MIN 600mm WHERE ECC NOT REQUIRED
** SEE NOTE 9

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
00	FIRST ISSUE	DA	DG	CF	09/03/2020

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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING ABOVE IN TREFOIL FORMATION 160mm HV DUCTS

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER: XDC-CBL-STND-H-002
SHEET: 003
REV: 00

STANDARD 110kV CABLE DRAWINGS
STANDARD CROSSING BELOW
3rd PARTY SERVICE FOR 125mm DUCTS

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-003	001	STANDARD 3rd PARTY CROSSING 125mm INDEX SHEET	00
XDC-CBL-STND-H-003	002	STANDARD 3rd PARTY CROSSING 125mm BELOW IN FULL FLAT FORMATION	00
XDC-CBL-STND-H-003	003	STANDARD 3rd PARTY CROSSING 125mm BELOW IN TREFOIL FORMATION	00

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
00	FIRST ISSUE	DA	DG	CF	09/03/2020

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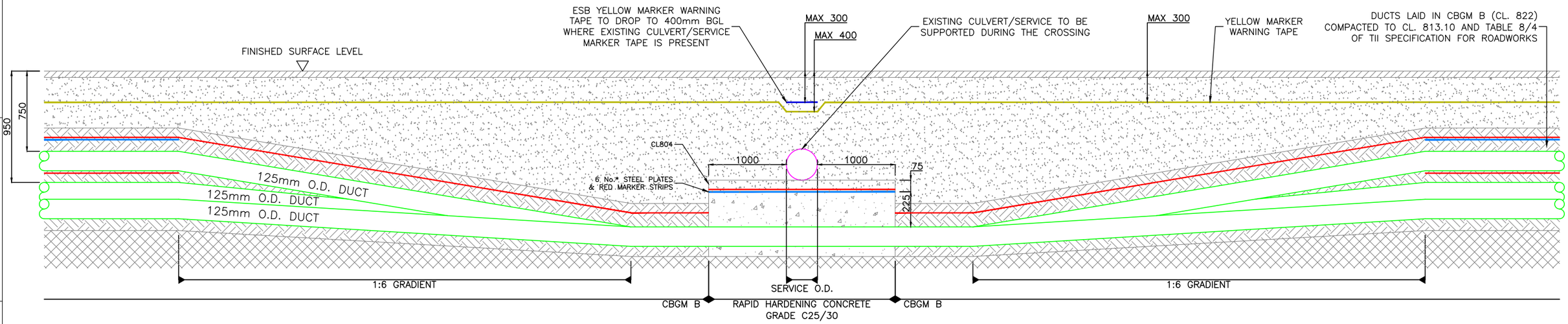
Web: www.eirgrid.com

STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING
125mm
INDEX SHEET

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-003	001	00



NOTES:

1. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, ESBN STANDARDS, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
2. 300mm MINIMUM VERTICAL AND HORIZONTAL CLEARANCES TO BE OBSERVED BETWEEN CABLE DUCTS AND THIRD PARTY SERVICES (e.g. GAS PIPES, WATER MAINS, CULVERTS, etc.) IN THE CASE OF HIGH RISK 3rd PARTY SERVICES, GREATER CLEARANCES MAY BE REQUIRED. DESIGNER TO CONSULT EIRGRID AND 3rd PARTY SERVICE OWNERS FOR GUIDANCE.
3. STEEL PLATES MUST COVER DUCTS. NO OVERLAP IS REQUIRED HOWEVER STANDARD DIMENSIONS MAY RESULT IN AN OVERLAP. SPACING OF 25mm TO BE MAINTAINED BETWEEN STEEL PLATES TO PREVENT THE TRANSFER OF STRAY CURRENT.
4. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS 75mm, BUT INCREASED SPACING MAY BE REQUIRED IN ORDER TO ACHIEVE THE CABLE RATING (TO BE CONFIRMED BY DESIGNER CABLE RATING CALCULATIONS).
5. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
6. TEMPLATES ARE TO BE USED AT 5m INTERVALS DURING DUCT INSTALLATION IN CBGM. PRE-MADE 75mm WIDE CONCRETE SPACERS TO BE USED DURING DUCT INSTALLATION IN WET CONCRETE.
7. HAND DIG WITHIN 500mm OF EXISTING SERVICE.
8. WHERE AN EARTH CONTINUITY CONDUCTOR (ECC) IS REQUIRED, A MIN 63mm DUCT TO BE INSTALLED OUTSIDE OF PHASE DUCT.
9. IF EXISTING SERVICE MARKER TAPE IS NOT PRESENT, THE ESBN YELLOW MARKER TAPE SHOULD BE INSTALLED AT MAXIMUM 300mm BELOW FINISHED SURFACE LEVEL.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- EXISTING SERVICE MARKER STRIP
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- BACKFILL, COMPACTED (CL. 804)
- EXISTING GROUND

FULL FLAT FORMATION FOR CROSSING BELOW 3RD PARTY SERVICE

A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
B= 125mm O.D. HDPE DUCT FOR HV CABLE
C= 63mm O.D. HDPE DUCT FOR EARTH CONTINUITY CONDUCTOR

* 5x200mm STEEL PLATES AND RED MARKER WHERE ECC IS NOT REQUIRED
** MIN 1225mm WHERE ECC NOT REQUIRED
*** SEE NOTE 8

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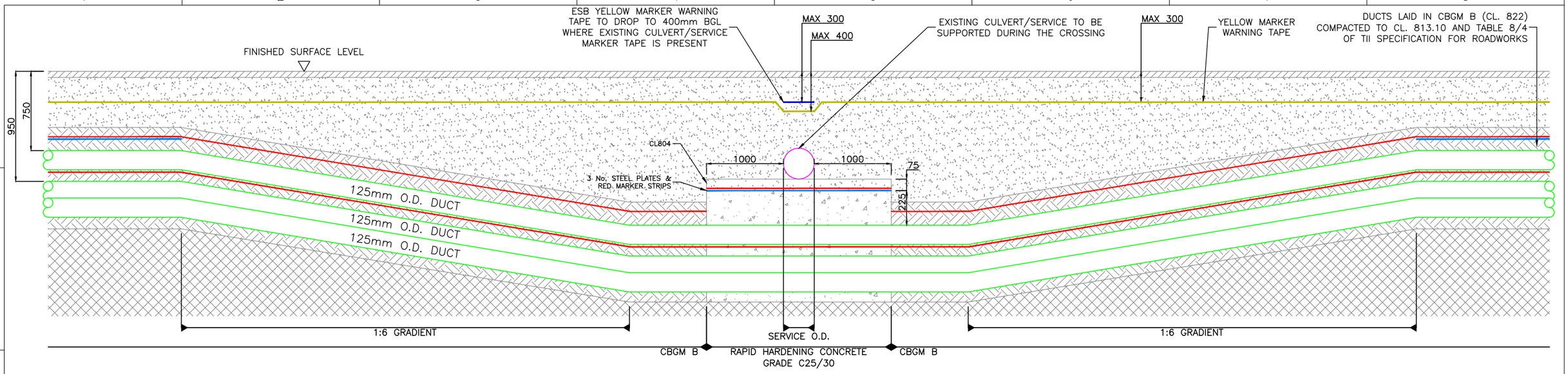
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING 125mm BELOW IN FULL FLAT FORMATION

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-003	002	00

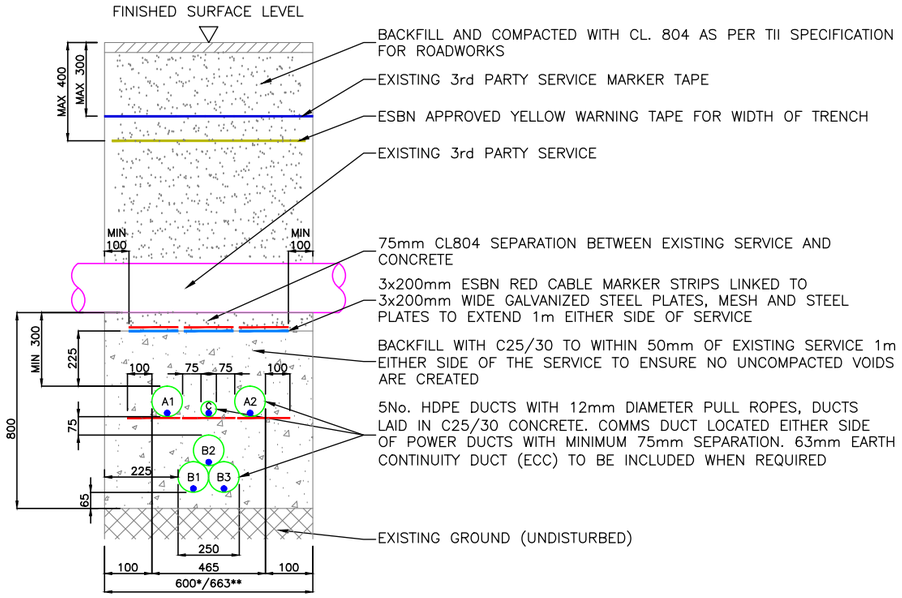


NOTES:

1. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, ESBN STANDARDS, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
2. 300mm MINIMUM VERTICAL AND HORIZONTAL CLEARANCES TO BE OBSERVED BETWEEN CABLE DUCTS AND THIRD PARTY SERVICES (e.g. GAS PIPES, WATER MAINS, CULVERTS, etc.) IN THE CASE OF HIGH RISK 3rd PARTY SERVICES, GREATER CLEARANCES MAY BE REQUIRED. DESIGNER TO CONSULT EIRGRID AND 3rd PARTY SERVICE OWNERS FOR GUIDANCE.
3. STEEL PLATES MUST COVER DUCTS. NO OVERLAP IS REQUIRED HOWEVER STANDARD DIMENSIONS MAY RESULT IN AN OVERLAP. SPACING OF 25mm TO BE MAINTAINED BETWEEN STEEL PLATES TO PREVENT THE TRANSFER OF STRAY CURRENT.
4. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS 75mm, (CABLE RATING CALCULATIONS TO BE REQUIRED FOR ACCEPTANCE).
5. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
6. TEMPLATES ARE TO BE USED AT 5m INTERVALS DURING DUCT INSTALLATION IN CBGM. PRE-MADE 75mm WIDE CONCRETE SPACERS TO BE USED DURING DUCT INSTALLATION IN WET CONCRETE.
7. HAND DIG WITHIN 500mm OF EXISTING SERVICE.
8. WHERE AN EARTH CONTINUITY CONDUCTOR (ECC) IS REQUIRED, A MIN 63mm DUCT TO BE INSTALLED OUTSIDE OF PHASE DUCT.
9. IF EXISTING SERVICE MARKER TAPE IS NOT PRESENT, THE ESBN YELLOW MARKER TAPE SHOULD BE INSTALLED AT MAXIMUM 300mm BELOW FINISHED SURFACE LEVEL.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- EXISTING SERVICE MARKER STRIP
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- BACKFILL, COMPACTED (CL. 804)
- EXISTING GROUND

TREFOIL FORMATION FOR CROSSING BELOW 3RD PARTY SERVICE



A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
B= 125mm O.D. HDPE DUCT FOR HV CABLE
C= 63mm O.D. HDPE DUCT FOR EARTH CONTINUITY CONDUCTOR

* MIN 600mm WHERE ECC NOT REQUIRED
** SEE NOTE 8

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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING 125mm BELOW IN TREFOIL FORMATION

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-003	003	00

STANDARD 110kV CABLE DRAWINGS
STANDARD CROSSING BELOW
3rd PARTY SERVICE FOR 160mm DUCTS

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-004	001	STANDARD 3rd PARTY CROSSING 160mm INDEX SHEET	00
XDC-CBL-STND-H-004	002	STANDARD 3rd PARTY CROSSING 160mm BELOW IN FULL FLAT FORMATION	00
XDC-CBL-STND-H-004	003	STANDARD 3rd PARTY CROSSING 160mm BELOW IN TREFOIL FORMATION	00

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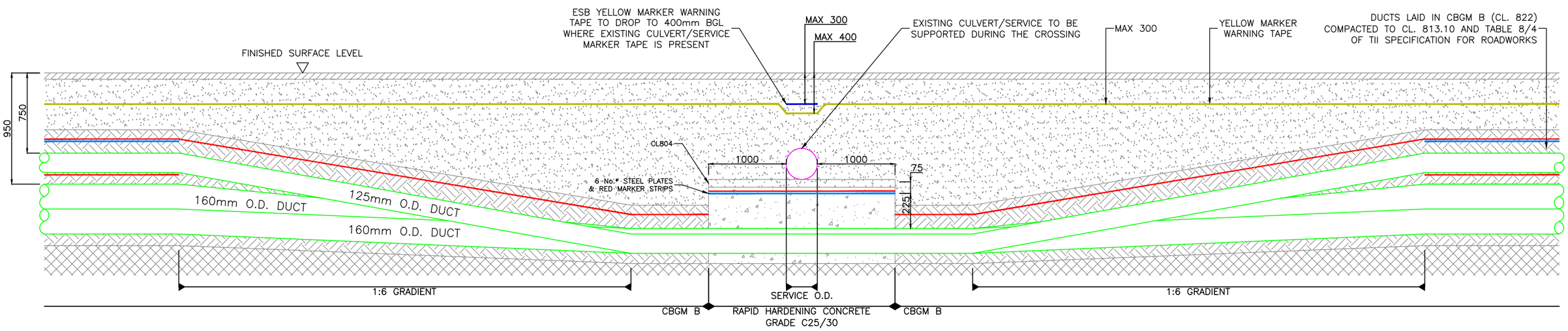
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING
160mm
INDEX SHEET

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-004	001	00

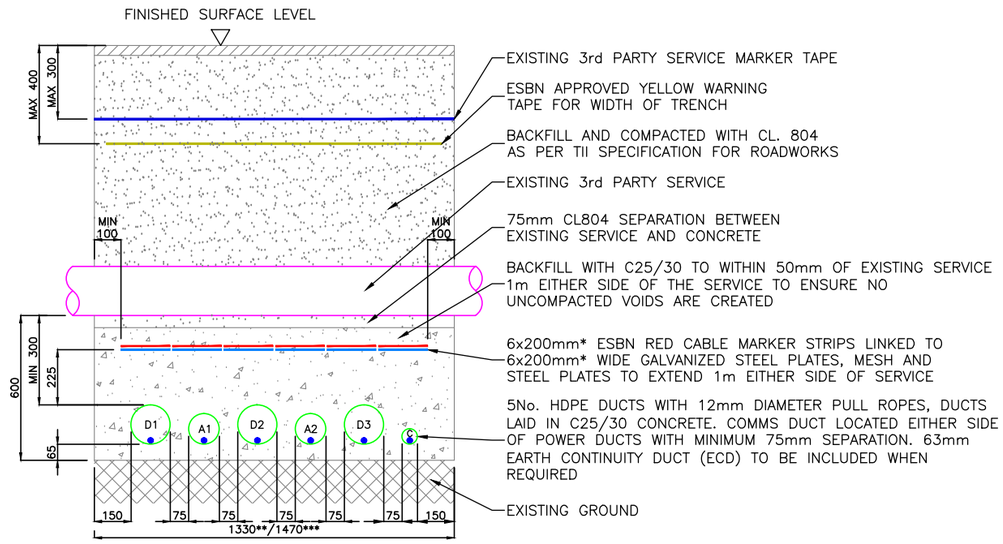


NOTES:

1. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, ESBN STANDARDS, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
2. 300mm MINIMUM VERTICAL AND HORIZONTAL CLEARANCES TO BE OBSERVED BETWEEN CABLE DUCTS AND THIRD PARTY SERVICES (e.g. GAS PIPES, WATER MAINS, CULVERTS, etc.) IN THE CASE OF HIGH RISK 3rd PARTY SERVICES, GREATER CLEARANCES MAY BE REQUIRED. DESIGNER TO CONSULT EIRGRID AND 3rd PARTY SERVICE OWNERS FOR GUIDANCE.
3. STEEL PLATES MUST COVER DUCTS. NO OVERLAP IS REQUIRED HOWEVER STANDARD DIMENSIONS MAY RESULT IN AN OVERLAP. SPACING OF 10mm TO BE MAINTAINED BETWEEN STEEL PLATES TO PREVENT THE TRANSFER OF STRAY CURRENT.
4. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS **75mm**, (CABLE RATING CALCULATIONS TO BE PROVIDED FOR ACCEPTANCE).
5. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
6. TEMPLATES ARE TO BE USED AT 5m INTERVALS DURING DUCT INSTALLATION IN CBGM. PRE-MADE 75mm WIDE CONCRETE SPACERS TO BE USED DURING DUCT INSTALLATION IN WET CONCRETE.
7. MINIMUM SPACING BETWEEN POWER DUCTS TO BE CONFIRMED WITH RATING CALCULATION.
8. HAND DIG WITHIN 500mm OF EXISTING SERVICE.
9. WHERE AN EARTH CONTINUITY CONDUCTOR (ECC) IS REQUIRED, A MIN 63mm DUCT TO BE INSTALLED OUTSIDE OF PHASE DUCT.
10. IF EXISTING SERVICE MARKER TAPE IS NOT PRESENT, THE ESBN YELLOW MARKER TAPE SHOULD BE INSTALLED AT MAXIMUM 300mm BELOW FINISHED SURFACE LEVEL.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- EXISTING SERVICE MARKER STRIP
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- BACKFILL, COMPACTED (CL. 804)
- EXISTING GROUND

FULL FLAT FORMATION FOR CROSSING BELOW 3RD PARTY SERVICE



A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
D= 160mm O.D. HDPE DUCT FOR HV CABLE
C= 63mm O.D. HDPE DUCT FOR EARTH CONTINUITY CONDUCTOR

* 5x200mm STEEL PLATE AND RED MARKER WHERE ECC IS NOT REQUIRED
** MIN 1330mm WHERE ECC NOT REQUIRED
*** SEE NOTE 9

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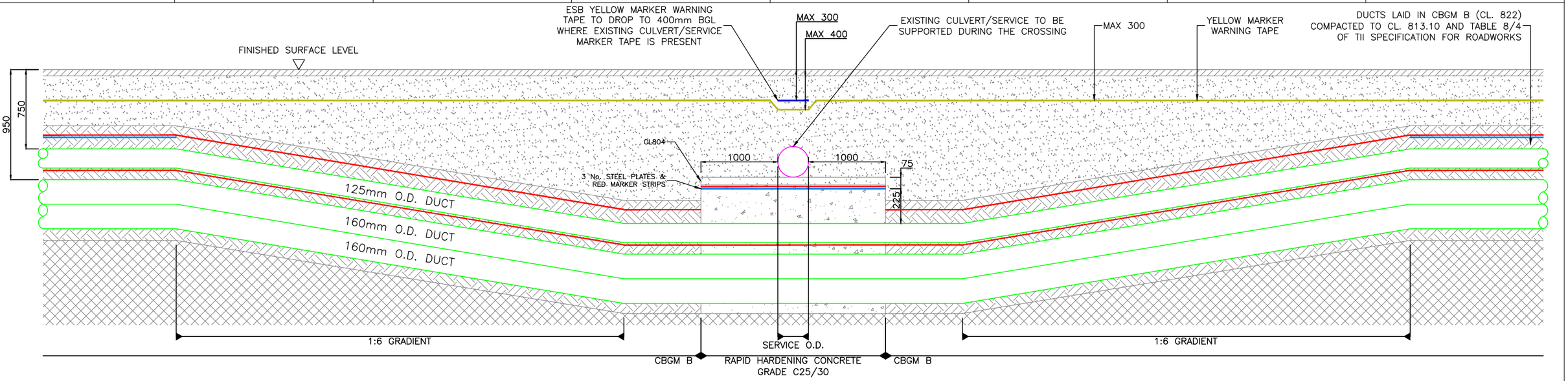
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING 160mm BELOW IN FULL FLAT FORMATION

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-004	002	00



NOTES:

1. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, ESBN STANDARDS, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
2. 300mm MINIMUM VERTICAL AND HORIZONTAL CLEARANCES TO BE OBSERVED BETWEEN CABLE DUCTS AND THIRD PARTY SERVICES (e.g. GAS PIPES, WATER MAINS, CULVERTS, etc.) IN THE CASE OF HIGH RISK 3rd PARTY SERVICES, GREATER CLEARANCES MAY BE REQUIRED. DESIGNER TO CONSULT EIRGRID AND 3rd PARTY SERVICE OWNERS FOR GUIDANCE.
3. STEEL PLATES MUST COVER DUCTS. NO OVERLAP IS REQUIRED HOWEVER STANDARD DIMENSIONS MAY RESULT IN AN OVERLAP. SPACING OF 10mm TO BE MAINTAINED BETWEEN STEEL PLATES TO PREVENT THE TRANSFER OF STRAY CURRENT.
4. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS **75mm**, (CABLE RATING CALCULATIONS TO BE PROVIDED FOR ACCEPTANCE).
5. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
6. TEMPLATES ARE TO BE USED AT 5m INTERVALS DURING DUCT INSTALLATION IN CBGM. PRE-MADE 75mm WIDE CONCRETE SPACERS TO BE USED DURING DUCT INSTALLATION IN WET CONCRETE.
7. MINIMUM SPACING BETWEEN POWER DUCTS TO BE CONFIRMED WITH RATING CALCULATION.
8. HAND DIG WITHIN 500mm OF EXISTING SERVICE.
9. WHERE AN EARTH CONTINUITY CONDUCTOR (ECC) IS REQUIRED, A MIN 63mm DUCT TO BE INSTALLED OUTSIDE OF PHASE DUCT.
10. IF EXISTING SERVICE MARKER TAPE IS NOT PRESENT, THE ESBN YELLOW MARKER TAPE SHOULD BE INSTALLED AT MAXIMUM 300mm BELOW FINISHED SURFACE LEVEL.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- EXISTING SERVICE MARKER STRIP
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- BACKFILL, COMPACTED (CL. 804)
- EXISTING GROUND

TREFOIL FORMATION FOR CROSSING BELOW 3RD PARTY SERVICE

A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
D= 160mm O.D. HDPE DUCT FOR HV CABLE
C= 63mm O.D. HDPE DUCT FOR EARTH CONTINUITY CONDUCTOR

* MIN 600mm WHERE ECC NOT REQUIRED
** SEE NOTE 9

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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD 3rd PARTY CROSSING 160mm BELOW IN TREFOIL FORMATION

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-004	003	00

STANDARD 110kV CABLE DRAWINGS
STANDARD CROSSING BELOW
RIVERBED FOR 125mm & 160mm DUCTS

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-005	001	STANDARD RIVERBED CROSSING INDEX SHEET	00
XDC-CBL-STND-H-005	002	STANDARD RIVERBED CROSSING 125mm RIVERBED CROSSING	00
XDC-CBL-STND-H-005	003	STANDARD RIVERBED CROSSING 160mm RIVERBED CROSSING	00

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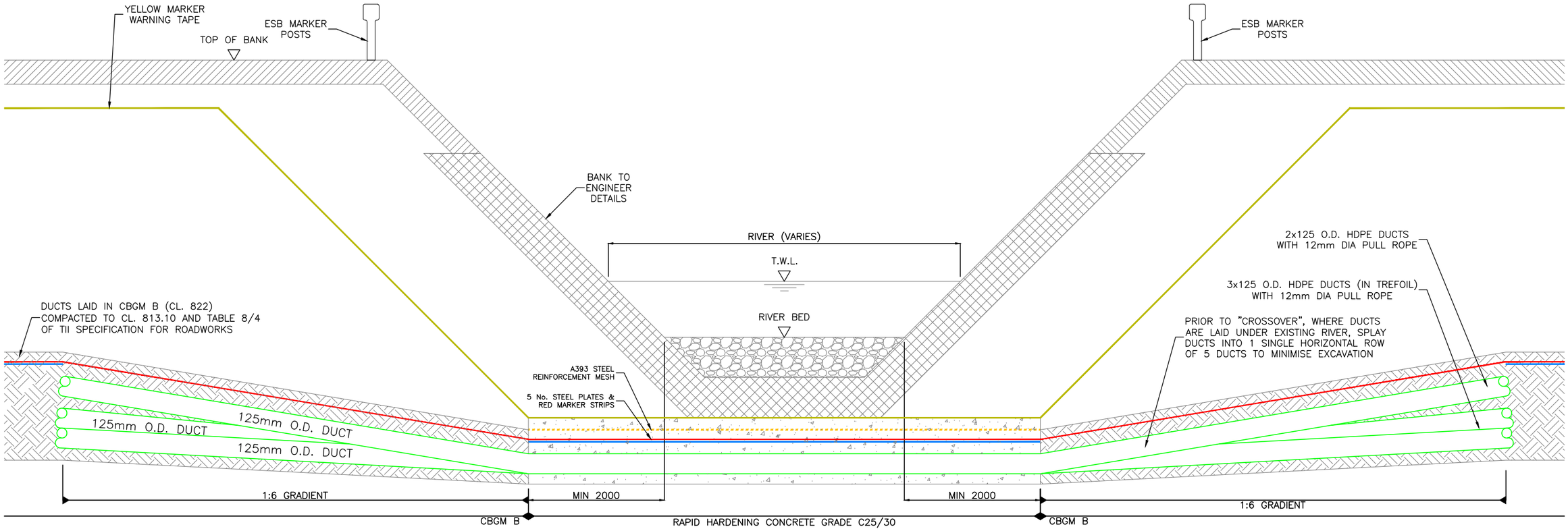
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD RIVERBED CROSSING
INDEX SHEET

No of Shts 3 | SIZE A3 | SCALE N/A

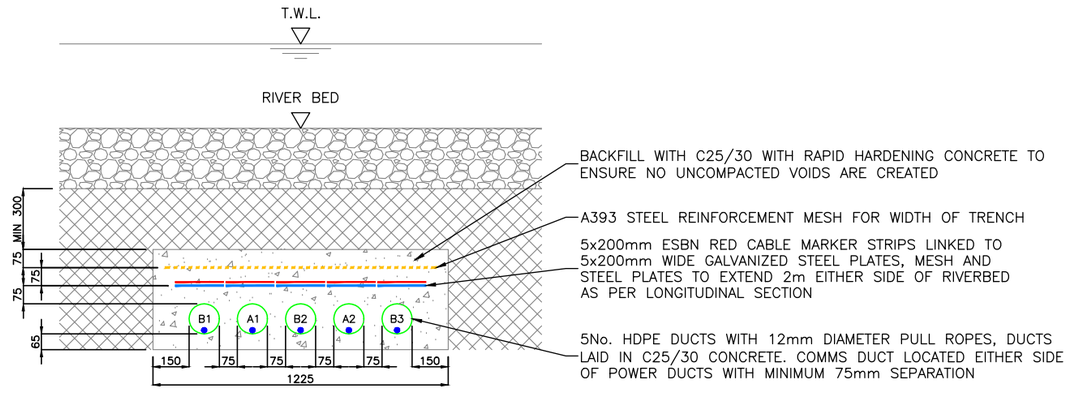
DRAWING NUMBER XDC-CBL-STND-H-005 | SHEET 001 | REV 00



NOTES:

1. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, ESBN STANDARDS, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
2. 300mm MINIMUM VERTICAL AND HORIZONTAL CLEARANCES TO BE OBSERVED BETWEEN CABLE DUCTS AND THIRD PARTY SERVICES (e.g. GAS PIPES, WATER MAINS, CULVERTS, etc.) IN THE CASE OF HIGH RISK 3rd PARTY SERVICES, GREATER CLEARANCES MAY BE REQUIRED. DESIGNER TO CONSULT EIRGRID AND 3rd PARTY SERVICE OWNERS FOR GUIDANCE.
3. STEEL PLATES MUST COVER DUCTS. NO OVERLAP IS REQUIRED HOWEVER STANDARD DIMENSIONS MAY RESULT IN AN OVERLAP. SPACING OF 10mm TO BE MAINTAINED BETWEEN STEEL PLATES TO PREVENT THE TRANSFER OF STRAY CURRENT.
4. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS **75mm**, BUT INCREASED SPACING MAY BE REQUIRED IN ORDER TO ACHIEVE THE CABLE RATING (CABLE RATING CALCULATIONS TO BE PROVIDED FOR ACCEPTANCE).
5. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
6. TEMPLATES ARE TO BE USED AT 5m INTERVALS DURING DUCT INSTALLATION IN CBGM. PRE-MADE 75mm WIDE CONCRETE SPACERS TO BE USED DURING DUCT INSTALLATION IN WET CONCRETE.
7. MINIMUM SPACING BETWEEN POWER DUCTS TO BE CONFIRMED WITH RATING CALCULATION.
8. MINIMUM CLEARANCE BETWEEN CABLE TRENCH CONCRETE AND RIVER BED TO BE AGREED WITH RELEVANT AUTHORITY. IN ANY CASE, NO LESS THAN 300mm.
9. STANDARD ESB MARKER POSTS TO BE INSTALLED AT EITHER SIDE OF RIVER CROSSING.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- A393 STEEL REINFORCEMENT MESH
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- EXISTING GROUND
- REINSTATED RIVERBED



A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
B= 125mm O.D. HDPE DUCT FOR HV CABLE

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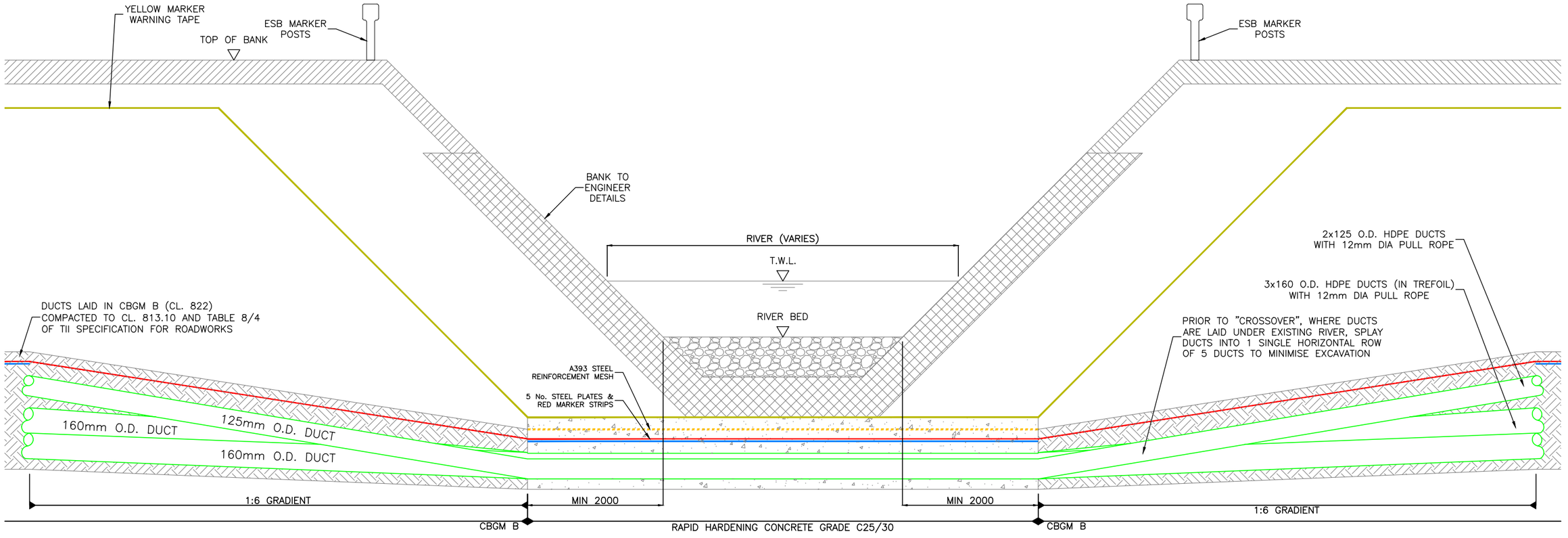
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD RIVERBED CROSSING
125mm RIVERBED CROSSING

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-005	002	00



NOTES:

1. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, ESBN STANDARDS, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
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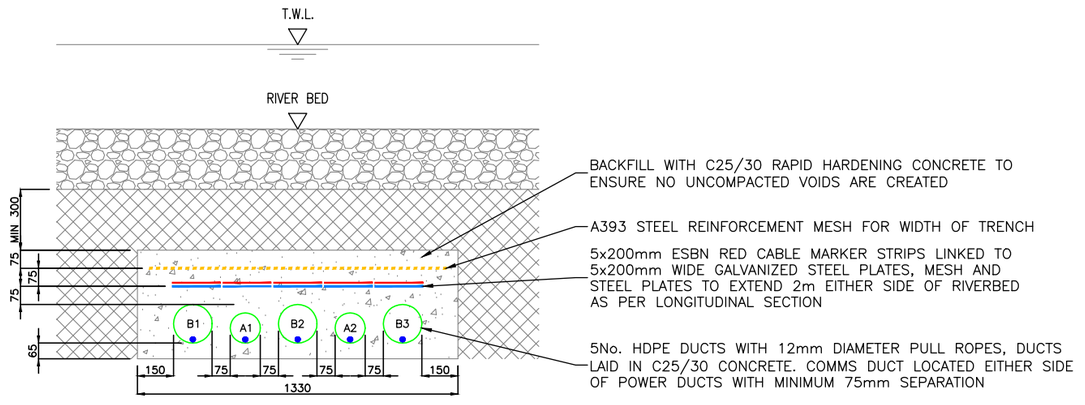
4. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS **75mm**, BUT INCREASED SPACING MAY BE REQUIRED IN ORDER TO ACHIEVE THE CABLE RATING (CABLE RATING CALCULATIONS TO BE PROVIDED FOR ACCEPTANCE).
5. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
6. TEMPLATES ARE TO BE USED AT 5m INTERVALS DURING DUCT INSTALLATION IN CBGM. PRE-MADE 75mm WIDE CONCRETE SPACERS TO BE USED DURING DUCT INSTALLATION IN WET CONCRETE.
7. MINIMUM SPACING BETWEEN POWER DUCTS TO BE CONFIRMED WITH RATING CALCULATION.
8. MINIMUM CLEARANCE BETWEEN CABLE TRENCH CONCRETE AND RIVER BED TO BE AGREED WITH RELEVANT AUTHORITY.
9. STANDARD ESB MARKER POSTS TO BE INSTALLED AT EITHER SIDE OF RIVER CROSSING.

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- A393 STEEL REINFORCEMENT MESH
- 6mm GALVANISED STEEL PLATE
- RAPID HARDENING WET CONCRETE C25/30
- CBGM B (CL. 822), COMPACTED TO CL. 813.10
- EXISTING GROUND
- REINSTATED RIVERBED



A= 125mm O.D. HDPE DUCT FOR COMMUNICATIONS
B= 160mm O.D. HDPE DUCT FOR HV CABLE

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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD RIVERBED CROSSING
160mm RIVERBED CROSSING

No of Shts	SIZE	SCALE
3	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-005	003	00

STANDARD 110kV CABLE DRAWINGS
STANDARD BRIDGE CROSSING

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-006	001	BRIDGE CROSSING INDEX SHEET	00
XDC-CBL-STND-H-006	002	BRIDGE CARRIAGEWAY STANDARD 110kV CABLE TRENCH	00

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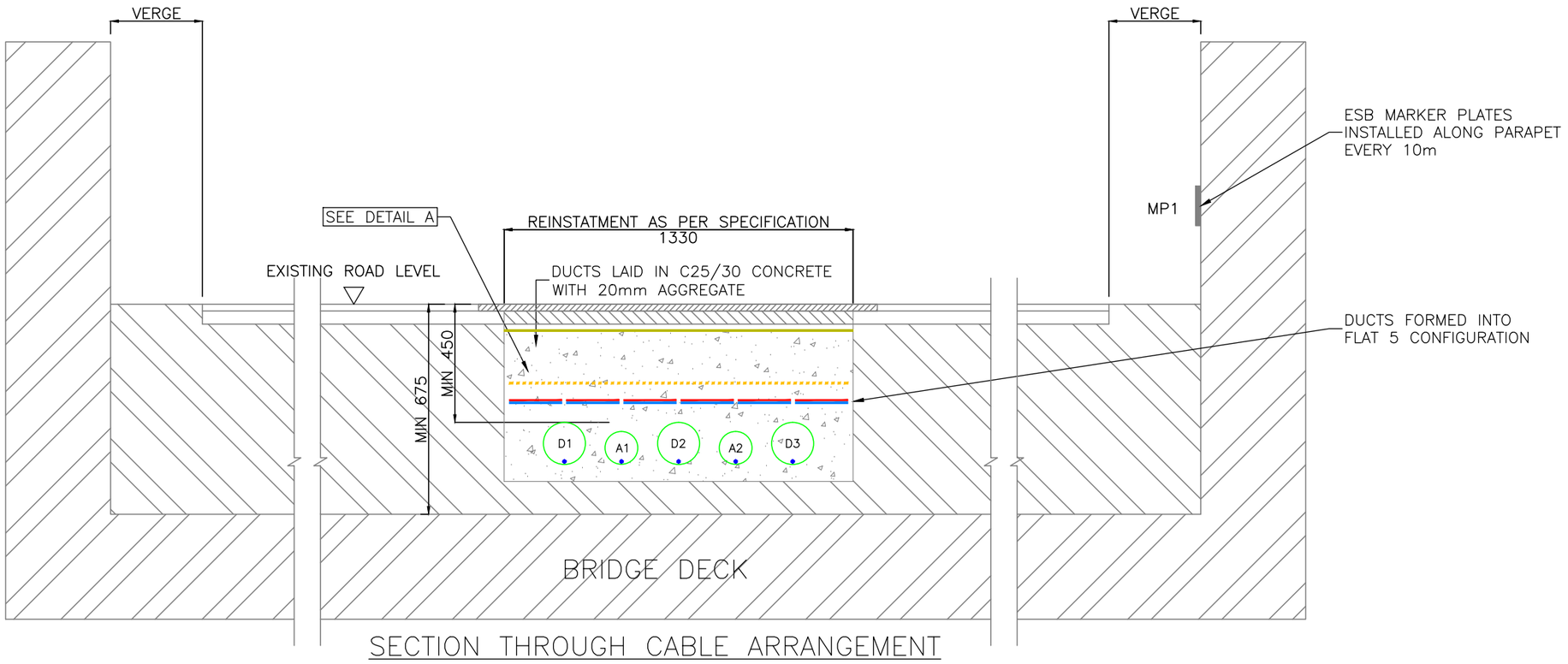
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
BRIDGE CROSSING
INDEX SHEET

No of Shts	SIZE	SCALE
2	A3	N/A

DRAWING NUMBER
XDC-CBL-STND-H-006

SHEET	REV
001	00



SECTION THROUGH CABLE ARRANGEMENT

NOTES:

1. THE REQUIREMENT FOR THE BRIDGE INSTALLATION SHALL BE AGREED IN ADVANCE BY THE CUSTOMER WITH THE LOCAL AUTHORITY, OR RELEVANT PUBLIC/PRIVATE BODY.
2. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
3. REINSTATEMENT TO BE AS PER TII SPECIFICATION FOR THE REINSTATEMENT OF OPENINGS IN NATIONAL ROADS. WHERE ENTIRE ROAD TO BE RELAID IT IS TO BE DONE AS PER NRA SPECIFICATION FOR ROADWORKS.
4. 300mm MINIMUM VERTICAL AND HORIZONTAL CLEARANCES TO BE OBSERVED BETWEEN CABLE DUCTS AND THIRD PARTY SERVICES (e.g. GAS PIPES, WATER MAINS, CULVERTS, etc.) IN THE CASE OF HIGH RISK 3rd PARTY SERVICES, GREATER CLEARANCES MAY BE REQUIRED. DESIGNER TO CONSULT EIRGRID AND 3rd PARTY SERVICE OWNERS FOR GUIDANCE.
5. STEEL PLATES MUST COVER DUCTS. SPACING OF 10mm TO BE MAINTAINED BETWEEN STEEL PLATES TO PREVENT THE TRANSFER OF STRAY CURRENT.
6. THE MINIMUM CLEARANCE BETWEEN ALL HV AND COMMUNICATION DUCTS IS 75mm, BUT INCREASED SPACING MAY BE REQUIRED IN ORDER TO ACHIEVE THE CABLE RATING (CABLE RATING CALCULATIONS TO BE PROVIDED FOR ACCEPTANCE).
7. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
8. TEMPLATES ARE TO BE USED AT 5m INTERVALS DURING DUCT INSTALLATION. PRE-MADE 75mm WIDE CONCRETE SPACERS TO BE USED FOR INSTALLATION IN WET CONCRETE.
9. MINIMUM BURIAL DEPTH IS 450mm.

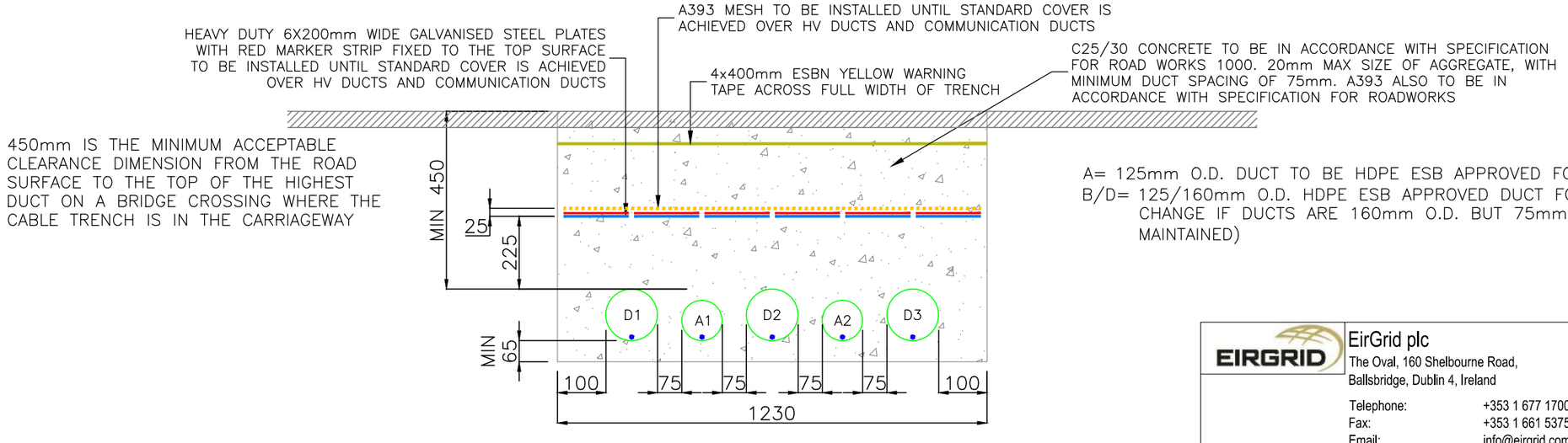
RED MARKER STRIP

YELLOW MARKER WARNING TAPE

A393 STEEL MESH

6mm STEEL PLATE

DETAIL A



450mm IS THE MINIMUM ACCEPTABLE CLEARANCE DIMENSION FROM THE ROAD SURFACE TO THE TOP OF THE HIGHEST DUCT ON A BRIDGE CROSSING WHERE THE CABLE TRENCH IS IN THE CARRIAGEWAY

A= 125mm O.D. DUCT TO BE HDPE ESB APPROVED FOR COMMUNICATIONS
B/D= 125/160mm O.D. HDPE ESB APPROVED DUCT FOR HV CABLE (OVERALL TRENCH WIDTH MAY CHANGE IF DUCTS ARE 160mm O.D. BUT 75mm DISTANCE REQUIREMENT BETWEEN DUCTS TO BE MAINTAINED)

PROPOSED FLAT 5 CONFIGURATION OVER BRIDGES WITH SHALLOW COVER – WITHIN CARRRIAGEWAY

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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
BRIDGE CARRIAGEWAY
STANDARD 110kV CABLE TRENCH

No of Shts	SIZE	SCALE
2	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-006	002	00

STANDARD 110kV CABLE DRAWINGS
STANDARD CABLE TRENCH THROUGH PEAT

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-007	001	STANDARD CABLE TRENCH THROUGH PEAT INDEX SHEET	00
XDC-CBL-STND-H-007	002	SECTION THROUGH SOLID CABLE TRENCH (FLOATING ROAD) PEAT DEPTH <2.5m	00
XDC-CBL-STND-H-007	003	SECTION THROUGH FLOATING ROAD UPGRADED TO SOLID PEAT DEPTH <2.5m	00
XDC-CBL-STND-H-007	004	SECTION THROUGH FLOATING ROAD PEAT DEPTH >2.5m	00

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STANDARD 110kV CABLE DRAWINGS

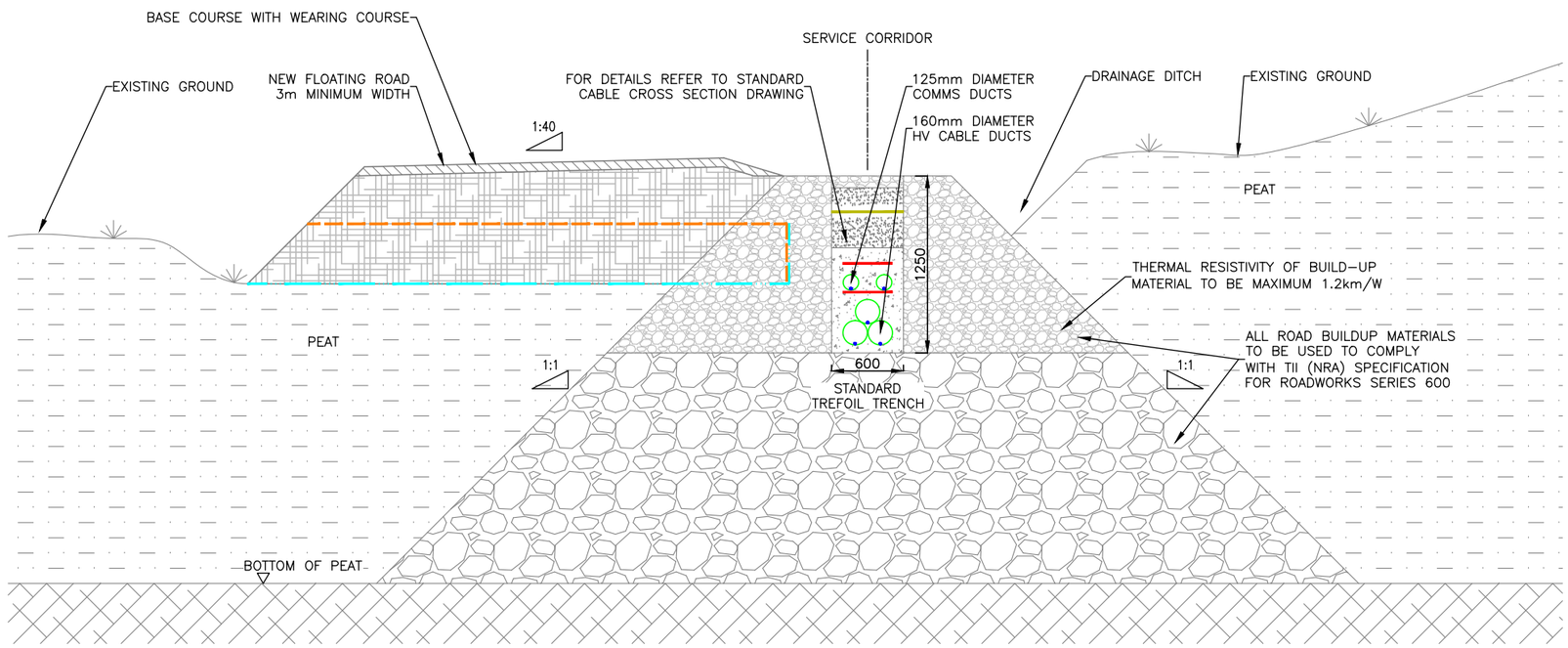
DRAWING TITLE
STANDARD CABLE TRENCH THROUGH PEAT INDEX SHEET

No of Shts	SIZE	SCALE
4	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-007	001	00

NOTES:

1. BASE COURSE AND WEARING COURSE TO BE IN ACCORDANCE WITH TII (NRA) SPECIFICATION FOR ROADWORKS SERIES 900.
2. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
3. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
4. FOR DETAILS OF CABLE TRENCH LAYOUT, REFER TO XDC-CBL-STND-H-008.
5. THIS IS A TYPICAL CROSS SECTION DETAIL FOR SHALLOW PEAT INSTALLATION. SPECIFIC CONSTRUCTION DESIGN SHALL COMPLY WITH CDS-HFS-01-001.



LEGEND:

- GEOTEXTILE
- GEOGRID
- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE

SECTION THROUGH CABLE TRENCH BUILT TO SOLID (FLOATING ROAD)
PEAT DEPTH <2.5m
SCALE 1:50

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STANDARD 110kV CABLE DRAWINGS

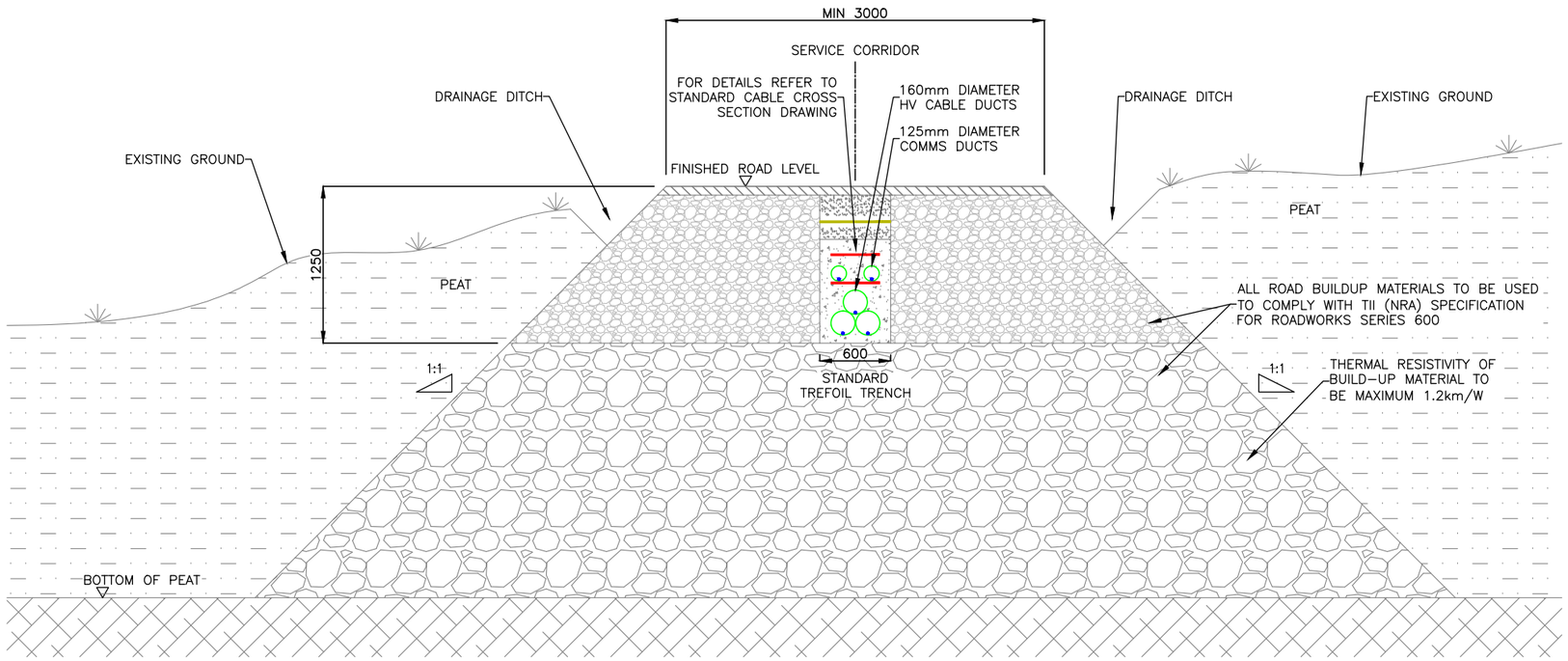
DRAWING TITLE
TYPICAL SECTION THROUGH SOLID CABLE TRENCH (FLOATING ROAD) PEAT DEPTH <2.5m

No of Shts	SIZE	SCALE
4	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-007	002	00

NOTES:

1. BASE COURSE AND WEARING COURSE TO BE IN ACCORDANCE WITH TII (NRA) SPECIFICATION FOR ROADWORKS SERIES 900.
2. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
3. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
4. FOR DETAILS OF CABLE TRENCH LAYOUT, REFER TO XDC-CBL-STND-H-008.
5. THIS IS A TYPICAL CROSS SECTION DETAIL FOR SHALLOW PEAT INSTALLATION. SPECIFIC CONSTRUCTION DESIGN SHALL COMPLY WITH CDS-HFS-01-001.



LEGEND:

- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE

SECTION THROUGH FLOATING ROAD UPGRADED TO SOLID
PEAT DEPTH <2.5m
SCALE 1:50

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STANDARD 110kV CABLE DRAWINGS

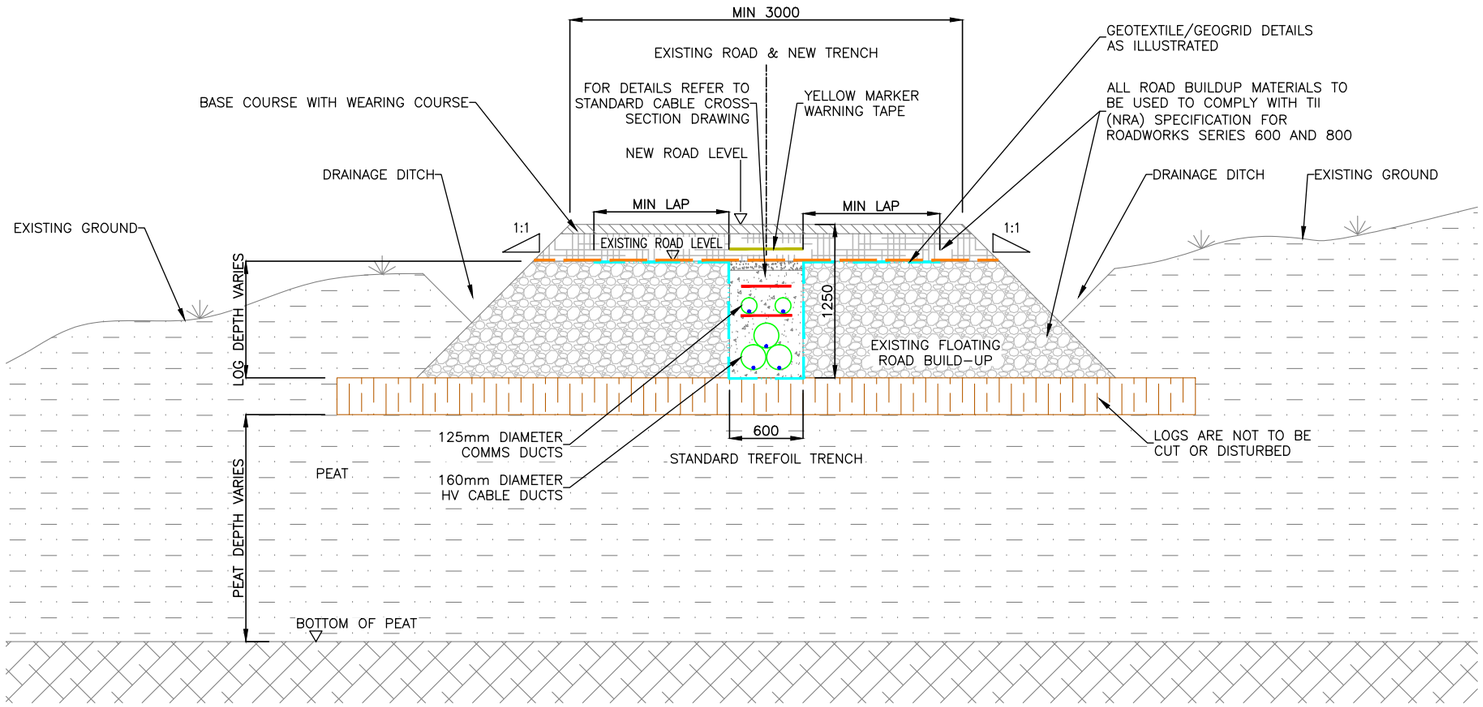
DRAWING TITLE
TYPICAL SECTION THROUGH FLOATING ROAD UPGRADED TO SOLID PEAT DEPTH <2.5m

No of Shts	SIZE	SCALE
4	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-007	003	00

NOTES:

1. BASE COURSE AND WEARING COURSE TO BE IN ACCORDANCE WITH TII (NRA) SPECIFICATION FOR ROADWORKS SERIES 900.
2. ALL PRODUCTS AND MATERIALS TO BE UTILISED DURING CONSTRUCTION TO COMPLY WITH EIRGRID FUNCTIONAL SPECIFICATION, TII SPECIFICATION FOR ROAD WORKS AND ALL RELEVANT IRISH (EUROPEAN) AND BRITISH STANDARDS.
3. DRAWING IS INDICATIVE ONLY, TO BE USED TO AID IN THE DESIGN OF THE RELEVANT INFRASTRUCTURE.
4. FOR DETAILS OF CABLE TRENCH LAYOUT, REFER TO XDC-CBL-STND-H-008.
5. THIS IS A TYPICAL CROSS SECTION DETAIL FOR DEEP PEAT INSTALLATION. SPECIFIC CONSTRUCTION DESIGN SHALL COMPLY WITH CDS-HFS-01-001.



SECTION THROUGH UPGRADED FLOATING ROAD
PEAT DEPTH >2.5m
SCALE 1:50

LEGEND:

- GEOTEXTILE
- GEOGRID
- RED MARKER STRIP
- YELLOW MARKER WARNING TAPE
- BASE WEARING COARSE
- NEW ROAD BUILT-UP MATERIAL
- EXISTING MATERIAL
- LOGS
- PEAT

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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TYPICAL SECTION THROUGH FLOATING ROAD
PEAT DEPTH >2.5m

No of Shts	SIZE	SCALE
4	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-007	004	00

STANDARD 110kV CABLE DRAWINGS
STANDARD CROSS SECTIONS
125mm AND 160mm DUCTS

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-008	001	STANDARD CROSS SECTIONS INDEX SHEET	00
XDC-CBL-STND-H-008	002	TRENCH CROSS SECTION FOR 125mm POWER DUCTS IN TREFOIL FORMATION	00
XDC-CBL-STND-H-008	003	TRENCH CROSS SECTION FOR 160mm POWER DUCTS IN TREFOIL FORMATION	00
XDC-CBL-STND-H-008	004	TRENCH CROSS SECTION FOR 125mm POWER DUCTS IN FLAT FORMATION	00
XDC-CBL-STND-H-008	005	TRENCH CROSS SECTION FOR 160mm POWER DUCTS IN FLAT FORMATION	00
XDC-CBL-STND-H-008	006	TRENCH CROSS SECTION FOR 125mm POWER DUCTS WITH EARTH CONTINUITY DUCT – TREFOIL FORMATION	00
XDC-CBL-STND-H-008	007	TRENCH CROSS SECTION FOR 160mm POWER DUCTS WITH EARTH CONTINUITY DUCT – TREFOIL FORMATION	00
XDC-CBL-STND-H-008	008	TRENCH CROSS SECTION FOR 125mm POWER DUCTS WITH EARTH CONTINUITY DUCT – FLAT FORMATION	00
XDC-CBL-STND-H-008	009	TRENCH CROSS SECTION FOR 160mm POWER DUCTS WITH EARTH CONTINUITY DUCT – FLAT FORMATION	00

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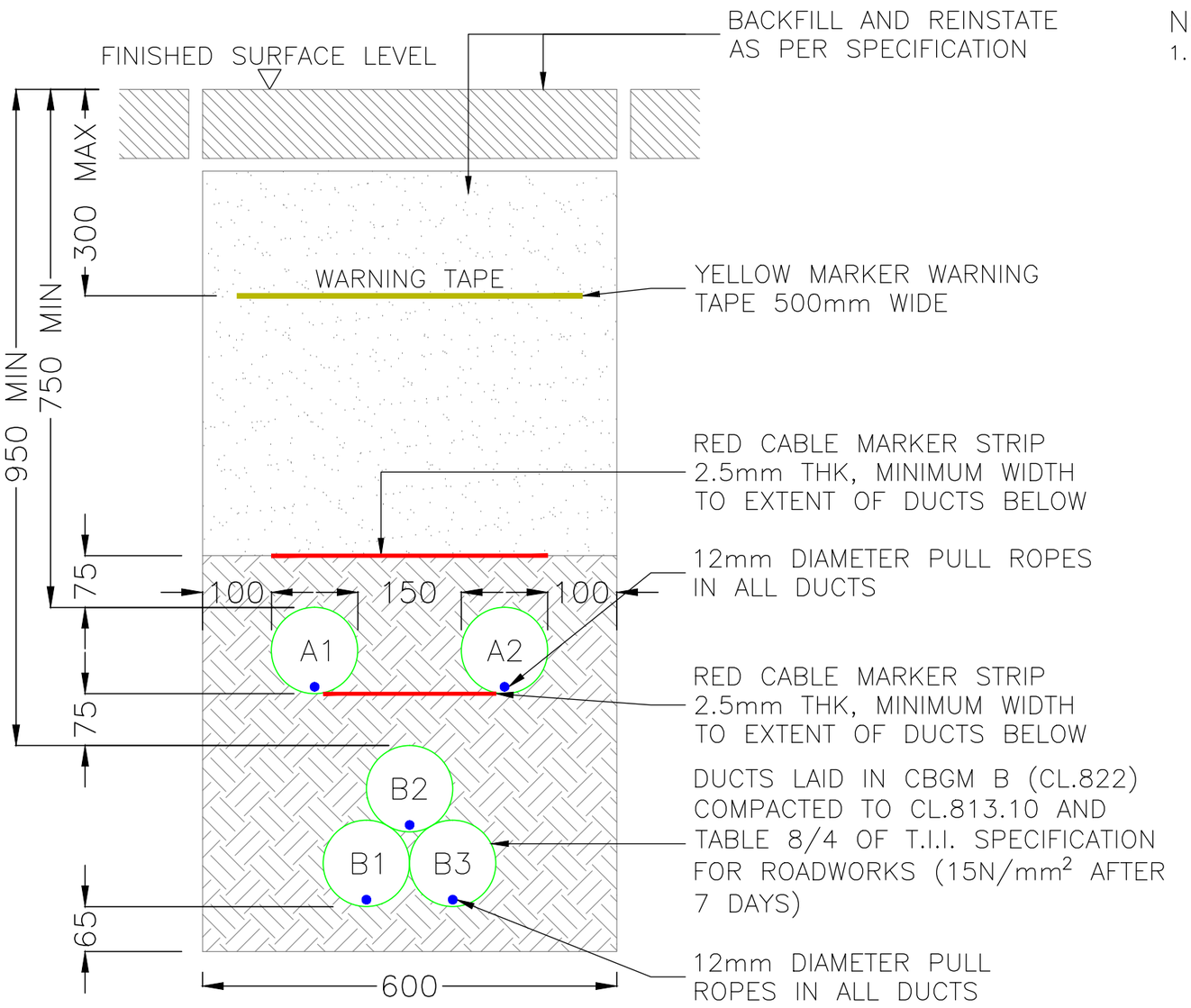
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD CROSS SECTIONS
INDEX SHEET

No of Shts	SIZE	SCALE
9	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-008	001	00



NOTES:

1. FOR CBGM & SOIL SURROUND, THERMAL RESITIVITY VALUES TO BE USED IN RATING CALCULATION, REFER TO CDS–HFS–02–001 SPECIFICATION.

RED MARKER STRIP

YELLOW MARKER WARNING TAPE

CBGM B (CL. 822), COMPACTED TO CL. 813.10

BACKFILL, COMPACTED (CL. 804)

A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
B=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
ALL DIMENSIONS IN MILLIMETERS

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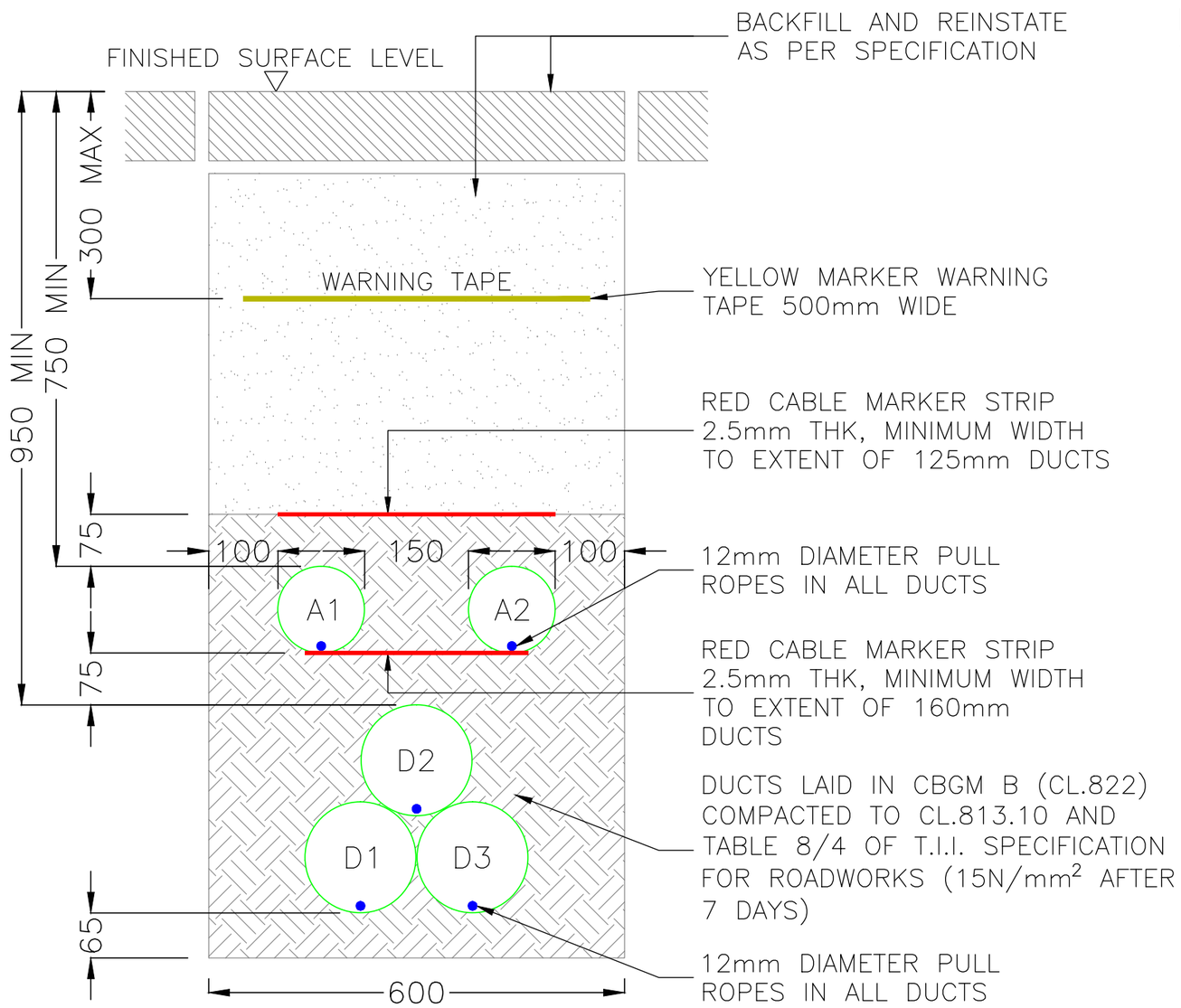
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TRENCH CROSS SECTION FOR 125mm POWER DUCTS IN TREFOIL FORMATION

No of Shts	SIZE	SCALE
9	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC–CBL–STND–H–008	002	00



NOTES:

1. FOR CBGM & SOIL SURROUND, THERMAL RESITIVITY VALUES TO BE USED IN RATING CALCULATION, REFER TO CDS–HFS–02–001 SPECIFICATION.

RED MARKER STRIP

YELLOW MARKER WARNING TAPE

CBGM B (CL. 822), COMPACTED TO CL. 813.10

BACKFILL, COMPACTED (CL. 804)

A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
D=160mm O.D. HDPE ESB APPROVED DUCT, SDR=21
ALL DIMENSIONS IN MILLIMETERS

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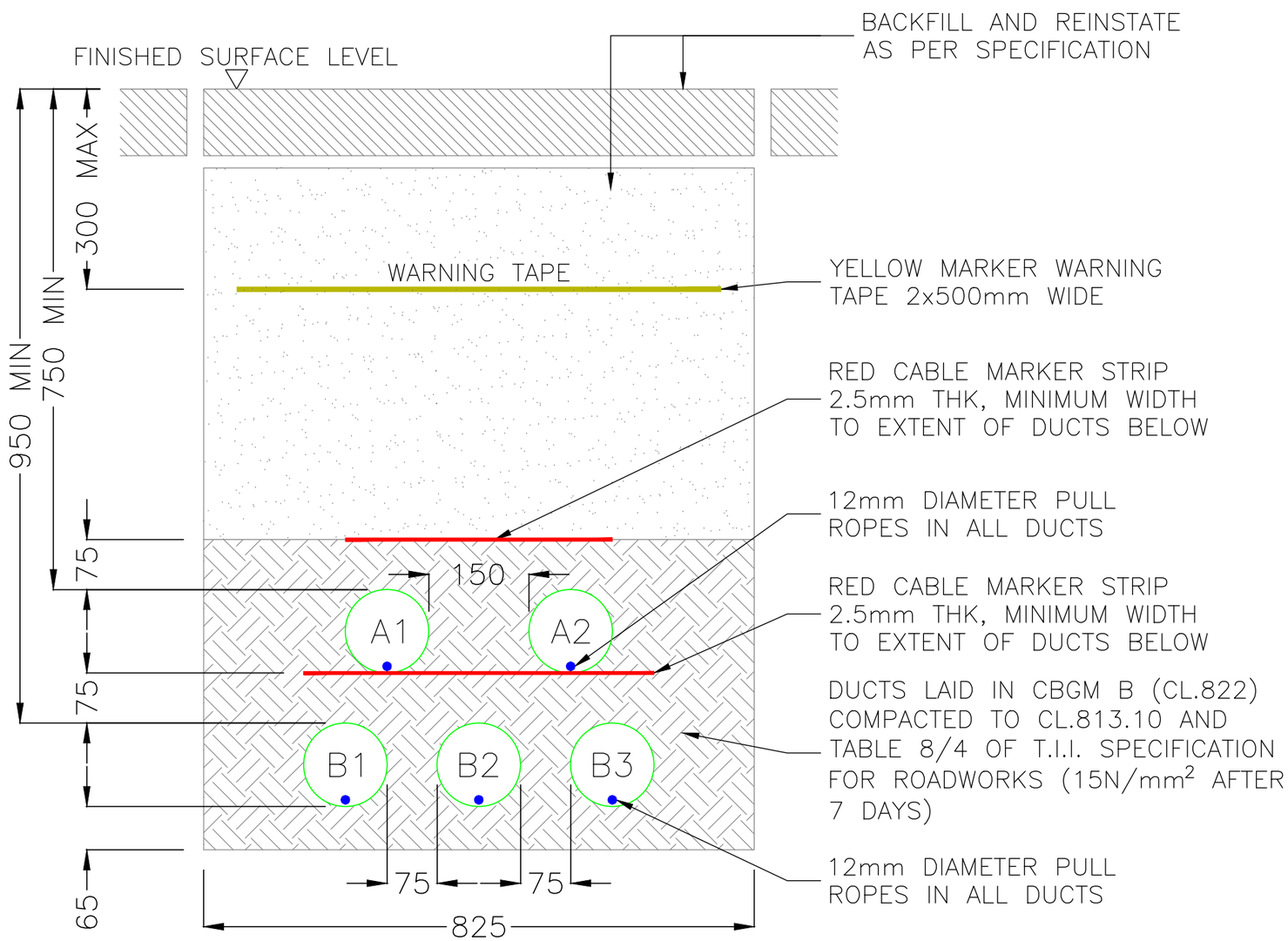
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TRENCH CROSS SECTION FOR 160mm POWER DUCTS IN TREFOIL FORMATION

No of Shts	SIZE	SCALE
9	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC–CBL–STND–H–008	003	00



NOTES:

1. FOR CBGM & SOIL SURROUND, THERMAL RESITIVITY VALUES TO BE USED IN RATING CALCULATION, REFER TO CDS–HFS–02–001 SPECIFICATION.

RED MARKER STRIP

YELLOW MARKER WARNING TAPE

CBGM B (CL. 822), COMPACTED TO CL. 813.10

BACKFILL, COMPACTED (CL. 804)

A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
B=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
ALL DIMENSIONS IN MILLIMETERS

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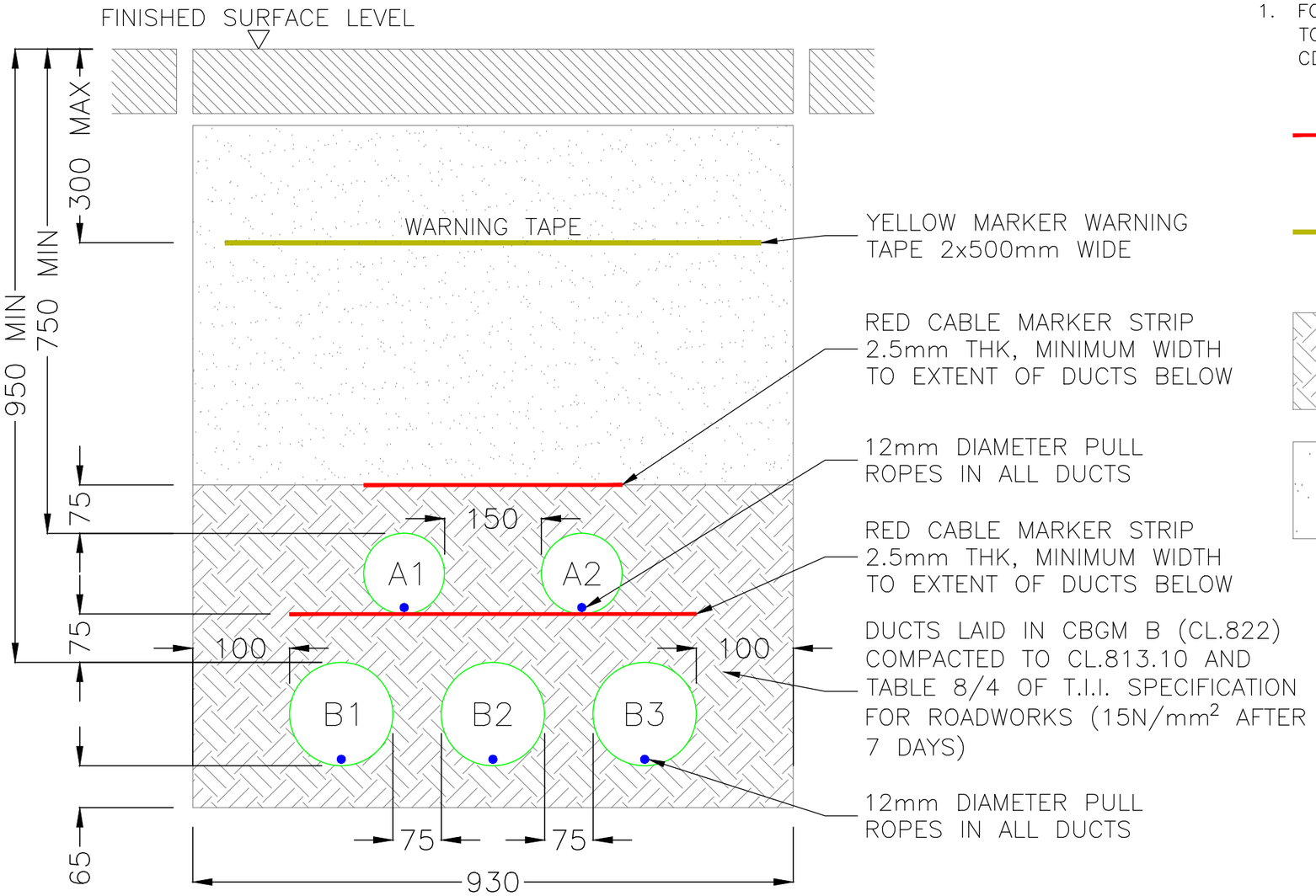
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TRENCH CROSS SECTION FOR 125mm POWER DUCTS IN FLAT FORMATION

No of Shts	SIZE	SCALE
9	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC–CBL–STND–H–008	004	00



YELLOW MARKER WARNING TAPE 2x500mm WIDE

RED CABLE MARKER STRIP 2.5mm THK, MINIMUM WIDTH TO EXTENT OF DUCTS BELOW

12mm DIAMETER PULL ROPES IN ALL DUCTS

RED CABLE MARKER STRIP 2.5mm THK, MINIMUM WIDTH TO EXTENT OF DUCTS BELOW

DUCTS LAID IN CBGM B (CL.822) COMPACTED TO CL.813.10 AND TABLE 8/4 OF T.I.I. SPECIFICATION FOR ROADWORKS (15N/mm^2 AFTER 7 DAYS)

12mm DIAMETER PULL ROPES IN ALL DUCTS

NOTES:

1. FOR CBGM & SOIL SURROUND, THERMAL RESITIVITY VALUES TO BE USED IN RATING CALCULATION, REFER TO CDS–HFS–02–001 SPECIFICATION.

RED MARKER STRIP

YELLOW MARKER WARNING TAPE

CBGM B (CL. 822), COMPACTED TO CL. 813.10

BACKFILL, COMPACTED (CL. 804)

A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
D=160mm O.D. HDPE ESB APPROVED DUCT, SDR=21
ALL DIMENSIONS IN MILLIMETERS

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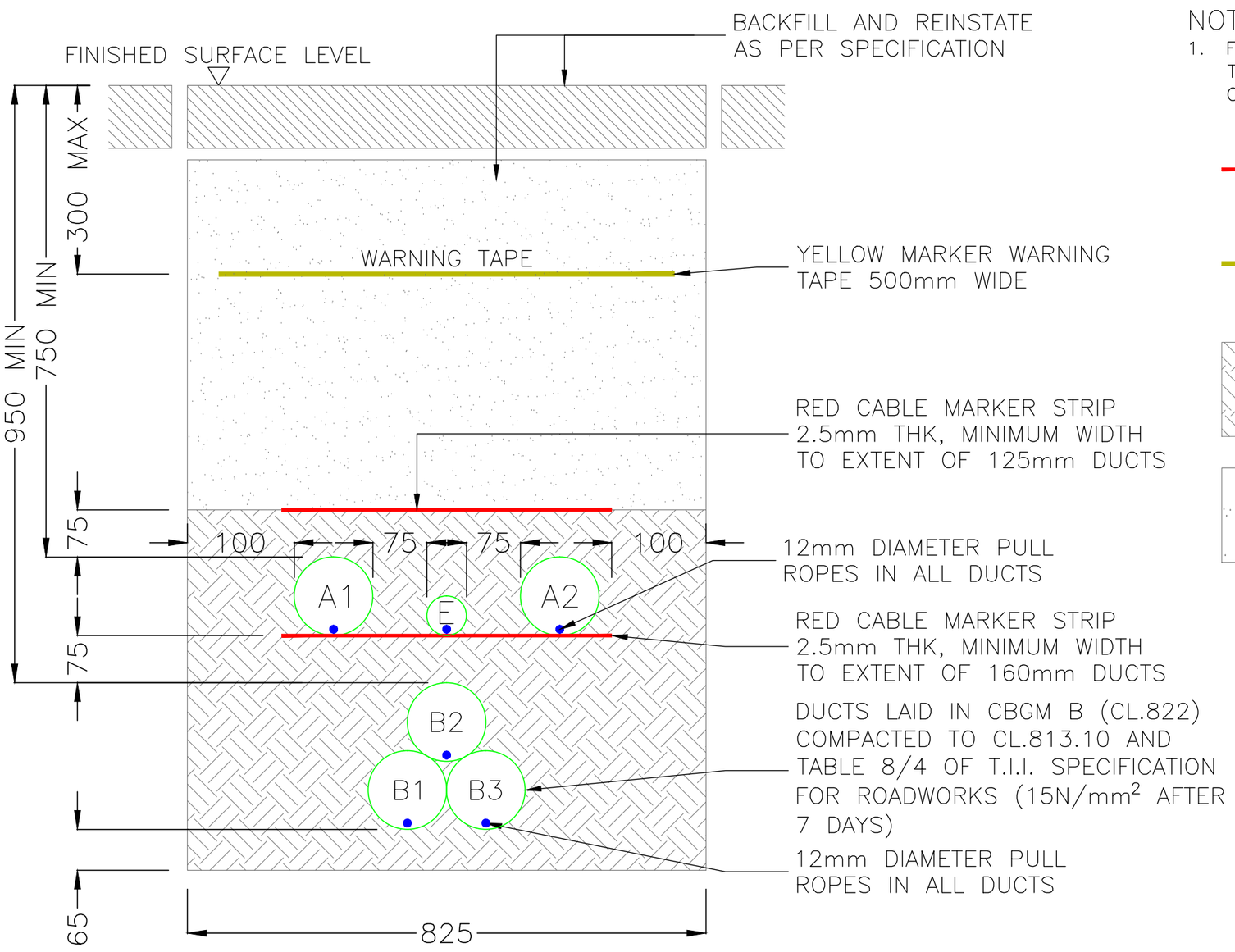
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TRENCH CROSS SECTION FOR 160mm POWER DUCTS IN FLAT FORMATION

No of Shts	SIZE	SCALE
9	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC–CBL–STND–H–008	005	00



NOTES:

1. FOR CBGM & SOIL SURROUND, THERMAL RESITIVITY VALUES TO BE USED IN RATING CALCULATION, REFER TO CDS–HFS–02–001 SPECIFICATION.

RED MARKER STRIP

YELLOW MARKER WARNING TAPE

CBGM B (CL. 822), COMPACTED TO CL. 813.10

BACKFILL, COMPACTED (CL. 804)

A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
B=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
E*=MIN 63mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
*DUCT TO BE USED FOR EARTH CONTINUITY CONDUCTOR
ALL DIMENSIONS IN MILLIMETERS

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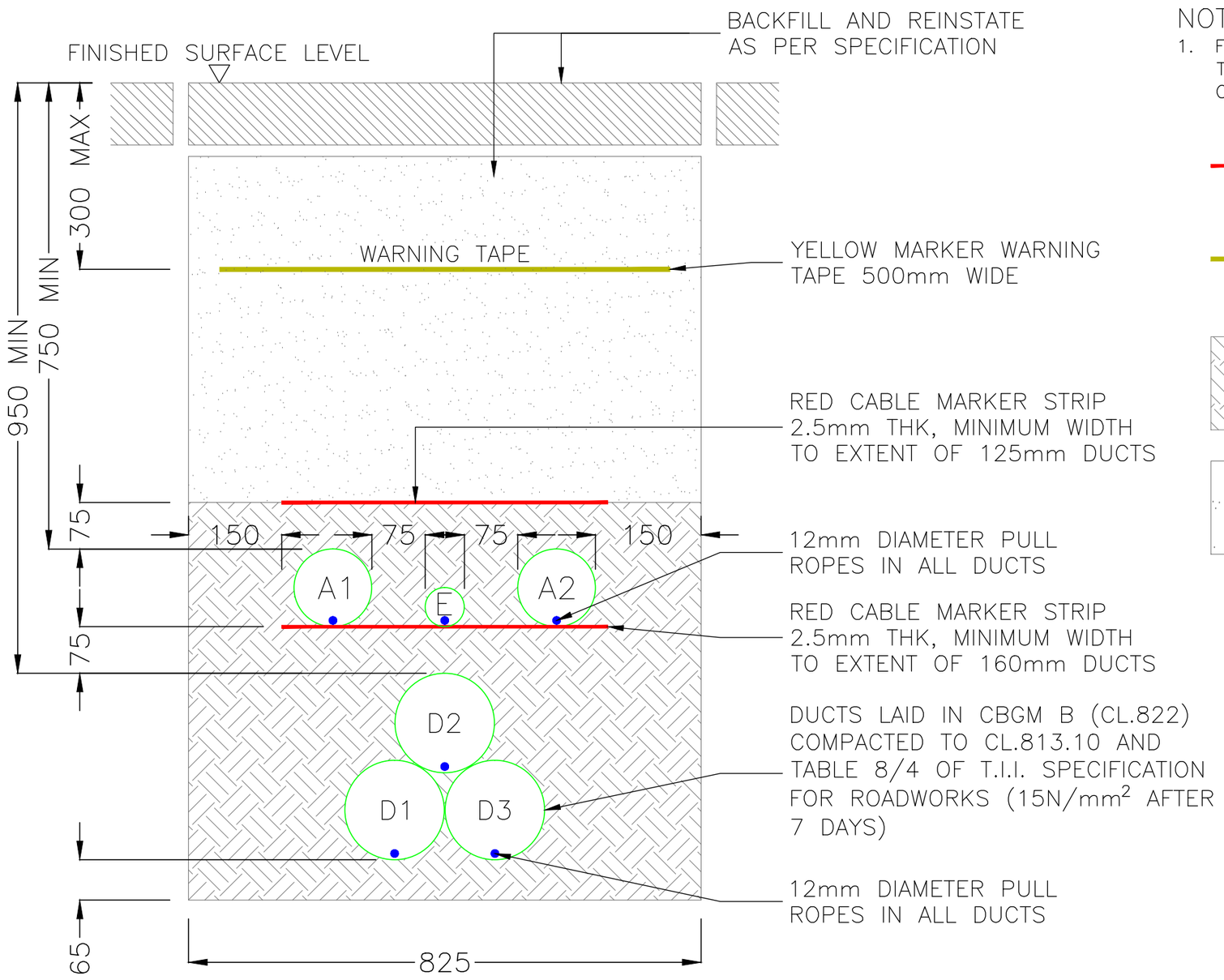
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TRENCH CROSS SECTION FOR 125mm POWER DUCTS WITH EARTH CONTINUITY DUCT – TREFOIL FORMATION

No of Shts	SIZE	SCALE
9	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-008	006	00



NOTES:

1. FOR CBGM & SOIL SURROUND, THERMAL RESITIVITY VALUES TO BE USED IN RATING CALCULATION, REFER TO CDS–HFS–02–001 SPECIFICATION.

RED MARKER STRIP

YELLOW MARKER WARNING TAPE

CBGM B (CL. 822), COMPACTED TO CL. 813.10

BACKFILL, COMPACTED (CL. 804)

A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
D=160mm O.D. HDPE ESB APPROVED DUCT, SDR=21
E*=MIN 63mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
*DUCT TO BE USED FOR EARTH CONTINUITY CONDUCTOR
ALL DIMENSIONS IN MILLIMETERS

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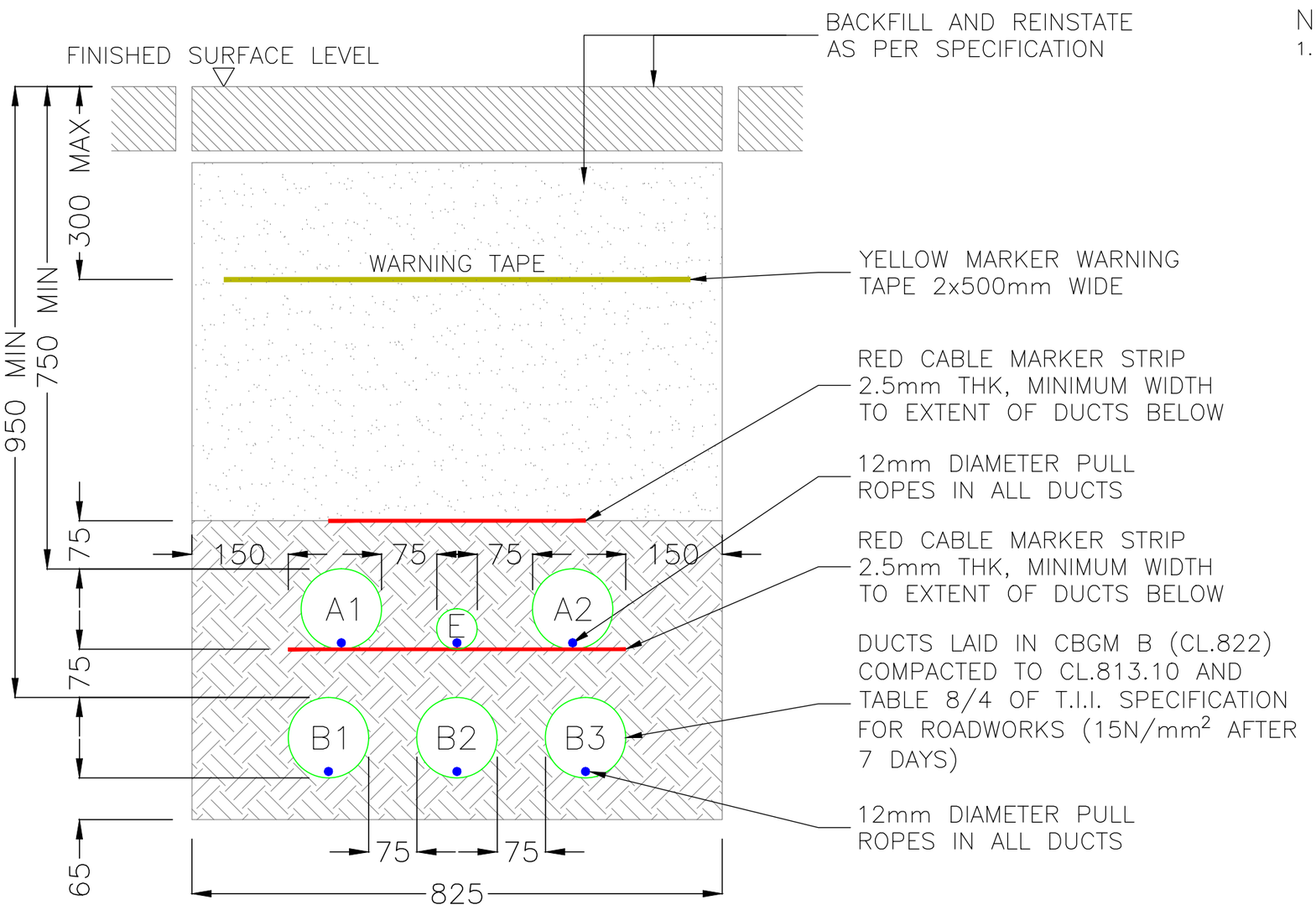
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TRENCH CROSS SECTION FOR 160mm POWER DUCTS WITH EARTH CONTINUITY DUCT – TREFOIL FORMATION

No of Shts	SIZE	SCALE
9	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC–CBL–STND–H–008	007	00



NOTES:

1. FOR CBGM & SOIL SURROUND, THERMAL RESITIVITY VALUES TO BE USED IN RATING CALCULATION, REFER TO CDS–HFS–02–001 SPECIFICATION.

RED MARKER STRIP

YELLOW MARKER WARNING TAPE

CBGM B (CL. 822), COMPACTED TO CL. 813.10

BACKFILL, COMPACTED (CL. 804)

A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
B=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
*E=MIN 63mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
*DUCT TO BE USED FOR EARTH CONTINUITY CONDUCTOR
ALL DIMENSIONS IN MILLIMETERS

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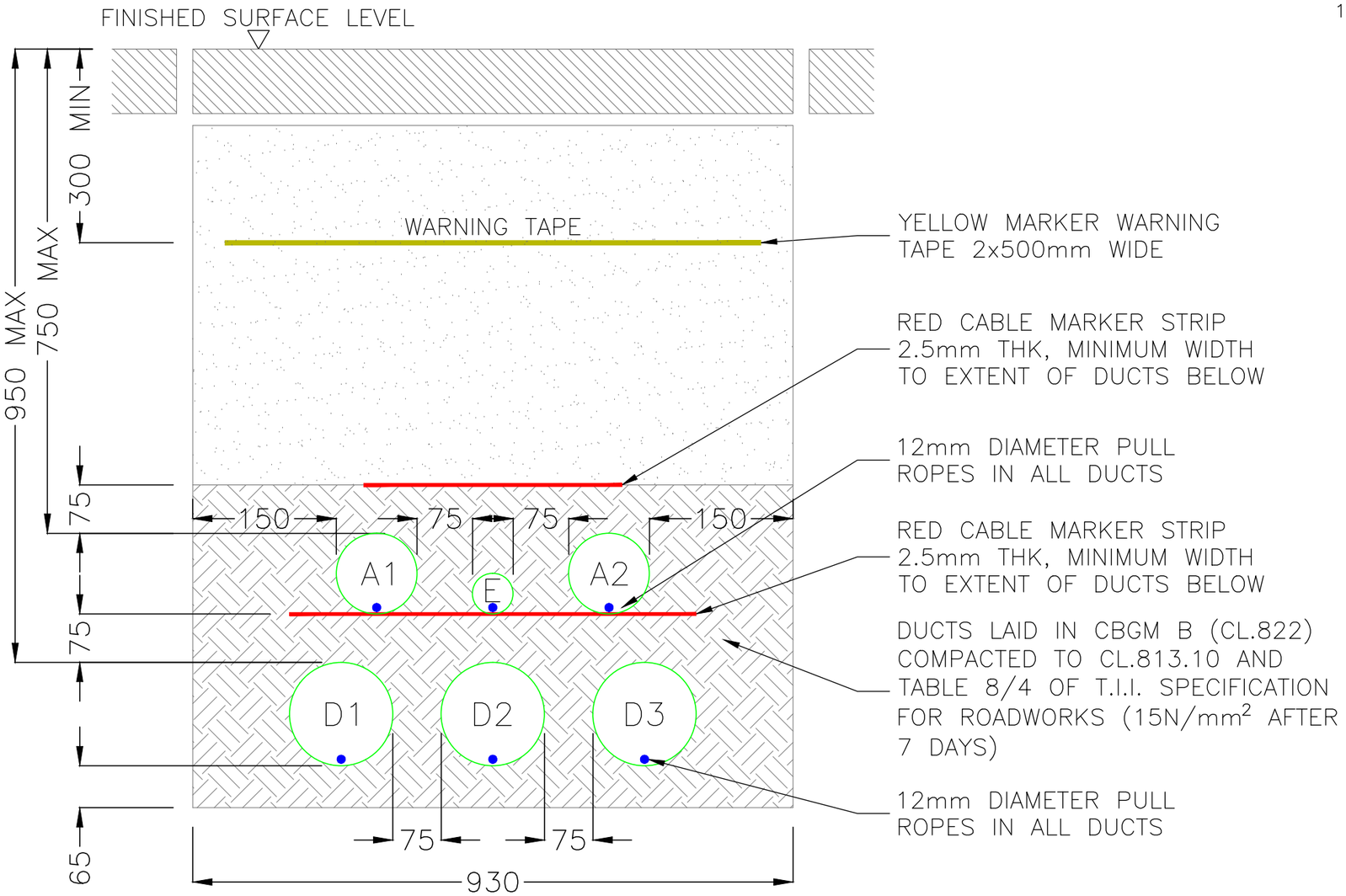
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TRENCH CROSS SECTION FOR 125mm POWER DUCTS WITH EARTH CONTINUITY DUCT – FLAT FORMATION

No of Shts	SIZE	SCALE
9	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC–CBL–STND–H–008	008	00



YELLOW MARKER WARNING TAPE 2x500mm WIDE

RED CABLE MARKER STRIP 2.5mm THK, MINIMUM WIDTH TO EXTENT OF DUCTS BELOW

12mm DIAMETER PULL ROPES IN ALL DUCTS

RED CABLE MARKER STRIP 2.5mm THK, MINIMUM WIDTH TO EXTENT OF DUCTS BELOW

DUCTS LAID IN CBGM B (CL.822) COMPACTED TO CL.813.10 AND TABLE 8/4 OF T.I.I. SPECIFICATION FOR ROADWORKS (15N/mm^2 AFTER 7 DAYS)

12mm DIAMETER PULL ROPES IN ALL DUCTS

A=125mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
D=160mm O.D. HDPE ESB APPROVED DUCT, SDR=21
*E=63mm O.D. HDPE ESB APPROVED DUCT, SDR=17.6
*DUCT TO BE USED FOR EARTH CONTINUITY CONDUCTOR
ALL DIMENSIONS IN MILLIMETERS

NOTES:

1. FOR CBGM & SOIL SURROUND, THERMAL RESITIVITY VALUES TO BE USED IN RATING CALCULATION, REFER TO CDS–HFS–02–001 SPECIFICATION.

RED MARKER STRIP

YELLOW MARKER WARNING TAPE

CBGM B (CL. 822), COMPACTED TO CL. 813.10

BACKFILL, COMPACTED (CL. 804)

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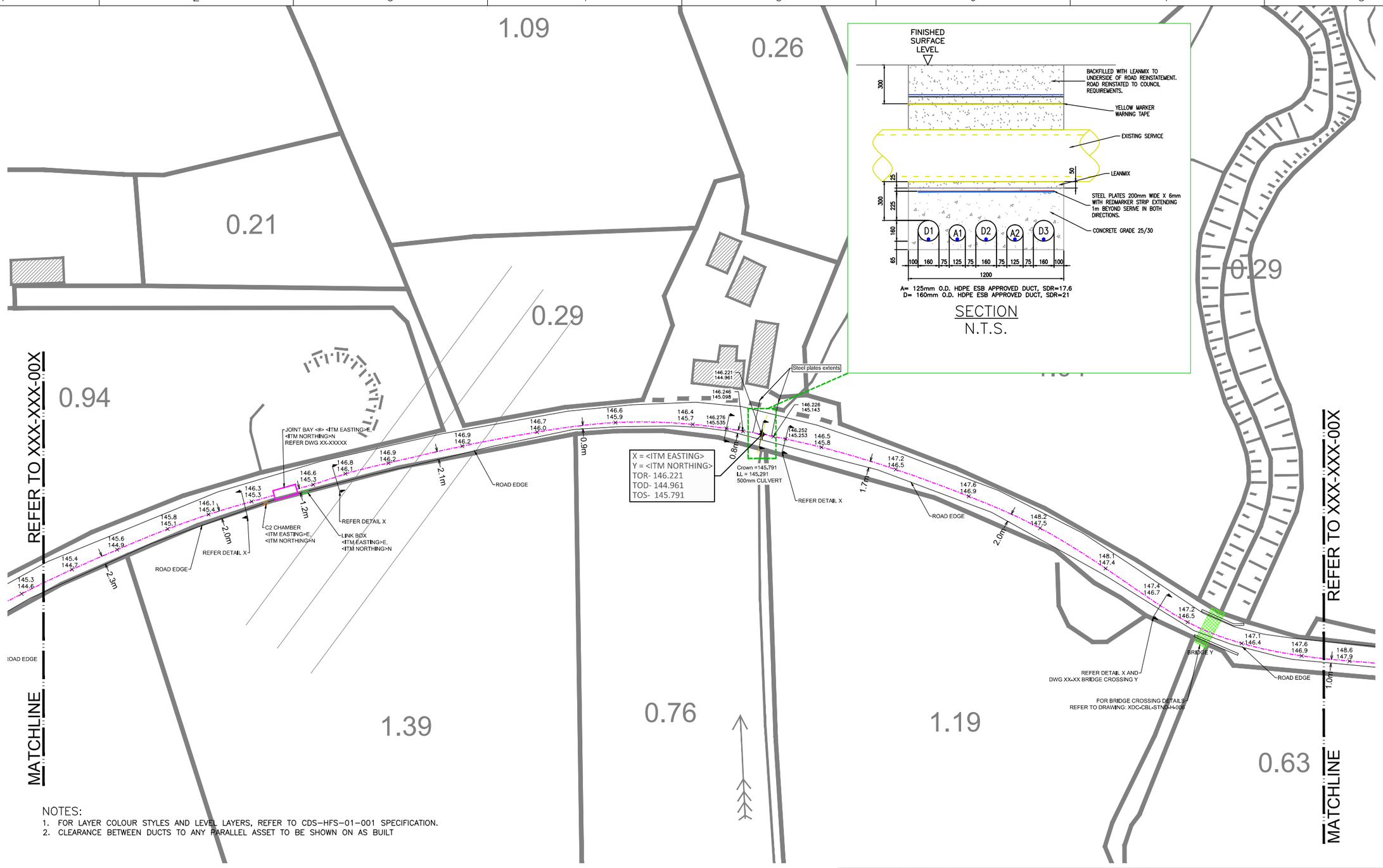
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TRENCH CROSS SECTION FOR 160mm POWER DUCTS WITH EARTH CONTINUITY DUCT – FLAT FORMATION

No of Shts	SIZE	SCALE
9	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC–CBL–STND–H–008	009	00



SECTION
N.T.S.

NOTES:
1. FOR LAYER COLOUR STYLES AND LEVEL LAYERS, REFER TO CDS–HFS–01–001 SPECIFICATION.
2. CLEARANCE BETWEEN DUCTS TO ANY PARALLEL ASSET TO BE SHOWN ON AS BUILT

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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
SAMPLE AS–BUILT CABLE ROUTE REQUIREMENTS

No of Shts	SIZE	SCALE
1	A3	1:1000

DRAWING NUMBER	SHEET	REV
XDC–CBL–STND–H–009	001	00

STANDARD 110kV CABLE DRAWINGS
STANDARD C2 COMMUNICATIONS CHAMBER

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-010	001	STANDARD C2 CHAMBER INDEX SHEET	00
XDC-CBL-STND-H-010	002	STANDARD C2 CHAMBER GENERAL ARRANGEMENT	00

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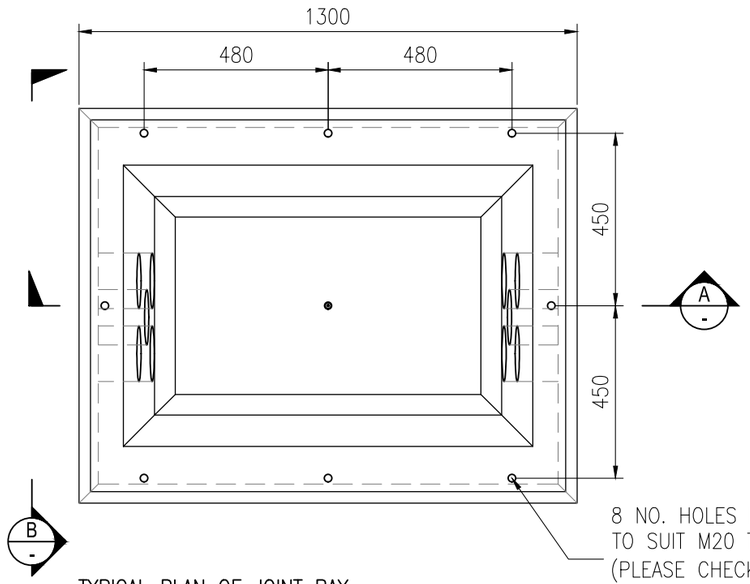
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD C2 CHAMBER
INDEX SHEET

No of Shts	SIZE	SCALE
2	A3	N/A

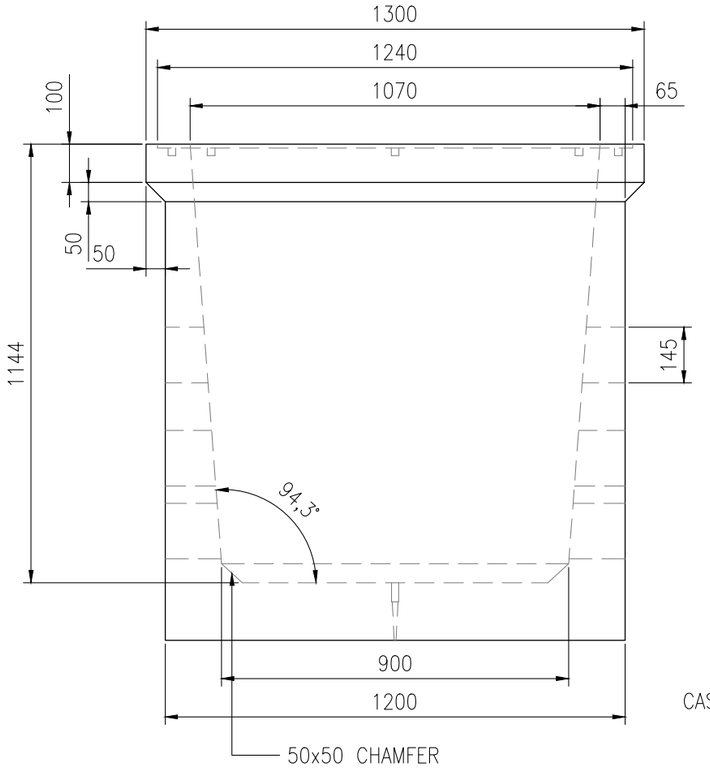
DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-010	001	00



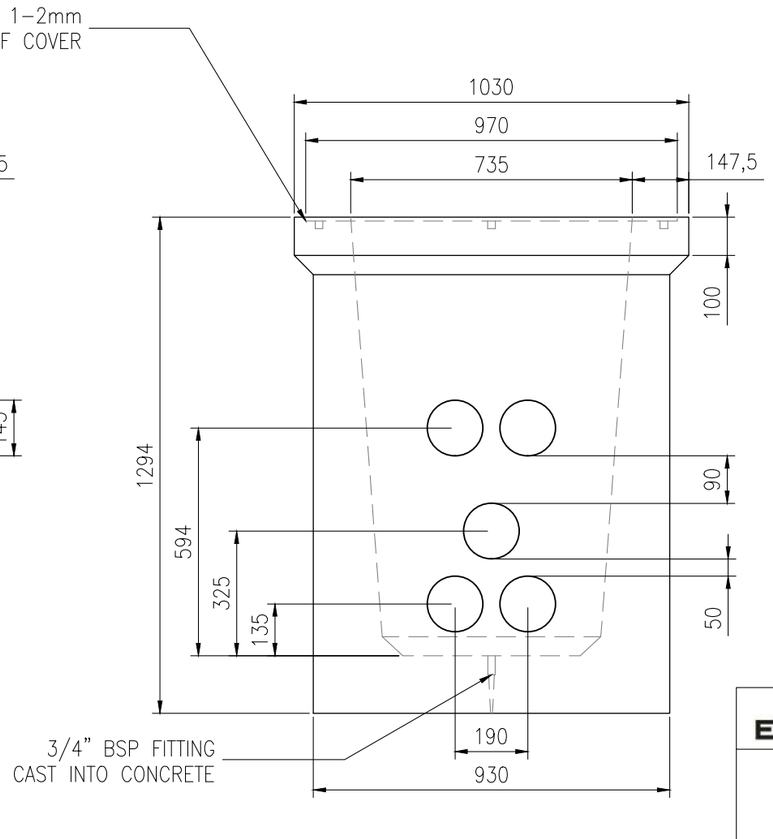
TYPICAL PLAN OF JOINT BAY
SCALE 1:16

NOTES:

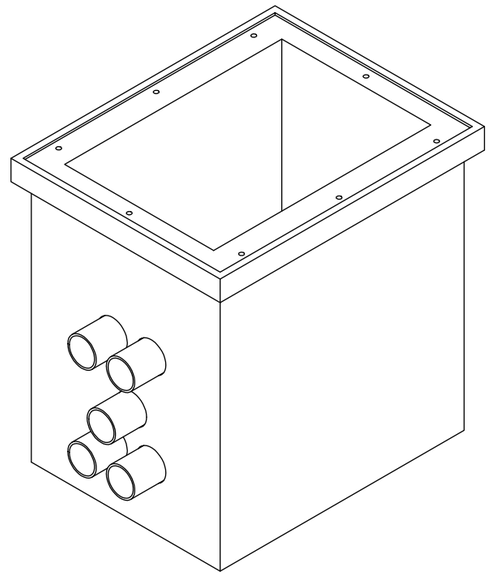
1. ALL DIMENSIONS IN MILLIMETERS.
2. REINSTATEMENT TO COMPLY WITH REQUIREMENTS OF THE RELEVANT LOCAL AUTHORITY/ASSET OWNER.
3. ENTRANCE & EXIT DUCTS TO BE IN LINE.
4. ALL MATERIALS AND WORKMANSHIP TO BE IN ACCORDANCE WITH THE NRA/T.I.I. SPECIFICATION FOR ROADWORKS, MAY 2005 & SUBSEQUENT REVISIONS.
5. REINFORCED CONCRETE TO BE MINIMUM GRADE C32/40, SULPHATE RESISTING CEMENT TO BE USED WHERE AGGRESSIVE SOIL CONDITIONS APPLY, REFER TO TABLE 6.1 OF B.S. 8110.
6. CARRIAGEWAY COVERS AND FRAMES TO BE TO B.S. EN 124.
7. ALL COVERS SHALL HAVE 'ESB' LOGO INCORPORATED IN THEM TO THE APPROVAL OF EIRGRID.
8. STEP IRONS TO BE HOT DIPPED GALVANISED TO B.S. 729 AND POSITIONED AS SHOWN ON ANY CHAMBER DEEPER THAN 700mm ON THE END REMOTE FROM ANY SIDE ENTRY DUCT.
9. CONCRETE PRECAST CHAMBER AND COVER SHOULD BE TESTED THROUGH A 5 POINTS 40 TONNES VERTICAL STATIC LOADING TEST BY AN INDEPENDENT TEST COMPANY. IF REQUIRED, FURTHER DETAILS WILL BE PROVIDED BY EIRGRID.
10. FINAL POSITION OF C2 CHAMBERS SHALL BE AGREED WITH EIRGRID.



A SECTION A
- SCALE 1:16



B SECTION B
- SCALE 1:16



ISOMETRIC: C2 CHAMBER ARRANGEMENT
NOT TO SCALE

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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
STANDARD C2 CHAMBER
GENERAL ARRANGEMENT

No of Shts	SIZE	SCALE
2	A3	1:16

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-010	002	00

STANDARD 110kV CABLE DRAWINGS
1300x800 LINK BOX CHAMBER

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-011	001	LINK BOX CHAMBER INDEX SHEET	00
XDC-CBL-STND-H-011	002	LINK BOX CHAMBER GENERAL ARRANGEMENT	00
XDC-CBL-STND-H-011	003	LINK BOX CHAMBER REINFORCEMENT	00
XDC-CBL-STND-H-011	004	LINK BOX CHAMBER STEEL REINFORCEMENT SCHEDULE	00

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
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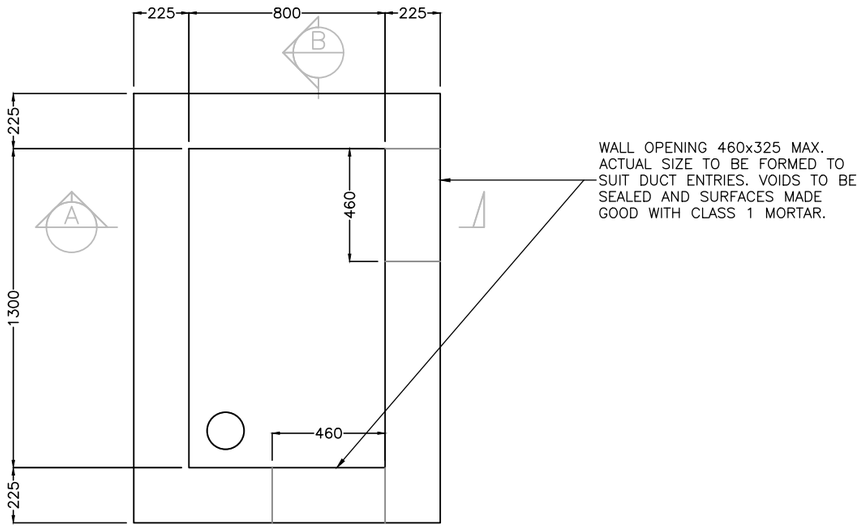
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
LINK BOX CHAMBER
INDEX SHEET

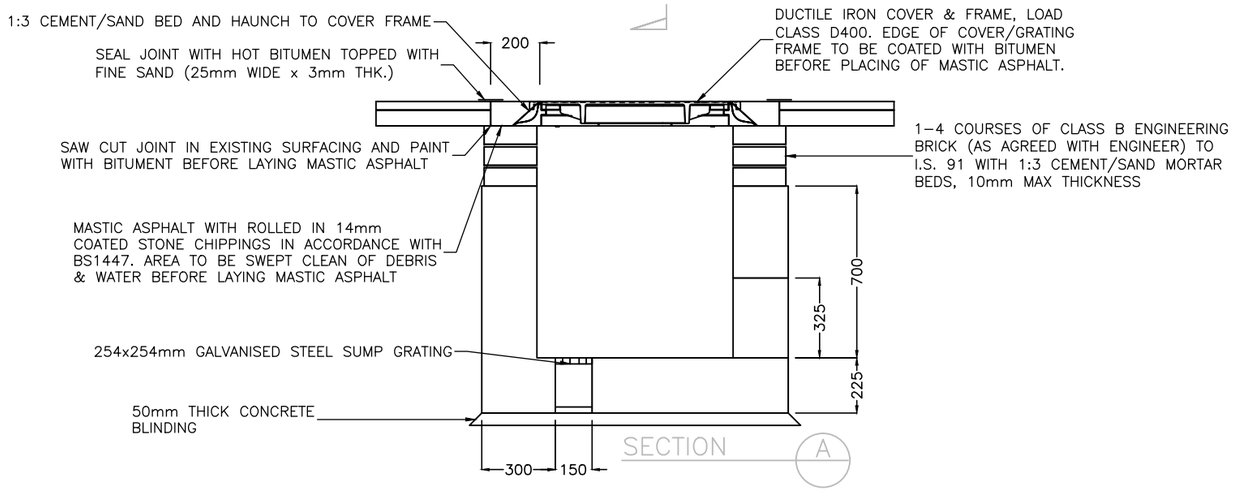
No of Shts	SIZE	SCALE
4	A3	N/A

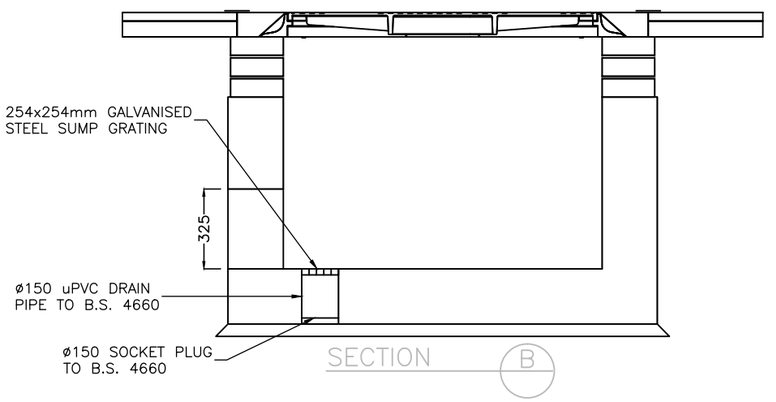
DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-011	001	00



NOTES:

1. ALL DIMENSIONS IN MILLIMETERS.
2. ALL MATERIALS AND WORKMANSHIP TO BE IN ACCORDANCE WITH THE NRA/T.I.I. SPECIFICATION FOR ROADWORKS, MAY 2005 & SUBSEQUENT REVISIONS.
3. REINFORCED CONCRETE TO BE MINIMUM GRADE C32/40. SULPHATE RESISTING CEMENT TO BE USED WHERE AGGRESSIVE SOIL CONDITIONS APPLY.
4. CARRIAGEWAY COVERS AND FRAMES TO BE TO B.S. EN 124.
5. ALL COVERS SHALL HAVE APPROVED BADGE MARKING WITH "ESB" LOGO INCORPORATED IN THEM TO THE APPROVAL OF EIRGRID.
6. BRICKWORK TO BE CLASS B ENGINEERING, BEDS AND JOINTS TO BE CLASS 1 MORTAR.
7. FINAL POSITION OF LINK BOX TO BE AGREED WITH EIRGRID PRIOR TO INSTALLATION.





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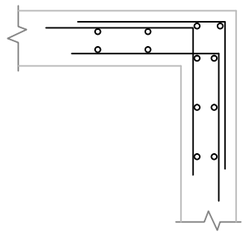
STANDARD 110kV CABLE DRAWINGS

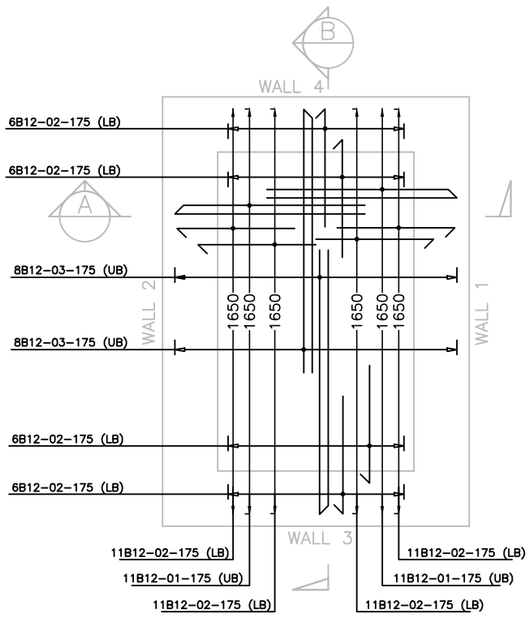
DRAWING TITLE
LINK BOX CHAMBER
GENERAL ARRANGEMENT

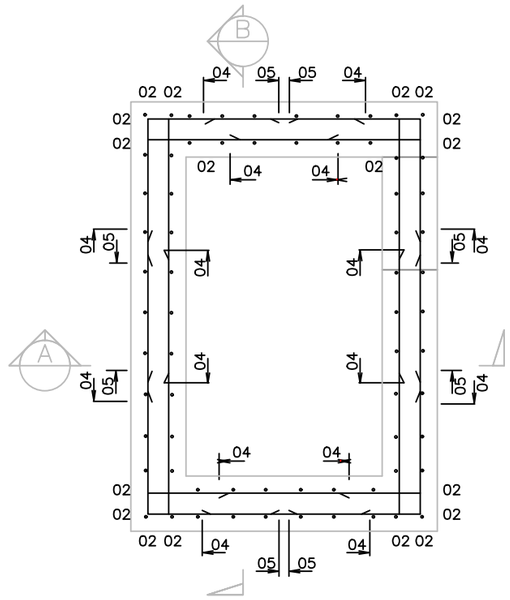
No of Shts	SIZE	SCALE
4	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-011	002	00



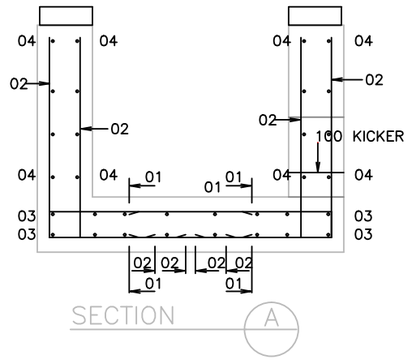
TYPICAL CORNER BAR DETAIL
SCALE 1:25



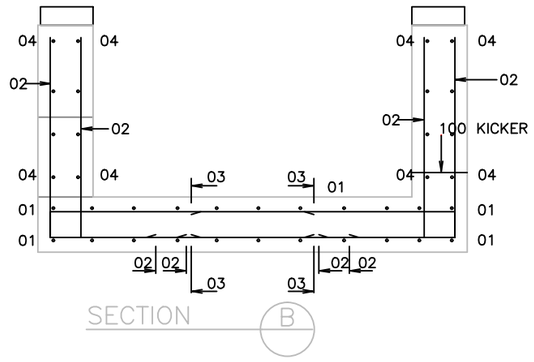


NOTES:

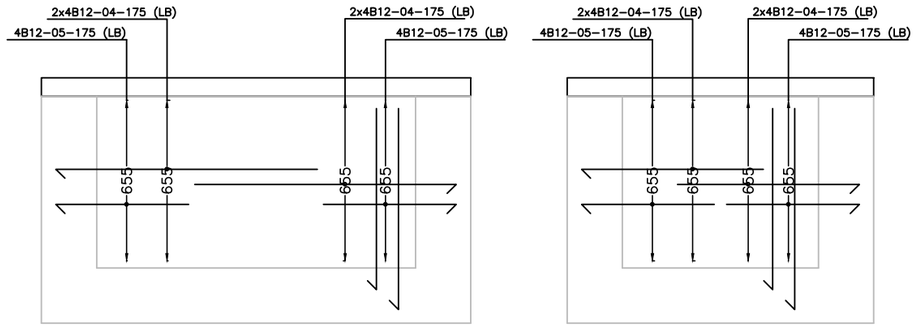
1. ALL DIMENSIONS IN MILLIMETERS.
2. COVER TO REINFORCEMENT TO BE A MINIMUM OF 50mm. LAP LENGTHS TO BE 40x Dia. ALL REINFORCEMENT TO BE CUT AND BENT IN ACCORDANCE WITH B.S. 8666:2005.
3. REINSTATEMENT TO COMPLY WITH REQUIREMENTS OF THE RELEVANT LOCAL AUTHORITY/ASSET OWNER.
4. DUCTS TO BE CAST OR BUILT IN.
5. ALL MATERIALS AND WORKMANSHIP TO BE IN ACCORDANCE WITH THE NRA/T.I.I. SPECIFICATION FOR ROADWORKS, MARCH 2000 & SUBSEQUENT REVISIONS.
6. REINFORCED CONCRETE TO BE MINIMUM GRADE C32/40. SULPHATE RESISTING CEMENT TO BE USED WHERE AGGRESSIVE SOIL CONDITIONS APPLY, REFER TO TABLE 6.1 OF B.S. 8110.
7. BOXOUTS NAY BE PERMISSIBLE AT THE DISCRETION AND TO THE APPROVAL OF EIRGRID. WHERE THE DUCTS HAVE TO BE FITTED THE CONTRACTOR SHALL COMPLY WITH THE SPECIFICATIONS.



SECTION A



SECTION B



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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
LINK BOX CHAMBER REINFORCEMENT

No of Shts	SIZE	SCALE
4	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-011	003	00

*SPECIFIED TO NEAREST 25mm
**SPECIFIED TO NEAREST 5mm

ALL BENDING DIMENSIONS ARE IN ACCORDANCE WITH B.S. 8666:2005

MEMBER	BAR MARK	TYPE	SIZE (mm)	No. of MEMBERS	No. in EACH	TOTAL No.	LENGTH of EACH BAR mm*	SHAPE CODE	A mm**	B mm**	C mm**	D mm**	E/r mm**
BASE	01	T	12	1	22	22	1725	21	825	125			
	02	T	12	1	68	68	1275	11	800				
	03	T	12	1	16	16	2200	13	1075	110			
WALLS	04	T	12	1	32	32	1875	11	825				
	05	T	12	1	16	16	1125	37	575				

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STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
LINK BOX CHAMBER
STEEL REINFORCEMENT SCHEDULE

No of Shts	SIZE	SCALE
4	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-011	004	00

STANDARD 110kV CABLE DRAWINGS
6mx2.5m JOINT BAY

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-012	001	JOINT BAY INDEX SHEET	00
XDC-CBL-STND-H-012	002	JOINT BAY GENERAL ARRANGEMENT	00
XDC-CBL-STND-H-012	003	PRECAST JOINT BAY DETAILS SECTION 1	00
XDC-CBL-STND-H-012	004	PRECAST JOINT BAY DETAILS SECTION 2	00
XDC-CBL-STND-H-012	005	PRECAST JOINT BAY DETAILS SECTION 3	00
XDC-CBL-STND-H-012	006	JOINT BAY REBAR SCHEDULE	00
XDC-CBL-STND-H-012	007	JOINT BAY REINSTATEMENT	00
XDC-CBL-STND-H-012	008	JOINT BAY EARTHING ARRANGEMENT	00

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
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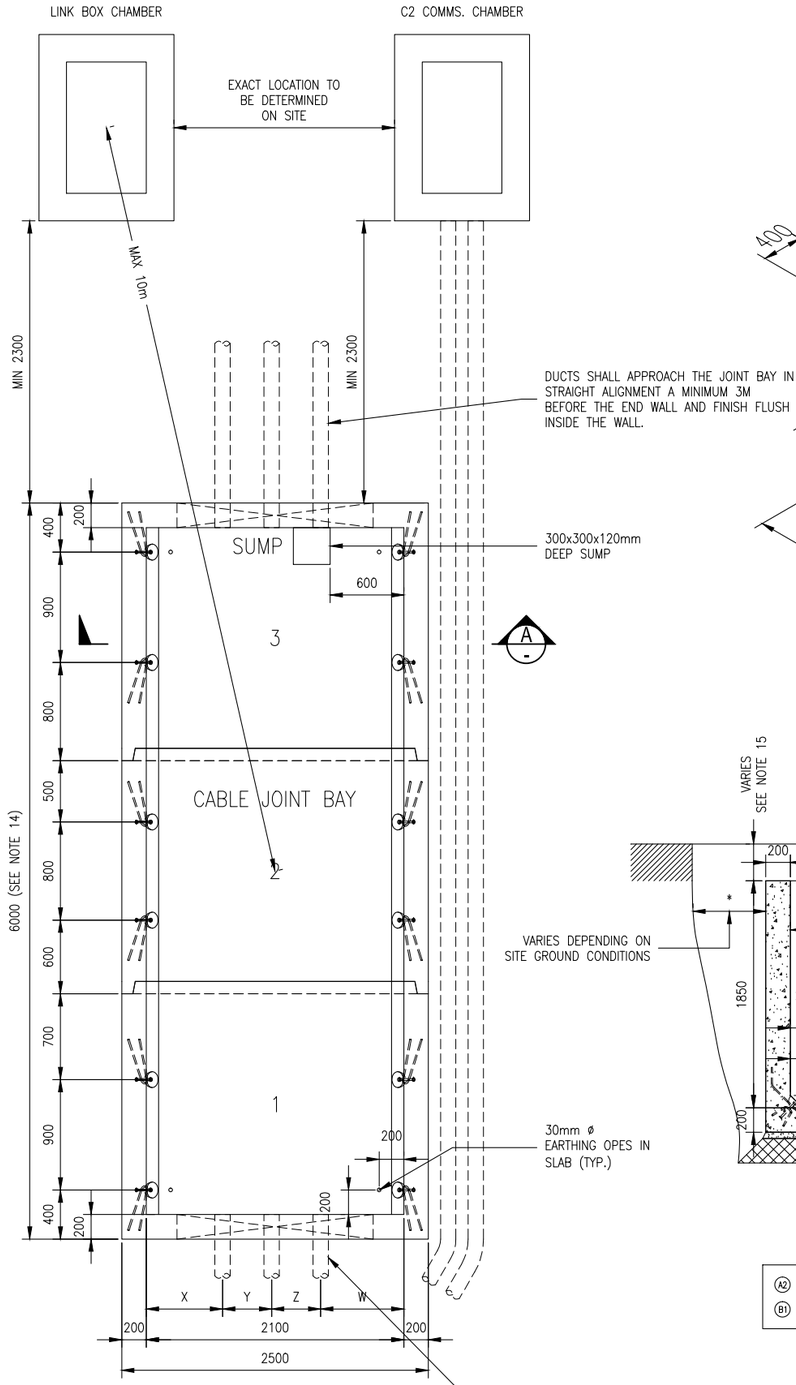
PROJECT
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
JOINT BAY
INDEX SHEET

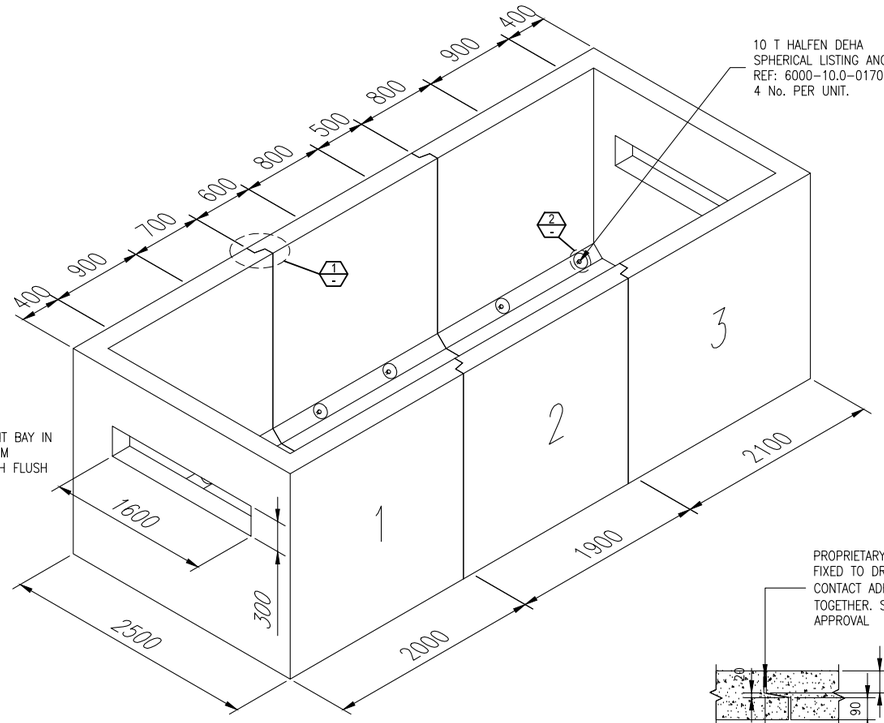
No of Shts 8 | SIZE A3 | SCALE N/A

DRAWING NUMBER
XDC-CBL-STND-H-012

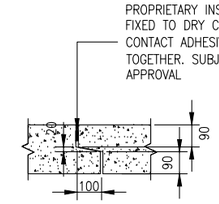
SHEET 001 | REV 00



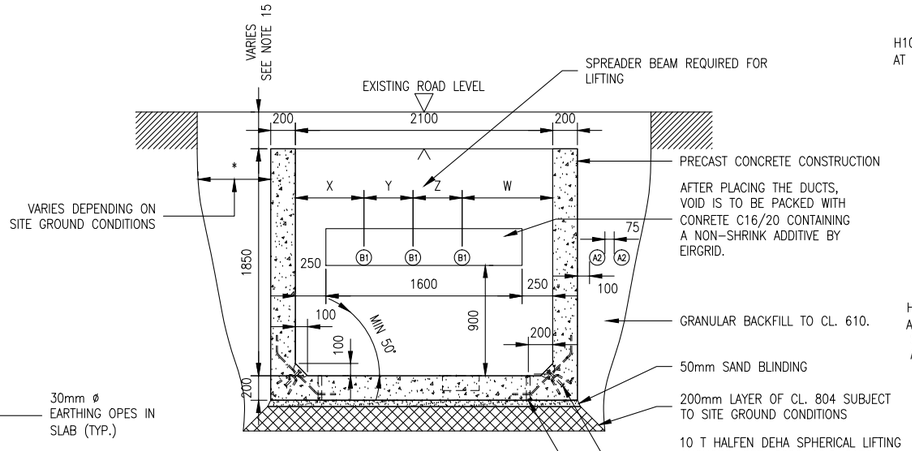
TYPICAL PLAN OF JOINT BAY
SCALE 1:50



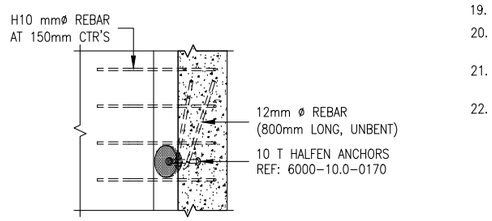
ISOMETRIC: JOINT BAY ARRANGEMENT
NOT TO SCALE

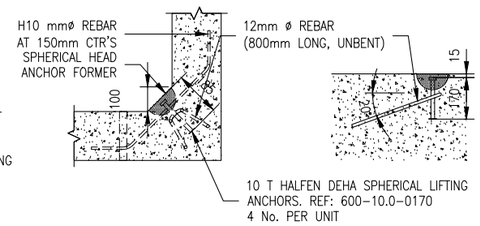


1 - DETAIL 1 – SOCKET AND SPIGOT DETAIL (WALL & FLOOR)
SCALE 1:25



A - SECTION A
SCALE 1:50





2 - DETAIL 2 – LIFTING EYE DETAIL
SCALE 1:25

GENERAL NOTES

1. ALL PRECAST CONCRETE ELEMENTS TO BE MANUFACTURED TO B.S. EN 13369:2004 "COMMON RULES FOR PRECAST CONCRETE PRODUCTS"
2. LIFTING INSERTS TO BE DESIGNED & INSTALLED TO PD CEN/TR 15728:2008 "DESIGN AND USE OF INSERTS FOR LIFTING AND HANDLING OF PRECAST CONCRETE ELEMENTS."
3. SPECIFIED LIFTING INSERTS HAVE A S.W.L. OF 10 TONNE.
4. LOCATION AND SPECIFICATION OF LIFTING INSERTS ARE ASSUMED TO FACILITATE DEMOULDING AND HANDLING IN PRECAST MANUFACTURING FACTORY. IT IS THE RESPONSIBILITY OF THE CUSTOMER TO NOTIFY EIRGRID IF THESE ARE UNSUITABLE FOR THEIR MANUFACTURING METHODOLOGY. EIRGRID IS TO BE INFORMED OF ANY ALTERNATIVE LIFTING LOCATIONS FOR FACTORY HANDLING & DEMOULDING.
5. CONCRETE TO HAVE A MINIMUM STRENGTH OF 30 N/mm^2 PRIOR TO HANDLING OF DEMOULDING.
6. CUSTOMER IS TO ENSURE THAT A METHOD STATEMENT AND RISK ASSESSMENT, INCLUDING A LIFTING PLAN, IS PRODUCED FOR INSTALLATION AND ARE AVAILABLE TO EIRGRID FOR REVIEW IF REQUESTED. LIFTING PLAN TO INCORPORATE REQUIREMENTS OF LIFTING INSERTS AND LIFTING LOOP EYES.
7. A MINIMUM LIFTING SLING ANGLE OF 50° TO THE HORIZONTAL IS REQUIRED.
8. A LIFTING SYSTEM WHICH ENSURES ALL LIFTING POINTS TAKE ON AN EQUAL LOAD IS REQUIRED.
9. HALFEN DEHA SPHERICAL LIFTING ANCHORS TO BE USED AS SPECIFIED. ANY DEVIATION FROM THIS MUST BE NOTIFIED TO EIRGRID BY THE CUSTOMER. LIFTING INSERTS TO BE INSTALLED AS PER MANUFACTURER'S GUIDELINES AND IN ACCORDANCE WITH PD CEN/TR 15728:2008.
10. FORMWORK FOR PRECASTING TO BE OF A MINIMUM STANDARD OF VARNISHED WOODEN MOULD WITH PLANED BOARDS.
11. COVER TO REINFORCEMENT TO BE 40mm.
12. CONCRETE TO BE GRADE C30/37 AS SPECIFIED IN TABLE 1.
13. ALL CONCRETE TO BE IN ACCORDANCE WITH I.S. EN 206-1:2013 WITH THE MIX DESIGNS SHOWN IN TABLE 1.
14. FOR 7.9m JOINT BAY INSERT 1 No. ADDITIONAL PRECAST SECTION 2.
    FOR 9.8m JOINT BAY INSERT 2 No. ADDITIONAL PRECAST SECTION 2.
15. THE DEPTH FROM GROUND/ROAD LEVEL TO THE TOP OF THE CONCRETE WALL SHALL BE:
    A. 500mm – IN CULTIVATED FIELDS AND GRASSED LANDS
    B. 300mm – IN PAVED ROADS AND GRASS VERGES
    C. 350mm – IN PAVED CITY ROADS AND GRASSED VERGES.
16. LINK BOX CHAMBER TO BE POSITIONED AT THE EDGE OF OR OFF ROAD.
17. ALLOWABLE BEARING PRESSURE TO BE AT LEAST 185kPa
18. FOR HIGHLY AGGRESSIVE ENVIRONMENTS, TABLE 1 IS NOT APPLICABLE. CONSULT WITH EIRGRID FOR BESPOKE DESIGN.
19. JOINT BAY TO BE UNIFORMLY BACKFILLED IN LAYERS NOT EXCEEDING 300mm THICK.
20. WHERE JOINT BAY IS TO BE INSTALLED ADJACENT TO TRAFFICKED LANE, A 1m WIDE LATERAL SAFETY ZONE IS TO BE PROVIDED TO SATISFY DESIGN LOADING ASSUMPTIONS.
21. CUSTOMER IS RESPONSIBLE FOR ALL TRAFFIC MANAGEMENT INCLUDING WHERE NECESSARY SAFETY BARRIERS, AS PER D.R.A.
22. LINK BOX CHAMBER AND C2 COMM CHAMBER FINAL POSITIONING TO BE AGREED WITH EIRGRID PRIOR TO INSTALLATION.

TABLE 1

CONCRETE SPECIFICATION TO I.S. EN 206-1		
	BLINDING & MASS CONCRETE, DRAINAGE PIPE & MANHOLE SURROUNDINGS	FOUNDATIONS & WALLS
EXPOSURE CLASS	X0	XC2, XA2
MIN. CEMENT CONTENT (kg/m^2)	240	340
MAX. WATER/CEMENT RATIO	–	0.50
CEMENT TYPE TO I.S. EN 197-1	CEM 1 N	CEM 1 N
CHLORIDE CONTENT CLASS	Cl. 1,0	Cl. 0,40
MAX. AGGREGATE	10	20
MIN. COVER (CMin) (mm)	–	40
*COMPRESSIVE STRENGTH CLASS	C16/20	C30/37

NOTES:
1. *C16/20 TO BE READ AS FOLLOWS: 16 – REFERS TO MIN. CHARACTERISTIC CYLINDER STRENGTH (N/mm2/). 20 – REFERS TO MIN. CHARACTERISTIC CUBE STRENGTH (N/mm2/).
2. DESIGN WORKING LIFE TO BE 50 YEARS MINIMUM.

TABLE 2 – DUCT SEPERATION

	X	Y	Z	W
110kV	560	400	400	740
220kV	375	675	675	375

REV	DESC	DRAWN	CHECKED	APPROVED	DATE
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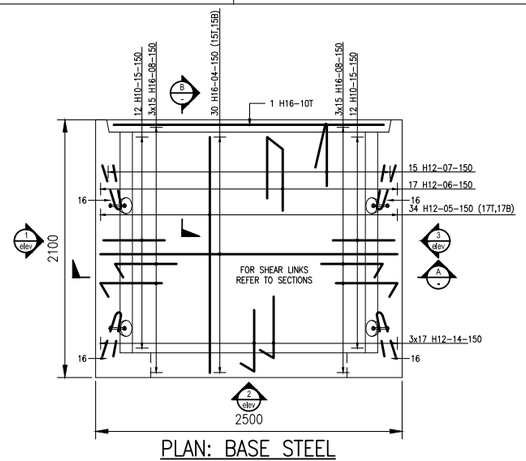
PROJECT
STANDARD 110kV CABLE DRAWINGS

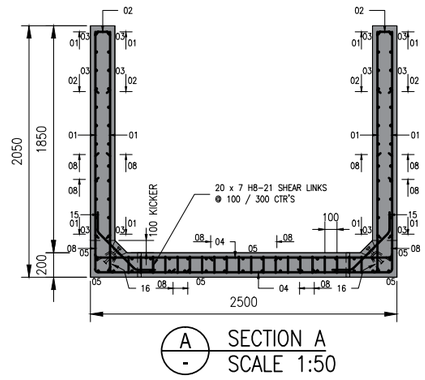
DRAWING TITLE
JOINT BAY
GENERAL ARRANGEMENT

No of Shts	SIZE	SCALE
8	A3	N/A

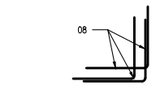
DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-012	002	00



PLAN: BASE STEEL
SCALE 1:50



A SECTION A
SCALE 1:50



SECTION ARR. 08 BARS
SCALE 1:50

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5. ALL REINFORCEMENT SHALL BE IN ACCORDANCE WITH B.S. 4449 AND SCHEDULED IN ACCORDANCE WITH B.S. 8666:2005.
6. COVER TO REINFORCEMENT TO BE 40mm.
7. CONCRETE TO BE GRADE C30/37 AS SPECIFIED IN TABLE 1.
8. ALL CONCRETE TO BE IN ACCORDANCE WITH I.S. EN 206-1:2013 WITH THE MIX DESIGNS SHOWN IN TABLE 1.
9. CONCRETE FINISH TO BE F2 FOR BELOW GROUND STRUCTURES AS PER T.I.I. PUBLICATION CC-SPW-01700.

THE NOTATION FOR THE LAYERING OF REINFORCEMENT SHALL BE AS FOLLOWS:

FF – FAR FACE
NF – NEAR FACE
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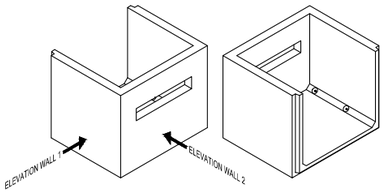
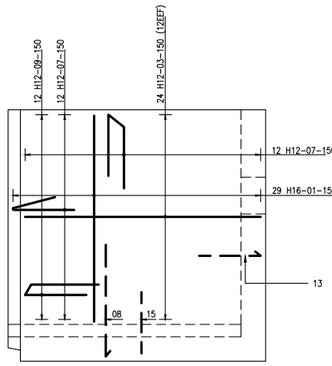
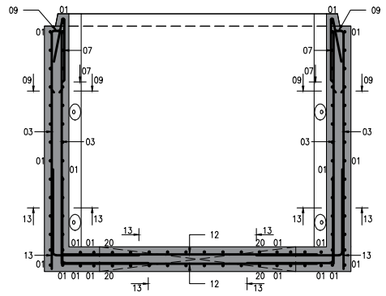


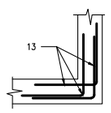
ISOMETRIC VIEW
SECTION 1



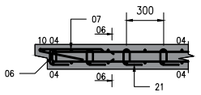
WALL ELEVATION 1
SCALE 1:50



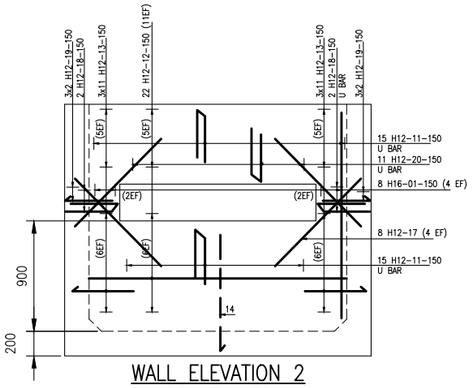
WALL ELEVATION 1
SCALE 1:50



PLAN ARR. 13 BARS
SCALE 1:50



B SECTION B
SCALE 1:50



WALL ELEVATION 2
SCALE 1:50

CONCRETE SPECIFICATION TO I.S. EN 206-1		
	BLINDING & MASS CONCRETE, DRAINAGE PIPE & MANHOLE SURROUNDINGS	FOUNDATIONS & WALLS
EXPOSURE CLASS	X0	XC2, XA2
MIN. CEMENT CONTENT (kg/m³)	240	340
MAX. WATER/CEMENT RATIO	–	0.50
CEMENT TYPE TO I.S. EN 197-1	CEM 1 N	CEM 1 N
CHLORIDE CONTENT CLASS	Cl. 1,0	Cl, 0,40
MAX. AGGREGATE	10	20
MIN. COVER (CMin) (mm)	–	40
*COMPRESSIVE STRENGTH CLASS	C16/20	C30/37

NOTES
1. *C16/20 TO BE READ AS FOLLOWS: 16 – REFERS TO MIN. CHARACTERISTIC CYLINDER STRENGTH (N/mm2/). 20 – REFERS TO MIN. CHARACTERISTIC CUBE STRENGTH (N/mm2/).
2. DESIGN WORKING LIFE TO BE 50 YEARS MINIMUM.

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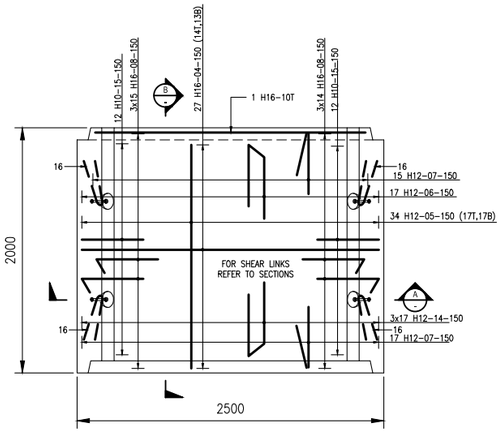
PROJECT
STANDARD 110kV CABLE DRAWINGS

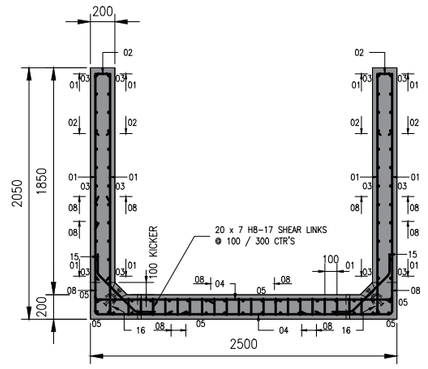
DRAWING TITLE
JOINT BAY
REINFORCEMENT DETAILS
JOINT BAY SECTION 1

No of Shts	SIZE	SCALE
8	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-012	003	00



PLAN: BASE STEEL
SCALE 1:50



A
-
SECTION A
SCALE 1:50

SECTION ARR. 08 BARS
SCALE 1:50

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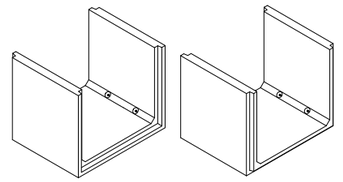
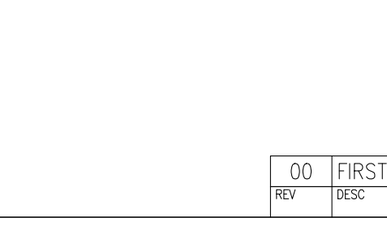
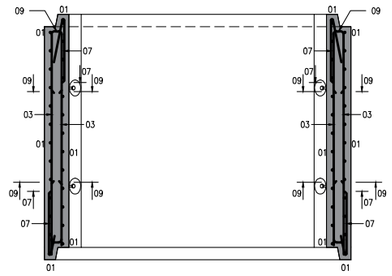


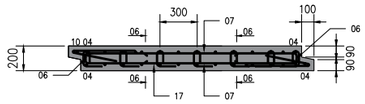
ISOMETRIC VIEW
SECTION 2



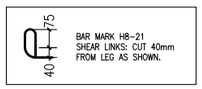
ELEVATION OF WALL TYP.
SCALE 1:50



PLAN: WALL STEEL
SCALE 1:50



B
-
SECTION B
SCALE 1:50



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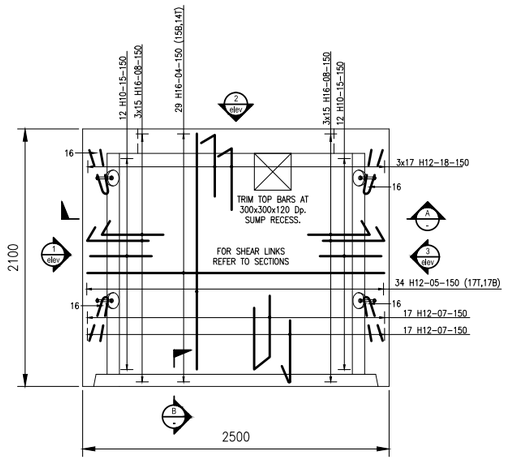
PROJECT
STANDARD 110kV CABLE DRAWINGS

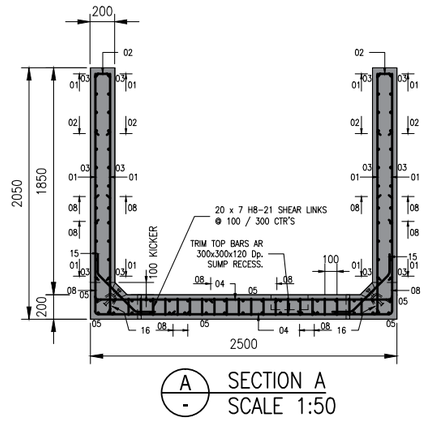
DRAWING TITLE
JOINT BAY
REINFORCEMENT DETAILS
JOINT BAY SECTION 2

No of Shts	SIZE	SCALE
8	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-012	004	00



PLAN: BASE STEEL
SCALE 1:50



A SECTION A
SCALE 1:50

SECTION ARR. 08 BARS
SCALE 1:50

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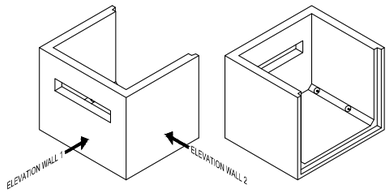
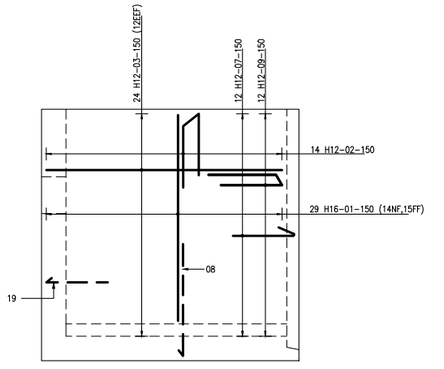
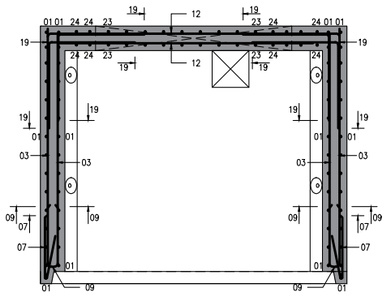


ISOMETRIC VIEW
SECTION 1



WALL ELEVATION 1
SCALE 1:50



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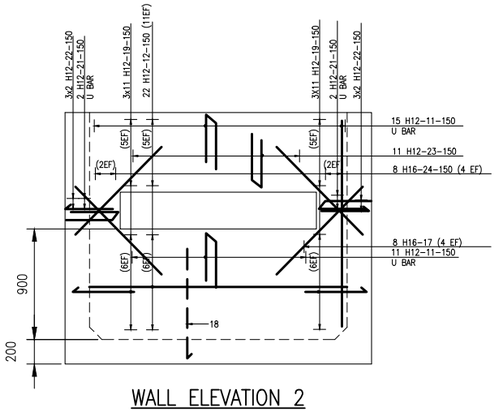
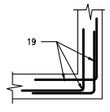
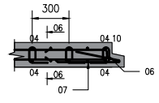


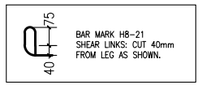
WALL ELEVATION 2
SCALE 1:50



PLAN ARR. 19 BARS
SCALE 1:50



B SECTION B
SCALE 1:50



CONCRETE SPECIFICATION TO I.S. EN 206-1		
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PROJECT
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
JOINT BAY
REINFORCEMENT DETAILS
JOINT BAY SECTION 3

No of Shts 8 | SIZE A3 | SCALE N/A

DRAWING NUMBER XDC-CBL-STND-H-012 | SHEET 005 | REV 00

TABLE 1: JOINT BAY R.C. DETAIL – SECTION 1

* – SPECIFIED TO NEAREST 5mm + – SPECIFIED TO NEAREST 25mm							ALL BENDING DIMENSIONS ARE IN ACCORDANCE WITH B.S. 8666:2005						
MEMBER	BAR MARK	TYPE	SIZE (mm)	No. OF MBRS	No. IN EACH	TOTAL No.	LENGTH OF EACH BAR (mm)	SHAPE CODE	A* mm	B* mm	C* mm	D* mm	E/r* mm
SIDE WALLS	01	H	16	2	29	58	1675	00					
	02	H	12	2	14	28	1075	21	500	120			
	03	H	12	2	24	48	1900	00					
	07	H	12	2	12	24	930	14	350	85	560		
	09	H	12	2	12	24	1000	13	480	80			
BASE	04	H	16	1	30	30	2400	00					
	05	H	12	1	34	34	1900	00					
	06	H	12	1	17	17	1025	13	500	80			
	07	H	12	1	15	15	930	14	350	85	560		
	08	H	16	1	90	90	1600	11	960				
	10	H	16	1	1	1	2200	00					
	14	H	12	1	51	51	1250	11	950	300			
	15	H	10	1	24	24	800	24	200	400	200	285	
	16	H	12	1	4	4	800	00	BEND ON SITE				
Shear Links	21	H	8	1	140	140	350	22	115	120	50	115	
END WALL	01	H	16	1	8	8	1675	00					
	11	H	12	1	26	26	1050	21	475	120			
	12	H	12	1	22	22	2075	00					
	13	H	12	1	66	66	1375	11	700				
	17	H	12	1	8	8	1000	00					
	18	H	12	1	4	4	775	13	375	75			
	19	H	12	1	12	12	675	11	350				
	20	H	12	1	11	11	1175	21	550	120			

TABLE 2: JOINT BAY R.C. DETAIL – SECTION 2

* – SPECIFIED TO NEAREST 5mm + – SPECIFIED TO NEAREST 25mm							ALL BENDING DIMENSIONS ARE IN ACCORDANCE WITH B.S. 8666:2005						
MEMBER	BAR MARK	TYPE	SIZE (mm)	No. OF MBRS	No. IN EACH	TOTAL No.	LENGTH OF EACH BAR (mm)	SHAPE CODE	A* mm	B* mm	C* mm	D* mm	E/r* mm
SIDE WALLS	01	H	16	2	28	56	1675	00					
	02	H	12	2	14	28	1075	21	500	110			
	03	H	12	2	24	48	1900	00					
	07	H	12	2	24	48	930	14	350	85	560		
	09	H	12	2	24	48	1000	21	480	80			
BASE	04	H	16	1	27	27	2400	00					
	05	H	12	1	34	34	1900	00					
	06	H	12	1	34	34	1025	21	500	110			
	07	H	12	1	32	32	930	14	350	85	560		
	08	H	16	1	84	84	1600	11	960				
	10	H	16	1	1	1	2200	00					
	15	H	10	1	24	24	800	24	200	400	200	285	
	16	H	12	1	4	4	800	00	BEND ON SITE				
Shear Links	17	H	8	1	140	140	350	22	115	120	50	115	

TABLE 3: JOINT BAY R.C. DETAIL – SECTION 3

* – SPECIFIED TO NEAREST 5mm + – SPECIFIED TO NEAREST 25mm							ALL BENDING DIMENSIONS ARE IN ACCORDANCE WITH B.S. 8666:2005						
MEMBER	BAR MARK	TYPE	SIZE (mm)	No. OF MBRS	No. IN EACH	TOTAL No.	LENGTH OF EACH BAR (mm)	SHAPE CODE	A* mm	B* mm	C* mm	D* mm	E/r* mm
SIDE WALLS	01	H	16	2	29	58	1675	00					
	02	H	12	2	14	28	1075	21	500	120			
	03	H	12	2	24	48	1900	00					
	07	H	12	2	12	24	930	14	350	85	560		
	09	H	12	2	12	24	1000	13	480	80			
BASE	25	H	8	1	140	140	350	22	115	120	50	115	
	04	H	16	1	29	29	2400	00					
	05	H	12	1	34	34	1900	00					
	06	H	12	1	17	17	1025	13	500	80			
	07	H	12	1	17	17	930	14	350	85	560		
	08	H	16	1	90	90	1600	11	960				
	15	H	10	1	24	24	800	42	200	400	200	285	
	16	H	12	1	4	4	800	00	BEND ON SITE				
	18	H	12	1	51	51	1375	11	900				
END WALL	11	H	12	1	26	26	1050	21	475	120			
	12	H	12	1	22	22	2075	00	475	120			
	19	H	12	1	66	66	1375	11	700				
	17	H	12	1	8	8	1000	00	700				
	21	H	12	1	4	4	775	13	375	75			
	22	H	12	1	12	12	675	11	350	75			
	23	H	12	1	11	11	1175	21	550	120			
	24	H	16	1	8	8	1675	00					

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00	FIRST ISSUE	DA	DG	CF	09/03/2020

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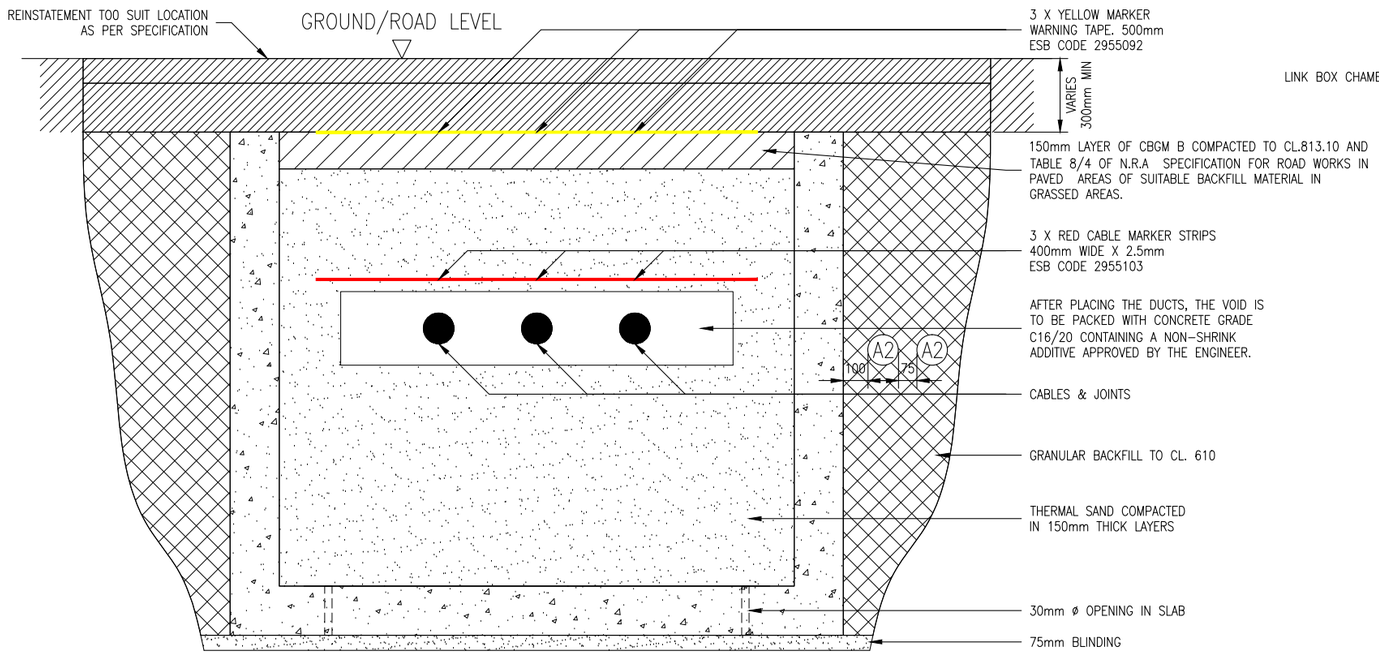
PROJECT: STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE: JOINT BAY REBAR SCHEDULE

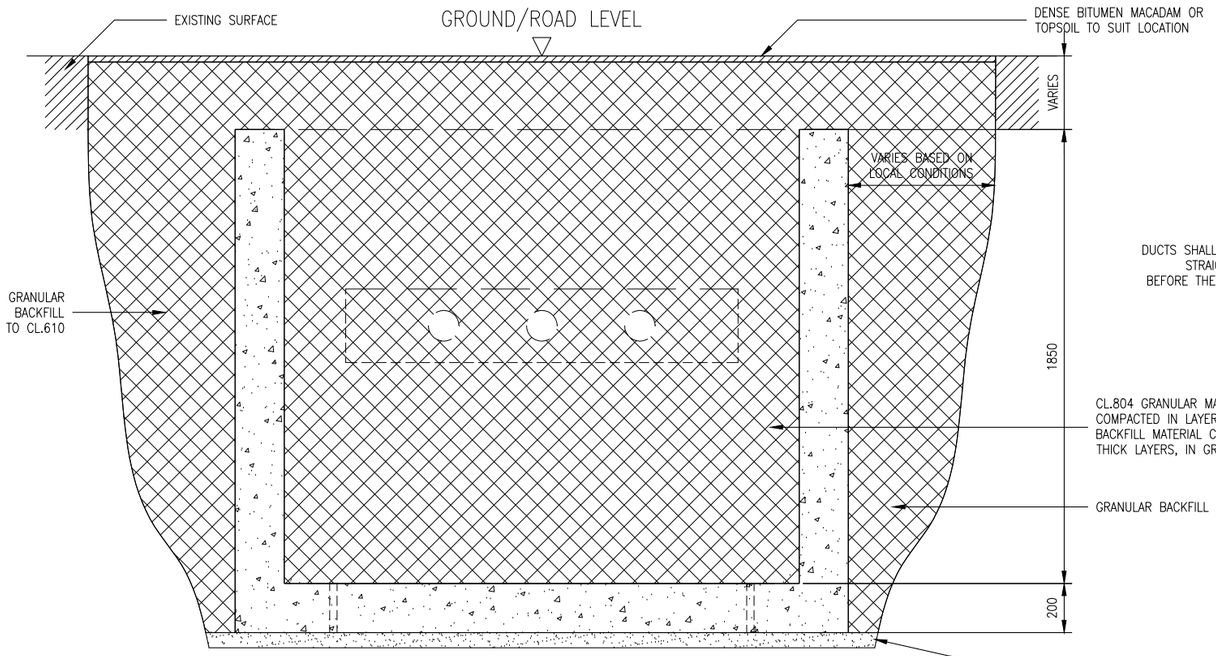
No of Shts: 8 | SIZE: A3 | SCALE: N/A

DRAWING NUMBER: XDC-CBL-STND-H-012 | SHEET: 006 | REV: 00

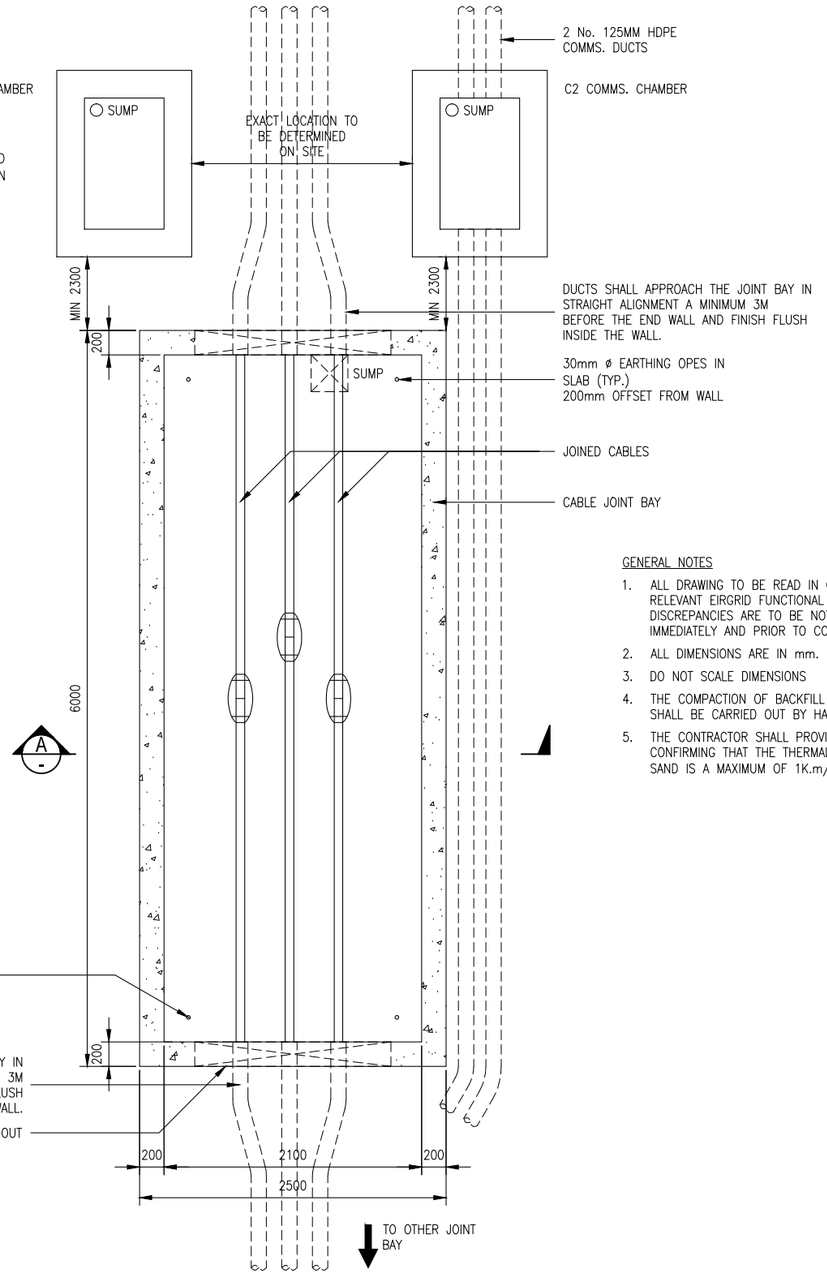


A / - SECTION A – PERMANENT REINSTATEMENT
SCALE 1:50

A2 = 125mm ø HDPE DUCT (COMMS)



A / - SECTION A – TEMPORARY REINSTATEMENT
SCALE 1:50



TYPICAL PLAN OF JOINT BAY IN ROAD
SCALE 1:50

GENERAL NOTES

1. ALL DRAWING TO BE READ IN CONJUNCTION WITH THE RELEVANT EIRGRID FUNCTIONAL SPECIFICATIONS. ANY DISCREPANCIES ARE TO BE NOTED IN WRITING TO EIRGRID IMMEDIATELY AND PRIOR TO COMMENCING THE WORK.
2. ALL DIMENSIONS ARE IN mm.
3. DO NOT SCALE DIMENSIONS
4. THE COMPACTION OF BACKFILL MATERIAL AROUND CABLES SHALL BE CARRIED OUT BY HAND.
5. THE CONTRACTOR SHALL PROVIDE TEST CERTIFICATES CONFIRMING THAT THE THERMAL RESITIVITY OF THE THERMAL SAND IS A MAXIMUM OF 1K.m/W.

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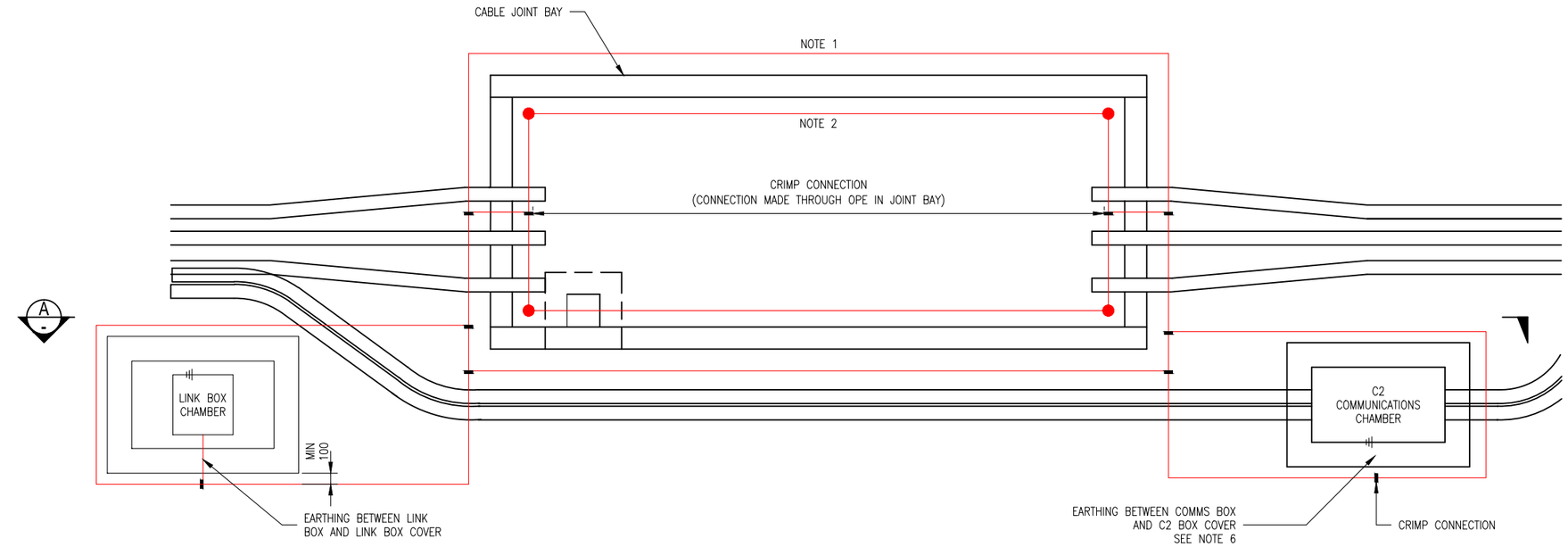
PROJECT: STANDARD 110kV CABLE DRAWINGS

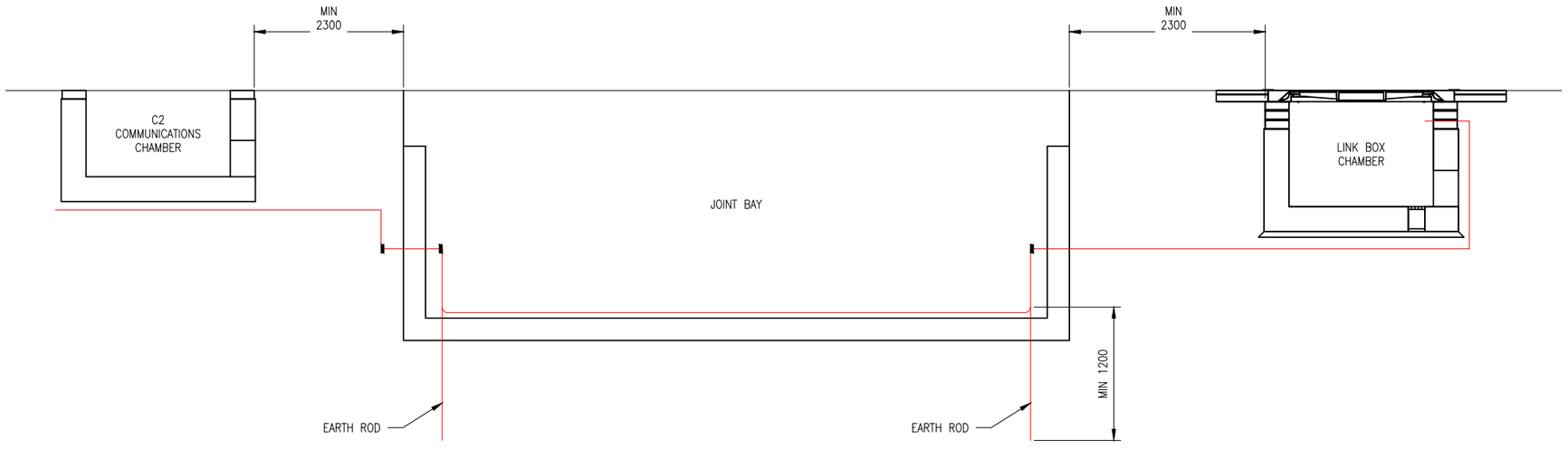
DRAWING TITLE: JOINT BAY REINSTATEMENT

No of Shts	SIZE	SCALE
8	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-012	007	00



TYPICAL PLAN OF JOINT BAY IN ROAD
SCALE 1:50



SECTION A
SCALE 1:50 (A -)

GENERAL NOTES:

1. FOR EARTH GRID SURROUNDING JOINT BAY AND CHAMBERS AREA, INSTALL A SINGLE LOOP OF 95mm² BARE Cu CONDUCTOR, EARTH GRID APPROX 500mm BELOW GROUND SURFACE LEVEL.
2. FOR EARTH GRID WITHIN THE JOINT BAY, INSTALL A SINGLE LOOP OF 95mm² BARE Cu CONDUCTOR RUNNING ALONG THE FLOOR OF THE JB CHAMBER. EARTH GRID APPROX 2000mm BELOW GROUND LEVEL.
3. EARTH RODS SHALL BE 1mm THICK COPPER-CLAD STEEL 1200mm LONG, 20mmø IN ACCORDANCE WITH ENA TS 43-94. THE EARTH CONNECTION TO THE EARTH ROD SHALL BE MOISTURE PROTECTED USING DENSO TAPE OVER THE COMPLETED CONNECTION.
4. EARTH RODS SHALL BE SUPPLIED COMPLETE WITH LUGS, BOLTS, HARDENED TIP, SCREW-ON STEEL DRIVING CAP, AND WITH THE APPROVED MEANS OF CONNECTING THE REQUIRED EARTHING LEADS.
5. EARTH RODS NOT LESS THAN 1.2m LONG TO BE INSTALLED VERTICALLY, ONE IN EACH CORNER OF THE JOINT BAY.
6. THE JOINT BAY EARTH RESISTANCE, WITH THIS ARRANGEMENT, SHOULD HAVE A MAXIMUM VALUE OF 10Ω. IF THIS VALUE CANNOT BE ACHIEVED, ADDITIONAL MEASURES WILL BE REQUIRED.
7. STEP VOLTAGE AND TRANSFERRED VOLTAGE TO OTHER METALLIC OBJECTS INSTALLED IN THE VICINITY OF THE JOINT BAY SHALL BE CALCULATED AND CHECKED AS PER LATEST IEEE 80 AND EIRGRID SPECIFICATION XDS-GFS-12-001.

FOR REQUIRED SHORT CIRCUIT RATING REFER TO EIRGRID FUNCTIONAL SPECIFICATION XDS-GFS-00-001

LEGEND

- 95mm² Cu BARE CONDUCTOR
- EARTH ROD
- C CRIMP

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PROJECT
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
JOINT BAY
TYPICAL EARTHING ARRANGEMENT

No of Shts	SIZE	SCALE
8	A3	N/A

DRAWING NUMBER
XDC-CBL-STND-H-012

SHEET	REV
008	00

STANDARD 110kV CABLE DRAWINGS
TRANSITION CHAMBER

DRAWING No.	SHEET No.	DESCRIPTION	REVISION No.
XDC-CBL-STND-H-013	001	TRANSITION CHAMBER INDEX SHEET	00
XDC-CBL-STND-H-013	002	TRANSITION CHAMBER GENERAL ARRANGEMENT	00
XDC-CBL-STND-H-013	003	TRANSITION CHAMBER SECTION DETAILS	00
XDC-CBL-STND-H-013	004	TRANSITION CHAMBER REINSTATEMENT	00
XDC-CBL-STND-H-013	005	TRANSITION CHAMBER NOTES	00

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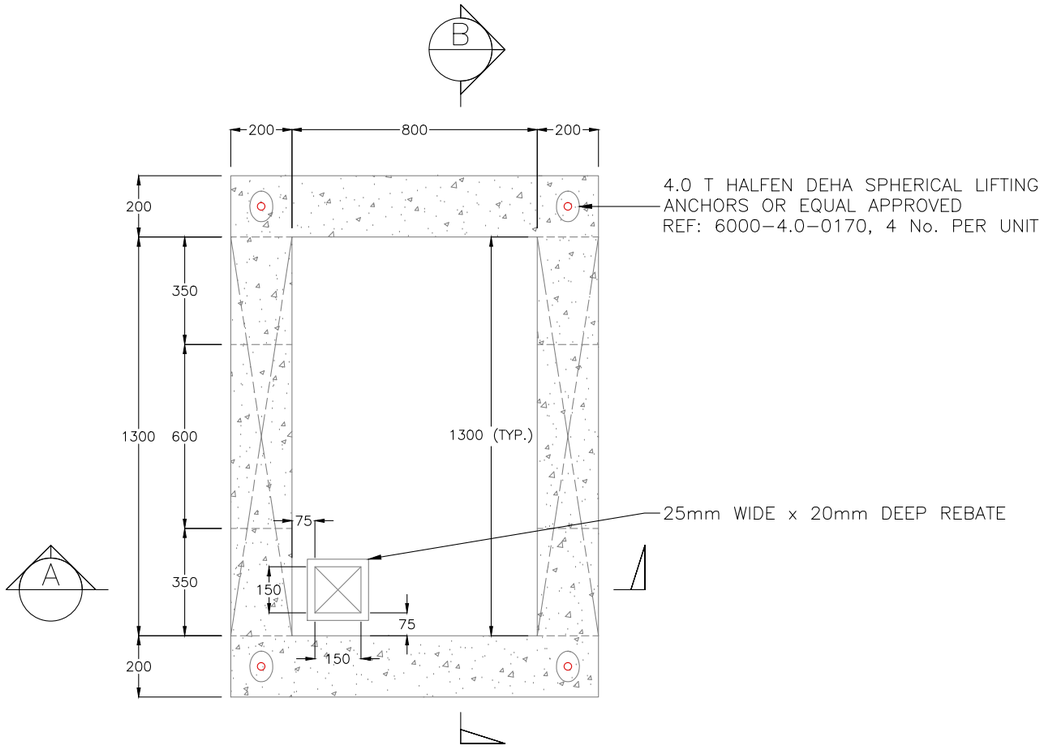
PROJECT: STANDARD 110kV CABLE DRAWINGS

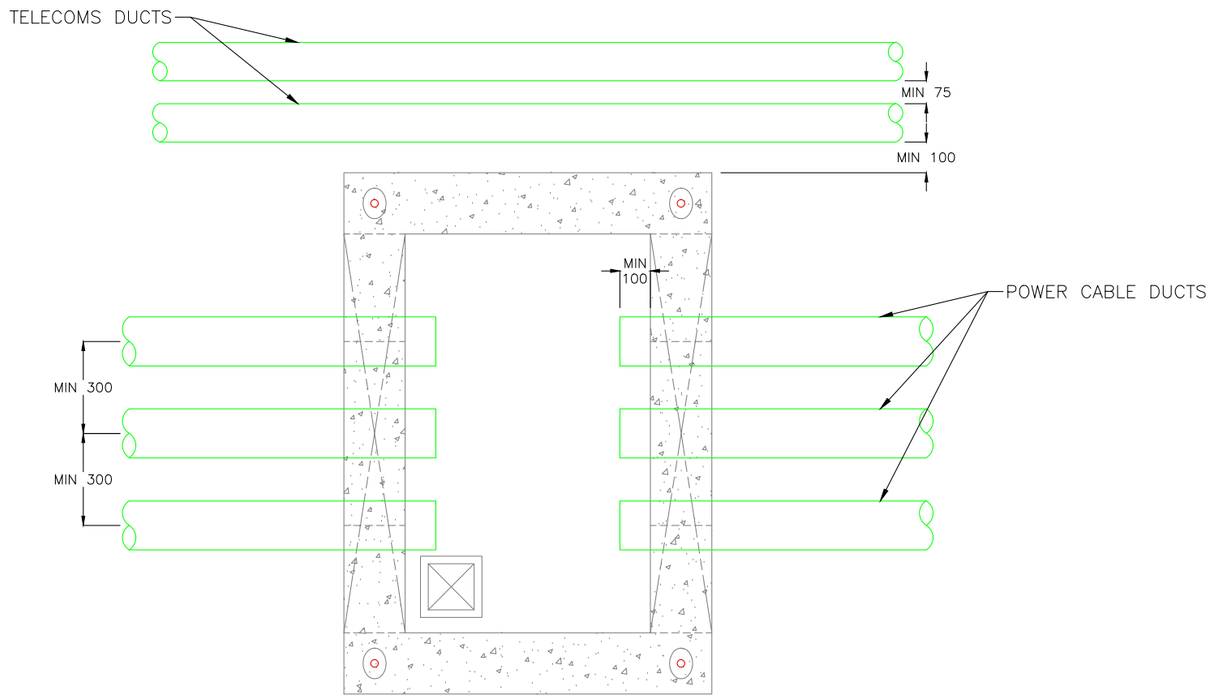
DRAWING TITLE: TRANSITION CHAMBER INDEX SHEET

No of Shts	SIZE	SCALE
5	A3	N/A

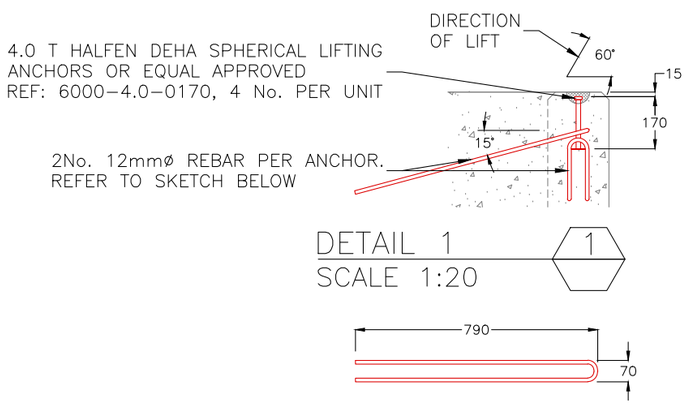
DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-013	001	00



PLAN – TRANSITION CHAMBER
SCALE 1:20 (COVER, FRAME & DUCTS OMITTED FOR CLARITY)



PLAN – TRANSITION CHAMBER
SCALE 1:20 (DUCT SETTING OUT)



DETAIL 1 (1)
SCALE 1:20

H12mmø REBAR (1625mm LONG. UNBENT)

REFER TO SHEET 005 FOR GENERAL AND PRECAST CONCRETE NOTES

GENERAL NOTES FOR TELECOMS DUCTS:

1. TELECOMMUNICATION DUCTS NOT TO BE ROUTED THROUGH TRANSITION CHAMBER.
2. IF TRANSITION CHAMBER IS USED TO INTERFACE WITH AN HDD SECTION, THEN THE TELECOMS DUCT SDR 17.6 SHOULD BE CHAMFERED WHEN COUPLED WITH SDR 11 DUCTS.

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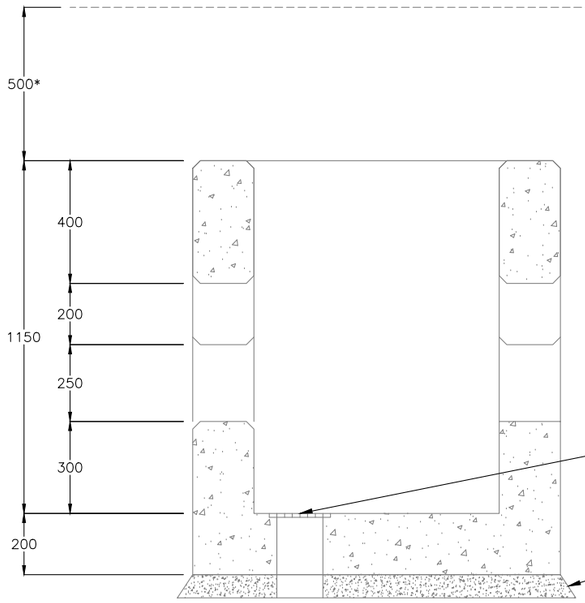
PROJECT: STANDARD 110kV CABLE DRAWINGS
DRAWING TITLE: TRANSITION CHAMBER GENERAL ARRANGEMENT
No of Shts: 5 | SIZE: A3 | SCALE: N/A
DRAWING NUMBER: XDC-CBL-STND-H-013 | SHEET: 002 | REV: 00

*COVER: REFER TO GENERAL NOTE 14
(SHEET 005)

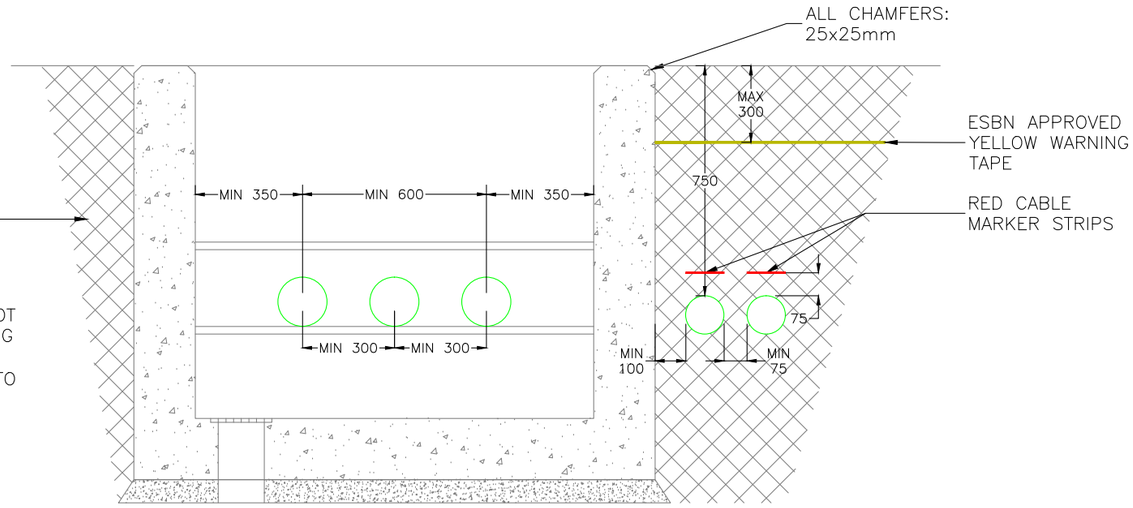


GRANULAR BACKFILL TO CL. 610 CLASSES 6N OR 6P COMPACTED IN ACCORDANCE WITH CL. 612 AND TABLE 6/1 OF T.I.I. SPECIFICATION. REFER TO GENERAL NOTE 5 & 6.

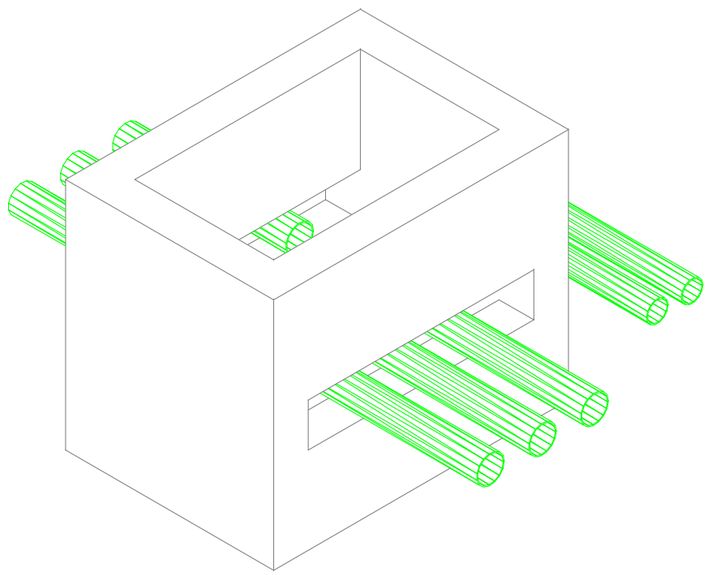
150mm Sq. SUMP WITH 195x195mm HOT DIPPED GALVANISED STEEL SUMP GRATING TO I.S. EN ISO 1461, FOLLOWING BLAST CLEANING TO Sa 2½ TO B.S. 7079 ½ TO B.S. 7079 TO B.S. 7079

75mm THICK C16/20 CONCRETE BLINDING

SECTION A
SCALE 1:20 (A)



SECTION B
SCALE 1:20 (B)



REFER TO SHEET 005 FOR GENERAL AND PRECAST CONCRETE NOTES

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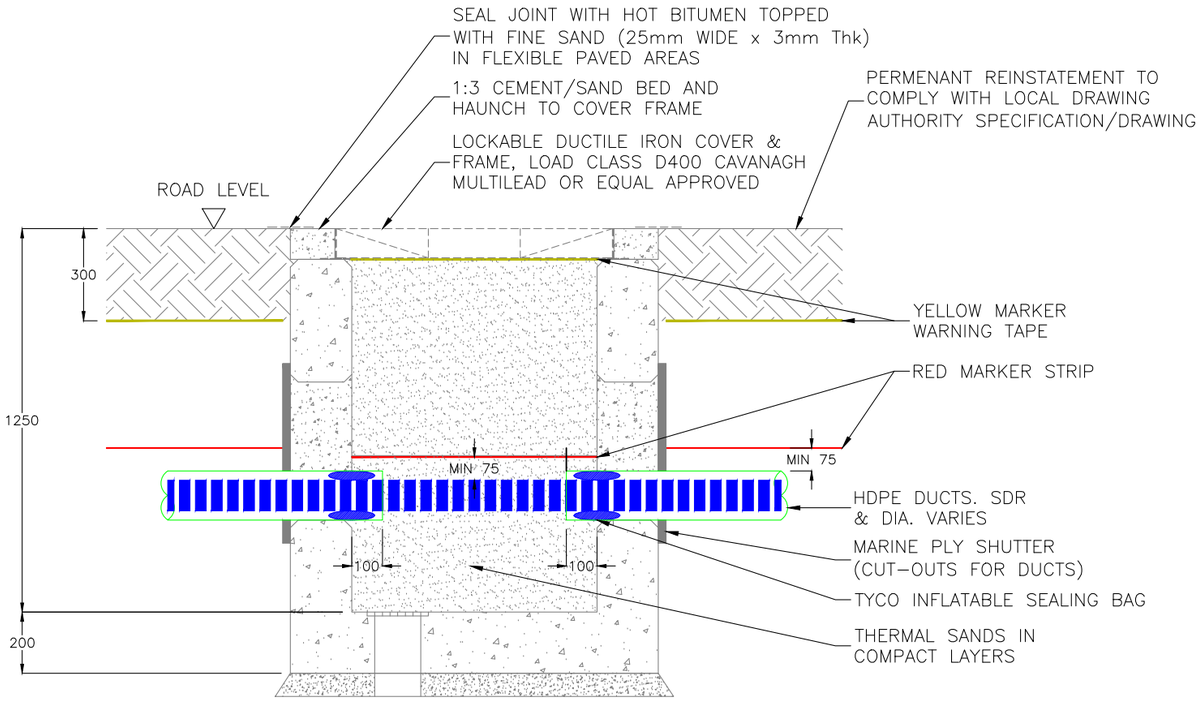
PROJECT: STANDARD 110kV CABLE DRAWINGS

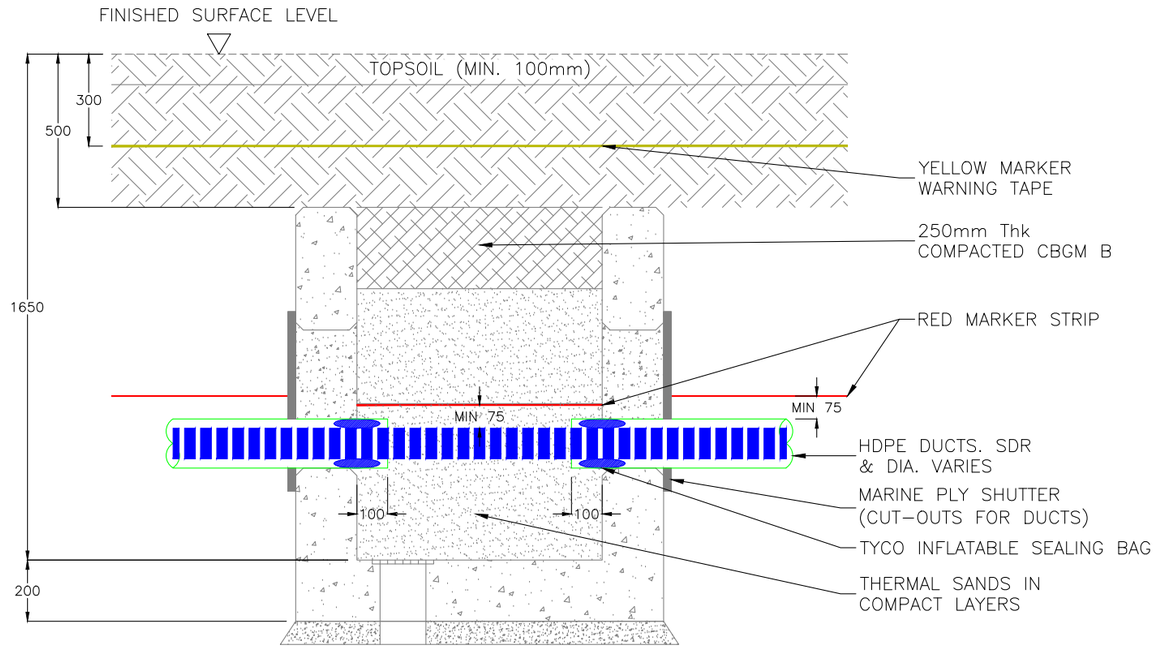
DRAWING TITLE: TRANSITION CHAMBER SECTION DETAILS

No of Shts	SIZE	SCALE
5	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-013	003	00



SECTION A
SCALE 1:20 (CHAMBER BACKFILL IN ROAD) A



SECTION A
SCALE 1:20 (CHAMBER BACKFILL IN FIELD) A

REFER TO SHEET 005 FOR GENERAL AND PRECAST CONCRETE NOTES

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PROJECT
STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE
TRANSITION BAY REINSTATEMENT

No of Shts	SIZE	SCALE
5	A3	N/A

DRAWING NUMBER	SHEET	REV
XDC-CBL-STND-H-013	004	00

GENERAL NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEER'S, ARCHITECT'S AND ESB NETWORKS DRAWINGS & SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN mm.
3. DO NOT SCALE DIMENSIONS.
4. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS PRIOR TO CONSTRUCTION, ANY DISCREPANCIES TO BE NOTIFIED TO THIS OFFICE IN WRITING IMMEDIATELY.
5. TEMPORARY SUPPORTS TO THE SIDES OF THE EXCAVATION MAY BE REQUIRED DEPENDENT ON SUBSOIL, METHOD OF WORK AND SITE CONSTRAINTS, AND ARE TO BE AGREED WITH THE ESBI ENGINEER PRIOR TO COMMENCEMENT OF EXCAVATION. SIDE SLOPES OF AN UNSUPPORTED EXCAVATION DEPENDENT UPON SUBSOIL AND SHALL BE AGREED WITH ESBI ENGINEER.
6. MAIN CONTRACTOR TO PROVIDE A METHOD STATEMENT AND RISK ASSESSMENT FOR THE EXCAVATION WORKS FOR THE ESBI ENGINEER TO REVIEW.
7. THE CONSTRUCTION, AS SHOWN, IS APPLICABLE ONLY WHERE THE SUBSOIL AT FORMATION LEVEL EXCEEDS 100 kN/m^2 BEARING CAPACITY.
8. SUITABILITY OF THE COVER AND CHAMBER TO BE ASSESSED BY THE PROJECT ENGINEER IN CIRCUMSTANCES OF HIGH TRAFFIC LOADING IN ACCORDANCE WITH THE RECOMMENDATIONS OF T.I.I. DESIGN MANUAL FOR ROADS AND BRIDGES ADDENDUM TO HA 104/09.
9. COVER AND FRAME TO B.S. EN 124.
10. COVER SHALL HAVE APPROVED BADGED MARKING INCORPORATED TO THE APPROVAL OF THE ESBI ENGINEER.
11. ALL MATERIALS AND WORKMANSHIP TO BE IN ACCORDANCE WITH THE T.I.I. SPECIFICATION FOR ROADWORKS.
12. THE CENTER LINE OF THE DUCTS ENTERING THE CHAMBER SHALL BE ALIGNED WITH THE DUCTS ON THE OPPOSITE SIDE, SO THAT THE CABLE IS PULLED IN A STRAIGHT LINE.
13. DUCTS SHALL APPROACH THE CHAMBER IN STRAIGHT ALIGNMENT (HORIZONTAL & VERTICAL) FOR A MINIMUM OF 3 METERS BEFORE THE WALL OPENING.
14. * THE DEPTH FROM GROUND LEVEL TO TOP OF CONCRETE WALL SHALL BE 500 mm IN CULTIVATED FIELDS & GRASSED LANDS.

PRECAST CONCRETE NOTES:

1. ALL PRECAST CONCRETE ELEMENTS TO BE MANUFACTURED TO B.S. EN 13369:2013 "COMMON RULES FOR PRECAST CONCRETE PRODUCTS".
2. LIFTING INSERTS TO BE DESIGNED & INSTALLED TO PD CEN/TR 15728:2008 "DESIGN AND USE OF INSERTS FOR LIFTING AND HANDLING OF PRECAST CONCRETE ELEMENTS".
3. WEIGHT OF PRECAST CONCRETE UNIT (1.382 m^3) = 3.31 T. SPECIFIED LIFTING INSERTS HAVE A S.W.L. OF 4 T. ACCOUNTING FOR DYNAMIC LOADING.
4. LOCATION & SPECIFICATION OF LIFTING INSERTS ARE ASSUMED TO FACILITATE DEMOULDING AND HANDLING IN PRECAST MANUFACTURING FACTORY. IT IS THE RESPONSIBILITY OF THE PRECAST MANUFACTURER TO NOTIFY THE ESBI ENGINEER IF THESE ARE UNSUITABLE FOR HIS MANUFACTURING METHODOLOGY. ESBI ENGINEER TO BE INFORMED OF ANY ALTERNATIVE LIFTING LOCATIONS FOR FACTORY HANDLING & DEMOULDING.
5. CONCRETE TO HAVE A MINIMUM STRENGTH OF 30 N/mm^2 PRIOR TO HANDLING OR DEMOULDING.
6. MAIN CONTRACTOR TO ENSURE THAT A METHOD STATEMENT AND RISK ASSESSMENT INCLUDING A LIFTING PLAN, ARE PRODUCED FOR INSTALLATION AND ARE AVAILABLE TO ESBI ENGINEER FOR REVIEW IF REQUESTED. LIFTING PLAN TO INCORPORATE REQUIREMENTS OF LIFTING INSERTS AND LIFTING LOOP EYES.
7. A MINIMUM LIFTING SLING ANGLE OF 60° TO THE HORIZONTAL IS REQUIRED.
8. A LIFTING SYSTEM WHICH ENSURES ALL LIFTING POINTS TAKE ON AN EQUAL LOAD IS REQUIRED.
9. TRANSPORT THE CHAMBER BY TRAILER WHEN TRAVELING OVER ROUGH TERRAIN TO AVOID DAMAGE TO LIFTING ANCHORS.
10. HALFEN DEHA SPHERICAL LIFTING ANCHORS TO BE USED AS SPECIFIED. ANY DEVIATION FROM THIS MUST BE NOTIFIED TO ESBI ENGINEER BY PRECAST MANUFACTURER.
11. FORMWORK FOR PRECASTING TO BE OF A MINIMUM STANDARD OF VARNISHED WOODEN MOULD WITH PLANED BOARDS.
12. CONCRETE TO BE GRADE C32/40, AS SPECIFIED IN TABLE 1.

TABLE 1 – CONCRETE SPECIFICATION TO I.S. EN 206-1

ELEMENT	BLINDING & MASS CONCRETE, DRAINAGE PIPE & MANHOLE SURROUNDS	GROUND BEAMS, FOUNDATIONS & PITS/CHAMBERS
EXPOSURE CLASS	X0	XC4
MIN. BINDER (CEMENT+GGBS) CONTENT (kg/m^3)	220	320
GGBS TO EN 15167-1 (kg/m^3)	0	95
CEM II/A-L TO I.S. EN 197-1 (kg/m^3)	220	225
MAX. WATER/CEMENT RATIO	--	0.50
CHLORIDE CONTENT CLASS	Cl. 1.0	Cl. 0.40
MAX. AGGREGATE (mm)	10	20
MIN. COVER (CMin) (mm)	--	40
*COMPRESSIVE STRENGTH CLASS @ 28 DAYS	C16/20	C32/40

NOTES:
1. *C16/20 TO BE READ AS FOLLOWS:
   16 = MIN. CYLINDER STRENGTH (N/mm^2)
   20 = MIN. CUBE STRENGTH (N/mm^2)
2. DESIGN WORKING LIFE TO BE 50 YEARS MINIMUM

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00	FIRST ISSUE	DA	DG	CF	09/03/2020

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PROJECT: STANDARD 110kV CABLE DRAWINGS

DRAWING TITLE: TRANSITION CHAMBER NOTES

No of Shts: 5 | SIZE: A3 | SCALE: N/A

DRAWING NUMBER: XDC-CBL-STND-H-013 | SHEET: 005 | REV: 00

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 4

Sample Public Complaints / Observations Procedure

RECORD OF PUBLIC COMPLAINTS & OBSERVATIONS

Observer Details

Name	
Address	
Telephone	
Email	

Contractors Representative

Name	
Position	
Contact	

Nature of the Complaint/Observation

Date		**Time**	
Location			
Nature	❑ Construction ❑ Operation ❑ Other		

Detailed Description of Complaint/Observation

Agreed Follow Up Actions

General Public Contact and Response Procedure

Communicate

If a member of the general public wants to communicate about any aspect of our current operations, they can make contact through the following channels:

Phone & email

- Contact the Coom Green Enrergy Park Ltd. head office directly
  Facility Operations Point of Contact
  E:
  T:

or

Writing

- Write to:
  Facility Operations Point of Contact
  Coom Green Energy Park Ltd.,
  Address
  Address

Listen

Irrespective of the context of the communication, we will listen to what is being said and the message being conveyed with both understanding and empathy.

We will record all aspects of the communication to allow us have a better understanding of the conveyed message.

We will respond to all contacts in an organised and professional manner and treat all contact seriously.

Respond

If an issue is communicated in person or over the phone, we will try to resolve the issue there and then.

If an issue is communicated by email or in writing, we will endeavour to acknowledge the communication within 7 days and do everything we can to resolve it within 28 days.

If this is not possible to resolve an issue within these timeframes, we will explain why and provide a plan for addressing the issues in the longer term.

FEHILY TIMONEY

30 YEARS

**CONSULTANTS IN ENGINEERING,
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Please see Appendix A
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30 YEARS

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Ireland
+353 59 972 3800

Appendix D: Site Synopsis and Conservation Objectives of the European sites within a 15km radius from the proposed development

Appendix 8.-D: European Sites Data

List of Tables:

Table 1: European Designated Sites (SAC and SPA) sites within 15km of CGEP and Grid Connection Route

Site	Code	Features of Interest	Summary Description	Distance (CGEP development boundary or GCR nearest works location)
Blackwater Callows SPA	004094	Whooper Swan (*Cygnus Cygnus*) Wigeon (*Anas Penelope*) Teal (*Anas crecca*) Black-tailed Godwit (*Limosa limosa*) Wetland and Waterbirds	Contains a stretch of the River Blackwater, running west to east for a 25km distance between Fermoy, Co. Cork and Lismore, Co. Waterford. Site is comprised of the river channel and a flood plain containing areas of seasonally-flooded grassland.	4.17km
Blackwater River (Cork/Waterford) SAC	002170	Estuaries, Mudflats, Sandflats, Perennial vegetation of stony banks, Atlantic salt meadows, Mediterranean salt meadows, Freshwater Pearl Mussel (*Margaritifera margaritifera*), Salmon (*Salmo salar*), Otter (*Lutra lutra*), Killarney Fern (*Trichomanes speciosum*)	One of Ireland's largest rivers, the River Blackwater drains a major part of Co. Cork and five mountain ranges. The river's surrounding peaty terrain give it a distinctively dark appearance. The river is surrounded by areas of hollows, wetlands, species-rich wet grasslands and woodlands.	0.6km

Table 2: European Designated Sites (SAC and SPA) sites within 15km of the Turbine Delivery Route

Site	Code	Features of Interest	Summary Description	Distance (nearest works or activity location)
Blackwater Callows SPA	004094	Whooper Swan (*Cygnus Cygnus*) Wigeon (*Anas Penelope*) Teal (*Anas crecca*) Black-tailed Godwit (*Limosa limosa*) Wetland and Waterbirds	Contains a stretch of the River Blackwater, running west to east for a 25km distance between Fermoy, Co. Cork and Lismore, Co. Waterford. Site is comprised of the river channel and a flood plain containing areas of seasonally-flooded grassland.	within 15km of Nodes [2.0 - 2.14] (closest 1.3 km)
Blackwater River (Cork/Waterford) SAC	002170	Estuaries, Mudflats, Sandflats, Perennial vegetation of stony banks, Atlantic salt meadows, Mediterranean salt meadows, Freshwater Pearl Mussel (*Margaritifera margaritifera*), Salmon (*Salmo salar*), Otter (*Lutra lutra*), Killarney Fern (*Trichomanes speciosum*)	One of Ireland's largest rivers, the River Blackwater drains a major part of Co. Cork and five mountain ranges. The river's surrounding peaty terrain give it a distinctively dark appearance. The river is surrounded by areas of hollows, wetlands, species-rich wet grasslands and woodlands.	within 15km of [all] Nodes (closest 10m)
Cork Harbour SPA	004030	Little Grebe (*Tachybaptus ruficollis*) [A004] Great Crested Grebe (*Podiceps cristatus*) [A005] Cormorant (*Phalacrocorax carbo*) [A017] Grey Heron (*Ardea cinerea*) [A028] Shelduck (*Tadorna tadorna*) [A048] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Red-breasted Merganser (*Mergus serrator*) [A069] Oystercatcher (*Haematopus ostralegus*) [A130] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157]	The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Mallard, Pintail, Shoveler, Redbreasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Blackheaded Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.	Within 15km of Nodes [1.3 & 1.4] (closest 1.6 km)

Site	Code	Features of Interest	Summary Description	Distance (nearest works or activity location)
		Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus* canus) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183] Common Tern (*Sterna hirundo*) [A193] Wetland and Waterbirds [A999]		
Great Island Channel SAC	001058	Mudflats and sandflats not covered by seawater at low tide [1140] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest.	within 15km of Nodes [1.3 & 1.4] (closest 5.6 km)
Lower River Suir SAC	002137	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092]	The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. The site also supports populations of several important animal species, some listed on Annex II of the Habitats Directive or listed in the Irish Red Data Book. The presence of two legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the site adds further to the ecological interest and importance.	within 15km of Node [2.0] (14 km)

Site	Code	Features of Interest	Summary Description	Distance (nearest works or activity location)
		Petromyzon marinus (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]		

Appendix E: CGEP Conservation and Habitat Management Plan (CHMP)

Brookfield Renewable Energy Ireland Ltd.

Coom Green Energy Park

Conservation and Habitat Management Plan

December 2020

INIS Environmental Consultants Ltd.

Suite 16,
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Quality Assurance

The findings outlined within this report and the data we have provided are to our knowledge true, and express our bona fide professional opinions. This report has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Code of Professional Conduct. Where pertinent CIEEM Guidelines used in the preparation of this report include the *Guidelines for Ecological Report Writing* (CIEEM, 2017a), *Guidelines for Preliminary Ecological Appraisals* (CIEEM, 2017b) and *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018). CIEEM Guidelines include model formats for Preliminary Ecological Appraisal and Ecological Impact Assessment. Also, where pertinent, evaluations presented herein take cognisance of recommended Guidance from the EPA such as *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017), and in respect of European Sites, *Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC* (European Commission, 2018).

Due cognisance has been given at all times to the provisions of the *Wildlife Act, 1976,* the *Wildlife (Amendment) Act, 2000*, the *European Union (Natural Habitats) (Amendment) Regulations. SI 378/2005*, the *European Communities (Birds and Natural Habitats) Regulations 2011,* EU Regulation 1143/2014 on Invasive Alien Species , the EU Birds *Directive 2009/147/EC* and *Habitats Directive 92/43/EEC*.

Version	**Date**		**Name**	**Signature**
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3	01/12/2020	**Report signed off by:**	Roger Macnaughton MSc, MCIEEM	
Title		Coom Green Energy Park, Conservation and Habitat Management Plan		

Notice

This report was produced by INIS Environmental Consultants Ltd. (INIS) on behalf of Coom Green Energy Park Ltd., the client, for the specific purpose of the Coom Green Energy Park project with all reasonable skill, care and due diligence within the terms of the contract with the client, incorporating our terms and conditions and taking account of the resources devoted to it by agreement with the client.

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Table of Contents

1 Introduction

Coom Green Energy Park Ltd (CGEP) are applying for a 22-turbine wind farm and associated infrastructure at Bottlehill, County Cork. The proposed Coom Green Energy Park site includes lands contained within the following townlands: Glashaboy North, Coom (Hudson), Tooreen South, Killeagh, Coom (Fitzgerald), Slievedotia, Mullenaboree, Knoppoge, Carrig, Knuttery, Lackendarragh North, Knockacullata, Knockdoorty, and Glannasack. This Conservation and Habitat Management Plan (CHMP), proposed for the lifetime of the project, has been prepared by INIS Environmental Consultants Ltd on behalf of Coom Green Energy Park Ltd. The plan is compiled in the context of the existing Hen Harrier population and their ecological requirements in the wider context of the proposed windfarm development and wider landscape. The document draws largely on the National Parks and Wildlife Service Farm Plan Scheme, Terms and Conditions documents (Anon, 2010, 2017, 2020) but also applies successful management prescriptions that were more recently applied at Hen Harrier breeding areas by Inis Environmental Consultants for similar developments.

2 Site Description

The proposed CGEP is located in north County Cork. The receiving environment for the proposed wind turbine locations is situated on the southern aspect of the Nagle Mountains range. In addition, there is a previously consented municipal landfill in close proximity within the townland of Bottlehill. The landfill was constructed but is not currently in operation.

Terrestrial Habitats within the Coom Green Energy Park study area are dominated by mature commercial coniferous forestry plantations. There are also areas of improved agricultural grassland, with smaller areas of broadleaved woodland, heathlands, hedgerows, wet grassland, private roads and public roads.

The greater part of the study area consists of commercial forestry plantation, particularly in the vicinity of the proposed windfarm. The grid connection will be located primarily within the public road which passes through lands characterised by a predominance of agricultural grassland and coniferous forestry plantation, as well as other habitat types associated with the public road, e.g. roadside hedgerows, treelines, earth banks, dwellings, farm buildings and associated gardens, amenity grassland, hedges and lawns. The site is located within the Munster Blackwater and River Bride catchments.

The proposed CGEP site includes lands contained within the following townlands: Glashaboy North, Coom (Hudson), Tooreen South, Killeagh, Coom (Fitzgerald), Slievedotia, Mullenaboree, Knoppoge, Carrig, Knuttery, Lackendarragh North, Knockacullata, Knockdoorty, and Glannasack.

3 Plan scope and objectives

3.1 Scope of Plan

This Conservation and Habitat Enhancement Plan has been prepared by Inis Environmental Consultants Ltd for the benefit of wildlife, but specifically Hen Harrier. Inis Environmental Consultants has previously been involved in the preparation of such Conservation and Habitat Enhancement Plans for sites in counties Clare, Cork, Leitrim, Monaghan, Tipperary, Kerry and Limerick. The rationale of the plan is based on available publications (Anon, 2010, 2017, 2020) which have been developed through research on Hen Harrier in Ireland, and recording what designed and managed habitats for Hen Harrier have been seen to be readily accepted/used by Hen Harrier at various locations throughout Ireland. The Hen Harrier is afforded protection under Annex I of the EU Birds Directive and is known to occupy the environs of the CGEP site. The other species which will benefit from this CHMP will include Sparrowhawk, Kestrel, Barn Owl, Irish Hare and a range of other small mammal and bird species which form prey items for Hen Harrier. Forestry plans and the future forestry management regime developed by Coillte for the area have also been considered closely when formulating the scope of this plan.

3.2 Hen Harrier

The Hen Harrier is an Annex 1 species on the EU Birds Directive and is currently Amber listed in Ireland (Colhoun & Cummins, 2013). It is a bird of open country that utilizes almost any open terrain that contains enough small mammals or birds for hunting purposes (Watson, 1977).

Thompson (1849) describes the Hen Harrier as being 'pretty generally distributed over the island' and although no specific mention is made of North Cork, he does quote other sources which say it is 'occasionally met with' in East Cork and 'common' in Kerry. By 1893, Usher (1893) describes the Hen Harrier as being 'resident and common' fifty years earlier but decreasing to the point where 'it seems now to have almost disappeared'. Ussher & Warren (1900) state that it is 'frequently seen on the mountains south of the Mallow and Killarney line', but 'a straggler to other parts of the county'. By the 1950's the hen harrier was considered to be 'nowadays a rare straggler' to Ireland (Kennedy et al., 1954) and sufficiently rare to merit publications of individual sightings. Subsequent to this, it became known that the Hen Harrier had continued to breed in the Slieve Bloom Mountains, in Co. Laois, and on the Waterford/Tipperary border (O'Flynn, 1983; Watson, 1977). In the early 1950's a recovery is believed to have begun (O'Flynn, 1983) and Sharrock (1976) suggested that the population had risen to 200-300 pairs by 1972.

However, by the late 1970's early 1980's the population is again believed to have declined and O'Flynn (1983) says that 'since 1978' in many areas, including the Nagles, he has been 'unable to find any evidence of breeding'. From 1980 onwards however, hen harriers were once again breeding in the Ballyhouras (C. Saich & P. Smiddy personal communication, cited in Nagle, 2006), although numbers as low as only 12-15 pairs were estimated in Cork in the mid-1980's (Hutchinson, 1989).

In recent years a number of national hen harrier surveys have taken place. The first National Survey took place in 1998-2000 and identified 102-129 breeding pairs nationally (Norriss et al., 2002). The second National Survey took place in 2005 and identified 132-153 breeding pairs (Barton et al., 2006). The third National Survey, only just published, was undertaken in 2010 and estimated 128-172

breeding pairs, although this survey had more than double the survey effort from 2005 (Ruddock et al., 2012).

Considerable Hen Harrier survey work has been carried out both at the site (2016 - 2020) of the proposed CGEP development and in the surrounding area. This includes work done during the national surveys of 1998-2000, 2005, 2010, 2015 (Barton et al., 2006; Norriss et al., 2002; Ruddock et al., 2012, 2016), work done by the 2007-2012 Plan for bio Hen Harrier project and specific surveys carried out at the proposed wind farm study area (2016 – present). **Table 3.1** below summarizes the results for the Nagles in the most recent National Hen Harrier Surveys.

Table 3.1: Summary of Results of Recent Hen Harrier Surveys in the Nagles Mountains.

Year of Survey	Number of Possible Breeding pairs	Number of Confirmed breeding pairs	Total Estimated Pairs
1998-2000	3-5	Not available	Not available
2005	0	9	9
2010	4	7	7-11
2015	5	Not available	Not available

3.3 Main Objectives

The main objective of this Conservation and Habitat Management Plan is to provide a net gain of habitat value for Hen Harrier for the lifetime of the proposed CGEP. This will be achieved by maintaining and improving the habitats, within viable foraging distances, on 5 no. managed areas in a way that maintains these areas as being optimal for foraging Hen Harrier. This will be achieved by the action of maintaining and improving the value of lands as foraging habitat for the species while also protecting historical nesting sites.

This Management Plan makes provision for habitat enhancement through management. It is recognised that anything that benefits potential prey species is of benefit to the Hen Harrier. Habitat enhancement will be achieved by diversifying the range and extent of habitats on 5 no. managed areas with a particular focus on habitats (e.g. heath and bog, rushy wet grassland, hedgerows, forestry rides) that support prey species and thus facilitate foraging Hen Harriers.

3.4 Habitat Requirements

3.4.1 Hen Harrier Habitat Selection and Preference

Hen harriers are primarily birds of open countryside, with requirements for extensive areas of suitable land over which to forage. Requirements for nesting, however, are small-scale and can be met in a variety of habitats (e.g. bog/heath, pre-thicket plantations, scrub). As available evidence suggests that foraging habitat, rather than nesting habitat, limits the size of the population, this plan is focused on the continuous provision, for the lifetime of the Coom Green Energy Park, of foraging habitat for the local Hen Harrier population (though these resultant managed areas will generally not preclude nesting).

Until relatively recently there had been little study of Hen Harrier habitat preference in Ireland. Unplanted blanket bog and heath had been traditionally recognised as prime Harrier habitat. The value for foraging of young conifer plantations on bog became apparent after the extensive afforestation programmes during the 1960s and 1970s (Biosphere Environmental Services, 2010). As recently as the early 2000s, the value of restock for foraging was unclear though it was recognised as important habitat for nesting (Norriss et al., 2002). Madders' (2000) studying Hen Harrier foraging preferences and success rates in western Scotland found that Hen Harriers foraged preferentially over young coniferous forests, and selected heathland and grassland habitats ahead of closed canopy woodland.

In the 2012 National Survey (Ruddock et al., 2012), the most frequent habitat category recorded was heather moorland although afforested habitats were recorded more frequently (49.4%) than open habitats (44.8%). Hunting was recorded most frequently in heather moorland (34%) and foraging was observed less frequently in afforested (42.5%) than in open habitats (53.4%). The 2015 National Survey (Ruddock et al., 2016) showed similar preferences for foraging habitat selection, with heather moorland the most frequent category (30%) followed by second rotation forest (19.7%). On the basis of the 2012 and 2015 surveys, and Madder's (2000) work, the creation of areas of perpetually maintained heathland and grassland habitats will provide a suitable habitat enhancement component for the Coom Green Energy Park wind farm.

Habitat selection for foraging by harriers has been investigated in various studies funded by NPWS. Although the preference order of positively selected habitats varied in different study areas and years, five habitats (heath/bog HB, hill farmland RG, new plantation NF, and the later stages of 2nd rotation pre-thicket plantation 2nd F 3 & 4) were consistently preferred by both sexes, whilst three (intensive grassland G, mature plantation F, and recently cleared plantation 2nd F1 & 2) were consistently avoided (habitat abbreviations are given in **Table 3.2**). Individual females showed quite variable habitat usage, reflecting the often-restricted choices within small foraging ranges close to the nest. For males, the average rank order of habitat selected across sites and years, from most to least preferred, was NF>2ndF3>H/B>2ndF4, followed by F>2ndF1&2>G.

Table 3.2: Recommended classification of habitat types for hen harrier assessments.

Habitat Code		Description
NF	NF 2	New forestry plantation, trees 20-30 cm high
	NF 3	New forestry plantation, trees c.1 m in height
	NF 4	New forestry plantation, trees > 2m in height, patchy thickets
2nd F	2nd F 1 & 2	2nd rotation forestry plantation, trees 20-30 cm high
	2nd F 3	2nd rotation forestry plantation, trees c. 1m in height
	2nd F 4	2nd rotation forestry plantation trees >2m high
F		Post thicket plantation
G		Grazing

Habitat Code	Description
RG	Rough Grazing & rushy pasture
H/B	Heath / Bog
DE	Deciduous woodland & scrub
GO	Gorse

In the 2015 National Survey the majority of confirmed nests/territories were located in afforested habitats (65.7%), primarily in second rotation crops (59.3%), compared to open moorland (heather) habitats (25.9%). Foraging activity, however, continued to indicate a preference for open moorland habitats on a national scale.

Within the Nagles Mountains, the proportion of second rotation forest has increased dramatically since the late 1990s and early 2000s. Suitable habitat generally exists from about 3 to 10 years after planting, out of a typical 30-40-year cycle. Observations within the Nagles Mountains (and the Ballyhouras to the north of this site) have shown that optimum habitat conditions occur where there is a mosaic of vegetation types. While the size of the units is important, each vegetation type should preferably be more than merely a few hectares. Linearity is also important in allocating land for enhancement measures. Hen Harrier will most benefit from linear routes not less than 30 metres wide and as long as possible. These factors have been taken strictly into consideration when choosing suitable areas for enhancement habitat for the proposed CGEP, i.e. finding linear plots or large extensive plots that will benefit Hen Harrier prey items and, therefore, Hen Harrier.

4 Enhancement Habitat Calculations

4.1 Hen Harrier estimated exclusion habitats

To calculate the exact extent of habitat from which Hen Harrier will theoretically be excluded from operational turbines, a radius of 250m has been mapped around each proposed turbine location (**Figure 4.1**). The rationale behind the selected distance relates to the recorded displacement of foraging and flight behaviour close to wind turbines as reported in the literature (100m for foraging and 250m for flight - Mike Madders & Whitfield, 2006; Pearce-Higgins et al., 2009; Whitfield & Madders, 2006).

A 250m radius around a turbine equates to an area of 19.6 ha. For the purposes of the following calculations, the extent of each suitable habitat type for Hen Harrier, within this 250m radius of each turbine, has been quantified using Geographic Information Systems (GIS) and then expressed as a percentage (%) of these 19.6 ha (**Table 4.1**). Habitats excluded from this percentage (i.e. considered unsuitable for Hen Harrier) are GA1 *Improved Agricultural Grassland* and BL3 *Buildings and artificial surfaces*. WD4 *Conifer plantation* habitats were considered suitable for Hen Harrier only during the pre-thicket phase, i.e. between year 2 and year 12 of each plantation, within the 250m radius of each turbine and during the 30-year operational lifespan of the proposed CGEP. A detailed habitat map for

the 250m radius around each turbine can be viewed in **Appendix A** and a detailed calculation per turbine can be found in **Appendix B.**

Other variables are then used, such as forestry age, habitat type, harvesting years, etc, to calculate the exact area of habitat that needs to be allocated for each turbine over its 30-year operational lifespan. All habitats are listed in the text using the Fossitt classification (Fossitt, 2000). Any overlap occurring for the 250m radius Hen Harrier exclusion areas has been ignored within the calculations, allowing for the allocation of more habitats within the CHMP, which represents an added conservationist benefit.

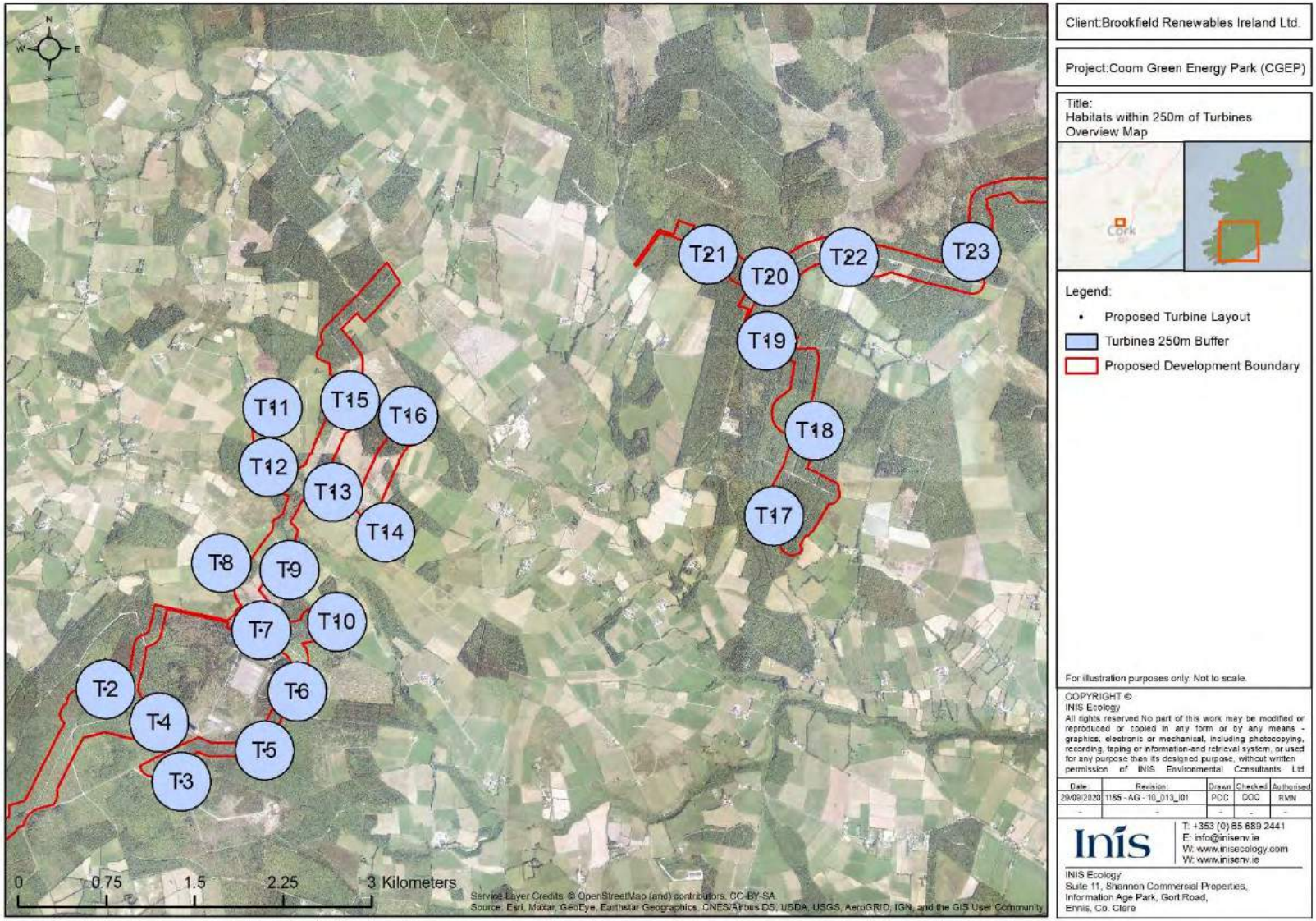

Figure 4.1: Overview map of the Turbines location and the 250m exclusion areas.

Table 4.1: Direct habitat loss required for all turbines within CGEP.

Turbine ID	Direct habitat loss (ha/annum) requiring habitat enhancement measures	Percentage of 250m radius buffer requiring habitat enhancement measures (%)
T2	5.8	29.7%
T3	7.2	36.9%
T4	4.3	22.1%
T5	9.1	46.6%
T6	5.5	27.9%
T7	12.1	61.7%
T8	3.1	15.6%
T9	11.1	56.6%
T10	0.8	4.3%
T11	2.9	14.6%
T12	4.8	24.5%
T13	16.4	83.5%
T14	6.6	33.6%
T15	8.7	44.4%
T16	7.8	39.9%
T17	9.4	47.8%
T18	2.4	12.1%
T19	1.4	7.0%
T20	5.7	29.1%
T21	3.6	18.5%
T22	17.8	90.8%
T23	2.3	12.0%
Total	**148.8 ha**	

4.2 Proposed Areas to be Managed under CHMP

As described in **Section 4.1**, it is estimated that the construction and operation of the proposed CGEP would represent a total of 148.8ha of potential suitable habitats displacement for Hen Harrier. To achieve an ecological net gain (CIEEM, 2016), this CHMP proposes the management of 5 areas, in the vicinity of the proposed CGEP where landowner consent has been achieved, which would amount to a total area of 170.82ha (**Figure 4.2**). Of this total area, 99.62% (170.16ha) are habitats favoured by Hen Harrier, which would represent a total net gain of 22.02ha (**Table 4.2** and **Appendix C**).

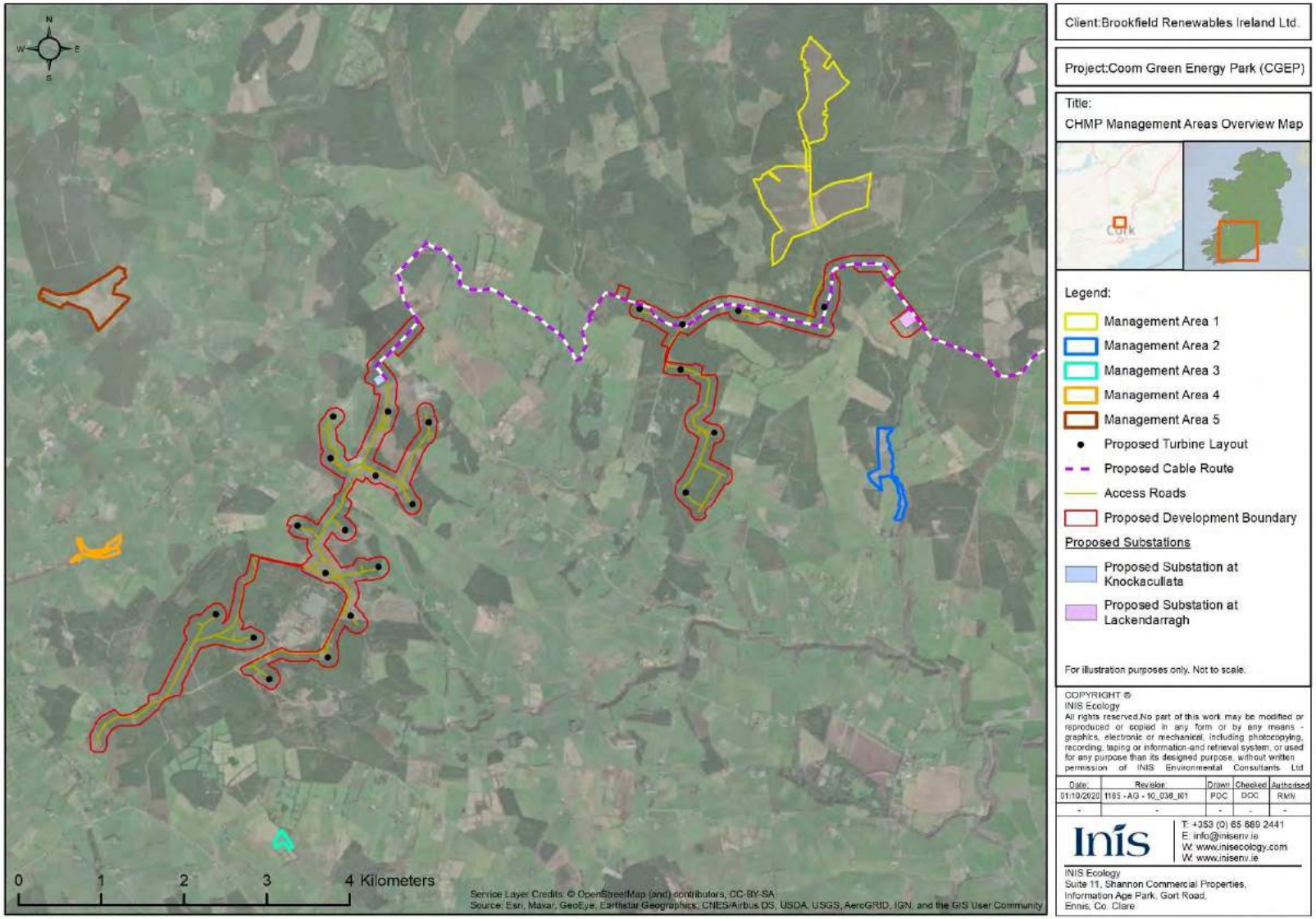

Figure 4.2: Overview of the five Management Areas.

The development of the proposed CGEP would then provide significant net gain of managed foraging areas for Hen Harrier for the lifetime of the proposed wind farm, i.e. approximately 22ha of additional lands on the 5 management areas. Four of the five management areas have been specially chosen to provide viable foraging opportunity proximal to historical and recent Hen Harrier nesting areas as this has been proven to be of benefit to breeding Hen Harrier.

Table 4.2: Details for the five proposed management areas.

Management Area	Habitat (Fossitt, 2000)	Area (ha)		Maximum Distance from CGEP Wind Farm (km)
Management Area 1	HH/PB Heath and Bog	116.82	117.96	1.4
	WD4 Conifer Plantation	1.14		
Management Area 2	GS/WS1 Grassland Scrub Mosaic	2.11	14.38	1.9
	GS4 Wet Grassland	6.26		
	HH/GS4 Heath/Wet Grassland	3.49		
	WS1 Scrub	2.52		
Management Area 3	GA1 Agricultural Grassland	0.66	2.27	1.9
	GS4 Wet Grassland	1.62		
Management Area 4	GS4 Wet Grassland	4.11	5.71	1.5
	WS1 Scrub	1.60		
Management Area 5	GS4 Wet Grassland	29.98	30.49	3.0
	WS1 Scrub	0.51		
Total		**170.82**		

5 Irish Conservation Management Best Practice

5.1 NPWS Management area prescriptions

The National Parks and Wildlife Service (NPWS) has operated a management area prescription scheme for pro-active habitat management for Hen Harriers within the Special Protection Areas (SPAs) designated specifically for Hen Harrier (Anon, 2010, 2020). The scheme's objectives are as follows:

- To protect key species and habitats through the delivery of site-specific conservation objectives at farm level;
- To engage with the farming community in the development of farming techniques which benefit key habitats and species;

- To provide a mechanism that allows the NPWS to assist farmers with the enhancement and protection of key wildlife habitats and species.

Although the proposed CGEP development is not within a SPA, the same management prescriptions applied by the NPWS for Hen Harrier Management in SPAs will be adhered to at five no. specified management areas through this CHMP. The management measures required for Hen Harrier will vary according to the habitats present, but the prescribed measures, in accordance with the NPWS scheme (Anon, 2010, 2020), are described in the following Sections. All measures will be monitored by a Hen Harrier ecologist.

5.1.1 Grazing

Management of areas of rough grassland with extensive or mixed grazing by cattle should continue. Light grazing, rather than cutting or topping, is to be introduced to areas with no stock. The guideline stocking level on rough grazing is 0.6 LU/ha, whereas a low stocking intensity should be maintained on bog and heath.

5.1.2 Scrub and Hedgerow

Existing areas of scrub and hedgerow should be retained. Small areas of established scrub and other hedge-banks can be trimmed but must not be removed, burnt or killed. In open areas, or areas where the extent of scrub/hedgerow is limited, habitat should either be created, or some scrub expansion should be allowed. Hedges should be planted where possible, e.g. along open banks or inside existing wire fences. If a hedgerow requires cutting it should be cut to an "A" shape, i.e. wider at the base than at the top. Cutting in this case should not come closer than 1m from the base of the hedge, and a buffer zone of 1.5m on each side of the hedge must be left uncut, within which fertilisers should not be applied. In addition, herbicides and pesticides should not be used within 5m of an existing hedgerow, with the exception being the spot treatment of difficult invasive weeds (e.g. Japanese Knotweed *Fallopia japonica*). Hedge cuttings should be piled into heaps and left to decay naturally. In all cases, cutting of hedgerows must not be carried out during the breeding season (i.e. March 1st to August 31st). Large continuous blocks (greater than one hectare) of established Bramble, Gorse or other scrub should be opened up (outside the March-August bird breeding season). At least 50% of such areas covered by scrub should be retained in lines or scattered patches, rather than in a single block.

5.1.3 Rushes

Rough wet grassland will be maintained in the optimal condition for Hen Harrier. Existing rush fields will be managed by rotational cutting. The frequency of cutting of rushes will vary, as the soil type, drainage, slope, grazing regime, machinery used, etc, will all affect the speed of re-colonisation. However, in most cases, upland rough grassland is likely to revert to rush relatively quickly. It is critical that the rush is not topped/cut too frequently. Annual cutting of the rushes would be conducted to ensure they do not become to excessive. Rushes should generally occupy no less than 30% of the field and no more than 70%. The distribution of rush will depend on the local drainage patterns. It is important that the rush is allowed to form tussocks, as this provides a habitat for Hen Harrier prey. In most situations, a regime of cutting every second year will be required. Reseeding of rough grassland fields will be allowed, or may be required, where this is shown to be necessary and part of an existing

management regime. The broadcast spraying of rushes will not be permitted but spot treatments or wipe-on treatments will be allowed where the rushes become too dominant.

5.1.4 Conifers

Within managed areas, all self-seeded conifers that are growing outside of forestry plantations will be removed in order to avoid the spread of conifers over open Hen Harrier foraging habitat. This is especially important at Management Area 1 (**Figure 4.2** and **Appendix C**) to the north of the proposed CGEP.

5.1.5 Other

Spraying or broadcast application of herbicide will not be permitted. Spot application and wipe-on treatments will be allowed to eradicate docks, thistles, ragwort and similar noxious weeds. Rhododendron and conifers may be removed by cutting and spot application. Bracken control may be by rolling, cutting and/or by controlled cattle trampling in early summer. In exceptional circumstances, control of bracken by herbicides may be permitted. The principal aim of the plan is to provide areas of optimum foraging habitat for hen harriers during the lifetime of the project, providing enhanced prey item production in managed foraging areas and in doing so provide a net gain to the local Hen Harrier population.

The rationale of this CHMP is based on results from operational Hen Harrier management plans that have proven to be successful for breeding Hen Harrier, from available research on Hen Harrier in Ireland and also on the results of Hen Harrier surveys carried out on the site of the proposed CGEP and its environs. The management area prescriptions have been chosen proximal to historical nest sites (within 3km) to reflect the results of successful Hen Harrier management plans.

6 Habitat management prescriptions

6.1 Introduction

The provision of the proposed prescriptions for effective habitat management for Hen Harrier is must be integral to every Hen Harrier Management Plan. In addition, the provision of prescriptions proximal to Hen Harrier nests is of extreme importance as parent birds staying close to the nest will be able to achieve increased surveillance of the nest and this could lead to a decrease in predation, which is now becoming a recognized significant risk to eggs and fledglings. Hen Harrier individuals using wind farm areas and adjoining lands have to forage over a larger area than most harriers to provide to their broods which, as it has been reported, leads to a constrained Hen Harrier Lifetime Reproductive Success (LRS) from the availability of prey (Irwin et al., 2012). This management plan provides managed foraging habitats proximal (i.e. within 3km) to known nest sites, allowing harriers the ability to increase their foraging success close to their nest sites, thus increasing the chance of breeding success rates.

The conservation habitat management prescriptions for Hen Harrier within this document are based on the prescriptions that are specified in the NPWS management area prescription scheme for Hen Harrier SPAs (Anon, 2010, 2017, 2020), even though the site of the proposed development is not part of, or adjacent to a SPA.

The prescriptions are concerned mainly with maintaining low-level extensive grazing in bog and heath areas, the maintenance of rough wet upland grassland in a condition that is neither too overgrown, nor too heavily grazed (preferably by means of low-intensity grazing) and the retention and creation of scrub areas and edge habitats (i.e. bushy hedgerows). The intention is to ensure that extensive grazing continues, and that appropriate management of grassland, scrub and bog creates a favorable habitat mosaic for Hen Harrier. The proposed prescriptions for effective habitat management for Hen Harrier are also planned to benefit a wide range of other species including Merlin.

Managing the land for Hen Harrier fits the concept of focal species modelling. In managing habitats to benefit Hen Harrier, a range of other beneficial outcomes can be achieved. Successful management for Hen Harrier should also benefit other species, as small passerines (prey species of Hen Harrier), other raptors, Irish Hare and a range of small mammal species. The development of habitats such as blanket bog, upland heath, rivers and streams, hedgerows and trees will also benefit.

The ability of the management prescriptions to deliver the enhancement, as designed within management plans, is imperative, especially in cases such as the CGEP site (i.e. outside SPAs), where Hen Harrier pairs need the protection and stable environments afforded to pairs within SPAs to remain successful. This proposed Conservation and Habitat Management Plan is formulated in the context of the available information on foraging behavior and Hen Harrier preference. The ecologist, who will supervise the implementation of the Conservation and Habitat Management Plan will have experience of Hen Harrier ecology and habitat management and will work in close association with landowners and the local Coillte forest manager.

The prescriptions for specific habitat types are outlined in Section 6.2, followed by generic prescriptions for all habitat types in Section 6.4.

6.2 Management Prescriptions for Specific Habitats

The habitats that are the subject of specific management prescriptions are outlined below:

- Hedgerows, Earth Banks and Scrub;
- Heath and Bog;
- Wet Grassland;
- Improved Agricultural Grassland; and
- Forestry.

The habitats that are the subject of specific management prescriptions are shown in **Appendix C**.

6.2.1 Hedgerows, Earth Banks and Scrub

Some blocks of scrub, large enough to map on a macro-scale, were recorded at some of the proposed management areas, although there were also small clumps of scrubby growth within other habitats at some of the management areas (on the micro-scale). Woody Scrub (e.g. Gorse, Willow, Alder, Birch, etc.) is one of the most beneficial habitats for Hen Harrier, as it provides prey (e.g. passerines, small mammals) and hunting habitat for the harrier. Scrub and hedgerow clearance are amongst the reported factors for the loss of viable Hen Harrier habitat in Ireland (e.g. O'Flynn, 1983; Ruddock et al., 2016; Wilson et al., 2009). In general, existing areas of scrub and hedgerow should be retained. Small areas of established gorse or willow scrub can be trimmed to prevent further encroachment onto grassland or access paths, but they must not be removed, burnt or killed. The overarching

principle in the management of scrub and hedgerow will be to increase the surface area as increased surface area equates to increased prey item supporting habitats, which leads to increased foraging ability for Hen Harrier.

6.2.1.1 Habitat management prescriptions for scrub and hedgerows

- Existing areas of scrub and hedgerows will be retained;
- Where there is evidence of scrub or hedgerow removal, these habitats will be reinstated as part of individual management area prescriptions; and
- In open areas or where the extent of scrub and hedgerows is limited, create new areas of habitat.

6.2.1.2 Habitats for Specific Management

- In open areas or where the extent of scrub and hedgerows is limited, the expansion of native hardwood scrub will be allowed;
- The only means of preventing further encroachment of established areas of gorse or willow scrub onto grassland or access paths and tracks will be trimming. This action can be repeated annually if necessary;
- Any removal, burning or herbicide use on areas of established scrub will be prevented;
- If it is deemed necessary for road safety reasons, roadside hedgerows will be cut outside of the bird nesting season (i.e. the period from March 1st to the 31st of August);
- If deemed necessary for the protection of overhead electricity lines, cut hedgerows outside of the bird nesting season (March 1st – August 31st), if possible;
- Hedgerow maintenance will be permitted to prevent hedge overgrowth. In such cases, hedgerow trees should be left uncut and the remainder of the hedgerow cut into an “A” shape, i.e. wider at the base than at the top;
- Encroachment of scrub onto grassland can be controlled by cutting on annual basis if required. Cutting in this case should not come closer than 1.5 metres to the base of the hedge;
- Herbicides and pesticides will not be used, except where spot treatment is required to treat invasive species (e.g. Rhododendron); and
- Hedge cuttings will be piled into heaps and left to decay naturally.

Habitats on the site should be reassessed prior to commencement of the proposed development and, should any blocks of scrub greater than one ha in area be present, these should be broken up by cutting rides through or cutting smaller blocks out of the large block of scrub. Sufficient rides should be cut into the large block to ensure that the remaining blocks of scrub do not exceed one hectare in area. Work on cutting out rides must commence in Year One; at least 80% of the required works must be completed before the end of Year Three; and 100% before the end of Year Four.

Since bushy hedgerows are good potential foraging sites for Hen Harrier, hedge cutting will be restricted to the minimum necessary and bushy hedges with tall shrubs will be encouraged (as opposed to heavily managed hedge lines). Any hedge cutting that does take place will be limited to the period from September to February, inclusive, except where cutting is required for Health and Safety requirements (e.g where vegetation is a risk of coming into contact with electricity cables). Prescriptions for scrub management at the management areas is concerned mainly with prevention

of scrub encroachment onto wet heath and wet grassland since (as described above) there are no large areas of scrub within the site at present.

6.2.2 Heath and Bog

Heath and bog habitats occupy 116.82 hectares of the proposed management areas, with an additional 3.49 hectares of heath/wet grassland mosaic (**Table 4.2**). In total these habitats comprise 70.43% of the 170.82ha of the proposed management areas.

The principle method for managing heath as a suitable habitat for Hen Harrier is the use of low intensity grazing and regular inspection to ensure no self-seeding conifers will become established. Grazing intensity will be kept at a low level and will follow Anon (2010) guidelines: 0.25 LU/hectare for heath; 0.10 LU/hectare on blanket bog. Relevant annual livestock units (LU) are presented in **Table 6.1** but livestock should only be grazing these habitats outside the breeding period, i.e. during the months of May to October, inclusive. Consequently, livestock levels can be as much as double the guideline annual stocking levels for the six months of grazing.

Table 6.1: Definition of livestock units according to animal age and type.

Animal	Livestock Unit
1 Cow	1
1 Bovine over 2 years old	1
1 Bovine over 1 year old but under 2 years old or under	0.6
1 Bovine under 1 year old	0.4
1 Equine over 6 months old	1
1 Equine under 6 months old	0.6
1 Ewe/ Goat	0.15
1 Deer (red)	0.38
1 Deer (Fallow or Sika)	0.15
1 Ewe + lamb	0.15
1 Hogget	0.15
1 Goat	0.15

6.2.2.1 Habitat management prescriptions for heath are outlined below:

- If stocking is proposed in the future, maintain NPWS guideline stocking levels of up to 0.25 LU/ha on heath (Anon, 2010);
- No new forestry planting on the heath areas within the study area will be permitted;
- Self-seeded conifers invading open areas of heath will be removed. Heath habitats will be surveyed at least once every two years to ensure that new seedlings are removed.

Consideration will be given to the creation of a shallow pool, or pools, 30-50 cm deep to provide spawning sites for amphibians. Appropriate measures will be adopted to maintain these habitats (e.g. periodic vegetation clearance and silt removal) and it will be ensured that a corridor of suitable vegetation between any such pond and the nearest hedgerow, stream or drain will also be maintained (i.e. a corridor with a vegetation height of at least 10 centimeters, so that the pond is not isolated in short-grazed grass).

The vegetated earth banks (and their vegetation cover) within the site will all be retained.

6.2.3 Grassland

6.2.3.1 Wet Grassland

Wet grassland occupies 41.96 hectares of the proposed management areas, or 24.57% of the total proposed management areas.

The objective of the habitat management prescriptions for wet or rough grassland is to maintain the habitat, wherever it is found, in as rank a condition as possible while not overgrown with dead grasses or rushes. To achieve this, management prescriptions will focus on three principal points: grazing management; rush management and nutrient management.

6.2.3.1.1 Grazing Management

Grazing of areas of wet or rough grassland by cattle or horses/ponies or by mixed grazing is preferred. For similar plans in other areas, grazing by sheep is often allowed to continue where this has been the traditional practice.

All areas of wet grassland and wet heath at the site are currently grazed and this will remain the practice during the lifetime of the proposed development. Guideline target stocking levels for rough grazing are specified below, but there is no formal upper limit to planned stocking density. In cases where the land is wet, consideration should be given to concentrating grazing pressure in the summer months.

Habitat management prescriptions for managing grazing on wet grassland are:

- Introduce light grazing, rather than cutting or topping, to areas with no stock;
- The guideline target stocking level on rough grazing is a minimum of 0.6 LU/ hectare;
- In cases where the land is wet, concentrate grazing during the summer months;
- Stocking levels will be specified in the individual management area prescriptions to be prepared for each contributing landowner.

6.2.3.1.2 Rush Management

The objective in managing rushes is to maintain rough grassland in the optimal condition for Hen Harrier. Optimal condition constitutes as dense a covering of rushes as feasible, but not to the point where rushes are falling over, or matting the ground. Rush cover in the 30–70% range is ideal. While appropriate grazing pressure is preferred, in most cases managing rush cover will require active management. In the majority of cases, rush management will be achieved by cutting every second year. However, there will be considerable variation from site to site and alternative cutting regimes may be more appropriate in certain cases (**Table 6.2**).

Table 6.2: Rush Management Regimes (adapted from Anon, 2010).

Code	Habitat Condition	Management Regimes
I	Habitats where rush cover of 30-70% is considered unlikely to be achievable, irrespective of management and perhaps in some cases undesirable, e.g. Shallow Limestone soils.	No cutting required.
II	Swards where reversion of Improved Grassland is planned or where Rush cover is less than 10%.	Allow further rush development in the early years of the management area prescription. One or two cycles of cutting commencing in year three may be appropriate to allow further rush development in the early years of the plan.
III	Swards where rush cover is 10-30% or where rushes have been topped in the past year.	One or two cycles of cutting commencing in year three may be appropriate.
IV	Swards where the rush cover is already in the 30-70% range.	In these cases, cutting/topping in years one, three and five of the management area prescription could maintain the sward in the desired state.
V	Swards where rush cover is dominant (>70%) and where weed-licking with a suitable herbicide in year one, followed by cutting/topping in years three and five could be considered.	Weed licking with a suitable herbicide may provide the opportunity for the creation of a suitable sward within two or three years. However, the use of herbicides must always be subject to consideration of possible effects on watercourses. No herbicide use is permitted within 5 metres of a watercourse or existing hedgerow without the consent of the NPWS.

Habitat management prescriptions for managing rushes on wet grassland are:

- In general, rushes should be cut on a two-year cycle unless there are specific reasons for a longer cycle (e.g. weak rush growth);
- In most cases, active rush management should commence in year one of the plan and should only be delayed until year two or three where improved grassland is in reversion, where rush growth is very weak or where the rushes were cut or treated with herbicide in the year prior;
- The use of an herbicide applied using a weed lick is permitted but not encouraged. This should only be considered in cases where rush growth is very dense and cutting is impractical;
- No herbicide use is permitted within five metres of a watercourse or existing hedgerow;
- If access difficulties prevent the active management of rushes, alternatives such as grazing will be employed.

The planned rush management should be reviewed on an annual basis to determine if it is having the desired effect. If it is found during an annual inspection that rush recovery has been stronger or weaker than had been originally anticipated, the management area prescription should be changed to adjust the cutting sequence for future years.

6.2.3.1.3 Nutrient Management

The nutrient management of areas of wet grassland consists on the avoidance of the application of chemical or organic fertilizer on the managed lands.

6.2.3.2 Improved Agricultural Grassland

Improved Agricultural Grassland occupies 0.66 ha of the proposed 5 management areas, or 0.38% of the total area.

NPWS guidelines for management area prescriptions in Hen Harrier SPAs allow normal agricultural practice on improved agricultural grassland to continue (Anon, 2010, 2017, 2020). The NPWS management area prescriptions also permit wet grassland to be improved, provided it accounts for no more than 20% of the designated area on the farm. Although the proposed CGEP is not located within any SPA boundary, such improvement will not be encouraged on the proposed CGEP site under this Conservation and Habitat Management Plan.

Landowners will be required to allow improved grassland to revert to a more natural state. In such cases, a reversion program will be required, which will involve:

- Analysis of soil samples so that a baseline record of soil phosphorus and potassium exists;
- Cease applying chemical and organic fertilizers;
- No application of lime; and
- Habitat enhancement works.

The above-mentioned habitat enhancement work will be satisfied by additional hedgerow planting. If there is already 400 metres of hedgerow per hectare on or adjoining the land planned for reversion, then no further planting will be required. If the amount of Hedgerow is less than 400 metres per hectare, the landowner will be encouraged to plant sufficient hedgerow to bring the length of hedgerow up to 400 metres per hectare, subject to a maximum planting requirement of 50 metres per hectare. New hedgerow should be located on, or adjacent to, the plots planned for reversion.

6.2.3.3 Grassland fields >2 hectares or with <100 metres of hedgerow per hectare

In fields of this type, the individual management area prescriptions will require the establishment of scrub in field corners, or the planting of 25 metres of hedgerow per hectare. The planting of hedgerows will be in accordance with the specifications for hedgerow planting outlined by Anon (2010). Hedgerows will be planted in Year one of the management area prescriptions and established by the end of Year four.

Under the field corners option, livestock must be excluded from at least two field corners and a permanent fence, set back at least 15 metres from the corners, will be required for this purpose. At least 10 native trees must be planted in the field corner, which must be staked and protected with a tree guard. The field corner must be left ungrazed for the duration of the management area

prescription. Where required, fencing and tree planting will be completed before the end of Year one of the plans.

6.2.3.3.1 Field corner treatment

Within the fenced area in the field corners, briars and Blackthorn will be controlled on an annual basis, where spot treatments with a suitable herbicide or mechanical control (e.g. using a strimmer) are acceptable methods. The use of herbicides in site preparation is permitted provided:

- They are not used within three metres of the existing field boundaries (five metres in the case of watercourses and existing hedgerows).
- That care is taken to ensure that no drift occurs.

6.2.3.4 Grassland fields greater than four hectares in size

In grassland fields over 4 ha in area, the establishment of new hedges and/or exclosures is required. At least one exclosure, or 100 metres of new hedgerow, is required for each hectare, or part thereof over 4 hectares. For example, in a six-hectare grassland plot, two exclosures, or 200 metres of new hedgerow, are required. If the plot in question is improved agricultural grassland in reversion, then these requirements are in addition to any additional hedgerow planting required as part of the reversion process.

Exclosures will be 0.1-0.3 hectares in size. Livestock will be excluded from these exclosures by means of a permanent fence before the end of Year one of the management area prescription. The fence must be maintained in a stock proof condition. Where possible, exclosures should incorporate any existing patches of scrub and are to be planted with native tree/shrub species at a density of 1,000 plants per hectare (whips of 40-80 cm in size are the preferred planting material). Planting must be completed be-fore the end of Year one of the plan. The planting density may be reduced if some scrub already exists on the site.

The planting of hedgerows will be in accordance with the specifications for hedgerow planting outlined by Anon (2010).

6.2.3.5 General Issues Relating to Grassland Management

Broadcast herbicide spraying of rushes is not permitted but spot treatments or wipe-on treatments are allowed. Herbicides applied using a weed lick can be applied where necessary, particularly in situations where rush growth is very dense or where cutting is impractical due to steep slopes. Applications should not be at a rate which will denude fields completely of rushes. Under normal circumstances, chemical treatment of rushes will only be permitted once in a five-year plan. Wipe on treatments will only be applied in either Year one or Year two of the management area prescriptions.

The following prescriptions will also apply to general grassland management:

- Maintain traditional grazing patterns;
- Control Bracken, if necessary, by weed licking, spot spraying, cutting, rolling or controlled trampling with stock. Mechanical control or trampling is most effective in May/early June. Mechanical control will need to be repeated several times during this period to have a beneficial impact;

- Cut species rich meadows after July 15th, preferably later;
- No plough, cultivation, drainage or otherwise reclaim of land will be undertaken;
- Conifers will not be planted;
- Trees will not be planted unless such action is provided for in the plan;
- Lime will not be applied;
- Fertilisers will not be applied above the stipulated levels;
- Slopes greater than 25 degrees will not be fertilized;
- The recommended stocking limits will not be exceeded;
- Supplementary feed stock will not be provided on the grassland except where this has been traditionally practiced; and
- There will be no dumping of waste material.

6.2.4 Forestry

The conifer forestry plantation occupies 1.14 ha of the proposed management areas for the proposed CGEP , or 0.67% of the total proposed management areas. These areas are under a 30-40-year forestry rotation plan and will be replanted after future felling.

Forest Service requirements for felling and replanting, imposed as conditions of felling licenses, will ensure that these areas will remain available, on a limited basis, for Hen Harrier habitat conservation. The Forest Service limits the area of forestry that can be felled yearly, so that the felling of the plantation on the site may be staggered. The cycle of planting, growth and felling will intermittently produce areas of pre-thicket plantation that are favourable for Hen Harrier nesting and foraging.

Habitat management prescriptions for forestry are :

- All felling operations are to be carried out in accordance with any felling license issued by the Forest Service;
- Any area of forestry felled as part of a regular forest rotation should be replanted with a similar species within one year of felling, unless otherwise stipulated by any condition of the felling license;
- All clear-felling forestry operations should be in accordance with current Forest Service guidelines.
- All forestry thinning operations should be in accordance with current Forest Service guidelines;
- All forestry fertilising operations should be in accordance with current Forest Service guidelines;
- Any measure employed to control disease in forestry areas should be in accordance with current Forest Service guidelines;
- Felling will not be carried during the Hen Harrier breeding season (i.e. March- August, inclusive).

As forestry plantations grow up, tracks or forestry rides provide edge habitat useful for Hen Harrier foraging. Tracks rides within forestry should be maintained to avoid scrub species overgrowth.

6.3 Management Prescriptions Common to All Habitats

6.3.1 Hen Harrier Nest Sites

If Hen Harrier nesting is suspected within the managed lands, the landowner should notify the NPWS at the earliest possible opportunity. Furthermore, landowners should refrain from publicising the exact location of any nest site. After contacting the NPWS, they should avoid approaching the nest during the period March 1st-July 31st and grazing will not be permitted within 50 metres of the nest site during the same period. Where it is discovered that Hen Harriers are nesting on the farm after a management area prescription has been prepared, the management area prescription will be amended as required.

Use of machinery (e.g. for firebreak cutting) and turbary practices will be avoided in the immediate vicinity of any Hen Harrier nesting sites from April to July, inclusive. Forestry planting and felling in these areas will also be avoided during this period.

6.3.2 Supplementary Feeding

Supplementary feeding of livestock will continue, provided excessive poaching is avoided. Sacrificial paddocks will not be permitted at any time. Supplementary feeding of round bales or from fixed feeding points is not permitted within 30 metres of a watercourse. On land sloping towards a watercourse, a greater distance will be required.

6.3.3 Burning

The burning of vegetation or other materials within the managed area of the CHMP is not permitted at any time.

6.3.4 Use of Herbicides

Spraying or broadcast application of herbicide is not permitted. Spot application and wipe-on treatments are permitted to eradicate docks, thistles, ragwort and similar noxious weeds. Rhododendron and conifers are to be removed by cutting and herbicide treatment (Round-up® applied to incision made into the cambium - just inside bark - works best). Bracken may be controlled by rolling, cutting and/ or by controlled cattle/equine trampling in early summer. In exceptional circumstances, control of bracken by herbicides may be permitted. The use of herbicides is not permitted within five metres of a watercourse or existing hedgerows; the only exception is spot treatment for the control of difficult invasive species such as Himalayan Knotweed and Rhododendron.

6.3.5 Use of Poisons or Stupefying Baits

The use of poisons or stupefying baits is not permitted. Hen Harriers and other birds of prey can fall victim to secondary and direct poisoning.

6.3.6 Fence Marking

Hen Harriers can fly into thin wires. 'Bird diverters'/'game guards' should be used to mark the guy wires of any anemometer towers or electricity transmission lines. The same measure should be considered for lengths of wire fencing. Any new fencing/boundary markers will make use of hedge planting instead of wire fencing alone.

6.3.7 Shooting

Shooting (except for the legal control of vermin) will not be allowed on the management areas.

7 Plan Implementation

7.1 Timing

This Conservation and Habitat Management Plan will be implemented to run concurrently with the commencement of construction of the proposed CGEP development. As per the additional bird surveying requirements outlined in **Section 8.2** below, which will commence in advance of the CGEP construction works commencing, preparation for the implementation of this conservation and habitat enhancement plan will also have to commence in advance of the physical works for the CGEP on the ground.

7.2 Consent

The proposed CGEP enhancement measures detailed will be implemented at the five land parcels, within 5 km of the proposed CGEP. The landowners of all these landholdings will retain ownership of their lands throughout the lifetime of the enhancement measures. As part of the proposed project, a lease agreement sets out the terms and conditions of the management of the landholdings and this will facilitate the implementation of the prescriptions set out in this Conservation and Habitat Management Plan.

7.3 Procedures

The prescriptions for each of the individual management areas will be chosen from the various recommended management options and practices outlined in **Section 5** of this report, and also from proven Hen Harrier habitat prescriptions that Inis ecologists have recorded over the past 10 years. These prescriptions will be based on a review of current land management and land management will be based on the most appropriate management options for each land use type so to maximise value for hen harrier.

7.4 Responsibility

Coom Green Energy Park Ltd (CGEP) and the planning permission applicant, will ultimately be responsible for the implementation of this Conservation and Habitat Management Plan. In the event of favorable consideration of the planning application, and should An Bord Pleanala deem it appropriate, it is expected that a condition requiring the implementation of this Conservation and Habitat Management Plan will be attached to the grant of planning permission. The responsibility for the implementation of the plan will lie solely with the developer and its agents. A Hen Harrier ecologist will be engaged by CGEP to oversee the implementation of this Conservation and Habitat Management Plan on the small scale (i.e. with respect to the application of measures in particular parts of the site, on a landholding by landholding or field by field basis). The implementation is also likely to require the input of agricultural advisors with regard to appropriate stocking levels.

Inis Environmental Consultants Ltd has extensive experience monitoring Hen Harrier in a wide range of habitat types in Ireland. This experience confers a high degree of confidence that the habitats produced with the implementation of the present Conservation and Habitat Management Plan will signify an important net gain/ enhancement in managed viable foraging habitats proximal to known Hen Harrier nesting territories.

8 Monitoring

A Conservation and Habitat Management Plan requires monitoring to determine if the objectives of the plan are being achieved and to determine whether any modifications to the plan are required to enable the achievement of the objectives. The principal objective of the present CGEP Conservation and Habitat Management Plan is to provide enhanced foraging habitat for Hen Harrier due to a calculated loss as a result of the CGEP project. Regular reporting on the results of management strategies will be required to show that the prescriptions are being managed properly and on a constant basis for the benefit of hen harriers.

8.1 Habitats

Areas of Hen Harrier foraging habitat (i.e. wet grassland, hedgerows, scrubby earth banks and wet heath) should be accurately mapped and should be monitored annually, for the lifetime of the proposed CGEP, to guarantee that the areas associated with the Conservation and Habitat Management Plan have not altered in size and that the grazing regime that is in place is maintaining the current state of these habitats (i.e. neither poaching nor overgrowth of open areas is occurring). As well as mapping, this monitoring should be recorded by means of fixed-point photography.

8.2 Additional Bird Surveying

Annual bird monitoring will take place throughout the construction period and operational phase of the proposed CGEP development to monitor nesting activity and confirm usage of the five enhancement areas by hen harrier, throughout the breeding season.

8.3 Auditing

Audits will be required to ensure the effectiveness of the Conservation and Habitat Management Plan. They are essential to ensure adequate plan quality, compliance and control. Audits will be based on a field inspection and the assessment of the management area prescriptions.

Ten percent of the management area prescriptions will be selected each year for auditing. The audit will assess:

- Objectives of the individual management area prescription;
- Implementation of the plan; and
- Adherence to requirements of the management area prescription.

8.4 Review

Individual management area prescriptions will be reviewed every five years, as is the case with NPWS Hen Harrier management area prescriptions.

9 Conclusion

The development of the proposed CGEP provides habitat enhancement measures at alternative lands due to loss of potential forage habitat within 250metres radius of each turbine, which totals an area of approximately 148.76ha.

The management prescriptions applied will benefit Hen Harrier in both the short and long term, and will ensure the supply of a substantial area of suitable foraging habitat for the local Hen Harrier population, over and above that potentially lost as a result of the proposed CGEP development.

The overall aim of the management plan is to provide a net gain of foraging habitat for Hen Harrier for the lifetime of the proposed CGEP. The management prescriptions proposed are likely to enhance the existing biodiversity of the site for prey items and wildlife in general, which is an extremely important component of a successful Conservation and Habitat Management Plan. The Plan will also promote a mosaic of vegetation types, which are optimal foraging habitat, and are likely to improve foraging success rates and, consequently, breeding success rates for the local Hen Harrier population, which is the ultimate target of the Conservation and Habitat Management Plan.

It is concluded that the proposed Conservation and Habitat Management Plan will provide full and effective additional habitat for Hen Harrier, as part of the proposed development of the CGEP.

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Appendix A - Habitat Maps for 250m Buffer of Turbine Locations

Client:Brookfield Renewables Ireland Ltd.

Project:Coom Green Energy Park (CGEP)

Title:
Habitats within 250m of Turbine 2

Legend:

Habitats within 250m of Turbine 2

- ED2: Spoil and bare ground
- WD4: Conifer plantation
- WS1: Scrub
- Proposed Turbine Layout
- Turbines 250m Buffer
- Proposed Development Boundary

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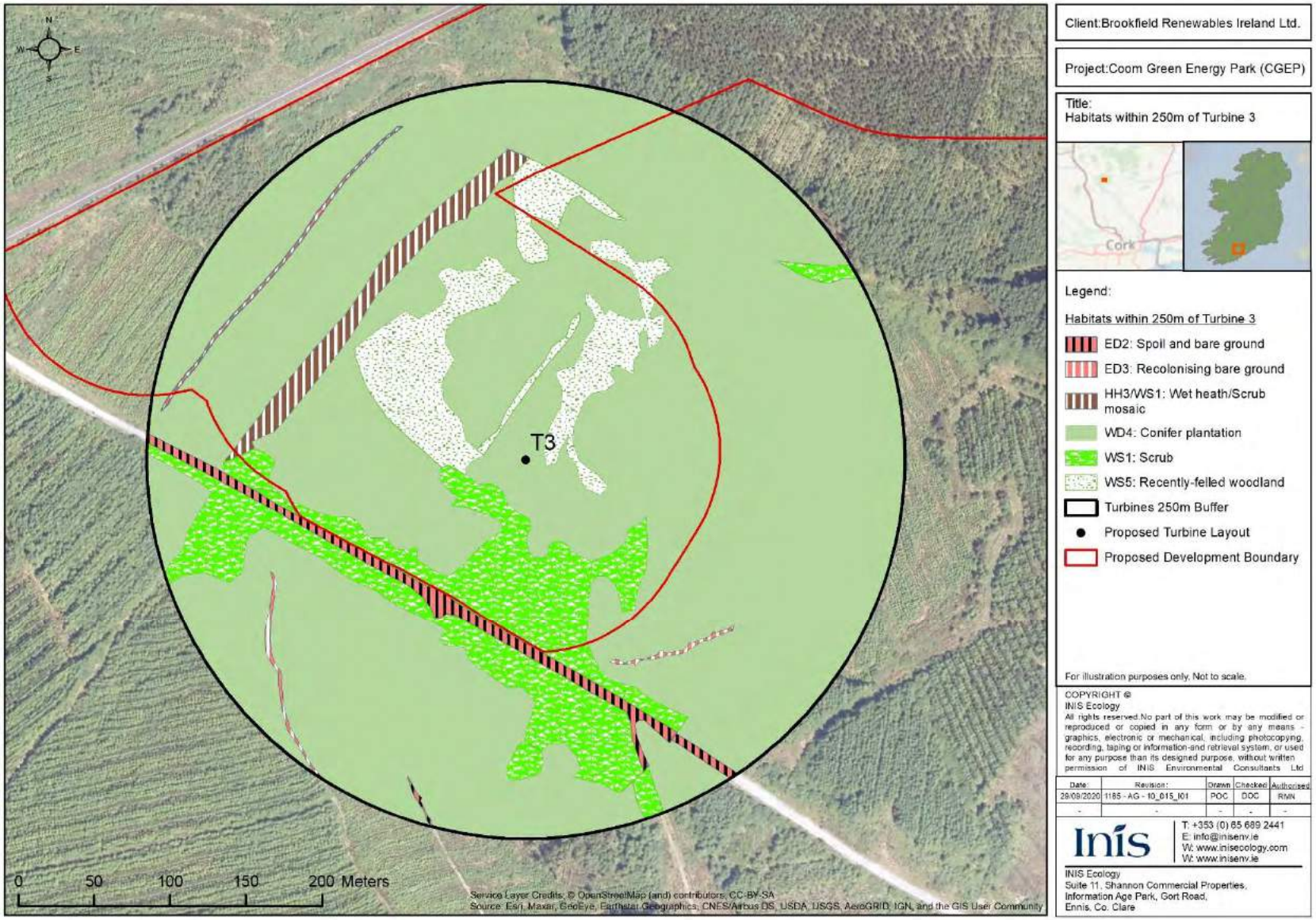
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Client:Brookfield Renewables Ireland Ltd.
Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 3
Cork
Legend:
Habitats within 250m of Turbine 3
ED2: Spoil and bare ground
ED3: Recolonising bare ground
HH3/WS1: Wet heath/Scrub mosaic
WD4: Conifer plantation
WS1: Scrub
WS5: Recently-felled woodland
Turbines 250m Buffer
Proposed Turbine Layout
Proposed Development Boundary
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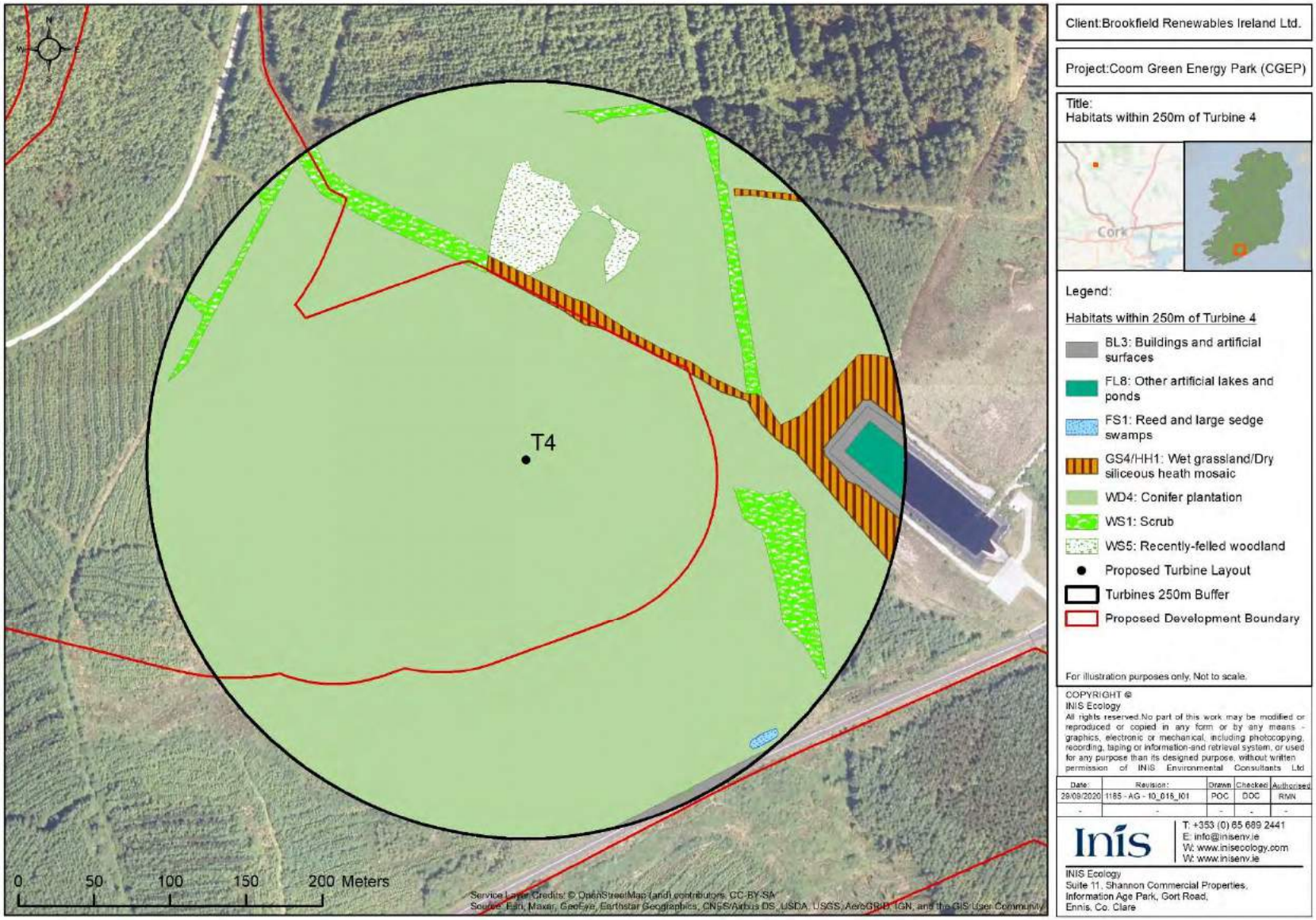
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Client:Brookfield Renewables Ireland Ltd.
Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 4
Cork
Legend:
Habitats within 250m of Turbine 4
BL3: Buildings and artificial surfaces
FL8: Other artificial lakes and ponds
FS1: Reed and large sedge swamps
GS4/HH1: Wet grassland/Dry siliceous heath mosaic
WD4: Conifer plantation
WS1: Scrub
WS5: Recently-felled woodland
Proposed Turbine Layout
Turbines 250m Buffer
Proposed Development Boundary
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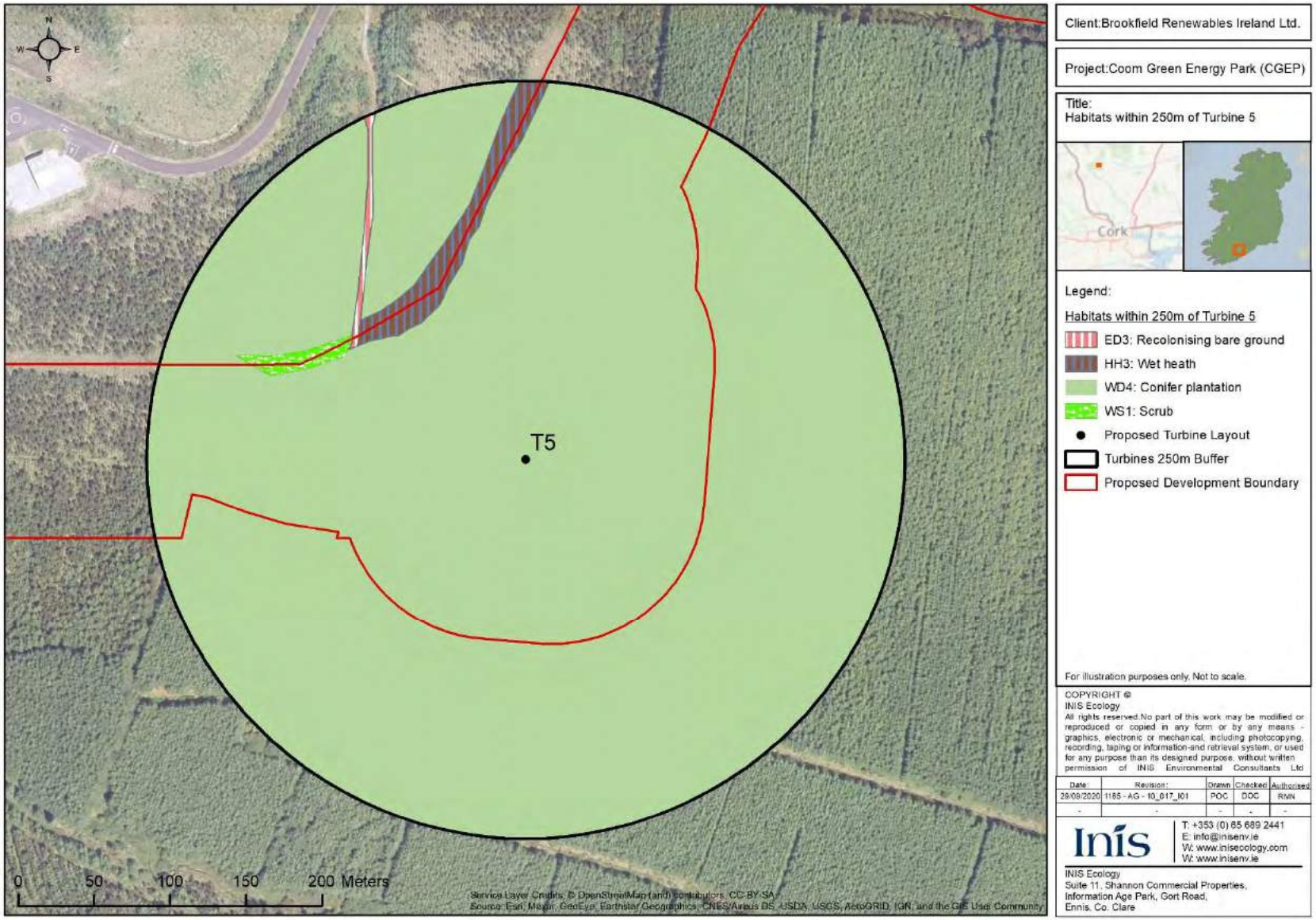
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Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 5
Cork
Legend:
Habitats within 250m of Turbine 5
ED3: Recolonising bare ground
HH3: Wet heath
WD4: Conifer plantation
WS1: Scrub
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Turbines 250m Buffer
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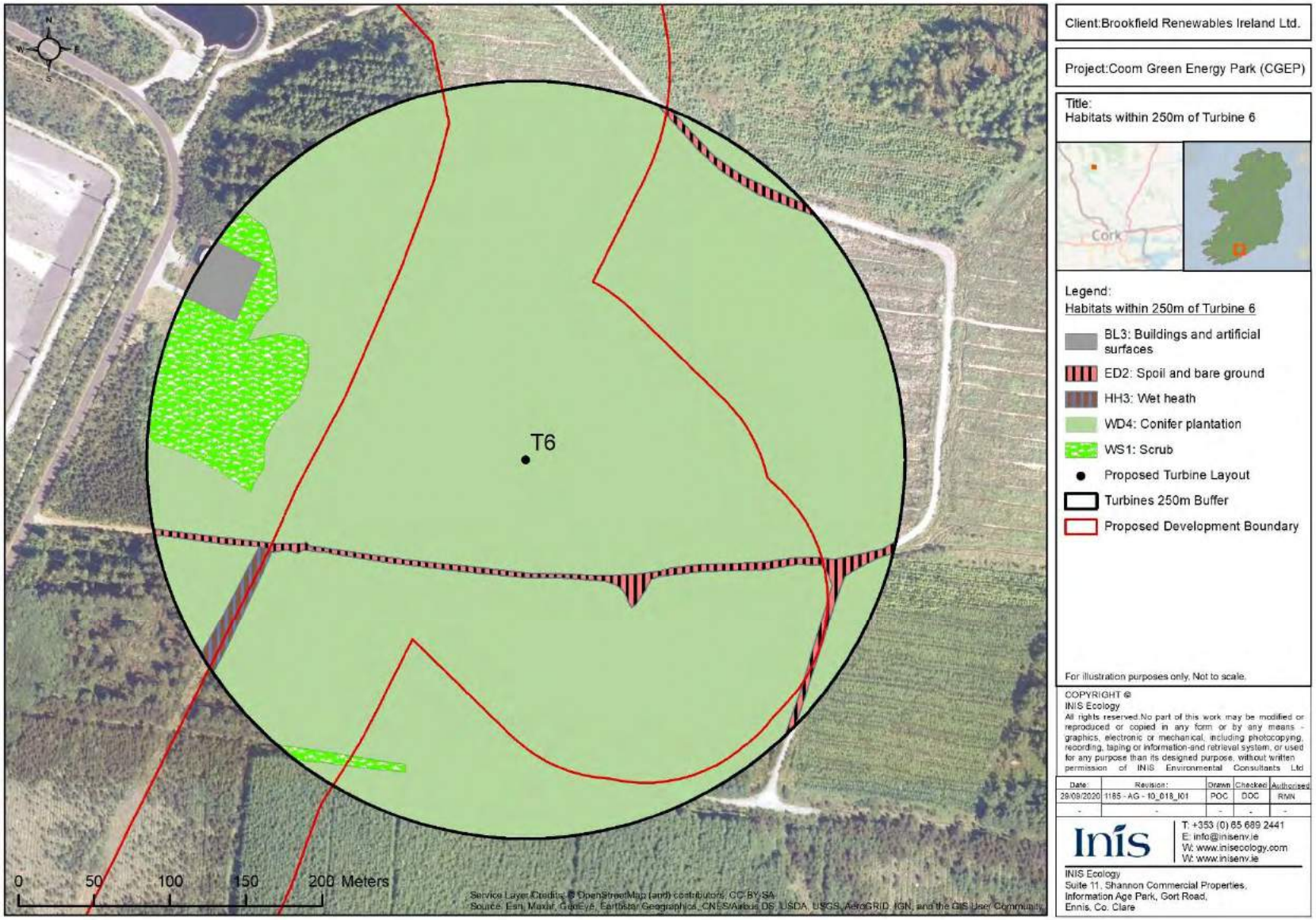
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Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 6
Cork
Legend:
Habitats within 250m of Turbine 6
BL3: Buildings and artificial surfaces
ED2: Spoil and bare ground
HH3: Wet heath
WD4: Conifer plantation
WS1: Scrub
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Turbines 250m Buffer
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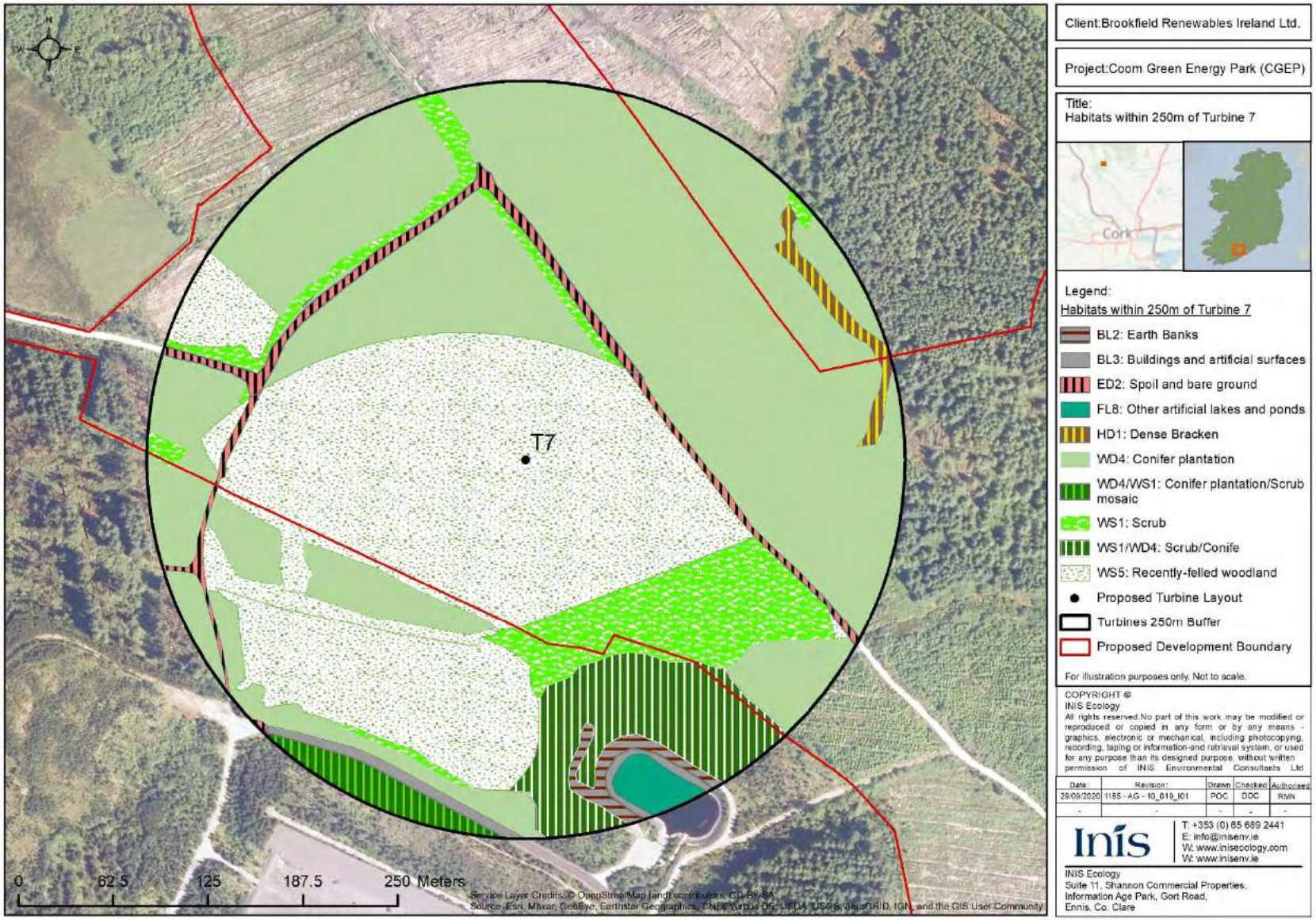
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Title:
Habitats within 250m of Turbine 7
Cork
Legend:
Habitats within 250m of Turbine 7
BL2: Earth Banks
BL3: Buildings and artificial surfaces
ED2: Spoil and bare ground
FL8: Other artificial lakes and ponds
HD1: Dense Bracken
WD4: Conifer plantation
WD4/WS1: Conifer plantation/Scrub mosaic
WS1: Scrub
WS1/WD4: Scrub/Conife
WS5: Recently-felled woodland
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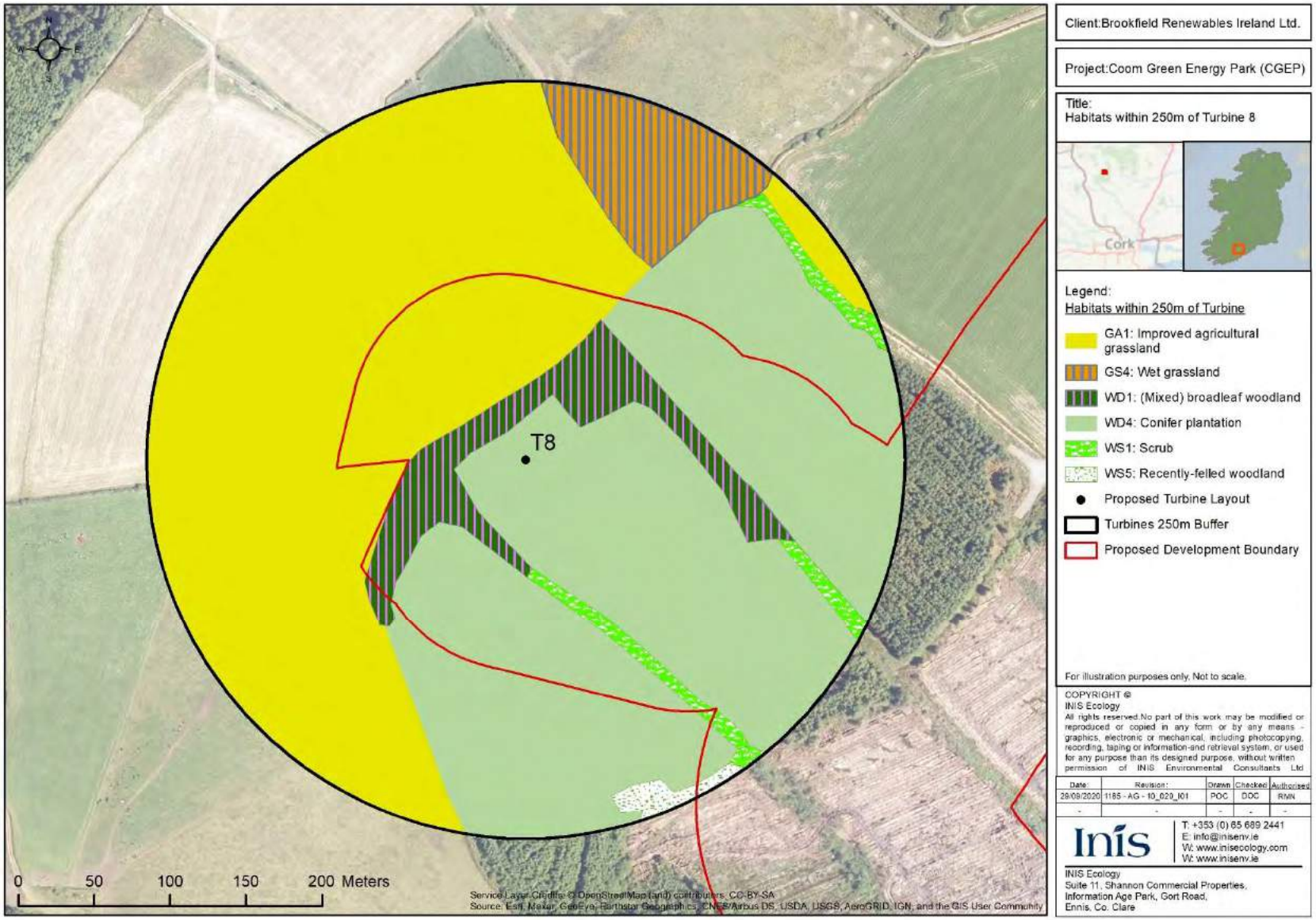
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Title:
Habitats within 250m of Turbine 8
Cork
Legend:
Habitats within 250m of Turbine
GA1: Improved agricultural grassland
GS4: Wet grassland
WD1: (Mixed) broadleaf woodland
WD4: Conifer plantation
WS1: Scrub
WS5: Recently-felled woodland
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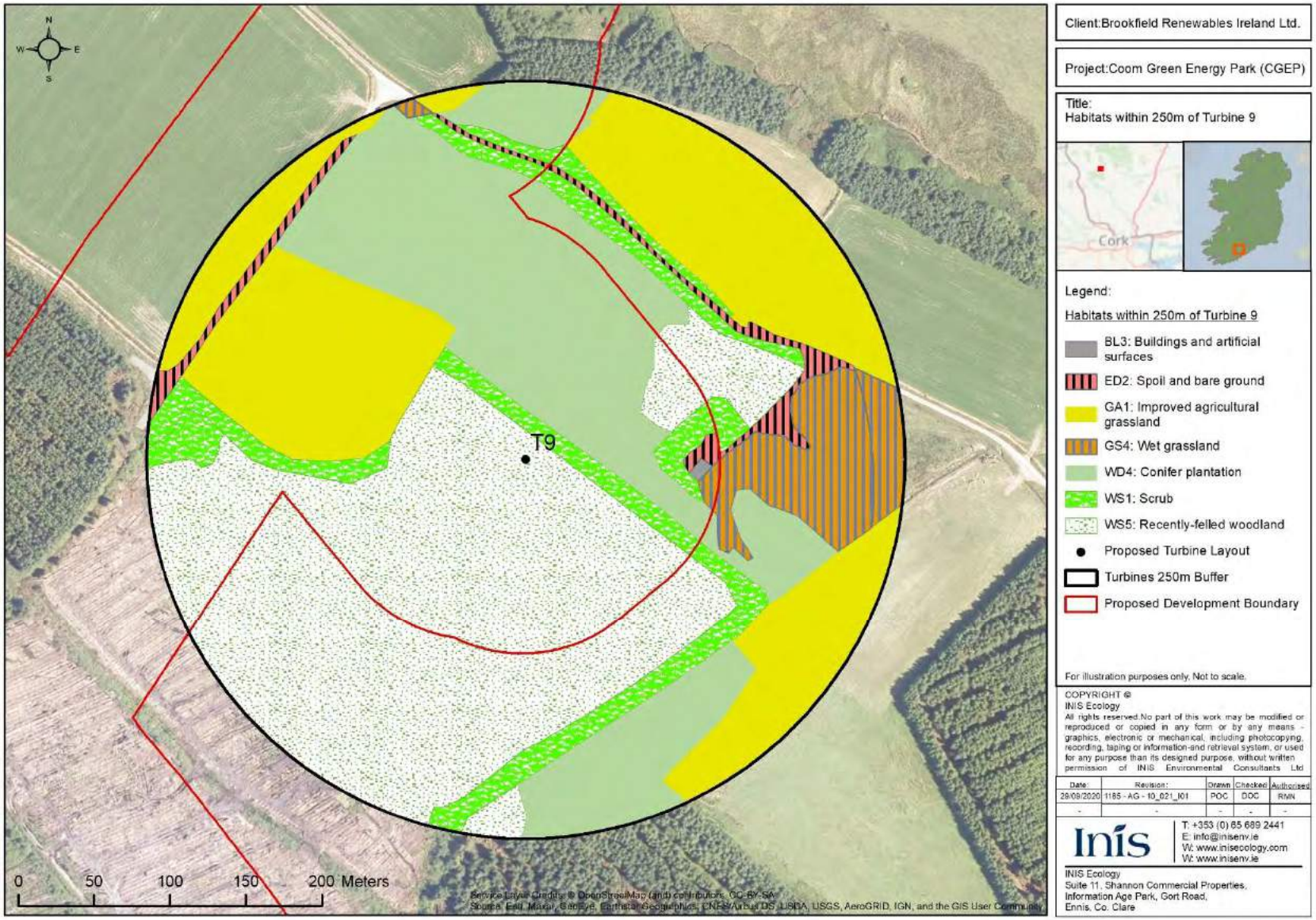
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Title:
Habitats within 250m of Turbine 9
Cork
Legend:
Habitats within 250m of Turbine 9
BL3: Buildings and artificial surfaces
ED2: Spoil and bare ground
GA1: Improved agricultural grassland
GS4: Wet grassland
WD4: Conifer plantation
WS1: Scrub
WS5: Recently-felled woodland
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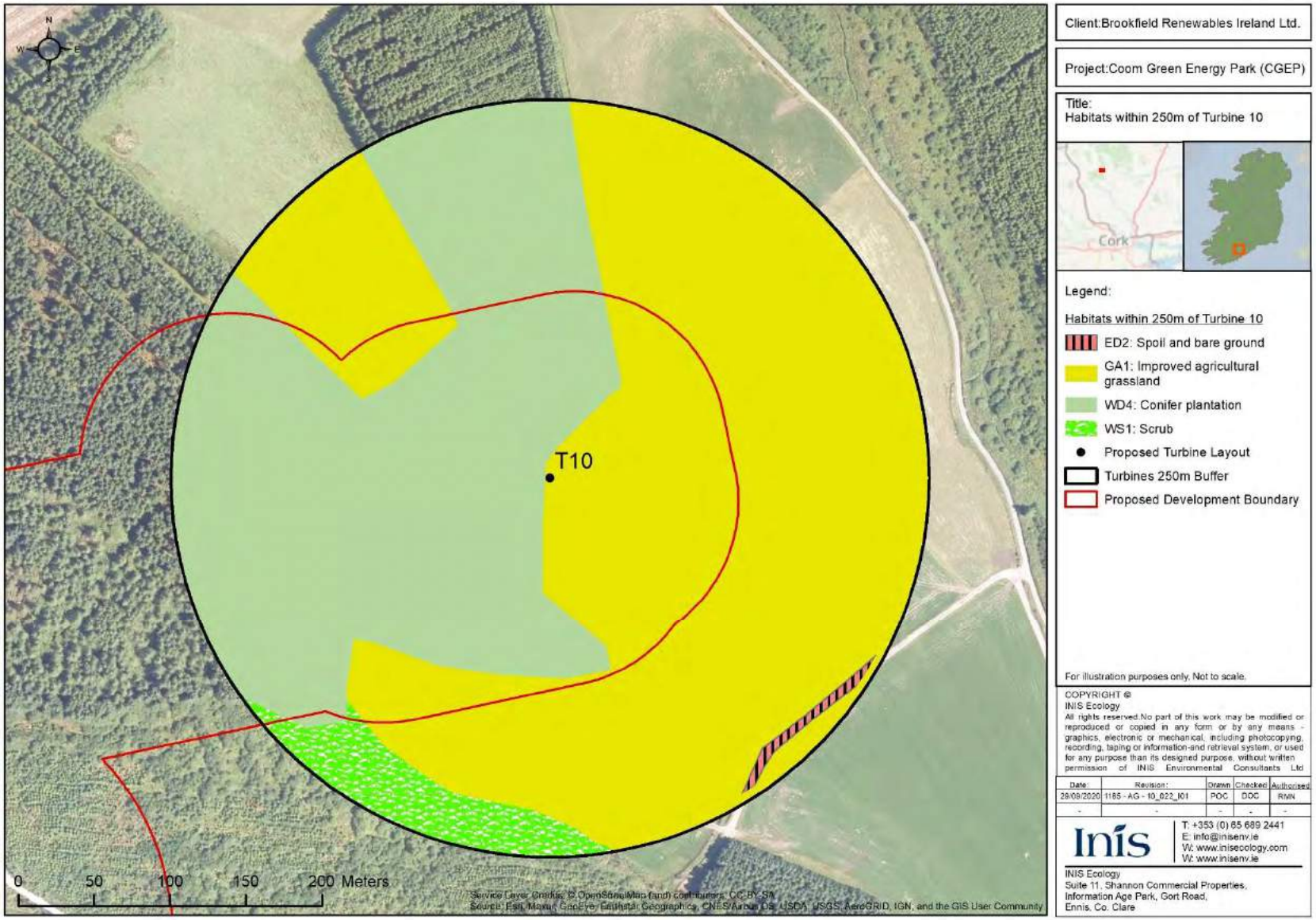
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Title:
Habitats within 250m of Turbine 10
Cork
Legend:
Habitats within 250m of Turbine 10
ED2: Spoil and bare ground
GA1: Improved agricultural grassland
WD4: Conifer plantation
WS1: Scrub
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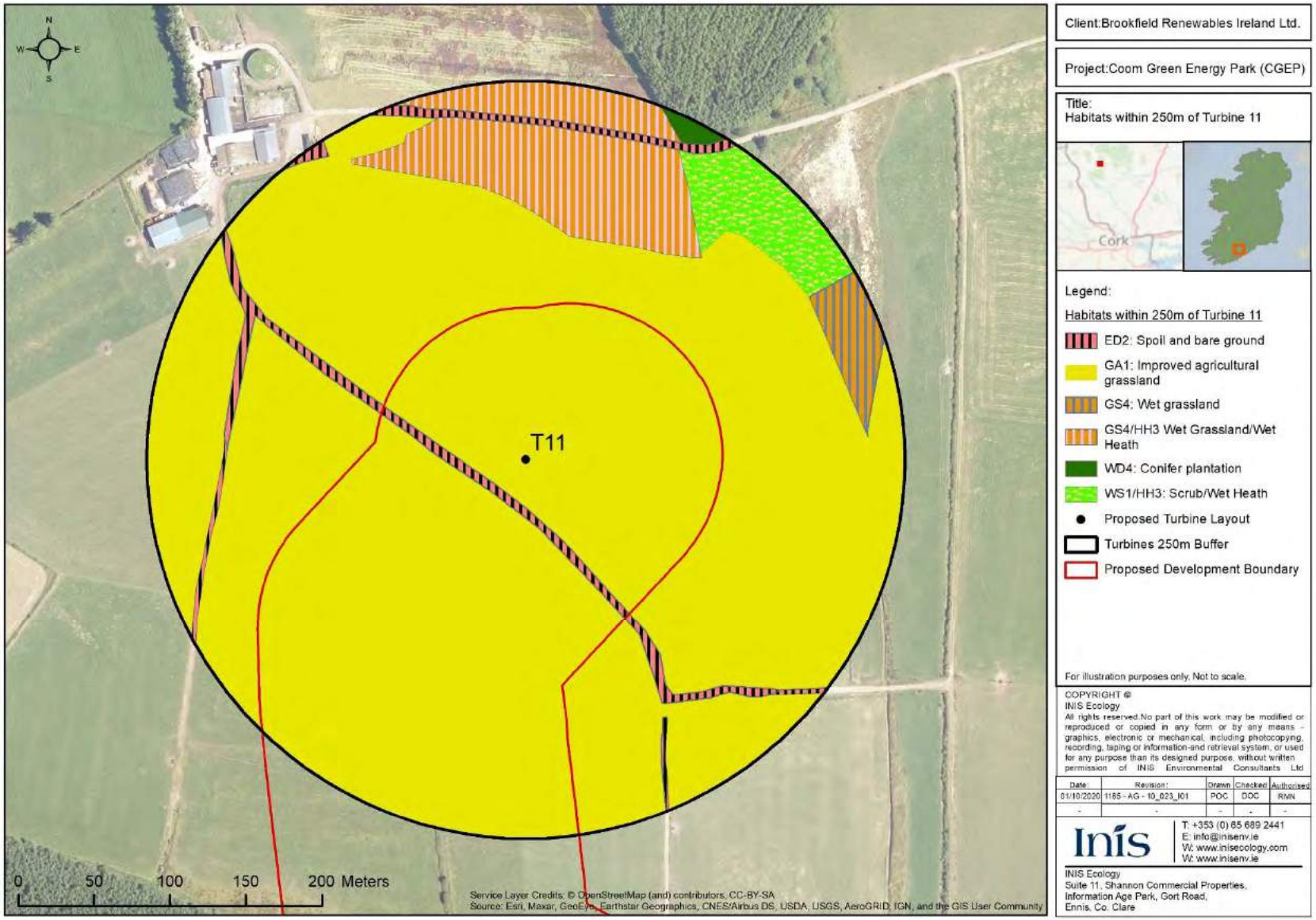
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Title:
Habitats within 250m of Turbine 11
Cork
Legend:
Habitats within 250m of Turbine 11
ED2: Spoil and bare ground
GA1: Improved agricultural grassland
GS4: Wet grassland
GS4/HH3 Wet Grassland/Wet Heath
WD4: Conifer plantation
WS1/HH3: Scrub/Wet Heath
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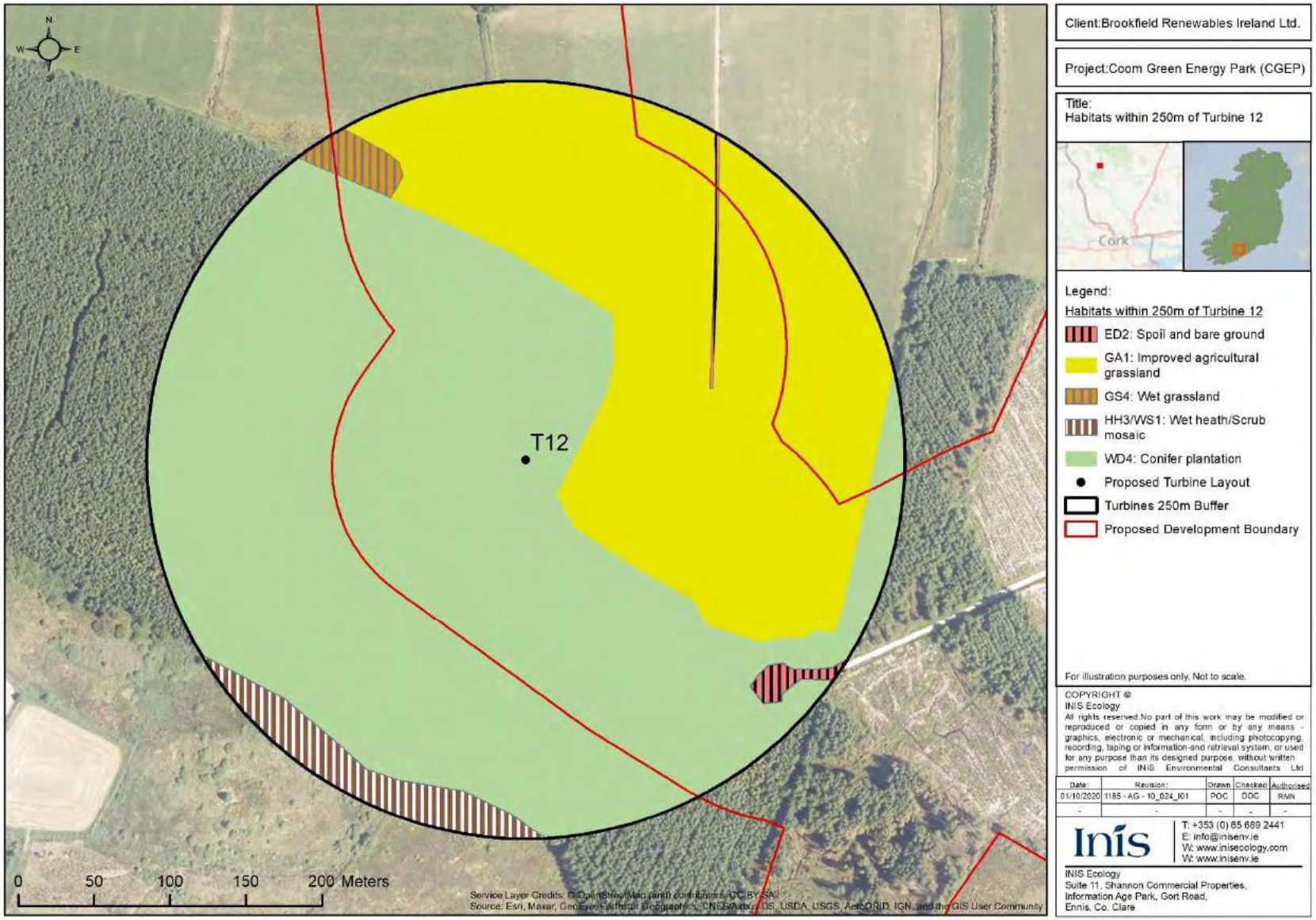
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Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 12
Cork
Legend:
Habitats within 250m of Turbine 12
ED2: Spoil and bare ground
GA1: Improved agricultural grassland
GS4: Wet grassland
HH3/WS1: Wet heath/Scrub mosaic
WD4: Conifer plantation
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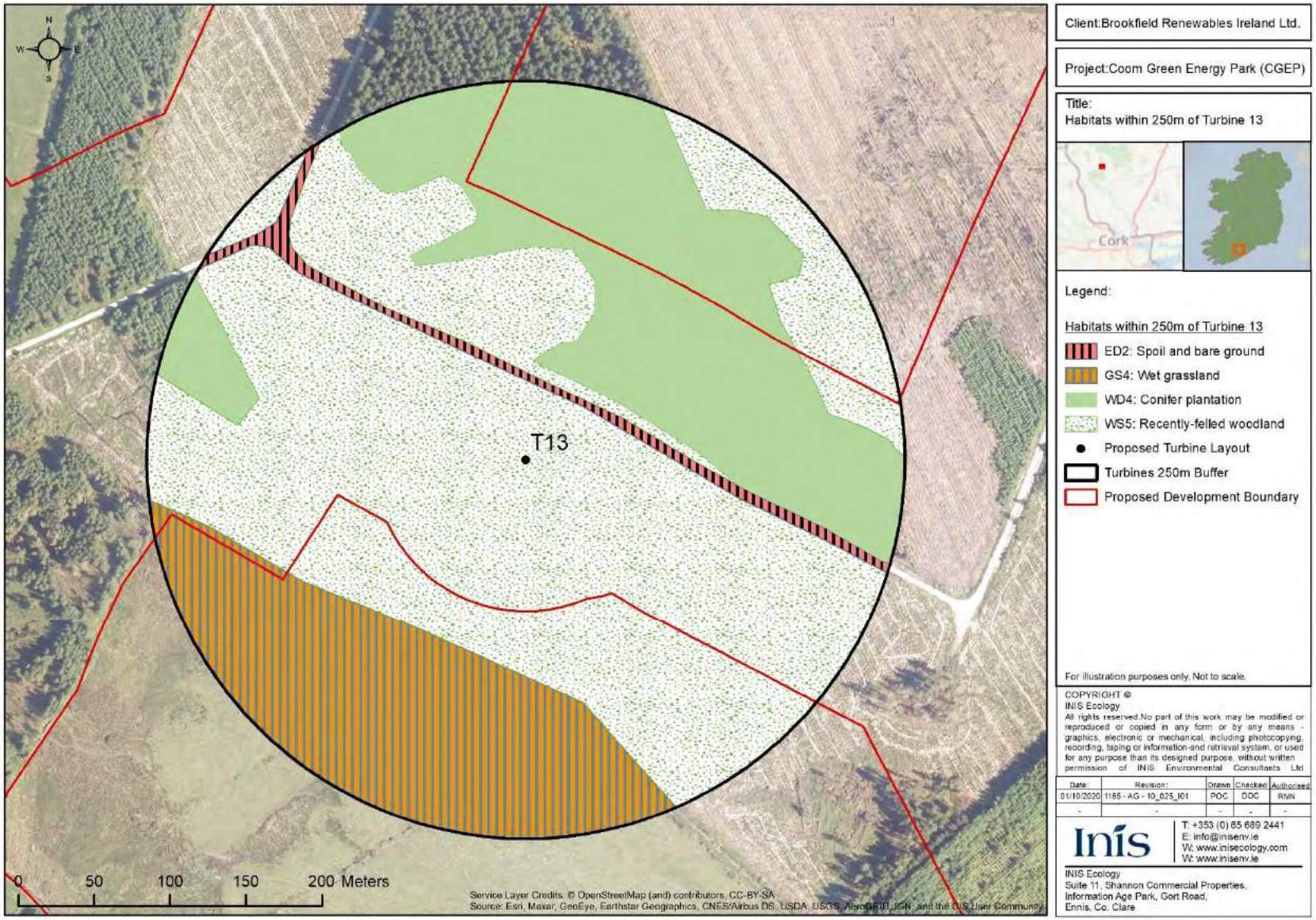
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Title:
Habitats within 250m of Turbine 13
Cork
Legend:
Habitats within 250m of Turbine 13
ED2: Spoil and bare ground
GS4: Wet grassland
WD4: Conifer plantation
WS5: Recently-felled woodland
Proposed Turbine Layout
Turbines 250m Buffer
Proposed Development Boundary
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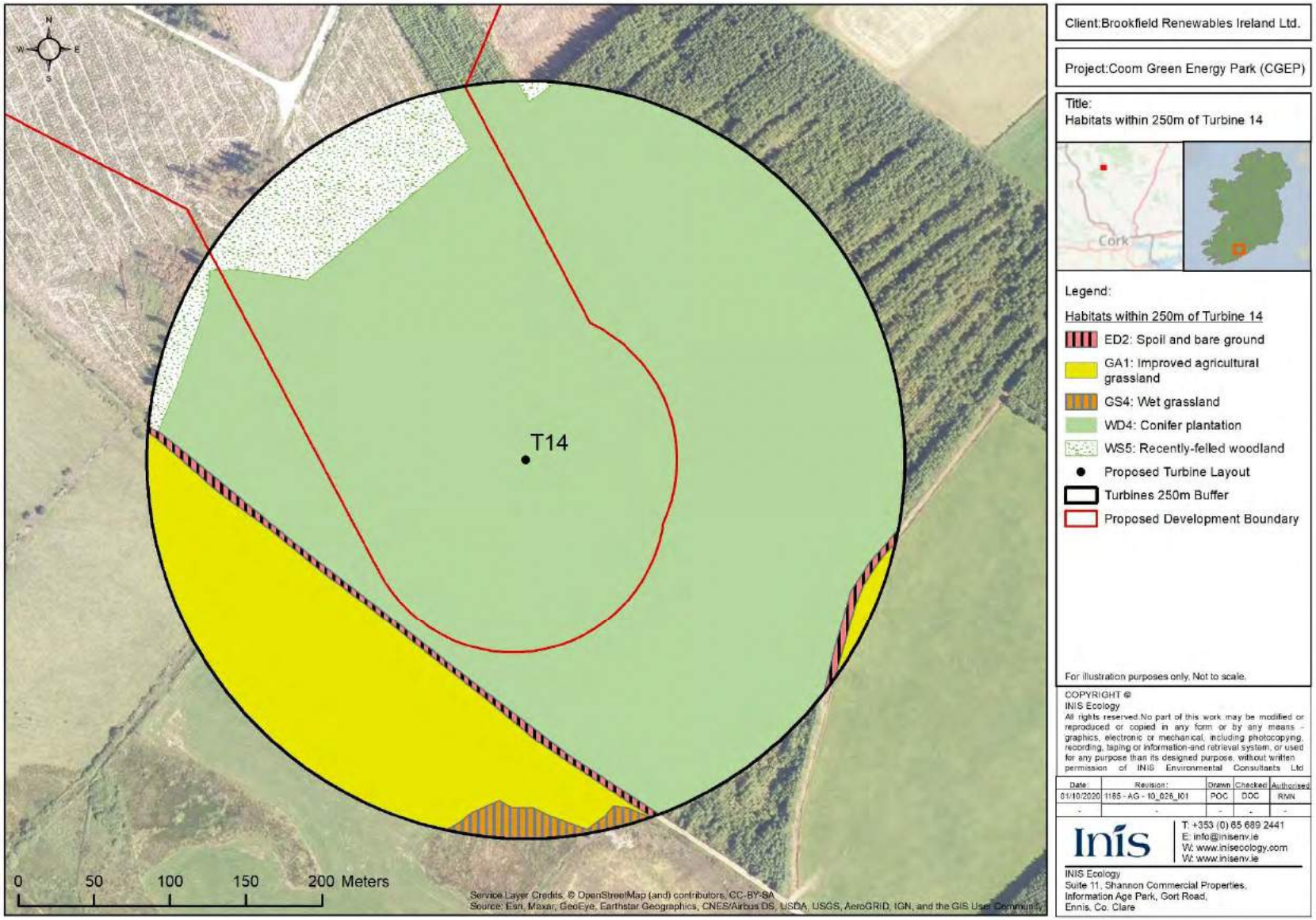
N
W
E
S
T14
0
50
100
150
200 Meters
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Title:
Habitats within 250m of Turbine 14
Cork
Legend:
Habitats within 250m of Turbine 14
ED2: Spoil and bare ground
GA1: Improved agricultural grassland
GS4: Wet grassland
WD4: Conifer plantation
WS5: Recently-felled woodland
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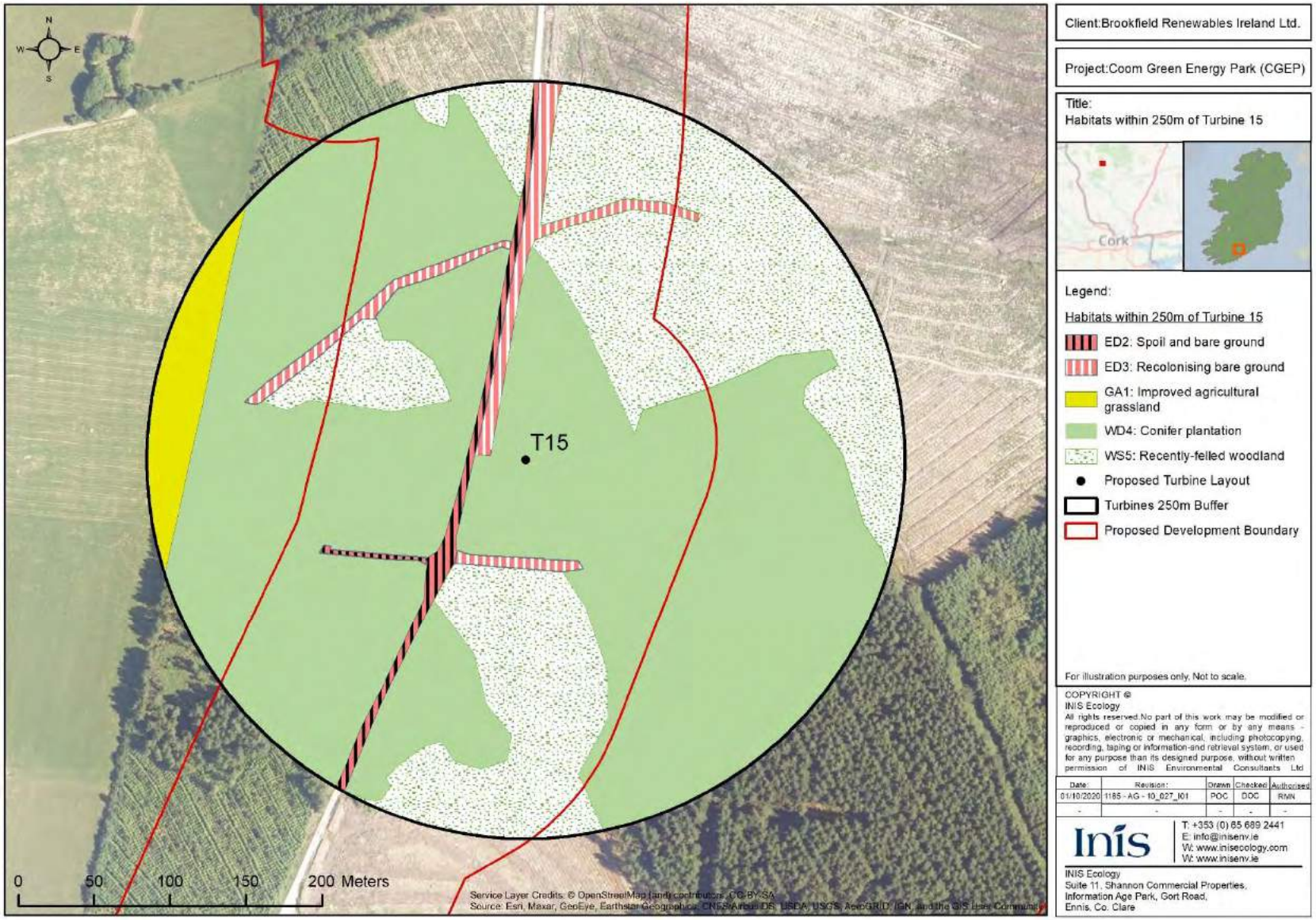
N
W
E
S
T15
0
50
100
150
200 Meters
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Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 15
Cork
Legend:
Habitats within 250m of Turbine 15
ED2: Spoil and bare ground
ED3: Recolonising bare ground
GA1: Improved agricultural grassland
WD4: Conifer plantation
WS5: Recently-felled woodland
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Proposed Development Boundary
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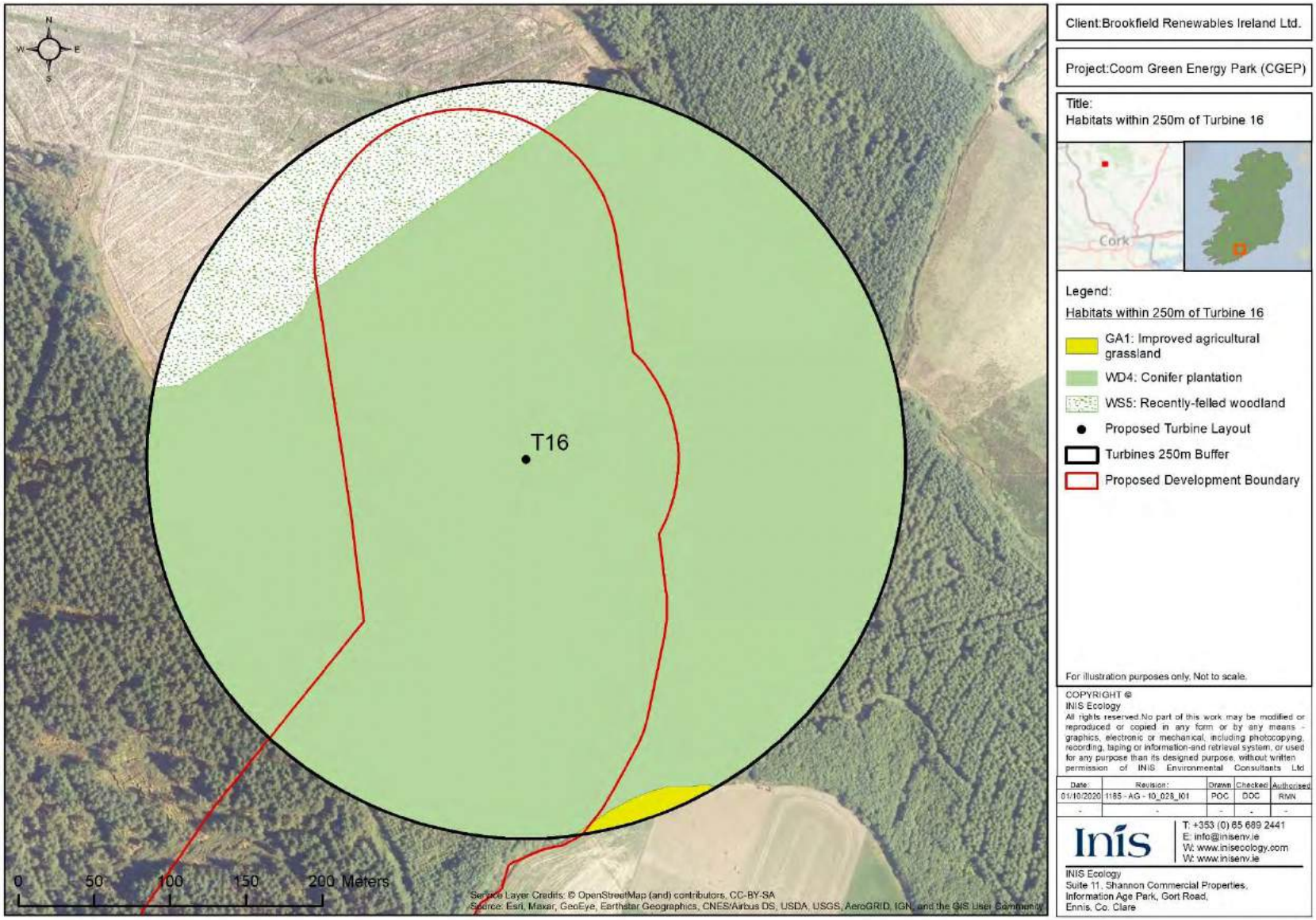
N
W
E
S
T16
0
50
100
150
200 Meters
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Client:Brookfield Renewables Ireland Ltd.
Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 16
Cork
Legend:
Habitats within 250m of Turbine 16
GA1: Improved agricultural grassland
WD4: Conifer plantation
WS5: Recently-felled woodland
Proposed Turbine Layout
Turbines 250m Buffer
Proposed Development Boundary
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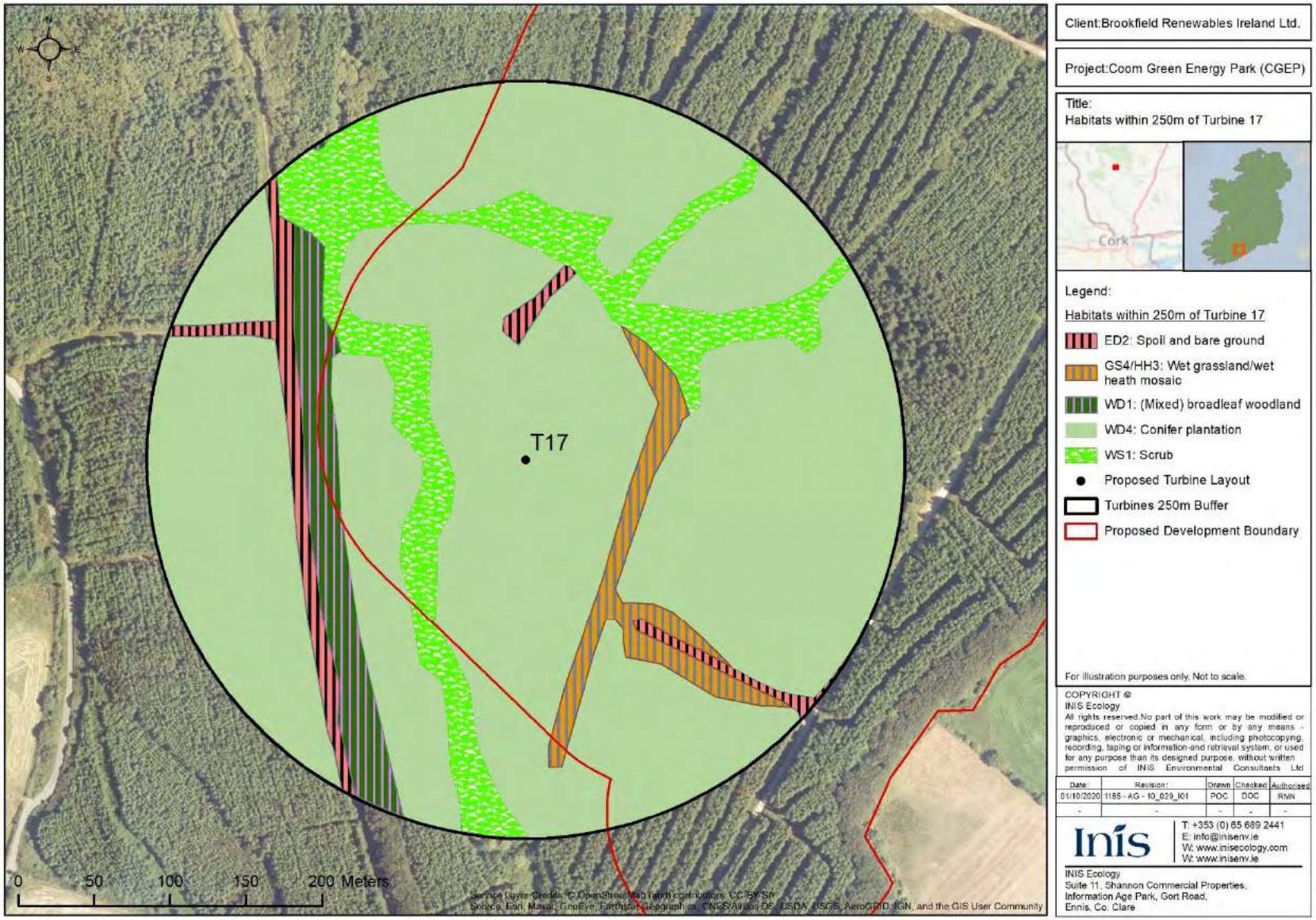
T17
0
50
100
150
200 Meters
Client:Brookfield Renewables Ireland Ltd.
Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 17
Cork
Legend:
Habitats within 250m of Turbine 17
ED2: Spoil and bare ground
GS4/HH3: Wet grassland/wet heath mosaic
WD1: (Mixed) broadleaf woodland
WD4: Conifer plantation
WS1: Scrub
Proposed Turbine Layout
Turbines 250m Buffer
Proposed Development Boundary
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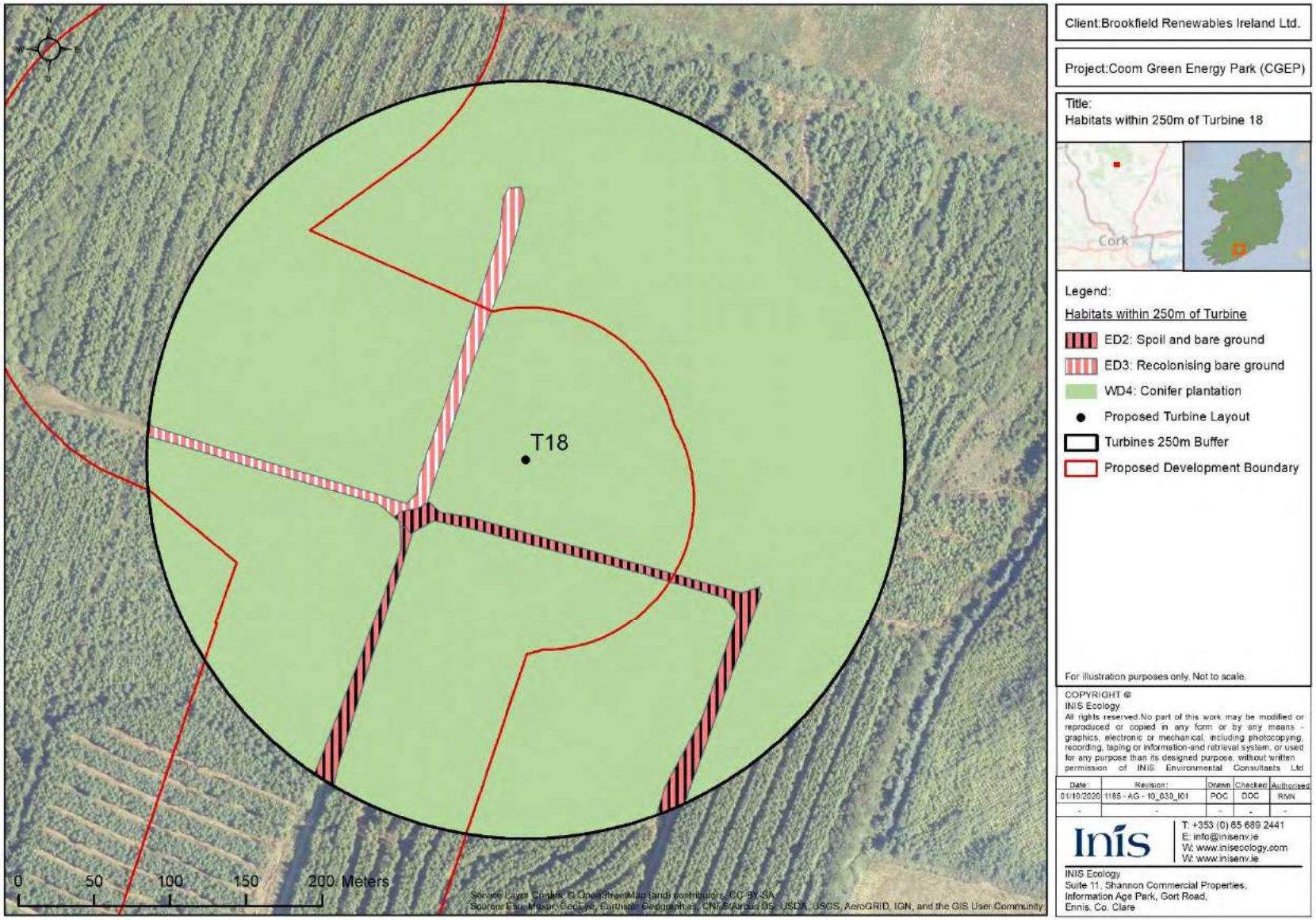
T18
0
50
100
150
200 Meters
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Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 18
Cork
Legend:
Habitats within 250m of Turbine
ED2: Spoil and bare ground
ED3: Recolonising bare ground
WD4: Conifer plantation
Proposed Turbine Layout
Turbines 250m Buffer
Proposed Development Boundary
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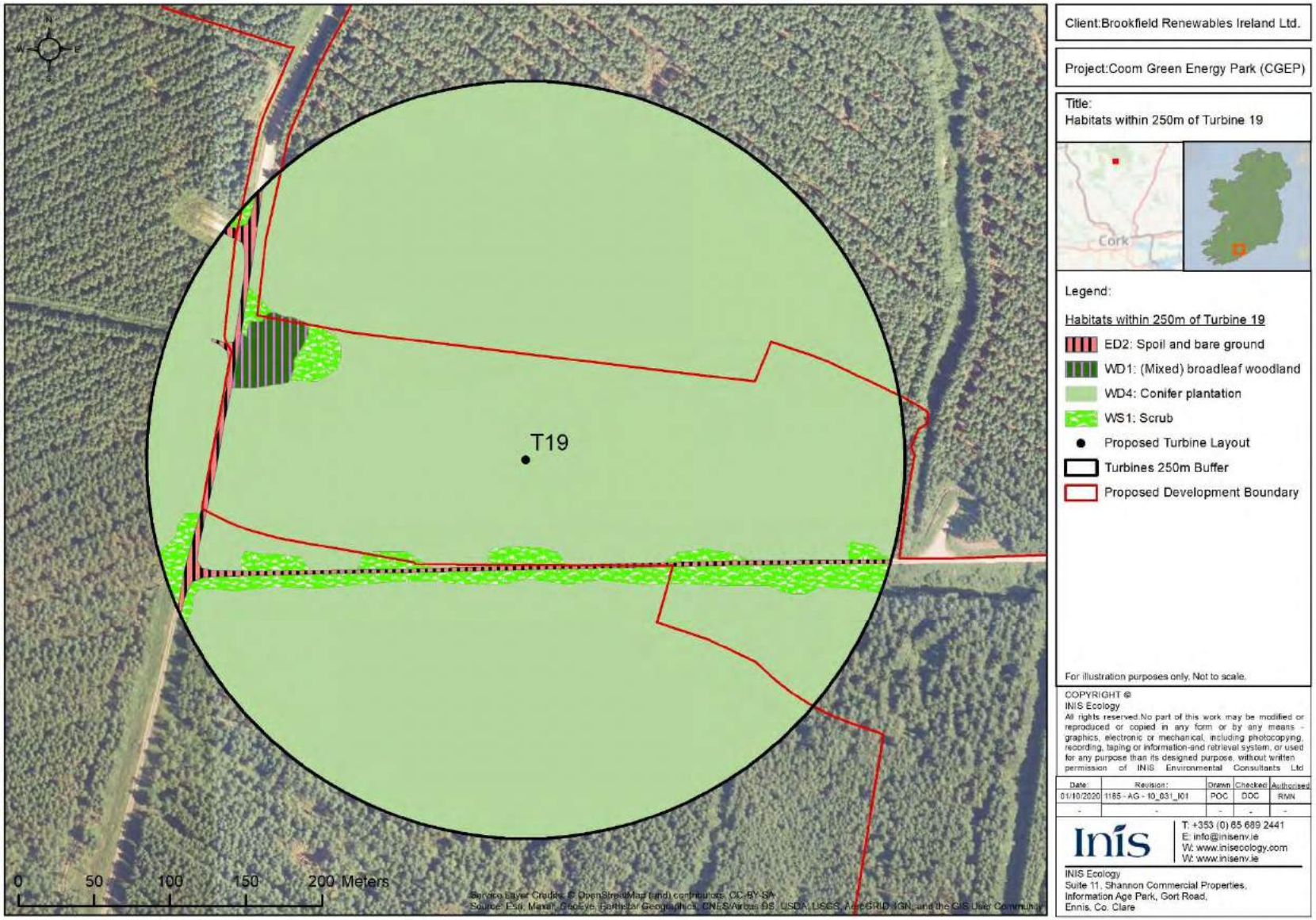
T19
0 50 100 150 200 Meters
Client:Brookfield Renewables Ireland Ltd.
Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 19
Cork
Legend:
Habitats within 250m of Turbine 19
ED2: Spoil and bare ground
WD1: (Mixed) broadleaf woodland
WD4: Conifer plantation
WS1: Scrub
Proposed Turbine Layout
Turbines 250m Buffer
Proposed Development Boundary
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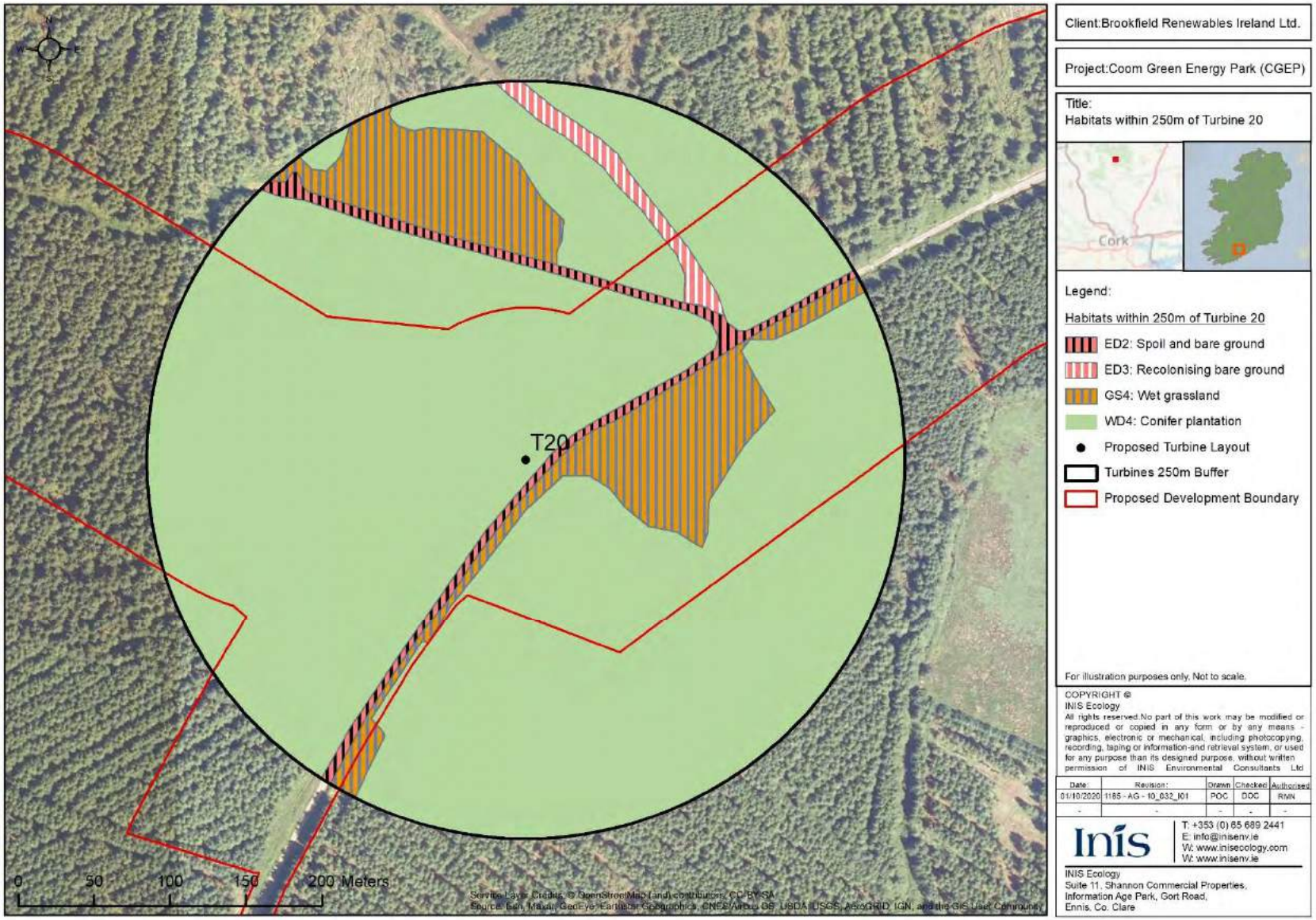
T20
0
50
100
150
200 Meters
Client:Brookfield Renewables Ireland Ltd.
Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 20
Cork
Legend:
Habitats within 250m of Turbine 20
ED2: Spoil and bare ground
ED3: Recolonising bare ground
GS4: Wet grassland
WD4: Conifer plantation
Proposed Turbine Layout
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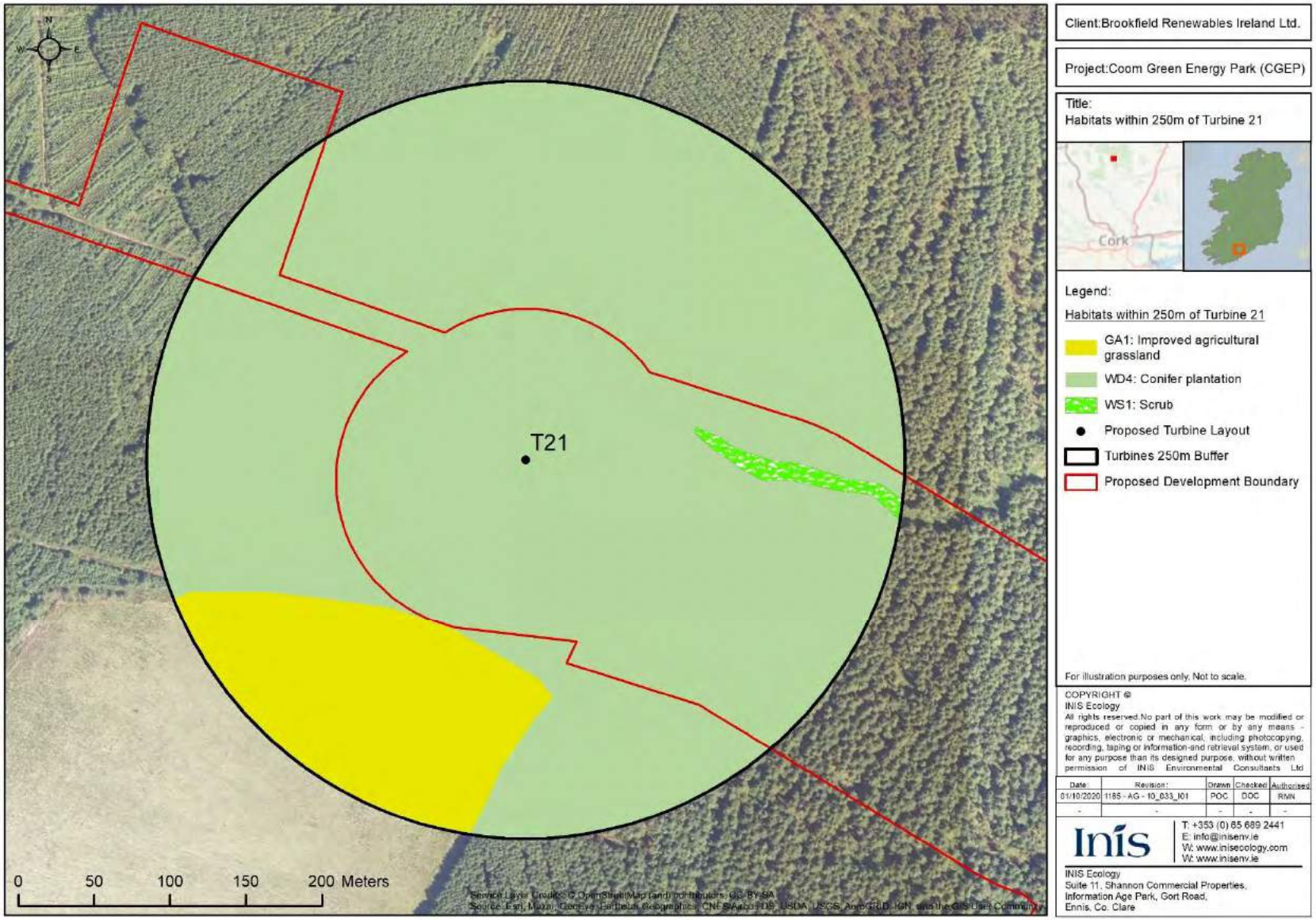
N
W
E
S
T21
0
50
100
150
200 Meters
Client:Brookfield Renewables Ireland Ltd.
Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 21
Cork
Legend:
Habitats within 250m of Turbine 21
GA1: Improved agricultural grassland
WD4: Conifer plantation
WS1: Scrub
Proposed Turbine Layout
Turbines 250m Buffer
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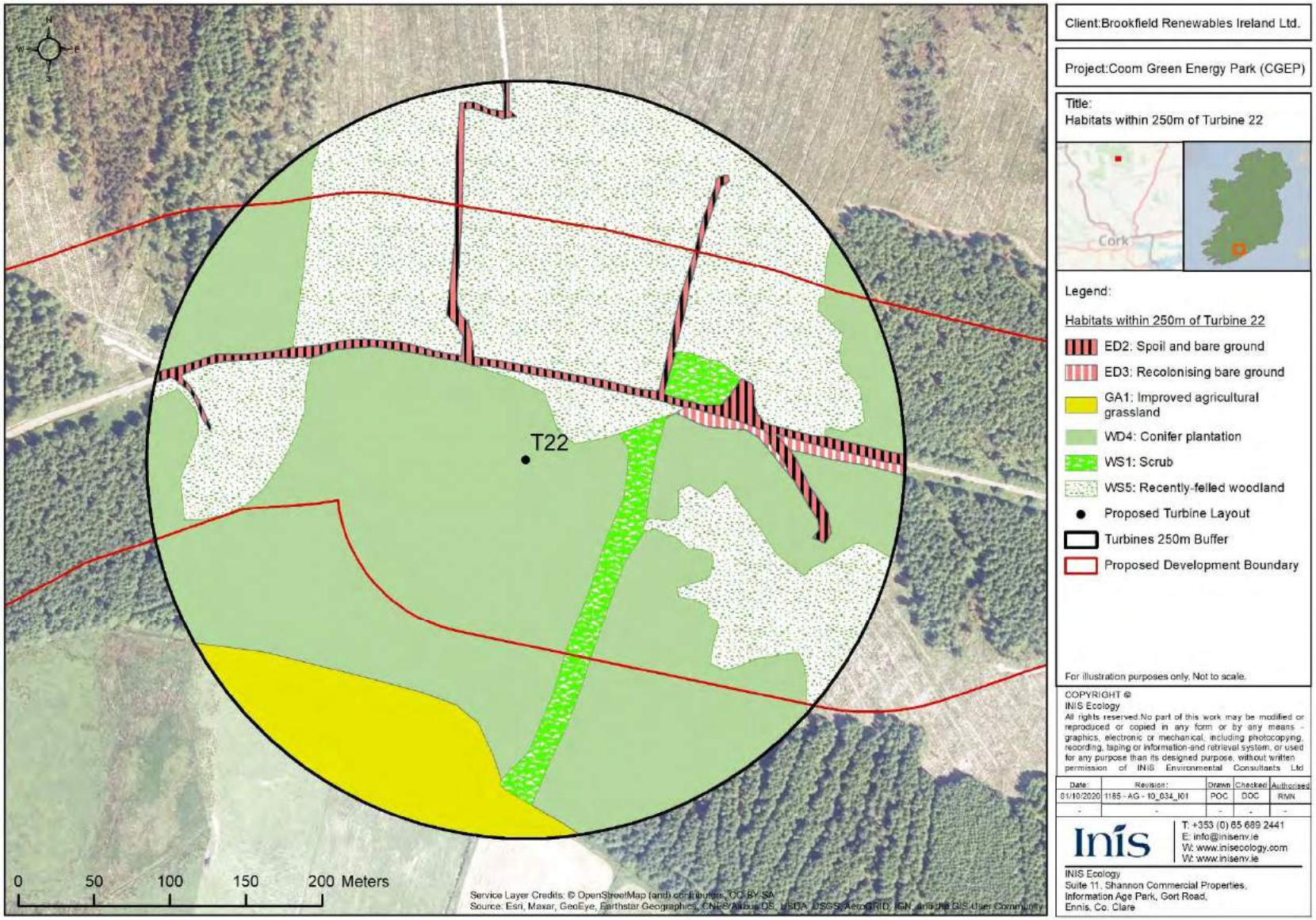
T22
0 50 100 150 200 Meters
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Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 22
Cork
Legend:
Habitats within 250m of Turbine 22
ED2: Spoil and bare ground
ED3: Recolonising bare ground
GA1: Improved agricultural grassland
WD4: Conifer plantation
WS1: Scrub
WS5: Recently-felled woodland
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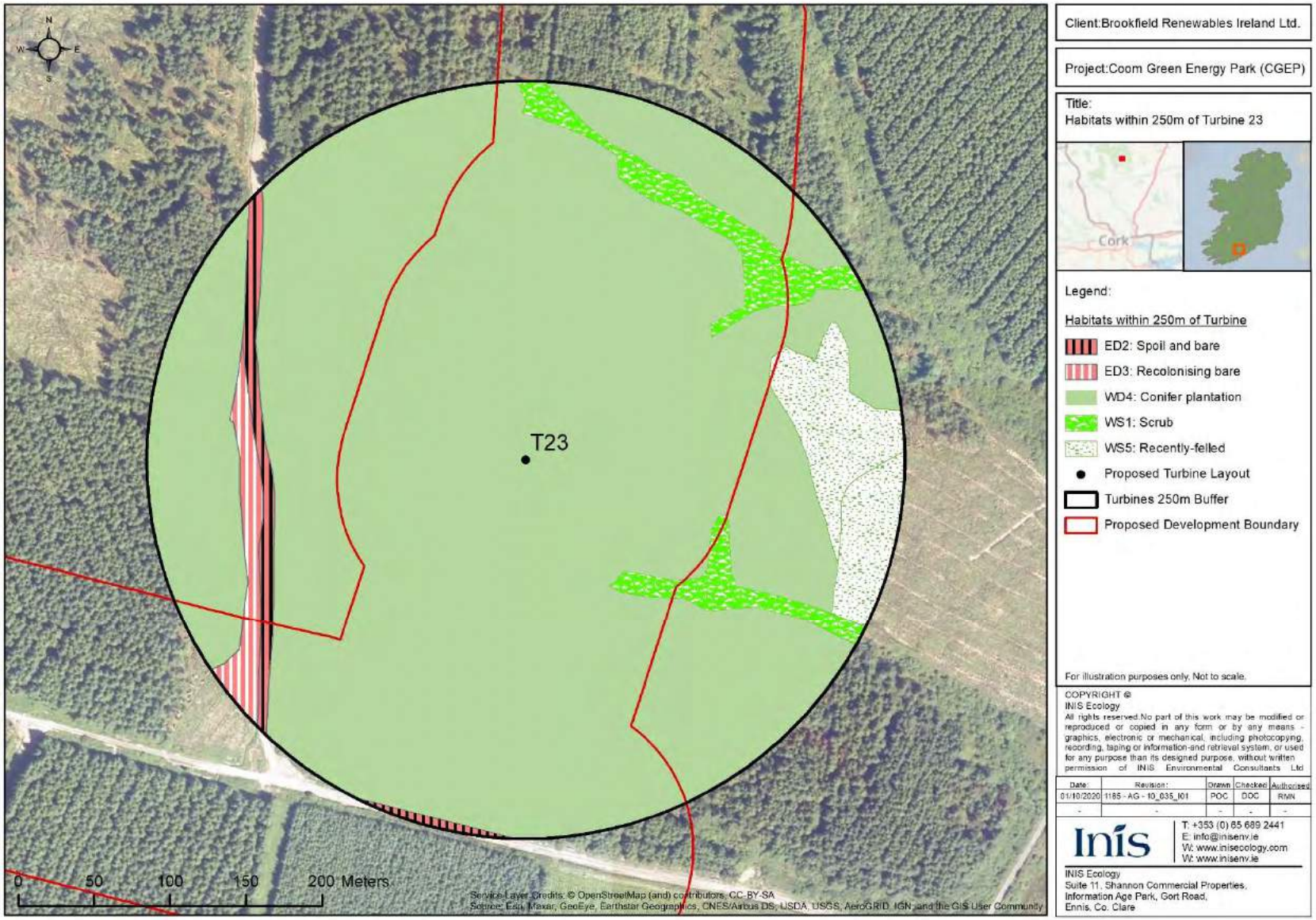
N
W
E
S
T23
0
50
100
150
200 Meters
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Project:Coom Green Energy Park (CGEP)
Title:
Habitats within 250m of Turbine 23
Cork
Legend:
Habitats within 250m of Turbine
ED2: Spoil and bare
ED3: Recolonising bare
WD4: Conifer plantation
WS1: Scrub
WS5: Recently-felled
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Appendix B – Forage habitat calculations for 250m buffer surrounding Turbines.

Turbine 2

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T2	WD4	17-18	2002	2045	1.05	5	0.18
T2	WD4	25-26	1994	2040	0.08	10	0.03
T2	WD4	25-26	1994	2027	0.00	10	0.00
T2	WD4	22-23	1997	2041	0.13	9	0.04
T2	WD4	21-22	1998	2046	1.63	4	0.22
T2	WD4	25-26	1994	2027	0.25	10	0.08
T2	WD4	25-26	1994	2040	0.00	10	0.00
T2	ED2	-			0.09		0.09
T2	WS1	-			0.12		0.12
T2	WD4	22-23	1997	2027	0.21	10	0.07
T2	WD4	22-23	1997	2041	0.87	9	0.26
T2	WD4	25-26	1994	2040	4.25	10	1.42
T2	WD4	25-26	1994	2040	2.48	10	0.83
T2	WD4	17-18	2002	2045	0.55	5	0.09
T2	WS1	-			0.24		0.24
T2	WD4	25-26	1994	2040	4.22	10	1.41
T2	WD4	12-13	2007	2025	0.06	10	0.02
T2	WS1	-			0.00		0.00
T2	WS1	-			0.08		0.08
T2	WS1	-			0.00		0.00
T2	WS1	-			0.12		0.12
T2	WD4	21-22	1998	2046	1.74	4	0.23
T2	WS1	-			0.01		0.01
T2	WS1	-			0.00		0.00
T2	WS1	-			0.00		0.00
T2	WD4	22-23	1997	2027	0.04	10	0.01
T2	WD4	21-22	1998	2046	0.20	4	0.03
T2	WD4	25-26	1994	2027	0.01	10	0.00
T2	WD4	25-26	1994	2040	0.04	10	0.01
T2	WD4	25-26	1994	2027	0.02	10	0.01
T2	WD4	17-18	2002	2046	0.14	4	0.02
T2	WD4	25-26	1994	2027	0.02	10	0.01
T2	WD4	22-23	1997	2060	0.00	0	0.00

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T2	WD4	22-23	1997	2045	0.06	5	0.01
T2	WD4	22-23	1997	2060	0.18	0	0.00
T2	WD4	22-23	1997	2027	0.44	10	0.15
T2	WD4	17-18	2002	2045	0.16	5	0.03
T2	WD4	25-26	1994	2045	0.11	5	0.02
T2	WD4	25-26	1994	2046	0.02	4	0.00
T2	WD4	25-26	1994	2045	0.00	5	0.00

Turbine 3

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T3	ED2	-			0.03		0.03
T3	WD4	-			0.13	0	0.00
T3	WD4	56-57	1963		0.08	0	0.00
T3	WS1	-			0.04		0.04
T3	WD4	56-57	1963		0.00	0	0.00
T3	WD4	56-57	1963		0.00	0	0.00
T3	WD4	7-8	2012	2023	1.68	12	0.67
T3	WD4	31-32	1988	2044	0.46	6	0.09
T3	WS1	-			0.04		0.04
T3	ED2	-			0.29		0.29
T3	WS1	-			0.99		0.99
T3	ED3	-			0.02		0.02
T3	WD4	7-8	2012	2023	1.27	12	0.51
T3	WD4	-			0.03	0	0.00
T3	WS1	-			0.96		0.96
T3	WS1	-			0.04		0.04
T3	WD4	56-57	1963		0.95	0	0.00
T3	ED2	-			0.01		0.01
T3	ED3	-			0.04		0.04
T3	WD4	7-8	2012	2023	1.50	12	0.60
T3	WS5	-			0.39		0.39
T3	WD4	15-16	2004	2047	0.18	3	0.02
T3	WD4	11-12	2008	2054	0.40	0	0.00
T3	WD4	9-10	2010	2045	0.01	5	0.00
T3	HH3/WS1	-			0.37		0.37
T3	WS1	-			0.06		0.06
T3	WS1	-			0.01		0.01
T3	WD4	7-8	2012	2023	1.05	12	0.42

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T3	WS5	-			0.60		0.60
T3	WD4	56-57	1963		2.17	0	0.00
T3	WD4	56-57	1963		0.64	0	0.00
T3	WS5	-			0.19		0.19
T3	WD4	9-10	2010	2045	2.21	5	0.37
T3	WS5	-			0.04		0.04
T3	ED3	-			0.04		0.04
T3	WD4	56-57	1963		0.00	0	0.00
T3	WD4	9-10	2010	2045	0.41	5	0.07
T3	WD4	56-57	1963		0.74	0	0.00
T3	WD4	7-8	2012	2047	1.25	5	0.21
T3	WD4	31-32	1988	2028	0.30	10	0.10

Turbine 4

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T4	BL3	-			0.06		0
T4	WD4	12-13	2007	2025	0.01	10	0.00
T4	WD4	9-10	2010	2045	10.11	5	1.68
T4	WD4	31-32	1988	2044	0.00	6	0.00
T4	WS1	-			0.21		0.21
T4	WD4	22-23	1997		0.97	0	0.00
T4	FS1	-			0.01		0.01
T4	WS1	-			0.00		0.00
T4	WD4	9-10	2010	2025	0.12	10	0.04
T4	WD4	12-13	2007	2025	0.12	10	0.04
T4	WD4	22-23	1997	2041	0.01	9	0.00
T4	WD4	12-13	2007	2025	0.08	10	0.03
T4	WS1	-			0.07		0.07
T4	WS1	-			0.02		0.02
T4	BL3	-			0.06		0
T4	FL8	-			0.11		0.11
T4	BL3	-			0.09		0
T4	WD4	31-32	1988	2044	0.48	6	0.10
T4	WD4	9-10	2010	2045	2.17	5	0.36
T4	WS1	-			0.29		0.29
T4	WD4	23-24	1996	2040	0.17	10	0.06
T4	WD4	23-24	1996	2040	0.60	10	0.20
T4	GS4/HH1	-			0.60		0.60

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T4	WD4	22-23	1997		0.10	0	0.00
T4	WD4	31-32	1988		0.95	0	0.00
T4	WD4	23-24	1996		1.04	0	0.00
T4	WS5	-			0.30		0.30
T4	WD4	22-23	1997		0.35	0	0.00
T4	WD4	22-23	1997		0.09	0	0.00
T4	WS5	-			0.06		0.06
T4	WD4	22-23	1997		0.23	0	0.00
T4	WS1	-			0.06		0.06
T4	WS1	-			0.11		0.11
T4	WD4	31-32	1988	2044	0.00	6	0.00
T4	WD4	22-23	1997		0.00	0	0.00
T4	WD4	22-23	1997		0.00	0	0.00

Turbine 5

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T5	WD4	26-27	1993		0.11	0	0.00
T5	WD4	32-33	1987	2031	5.17	10	1.72
T5	WD4	18-19	2001		4.04	0	0.00
T5	WD4	32-33	1987	2031	1.01	10	0.34
T5	WS1	-			0.08		0.08
T5	WD4	26-27	1993		1.23	0	0.00
T5	WD4	26-27	1993	2043	0.23	7	0.05
T5	WD4	26-27	1993		0.88	0	0.00
T5	WD4	26-27	1993	2043	1.67	7	0.39
T5	HH3	-			0.34		0.34
T5	ED3	-			0.06		0.06
T5	WD4	26-27	1993	2043	1.78	7	0.42
T5	WD4	26-27	1993	2043	1.19	7	0.28
T5	WD4	18-19	2001		0.01	0	0.00
T5	WD4	18-19	2001		0.06	0	0.00
T5	WD4	26-27	1993	2054	0.82	0	0.00
T5	WD4	26-27	1993	2054	0.96	0	0.00
T5	BL3	-			0.15		0
T5	WD4	9-10	2010	2045	0.21	5	0.04
T5	WD4	8-9	2011	2045	0.00	6	0.00
T5	WD4	8-9	2011	2045	0.10	6	0.02
T5	WD4	9-10	2010	2045	0.00	5	0.00

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T5	WD4	46-47	1973	2020	0.00	10	0.00
T5	WD4	46-47	1973	2020	3.78	10	1.26
T5	WD4	32-33	1987	2031	0.63	10	0.21
T5	WD4	46-47	1973	2045	0.00	5	0.00
T5	WD4	2-3	2017	2051	6.42	7	1.50
T5	WS1	-			0.98		0.98
T5	ED2	-			0.31		0.31
T5	WD4	32-33	1987	2031	0.13	10	0.04
T5	WD4	46-47	1973	2045	1.13	5	0.19
T5	WD4	46-47	1973		0.38	0	0.00
T5	WD4	46-47	1973		0.28	0	0.00
T5	HH3	-			0.09		0.09
T5	ED2	-			0.04		0.04
T5	WS1	-			0.00		0.00
T5	WD4	46-47	1973		0.02	0	0.00
T5	WS1	-			0.05		0.05
T5	WD4	46-47	1973	2020	0.00	10	0.00
T5	WD4	46-47	1973	2020	0.00	10	0.00
T5	WD4	46-47	1973		1.77	0	0.00
T5	WD4	2-3	2017	2051	3.14	7	0.73

Turbine 6

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T6	BL3	-			0.15		0
T6	WD4	9-10	2010	2045	0.21	5	0.04
T6	WD4	8-9	2011	2045	0.00	6	0.00
T6	WD4	8-9	2011	2045	0.10	6	0.02
T6	WD4	9-10	2010	2045	0.00	5	0.00
T6	WD4	46-47	1973	2020	0.00	10	0.00
T6	WD4	46-47	1973	2020	3.78	10	1.26
T6	WD4	32-33	1987	2031	0.63	10	0.21
T6	WD4	46-47	1973	2045	0.00	5	0.00
T6	WD4	2-3	2017	2051	6.42	7	1.50
T6	WS1	-			0.98		0.98
T6	ED2	-			0.31		0.31
T6	WD4	32-33	1987	2031	0.13	10	0.04
T6	WD4	46-47	1973	2045	1.13	5	0.19
T6	WD4	46-47	1973		0.38	0	0.00

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T6	WD4	46-47	1973		0.28	0	0.00
T6	HH3	-			0.09		0.09
T6	ED2	-			0.04		0.04
T6	WS1	-			0.00		0.00
T6	WD4	46-47	1973		0.02	0	0.00
T6	WS1	-			0.05		0.05
T6	WD4	46-47	1973	2020	0.00	10	0.00
T6	WD4	46-47	1973	2020	0.00	10	0.00
T6	WD4	46-47	1973		1.77	0	0.00
T6	WD4	2-3	2017	2051	3.14	7	0.73

Turbine 7

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T7	WS1	-			0.07		0.07
T7	WS5	-			0.29		0.29
T7	WS1	-			0.10		0.10
T7	WS1	-			0.02		0.02
T7	HD1	-			0.16		0.16
T7	WS1	-			0.09		0.09
T7	WS1	-			0.00		0.00
T7	WD4	45-46	1974	2008	0.00	10	0.00
T7	WD4	47-48	1972		0.02	0	0.00
T7	WD4	45-46	1974	2008	0.26	10	0.09
T7	WD4	45-46	1974		0.00	0	0.00
T7	WS1	-			0.09		0.09
T7	WS1	-			0.00		0.00
T7	WD4	45-46	1974	2008	0.00	10	0.00
T7	WD4	45-46	1974	2008	0.02	10	0.01
T7	WD4	45-46	1974	2008	0.69	10	0.23
T7	WD4	45-46	1974	2051	0.00	0	0.00
T7	WS1	-			0.00		0.00
T7	WS1	-			0.04		0.04
T7	WS1	-			0.01		0.01
T7	WS1	-			0.00		0.00
T7	WD4	2-3	2017	2051	1.13	7	0.26
T7	WD4	45-46	1974	2008	2.64	10	0.88
T7	WD4	21-22	1998		0.34	0	0.00
T7	WD4	18-19	2011	2049	0.00	2	0.00

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T7	WD4	18-19	2011	2049	0.38	2	0.03
T7	WS5	-			0.01		0.01
T7	WS1	-			0.00		0.00
T7	WD4	18-19	2011	2049	0.02	2	0.00
T7	WS1	-			0.00		0.00
T7	ED2	-			0.01		0.01
T7	ED2	-			0.25		0.25
T7	BL3	-			0.12		0
T7	ED2	-			0.09		0.09
T7	ED2	-			0.08		0.08
T7	WD4/WS1	-			0.26		0.26
T7	WD4	45-46	1974		0.12	0	0.00
T7	WD4	45-46	1974		0.38	0	0.00
T7	WD4	18-19	2011	2049	0.30	2	0.02
T7	FL8	-			0.15		0.15
T7	BL3	-			0.06		0
T7	BL2	-			0.15		0.15
T7	WS1/WD4	-			1.08		1.08
T7	WD4	18-19	2011	2049	0.06	2	0.00
T7	WS1	-			0.48		0.48
T7	WS1	-			0.49		0.49
T7	WS5	-			1.46		1.46
T7	WS1	-			0.12		0.12
T7	WS5	-			4.58		4.58
T7	WS5	-			0.23		0.23
T7	WD4	45-46	1974		0.31	0	0.00
T7	WD4	45-46	1974		0.18	0	0.00
T7	WD4	47-48	1972		0.23	0	0.00
T7	WS5	-			0.05		0.05
T7	WD4	2-3	2017	2052	0.24	7	0.06
T7	WS1	-			0.03		0.03
T7	WS5	-			0.00		0.00
T7	WS5	-			0.00		0.00
T7	ED2	-			0.00		0.00
T7	WD4	45-46	1974	2100	0.43	0	0.00
T7	WD4	2-3	2017	2052	0.30	7	0.07
T7	WD4	45-46	1974	2045	0.42	5	0.07
T7	WD4	45-46	1974	2052	0.59	0	0.00

Turbine 8

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T8	WD4	21-22	1998		1.23	0	0.00
T8	WD1	-			1.06		1.06
T8	WD4	21-22	1998		1.54	0	0.00
T8	WS1	-			0.10		0.10
T8	GA1	-			0.04		0
T8	WS5	-			0.12		0.12
T8	WS1	-			0.15		0.15
T8	WS1	-			0.02		0.02
T8	WD4	15-16	2004	2045	2.76	5	0.46
T8	WD4	44-45	1974	2045	1.45	5	0.24
T8	WS1	-			0.08		0.08
T8	WD4	44-45	1974	2100	0.49	0	0.00
T8	WD4	15-16	2004	2100	1.00	0	0.00
T8	GA1	-			2.84		0
T8	GA1	-			0.53		0
T8	GA1	-			0.73		0
T8	GA1	-			2.89		0
T8	GS4	-			0.82		0.82
T8	GA1	-			1.49		0
T8	WS1	-			0.02		0.02

Turbine 9

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T9	ED2	-			0.27		0.27
T9	BL3	-			0.01		0
T9	ED2	-			0.16		0.16
T9	GA1	-			0.49		0
T9	WD4	31-32	1988		0.16	0	0.00
T9	WS1	-			0.15		0.15
T9	GA1	-			0.22		0
T9	GA1	-			0.81		0
T9	GS4	-			0.80		0.80
T9	GA1	-			1.58		0
T9	WS1	-			0.74		0.74
T9	WS1	-			0.32		0.32
T9	WS1	-			0.15		0.15

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T9	WS5	-			7.40		7.40
T9	WS5	-			0.17		0.17
T9	WD4	31-32	1988		1.01	0	0.00
T9	WS1	-			0.28		0.28
T9	WS1	-			0.16		0.16
T9	WS5	-			0.48		0.48
T9	WD4	21-22	1998		3.45	0	0.00
T9	GA1	-			0.81		0
T9	GA1	-			0.00		0
T9	GA1	-			0.00		0
T9	WD4	31-32	1988		0.00	0	0.00
T9	GA1	-			0.00		0
T9	GA1	-			0.00		0
T9	GS4	-			0.00		0.00
T9	WD4	21-22	1998		0.00	0	0.00
T9	GS4	-			0.00		0.00
T9	GA1	-			0.00		0
T9	GA1	-			0.00		0

Turbine 10

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T10	WS1	-			0.66		0.66
T10	GA1	-			2.13		0
T10	WD4	31-32	1988		0.57	0	0.00
T10	WD4	23-24	1996		7.01	0	0.00
T10	GA1	-			0.07		0
T10	GA1	-			7.53		0
T10	GA1	-			1.29		0
T10	ED2	-			0.07		0.07
T10	GA1	-			0.03		0
T10	GA1	-			0.11		0
T10	GA1	-			0.06		0
T10	WS1	-			0.01		0.01
T10	WD4	23-24	1996		0.00	0	0.00
T10	WS1	-			0.10		0.10

Turbine 11

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T11	GS4/HH3	-			0.37		0.37
T11	GS4/HH3	-			1.13		1.13
T11	WS1/HH3	-			0.55		0.55
T11	GA1	-			0.25		0
T11	GS4	-			0.26		0.26
T11	GA1	-			0.00		0
T11	GA1	-			0.13		0
T11	GA1	-			0.17		0
T11	GA1	-			3.50		0
T11	GA1	-			8.42		0
T11	ED2	-			0.14		0.14
T11	WD4	23-24	1996	2040	0.05	10	0.02
T11	ED2	-			0.32		0.32
T11	ED2	-			0.04		0.04
T11	GA1	-			0.77		0
T11	GA1	-			3.07		0
T11	ED2	-			0.02		0.02
T11	GA1	-			0.03		0
T11	ED2	-			0.01		0.01
T11	GA1	-			0.40		0

Turbine 12

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T12	ED2	-			0.05		0.05
T12	GS4	-			0.16		0.16
T12	WD4	21-22	1997	2037	11.94	10	3.98
T12	GA1	-			6.87		0
T12	HH3/WS1	-			0.53		0.53
T12	ED2	-			0.08		0.08

Turbine 13

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T13	GS4	-			3.40		3.40

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T13	WD4	20-21	1999	2040	0.33	10	0.11
T13	WS5	-			8.27		8.27
T13	WS5	-			0.12		0.12
T13	ED2	-			0.36		0.36
T13	WS5	-			1.58		1.58
T13	WD4	46-47	1973	2023	4.56	10	1.52
T13	WS5	-			1.01		1.01

Turbine 14

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T14	WD4	25-26	1994	2040	14.77	10	4.92
T14	WD4	10-11	2009	2040	0.15	10	0.05
T14	WS5	-			0.02		0.02
T14	WS5	-			1.19		1.19
T14	GS4	-			0.17		0.17
T14	GA1	-			3.03		0
T14	GA1	-			0.08		0
T14	ED2	-			0.06		0.06
T14	ED2	-			0.17		0.17

Turbine 15

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T15	ED2	-			0.28		0.28
T15	WS5	-			1.66		1.66
T15	WD4	10-11	2009	2053	0.65	0	0.00
T15	ED3	-			0.32		0.32
T15	WD4	47-48	1972	2024	3.78	10	1.26
T15	WS5	-			3.54		3.54
T15	GA1	-			0.58		0
T15	WD4	10-11	2009	2053	2.20	0	0.00
T15	WS5	-			0.25		0.25
T15	WD4	10-11	2009	2053	0.69	0	0.00
T15	WD4	10-11	2009	2053	0.92	0	0.00
T15	WS5	-			0.43		0.43

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T15	WD4	10-11	2009	2023	2.21	10	0.74
T15	WD4	10-11	2009	2053	0.75	0	0.00
T15	ED3	-			0.14		0.14
T15	WD4	10-11	2009	2053	1.16	0	0.00
T15	ED3	-			0.06		0.06
T15	ED2	-			0.02		0.02

Turbine 16

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T16	WS5	-			1.98		1.98
T16	WD4	26-27	1993	2040	0.96	10	0.32
T16	WD4	26-27	1993	2040	0.08	10	0.03
T16	WD4	26-27	1993	2040	0.24	10	0.08
T16	GA1	-			0.11		0
T16	WD4	26-27	1993	2040	0.84	10	0.28
T16	WD4	47-48	1972	2024	1.20	10	0.40
T16	WD4	26-27	1993	2040	5.26	10	1.75
T16	WD4	26-27	1993	2040	8.70	10	2.90
T16	WD4	26-27	1993	2040	0.26	10	0.09

Turbine 17

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T17	WS1	-			2.36		2.36
T17	ED2	-			0.10		0.10
T17	WD4	22-23	1997	2027	5.29	10	1.76
T17	WD1	62-63	1957	2053	0.87		0.87
T17	WD1	62-63	1957	2053	0.00		0.00
T17	WD4	22-23	1997	2027	1.26	10	0.42
T17	WD4	22-23	1997	2027	1.80	10	0.60
T17	WD4	18-19	2000	2027	0.75	10	0.25
T17	WD4	22-23	1997	2027	3.37	10	1.12
T17	GS4/HH3	-			0.64		0.64
T17	WD4	22-23	1997	2039	2.10	10	0.70
T17	WD4	13-14	2006	2050	0.37	0	0.00

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T17	ED2	-			0.07		0.07
T17	ED2	-			0.48		0.48

Turbine 18

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T18	WD4	13-14	2006	2050	2.21	0	0.00
T18	WD4	16-17	2003	2050	11.90	0	0.00
T18	WD4	22-23	1997	2027	3.99	10	1.33
T18	WD4	22-23	1997	2027	0.71	10	0.24
T18	ED3	-			0.34		0.34
T18	ED2	-			0.14		0.14
T18	ED2	-			0.34		0.34

Turbine 19

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T19	ED2	-			0.31		0.31
T19	WD1	-			0.18		0.18
T19	WS1	-			0.07		0.07
T19	WS1	-			0.48		0.48
T19	WS1	-			0.04		0.04
T19	WS1	-			0.04		0.04
T19	WS1	-			0.05		0.05
T19	WS1	-			0.03		0.03
T19	WS1	-			0.02		0.02
T19	WS1	-			0.09		0.09
T19	WS1	-			0.03		0.03
T19	WS1	-			0.02		0.02
T19	WD4	24-25	1995		0.77	0	0.00
T19	WD4	26-27	1993		6.17	0	0.00
T19	WD4	24-25	1995		5.62	0	0.00
T19	WD4	28-29	1991		2.66	0	0.00
T19	WD4	24-25	1995		3.04	0	0.00

Turbine 20

Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T20	WD4	28-29	1991		6.83	0	0.00
T20	WD4	36-37	1983		1.33	0	0.00
T20	GS4	-			1.19		1.19
T20	WD4	35-36	1983		7.70	0	0.00
T20	WD4	35-36	1983		0.87	0	0.00
T20	WD4	35-36	1983		0.05	0	0.00
T20	GS4	-			0.96		0.96
T20	ED3	-			0.25		0.25
T20	ED2	-			0.46		0.46

Turbine 21

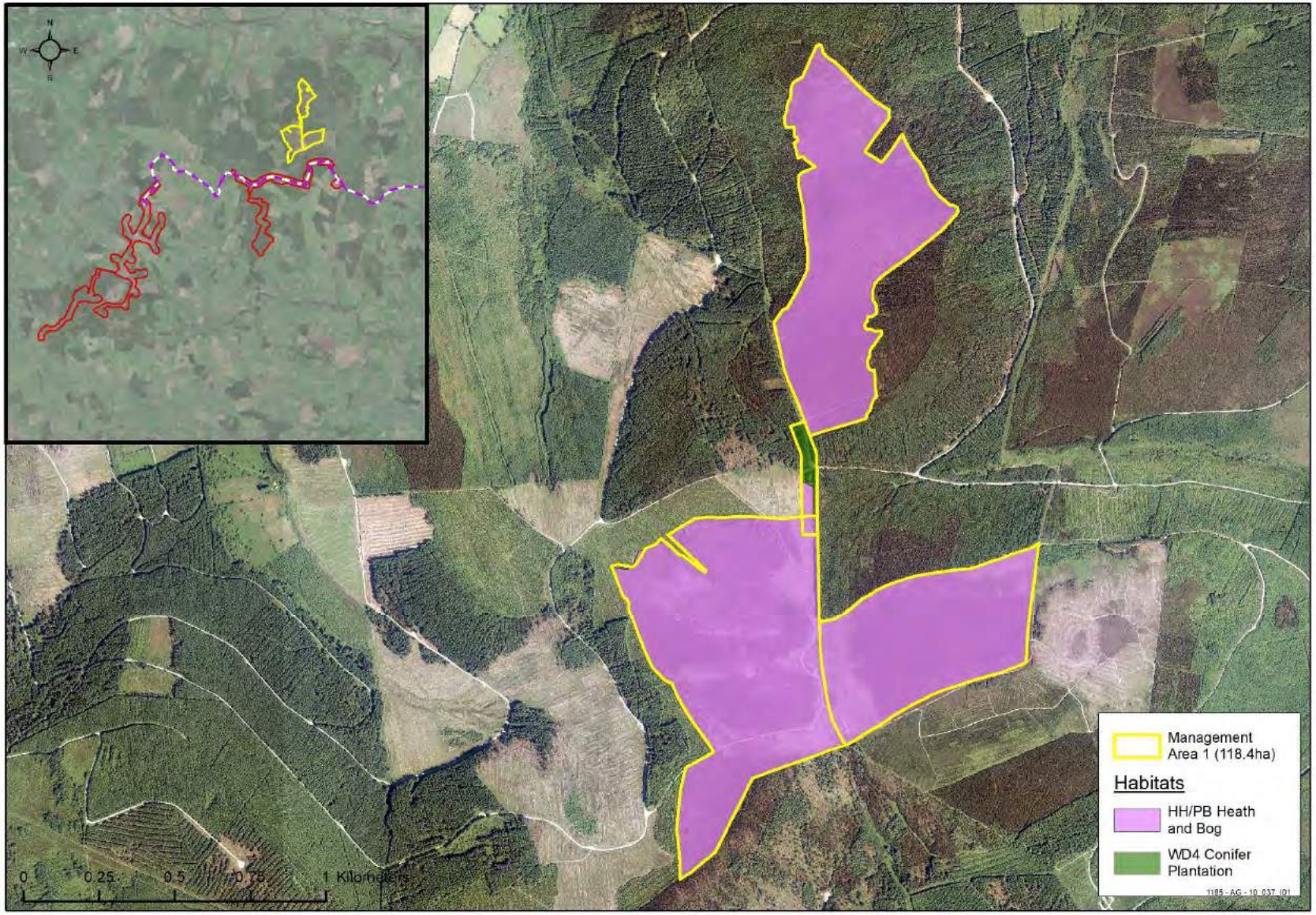
Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T21	GA1	-			2.37		0
T21	WS1	-			0.16		0.16
T21	WD4	11-12	2008	2055	1.35	0	0.00
T21	WD4	25-26	1994	2040	0.38	10	0.13
T21	WD4	25-26	1994	2045	9.15	5	1.53
T21	WD4	36-37	1983		6.21	0	0.00

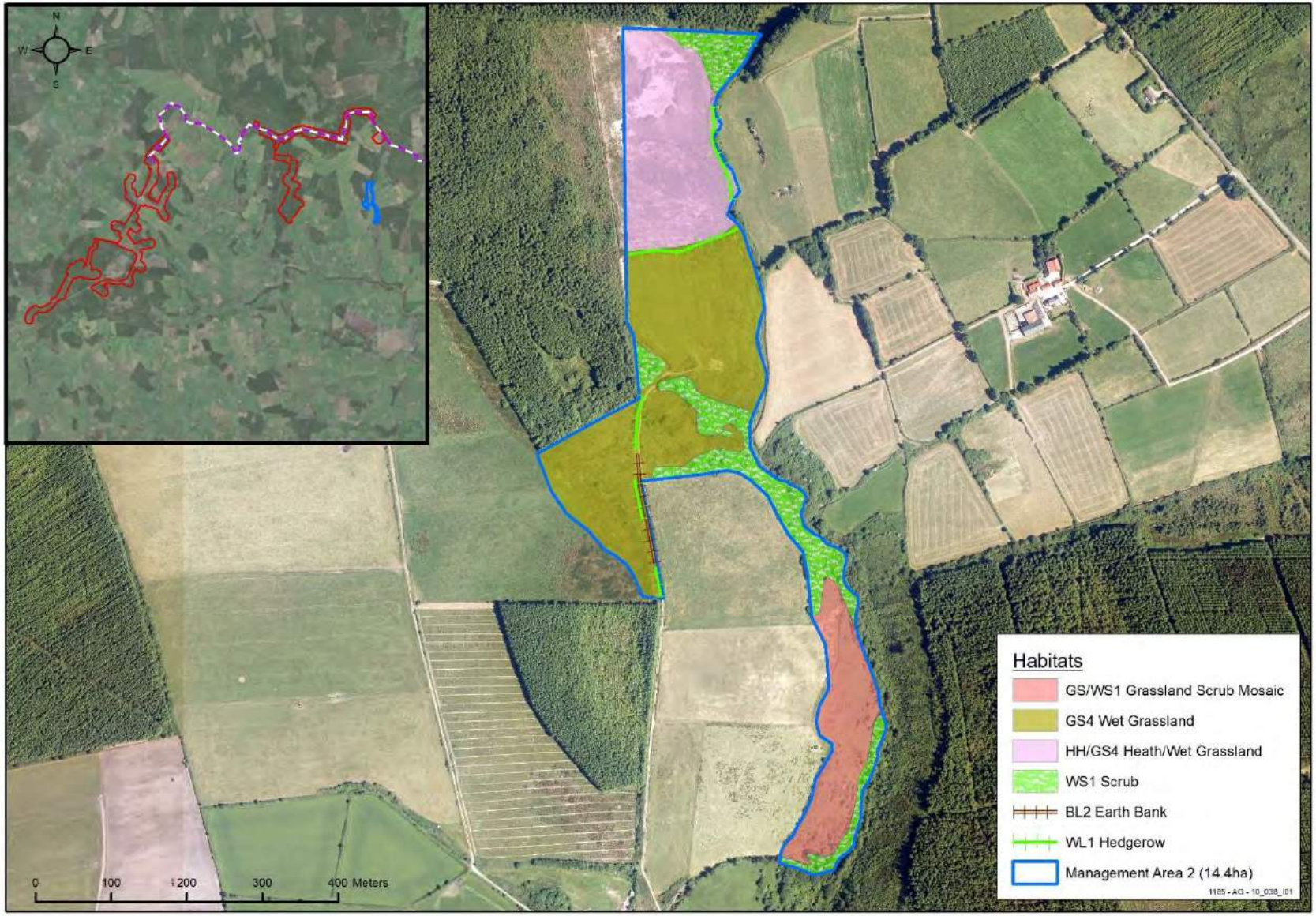
Turbine 22

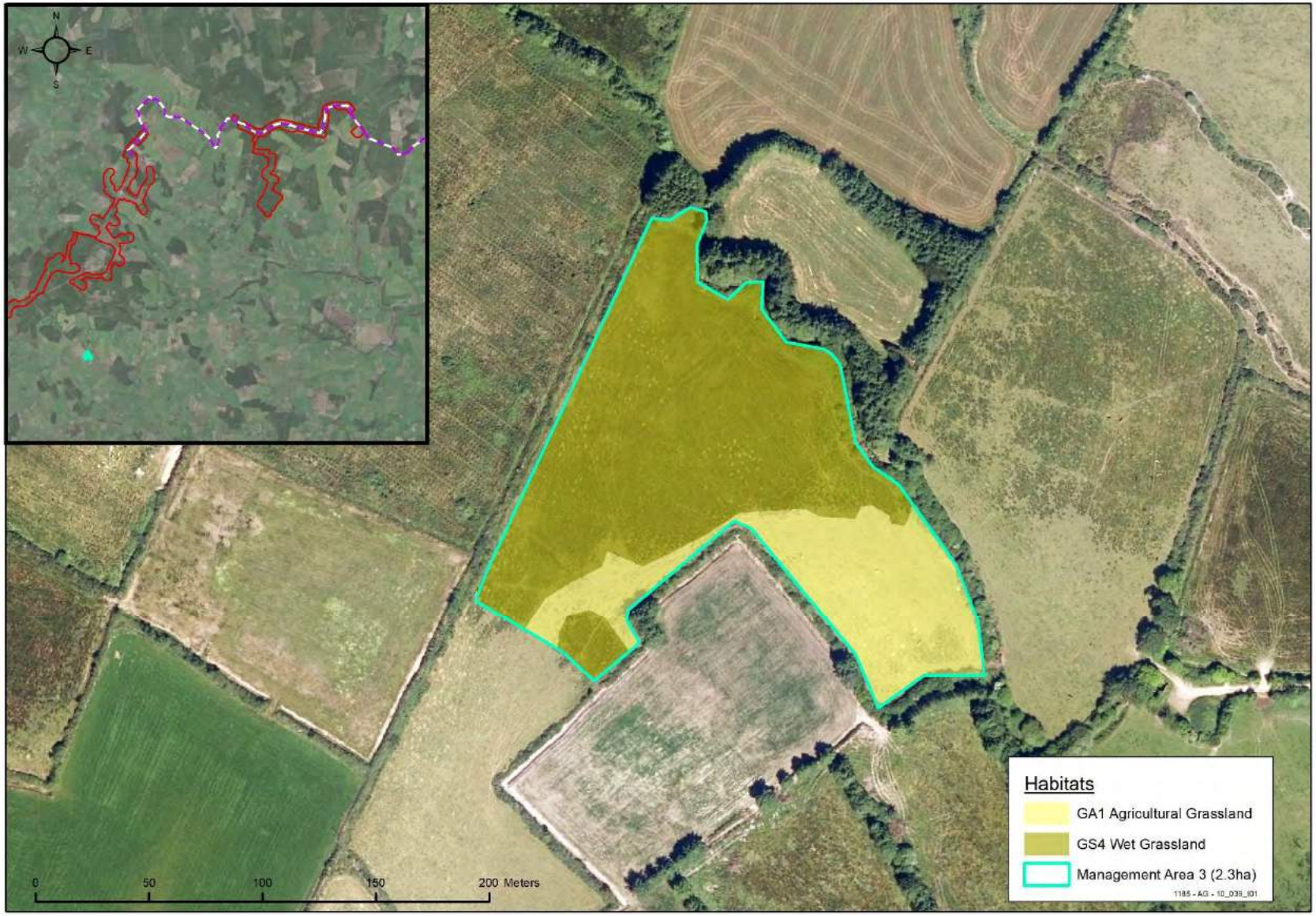
Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T22	WD4	28-29	1991		0.37	0	0.00
T22	WD4	28-29	1991		0.88	0	0.00
T22	WD4	28-29	1991		1.92	0	0.00
T22	WD4	28-29	1991		5.32	0	0.00
T22	WS5	-			1.03		1.03
T22	GA1	-			1.42		0
T22	WD4	35-36	1983		0.80	0	0.00
T22	WS5	-			1.55		1.55
T22	WS5	-			0.68		0.68
T22	WS1	-			0.12		0.12
T22	WS5	-			4.15		4.15
T22	WS1	-			0.47		0.47

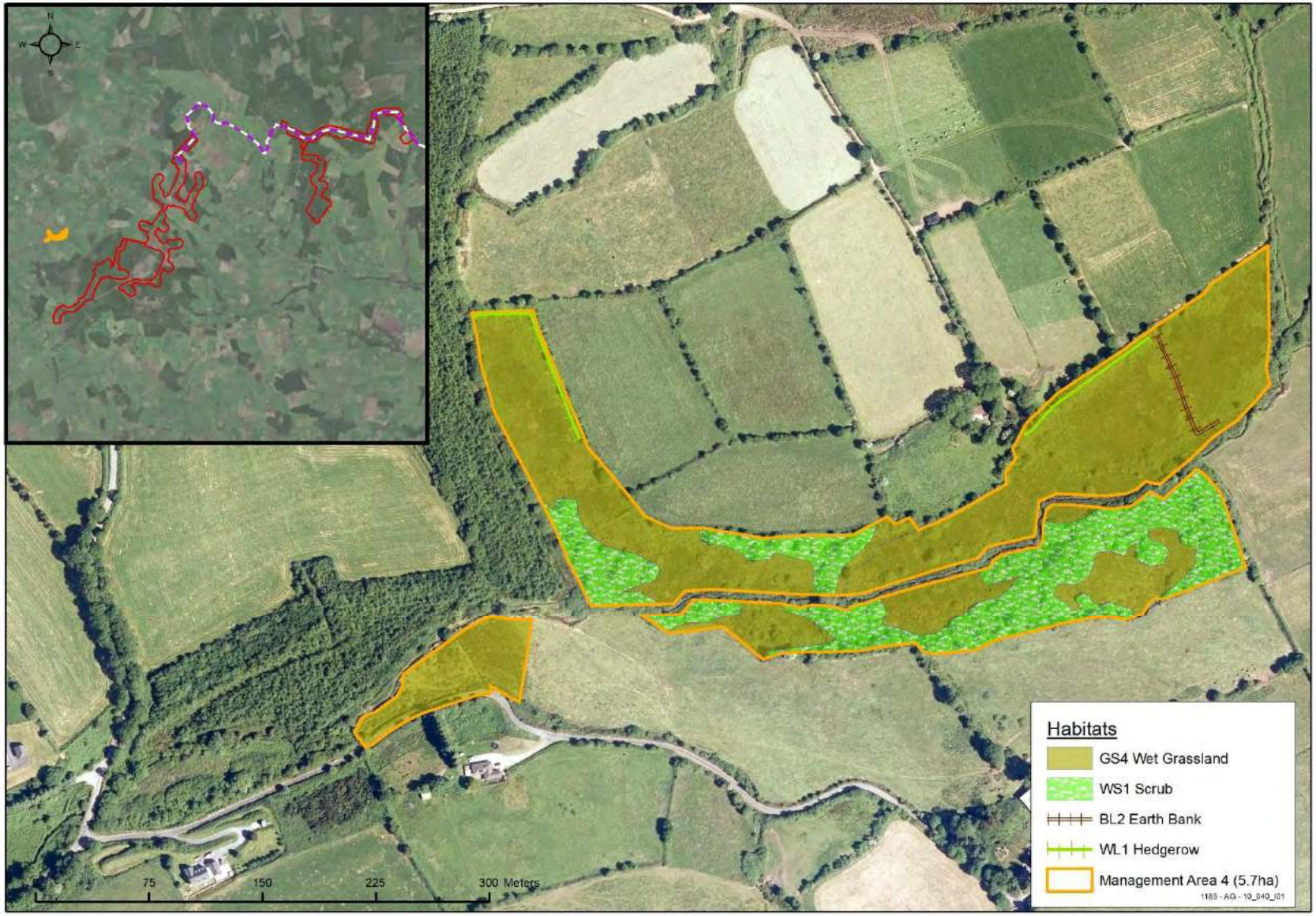
Turbine	Fossitt Code	Forestry age class (2020)	Plant year	Fell year	Area (ha)	Availability of Habitat (yrs)	Mitigation Habitat (ha/annum)
T22	ED3	-			0.05		0.05
T22	ED3	-			0.05		0.05
T22	WS5	-			0.25		0.25
T22	ED2	-			0.54		0.54

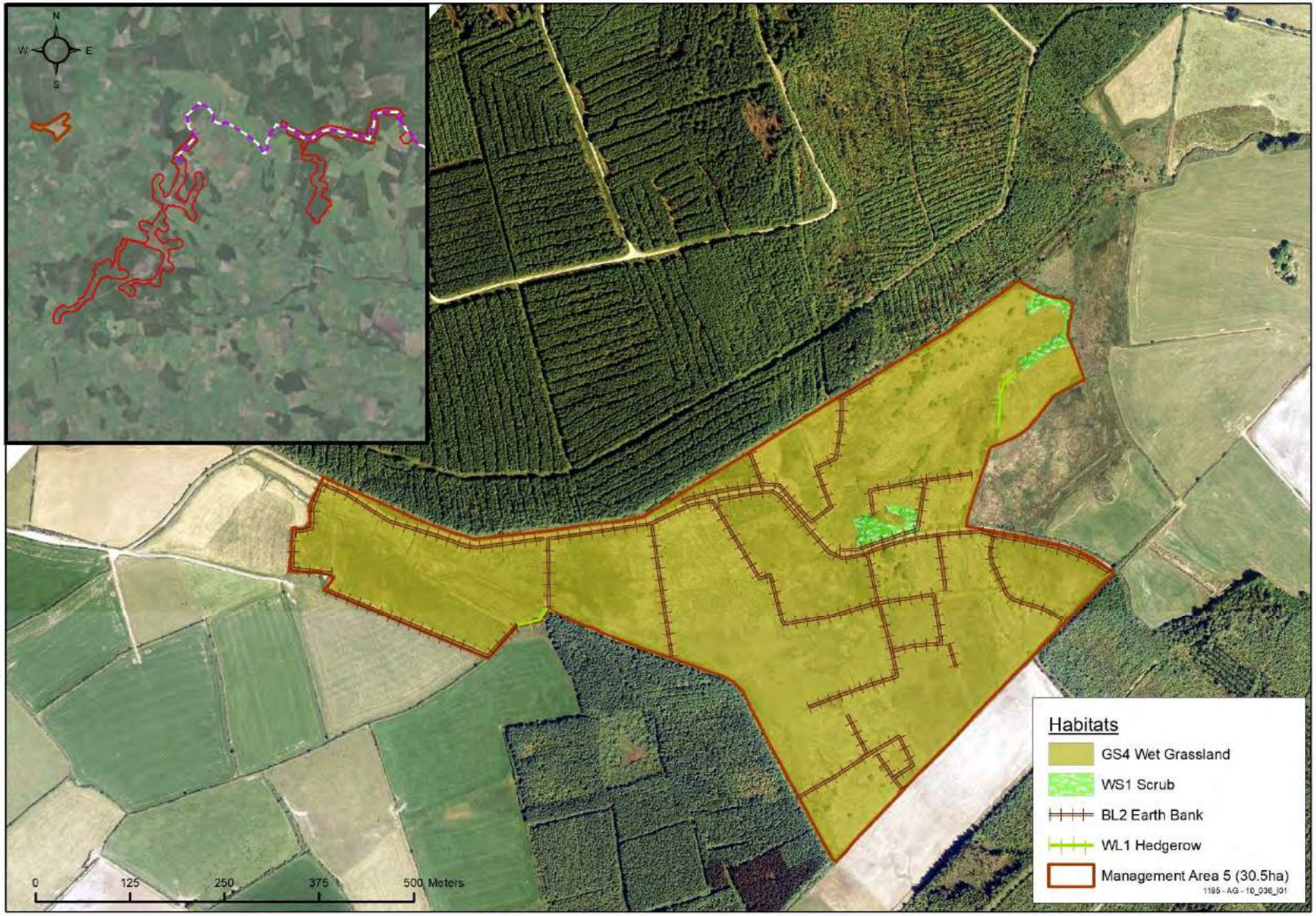
Appendix C – Site Conditions and Description of Management Areas.


Management Area 1 (118.4ha)
Habitats
HH/PB Heath and Bog
WD4 Conifer Plantation
0
0.25
0.5
0.75
1 Kilometers


N
W
E
S
Habitats
GS/WS1 Grassland Scrub Mosaic
GS4 Wet Grassland
HH/GS4 Heath/Wet Grassland
WS1 Scrub
BL2 Earth Bank
WL1 Hedgerow
Management Area 2 (14.4ha)
0
100
200
300
400 Meters


N
W
E
S
Habitats
GA1 Agricultural Grassland
GS4 Wet Grassland
Management Area 3 (2.3ha)
0
50
100
150
200 Meters


N
W
E
S
Habitats
GS4 Wet Grassland
WS1 Scrub
BL2 Earth Bank
WL1 Hedgerow
Management Area 4 (5.7ha)
1185 - AG - 10_040_101
75
150
225
300 Meters


N
W
E
S
Habitats
GS4 Wet Grassland
WS1 Scrub
BL2 Earth Bank
WL1 Hedgerow
Management Area 5 (30.5ha)
1185 - AG - 10_036_I01
0
125
250
375
500 Meters

Appendix F: CGEP - Surface Water Management Plan

FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

COOM GREEN ENERGY PARK

SURFACE WATER MANAGEMENT PLAN

Prepared for: Coom Green Energy Park Limited

coom green energy

Date: December 2020

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North Road, Dublin 11, D11 PXT0, Ireland

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1. SITE DRAINAGE MANAGEMENT PLAN

This Site Drainage Management Plan should be read in conjunction with the EIAR. The Site Drainage Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works.

1.1 Daily Preparation during the Implementation of the Surface Water Management Plan

The Drainage Engineer appointed by the contractor should conduct regular meetings with the Construction Management Team to discuss the phasing of construction and drainage as the work progresses. The focus of these meetings will be on establishing an operational drainage system in advance of the progression of the works. Particular regard will be taken of daily weather conditions and long-range forecasts.

The Drainage Engineer will have the authority to suspend the works if weather conditions are deemed too extreme for the effective protection of receiving watercourses. Mitigation measures to protect receiving watercourses will be put in place as directed by the Drainage Engineer in response to extreme forecasts.

1.1.1 Personnel Qualifications and Key Contacts

All those carrying out work on site must have a Fás/Solas Safe Pass Card. All works must be supervised by a competent supervisor. Workers must be adequately trained in the tasks they are required to carry out. The key contact names and contact details should be supplied to all personnel entering the site. All site staff should be informed of the emergency procedures for the site.

1.2 Construction Stage Impacts

During the construction period, the development has the potential to lead to impacts on hydrology and water quality unless appropriate mitigation is applied.

Tree felling, new site access roads, turbine hard-standing areas, the on-site sub-station and other new, hard surfaces have the potential to contribute to an increase in run-off and release of sediments in the watercourses.

No modifications are proposed at stream crossings to facilitate the turbine delivery route and therefore no potential hydrological impacts are expected from the Turbine Delivery Route.

Modifications along the TDR involves the temporary removal of street furniture and removal of some vegetation in addition to the temporary local widening at bends using hardcore material. Inappropriate management of the carrying out of these modifications could result in blockages of existing roadside drainage.

During construction, the transport of both dissolved and sediment-bound nutrients from soil to water could deleteriously affect water quality downstream, in the absence of mitigation measures. Nutrient transport from soil to water, may lead to eutrophication in waters receiving drainage from the site.

A detailed description of the potential construction stage impacts on hydrology and water quality can be found in Chapter 10 of the EIAR.

1.3 Operational Phase Impacts

The main hydrological impact of the development is the increase in runoff. Due to the insignificance of the increase in runoff from the development, the grassing over the drainage swales, and the non-intrusive nature of site operations, there is a negligible risk of sediment release to the watercourses during the operational stage.

1.4 Decommissioning Stage Impacts

The potential impacts associated with decommissioning will be similar in nature to those associated with construction of the Coom Green Energy park.

It is proposed that turbine foundations and hardstanding areas are left in place and covered with local topsoil and revegetated. Removal of this infrastructure would result in considerable disruption to the local environment in terms of an increased possibility of sedimentation. It is considered that leaving the turbine foundations hardstanding areas in-situ will cause less environmental damage than removing them.

Grid connection cables will be left in the ground, therefore no potential impacts during decommissioning stage are likely to occur.

It is proposed that the internal site access tracks will be left in place, subject to agreement with Cork County Council and the relevant landowners.

1.5 Drainage of Wind Farm during the Construction and Operation Phases

Sustainable Drainage Systems (SuDS)

Where possible, sustainable drainage systems, in the form of grassed swales will be used to drain the permitted development. The grassed swales will serve to slow down the velocities of flows draining the hardcore surfaces of the hardstanding areas and the access tracks. The proposed layout of the drainage system for CGEP is provided in Appendix 1.

The grassed swales will also treat the surface water run-off, removing some of the sediment borne contaminants. These grassed swales will serve to detain flows and reduce the velocities of surface water flows. The swales will be 0.3 m in depth with a bottom width of 0.5 m and side slopes of 1 in 3. A grassed swale is shown on Figure 1.

The swales will be constructed in accordance with CIRIA C698 Site Handbook for the Construction of SUDS. Swale draining to settlement pond is shown on Figure 2.

76 settlement ponds will be put in place in advance as construction progresses across the site. Settlement ponds will have a diffuse stone filled outflow which will encourage the diffuse spread of flows overland and back into natural drains down slope of the settlement ponds. Drainage stone will be placed at the inlet to the ponds to filter the flows before they enter the ponds.

After passing through the settlement ponds, the concentration of suspended solids in the surface water run-off due to the excavations will be reduced to within acceptable levels in accordance with Directive 2006/44/EC – European Communities (Quality of Fresh Waters Needing Protection or Improvement to Support Fish Life).

In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow from these ponds for a limited period. The settlement ponds will be fenced off for safety. Erosion control and retention facilities, including settlement ponds will be regularly maintained during the construction phase.

Figure 1: Grassed Swale along access track

The drainage system will remain operational and will be utilised for the decommissioning phase to treat any surface water from exposed areas as a result of decommissioning at the site. During the decommissioning of the turbine base, hardstanding areas and access tracks should remain in place and be covered with local soil/topsoil to minimise disturbance to soils. Removal of this infrastructure would result in considerable disruption to the local environment in terms of increased sedimentation, erosion, dust, noise, traffic and an increased possibility of contamination of the local water table. However, if removal is deemed to be required all infrastructure will be removed with mitigation measures in line to those during construction being employed.

The drainage system outlined below provides for a multi-stage treatment train of the discharges from the development, as recommended in the SUDS manual:

- grassed swales removing some of the sediment borne contaminants
- settlement ponds providing retention and treatment of discharges
- diffuse outflow from settlement ponds providing for further retention and settlement of suspended solids by reducing the velocities of flows and increasing the flow path of discharges
- continuation of flows by natural flow paths over vegetated areas before entering the watercourse, providing further retention and treatment of discharges.

Figure 2: Swale draining to Settlement pond

Drainage of Temporary Site Compound

The compound will be set back a minimum of 50m from streams. Drains around the hard-standing areas of the site compound will be in the form of shallow grassed swales to minimise the disturbance to sub-soils.

Filter drains may be used where trafficking by site staff is required to access the temporary site compound. The filter drains/swales will drain to a suitably designed settlement pond. The settlement pond will be backfilled at the temporary compound following the construction period and the vacation of the temporary site compound.

Refuelling of plant during construction will be carried out at the temporary compound. The station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. In addition to the above, onsite re-fuelling of machinery will be carried out 100m from watercourses using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site or at the designated refuelling area and will be towed by a 4x4 jeep to designated re-fuelling areas near to where machinery is located but at distances of greater than 100m from watercourses. Drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.

Concrete washout will be carried out in a dedicated area of the temporary compound or at a designated washout pit on site. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement lagoon provided to receive all run-off.

Any diesel or fuel oils stored at the temporary site compound will be bunded. The bund capacity will be sufficient to contain 110% of the tank's maximum capacity. Where there is more than one tank within the bund, the capacity will be sufficient to accommodate 110% of the largest tank's maximum capacity or 25% of the total maximum capacities of all tanks, whichever is the greater. Design and installation of fuel tanks will be in accordance with best practice guidelines BPGCS005 (Oil Storage Guidelines).

Portaloos and/ or containerised toilets and welfare units with storage tanks will be used to provide toilet facilities for site personnel during construction. The sanitary waste will be removed from site by a licensed waste disposal contractor.

All portaloo units located on site during the construction phase will be operated and maintained in accordance with the manufacturer's instructions, and will be serviced under contract with the supplier. All such units will be removed off-site following completion of the construction phase.

Temporary petrol and oil interceptors will be installed at the site compound and at all locations dedicated for plant repairs/storage of fuel/temporary generator installation. Surface water run-off from the compound will be directed through a Class 1 Full Retention Oil Interceptor before discharge to the surface water drainage system for the site. This surface water drain flows to a settlement pond before final discharge over land. A trained and dedicated environmental and fuel spill emergency response team will be set up on site before commencement of construction on-site. An example of Oil Interceptor Class 1 is provided in the Appendix 2.

Drainage of Overland Flows

Existing overland flow channels will be maintained, and cross-drains provided in the access tracks to allow continuity of flow. Where required, on the upslope side of new sections of access track and hardstanding areas, overland flows will be intercepted in channels. The flow will then be discharged diffusely over vegetated areas. Cross-drains will be provided where required at a minimum of 200m intervals. The roadside drains will therefore only carry the site access track runoff. This will ensure that there will be no mixing of 'clean' and 'dirty' water and will avoid a large concentration of flows. Thus, erosion risks will be reduced and the quantity of water requiring treatment will be minimised.

Drainage of Site Access Tracks

The permitted new site access tracks will be drained via roadside grassed swales with settlement ponds at the end of the swale run. At slopes greater than 2%, check dams will be required in the swales and interceptor drains to slow down the velocities of flows and prevent erosion occurring, as shown in Figure 3. These check dams will be in stone of minimum size 37.5 mm and will be laid at a spacing of between 9 and 30 m dependent on the slope.

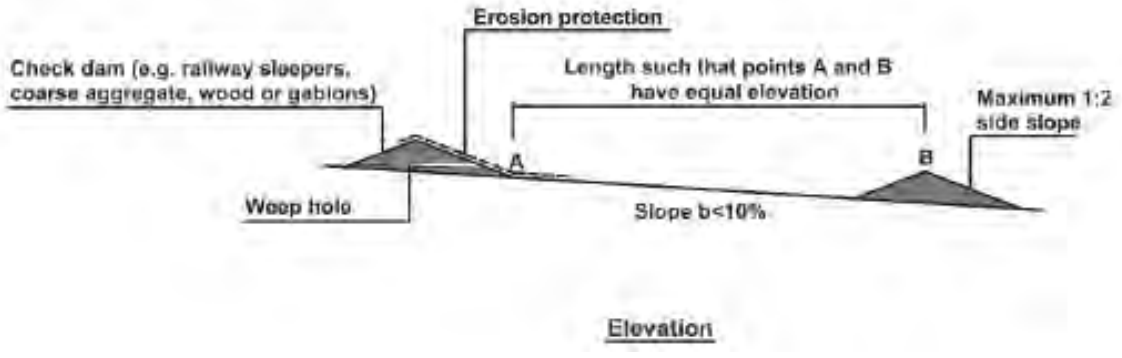

Figure 3: Check Dam Details

The roadside swales will drain to settlement ponds before discharging diffusely overland. The settlement ponds will remain in place following the construction period.

Silt traps will be provided in swales which will consist of geotextile staked across the swale at regular intervals. The geotextile will be weighed down on the upstream side with clean filter stone to provide further filtration and stability to the silt trap, as shown in Figure 4 to Figure 6.

Silt fencing will be kept on site and erected as required during construction to provide further protection to prevent the ingress of silt into the watercourses. The silt fencing will be kept in place until the natural vegetation has been re-established.

Site drainage, including silt traps and settlement ponds, will be put in place in parallel with or ahead of construction, such that excavation for new infrastructure will have a functioning drainage system in place.

Figure 4: Silt Trap across Grassed Swale

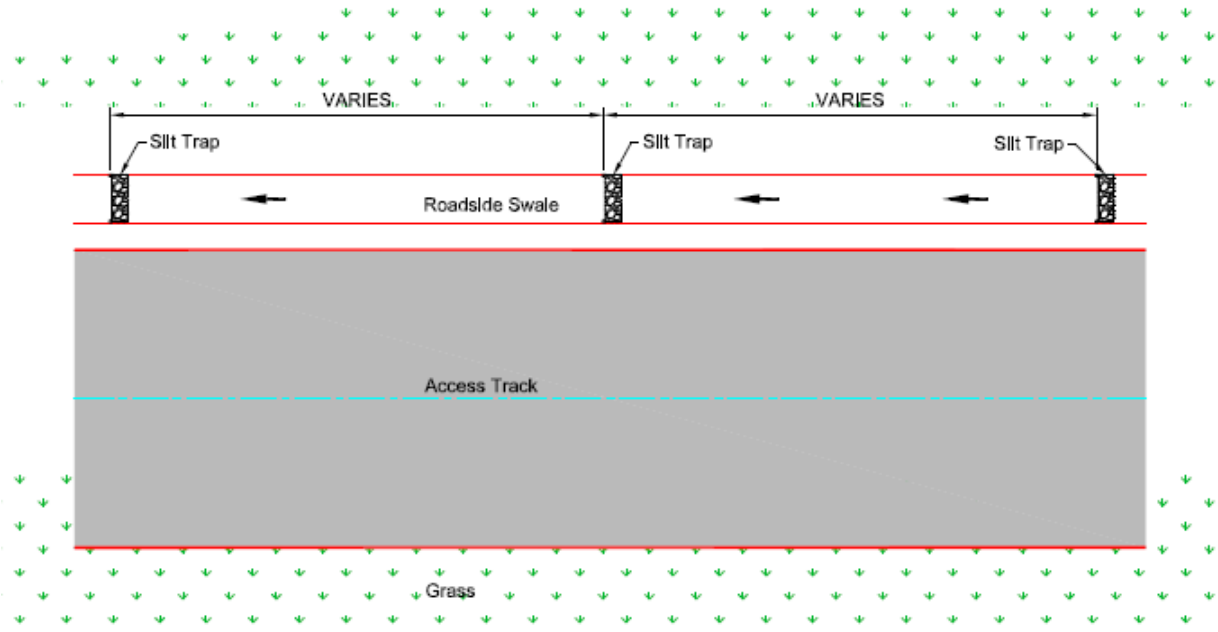

Figure 5: Plan of Silt Trap in Swale

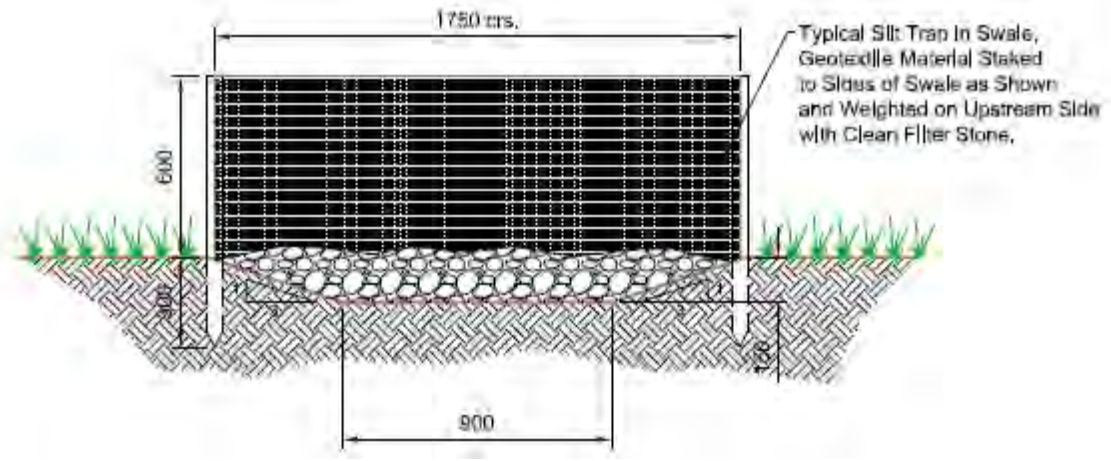

Figure 6: Silt Trap Details

Drainage of Turbine Bases and Hardstanding

The excavations for turbines will be pumped into the site drainage system (including settlement ponds), which will be constructed at site clearance stage, in advance of excavations for the turbine bases.

As discussed above, the new turbine hard-standing areas will be drained via shallow swales with suitably designed settlement ponds. The settlement ponds will remain in place following the construction period.

If cross-drains are required to convey the drainage across the hardstanding area, the diameters will be suitably designed in advance.

Drainage of Cable Trenches

Cables running throughout the wind farm site will be installed in trenches adjacent to site access tracks, where possible. Cable trenches will be excavated using a mechanical excavator and the excavated materials placed in small bunds adjacent to the trenches for back filling, as shown in Figure 7.

The seed bank is to be retained for placing back as the top layer of backfill to the trench, to aid successful restoration of vegetation in disturbed areas.

Cable trenches will be excavated during dry periods where possible, in short sections and left open for minimal periods, to avoid acting as a conduit for surface water flows. Clay bunds will be constructed at up to 10m intervals within the cable trench.

Figure 7: Backfill over Cable Trench

Procedure for Dewatering of Excavations

Standing water, which could arise in excavations, has the potential to contain an increased concentration of suspended solids as a result of the disturbance to soils. Water in the excavations for turbines will be pumped into the site drainage system which will be constructed at site clearance stage, in advance of excavations for the turbine bases.

Drainage of Substation

The permitted on-site substation will be drained using shallow swales, with a suitably designed settlement pond. The settlement pond will remain in place following the construction period. At the upslope side of the sub-station overland flows will be intercepted in channels and discharged diffusely over vegetated areas.

A suitable permanent petrol and oil interceptor shall be installed to deal with all substation surface water drainage.

Permanent sanitary facilities will be provided at the substation.

The runoff from roofs will be collected to water harvesting tanks. Waste water will drain to a tank which will be regularly emptied and maintained.

Drainage of Stockpiled Material

During the construction period, the excavated material will be used to reinstate the turbine bases.

All excavations shall be constructed and backfilled as quickly as possible. Excavation will stop during or immediately after heavy rainfall.

Excavation will precede the turbine base construction, cable trench and access track construction. Soil will be excavated and replaced with granular fill where required. Excavation will be carried out from access tracks where possible in order to reduce the compaction of topsoil.

During the construction period, spoil heaps from the excavations for the turbine bases will be stored temporarily. These temporary spoil heaps will be covered if required and surrounded by silt fences to filter sediment from the surface water run-off from excavated material. The silt fences will be inspected regularly and after rainfall events by Environmental Clerk of Works (ECOW).

Surplus soil or rock excavated during the course of the works will be used on site in the form of landscaping including low berms, where appropriate. No spoil stockpiles will be left on site after construction is completed.

It should be noted that any stockpiling will be short-term and temporary and will occur only within the site boundary as the construction proceeds. The site drainage system will be put in place prior to excavation, therefore the discharge routes from any temporary stockpiling will be via the site drainage system. A minimum buffer of 50m will be provided between temporary stockpiles and the nearest watercourse.

Watercourse Crossings

Existing stream crossings will be protected using silt fencing.

Minor drains such as manmade agricultural and bog drains will be crossed using suitably designed pipe culverts.

Turbine delivery will not take place during extreme weather conditions.

Climate Change

To accommodate the effect of future climate change in Ireland, the 100-year peak flow values for stream crossing designs should be multiplied by 1.2 to obtain the design 100-year flood value for the crossing.

Wash Down from Concrete Trucks and Cement Mixers

Concrete washout will be carried out in a dedicated area of the temporary compound. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement lagoon provided to receive all run-off.

An adequately designed settlement lagoon will be provided to receive all runoff from the concrete wash down area, similar to that shown in Figure 8. Regular inspections of the wash down areas and associated settlement lagoons shall be carried out and adequate records kept.

The settlement lagoon shall be lined using a 1mm LLDPE impermeable liner. A sump will be provided at this location which will collect the wash water from the concrete trucks. The excavated material will be kept on site for reinstatement following the construction period.

Figure 8: Lined Settlement Lagoon for Concrete Washout Facility

During construction, wash water and any solids in the sump will be removed periodically to an appropriate licensed facility. The sump can be emptied daily if required. Following construction, any solids, the liner, and any remaining wash water in the sump will all be removed to an appropriate licensed facility for disposal. The sump will then be reinstated.

1.6 Mitigation Measures for Flooding

Settlement ponds are to be provided as part of the drainage system for the development. The settlement ponds, together with the swales, will serve to reduce velocities in the surface water runoff draining from the access tracks and hardstanding areas and will provide retention of the flows. This will also mitigate any increase in the risk of flooding.

No construction personnel, operation or maintenance personnel will be permitted on site during extreme flood events. Landowners will carry on their normal activities in the vicinity of the development and will take the usual precautionary measures as far as practicable during flood events.

1.7 Mitigation Measures for Pollution Control to Protect Water Quality in Downstream Receptors

All personnel working on site will be trained in pollution incident control response. An emergency response procedure is prepared herein which will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt.

Silt Protection Controls (SPCs) are proposed at the location of watercourse crossings and where haul roads pass close to watercourses, silt fencing will be used to protect the streams.

Silt traps will also be provided at outfalls from roadside swales. Silt traps will be kept upstream of outfalls to allow a buffer zone to the outfall. Additional silt fencing will be kept on site in case of an emergency break out of silt laden run-off.

Settlement ponds will be put in place in advance as construction progresses across the site. The settlement ponds with a diffuse outflow detail will mitigate any increase in runoff and treat suspended solids in the surface water runoff. Erosion control and retention facilities, including settlement ponds will be regularly maintained during the construction phase.

All stockpile material will be bunded adequately and protected from heavy rainfall to reduce silt runoff, where necessary. Adequate security will be provided to prevent spillage as a result of vandalism.

Drains around hardstanding areas will be shallow to minimize the disturbance to sub-soils.

Suitably sized cross-drains will be provided for drainage crossings to convey flows from agricultural drains and forestry drains across the access tracks, to prevent a risk of clogging.

Tracks will be capped as soon as practicably possible to cover exposed subsoils and as such reduce the concentration of suspended solids in the run-off.

All open water bodies adjacent to proposed construction areas will be protected by fencing, including the proposed settlement ponds.

Additional protection will be provided in the form of silt fencing downslope where required and at existing stream crossings during construction, to further ensure that there is no impact from the development to streams and rivers crossing the site.

Where haul roads pass close to watercourses, silt fencing will be used to protect the streams. Silt traps will also be provided at outfalls from roadside swales. Silt traps will be kept upstream of outfalls to allow a buffer zone to the outfall.

Refuelling of plant during construction will be carried out at the temporary compound, which will be located a minimum of 50m from any watercourse. The station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. In addition to the above, onsite re-fuelling of machinery will be carried out 100m from watercourses using a mobile double skinned fuel bowser.

The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site or at the designated refuelling area and will be towed by a 4x4 jeep to designated re-fuelling areas near to where machinery is located but at distances of greater than 100m from watercourses. Drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.

Concrete washout will be carried out in a dedicated area of the temporary compound. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement lagoon provided to receive all run-off. During construction concrete will be kept out of all watercourses and drains.

Any diesel, fuel or hydraulic oils stored at the temporary site compound will be bunded. The bund capacity will be sufficient to contain 110% of the tank's maximum capacity.

Vehicles entering the site should be in good working order, free from leakage of fuel or hydraulic fluid.

A wheel wash will be provided at the site entrance draining to a silt trap to avoid any silt laden run-off flowing on to the public road and entering roadside drains.

Portaloos and/or containerised toilets and welfare units will be used to provide toilet facilities for site personnel during construction. Sanitary waste will be removed from site via a licenced waste disposal contractor.

Silt fencing will be erected at the location of stream crossings along the cable route.

1.8 Emergency Silt Control and Spillage Response Procedures

All personnel working on site will be trained in pollution incident control response. An emergency response plan will be prepared which will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt. A regular review of forecasts of heavy rainfall is required and a contingency plan will be prepared for before and after such events. A record will be kept of daily visual examinations of watercourses which receive flows from the permitted development, during and for an agreed period after the construction phase. Procedures for particular accidental spillages, from leaking or damaged fuel lines or a break out of silt are outlined below.

Oils, Fuels and Site Vehicles

Refuelling of plant during construction will be carried out at the temporary compound. The station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. In addition to the above, onsite re-fuelling of machinery will be carried out 100m from watercourses using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site or at the designated refuelling area and will be towed by a 4x4 jeep to designated re-fuelling areas near to where machinery is located but at distances of greater than 100m from watercourses.

Details of tests to be carried out on Storage tanks to a recognized standard together with a secondary containment system to provide at least 110% of the maximum tank capacity are as follows:

All tank and drum storage areas shall, as a minimum, be bunded, either locally or remotely, to a volume not less than the greater of the following:

a. 110% of the capacity of the largest tank or drum within the bunded area; or

b. 25% of the total volume of substance which could be stored within the bunded area.

Accidental spillage from leaking or damaged fuel lines

Emergency drip trays and spill kits will be kept available on site for use in emergencies to ensure that any spills from vehicles are contained and removed off site. Each refuelling station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site.

In the case of water pollution in addition to the Local Authority, Inland Fisheries Ireland should also be informed immediately.

In the event of an accidental spillage from leaking or damaged fuel lines, the spillage will be cleaned up with absorbent material e.g. sand or turf mould and placed in a designated bunded location while awaiting removal offsite to a licensed facility.

In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow from these ponds for a limited period.

Accidental break out of silt

Following an accidental break out of silt, emergency measures will be put in place. During the construction period an emergency facility will be provided with sand bags to block off the outlet in the sedimentation ponds to prevent discharge from the sedimentation ponds in the event of a break out of the silt.

Additional silt fencing will be available on site for use in emergencies.

The drainage engineer should be contacted if there is an accidental spillage or break out of silt on the site.

1.9 Maintenance of Site Drainage Systems

The drainage system for the development should be maintained regularly to keep it operating effectively. The maintenance should include the following:

- inspection and maintenance of swales;
- inspecting cross-drains for any blockages;
- inspecting settlement ponds and outfalls;
- inspecting the stream crossings and piped crossings for obstructions;
- inspecting the progress of the re-establishment of vegetation;
- implementing appropriate remedial measures as required after the above inspections.

1.10 Construction Stage Mitigation Measures

Long range weather forecasts should be examined, and the construction phases planned taking cognisance of expected weather conditions. Regular meetings should be held to re-assess construction phases with weather conditions as the project progresses.

Regular meetings should be held between the Drainage Engineer appointed by the contractor and the contractor's Project Manager. The planning of traffic routes through the site should be agreed in advance, in order to plan appropriate construction drainage management.

The proposed mitigation measures are listed in Chapter 10 of EIAR.

A detailed water quality monitoring programme will be undertaken during the construction phase of the proposed development, in addition to the visual inspections outlined above, so as to ensure the effective implementation of the proposed mitigation measures. A water quality monitoring plan is detailed below.

1.11 Water Quality Monitoring Plan

A monitoring programme will be established to ensure that the water quality is maintained. This programme will ensure that designed measures are working to ensure water quality is not affected. The details of this programme are outlined below.

Daily visual inspections of drains and outfalls will be performed during the construction period to ensure suspended solids are not entering the streams and rivers of the site, to identify any obstructions to channels, and to allow for appropriate maintenance of the drainage regime. If excessive suspended solids are noted, construction work will be stopped, and remediation measures will be put in place immediately.

Visual inspections will be continued during the operational period until vegetation is established on site at intervals to be agreed with Cork County Council/IFI.

A detailed water quality monitoring programme will be undertaken during the construction phase of the proposed development, in addition to the visual inspections outlined above, so as to ensure the effective implementation of the proposed mitigation measures. Field measurements and grab samples will be taken at suitable locations, which will be decided prior to the construction phase commencing. The field measurements will be recorded at the site and will include measurement of the following parameters, electrical conductivity (µs/cm), pH, temperature (ºC), suspended solids (mg/l) and dissolved oxygen (mg/l). The field measurements will be taken on a weekly basis during the site clearance and earthworks stage of the construction period. An ECOW will compare the results with the pre work levels and ensure that designed mitigation measures are working. An ECOW will propose new mitigation measures if results exceed pre work levels.

1.12 Operational Phase Mitigation Measures

It is not envisaged that the operation of the wind farm will result in significant impacts on the hydrological regime or water quality of the area, as there will be no further disturbance of soils post-construction, and only a minimum of traffic movement.

Oil used in transformers (at the substation and within each turbine) and storage of oils in tanks at the substation could leak during the operational phase and impact on groundwater quality. The substation transformer and oil storage tanks will be in a concrete bunded capable of holding 110% of the oil in the transformer and storage tanks. Turbine transformers are located within the turbines, so any leaks would be contained.

Visual inspections will be continued during the operational period until satisfactory vegetation is established on site at intervals to be agreed with Cork County Council/IFI.

It is not envisaged that the maintenance period will involve any significant impacts on the hydrological regime of the area. The maintenance of the development will incorporate effective maintenance of the drainage system. Visual inspections will be undertaken during the maintenance period in accordance with maintenance schedule in CIRIA C753. The maintenance regime will include inspecting the following:

- Drains, cross-drains and culverts for any blockages
- Outfalls to existing field drains and watercourses
- Existing roadside swales for any obstructions
- Swales
- Progress of the re-establishment of vegetation.

The maintenance regime will also include implementing appropriate remedial measures as required after the above inspections and testing the water quality at the outfalls at appropriate intervals.

1.13 Decommissioning Stage and Mitigation Measures

As in the construction phase silt protection controls would again be put in place. The drainage system will remain operational during the decommissioning phase and will serve to treat any sediment laden surface water runoff due to a renewed disturbance of soils. Revegetation following the backfilling of hardstanding areas will be monitored. If it is deemed necessary, erosion control matting will be used to assist in the re-establishment of vegetation.

FEHILY TIMONEY
30 YEARS

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APPENDIX 1

Proposed Drainage Layout

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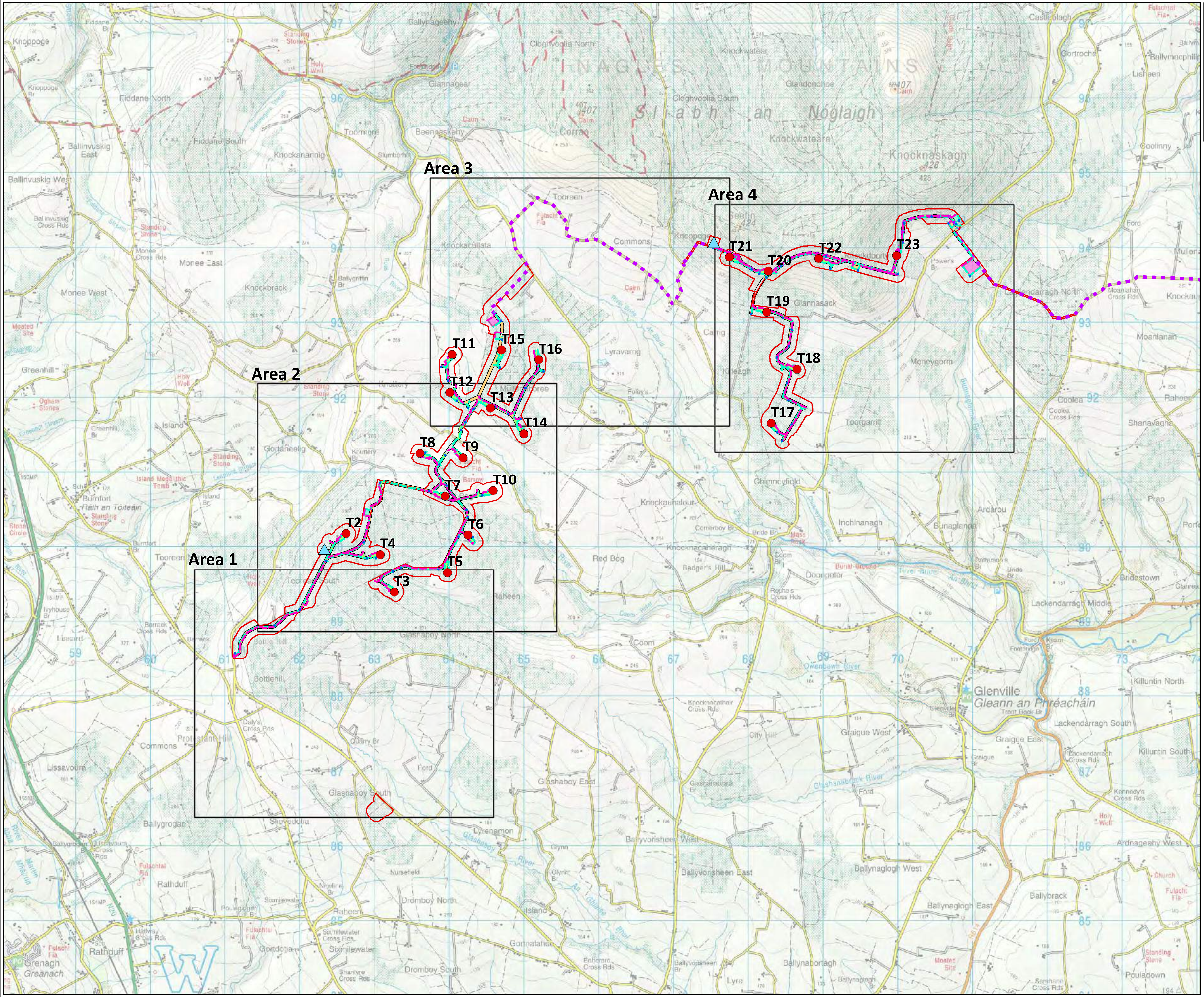

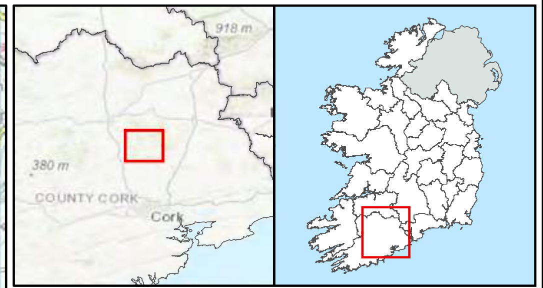

Proposed Turbine Layout
Proposed Permanent Met Masts
Stilling Ponds
Interceptor Ditch
Swales
Proposed Cable Route
Proposed Development Boundary
Existing Road
Proposed Existing Road Upgrade
Proposed New Road
Proposed Borrow Pit
Proposed Temporary Compound
Proposed Substation
P1306_DDPages_DevelopmentBoundary

TITLE: Proposed Drainage Layout Overview	
PROJECT: Coom Green Energy Park, Co. Cork	
FIGURE NO: 1	
CLIENT: Coom Green Energy Park Ltd.	
SCALE: 1:50000	**REVISION:** 0
DATE: 08/12/2020	**PAGE SIZE:** A3

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N W E S
Kilometers
0 0.25 0.5 1

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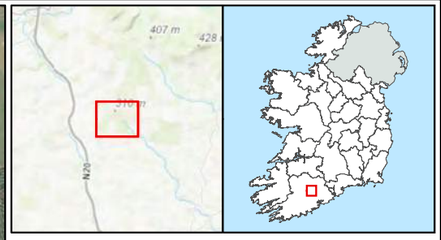

- Proposed Turbine Layout
- Stilling Ponds
- Interceptor Ditch
- Swales
- Proposed Development Boundary
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Temporary Compound

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	Proposed Drainage Layout Area 1		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
DATE:	08/12/2020	**PAGE SIZE:**	A3

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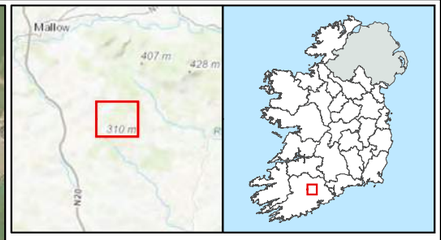

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Stilling Ponds
- Interceptor Ditch
- Swales
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Temporary Compound

TITLE:	Proposed Drainage Layout Area 2		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
DATE:	08/12/2020	**PAGE SIZE:**	A3

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N W E S

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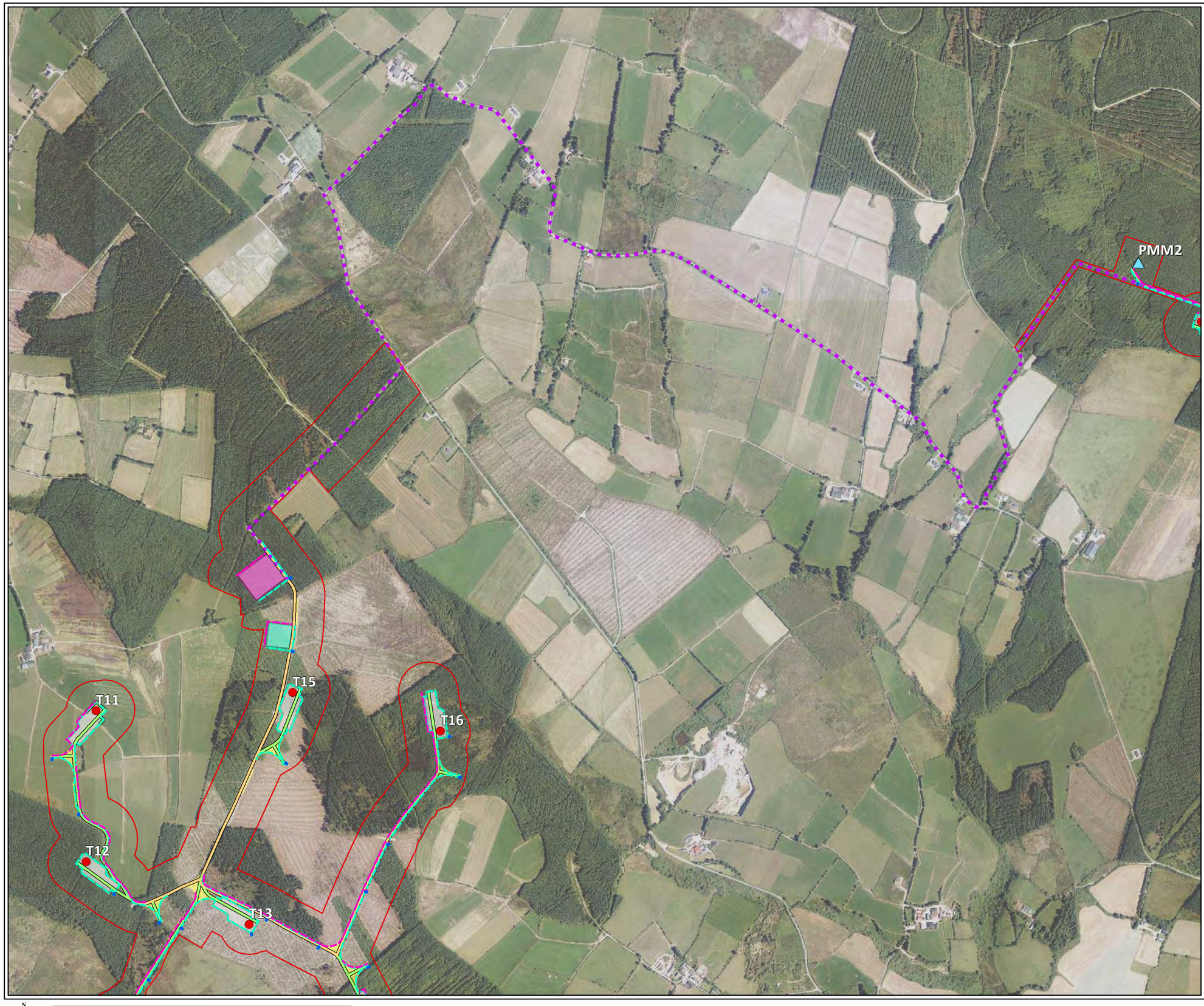

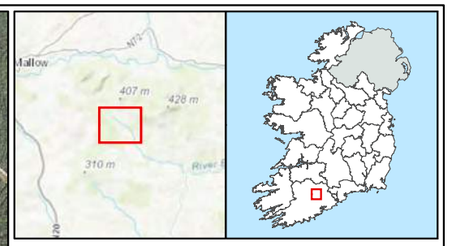

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Stilling Ponds
- Interceptor Ditch
- Swales
- Proposed Cable Route
- Proposed Development Boundary
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Substation

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	Proposed Drainage Layout Area 3		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
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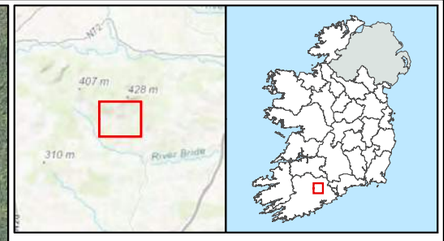

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Stilling Ponds
- Interceptor Ditch
- Swales
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- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Temporary Compound
- Proposed Substation

TITLE:	Proposed Drainage Layout Area 4		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:12500	**REVISION:**	0
DATE:	08/12/2020	**PAGE SIZE:**	A3

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N W E S

0 0.25 0.5 1 Kilometers

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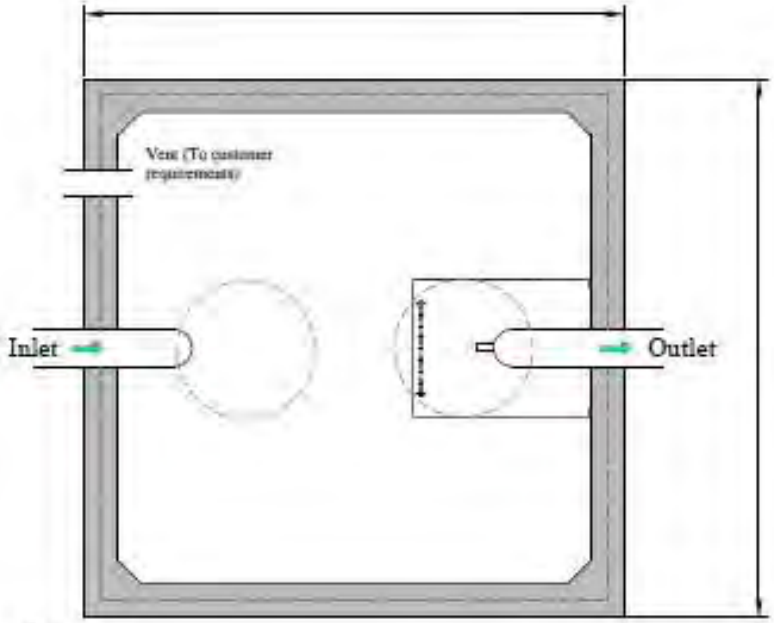
APPENDIX 2

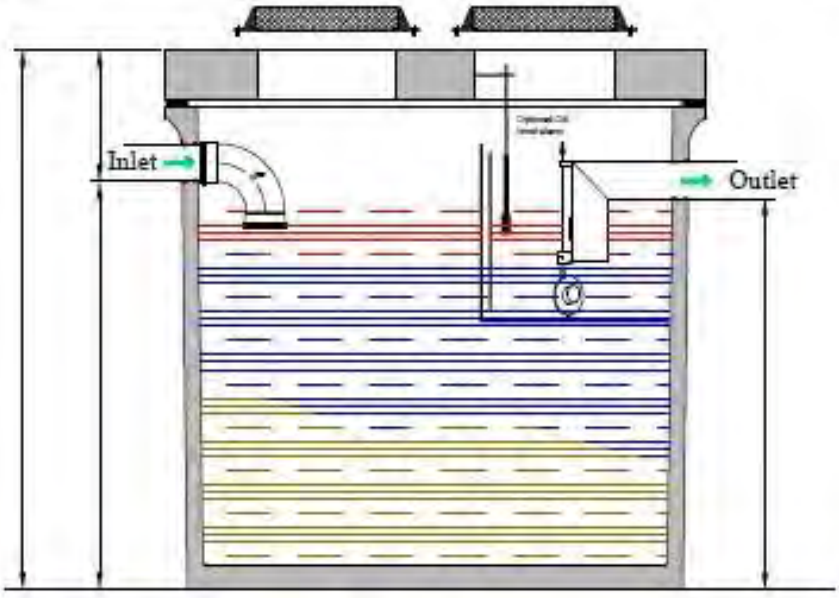
Class 1 Oil Interceptor – Example

Full Retention Interceptor Class 1



All the tanks must be placed on a perfectly level and firm suitable base.
Typical layout, variations as required per customer.

An anti-syphon vent is required for long run outflows



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Note: Observe all safety regulations in regard to excavation and lifting requirements. Never leave opening uncovered or unattended at any time.
Note: Specify any specific requirements prior to ordering. All civil works by customer.
Note: Do not scale from this drawing. Only for illustration purposes.

Tank Type: C Full Retention Interceptor	**Title:**
Tank Size:	Full Retention Interceptors
Height:	**Date:**
Volume:	**Drg. No.:**
Weight:	**Drawn By:**

Appendix G: Aquatic Ecology, Fisheries and Freshwater Pearl Mussel (*Margaritifera margaritifera*) Surveys in Watercourses Downstream of CGEP.

Fisheries assessment of Coom Green Energy Park, Co. Cork

Prepared by Triturus Environmental Ltd. for INIS Environmental Consultants Ltd.

September 2020

Please cite as:

Triturus (2020). Fisheries assessment of Coom Green Energy Park, Co. Cork. Report prepared by Triturus Environmental Ltd. for INIS Environmental Consultants Ltd. September 2020.

Table of contents

1. Introduction

1.1 Background

Triturus Environmental Ltd. were contracted by INIS Environmental Consultants Ltd. (on behalf of Brookfield Renewable Ireland) to undertake a baseline fisheries assessment on numerous watercourses in the footprint of the proposed Coom Green Energy Park development, located near Bottlehill, Co. Cork.

The survey was undertaken to establish baseline fisheries data used in the preparation of the EIAR for the proposed development, which includes a proposed wind turbine layout and associated cable route alignment (Figure 1.1). In order to gain an accurate overview of the existing and potential fisheries value of the riverine watercourses within the footprint of the proposed development, a catchment-wide electro-fishing survey across *n*=25 sites was undertaken (Figure 1.1, Table 1.1). Electro-fishing helped to identify the importance of the watercourses as nurseries and habitats for salmonids, lamprey and European eel (*Anguilla anguilla*), as well as other species, and helped to further inform impact assessment and any subsequent mitigation for the development.

Triturus Environmental Ltd. made an application under Section 14 of the Fisheries (Consolidation) Act, 1959 as substituted by Section 4 of the Fisheries (Amendment) Act, 1962, to undertake a catchment-wide electro-fishing survey in the footprint of the proposed Coom Green Energy Park located near Bottlehill, Co. Cork. Permission was granted on Monday 27th July 2020 and the survey was undertaken over Wednesday 29th to Friday 31st July 2020.

1.2 Fisheries asset of the survey area

The proposed Coom Green Energy Park development encompasses numerous small streams and rivers in Co. Cork, located. The majority of survey sites were located in the Munster Blackwater catchment (sub-catchment ID: Blackwater [Munster]_SC_080 and Blackwater [Munster]_SC_110) although, to the east, numerous sites drained the Bride [Waterford] catchment (Bride [Waterford]_SC_010). A single site was located within the northernmost extent of the Manin_SC_010 sub-catchment. Several aquatic survey sites are located within or have connectivity with the River Blackwater SAC (site code: 002170) (Figure 1). Survey sites were present on the Tooreen North Stream (EPA code: 19T33), Slievedotia Stream (19S09), Monparson River (18M58), Toor River (18T51), Coom Stream and River (18C03), Lyravarrig Streams (18L82 and 18L66), Seefin Stream (18S52), River Bride (18B05), Field Chimney Stream (18F43), Inchinanagah River (18I16), Bunnaglanna Stream (18B07), Slumberhill Stream, Ross Stream (18S40), Shanowen Trib 1 Stream (18S42) and Farran North River (18F27), as well as several unnamed watercourses (Table 1.1).

The River Bride (Waterford) is a major tributary of the (Munster) River Blackwater and is known to support a range of fish species including Atlantic salmon (*Salmo salar*), brown and sea trout (*Salmo trutta*), European eel and stone loach (*Barbatula barbatula*) (Kelly et al., 2011). Salmon, brown trout and sea trout angling are all popular on the River Bride (O'Reilly, 2009). The Bride is

also known to support river lamprey (*Lampetra fluviatilis*) in its lower reaches (NPWS data). Additionally, surveys conducted as part of the National European eel monitoring programme on the River Bride sub-catchment found that eels occupied a very uniform distribution throughout the Bride catchment (IFI, 2015).

Fisheries data for other, more minor watercourses within the survey area was largely lacking. However, the Clyda River to which the Monparson River (site A6) joins is known locally to support Atlantic salmon, brown trout and European eel as well as non-native roach (*Rutilus rutilus*) and dace (*Leuciscus leuciscus*) (pers. obs.). *Lampetra* sp. lamprey and sea lamprey (*Petromyzon marinus*) are also known from the Clyda River (King & Linnane, 2004).

Furthermore, a catchment-wide electro-fishing survey was undertaken by Triturus in 2017 for an early precursor to the Coom Green Energy Park development (Triturus, 2017). Some of the 2020 survey sites overlapped with those visited in 2017 and, where applicable, this is referred to in the Results section of this report. The wider catchment was found to support brown trout, European eel, *Lampetra* sp. ammocoetes and low numbers of Atlantic salmon in 2017.

Table 1.1 Electro-fishing survey site locations in the footprint of the proposed Coom Green Energy Park development, Co. Cork.

Site no.	Watercourse	EPA code	Location / townland	ITM (x)	ITM (y)
A1	Unnamed stream	n/a	Knuttery Bridge	562621	591186
A2	Unnamed stream	n/a	Tooreen North	561491	589545
A3	Tooreen North Stream	19T33	Tooreen North	561359	589281
A4	Slievedotia 19 Stream	19S09	Daly's Cross Roads	561011	587722
A5	Unnamed stream	n/a	Lissard	559515	588386
A6	Monparson River	18M58	Lissard	558677	590203
B1	Toor River	18T51	Mullenaboree	564085	591709
B2	Coom 18 Stream	18C03	Bottlehill Landfill	563229	589796
B3	Coom 18 River	18C03	Coom	565442	588887
B4	Toor River	18T51	Raheen	565547	589591
B5	Lyravarrig 18 Stream	18L82	Commons	566739	593598
B6	Seefin 18 Stream	18S52	Commons	566862	593456
B7	River Bride	18B05	Commons	566523	592989
B8	Lyravarrig 18 Stream	18L66	Mullenaboree	565741	592184
B9	Field Chimney Stream	18F43	Chimneyfield	568146	591922
B10	Inchinanagh River	18I16	Inchinanagh	568592	590845
B11	River Bride	18B05	Bride Bridge	568376	590182

Site no.	Watercourse	EPA code	Location / townland	ITM (x)	ITM (y)
B12	Unnamed stream	n/a	Knockdoorty	570075	594332
B13	Unnamed stream	n/a	Powers Bridge	570337	593908
B14	Bunnaglanna Stream	18B07	Moneygorm	570301	593711
B15	River Bride	18B05	Old Bridge	571380	589562
C1	Slumberhill 18 Stream	18S40	Knockacullata	564792	594397
C2	Ross Stream	18R02	Knockacullata	563403	593486
D1	Shanowen Trib 1	18S42	Ballynahina	578462	595293
D2	Farran North River	18F27	Farran North	582016	594305

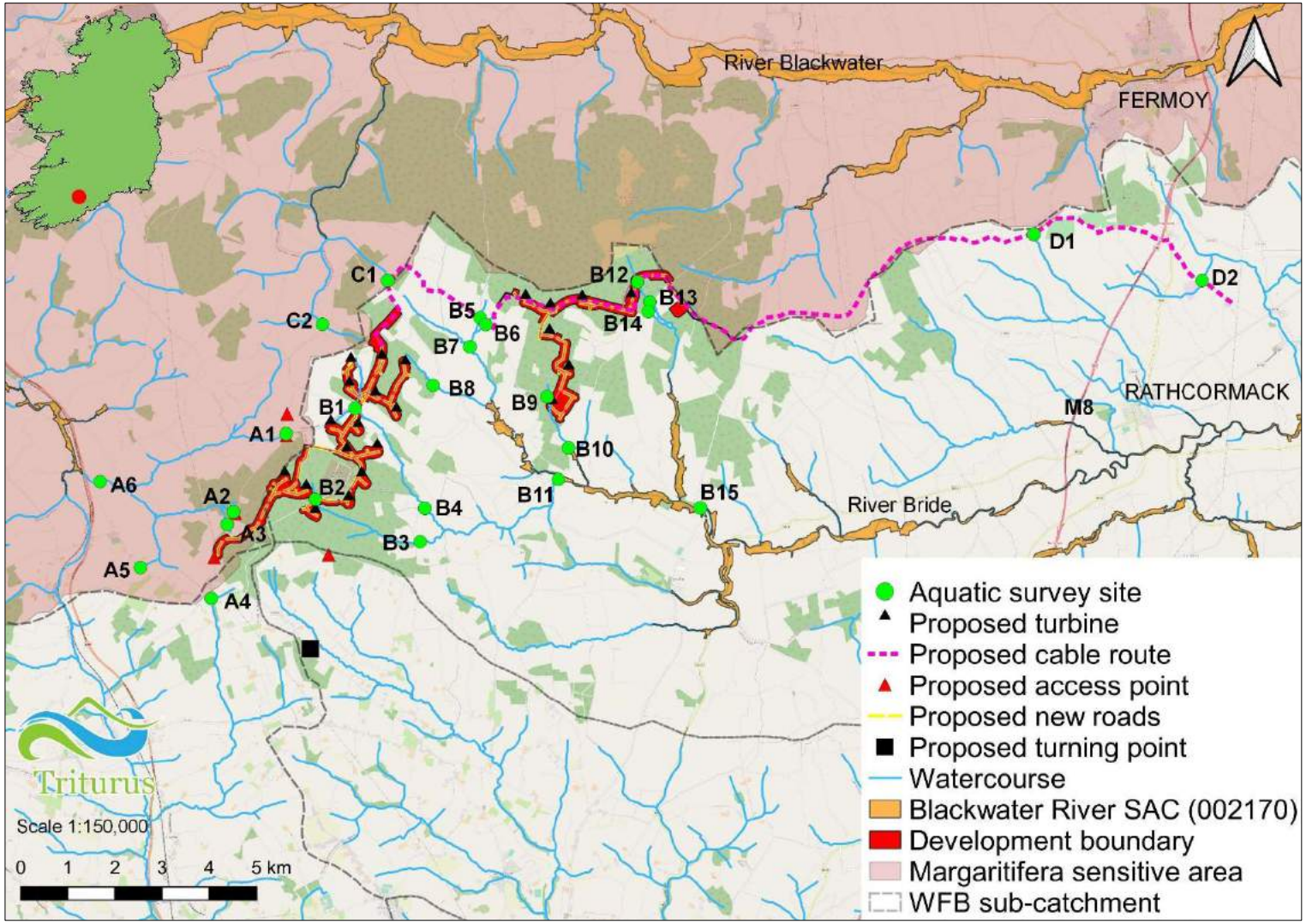

Figure 1.1 Location overview of the electro-fishing sites in vicinity of the proposed Coom Green Energy Park, Co. Cork.

2. Methodology

2.1 Fish stock assessment (electro-fishing)

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish sites on both named and unnamed watercourses in the footprint of the proposed Coom Green Energy Park over the course of Wednesday 29th to Friday 31st July 2020, following notification to Inland Fisheries Ireland (Macroom) and under the conditions of a Department of Communications, Climate Action & Environment (DCCAE) license. Both river and holding tank water temperature was monitored continually throughout the survey to ensure temperatures of 20°C were not exceeded, thus minimising stress to the captured fish due to low dissolved oxygen levels. A portable battery-powered aerator was also used to further reduce stress to any captured fish contained in the holding tank.

Salmonids, European eel and other captured fish species were transferred to a holding container with oxygenated fresh river water following capture. Where captured, European eel and larval lamprey were anaesthetised using 0.5ml/l clove oil solution (emulsified in ethanol at a ratio of 1:9) to facilitate accurate measurement and speciation. All other fish (e.g. salmonids) were not anaesthetised, to reduce fish stress levels. All fish were measured to the nearest millimetre and released in-situ following a suitable recovery period.

As three primary species groups were targeted during the survey, i.e. salmonids, lamprey, and eel, the electro-fishing settings were tailored for each species. By undertaking electro-fishing using the rapid electro-fishing technique (see methodology below), the broad characterisation of the fish community at each sampling reach could be determined as a longer representative length of channel can be surveyed. Electro-fishing methodology followed accepted European standards (CEN, 2003) and best practice (e.g. CFB, 2008) and is outlined below.

The catchment-wide electro-fishing (CWEF) survey was undertaken across *n*=25 sites (see Table 1.1, Figure 1.1). Length frequency graphs and species composition graphs for all species with numbers captured are illustrated in the Results section.

2.1.1 Salmonids, European eel and cyprinids

For salmonid species and European eel, as well as other incidental species such as three-spined stickleback (*Gasterosteus aculeatus*), electro-fishing was carried out in an upstream direction for a 10-minute CPUE, an increasingly common standard approach for wadable streams (Matson et al., 2018). A total of approx. ≥100m channel length was surveyed at each site, where feasible, in order to gain a better representation of fish stock assemblages. At certain, more minor watercourse sites or sites with limited access, it was more feasible to undertake electro-fishing for a 5-minute CPUE. Discrepancies in fishing effort (CPUE) between sites are accounted for in the subsequent results section.

Relative conductivity of the water at each site was checked in-situ with a conductivity meter and the electro-fishing backpack was energised with the appropriate voltage and frequency to provide enough draw to attract salmonids and European eel to the anode without harm. For the low to

moderate conductivity waters of the sites (most draining upland/sandstone areas) a voltage of 250-300V, frequency of 40-45Hz and pulse duration of 3.5ms was utilised to draw fish to the anode without causing physical damage.

2.1.2 Lamprey

Electro-fishing for lamprey ammocoetes was conducted using targeted box quadrat-based electro-fishing (as per Harvey & Cowx, 2003) in objectively suitable areas of sand/silt, where encountered. As lamprey take longer to emerge from silts and require a more persistent approach, they were targeted at a lower frequency (30Hz) setting which also allowed detection of European eel, if present. Settings for lamprey followed those recommended and used by Harvey & Cowx (2003), APEM (2004) and Niven & McAuley (2013). Using this approach, the anode was placed under the water's surface, approx. 10–15 cm above the sediment, to prevent immobilising lamprey ammocoetes within the sediment. The anode was energised with 100V of pulsed DC for 15-20 seconds and then turned off for approximately five seconds to allow ammocoetes to emerge from their burrows. The anode was switched on and off in this way for approximately two minutes. Immobilised ammocoetes were collected by a second operator using a fine-mesh hand net as they emerged.

Lamprey species were identified to species level, where possible, with the assistance of a hand lens, through external pigmentation patterns and trunk myomere counts as described by Potter & Osborne (1975) and Gardiner (2003).

2.2 Fisheries habitat

2.2.1 Salmonids

Fisheries habitat quality for salmonids was assessed using the Life Cycle Unit method (Kennedy, 1984; O'Connor & Kennedy, 2002) to map the *n*=25 riverine sites as nursery, spawning and holding habitat, by assigning quality scores to each type of habitat. Those habitats with poor quality substrata, shallow depth and a poorly defined river profile receive a higher score. Higher scores in the Life Cycle Unit method of fisheries quantification are representative of poorer value, with lower scores being more optimal despite this appearing counter-intuitive.

Table 2.1 Life Cycle Unit scoring system for salmonid nursery, spawning and holding habitat value (as per Kennedy, 1984 & O'Connor & Kennedy, 2002)

Habitat quality	Habitat score	Total score (three components)
Poor	4	12
Moderate	3	9-11
Good	2	6-8
Excellent	1	3-5

2.2.2 Lamprey

Lamprey habitat evaluation for each survey site was undertaken using the Lamprey Habitat Quality Index (LHQI) scoring system, as devised by Macklin et al. (2018). The LHQI broadly follows a similar rationale as the Life Cycle Unit score for salmonids. Those habitats with a lack of soft, largely organic sediment areas for ammocoete burrowing, shallow sediment depth (<10cm) or compacted sediment nature receive a higher score. Higher scores in this index are thus of poorer value (in a similar fashion to the salmonid Life Cycle Unit Index), with lower scores being more optimal. Overall scores are calculated as a simple function of the sum of individual habitat scores.

Larval lamprey habitat quality as well as the suitability of adult spawning habitat is assessed based on the information provided in Maitland (2003) and other relevant literature (e.g. Gardiner, 2003). Unlike the salmonid Life Cycle Unit index, holding habitat for adult lamprey is not assessed owing to their different migratory and life history strategies, and that electro-fishing surveys routinely only sample larval lamprey.

The LHQI scoring system provides additional information compared to the habitat classification based on the observations of Applegate (1950) and Slade et al. (2003), which deals specifically with larval (sea) lamprey settlement habitat. Under this scheme, habitat is classified into three different types: preferred (Type 1), acceptable (Type 2), and not acceptable for larvae (Type 3) (Slade et al. 2003). Type 1 habitat is characterized by soft substrate materials usually consisting of a mixture of sand and fine organic matter, often with some cover over the top such as detritus

or twigs in areas of deposition. Type 2 habitat is characterized by substrates consisting of shifting sand with little if any organic matter and may also contain some gravel and cobble (lamprey may be present but at much lower densities than Type 1). Type 3 habitat consists of materials too hard for larvae to burrow including bedrock and highly compacted sediment. This classification can also be broadly applied to other lamprey species ammocoetes, including *Lampetra* species.

Table 2.2 Lamprey Habitat Quality Index (LHQI) scoring system for lamprey spawning and nursery habitat value (Macklin et al., 2018).

Habitat quality	Habitat score	Total score (two components)
Poor	4	8
Moderate	3	6-7
Good	2	3-5
Excellent	1	2

2.2.3 General fisheries habitat

A broad appraisal / overview of the upstream and downstream habitat at each site was also undertaken to evaluate the wider contribution to salmonid and lamprey spawning and general fisheries habitat. River habitat surveys and fisheries assessments were also carried out utilising elements of the approaches in the River Habitat Survey Methodology (Environment Agency, 2003) and Fishery Assessment Methodology (O'Grady, 2006) to broadly characterise the river sites (i.e. channel profiles, substrata etc.).

2.3 Biosecurity

A strict biosecurity protocol following the Check-Clean-Dry approach was employed during the survey. Equipment and PPE used was disinfected with Virkon® between survey sites to prevent the transfer of pathogens and/or invasive species between survey areas. Where feasible, equipment was also be thoroughly dried (through UV exposure) between survey areas. As per best practice, surveys were undertaken at sites in a downstream order (i.e. uppermost site surveyed first etc.) to prevent the upstream mobilisation of invasive propagules and pathogens. Any invasive species recorded within or adjoining the survey area were geo-referenced.

3. Results

A catchment-wide electro-fishing survey of *n*=25 sites in the footprint of the proposed Coom Green Energy Park was conducted over Wednesday 29th to Friday 31st July 2020 following notification to Inland Fisheries Ireland (Macroom). The results of the survey are discussed below in terms of fish population structure, population size and the suitability and value of the surveyed areas as nursery and spawning habitat for salmonids, European eel and lamprey species. Scientific names are provided at first mention only.

3.1 Fish stock assessment (electro-fishing)

Site A1 – unnamed stream, Knuttery Bridge

No fish were recorded during electro-fishing at site A1. The stream was dry at the time of survey (July 2020) and was not capable of supporting resident fish. The stream may be utilised by brown trout and European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered very low given likely seasonality.

Plate 3.1 Representative image of site A1 on an unnamed stream at Knuttery Bridge (no fish recorded via electro-fishing, channel semi-dry).

Site A2 – unnamed stream, St. John's Well, Tooreen North

No fish were recorded during electro-fishing at site A2. The site (i.e. at source, St. John's Well) was not considered of fisheries value due to its very small size, shallow depth and situation in the uppermost reaches of a catchment. The upstream catchment is extremely short, emanating from a small spring <50m upstream of the survey area.

Plate 3.2 Representative image of site A2 on an unnamed stream at Tooreen North (no fish recorded via electro-fishing).

Site A3 – Tooreen North Stream, Tooreen North

No fish were recorded during electro-fishing at site A3. The site was not considered of fisheries value due to its very small size and situation in the uppermost reaches of a catchment with water shallow depth and very limited holding pool habitat. The stream may be utilised by migratory European eel during periods of higher flow although its overall fisheries value was considered low given likely seasonality.

Plate 3.3 Representative image of site A3 on the Tooreen North Stream at Tooreen North.

Site A4 – Slievedotia Stream, Daly's Cross

No fish were recorded during electro-fishing at site A4. The stream was semi-dry at the time of survey (July 2020) and was not capable of supporting resident fish. The stream may be utilised by migratory European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered low given likely seasonality and overall modified nature.

Plate 3.4 Representative image of site A4 on the Slievedotia Stream (no fish recorded via electro-fishing, channel semi-dry).

Site A5 – unnamed stream, Lissard

No fish were recorded during electro-fishing at site A5. The stream was 100% dry at the time of survey (July 2020) and was not capable of supporting resident fish (no fisheries value). Given downstream connectivity to the Monparson River, the stream may be migratory European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered low given likely seasonality.

Plate 3.5 Representative image of site A5 on an unnamed stream at Lissard (no fish recorded via electro-fishing, channel 100% dry).

Site A6 – Monparson River, Lissard

Three fish species were recorded from the Monparson River at site A6 (Figure 3.1). Brown trout (*n*=47) followed by Atlantic salmon (*n*=27) dominated the site, with moderate number of *Lampetra* sp. ammocoetes recorded from small marginal silt patches in the vicinity of the bridge structure. Both juvenile and adult trout were recorded, with two size classes of Atlantic salmon present.

Despite historical straightening (good recovery), salmonid habitat scored as 'excellent' overall according to Life Cycle Unit scores (Table 3.2). The site was evidently an excellent nursery for both brown trout and Atlantic salmon and offered some good quality holding and spawning habitat. The quality of the latter was reduced somewhat given compaction and sedimentation of substrata, locally. Lamprey spawning and nursery habitat were both considered of good quality (Table 3.3), with localised small-medium gravel patches between cobble and small boulder in addition to marginal pockets of silt/sand (some up to 10cm in depth). Although none were recorded, European eel habitat was considered good given the presence of deeper pool areas and ample refugia.

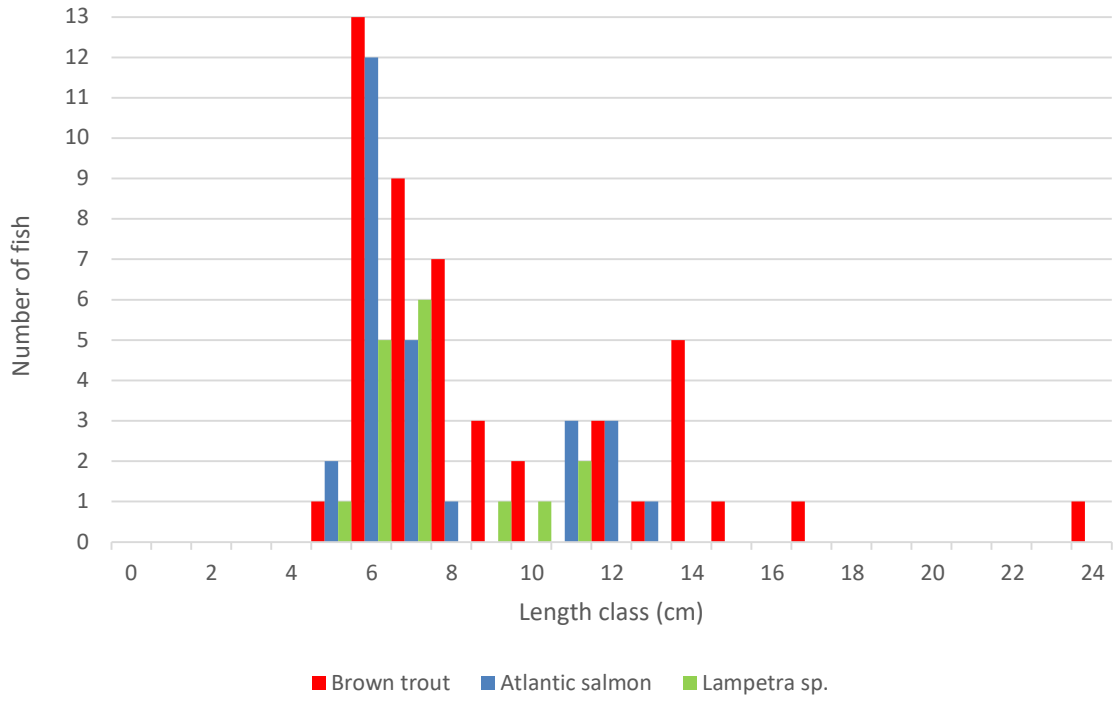

Figure 3.1 Fish stock length distribution recorded via electro-fishing at site A6 on the Monparson River, Lissard in July 2020.

Plate 3.6 Representative image of Atlantic salmon parr recorded form site A6 on the Monparson River at Lissard, July 2020.

Plate 3.7 Representative image of site B1 on the upper Toor River at Mullenaboree (no fish recorded via electro-fishing, channel very shallow and heavily overgrown).

Site B1 – Toor River, Mullenaboree

No fish were recorded during electro-fishing at site B1. The stream had been extensively deepened and straightened and retained very little natural character, with (upstream of bridge) heavy macrophyte and (downstream) riparian cover present, in addition to shallow water (<0.1m). Given improved fisheries habitat downstream, the site may be utilised by brown trout and European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered low at this location.

Site B2 – Coom Stream, Bottlehill landfill

No fish were recorded during electro-fishing at site B2 but only 70m^2 was effectively fished due to the overgrown nature of the channel. The site was considered to have poor fisheries value given the shallow, upland nature of the stream at this site, with no suitability for lamprey or salmonids. Given improved fisheries habitat downstream, the site may be utilised by European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered low at this location.

Plate 3.8 Representative image of site B2 on the upper Coom Stream near Bottlehill Landfill (no fish recorded via electro-fishing).

Site B3 – Coom River, Coom

Atlantic salmon (*n*=43) and brown trout (*n*=36) were the only two fish species recorded from site B3 on the Coom River (Figure 3.2). Both juvenile and (small) adult trout were recorded, with two size classes of Atlantic salmon present. With the exception of European eel, the same species assemblage was recorded during a 2017 survey of this site (Triturus, 2017).

The river was considered an excellent salmonid nursery with good holding and spawning habitat present (Table 3.2). Atlantic salmon density was the highest recorded across all survey sites (0.225 fish per m^2; Table 3.1). However, the site's spawning potential for salmonids was impacted by siltation with partial bedding of the substrata. Holding habitat was limited to a large pool downstream of the weir below the bridge. The site was of too high energy for lamprey despite the presence of some limited potential spawning substrata marginally. The site was considered of low value as an eel nursery due to the sites location high in the catchment and evident absence of the species during electro-fishing.

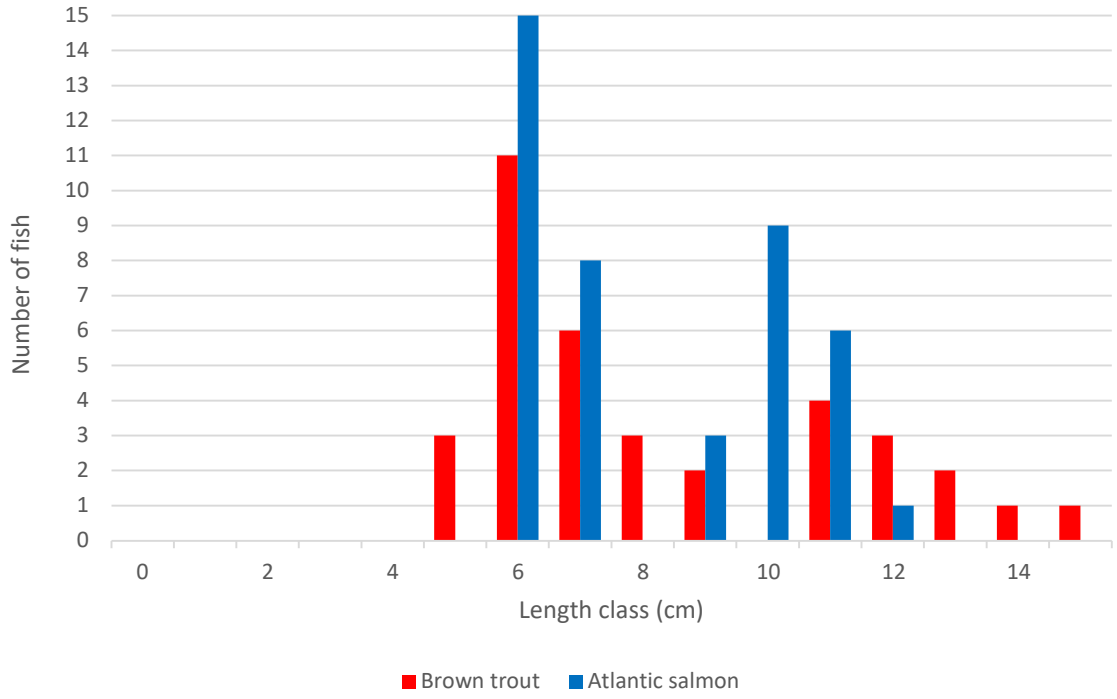

Figure 3.2 Fish stock length distribution recorded via electro-fishing at site B3 on the Coom River, Coom, July 2020.

Plate 3.9 Representative image of site B3 on the Coom River at Coom.

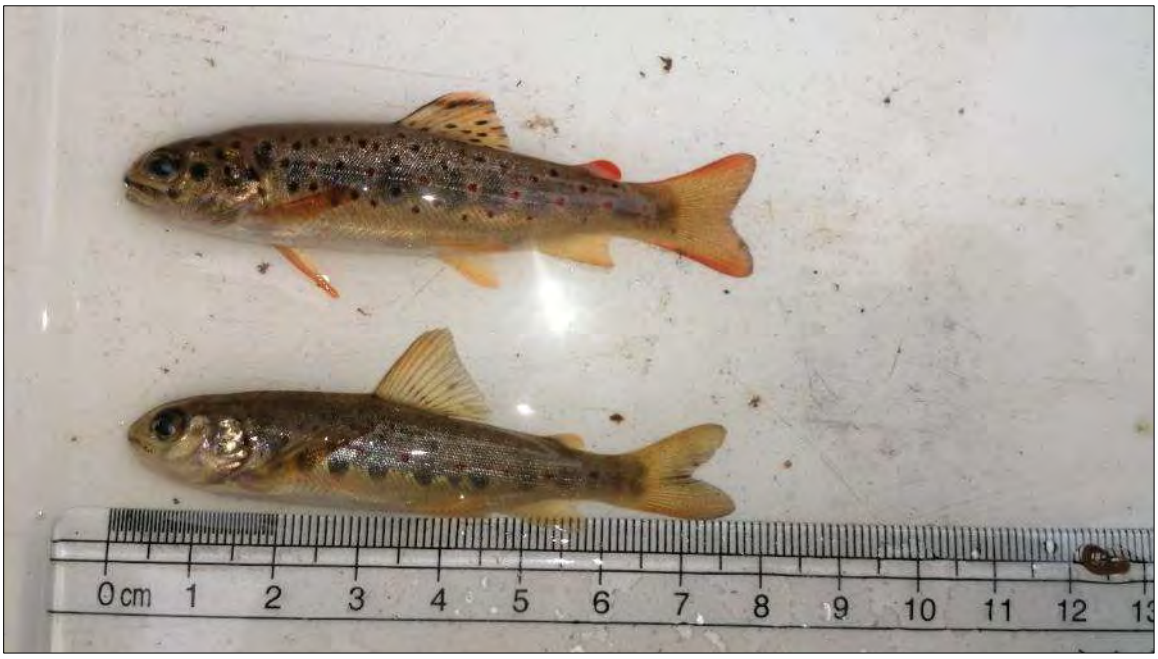

Plate 3.10 Representative image of brown trout and Atlantic salmon parr recorded form site B4 on the Toor River, Raheen, July 2020.

Site B4 – Toor River, Raheen

Two fish species were recorded from site B4. Brown trout dominated (*n*=36) with a small number of Atlantic salmon parr (*n*=3) also captured (Figure 3.3). Both juvenile and adult trout were present, with two size classes of Atlantic salmon recorded. With the exception of European eel, the same species assemblage was recorded during a 2017 survey of this site (Triturus, 2017).

The river was considered a good salmonid nursery with good holding and spawning habitat present (Table 3.1). However, the site's spawning potential for salmonids was impacted by siltation with partial bedding of the substrata and light to moderate siltation pressures. The site was of too high energy for lamprey despite the presence of some limited potential spawning substrata marginally. Soft sediment areas were scarce and, where present, were typically compacted and composed predominantly of sand, thus providing poor larval lamprey nursery habitat. The site was considered of low value as an eel nursery and foraging habitat.

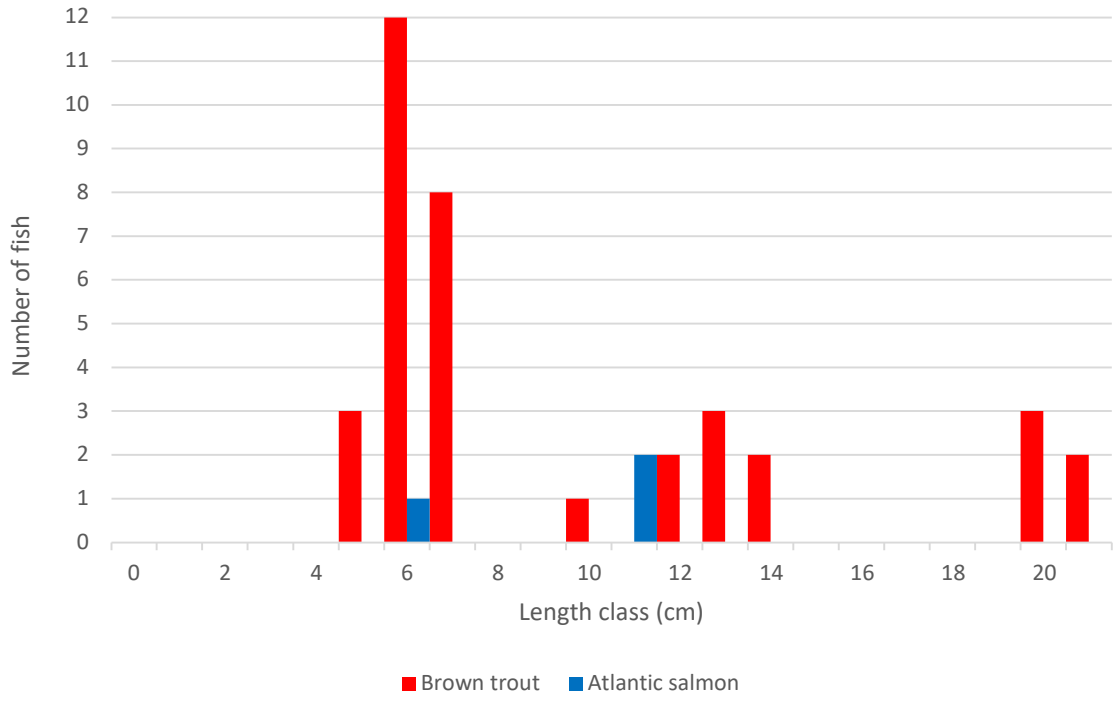

Figure 3.3 Fish stock length distribution recorded via electro-fishing at site B4 on the Toor River, Raheen, July 2020.

Site B5 – Lyravarrig Stream, Commons

Brown trout and European eel were the only two fish species recorded from site B5 on the Lyravarrig Stream, a tributary of the upper River Bride. A low number of juvenile brown trout (*n*=7) and maturing European eel were present.

The historically straightened and deepened stream suffered from heavy siltation with the majority of the substrata covered in silt. Overall, the stream was considered a lower value nursery and spawning area for brown trout, with moderate quality nursery, spawning and holding habitat present (Table 3.2). It was also a lower value nursery for European eel. The stream appeared to be of moderate value for lamprey (Table 3.3) given frequent soft sediment areas but none were recorded during the survey.

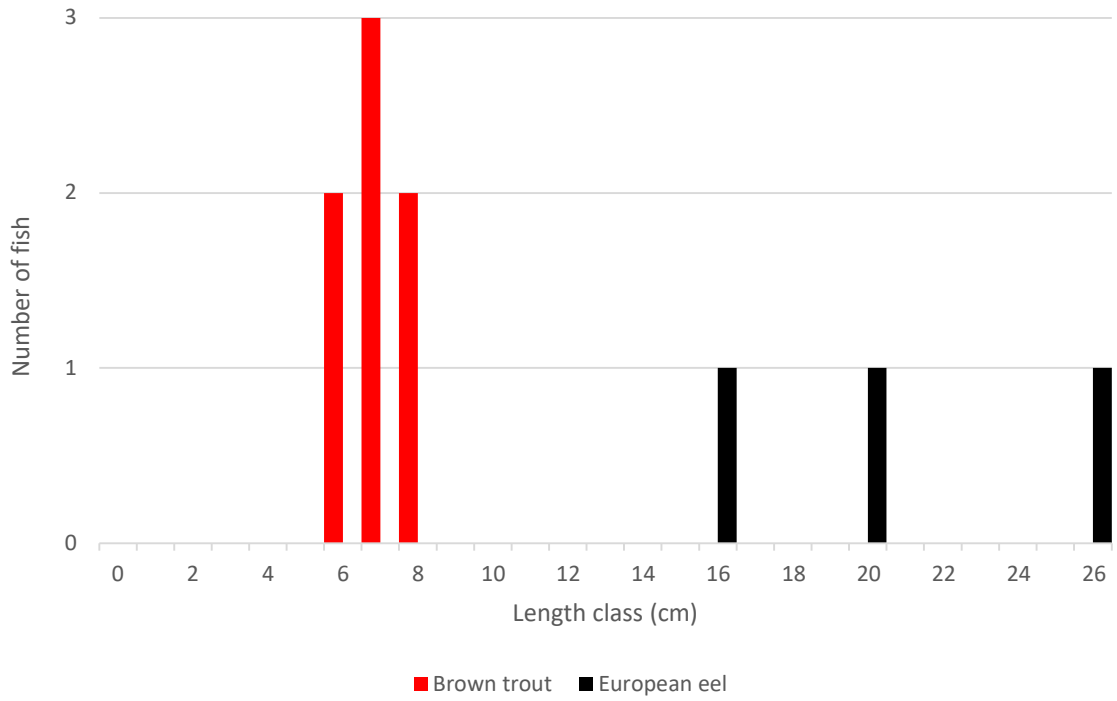

Figure 3.4 Fish stock length distribution recorded via electro-fishing at site B5 on the Lyravarrig Stream, Commons in July 2020.

Plate 3.11 Juvenile brown trout and European eel recorded from site B5 on the Lyravarrig Stream, Commons in July 2020.

Plate 3.12 European eel recorded from site B6 on the Seefin Stream, Commons in July 2020.

Site B6 – Seefin Stream, Commons

A single European eel was the only fish recorded from site B6 on the Seefin Stream (Figure 3.5). The channel suffered from very low flows at the time of survey, with localised semi-stagnant pools. Thus, salmonid habitat was not present. The site had no inherent fisheries value given small size and low flows although, given downstream connectivity with the River Bride, may support brown trout and greater densities of European eel during higher flow periods (e.g. winter).

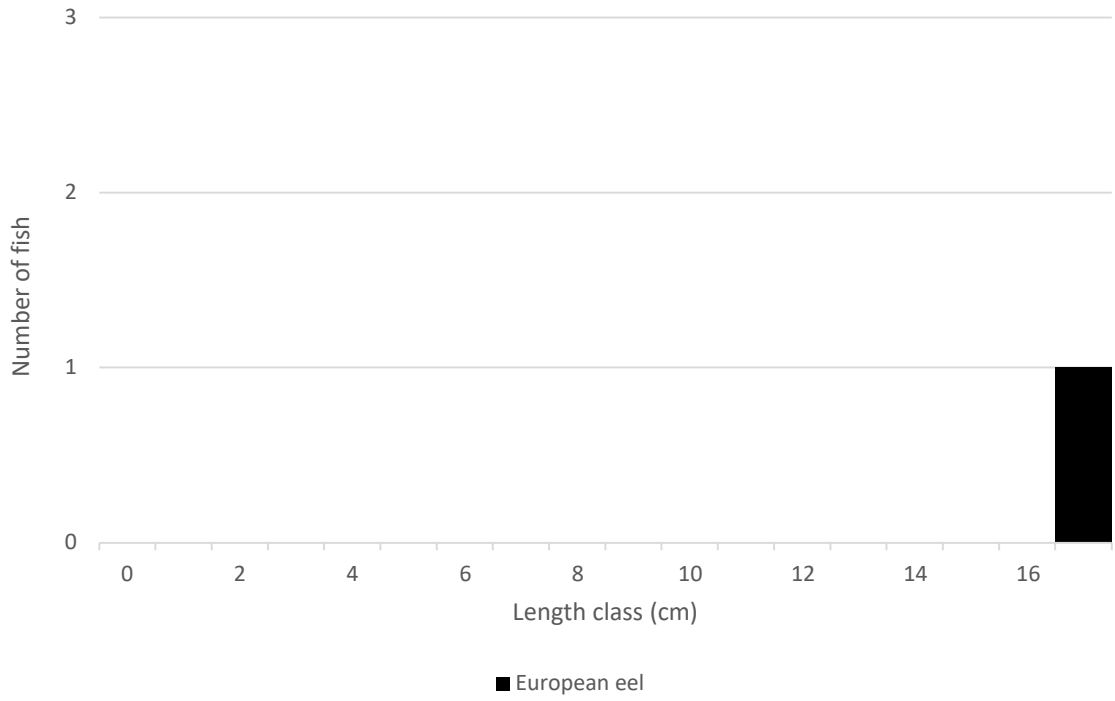

Figure 3.5 Fish stock length distribution recorded via electro-fishing at site B6 on the Seefin Stream, Commons in July 2020.

Site B7 – River Bride, Commons

Brown trout were the dominant species recorded from site B7 on the River Bride (*n*=37), with a single European eel also captured (Figure 3.6). Relatively high numbers of juvenile trout were present in addition to a range of adult size classes.

The site was evidently a very good salmonid nursery with good quality spawning and holding habitat (on meanders) present also (Table 3.2). However, the overall value was diminished due to siltation and evident enrichment (excessive filamentous algae present). Whilst some localised lamprey spawning habitat (smaller gravel fractions) was present, the site was generally unsuitable for larval lamprey given its higher energy nature and none were recorded. European eel habitat was considered moderate as localised pool was present with some suitable instream refugia.

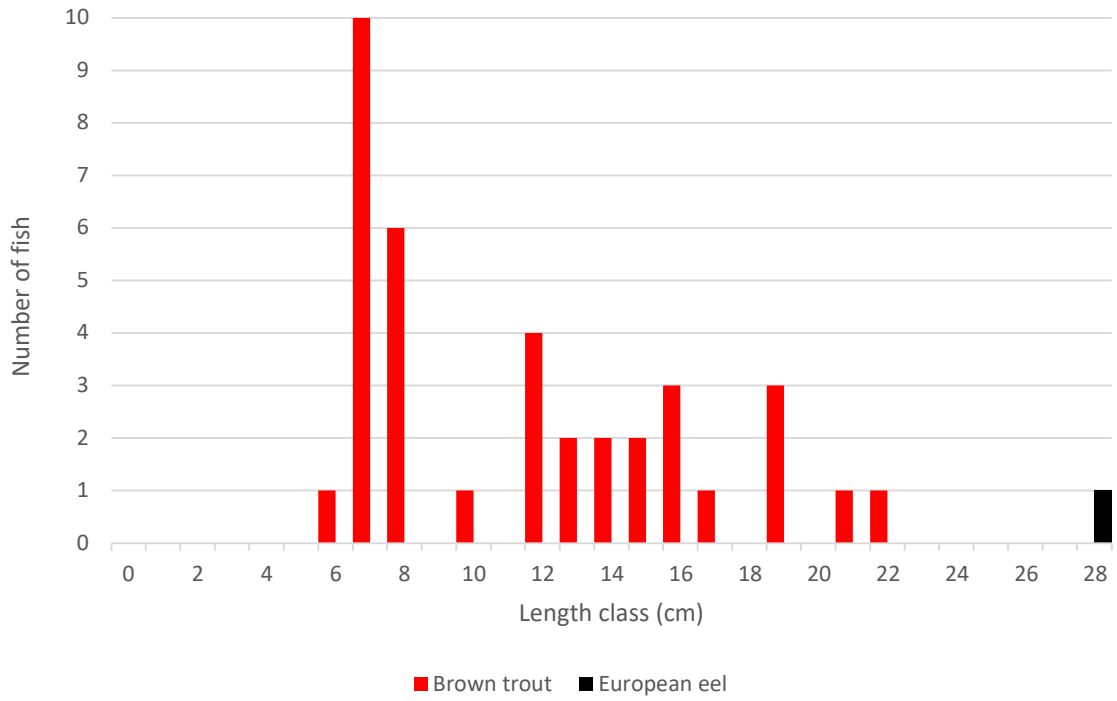

Figure 3.6 Fish stock length distribution recorded via electro-fishing at site B7 on the River Bride, Commons in July 2020.

Plate 3.13 A range of brown trout size classes recorded from site B7 on the upper River Bride, Commons in July 2020.

Site B8 – Lyravarrig Stream, Mullenaboree

Brown trout were the dominant species recorded from site B8 on the Lyravarrig Stream (*n*=38), with a single European eel also captured (Figure 3.7). Relatively high numbers of juvenile trout were present (majority ≤7.6cm FL) with only two small adults recorded.

The site was evidently a good salmonid nursery although it was impacted by siltation pressures. The spawning habitat was considered of moderate quality (siltation) with a paucity of deeper holding areas for adults (Table 3.2). The site was generally unsuitable for lamprey (Table 3.3) given its higher energy nature and lack of suitable sediment accumulations and none were recorded. European eel habitat was moderate, at best, given the lack of deeper pool habitat and overall shallow nature of the stream.

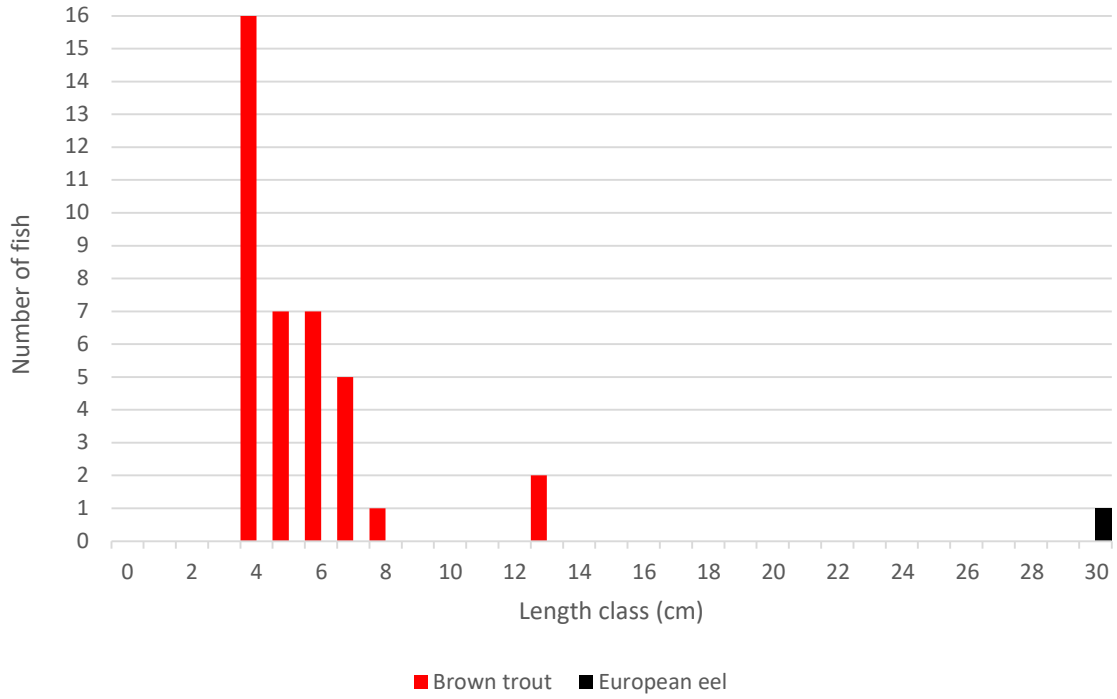

Figure 3.7 Fish stock length distribution recorded via electro-fishing at site B8 on Lyravarrig Stream, Mullenaboree in July 2020.

Plate 3.14 Juvenile brown trout recorded from site B8 on the Lyravarrig Stream, Mullenaboree in July 2020.

Plate 3.15 Representative image of site B9 on the Field Chimney Stream, Chimneyfield, July 2020.

Site B9 – Field Chimney Stream, Chimneyfield

A total of two fish species were recorded from site B9 on the Field Chimney Stream. Brown trout dominated (*n*=15) with low numbers (*n*=5) of Atlantic salmon parr also captured (Figure 3.8). All fish recorded were juveniles.

The site was evidently a good salmonid nursery although it was impacted by siltation pressures. Salmonid spawning and holding habitat were both considered of moderate value (Table 3.2). The site was of too high energy to support lamprey and none were recorded. Despite some moderate suitability as a nursery/foraging area, no European eel were recorded.

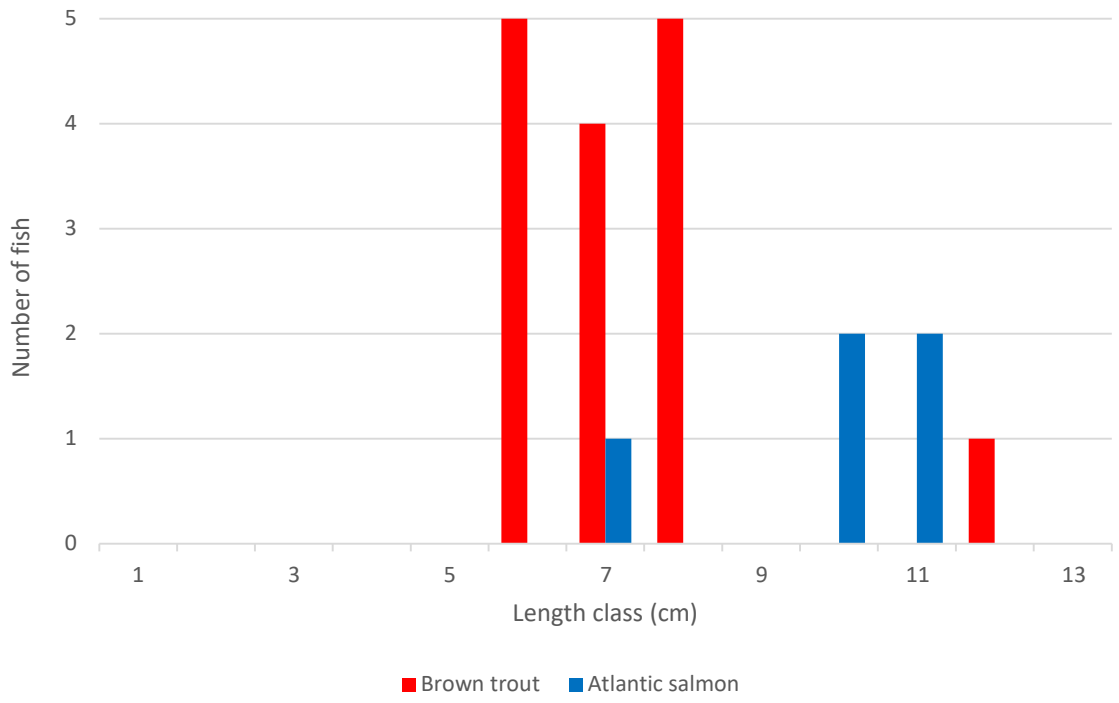

Figure 3.8 Fish stock length distribution recorded via electro-fishing at site B9 on Field Chimney Stream, Chimneyfield, July 2020.

Site B10 – Inchinanagh River, Inchinanagh

A total of three fish species were recorded from site B10 on the Inchinanagh River (Figure 3.9). Brown trout predominated (*n*=50), with a particularly high abundance of juveniles recorded in addition to low numbers of small adults. Brown trout density was the highest recorded across all survey sites (0.385 fish per m^2; Table 3.1). A low number of Atlantic salmon parr (two size classes) and adult European eel were also present.

The river was evidently a good salmonid nursery with some good spawning habitat but had only moderate holding habitat with limited deeper pools (Table 3.2). The small river site was of too high energy for larval lamprey, despite some physical spawning habitat suitability (Table 3.3). The site was considered a good eel nursery/foraging area with ample boulder habitat present throughout.

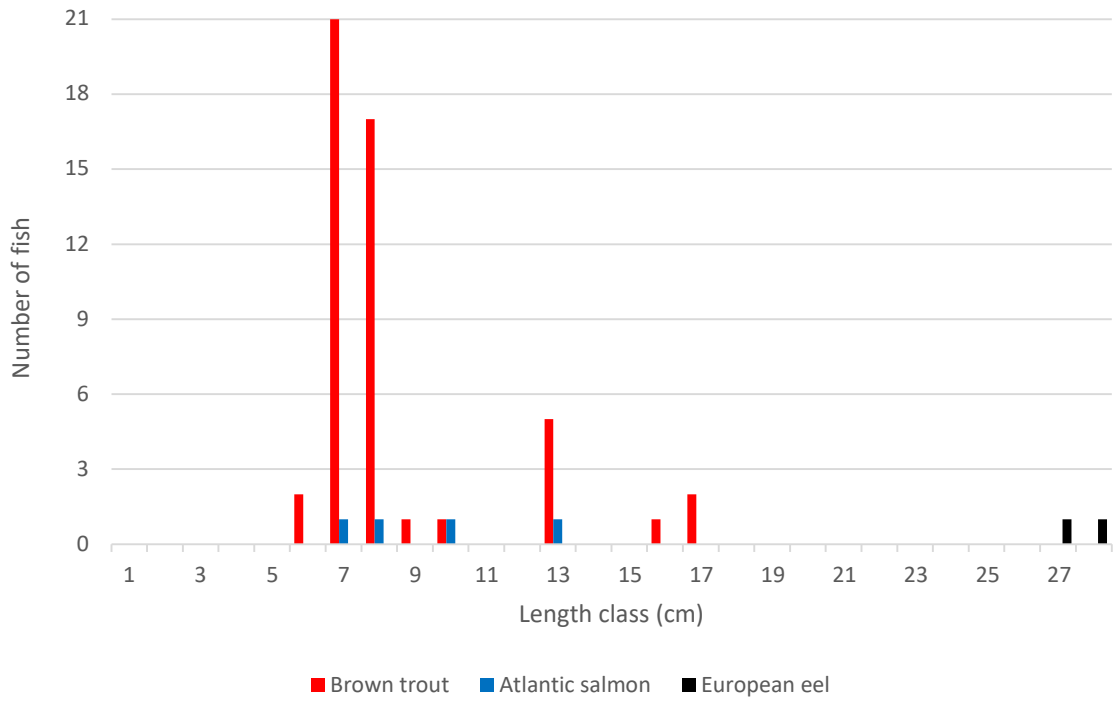

Figure 3.9 Fish stock length distribution recorded via electro-fishing at site B10 on the Inchinanagh River, Inchinanagh, July 2020.

Plate 3.16 Representative image of site B10 on the Inchinanagh River, Inchinanagh, July 2020.

Plate 3.17 Representative image of site B11 on River Bridge downstream of Bride Bridge, July 2020.

Site B11 – River Bride, Bride Bridge

Brown trout and Atlantic salmon were the only two species recorded from site B10 on the River Bride (Figure 3.10). Brown trout dominated (*n*=35), with a healthy range of juvenile and adult size classes present. Moderate numbers of Atlantic salmon parr (*n*=16) were also recorded (two size classes). The same species assemblage was also recorded during a 2017 survey of this site (Triturus, 2017) although abundances of Atlantic salmon were notably higher in 2020.

The upland, cascading site offered excellent holding habitat for adult salmonids, in addition to being an evidently good nursery (Table 3.2). Spawning was of good quality (frequent well-sorted coarse-medium gravels) although typically more suited to Atlantic salmon. Whilst localised spawning substrata for lamprey were present, larval lamprey habitat was not present given the higher energy nature of the site. Although no European eel were recorded during the survey, the site did offer some good suitability for the species, especially in deeper pool areas.

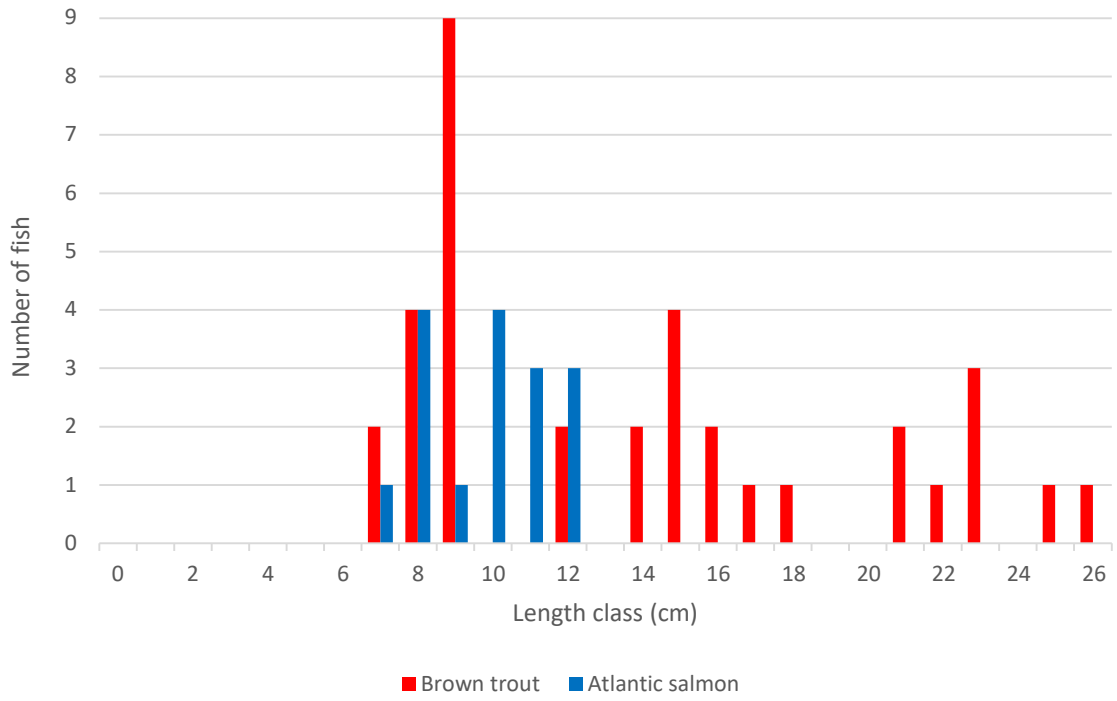

Figure 3.10 Fish stock length distribution recorded via electro-fishing at site B11 on the River Bride at Bride Bridge, July 2020.

Site B12 – unnamed stream, Knockdoorty

No fish were recorded during electro-fishing at site B12. The shallow, upland nature of the small channel with heavily bedded substrata (moderate siltation) reduced its viability for salmonids albeit populations would be present further downstream in higher order reaches. Lamprey habitat was absent. The stream may be utilised seasonally by migratory European eel during periods of higher flow (e.g. autumn, winter) although the site's overall fisheries value was considered low.

Plate 3.18 Representative image of site B12 on an unnamed stream at Knockdoorty, July 2020.

Site B13 – unnamed stream, Power's Bridge

European eel was the only species recorded from site B13, with two juveniles captured via electro-fishing (Figure 3.11).

Overall, the shallow nature of the small stream channel, with heavily bedded substrata, reduced its viability for salmonids. However, populations were present further downstream as the channel deepened and widened. The upland site was not suitable for lamprey. A small European eel population was present, exemplifying its value as a nursery and likely utilisation as a seasonal migratory pathway for the species.

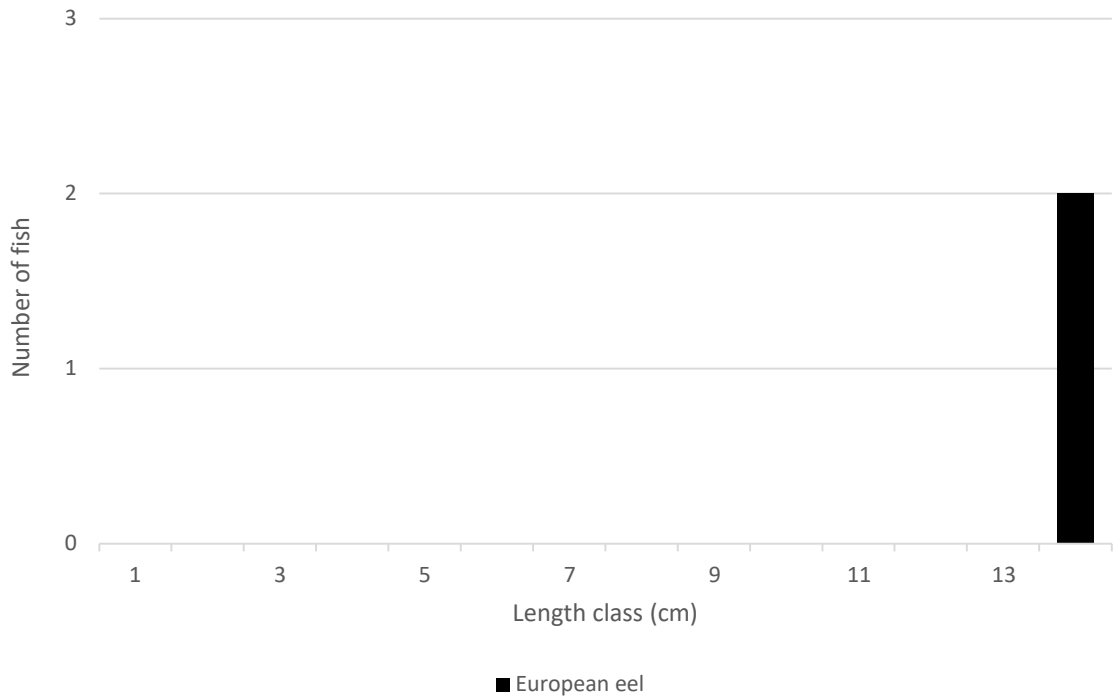

Figure 3.11 Fish stock length distribution recorded via electro-fishing at site B13 on an unnamed stream at Power's Bridge, July 2020.

Plate 3.19 Representative image of site B13 on an unnamed stream at Powers Bridge, July 2020.

Plate 3.20 Representative image of site B14 on the Bunnaglanna Stream at Moneygorm, July 2020.

Site B14 – Bunnaglanna Stream, Moneygorm

No fish were recorded during electro-fishing at site B14. The shallow, upland nature of the small channel with heavily bedded substrata (heavy siltation) reduced its viability for salmonids albeit populations were present further downstream in higher order reaches. Lamprey habitat was absent. The stream may be utilised seasonally by migratory European eel during periods of higher flow (e.g. autumn, winter) although the site's overall fisheries value was considered low.

Site B15 – River Bride, Old Bridge

Atlantic salmon and brown trout were the only two species recorded from site B15 on the River Bride (Figure 3.12). Both species were recorded in similar numbers (*n*=22, *n*=21 respectively). A healthy range of juvenile and adult trout size classes were present along with two distinct Atlantic salmon size classes. With the exception of European eel, the same species assemblage was also recorded during a 2017 survey of this site (Triturus, 2017) although abundances of juvenile Atlantic salmon and brown trout were notably higher in 2020.

The site was evidently an excellent salmonid nursery (Table 3.2) and also exhibited good spawning habitat locally, as reflected by the stock demographic captured during the survey. The best nursery areas were in the faster riffle area near the bridge. Holding habitat was also good moving upstream where pool habitat existed below large instream boulders. However, the River Bride was of too high energy at site B15 to support lamprey species. Some suitability existed as an eel nursery in the boulder and cobble areas although none were recorded during the survey.

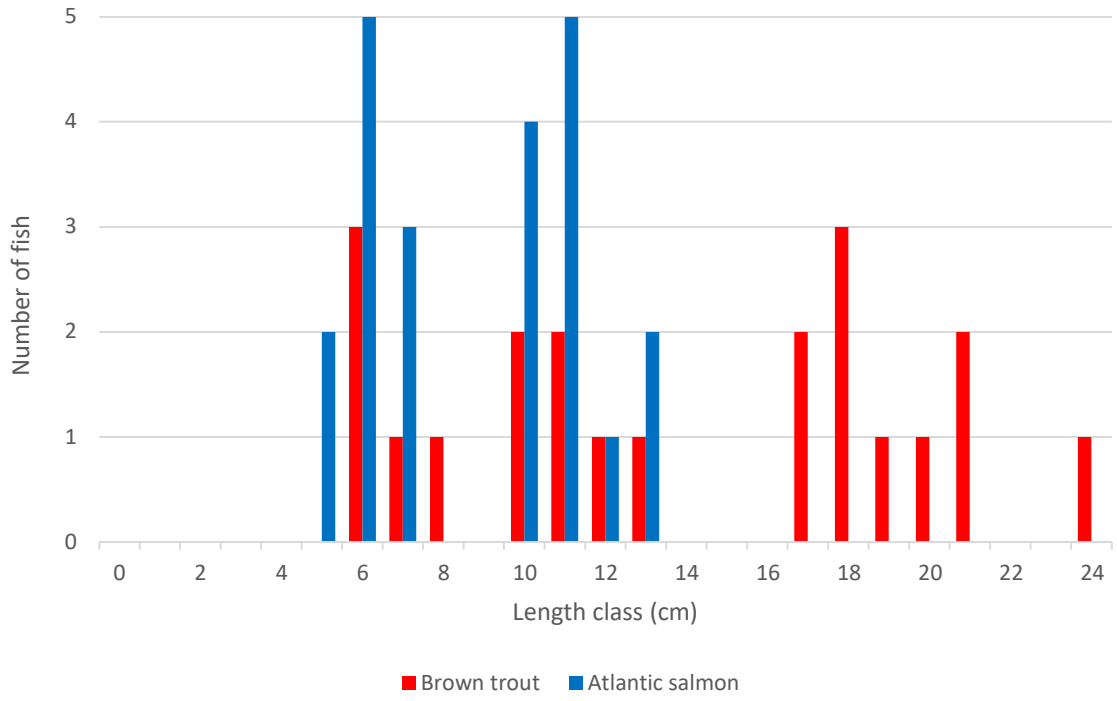

Figure 3.12 Fish stock length distribution recorded via electro-fishing at site B15 on the River Bride at Old Bridge, July 2020.

Plate 3.21 Adult brown trout and Atlantic salmon parr recorded from site B15 on the River Bride at Old Bridge, July 2020.

Plate 3.22 Representative image of site C1 on the upper Slumberhill Stream, Knockacullata, July 2020.

Site C1 – Slumberhill Stream, Knockacullata

No fish were recorded from site C1 on the Slumberhill Stream. The historically straightened and deepened site was of poor fisheries value given the very shallow and likely seasonal nature of the stream at this location. Given downstream connectivity, the stream may be of some value to migratory European eel during higher flow periods (e.g. autumn, winter).

Site C2 – Ross Stream, Knockacullata

Three fish species were recorded from site C2 on the upper reaches of the Ross Stream (Figure 3.13), with low numbers of brown trout and European eel present. A single three-spined stickleback was also captured.

The heavily silted stream site was considered a lower value nursery and spawning area for brown trout, with poor quality spawning and holding habitat present (Table 3.2). It was also a lower value nursery and foraging area for European eel. Lamprey habitat was considered sub-optimal due to the position of the survey area high up in catchment. Despite the presence of silt areas for lamprey ammocoete burial, the sediment was more mobile in nature and its presence due to constant siltation pressure from bank erosion and cattle fords (Table 3.3).

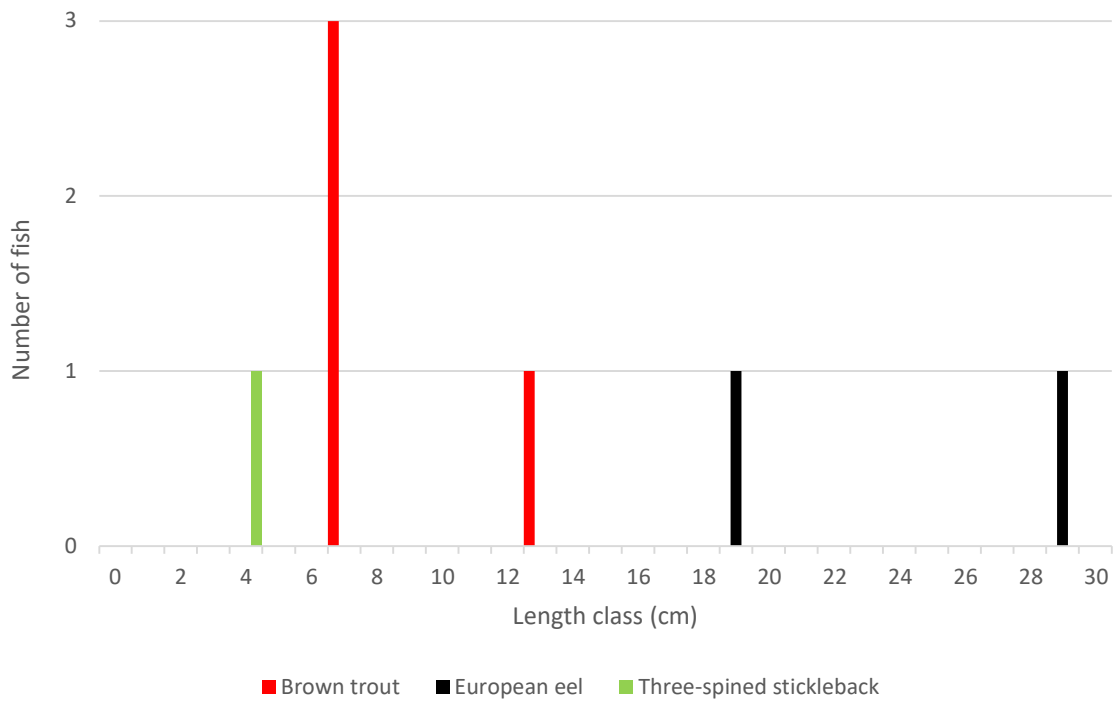

Figure 3.13 Fish stock length distribution recorded via electro-fishing at site C2 on Ross Stream, Knockacullata in July 2020.

Plate 3.23 Juvenile and small adult brown trout recorded from site C2 on the Ross Stream, Knockacullata, July 2020.

Plate 3.24 Representative image of site D1 on the upper reaches of the Shanowen Trib Stream Ballynahina, July 2020.

Site D1 – Shanowen Trib 1, Ballynahina

No fish were recorded from site D1 on the Shanowen Trib 1 Stream via electro-fishing. The very shallow (≤0.05m), heavily modified lowland stream featured moderate siltation with bedded substrata and was not considered of fisheries value at the time of survey, although, given downstream connectivity, it may be utilised seasonally by migratory European eel.

Site D2 – Farran North River, Farran North

A total of five fish species were recorded from site D2 on the Farran North Stream. Larval lamprey (*Lampetra* sp.) were the most abundant (*n*=65) followed by brown trout (*n*=10) (Figure 3.14). The majority of lamprey ammocoetes were recorded from targeted 1m^2 quadrats in suitable soft sediment areas (some were captured incidentally). The density of lamprey ammocoetes was the highest recorded across all survey sites (16.25 larvae per m^2 of targeted 1m^2 quadrat; Table 3.1). Both juvenile and adult trout were captured. Low numbers of Atlantic salmon parr, European eel and three-spined stickleback were also recorded. A 2017 electro-fishing survey of this site reported only brown trout and *Lampetra* sp. ammocoetes (Triturus, 2017).

The heavily modified site D2 suffered from heavy (locally, very heavy) siltation. As such, it was considered a lower value salmonid nursery area, with better spawning habitat noted upstream of the survey area. Holding habitat for adult salmonids was largely absent (Table 3.2). However, the site was considered an excellent nursery area for lamprey (likely brook lamprey) (Table 3.3), with moderate spawning substrata. The site was also a good eel nursery but had a paucity of stone refugia. Most eel emanated from soft sediment as with lamprey and the species can avail of softer sediment as nursery habitat in the absence of stone refugia. A storm drain at the meander appeared to be contributing to the majority of the habitat degradation.

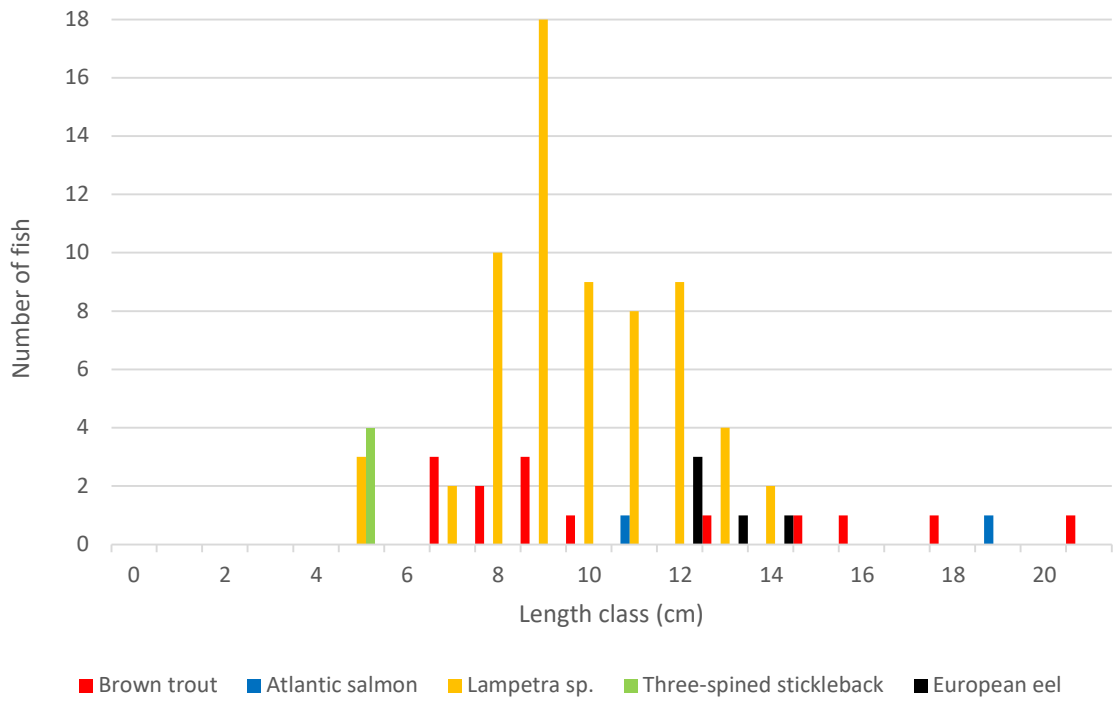

Figure 3.14 Fish stock length distribution recorded via electro-fishing at site D2 on the Farran North River, Farran North in July 2020.

Plate 3.25 Representative image of site D2 on the Farran North River, Farran North, July 2020.

Table 3.1 Fish species densities per m^2 recorded at sites in the vicinity of Coom Green Energy Park via electro-fishing in July 2020. Values in **bold** represent the highest densities recorded for each species, respectively. Lamprey numbers are presented per $1m^2$ targeted quadrat unless otherwise stated.

Site	Fish density (number fish per m^2)						
	CPUE	Approx. area fished (m^2)	Brown trout	Atlantic salmon	*Lampetra* sp.	European eel	Three-spined stickleback
A1	5-minute	40	0	0	0	0	0
A2	5-minute	45	0	0	0	0	0
A3	5-minute	50	0	0	0	0	0
A4	5-minute	75	0	0	0	0	0
A5	n/a – site dry at time of survey						
A6	10-minute	250	0.108	0.192	5 per $1m^2$ quadrat	0	0
B1	10-minute	50	0	0	0	0	0
B2	10-minute	70	0	0	0	0	0
B3	10-minute	200	0.180	**0.225**	0	0	0
B4	10-minute	150	0.240	0.020	0	0	0
B5	10-minute	100	0.080	0	0	0.040	0
B6	10-minute	50	0	0	0	0.020	0
B7	10-minute	200	0.185	0	0	0.005	0
B8	10-minute	150	0.253	0	0	0.013	0
B9	10-minute	120	0.133	0.042	0	0	0

Site	CPUE	Approx. area fished (m^2)	Fish density (number fish per m^2)				
			Brown trout	Atlantic salmon	*Lampetra* sp.	European eel	Three-spined stickleback
B10	10-minute	130	**0.385**	0.031	0	0.015	0
B11	10-minute	200	0.095	0.080	0	0	0
B12	10-minute	100	0	0	0	0	0
B13	10-minute	50	0	0	0	0	0
B14	10-minute	65	0	0	0	0	0
B15	10-minute	240	0.088	0.092	0	0	0
C1	5-minute	75	0	0	0	0	0
C2	10-minute	100	0.040	0	0	0.020	0.010
D1	10-minute	90	0	0	0	0	0
D2	10-minute	110	0.091	0.009	**16.25 per $1m^2$ quadrat**	**0.045**	**0.036**

3.2 Fisheries habitat

3.2.1 Salmonid habitat

Salmonid habitat ranged from poor to excellent value across the survey sites (Table 3.2). Of the *n*=25 sites, four sites in total offered excellent quality salmonid habitat according to life Cycle Unit scores. These were sites A6 (Monparson River), B3 (Coom River) and B11 and B15 (River Bride).

Sites B4, B7, B9, B10 and D2 offered good quality salmonid habitat, with these sites often featuring moderate-heavy siltation, thus reducing overall scores. Sites B5, B8, C1, C2 and D1 scored as moderate quality salmonid habitat. Nine sites in total (sites A2, A3, A4, B1, B2, B6, B12, B13 and B14) offered little or no value for salmonids and scored as 'poor' in terms of salmonid habitat. Sites A1 (unnamed stream, Knuttery Bridge) and A5 (unnamed stream, Lissard) were 100% dry at the time of survey and thus a Life Cycle Unit score was not applicable (no fisheries habitat present).

Table 3.2 Life Cycle Unit scores for sites surveyed in the vicinity of the proposed Coom Green Energy Park, July 2020.

Site	Salmonid habitat value	Spawning	Nursery	Pool (holding)	Total score
A1	n/a – channel 100% dry				
A2	Poor	4	4	4	**12**
A3	Poor	4	4	4	**12**
A4	Poor	4	4	4	**12**
A5	n/a – channel 100% dry				
A6	Excellent	2	1	2	**5**
B1	Poor	4	4	4	**12**
B2	Poor	4	4	4	**12**
B3	Excellent	2	1	2	**5**
B4	Good	2	2	2	**6**
B5	Moderate	3	3	4	**10**
B6	Poor	4	4	4	**12**
B7	Good	2	2	2	**6**
B8	Moderate	3	2	4	**9**

Site	Salmonid habitat value	Spawning	Nursery	Pool (holding)	Total score
B9	Good	3	2	3	**8**
B10	Good	2	2	3	**7**
B11	Excellent	2	2	1	**5**
B12	Poor	4	4	4	**12**
B13	Poor	4	4	4	**12**
B14	Poor	4	4	4	**12**
B15	Excellent	2	1	2	**5**
C1	Moderate	3	4	4	**11**
C2	Moderate	4	3	4	**11**
D1	Moderate	4	4	4	**12**
D2	Good	3	2	2	**7**

3.2.2 Lamprey habitat

Lamprey habitat was typically of poor to moderate quality across the majority of the survey area (21 or 91% of 23 sites) based on Lamprey Habitat Quality Index (LHQI) scores (Table 3.3). Eleven sites offered poor lamprey habitat whilst ten sites offered moderate quality lamprey habitat. However, sites B7 (River Bride) and B10 (Inchinanagh River) (both achieved 'moderate' scores) provided some good quality spawning substrata by way of finer gravel fractions.

Only sites A6 (Monparson River) and D2 (Farran North Stream) provided overall good quality lamprey habitat. Sites A1 and A5 were 100% dry at the time of survey and was therefore not assessable via LHQI scores (no fisheries habitat present).

Table 3.3 Lamprey Habitat Quality Index (LHQI) scores for sites surveyed in the vicinity of the proposed Coom Green Energy Park, July 2020.

Site	Lamprey habitat value	Spawning	Nursery	Total score
A1	n/a – channel 100% dry			
A2	Poor	4	4	**8**
A3	Poor	4	4	**8**
A4	Poor	4	4	**8**
A5	n/a – channel 100% dry			
A6	Good	2	2	**4**
B1	Poor	4	4	**8**
B2	Poor	4	4	**8**
B3	Moderate	3	4	**7**
B4	Moderate	4	3	**7**
B5	Moderate	3	3	**6**
B6	Poor	4	4	**8**
B7	Moderate	2	4	**6**
B8	Poor	4	4	**8**
B9	Moderate	3	4	**7**
B10	Moderate	2	4	**6**

Site	Lamprey habitat value	Spawning	Nursery	Total score
B11	Moderate	3	4	**7**
B12	Poor	4	4	**8**
B13	Poor	4	4	**8**
B14	Poor	4	4	**8**
B15	Moderate	3	4	**7**
C1	Moderate	3	4	**7**
C2	Moderate	4	3	**7**
D1	Poor	4	4	**8**
D2	Good	2	1	**3**

3.2.3 European eel habitat

European eel were recorded from a total of seven sites (i.e. B5, B6, B7, B8, B10, B13 and C2). Eel habitat ranged from poor to moderate across the majority of survey sites, with only a few larger sites providing better quality eel habitat (e.g. Monparson River, River Bride, Inchinanagh River).

4. Discussion

4.1 Most valuable sites

4.1.1 Salmonids

Across *n*=25 sites, Atlantic salmon were recorded from a total of eight sites (i.e. sites A6, B3, B4, B9, B10, B11, B15 and D2), with brown trout present at a total of twelve sites (i.e. A6, B3, B4, B5, B7, B8, B9, B10, B11, B15, C2 and D2). Atlantic salmon density was highest at site B3 (Coom River), with brown trout density highest at site B10 (Inchinanagh River) (Table 3.1).

Salmonid habitat ranged from poor to excellent value across the survey sites according to Life Cycle Unit scores (Table 3.2). Sites A6 (Monparson River), B3 (Coom River), B11 and B15 (River Bride) and D2 (Farran North Stream) offered excellent quality salmonid habitat. Typically, these high scores were a result of the presence of excellent quality nursery habitat for brown trout and or Atlantic salmon. Sites B4, B7, B9 and B10 offered good quality salmonid habitat, with these sites often featuring moderate siltation, thus reducing overall scores.

Sites B5, B8, C1, C2, D1 and D2 scored as moderate quality salmonid habitat, with overall scores reduced given siltation pressures in addition to a lack of deeper holding habitat (i.e. shallow watercourses).

Ten sites (sites A1, A2, A3, A4, B1, B2, B6, B12, B13 and B14) offered little or no value for salmonids and scored as 'poor' in terms of salmonid habitat. Site A5 (unnamed stream, Lissard) was 100% dry at the time of survey and thus a Life Cycle Unit score was not applicable (no fisheries habitat present; Table 3.2).

In general, smaller and or more upland sites received higher (worse) scores given their lack or even absence of suitable spawning substrata and nursery habitat resulting from higher gradients, higher-energy flows and spate natures. Stream gradient is known to be one of the principal determinants of juvenile salmonid production, with medium gradients most optimal in terms of successful recruitment and population persistence (Wood & Budy, 2009; O'Grady, 2006; Amiro, 1993). Furthermore, as would be expected in catchments exposed to pressures including afforestation and agriculture, survey sites on larger watercourses typically offered better quality salmonid habitat and supported higher densities of salmonids (e.g. River Bride).

Biological water quality was typically of less than good status (i.e. ≤Q3-4) across the survey sites, with only sites B15 on the River Bride meeting Water Framework Directive (i.e. ≥Q4) and Surface Water Regulations (S.I. No. 77/2019) standards (i.e. EQR high/good ≥0.85). The abundance of salmonids (especially Atlantic salmon as opposed to brown trout) is more stable at better quality sites (≥Q4), with salmon populations tending to oscillate due to fry abundance 'pulses' at moderate quality sites (i.e. Q3-4) (Kelly et al., 2007; Champ et al., 2009).

4.1.2 Lamprey

Lamprey habitat was typically of poor to moderate quality across the majority of the survey area (21 or 91% of 23 sites) based on Lamprey Habitat Quality Index (LHQI) scores (Table 3.3). Twelve sites offered poor lamprey habitat given the absence of suitable larval habitat (e.g. in higher flow sites) and or little to no suitable spawning substrata. Many of the survey sites were located on upland eroding watercourses and naturally such sites do not encourage the deposition of fine, organic rich sediment required by larval lamprey (Goodwin et al., 2008; Aronsuu & Virkkala, 2014).

Ten sites offered moderate quality lamprey habitat with scores invariably reduced given a paucity or lack of suitable soft sediment areas for ammocoetes. However, sites B7 (River Bride) and B10 (Inchinanagh River) (both of which achieved 'moderate' overall scores) provided some good quality spawning substrata by way of finer gravel fractions.

Only sites A6 (Monparson River) and D2 (Farran North Stream) provided overall good quality lamprey habitat. Site A6 offered a combination of good quality spawning and nursery habitat, whilst site D2 featured some good spawning substrata in addition to excellent quality larval habitat. Site D2 provided the best lamprey habitat of any survey site.

4.1.3 European eel

On both a global and Irish scale European eel is listed as 'critically endangered' (Pike et al., 2020; King et al., 2011). European eel were recorded from a total of seven sites (i.e. B5, B6, B7, B8, B10, B13 and C2), typically in low abundances. Eel habitat ranged from poor to moderate across the majority of survey sites, with only a few larger sites providing better (good) quality eel habitat (e.g. Monparson River, River Bride, Inchinanagh River). The highest eel density was recorded at site D2 on the Farran North Stream (0.045 fish per m^2; Table 3.1). In general, the majority of sites featured a paucity of suitable refugia, deeper pool areas and or were too shallow/high energy to be considered of good value to eel. Nonetheless, even smaller channels with poor or little overall fisheries value (e.g. B5, B6, C2 etc.) offered value as potential European eel migratory pathways given their downstream connectivity to larger channels. (e.g. adult migration seawards, usually from September/October onwards).

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FRESHWATER PEARL MUSSEL (*Margaritifera margaritifera*) SURVEY IN WATERCOURSES DOWNSTREAM OF COOM WINDFARM SITE

09 September 2020

TABLE OF CONTENTS

1.0 INTRODUCTION

The purpose of this report is to assess the occurrence of the legally protected freshwater pearl mussel (*Margaritifera margaritifera*) in watercourses downstream of the proposed Coom Windfarm. The windfarm site and proposed cable routes are mainly within the catchment of the River Bride (EPA Code 18B05), but small watercourses from the subject site also flow to the Clyda River (EPA Code 18C02) and the River Martin (EPA Code 19M01).

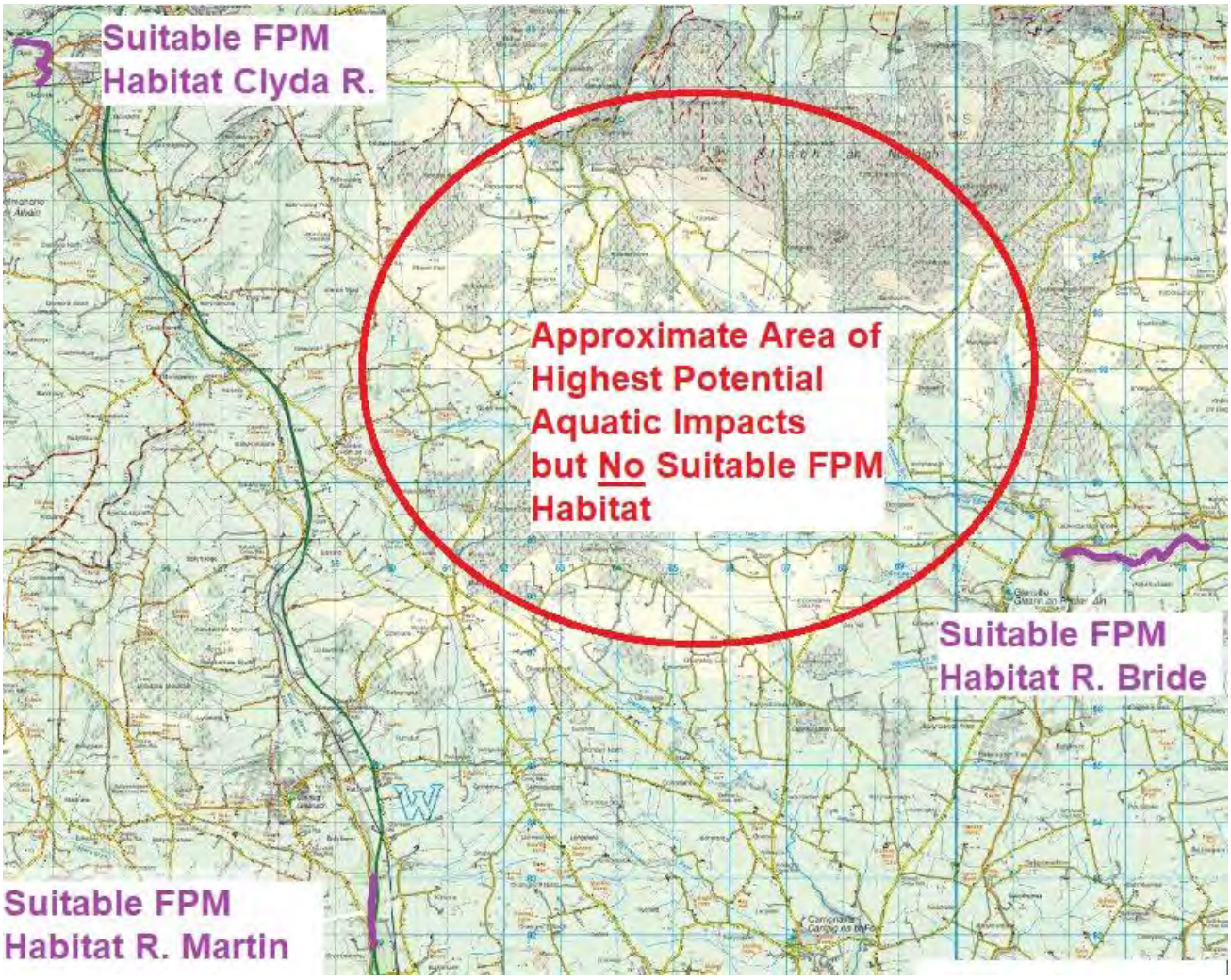
2.0 METHODOLOGY

2.1 SITE SELECTION

In 2017, seven sections of small watercourses in the upper Bride catchment were surveyed by Daireann McDonnell and were found to be of unsuitable habitat quality for freshwater pearl mussels (FPM) due to unstable substrata resulting from high energy water flows. Surveys in this general area carried out by Sweeney Consultancy for a variety of other projects confirms this. Therefore, it was decided that surveying for the present project should be undertaken farther downstream of the subject site, where the gradient decreases, with consequent improvement in the suitability of the habitat for FPM. In each of the three river catchments downstream of the subject site, sections of channel were selected, based on previous experience of these watercourses (Figure 1). While there are no previous records of FPM in the Rivers Bride or Martin, some mussels have been found at the lower end of the Clyda River in the past, just upstream of the confluence with the Munster Blackwater, where there is a significant population of this species (Evelyn Moorkens, *pers. comm.*).

The river sections selected were,
R. Bride: Keam Br. (ITM 571887 588835) to Corbally Br. (ITM 574407 588928).
Clyda R.: Railway viaduct (ITM 553387 597840) to Blackwater confluence (ITM 553387 597840).
R. Martin: Stream confluence at ITM 559650 583050 to car park at ITM 559606 581840.

Figure 1: Watercourses Surveyed



2.1 SURVEY METHODS

Field surveys were carried out under Licence No. C15/2020, issued by the National Parks and Wildlife Service. The survey methodology used was in accordance with the guidelines given in Irish Wildlife Manual No. 12, NPWS (Anon., 2004). Surveying was carried out from September 4th to 7th, 2020, in bright weather, with good visibility. Following an initial safety inspection of stretches to be surveyed, the riverbed was examined visually with a bathyscope. Exposed banks of gravel and sand were checked for the presence of mussel shells. Biosecurity measures were strictly adhered to, with all equipment in contact with river water washed down with Virkon Aquatic disinfectant between sites. Assessments were made of the habitat suitability for freshwater pearl mussels, based on the criteria of Hastie *et al.* (2000) and Skinner *et al.* (2003).

3.0 Results

3.1 Freshwater Pearl Mussel Survey Results

No live freshwater pearl mussels were found at any of the sites surveyed. No empty shells were found.

The physical habitat of the stretch of the River Bride surveyed was rated as very good, based on substrate type, flow, aquatic plant cover and degree of shade (Photos 1 & 2, Appendix 1). The stretch of the River Martin surveyed was mostly of good habitat quality for FPM (Photos 3 & 4), although absence of trees along parts of the right (western) bank result in little shade here. While the instream habitat of the section of the Clyda River appears good (Photos 5 & 6), there is a field of maize to the right bank from the railway viaduct to the road bridge, while downstream of the road bridge, grassland of on the left side of the river has been re-seeded and there has been some bank erosion (Photo 7) and reinforcement with rocks (Photo 8). In 2012, the treeline on the right bank near the confluence with the Blackwater, where FPM were previously recorded was removed and the bank re-contoured. Further tree removal had occurred on the left bank at the confluence by May 2018. This can be seen in the Google Earth images presented in Appendix 2.

4.0 Conclusions

There is no indication of the current presence of freshwater pearl mussels in the River Bride, the River Martin or the Clyda River.

There are no freshwater pearl mussels records farther downstream of the stretches surveyed in the Rivers Bride and Martin.

Freshwater pearl mussels are known to occur in the Munster Blackwater River, downstream of the Clyda River confluence.

The current absence of mussels from the lower reaches of the Clyda River is probably due to land use practices.

Appendix 1 Photographs

Photo 1: River Bride. Suitable FPM Habitat

Photo 2: River Bride. Suitable FPM Habitat

Photo 3: River Martin. Suitable FPM Habitat

Photo 4: River Martin. Suitable FPM Habitat

Photo 5: Clyda River. Suitable FPM Habitat downstream of Railway viaduct

Photo 6: Clyda River. Suitable FPM Habitat

Photo 7: Clyda River. Bank Erosion

Photo 8: Clyda River. Bank Reinforcement

Appendix 2 Google Earth Images of Clyda River

27/03/2012

03/09/2012

24/05/2018

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