Hornsea Project Three
Offshore Wind Farm

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Offshore Wind Farm

Environmental Statement:
Volume 6, Annex 8.2 – Construction Noise Model Output

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Hornsea 3
Offshore Wind Farm

Ørsted

Environmental Impact Assessment

Environmental Statement

Volume 6

Annex 8.2 – Construction Noise

Liability

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Glossary

Term	Definition
Baseline sound levels/Baseline sound environment	The existing sound levels before construction or operation of the Authorised Development commences.
Decibel	Units of sound measurement and noise exposure measurement.
Equivalent continuous sound pressure level	Defined in BS 7445 (BSI, 2003) as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time" (i.e. it is a measure of the noise dose or exposure over a period). It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. It is also the unit best suited to assessing community response.
Onshore elements of Hornsea Three	Hornsea Three landfall area, onshore cable corridor, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main National Grid substation.
Receptor	A component of the natural or man-made environment that is affected by an impact, including people.
Sound Pressure Level	Sound pressure is the dynamic variation of the static pressure of air and is measured in force per unit area. Sound pressure is normally represented on a logarithmic amplitude scale, which gives a better relationship to the human perception of hearing. The sound pressure level is expressed in decibels and is equal to 20 times the logarithm to the base 10 of the ratio of the sound pressure at the measurement location to a reference sound pressure. The reference sound pressure in air is normally taken to be 20 µPa, which roughly corresponds to the threshold of human hearing.

Acronyms

Acronyms	Description
AAWT	Annual Average Weekday Traffic
BPM	Best Practicable Means
BS	British Standard
CoPA	Control of Pollution Act
CRTN	Calculation of Road Traffic Noise
DMRB	Design Manual for Roads and Bridges
HDD	Horizontal Directional Drilling
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
$L_{Aeq,T}$	See "Equivalent continuous sound pressure level".
L_{Amax}	Maximum value of the A-weighted sound pressure level, measured using the fast (F) time weighting (in dBA).
SPL	Sound pressure level

Units

Unit	Description
dB	Sound pressure level referenced to 20 µPa.
GW	Gigawatt (power)
kVA	1000 volt-amperes (apparent power)

1. Construction Noise

1.1 Introduction

1.1.1.1 This annex presents the assumptions applied to and the results of modelling the noise emissions from the construction of the onshore elements of Hornsea Three (i.e. landfall area, onshore cable corridor, onshore HVAC booster station and onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main National Grid substation) together with compounds, storage areas and accesses. The results from the modelling informs the assessment carried out in volume 3, chapter 8: Noise and Vibration.

1.2 Legislation and Guidance

1.2.1 Control of Pollution Act

1.2.1.1 The key legislative driver for noise management in the UK is Section 60, Part III of the Control of Pollution Act 1974 (CoPA). It provides local planning authorities the ability to regulate noise from construction sites to prevent noise disturbance from occurring.

1.2.1.2 Measures to control noise from construction works include notices issued by the local planning authorities which stipulate the following:

- specify the plant or machinery which is, or is not, to be used;
- specify the hours during which the works may be carried out;
- specify the level of noise which may be emitted from the premises in question or at any specified point on those premises or which may be so emitted during specified hours; and
- provide for any change of circumstances.

1.2.1.3 Developers should apply for prior consent for work on construction sites setting out the construction methods and hours of work. The process of applying for prior consent is set out in Section 61, Part III of the CoPA. Consent under S.61 should be granted if after having considered the application the Local Authority is satisfied that it would not serve a notice under S.60. Further it will be a defence to a notice served under S.60 if consent is granted under S.61.

1.2.1.4 Section 72, Part III of the CoPA introduces the concept of the 'best practicable means' (BPM), which is defined that:

"In that expression "practicable" means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications.

The means to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structures."

1.2.2 British Standard 5228

1.2.2.1 British Standard (BS) 5228 is a two-part standard which comprises:

- BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'; and
- BS 5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'.

1.2.2.2 The Standard provides guidance, information and procedures for the control of noise and vibration from demolition and construction sites. BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014 gained approval for the purpose of giving guidance on appropriate methods for minimising noise from construction and open sites under the relevant sections of the Control of Pollution Act 1974.

1.2.2.3 There are no set standards for the definition of the significance of construction noise effects; however, for noise example criteria are provided in BS 5228-1:2009+A1:2014 Annex E. For vibration, example criteria are provided in BS 5228-2:2009+A1:2014 Annex B.

1.2.2.4 BS 5228-1:2009+A1:2014 provides basic information and recommendations for methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels. It includes sections on: community relations; noise and persons on site; neighbourhood nuisance; project supervision; and control of noise. The annexes include: information on legislative background; noise sources, remedies and their effectiveness (mitigation options); current and historic sound level data on site equipment and site activities; significance of noise effects; calculation procedures estimating sound emissions from sites and sound level monitoring; types of piling; and air overpressure.

1.2.2.5 BS 5228-2:2009+A1:2014 covers basic information and recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels. It includes sections on: community relations; vibration and persons on site; neighbourhood nuisance; project supervision; control of vibration and measurement. BS 5228-2:2009+A1:2014 refers to BS ISO 4866:2010; BS 7385-2:1993; BS 6472-1:2008, and BS 6472-2:2008 for further advice on the significance of vibration.

1.3 Methodology

1.3.1.1 This section outlines the technical methods used to determine the noise arising from the construction of Hornsea Three and the likely magnitude of impacts. Various calculation methods have been employed dependent upon the nature of the works and the most effective modelling technique. A summary of each of the modelling methodologies is provided below, along with a list of where these methodologies have been employed.

1.3.1.2 The level of noise generated from construction activities is inherently variable, and is influenced by factors such as the type of plant used, weather conditions, ground conditions and working methods. Assumptions regarding these factors are incorporated into the noise model. The assumptions used in the construction noise model for Hornsea Three are set out below.

1.3.2 Study area

1.3.2.1 For the assessment of construction noise impacts, the extent of the study area is dependent upon the source of noise or vibration, the duration of works and the times of day at which works are likely to take place. This is necessary as some works are likely to generate higher levels of noise over distance, and the time and duration of work has been taken into account when determining the threshold at which a significant noise effect is likely to occur.

1.3.2.2 The Hornsea Three noise and vibration study area considers noise sensitive receptors (NSR) and Public Rights of Way (PRoWs) within approximately 1 km of the onshore elements of Hornsea Three (namely the Hornsea Three landfall area, the onshore cable corridor, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main National Grid substation) together with storage areas, compounds and accesses. This study area aligns with the upper end of RPS standard practice study areas for construction projects, which typically range between 300 m and 1 km.

1.3.2.3 Locations of potentially NSRs have been identified from the Ordnance Survey Address Base data, used across the project. Approximately 5,000 residential properties have been identified within the noise and vibration study area. However, no schools or hospitals, or any other particularly NSR class were identified.

1.3.2.4 A number of PRoWs cross the Hornsea Three noise and vibration study area including two National Trails (see chapter 6: Land Use and Recreation). Whilst users might experience elevated noise levels for short periods when using PRoWs in the area, this is not considered a mechanism for significant effect. From any publicly accessible locations, noise levels would be below the threshold for discomfort or auditory damage and most users of the PRoW would experience only transitory exposure to construction noise as they pass by.

1.3.3 Baseline noise levels

1.3.3.1 The baseline sound levels have been evaluated for each identified NSR. NSRs have been grouped to the most appropriate monitoring location and a numerical level has been applied for the appropriate periods (e.g. night-time, evening etc) based on an appraisal of the survey data as reported in annex 8.1: Baseline Noise Survey. For example, for NSRs around the onshore HVDC converter/HVAC substation, a representative daytime ambient level of 55 dB $L_{Aeq,16hr}$ is identified; for the onshore HVAC booster station, a representative daytime ambient level of 52 dB $L_{Aeq,16hr}$ applies.

1.3.3.2 Existing baseline vibration is not a significant factor with regard to the assessment of construction vibration. No significant existing vibration sources near the onshore HVDC converter/HVAC substation have been identified. Therefore, no baseline vibration measurements have been undertaken.

1.3.3.3 The future baseline traffic data indicate that there would be a minor increase in baseline noise levels from road traffic due to natural growth. However, the increases are very low (calculated as less than 0.1 dB from the reported 3.5% increase in flow reported within the volume 3, chapter 7 Traffic and Transport) and are unlikely to have an influence on the assessment. Therefore, these changes have only been accounted for within the road traffic noise assessment as they are unlikely to influence other assessments. In the circumstance where construction traffic noise is identified as a potentially significant impact, its cumulative effect with other construction noise impacts will be considered in the determination of effect.

1.3.4 Guidance specific to noise and vibration

BS 5228-2:2009+A1:2014 calculation method

1.3.4.1 If works were likely to produce potentially significant levels of vibration, calculations would be carried out based upon the appropriate methodologies in Table E.1 of BS 5228-2:2009+A1:2014. However, no works likely to produce potentially significant levels of vibration have been identified.

1.3.4.2 For other works that have potential to generate vibration, effects have been considered qualitatively.

Calculation of Road Traffic Noise

1.3.4.3 Road traffic on the public highway has been modelled using noise change procedure based on the methodology in the 'Calculation of Road Traffic Noise' (CRTN) (Department for Transport, 1988). This considers the increase in noise from individual road links, based on the change in flow, speed and Heavy Goods Vehicle (HGV) composition. Within the assessment, HGVs and heavy-duty vehicles (HDVs) are regarded as having comparable noise emissions.

1.3.4.4 The noise changes identified in Table 1.1 have been used in the assessment of noise impacts associated with construction traffic on the local road network and from temporary diversion routes resulting from construction of Hornsea Three. These are based on the guidance in Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 7 'Noise and Vibration' for the classification of magnitude of noise impacts in the long term. These DMRB criteria best reflect the temporary nature of the construction noise impacts; the short-term response to a temporary change is found to best match the long-term response to a permanent change.

Table 1.1: Classification of Magnitude of Temporary Noise Impacts within DMRB.

Magnitude of Impact	Noise Change, $L_{Aeq,T}/L_{A10,18h}$
No change	0
Negligible	0 1– 2.9
Minor	3 – 4.9
Moderate	5 – 9.9
Major	10+

Construction noise criteria from BS 5228-1:2009+A1:2014

1.3.4.5 The magnitude of construction noise impacts has been determined in accordance with Annex E of BS 5228-1:2009+A1:2014. The criteria for assessing noise impact from construction works have been based on Example Method 2 contained within Annex E.3.3 of BS 5228-1:2009+A1:2014, which indicates that:

"Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$, from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect."

1.3.4.6 Whilst these criteria reference the pre-construction ambient noise, in practice for a relatively quiet area such as the Hornsea Three noise and vibration study area, the lower cut-off values apply. Consequently, fixed lower noise limits have been adopted for the construction works, which are independent of existing noise levels. This also aligns with the precautionary approach.

1.3.4.7 Table 1.2 summarises the criteria that have been used to inform the assessment of construction noise effects for residential dwellings and other NSRs of medium and high sensitivity, based on the guidance in BS 5228-1:2009+A1:2014. Determination of impact also includes consideration of duration, absolute noise levels and management of the noise sources, all of which make up the context. For NSRs that have low sensitivity, professional judgement has been applied to determine the overall level of impact.

Table 1.2: Construction noise levels lower cut-off values which might result in adverse impact at residential building facades.

Assessment category and threshold value period (L_{Aeq})	Impact Magnitude Threshold value [a], in decibels (dB)			
	No/Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Night-time (23.00 to 07.00 hours)	<40	40 - 45	45 – 55	>55
Evenings (19.00 to 23.00 hours weekdays). Weekends (13.00 to 23.00 hours Saturdays and 07.00 to 23.00 hours Sundays)	<50	50 - 55	55 – 65	>65
Daytime (07.00 to 19.00 hours) weekdays and Saturdays (07.00 to 13.00 hours)	<60	60 - 65	65 - 75	>75

[a] Subject to duration criteria and where ambient noise levels are low.

1.3.4.8 The calculation method of BS 5228-1:2009+A1:2014 takes account of the duration of an activity per hour, the 'on-time'; and the attenuation of sound due to distance, ground attenuation and barrier effects. The assessment is based on reasonably expected construction phases, plant items and on-times based on the information provided within BS 5228-1:2009+A1:2014. The average percentage on-time comes from estimates of the time that the plant will be operating at full power.

1.3.4.9 Where predicted construction noise levels are <5 dB below the lower cut-off values in paragraph 1.3.4.5 for the relevant time period, or of short duration (<1 month), the magnitude of impact is considered to be 'no change' or a negligible adverse as appropriate.

1.3.4.10 For works of longer duration (>1 month) where predicted noise levels are between 5 dB below and equal to the lower cut-off values in paragraph 1.3.4.6, this is considered to result in a minor adverse impact depending on the context and duration of the works. Where the lower cut-off values are exceeded by up to 10 dB, this is considered to be a moderate adverse impact depending on the context and duration of the works. Predicted noise levels greater than 10 dB above the lower cut-off values are considered to result in a major adverse impact depending on the context and duration of the works.

1.3.4.11 The levels provided in Table 1.2 apply when the existing ambient noise levels are low; for daytime this equates to ambient noise levels of 62 dB or below. As set out in volume 6, annex 8.1: Baseline Noise Survey, levels of 52 dB and 55 dB $L_{Aeq,day}$ are given as representative of the onshore HVDC converter/HVAC substation and onshore HVAC booster station areas. Consequently, existing daytime noise levels result in the criteria set within the lower cut-off values given in Table 1.2 above (i.e. the most stringent limits). As such, the lower cut-off values are used throughout the construction assessment. This follows a precautionary approach.

1.4 Assumptions and limitations

1.4.1.1 The acoustics standards and guidance adopted for Hornsea Three are based on the subjective response of the majority of the population. This is the widely used approach, considered by RPS to be the best that can be achieved in a population of varying subjective responses, which are dependent upon a wide range of factors. Individual responses to noise may vary greatly from the effects identified for the populace.

1.4.1.2 Sound monitoring at all NSRs (approximately) identified within the Hornsea Three noise and vibration study area is not required or practicable. Rather, monitoring has been carried out at select representative NSRs in close proximity to the onshore HVDC converter/HVAC substation and onshore HVAC booster station areas, in order to determine existing noise levels to inform the operational noise assessment. Where existing noise levels are relatively low (such as for the Hornsea Three noise study area), determination of impacts due to construction noise are independent of the existing noise level.

1.4.1.3 Uncertainty in the baseline data has been reduced significantly by:

- Carrying out monitoring over a period of at least seven days, allowing analysis of how representative the baseline data is given the naturally varying noise level at the receptors (see annex 8.1: Baseline Noise Survey);
- Introduction of modern instrumentation; and
- By ensuring that all instrumentation is calibrated before and after each measurement period and is within accepted calibration intervals.

1.4.1.4 Where quantitative assessments have been undertaken, these are based on likely source levels provided by manufacturers, existing empirical data, and relevant British Standards. This approach minimises uncertainty associated with the source inputs in sound propagation models that have been used.

1.4.1.5 There are uncertainties in any sound propagation prediction methodology. The methodology in Annex F of BS 5228-1:2009+A1:2014 is generally only applicable for distances of up to 300 m due to the exclusion of meteorological effects, which has a greater bearing on the propagation of sound as the distance between the source and receiver is increased. In general, this method is more likely to result in an over-estimate than an underestimate of effects at receptors.

1.4.1.6 International Organization for Standardization 9613-2 (ISO, 1996) is applicable in practice to a great variety of noise sources and environments. The standard estimates accuracy for values of an A-weighted sound level down-wind is stated as +/-3 dB for a mean source/receptor height of up to 5 m and source/propagation separation distance of up to 1 km. For a mean source height between 5 and 30 m, the estimated accuracy is given as +/-1 dB for a source/propagation separation distance of 0 to 100 m and +/-3 dB for a source/propagation separation distance of >100 m. This is a standard approach and is considered to be an acceptable and robust prediction methodology.

1.4.1.7 For the traffic noise model, predicted noise levels consider noise only from road links for which traffic data have been provided. The prediction does not include noise from any other sources, such as wind/environmental noise, agricultural activity or industry.

1.5 Measures adopted as part of Hornsea Three

1.5.1.1 Numerous mitigation measures have been integrated into Hornsea Three and therefore have been included in the construction noise model.

1.5.1.2 Works would be undertaken in accordance with the Outline Code of Construction Practice (CoCP) (document reference A8.5), which sets out the overarching principles of construction, contractor protocols and pollution prevention measures covering the intertidal and onshore environments. The Outline CoCP (document reference A8.5) also sets out the standard working hours. While construction works will generally be limited to the daytime, works may also occur during the evening or night-time periods. Further detail will be added to the CoCP during the detailed design stage on construction-related environmental management measures, the selection of appropriate construction techniques, construction noise management measures and monitoring processes These construction noise management measures will be agreed with the relevant local authorities.

1.5.1.3 Activities outside of the standard working hours will follow the processes identified within the Outline CoCP (document reference A8.5). In summary, this requires agreement with the relevant local authority Environmental Health Officer (EHO) in consultation with relevant stakeholders (e.g. third-party asset owner) as required. Assessment of noise impacts associated with works outside the standard working hours will be undertaken as appropriate to support any application for agreement with the Local Authorities and will only be considered within the Environmental Statement where out of hours works are specifically identified in the Outline CoCP (document reference A8.5).

1.5.1.4 Two plant items required for the intertidal cable installation by Horizontal Directional Drilling (HDD) were identified as warranting additional mitigation: the Prime Drilling PD250/90 Drilling Rig and Ingersoll Rand 250 kVA Generator in paragraph 1.6.1.11. Based on the source levels indicated by the manufacturer, the main drilling rig will be attenuated by -10 dB to a noise level of approximately 89 dB at 10 m distance; the 250 kVA generator will be attenuated by -5 dB to a noise level of approximately 83 dB at 10 m distance. It is considered that this mitigation can be readily achieved by appropriate plant selection, for example, a silenced version of the plant items, and form part of reasonably practicable measures (see paragraph 1.1.1.1).

1.6 Construction phase model input

1.6.1.1 The impacts of the onshore construction of Hornsea Three have been assessed with regards to noise and vibration. The full assessment, along with the maximum design scenario against which each construction phase impact has been assessed, are provided in volume 3, chapter 8: Noise and Vibration.

1.6.1.2 For the purposes of the Environmental Statement, construction effects are typically temporary or short-term. This would include effects resulting from construction of the onshore elements of Hornsea Three including compounds, storage areas and accesses, such as noise and vibration from construction plant and machinery.

1.6.1.3 A set of construction plant source data, including sound power levels, level source, heights, numbers, percentage operating times, are provided in Appendix A of this annex. The key working scenarios are described below.

1.6.1.4 The onshore elements of Hornsea Three (together with the compounds, storage areas and accesses) and the associated construction activities are described in volume 1, chapter 3: Project Description. The maximum design scenario for the assessment of noise during construction, operation and maintenance, and decommissioning is presented in volume 3, chapter 8: Noise and Vibration.

1.6.1.5 Construction vibration is considered qualitatively, given the unlikelihood of significant construction vibration propagating beyond the immediate areas of works.

The temporary impact of open cut cable installation during construction may affect receptors sensitive to noise or vibration.

1.6.1.6 Construction effects associated with the trenched cable route works would be temporary at any one receptor, occurring for only a fraction of the overall construction period. On similar projects, the onshore cable was installed at a rate of approximately 5 km in 3 months.

1.6.1.7 The open cut cable installation would primarily comprise excavator and HDV movements. For this assessment, averaged over a working day, one excavator for 100% operation and one HGV for 50% operation have been assumed to be operating at or near maximum capacity of the assessment period.

The temporary impact of cable installation by HDD (excluding duct installation at the Hornsea Three intertidal area) may affect receptors sensitive to noise or vibration.

1.6.1.8 Cable installed by HDD will involve potentially more noisy works than for most of the cable laying. If required, HDD compounds would be located within the Hornsea Three onshore cable corridor.

1.6.1.9 The HDD crossing installations would primarily comprise the directional drill with generator, supporting equipment, plus excavator and HGV movements. For this assessment, averaged over a working day, all plant has been assumed to be operating at, or near, maximum capacity for 100% of the assessment period.

The temporary impact of cable installation at the Hornsea Three landfall area may affect receptors sensitive to noise or vibration.

1.6.1.10 Landfall may be either HDD or open cut. Construction by open cut would be similar to that for the onshore cable corridor, albeit of greater duration. However, if the intertidal and undersea cable is installed by HDD from the landfall worksite, this will involve potentially noisier and longer works than for most of the cable laying or other HDD sites. As a worst-case assessment, construction by HDD is assessed.

1.6.1.11 An example set of construction plant is outlined below, which reflects the potential noisiness of the HDD plant. While this refers to particular brands and models of equipment, other similar plant would result in comparable noise levels off site. The plant identified comprises:

- Prime Drilling PD250/90 Drilling Rig;
- Ingersoll Rand 250KVA Generator;
- Weatherford Mud Pump T270A;
- Prime Drilling Pump House;
- Clear Solutions Mixing System; and
- WB 2000 Re-cycling System.

1.6.1.12 In addition, this is likely to be supported by plant including: an excavator; HGV; dump truck and mobile tracked crane.

The temporary impact of constructing the cable route construction accesses may affect receptors sensitive to noise or vibration.

1.6.1.13 The installation of construction accesses and haul roads allowing vehicular access will require earth moving plant, such as excavators, rollers and HGVs. Temporary access will be removed upon reinstatement. Details of construction are provided within volume 1, chapter 3: Project Description.

1.6.1.14 Construction effects associated with the construction of accesses for Hornsea Three onshore cable corridor would occur for only a fraction of the overall construction period, and are considered temporary.

1.6.1.15 The construction of the cable route construction accesses would primarily comprise generator, excavator, roller and HGV movements. For this assessment, averaged over a working day, all plant has been assumed to be operating at, or near, maximum capacities as shown in Appendix A.

The temporary impacts of onshore HVDC converter/HVAC substation and HVAC booster station construction may affect receptors sensitive to noise or vibration.

1.6.1.16 Construction of the onshore HVDC converter/HVAC substation and HVAC booster station will involve potentially more noisy works than for most of the cable laying. Work will occur over the permanent site and the temporary construction areas associated with the onshore HVAC booster station and HVDC converter/HVAC substation.

1.6.1.17 During construction, noise will be generated from small scale plant operations such as earth moving activity and general construction activity associated with the onshore HVDC converter/HVAC substation and HVAC booster station.

1.6.1.18 Assessment has been undertaken for construction activities. These give an indication of typical noise levels that would be expected during the construction of the onshore HVDC converter/HVAC substation and HVAC booster station. The scale of the respective sites is most likely to affect the duration for which construction works occur, rather than the emitted noise levels.

1.6.1.19 The activities considered are:

- Stripping of topsoil and installation of stone capping;
- Piling;
- Installation of equipment; and
- Concrete pouring.

1.6.1.20 The plant and operating regime assumed for each activity is shown in Appendix A.

1.6.1.21 From calculation of the overall sound emission from each activity, that associated with concrete pouring has resulted in the highest noise levels. Within the ES, only activity with this noise emission has been considered within the assessment.

The temporary impact of increased vehicles on the existing road network associated with all construction works may affect receptors sensitive to noise or vibration.

1.6.1.22 The construction works will result in additional vehicle movements on the existing road network. A high proportion of these additional vehicles will be HGVs.

1.6.1.23 Traffic flows have been provided by the transportation consultant and are discussed in volume 3, chapter 7: Traffic and Transport. Noise change calculations follow the protocol within CRTN. Calculations allow for changes in flow, HGV composition and speed, between without and with the construction traffic for the year 2022. The traffic data modelled is provided in Table 1.3 (see volume 3, chapter 7: Traffic and Transport for construction vehicle generation assumptions).

Table 1.3: Construction Traffic Noise Data - 18hr AAWT Forecast 2022.

Link Name	18hr AAWT 2022 without Hornsea Three				18hr AAWT 2022 with construction of Hornsea Three			
	Total vehicles	HDV	%HDV	Speed (kph)	Total vehicles	HDV	%HDV	Speed (kph)
(1) A148, west of The Street and east of Green Lane	13860	1607	12	97	14225	1833	13	97
(2) A148 west of Holt and east of Letheringsett	11499	1306	11	97	11865	1532	13	97
(3) A148, east of the B1149 roundabout and west of Station Road	12536	1345	11	64	12798	1523	12	64
(4) B1354 between the Swanton Road junction and B1110 junctions	4150	580	14	97	4150	580	14	97
(5) B1354 east of Melton Constable and west of Briston	5928	801	14	48	5928	801	14	48
(6) B1149 at Edgefield, north of the village hall and south of Hempstead Road	4709	415	9	64	5070	639	13	64
(7) A148 at High Kelling, south of Kelling Hospital	14214	1370	10	64	14476	1548	11	64
(8) A148, east of Bodham and west of the Woodlands Leisure centre	13458	1336	10	97	13909	1543	11	97
(9) A148, west of the B1436 junction and east of the Lion's Mouth junction	14592	1423	10	80	15132	1641	11	80
(10) B1436, east of Felbrigg	9806	944	10	48	10346	1162	11	48
(11) A140, south of Roughton and north of the Topshill Road junction	11723	1067	9	64	12263	1285	10	64
(12) A149 west of Weybourne and east of The Pheasant Hotel	3451	260	8	48	3451	260	8	48
(13) A149 east of Weybourne, west of the North Norfolk Railway Line	4651	299	6	97	4895	410	8	97
(14) A1067, north of Bridge Road and east of Little Ryburgh	9789	1304	13	97	9988	1432	14	97
(15) B1145 at Bawdeswell, between The Street junction and Hall Road junction	3522	393	11	48	3522	393	11	48
(16) B1145, west of Reepham and east of the Old Lane junction	3195	414	13	97	3195	414	13	97
(17) B1145 east of Cawston, west of the B1149 crossroads	4357	413	9	97	4790	602	13	97
(18) B1145 east of the B1149 crossroads junction, west of Cawston Park Hospital	5099	460	9	97	5180	460	9	97
(19) A140, south of Aylsham's B1145 / A140 roundabout, and north of Marsham	15844	1636	10	97	16344	1854	11	97
(20) A1067, between Attlebridge and the Fir Covert Road junction	11036	1416	13	97	11468	1573	14	97
(21) A140 between the A47 and B1113 junctions	25714	2669	10	97	26296	2933	11	97
(22) B1113, south of the A47 near Norwich Sports ground	9296	725	8	97	9878	989	10	97
(23) A47 at Honingham (Highways England)	31067	3350	11	97	31475	3597	11	97
(24) A47 at Bawburgh (Highways England)	50926	4020	8	113	51349	4268	8	113
(25) A47 at Intwood (Highways England)	60291	5131	9	113	60982	5405	9	113
(26) A11 at Hethersett (Highways England)	54115	5136	9	113	54441	5334	10	113
(27) A47, between A140 and A146 junctions	57262	4873	9	113	57903	5103	9	113
(28) A1065, North of Swaffham	8307	963	12	97	8580	1142	13	97

Link Name	18hr AAWT 2022 without Hornsea Three				18hr AAWT 2022 with construction of Hornsea Three			
	Total vehicles	HDV	%HDV	Speed (kph)	Total vehicles	HDV	%HDV	Speed (kph)
(29) A1065, east of Weasenham	5560	645	12	80	5833	824	14	80
(30) A1082, South of Sheringham	8915	140	2	48	9159	251	3	48
(31) A1270 Northern Distributor Road between A1067 and B1149 junction	22314	1553	7	113	22686	1710	8	113
(32) B1149 between A1270 Northern Distributor Road and Buxton Road junctions	11833	616	5	97	12496	863	7	97
(33) A1270 Northern Distributor Road between B1149 and A140 junctions	25986	1809	7	113	26945	2161	8	113
(34) A1270 Northern Distributor Road between A140 and A47 junctions	23838	1659	7	113	24579	1936	8	113
(35) A140 between A1270 and B1145	15557	550	4	97	16058	767	5	97
(36) A1270 between A140 and A47 (Near junction with A47)	36762	2559	7	113	37503	2835	8	113
(37) A47 East of A1270 junction	47018	3272	7	113	47472	3325	7	113

1.7 Construction phase model output

1.7.1 Construction activity noise

1.7.1.1 For each activity, the assumed construction plant and operating characteristics have been assessed. The construction plant source data, identifying items, number, noise level and percentage time operating over a working day is provided in Appendix A. Within a spreadsheet model, the transmission of noise from construction works has been calculated following the procedure within BS 5228-1:2009+A1:2014 (see section 1.3.4).

1.7.1.2 To provide a robust assessment, the effects of the construction works when closest to any NSR is considered. The distances between the worksite and receptor, and the construction noise threshold criteria are calculated for each activity, for day, evening and night works. Although levels are calculated for evening and night works, this assessment does not consider the likelihood of any particular works occurring outside the daytime hours. A discussion of hours of working is provided in the Outline CoCP (document reference A8.5) which accompanies the Development Consent Order application.

1.7.1.3 Predicted noise levels for each activity, at a range of distances up to 1 km from the relevant worksite edge are provided in Appendix B, calculated following the procedure within BS 5228-1:2009+A1:2014. Table B. also contains calculations of the distances from which construction noise will fall into the negligible, minor, moderate or major categories, for day workings, based on the BS 5228-1:2009+A1:2014 criteria set out in Table 1.1.

1.7.1.4 Figures illustrating the distance bands for which a range of construction activities will result in minor, moderate or major adverse magnitude of impact are provided in Figure 1.1 to Figure 1.6. The figures also identify where residential properties fall within the minor, moderate or major bands. A summary of the residential NSRs within each band of minor, moderate or major impact are provided in Table 1.4.

Table 1.4: Construction Noise Impact Residential Property Count.

Impact	Figure 1.1: Trenched cable-route	Figure 1.2: Route HDDs	Figure 1.3: Access construction	Figure 1.4: Substation construction	Figure 1.5: Landfall HDD	Figure 1.6: Landfall HDD with mitigation
Major	1	11	8	0	0	0
Moderate	12	70	27	0	0	0
Minor	17	123	21	0	6	0

1.7.1.5 Where clusters of properties are affected by a single works activity, such as from HDD, construction noise control measures may be required. The Outline CoCP (document reference A8.5) sets out the general construction principles, working hours and a commitment to apply the best practicable means to managing noise. Construction noise control measures for specific activities (e.g. HDD) will be identified and agreed with the relevant local authorities prior to construction. These measures will be documented and implemented through the CoCP.

1.7.2 Construction traffic noise

1.7.2.1 Noise change calculations have been undertaken for each of the thirty-seven links where traffic data has been provided, not constrained by the scoping distance. The calculations consider total flows, percentage HGV/HDV and average speed, using the formula from CRTN. The noise changes forecast in Table 1.5 represent the expected noise change at any NSR for which that traffic link is already the dominant noise source. For NSRs where a link contributes only a portion towards their overall existing noise environment, the noise change reported for that link forms an upper limit to the noise change which a NSR might experience due to the increased traffic flows. As a result, where existing flows are particularly low (CRTN cites <1000 vehicles per 18-hour), this will also result in an over-calculation of any potential noise change at these NSRs. This therefore represents a precautionary approach.

Table 1.5: Construction Traffic Noise Impact Calculation - 18hr AAWT Forecast.

Link Identity	Base Flow, 2022 18hr AAWT	Additional Future Flow, 2022 from construction of Hornsea Three	dB noise change	Impact magnitude
(1) A148, west of The Street and east of Green Lane	13860	366	0.3	Negligible
(2) A148 west of Holt and east of Letheringsett	11499	366	0.4	Negligible
(3) A148, east of the B1149 roundabout and west of Station Road	12536	262	0.3	Negligible
(4) B1354 between the Swanton Road junction and B1110 junctions	4150	0	0.0	No change
(5) B1354 east of Melton Constable and west of Briston	5928	0	0.0	No change
(6) B1149 at Edgefield, north of the village hall and south of Hempstead Road	4709	361	1.0	Negligible
(7) A148 at High Kelling, south of Kelling Hospital	14214	262	0.3	Negligible
(8) A148, east of Bodham and west of the Woodlands Leisure centre	13458	451	0.3	Negligible
(9) A148, west of the B1436 junction and east of the Lion's Mouth junction	14592	540	0.3	Negligible

Link Identity	Base Flow, 2022 18hr AAWT	Additional Future Flow, 2022 from construction of Hornsea Three	dB noise change	Impact magnitude
(10) B1436, east of Felbrigg	9806	540	0.6	Negligible
(11) A140, south of Roughton and north of the Topshill Road junction	11723	540	0.5	Negligible
(12) A149 west of Weybourne and east of The Pheasant Hotel	3451	0	0.0	No change
(13) A149 east of Weybourne, west of the North Norfolk Railway Line	4651	243	0.5	Negligible
(14) A1067, north of Bridge Road and east of Little Ryburgh	9789	199	0.2	Negligible
(15) B1145 at Bawdeswell, between The Street junction and Hall Road junction	3522	0	0.0	No change
(16) B1145, west of Reepham and east of the Old Lane junction	3195	0	0.0	No change
(17) B1145 east of Cawston, west of the B1149 crossroads	4357	433	0.9	Negligible
(18) B1145 east of the B1149 crossroads junction, west of Cawston Park Hospital	5099	81	0.0	No change
(19) A140, south of Aylsham's B1145 / A140 roundabout, and north of Marsham	15844	500	0.3	Negligible
(20) A1067, between Attlebridge and the Fir Covert Road junction	11036	432	0.3	Negligible
(21) A140 between the A47 and B1113 junctions	25714	581	0.2	Negligible
(22) B1113, south of the A47 near Norwich Sports ground	9296	581	0.6	Negligible
(23) A47 at Honingham (Highways England)	31067	408	0.1	Negligible
(24) A47 at Bawburgh (Highways England)	50926	422	0.1	Negligible
(25) A47 at Intwood (Highways England)	60291	692	0.1	Negligible
(26) A11 at Hethersett (Highways England)	54115	326	0.1	Negligible
(27) A47, between A140 and A146 junctions	57262	641	0.1	Negligible
(28) A1065, North of Swaffham	8307	273	0.4	Negligible
(29) A1065, east of Weasenham	5560	273	0.6	Negligible
(30) A1082, South of Sheringham	8915	243	0.5	Negligible
(31) A1270 Northern Distributor Road between A1067 and B1149 junction	22314	372	0.2	Negligible
(32) B1149 between A1270 Northern Distributor Road and Buxton Road junctions	11833	663	0.5	Negligible
(33) A1270 Northern Distributor Road between B1149 and A140 junctions	25986	959	0.3	Negligible
(34) A1270 Northern Distributor Road between A140 and A47 junctions	23838	741	0.3	Negligible
(35) A140 between A1270 and B1145	15557	500	0.4	Negligible
(36) A1270 between A140 and A47 (Near junction with A47)	36762	741	0.2	Negligible
(37) A47 East of A1270 junction	47018	454	0.0	No change

1.7.2.2 From Table 1.5 it can be seen that for the road links identified, any noise increase will be below 3 dB; of no or negligible impact.

1.7.2.3 No significant construction traffic is forecast during the night hours, so no significant change would result at night.

1.7.2.4 In the circumstance where noise arising from construction traffic is identified as a potentially significant impact, its cumulative effect with other construction noise impacts would be considered in the determination of effect. However, given that for all road links, noise from construction traffic is demonstrated to be negligible or no change, no cumulative effects with other construction noise impacts would occur.

1.7.3 Construction vibration

1.7.3.1 Construction vibration will be minimised as far as is reasonably practicable. At this stage, blasting or impact piling is considered unlikely. As such, construction vibration would be unlikely to be significant beyond the immediate works boundary. Off-site vibration from HGVs etc. on haul roads or the public highway would be negligible impact at all locations assuming the roads are maintained. No significant vibration-generation plant will be used during the trenched cable construction process so vibration is unlikely to be greater than a minor adverse impact.

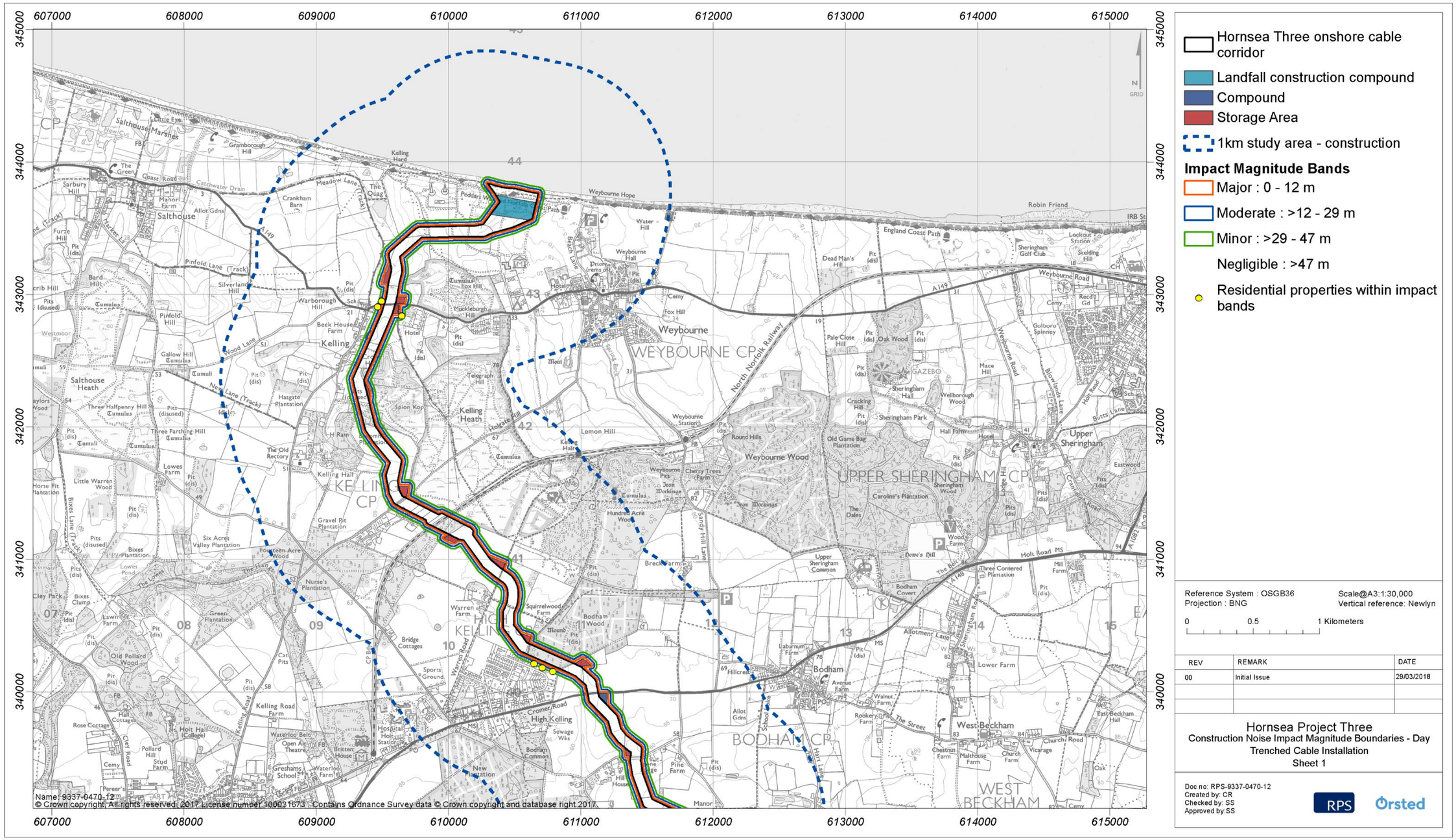


Figure 1.1: Construction noise impact magnitude boundaries – day – trenched cable installation.

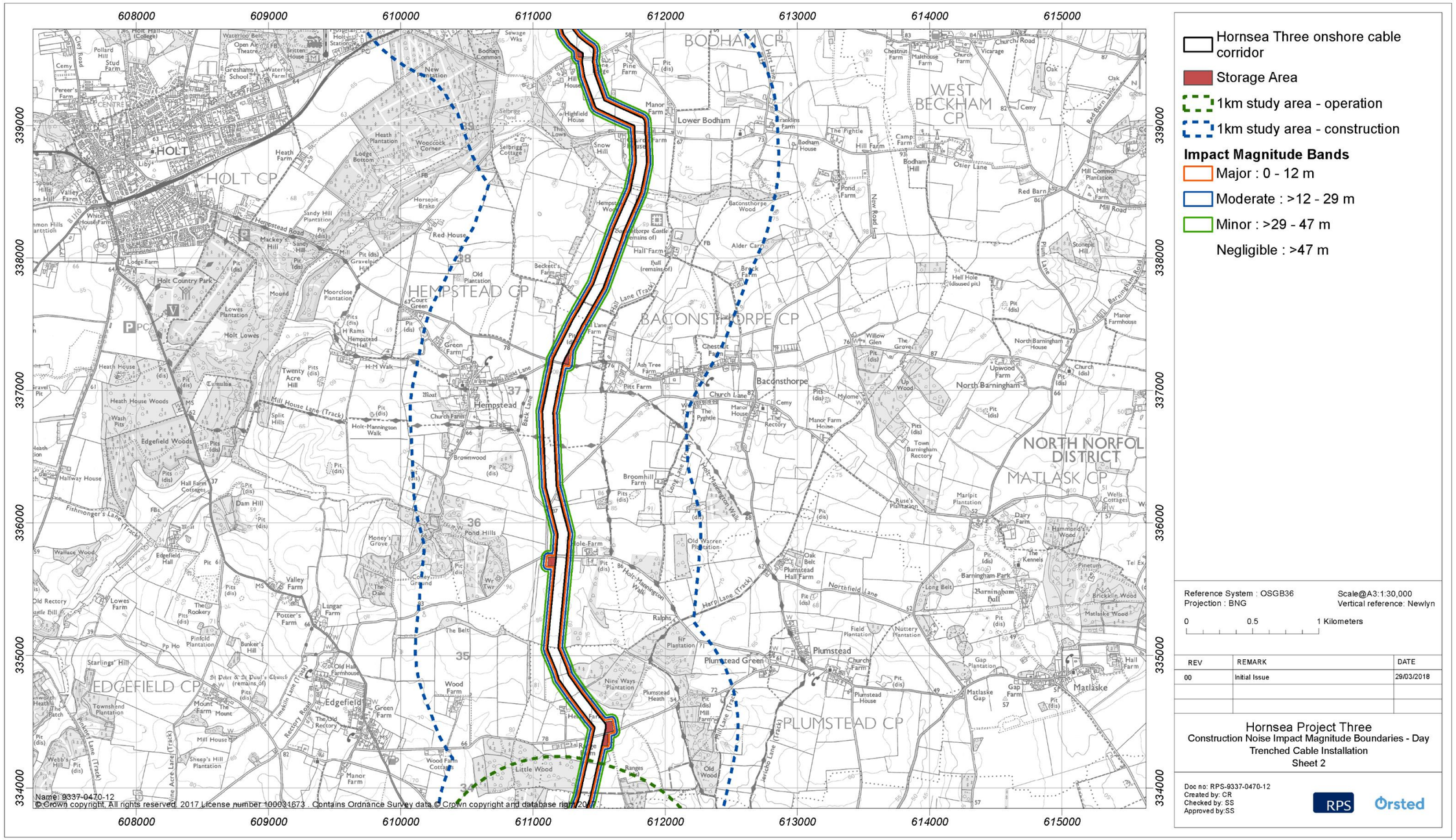


Figure 1.1: Construction noise impact magnitude boundaries – day – trenched cable installation.

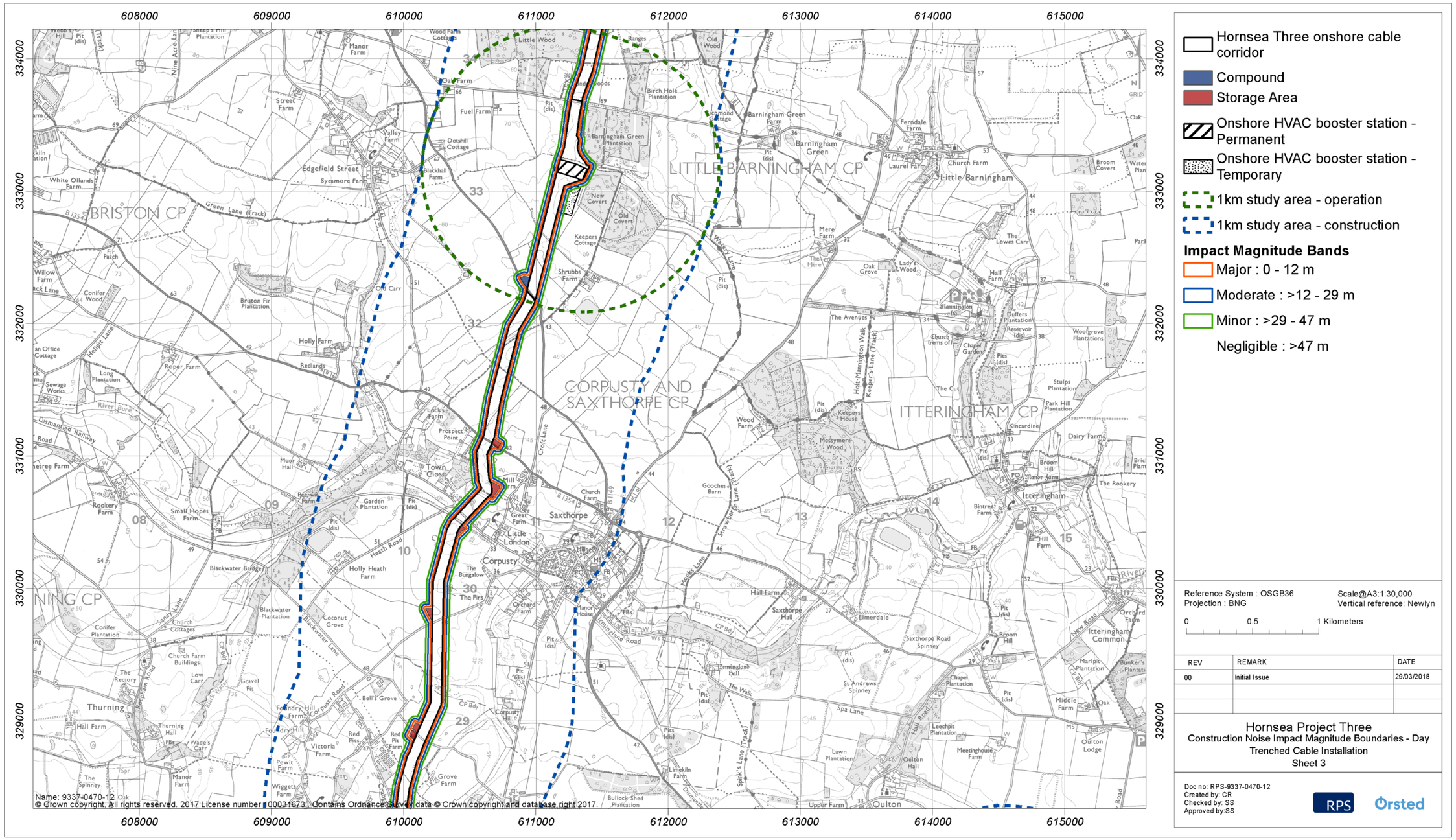


Figure 1.1: Construction noise impact magnitude boundaries – day – trenched cable installation.

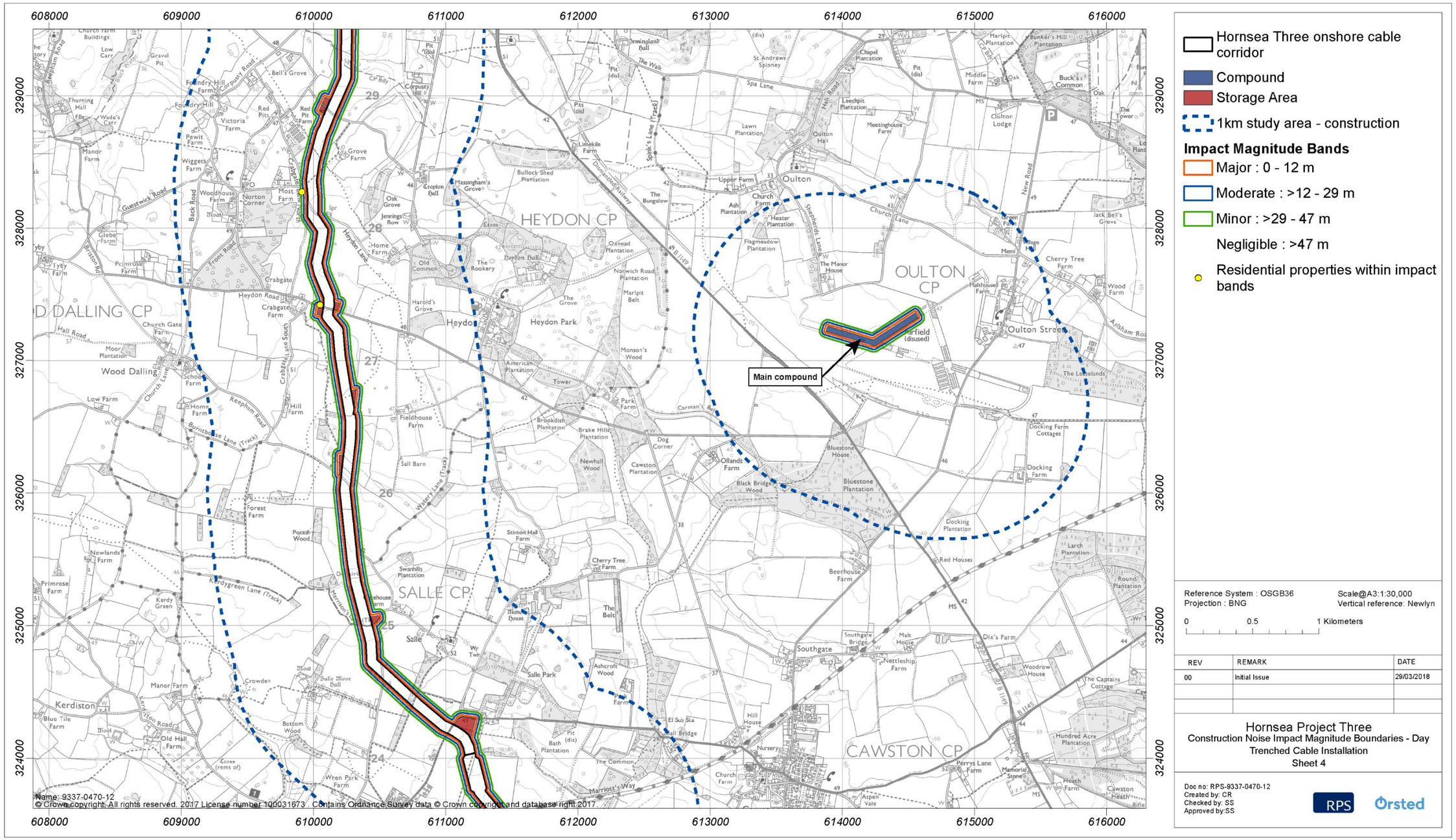


Figure 1.1: Construction noise impact magnitude boundaries – day – trenched cable installation.

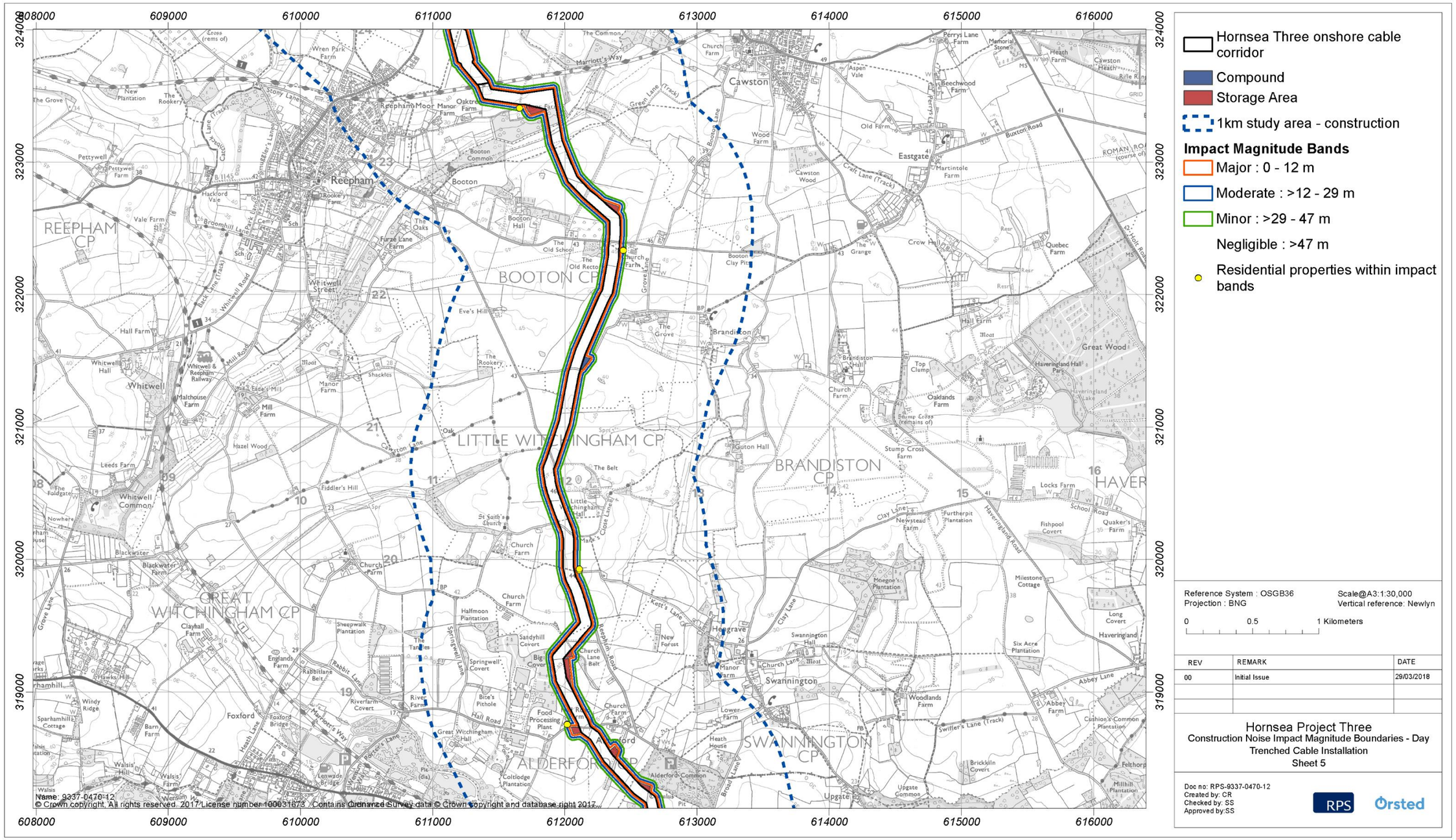


Figure 1.1: Construction noise impact magnitude boundaries – day – trenched cable installation.

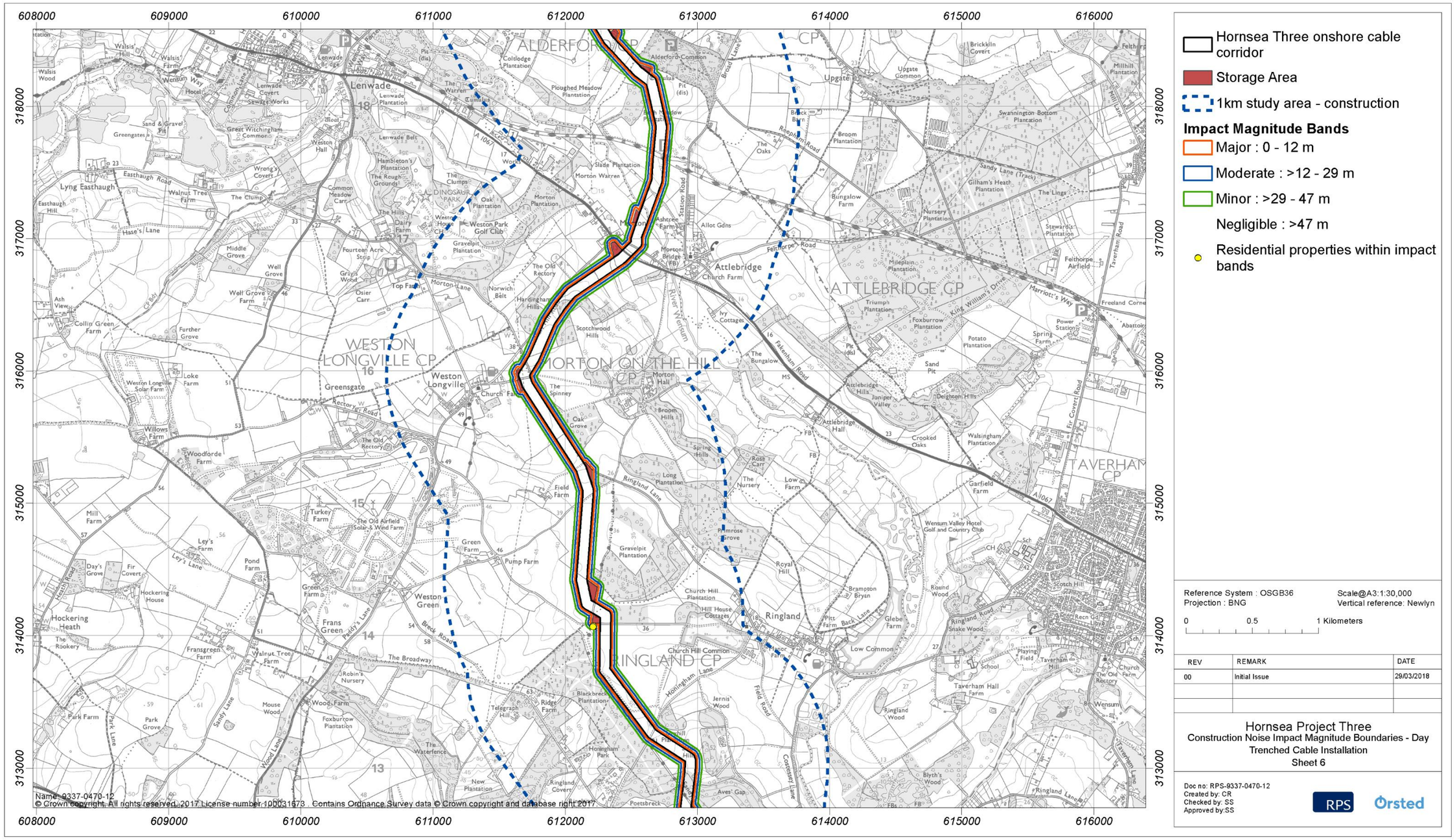


Figure 1.1: Construction noise impact magnitude boundaries – day – trenched cable installation.

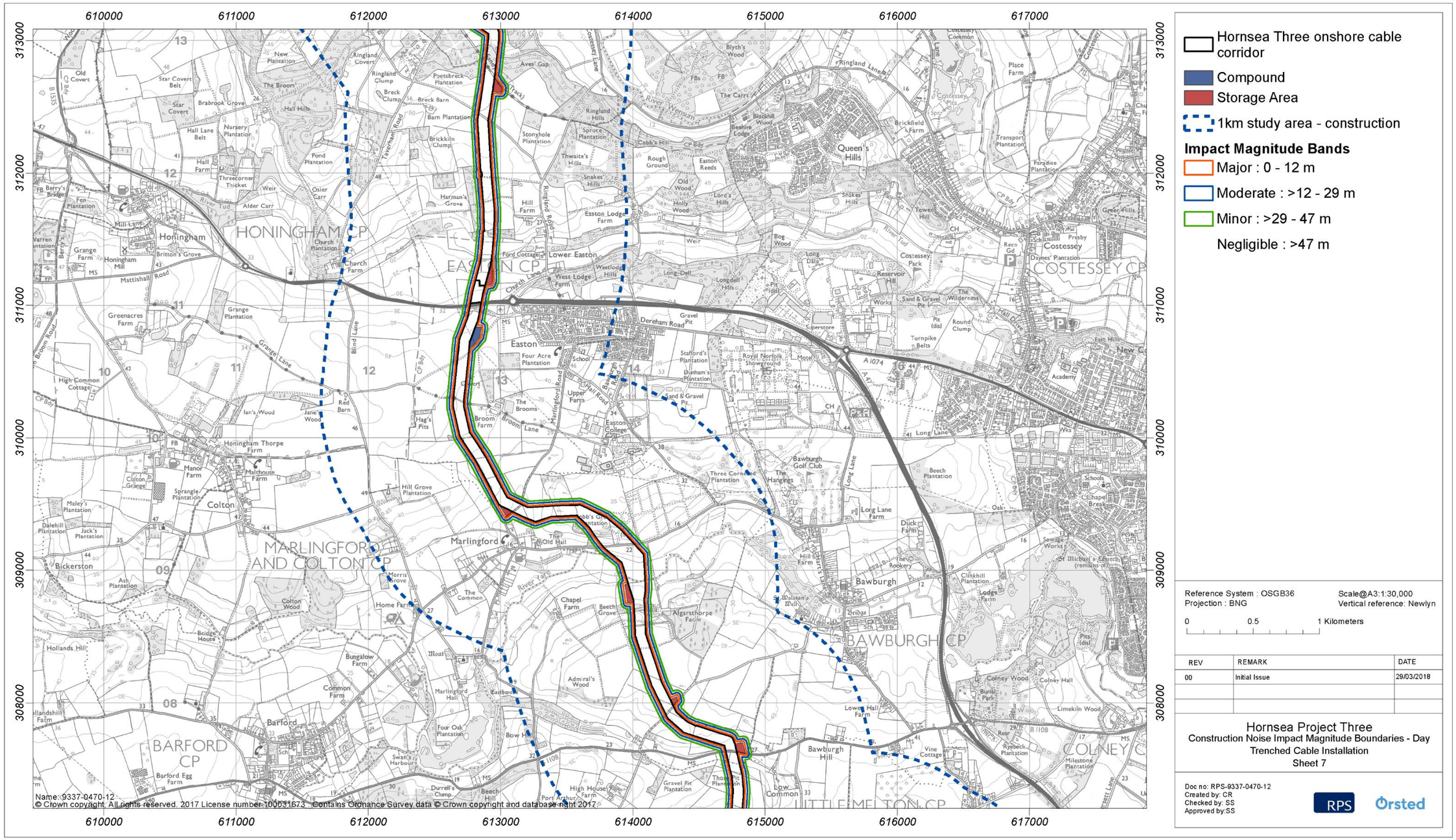


Figure 1.1: Construction noise impact magnitude boundaries – day – trenched cable installation.

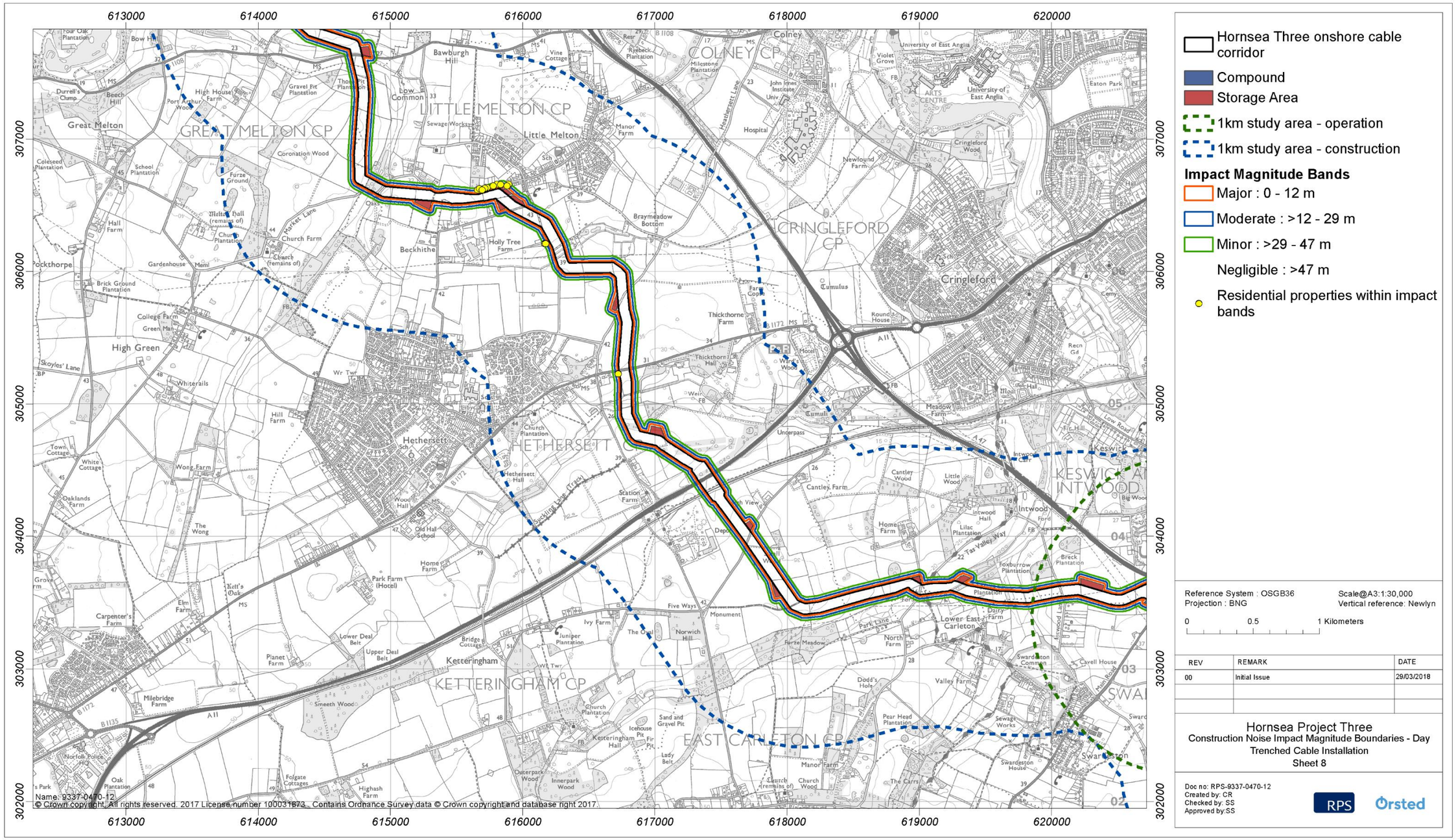


Figure 1.1: Construction noise impact magnitude boundaries – day – trenched cable installation.

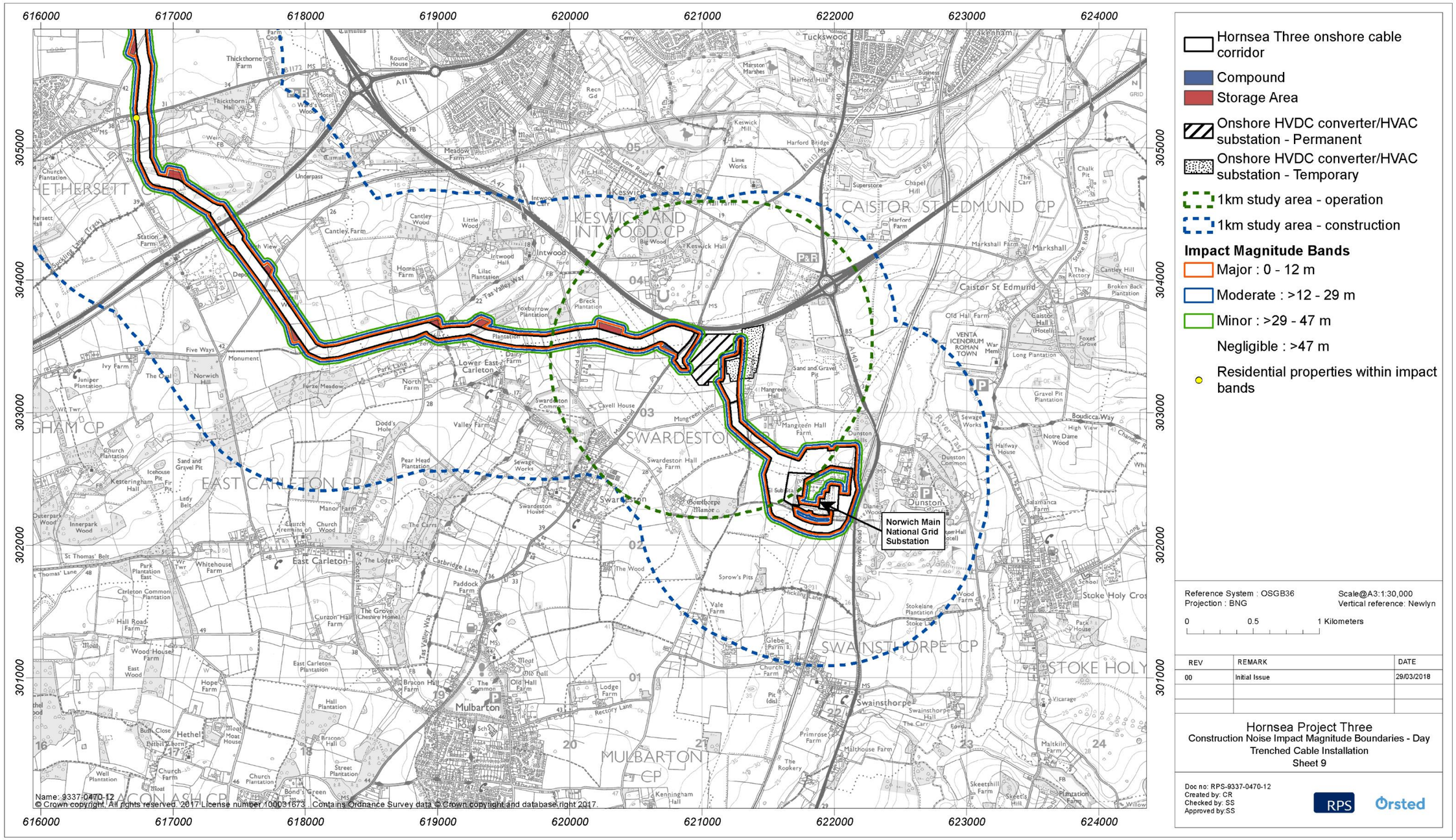


Figure 1.1: Construction noise impact magnitude boundaries – day – trenched cable installation.

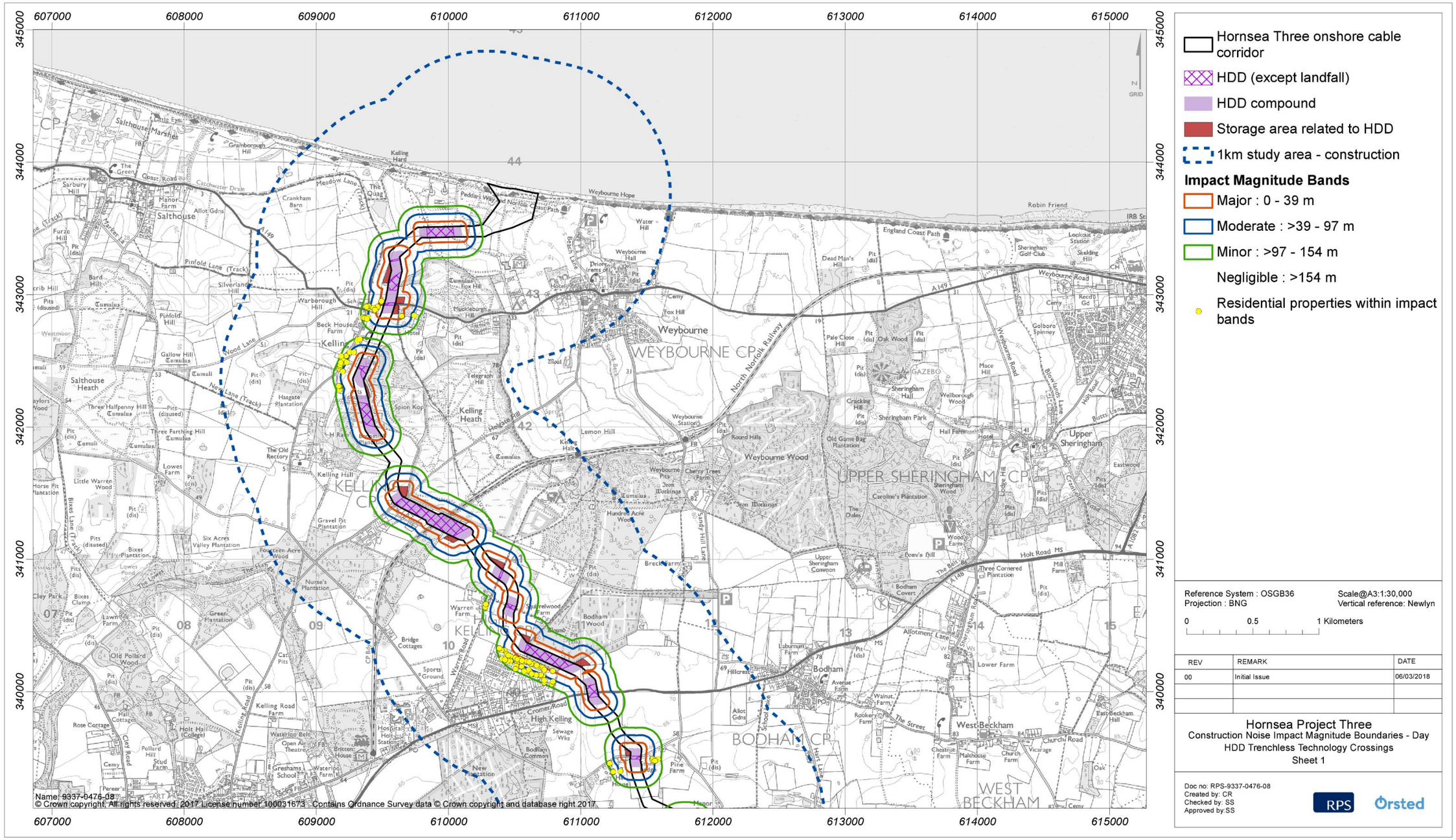


Figure 1.2: Construction noise impact magnitude boundaries – day – HDD trenchless technology crossings. (excluding landfall – see Figures 1.5 and 1.6)

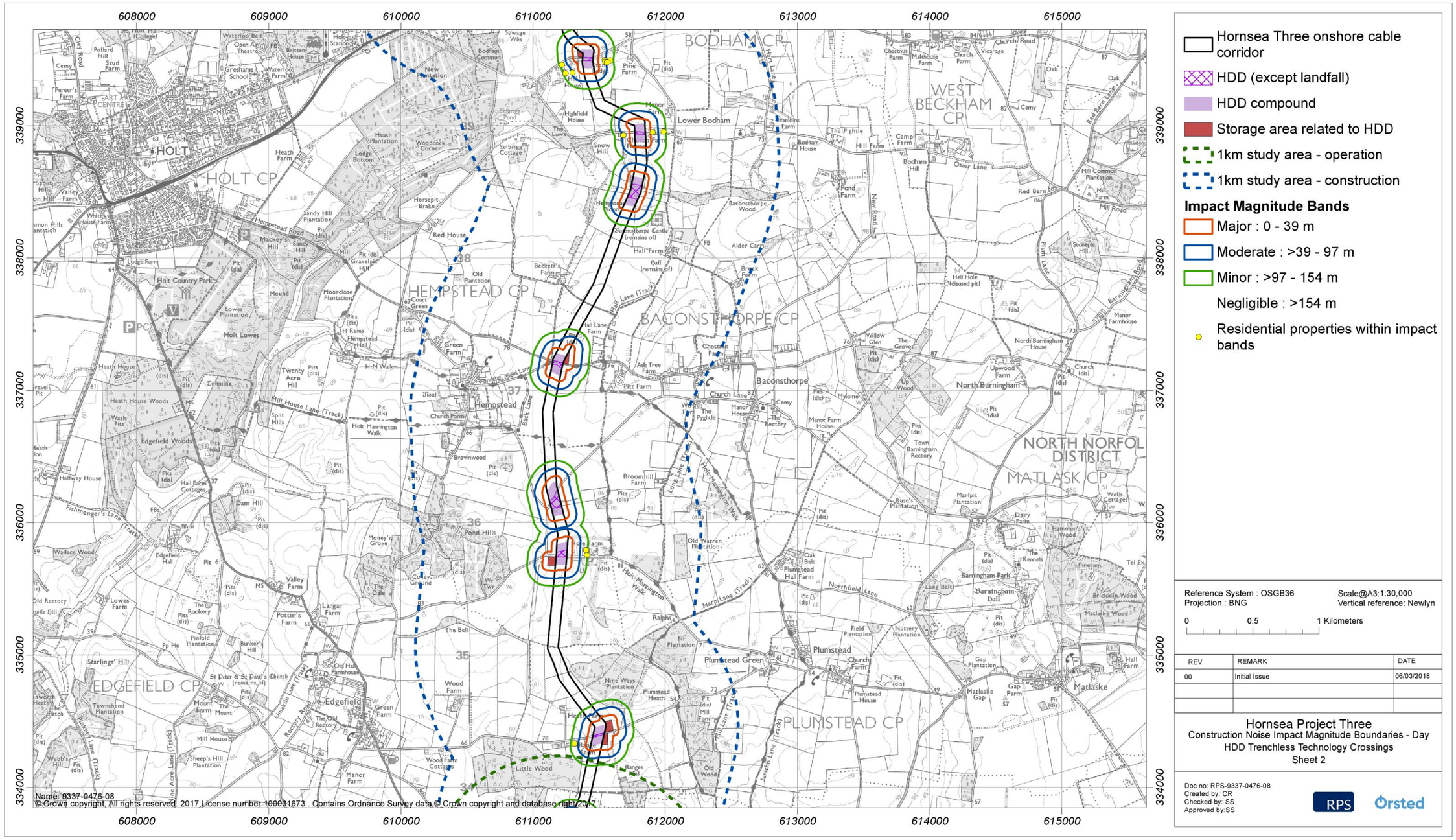


Figure 1.2: Construction noise impact magnitude boundaries – day – HDD trenchless technology crossings.

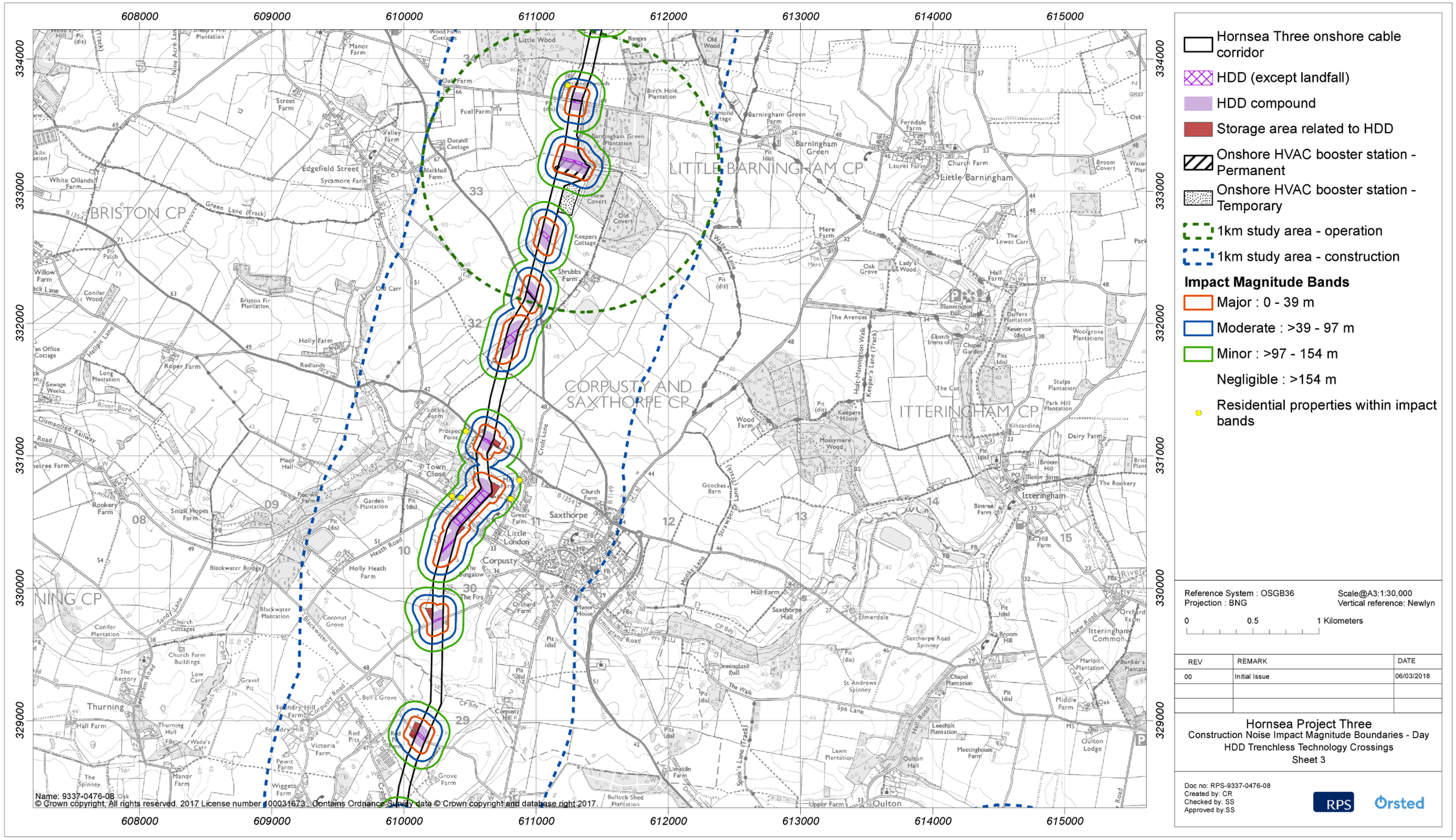


Figure 1.2: Construction noise impact magnitude boundaries – day – HDD trenchless technology crossings.

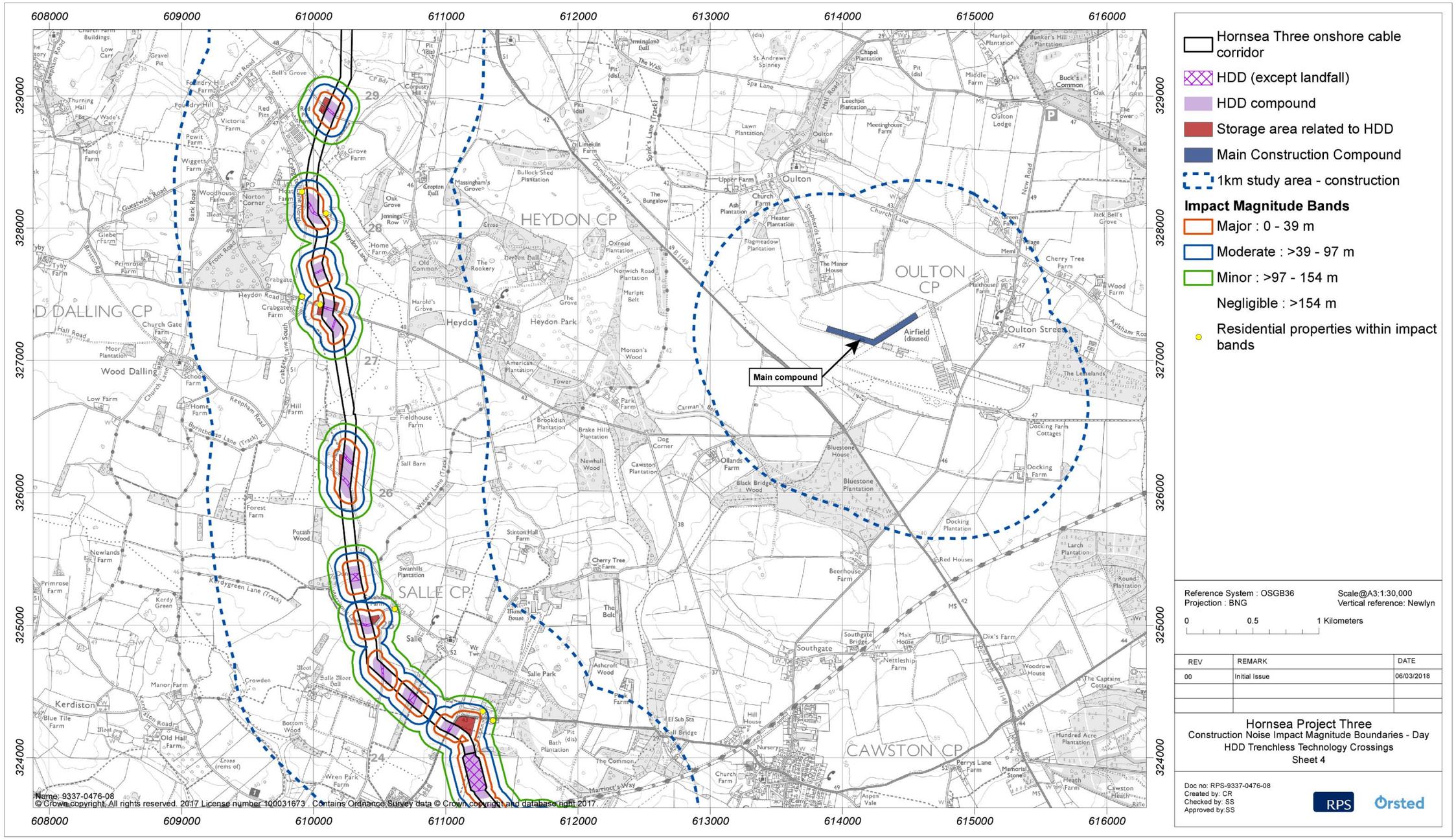


Figure 1.2: Construction noise impact magnitude boundaries – day – HDD trenchless technology crossings.

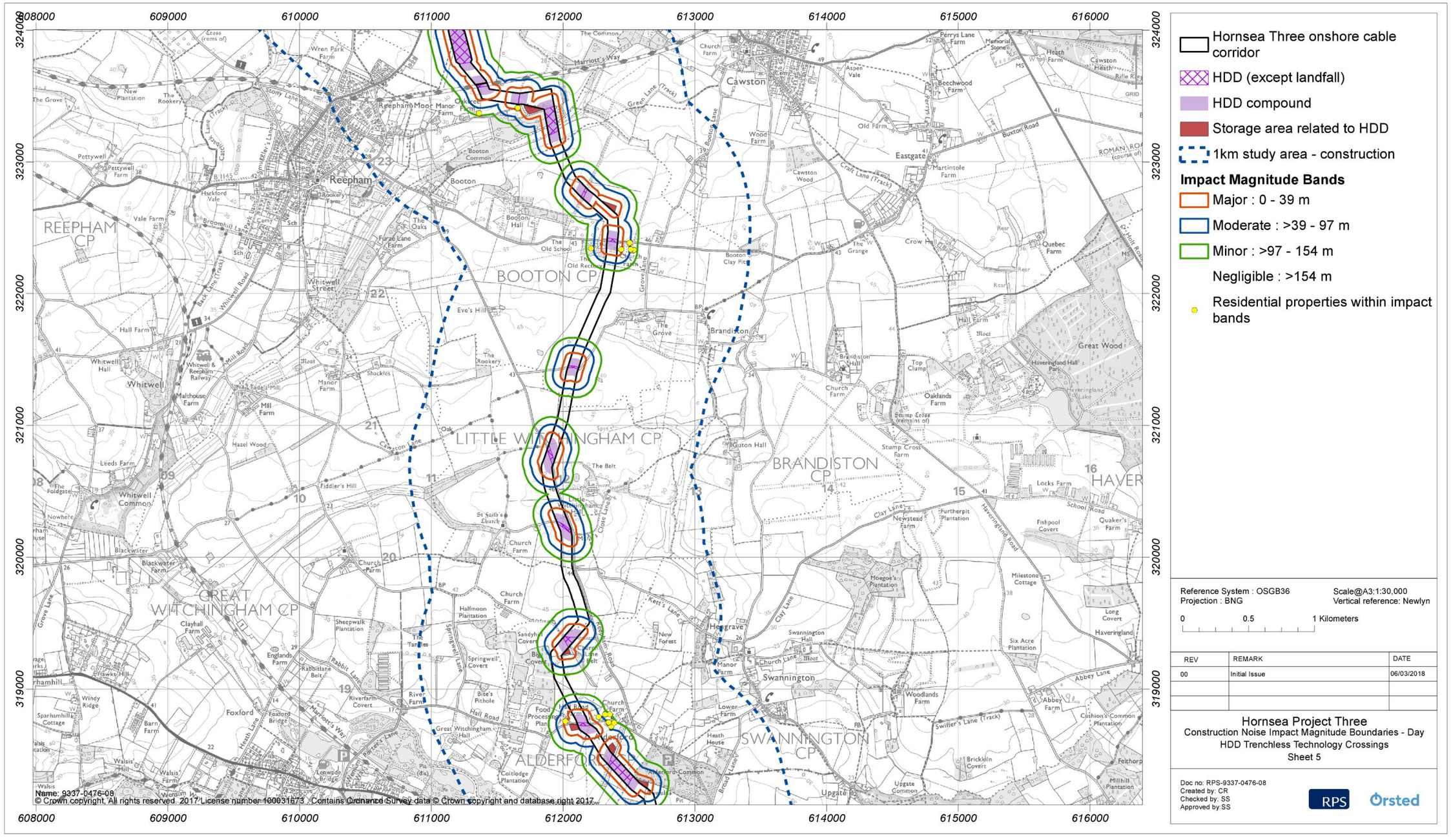


Figure 1.2: Construction noise impact magnitude boundaries – day – HDD trenchless technology crossing.

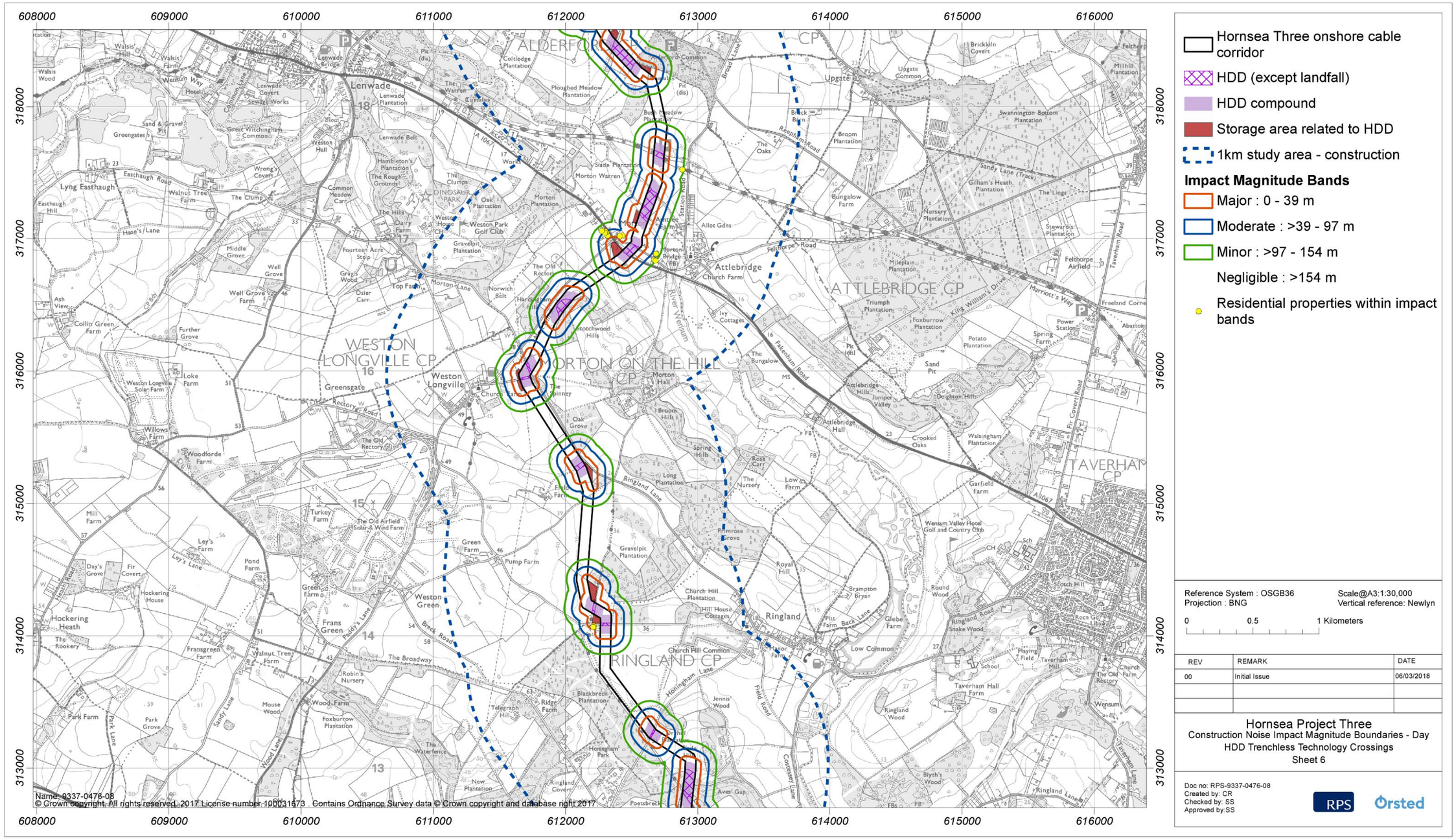


Figure 1.2: Construction noise impact magnitude boundaries – day – HDD trenchless technology crossings.

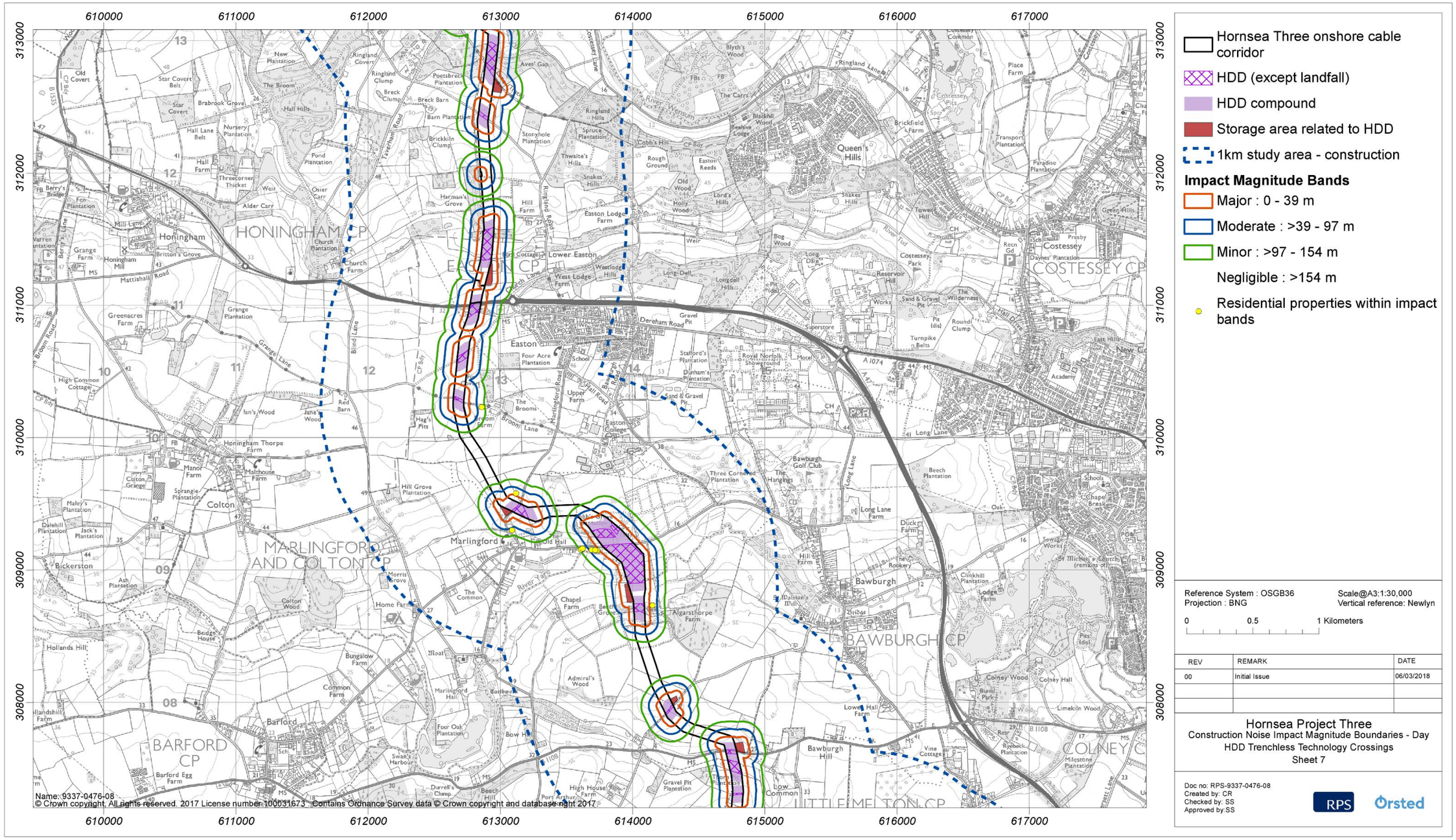


Figure 1.2: Construction noise impact magnitude boundaries – day – HDD trenchless technology crossings.

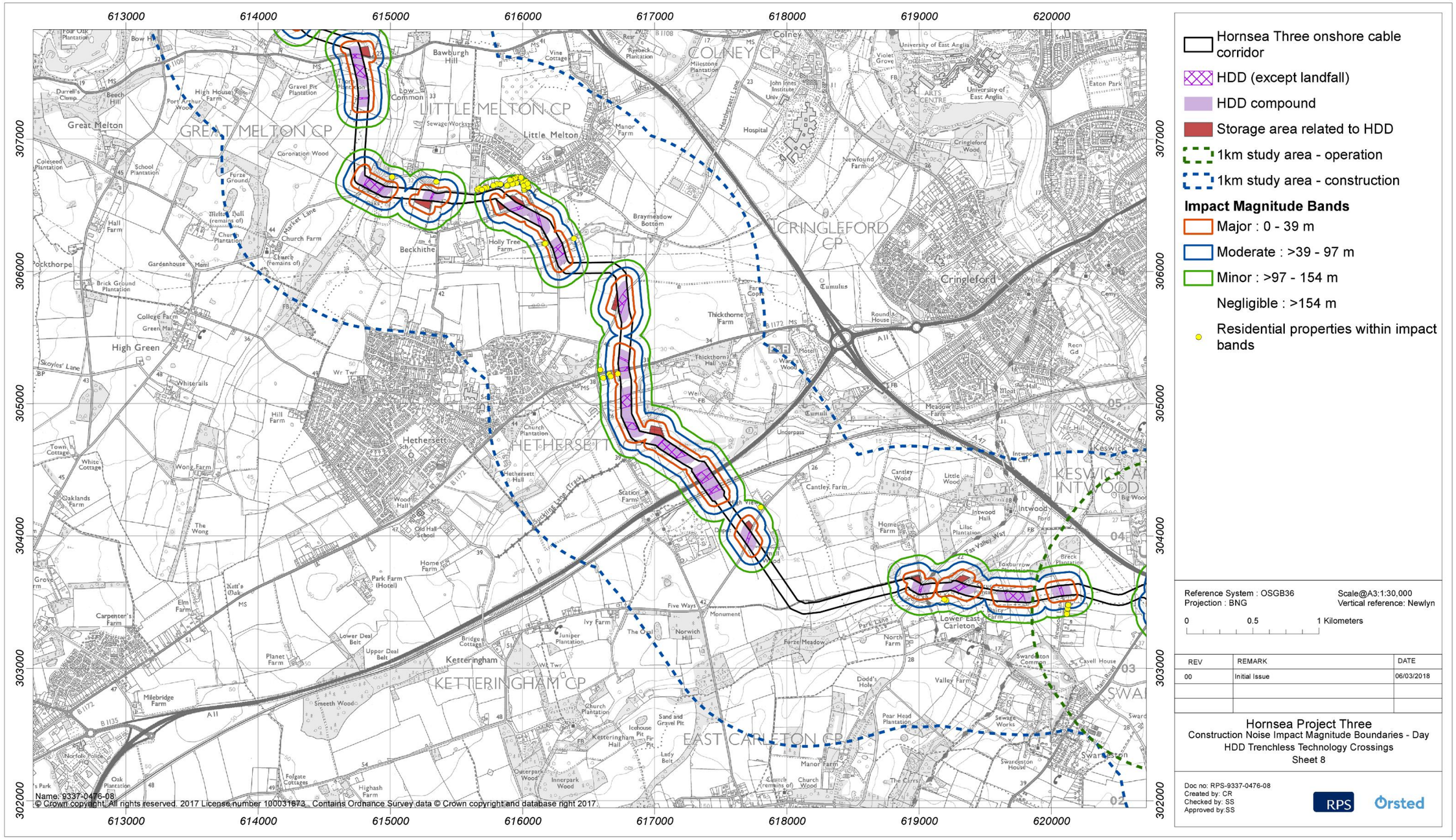


Figure 1.2: Construction noise impact magnitude boundaries – day – HDD trenchless technology crossings.

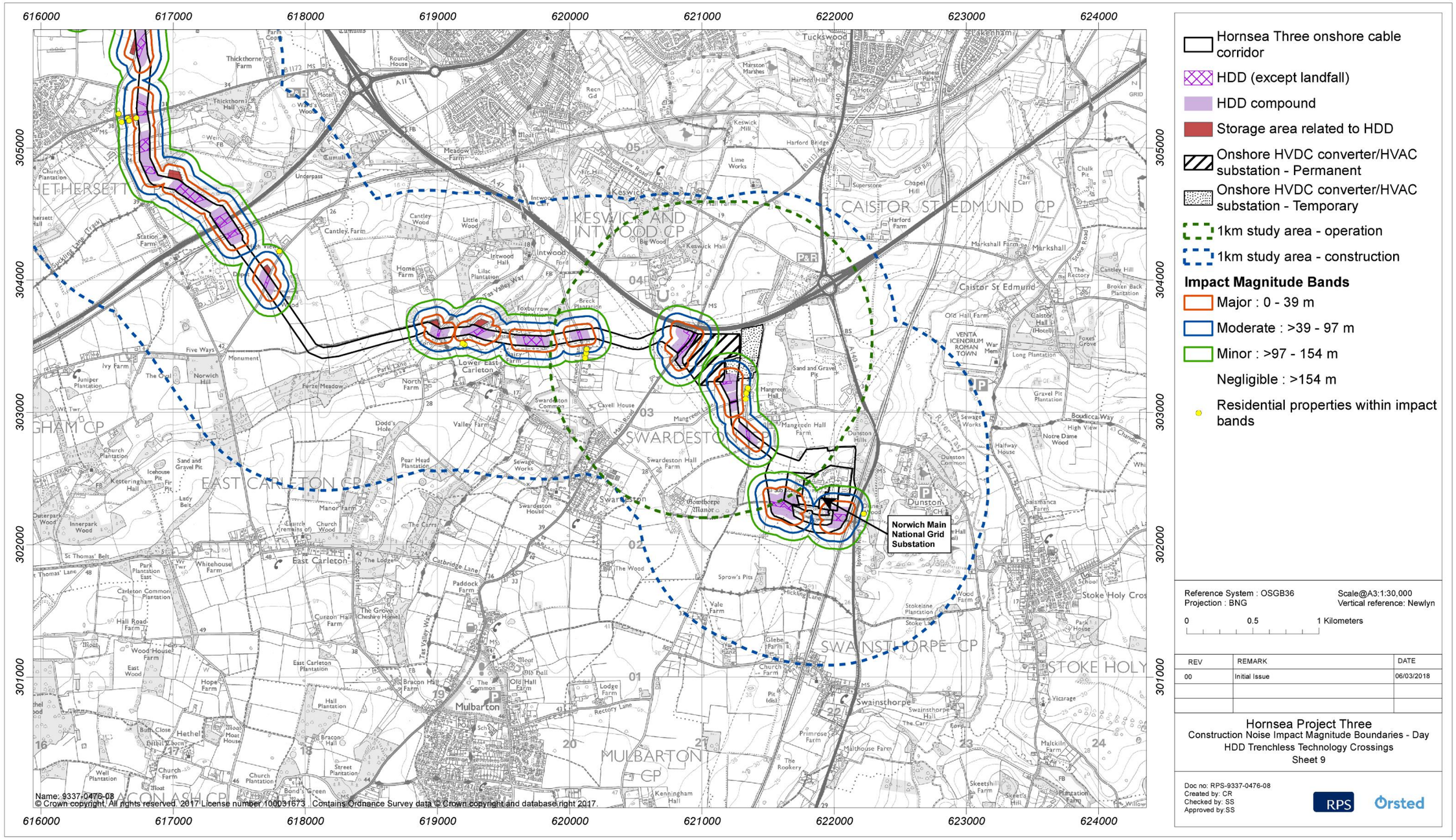


Figure 1.2: Construction noise impact magnitude boundaries – day – HDD trenchless technology crossings.

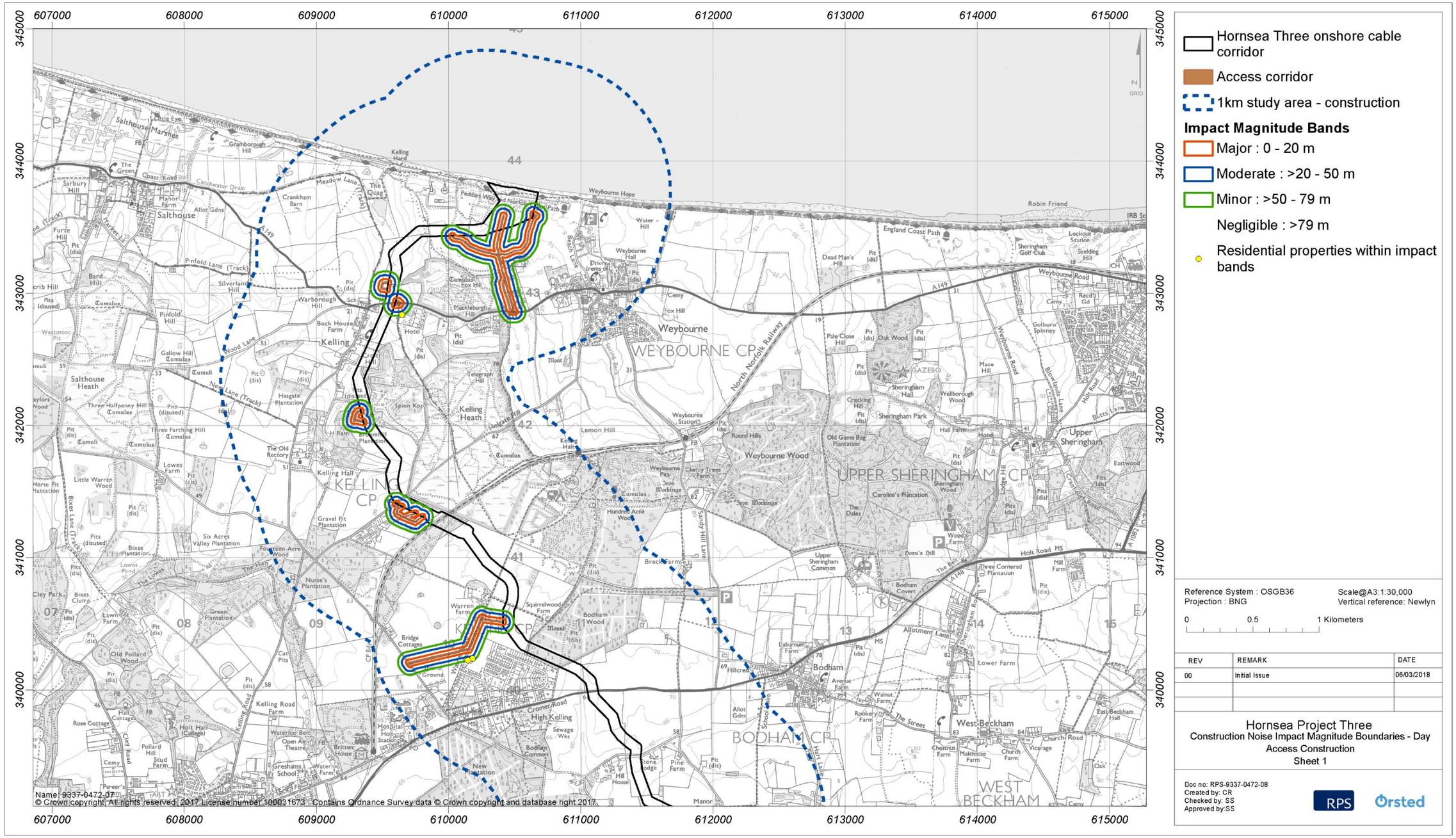


Figure 1.3: Construction noise impact magnitude boundaries – day – access construction.

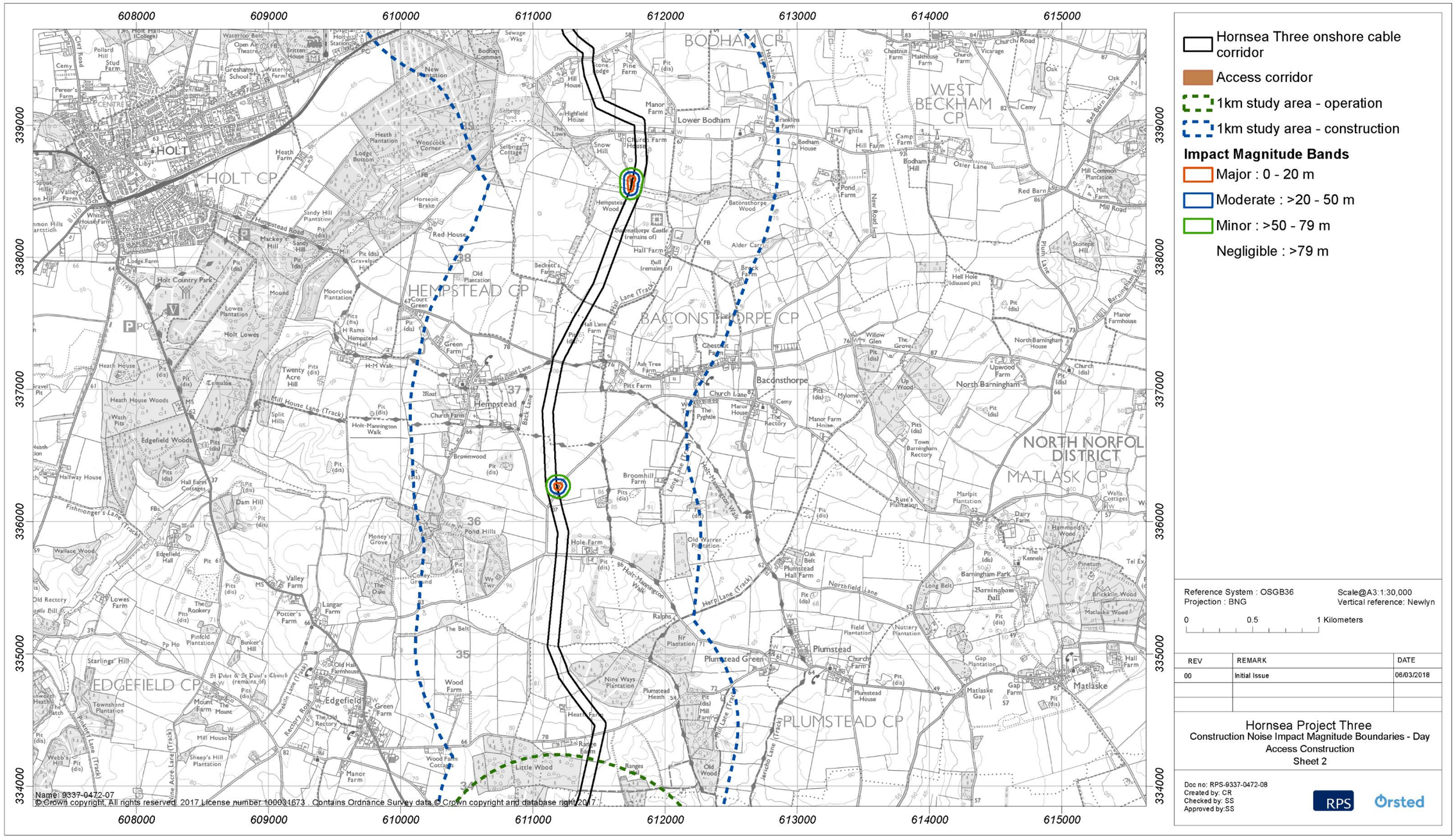


Figure 1.3: Construction noise impact magnitude boundaries – day – access construction.

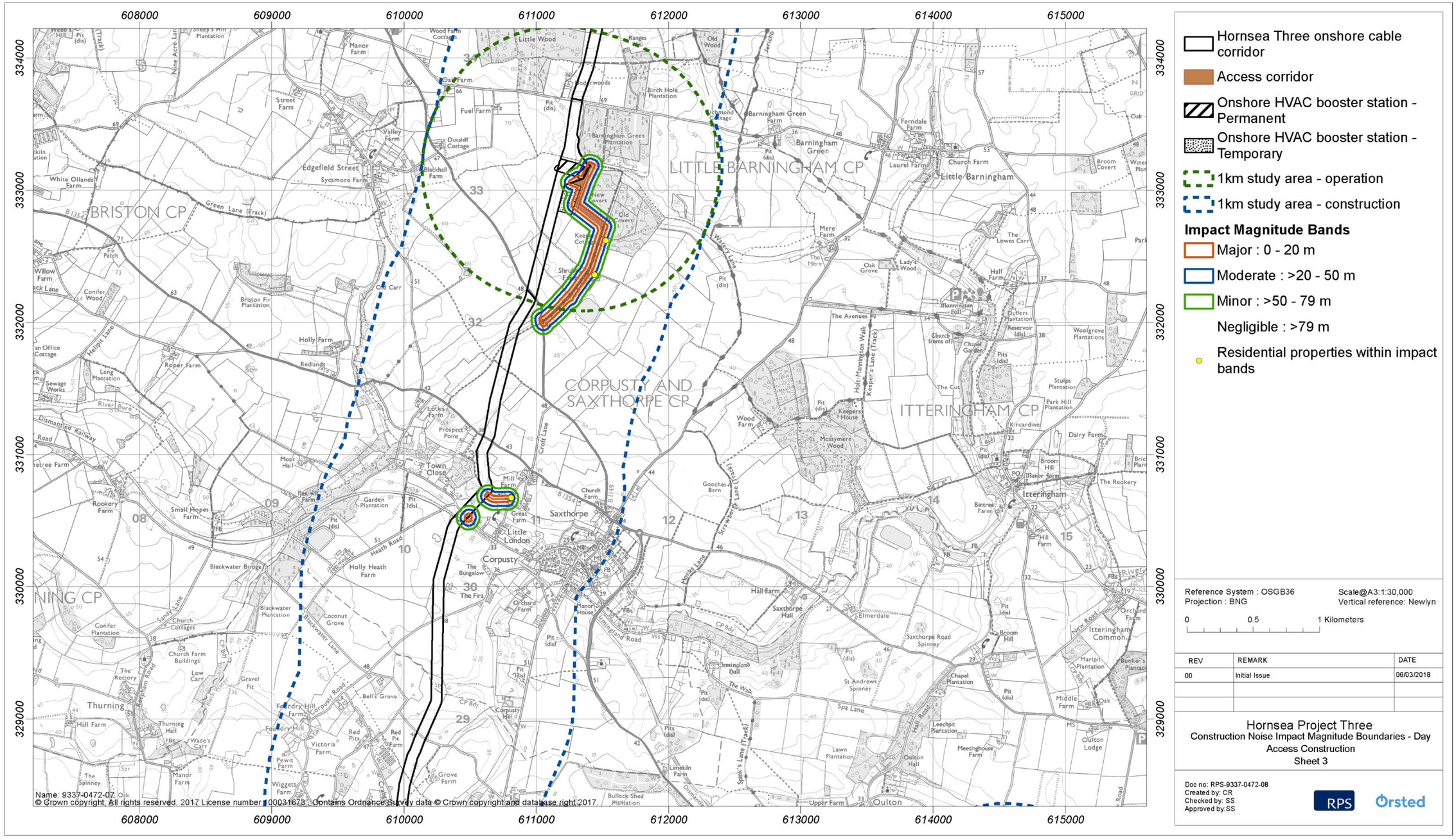
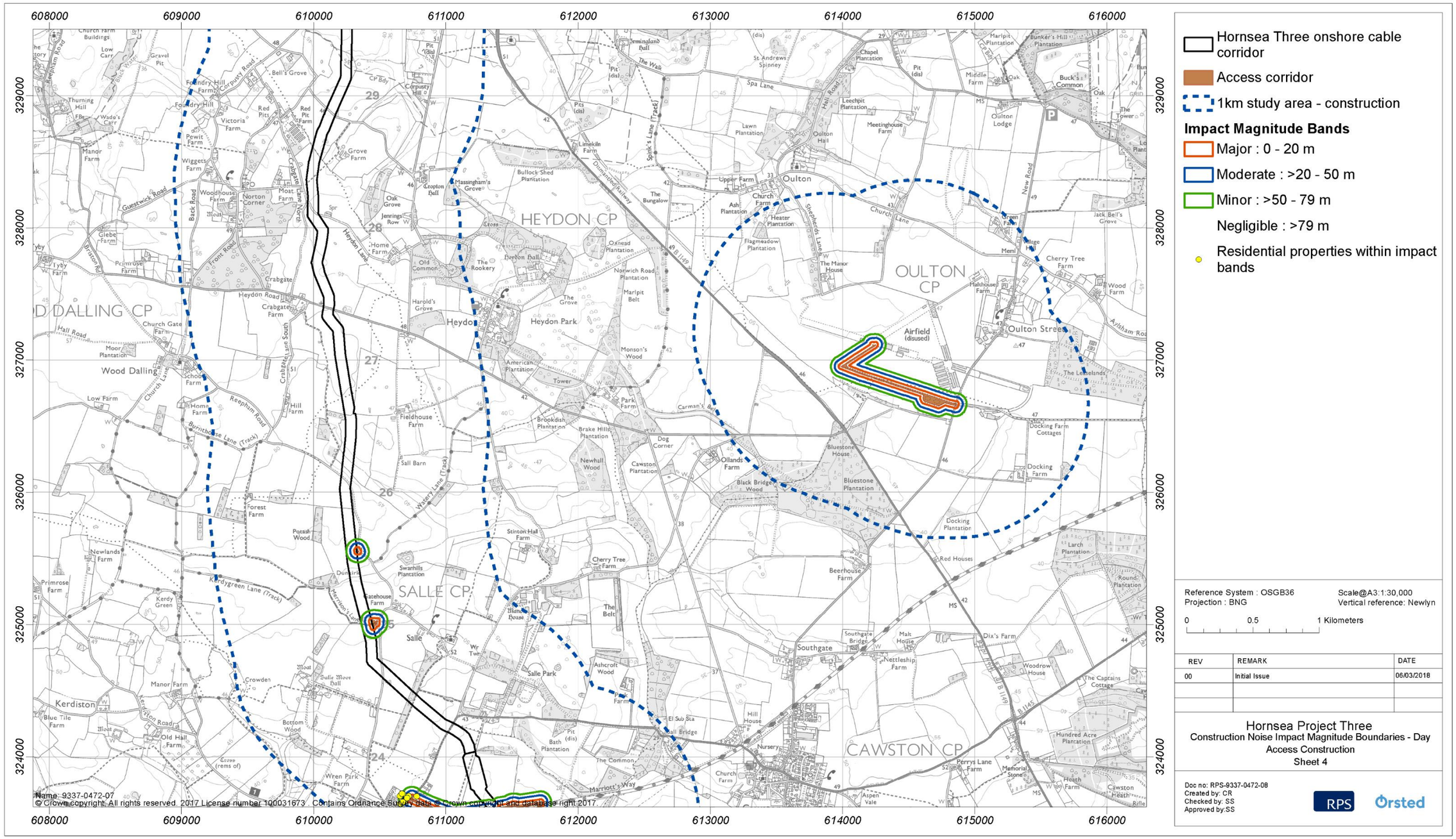


Figure 1.3: Construction noise impact magnitude boundaries – day – access construction.



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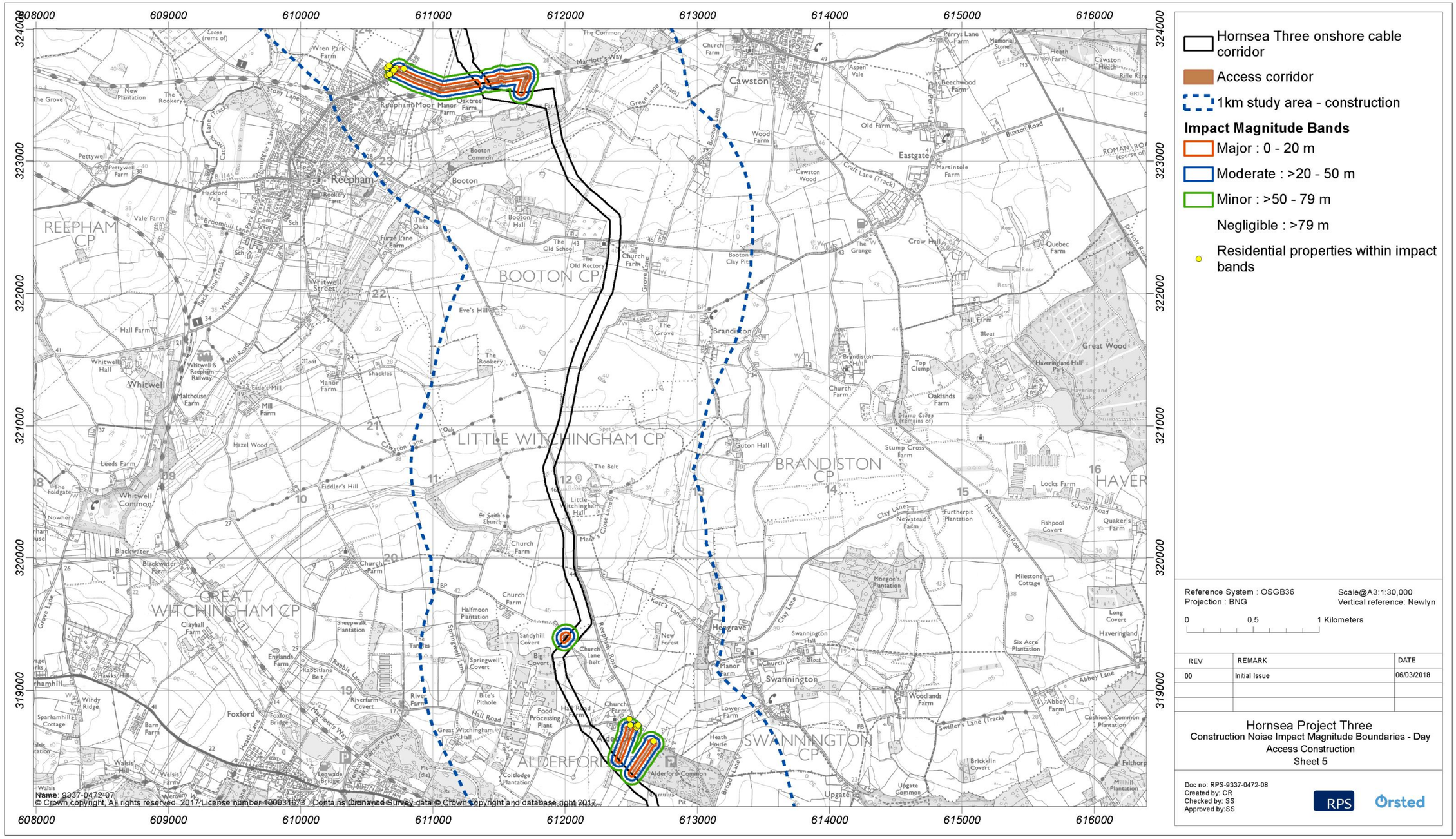

Figure 1.3: Construction noise impact magnitude boundaries – day – access construction.

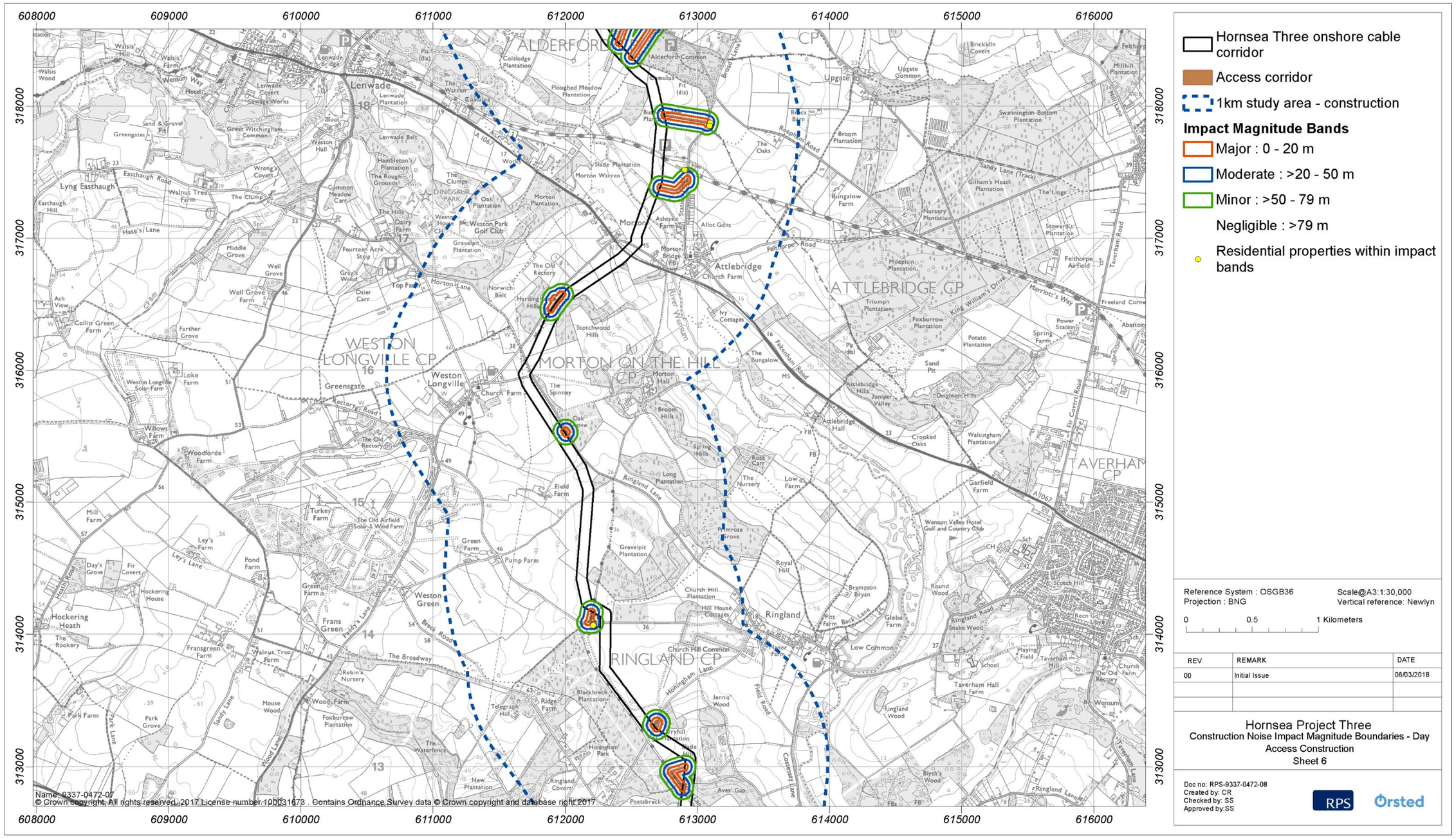

Figure 1.3: Construction noise impact magnitude boundaries – day – access construction.

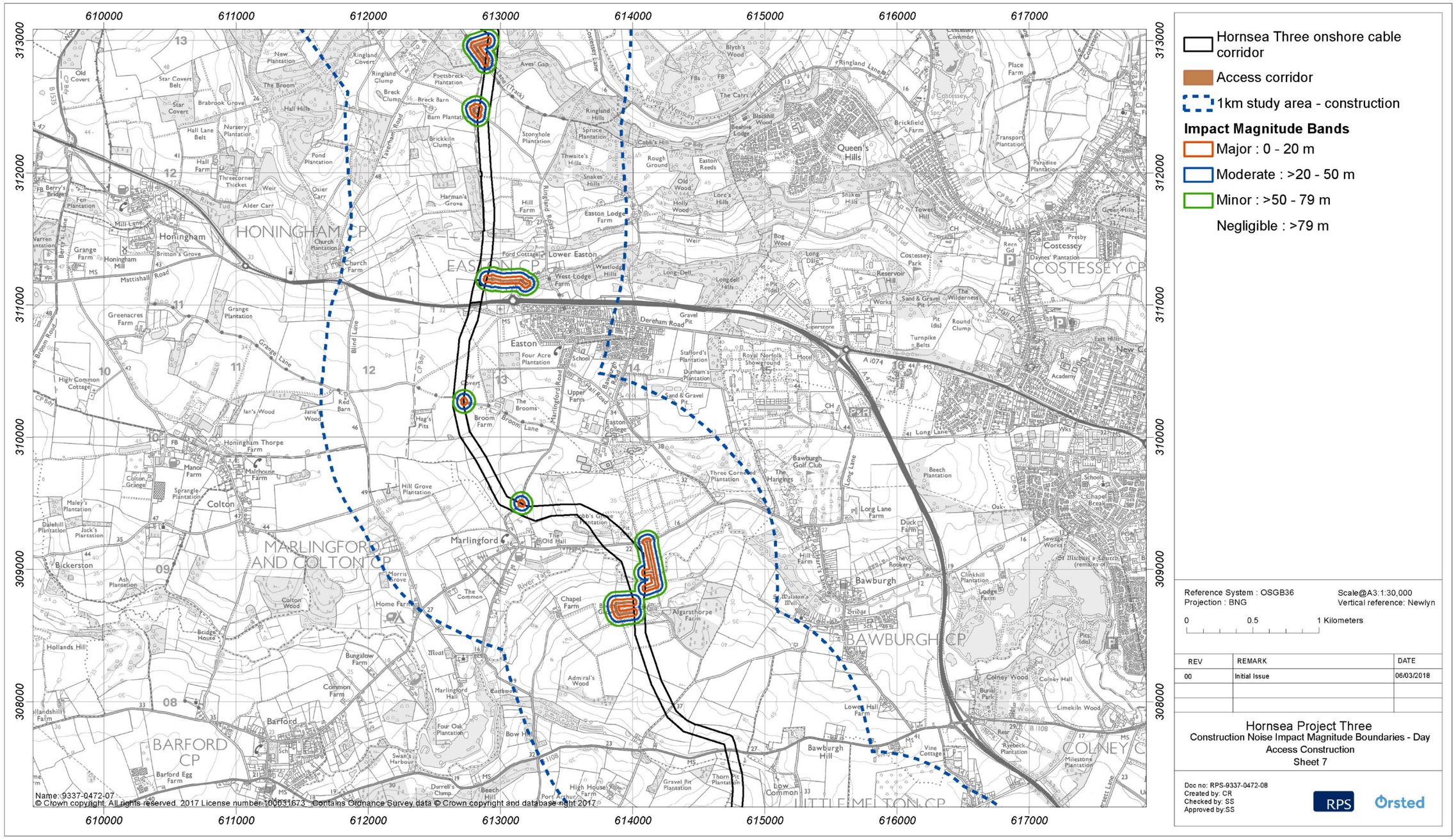

Figure 1.3: Construction noise impact magnitude boundaries – day – access construction.

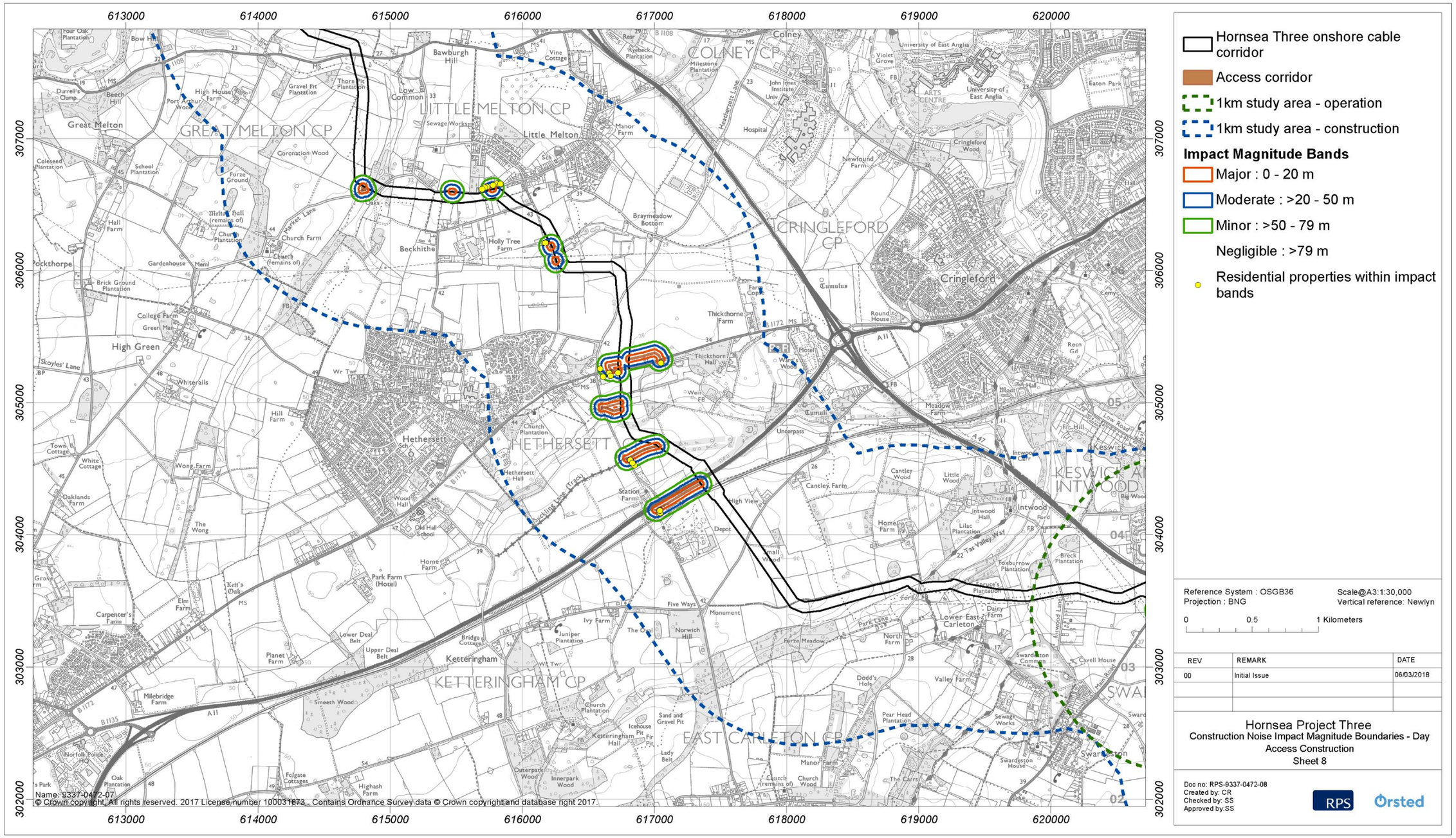

Figure 1.3: Construction noise impact magnitude boundaries – day – access construction.

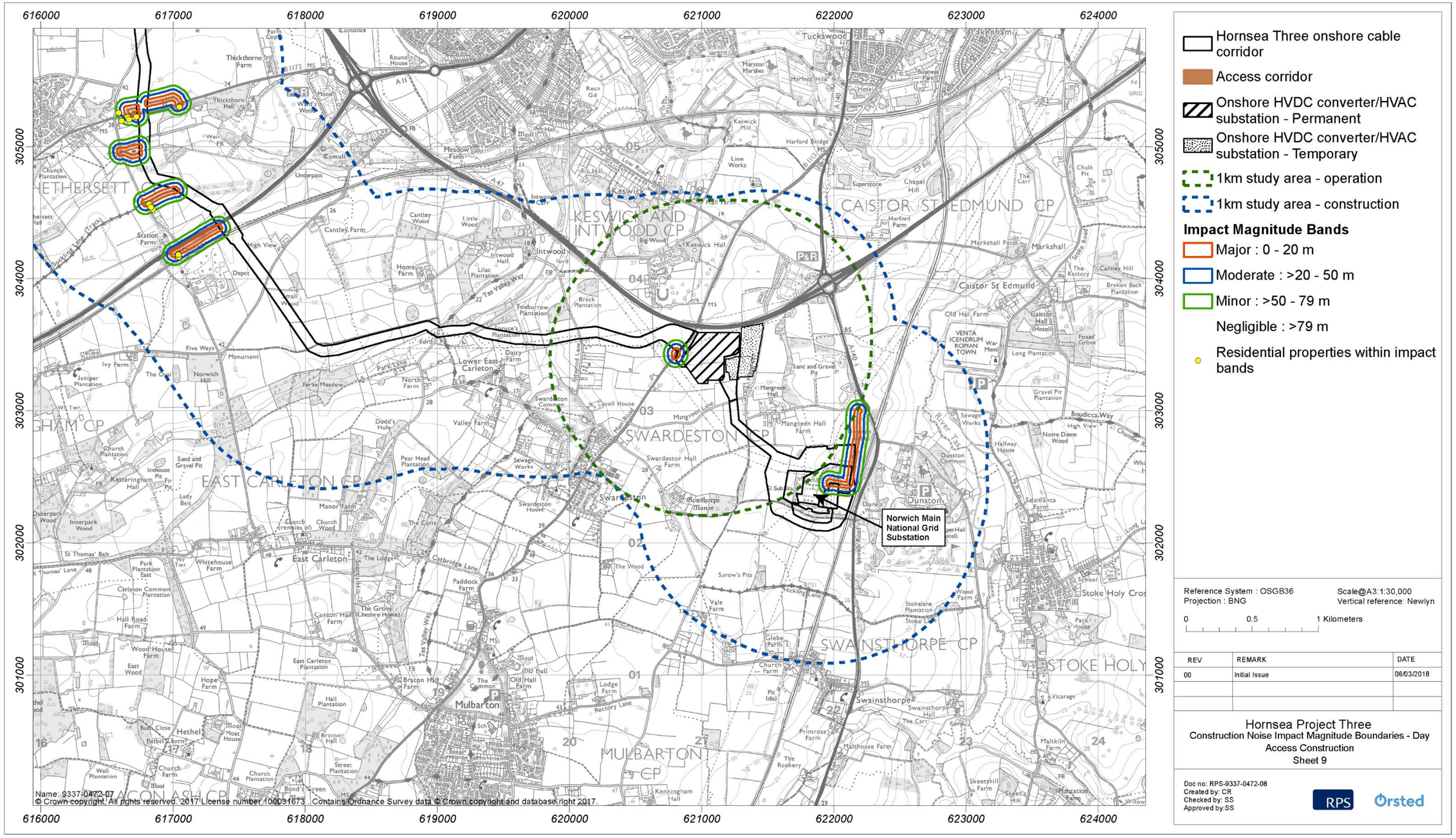

Figure 1.3: **Construction noise impact magnitude boundaries – day – access construction.**

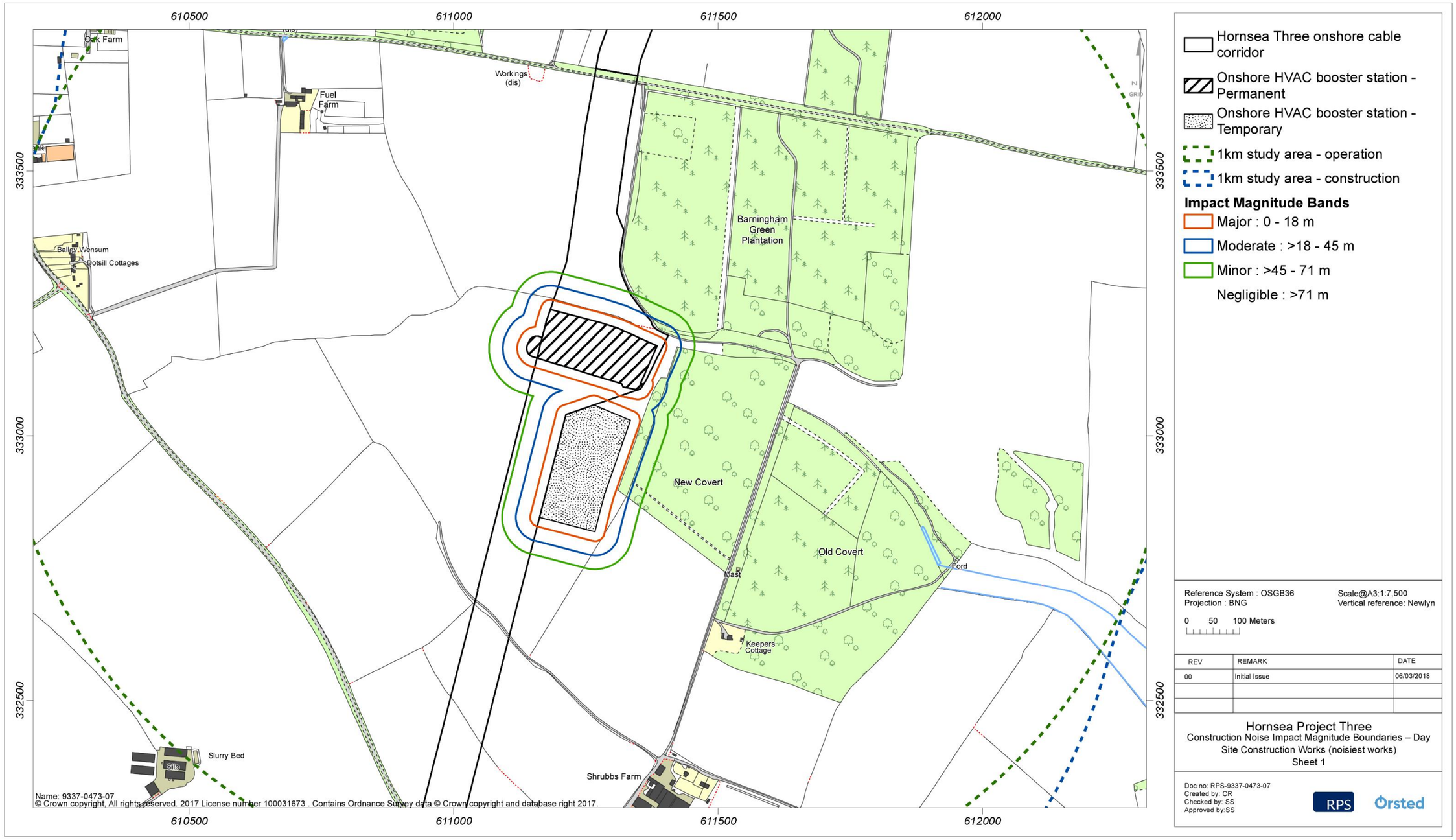

Figure 1.4: **Construction noise impact magnitude boundaries – day – site construction works (noisiest works).**

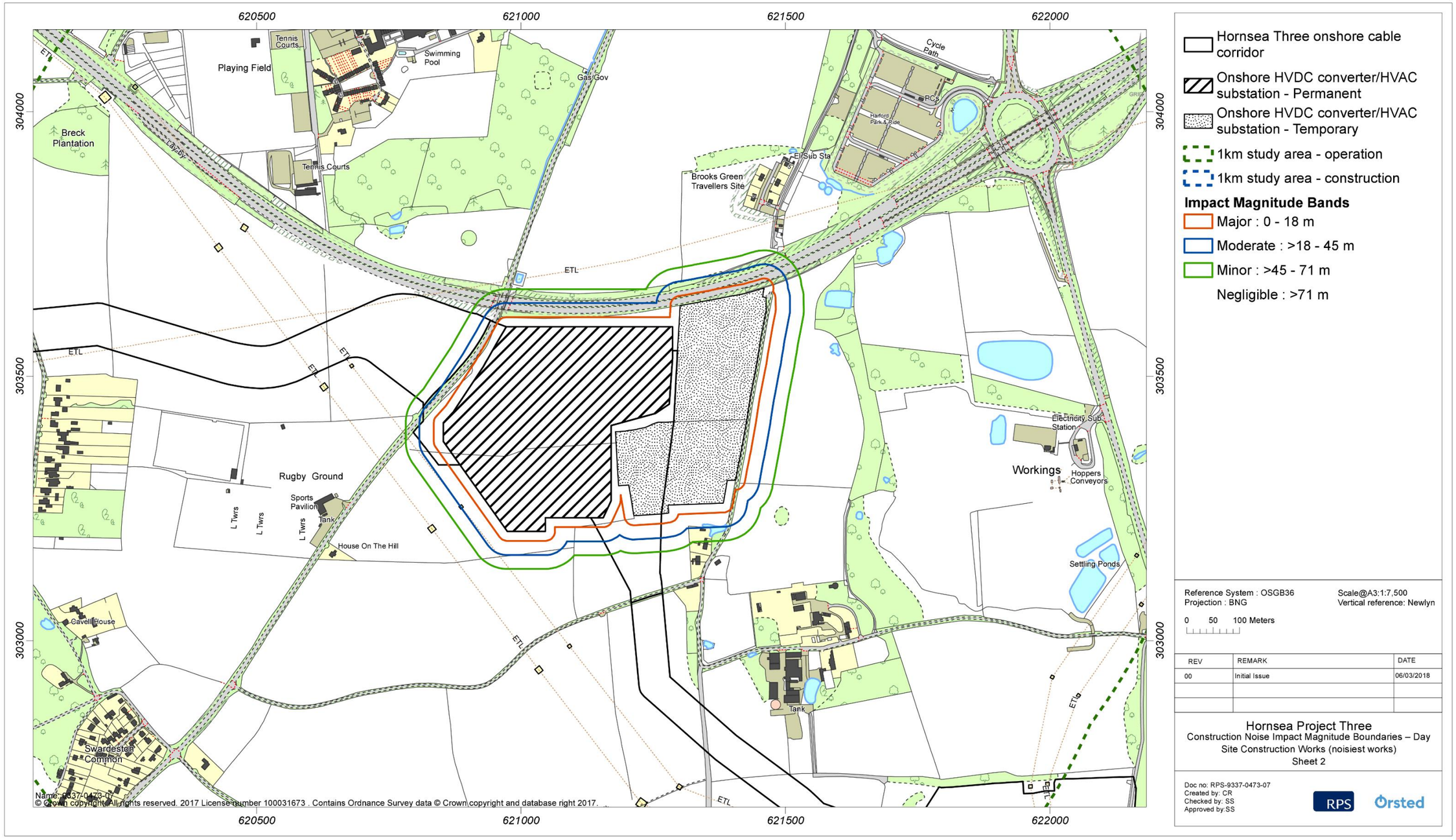

Figure 1.4: Construction noise impact magnitude boundaries – day –site construction works (noisiest works).

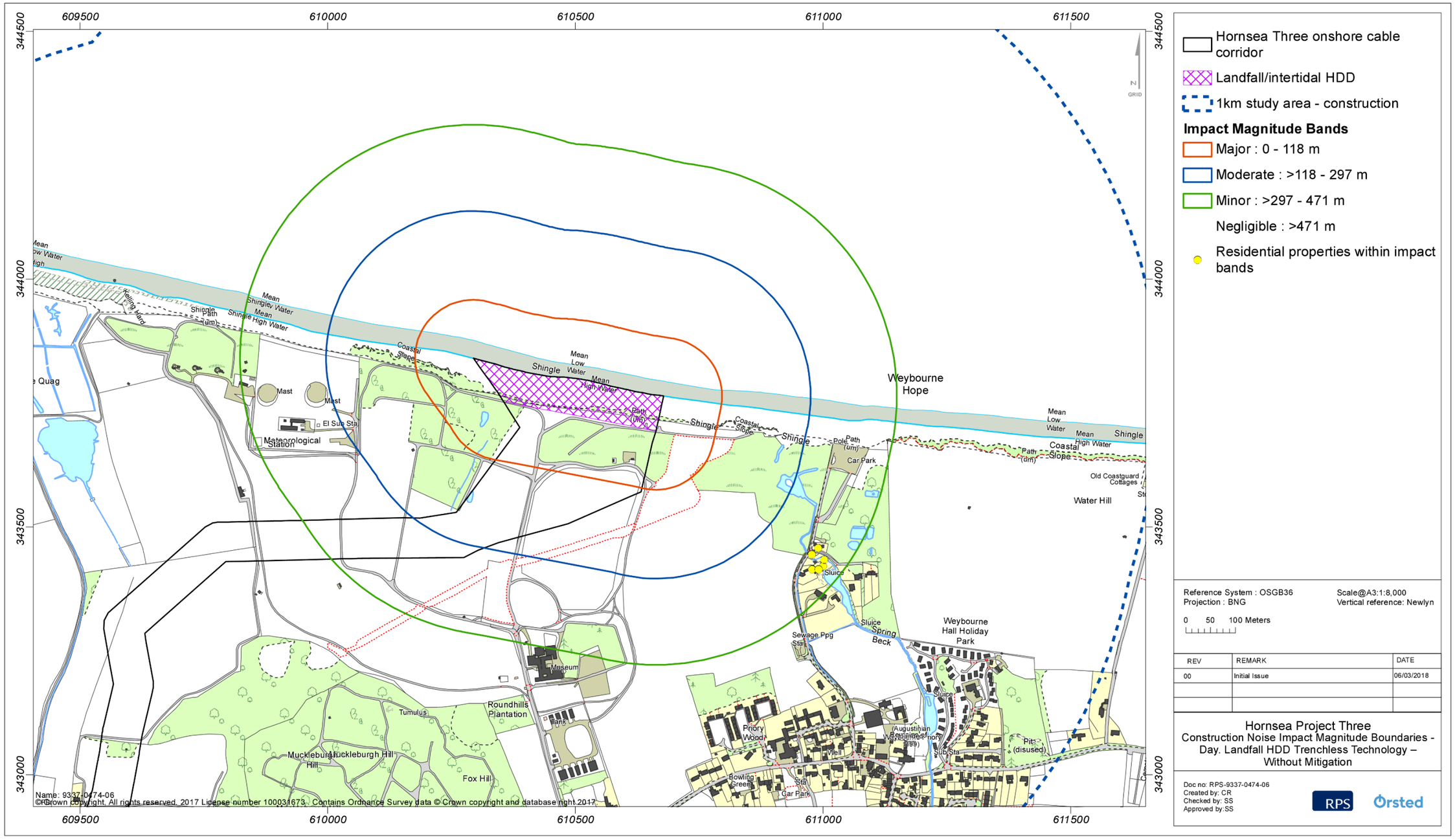

Figure 1.5: Construction noise impact magnitude boundaries – day – landfall HDD trenchless technology – without mitigation.

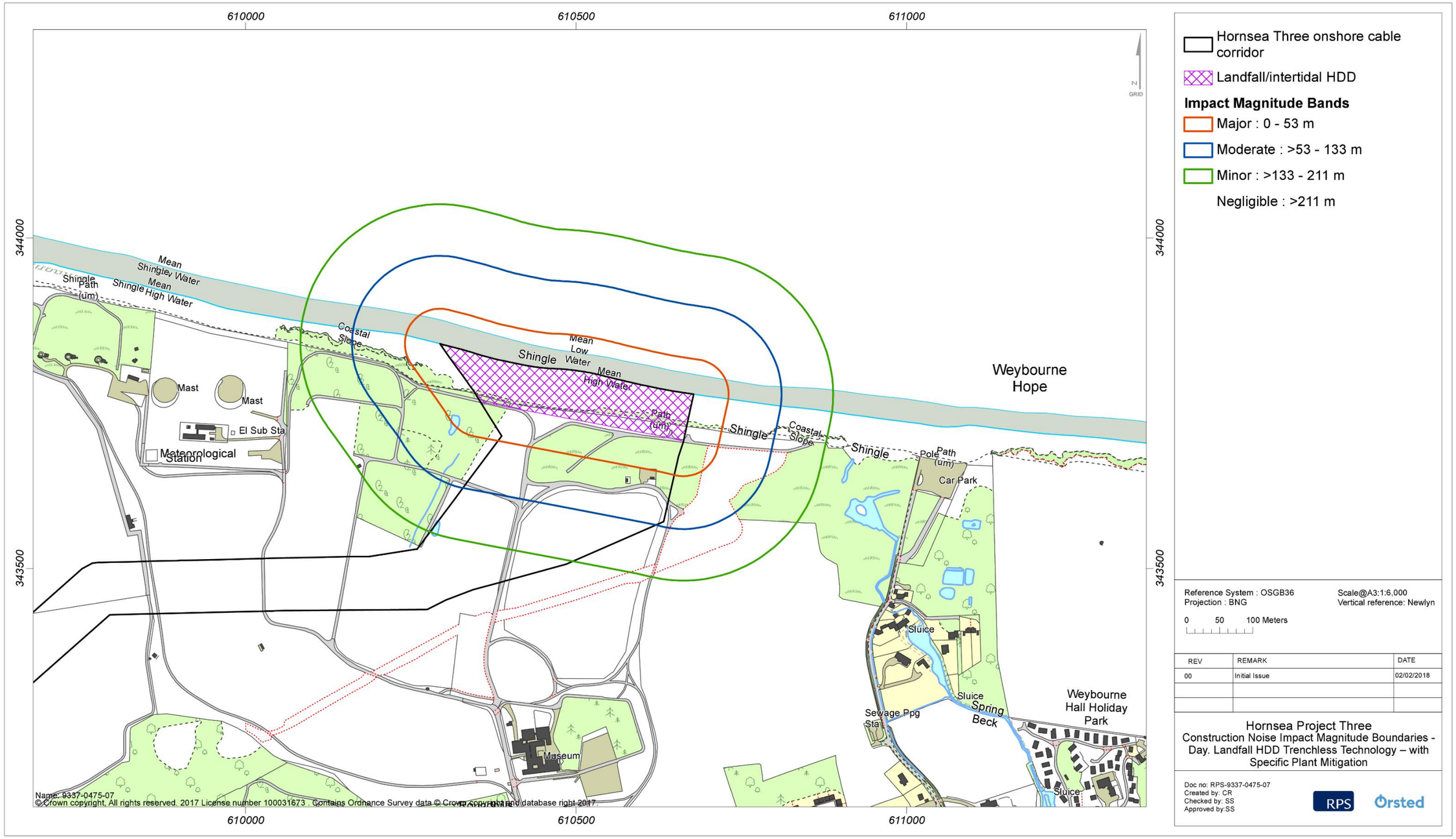

Figure 1.6: Construction noise impact magnitude boundaries – day – landfall HDD trenchless technology – with specific plant mitigation.

1.8 References

British Standards Institution (BSI) (2014) British Standard 5228: Code of practice for noise and vibration control on construction and open sites. Part 1: Noise+A1:2014. Milton Keynes, BSI.

British Standards Institution (BSI) (2014) British Standard 5228: Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration+A1:2014. Milton Keynes, BSI.

Department of Transport (1988) Calculation of Road Traffic Noise (CRTN). London, HMSO.

Highways Agency (2011) Design Manual for Roads and Bridges (DMRB). London, The Stationary Office.

International Organization for Standardization (1996) ISO 9613-2:1996 Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation.

Appendix A Construction Plant Source Data

Table A.1: Construction Plant Source Data.

Reference	Activity	Plant Requirements	BS:5228 Table No.	$L_{Aeq,T}$ at 10m, dB	Source Height	Sound Power Level, dB(A)	No. of Plant	Percentage on-time (average % of time that plant will be operating at full power)	Resultant Sound Power Level, dB(A)
1	Stripping /Excavating Topsoil & Installation of Capping	Excavator	C6.12	74	1.8	102	1	50	99
		Roller	C2.37	79	0.5	107	1	25	101
		Dump truck	C4.6	79	1.8	107	1	10	97
		HGV	C6.21	80	1.8	108	1	10	98
								Total	**105**
2	Piling	Piling rig - CFA	C3.21	79	2	107	1	50	104
		Generator for piling rig	C4.79	64	1.5	92	1	50	89
		Excavator	C6.12	74	1.8	102	1	25	96
								Total	**105**
3	Installation of equipment	Mobile tracked crane	C3.29	70	2	98	1	50	95
		MEWP	C4.57	67	1.8	95	1	50	92
								Total	**97**
4	Concrete Pouring	Concrete mixer truck	C4.20	80	1.5	108	1	50	105
		Concrete pump	C3.25	78	1.5	106	1	50	103
								Total	**107**
5	Site Welfare	Generator for piling rig	C4.79	64	1.5	92	1	100	92
								Total	**92**
6	Breaking Foundations (decommissioning)	Excavator	C6.12	74	1.8	102	1	50	99
		Breaker attachment	C1.9	90	1.5	118	1	25	112
		Dump truck	C4.6	79	1.8	107	1	10	97
		HGV	C6.21	80	1.8	108	1	10	98
								Total	**112**

Reference	Activity	Plant Requirements	BS:5228 Table No.	$L_{Aeq,T}$ at 10m, dB	Source Height	Sound Power Level, dB(A)	No. of Plant	Percentage on-time (average % of time that plant will be operating at full power)	Resultant Sound Power Level, dB(A)
7	Cable Route Worksite	Excavator	C6.12	74	1.8	102	1	100	102
		HGV	C6.21	67	1.2	95	1	50	92
		Dump truck	C4.6	79	1.8	107	1	10	97
		Mobile tracked crane	C3.29	70	1.8	98	1	50	95
								Total	**104**
8	Cable Route	Excavator	C6.12	74	1.8	102	1	100	102
		HGV	C6.21	67	1.5	95	1	50	92
				Total	**1.65**			***Total***	**102**
9	Access Construction	Excavator	C6.12	74	1.8	102	1	50	99
		Roller	C2.37	79	1.8	107	1	25	101
		HGV	C6.21	80	1.8	108	1	20	101
								Total	**105**
						Road Length	***200 m***	***Total per m***	**82**
10	HDD crossings	Supports for directional drill	C4.92	87	1.8	115.4	1	100	115
		Directional drill (generator 106 kW)	C4.96	77	1.8	105.4	1	100	105
				Total	**1.8**			***Total***	**116**
11	Intertidal HDD unmitigated	Drilling Rig	n/a	99.4	2.4	127.4	1	100	127
		Ingersoll Rand 250KVA Generator	n/a	88.4	1.52	116.4	1	100	116
		Weatherford Mud Pump T270A	n/a	79	1.73	107	1	100	107
		Prime Drilling Pump House	n/a	69.7	1.73	97.7	1	100	98
		Clear Solutions Mixing System	n/a	77	1.8	105	1	100	105
		WB 2000 Re-cycling System	n/a	77.7	1.8	105.7	1	100	106
								Total	**128**

Reference	Activity	Plant Requirements	BS:5228 Table No.	$L_{Aeq,T}$ at 10m, dB	Source Height	Sound Power Level, dB(A)	No. of Plant	Percentage on-time (average % of time that plant will be operating at full power)	Resultant Sound Power Level, dB(A)
12	Intertidal HDD Mitigated	Mitigated -10dB: Drilling Rig	n/a	89.4	2.4	117.4	1	100	117
		Mitigated -5dB: Ingersoll Rand 250KVA Generator	n/a	83.4	1.73	111.4	1	100	111
		Weatherford Mud Pump T270A	n/a	79	1.73	107	1	100	107
		Prime Drilling Pump House	n/a	69.7	1.73	97.7	1	100	98
		Clear Solutions Mixing System	n/a	77	1.8	105	1	100	105
		WB 2000 Re-cycling System	n/a	77.7	1.8	105.7	1	100	106
								Total	**119**

Table A.2: Construction plant scenarios – onshore HVDC converter/HVAC substation and HVAC booster station works.

Situation in Model	Activities (from Table A.1) Included in Situation	Total Sound Power Level, dB(A)
Stripping of Topsoil & Installation of Stone Capping	1,5	105
Piling	2,5	105
Installation of Equipment	3,5	98
Concrete Pouring	4,5	107
Access Road Construction	9,5	105
Cable Route	8	102
Cable Route with worksite	7,8	106
HDD Crossing	8,10	116
Intertidal/landfall HDD (unmitigated)	7,11	128
Intertidal/landfall HDD (mitigated)	7,12	119

Table A.3: Onshore cable corridor works

Reference	Activity	Plant Requirements	BS:5228 Table No.	$L_{Aeq,T}$ at 10m, dB	Source Height	Sound Power Level, dB(A)	No. of plant	Percentage on-time (average % of time that plant will be operating at full power)	Resultant Sound Power Level, dB(A)
11	Construction of Cable Installation/open cut trenching	Tracked Excavator	C6.12	75	1.8	103	1	100	103
12	Horizontal Directional Drilling Compounds/trenchless	Large HDD Compound	C2.44	88	1.8	116	1	100	116
13	Construction of Access Roads	Tracked Excavator	C2.16	75	1.8	103	1	100	103
		Dump Truck (tipping fill)	n/a	79	1.8	107	1	100	107
								Total	**108**

Appendix B Construction Noise Model Results

Table B.1: Construction Noise Level Impact and Distance Bands Day, Evening, Night.

Impact Magnitude	Distance bands from Hornsea Three (m)		
	Day (0700 - 1900)	Evening (1900 - 2300)	Night (2300 - 0700)
Onshore cable corridor construction (cable installation)			
Negligible	>47	>117	>294
Minor	>29 - 47	>74 - 11	>185 - 294
Moderate	>12 - 29	>29 - 74	>74 - 185
Major	0 - 12	0 - 29	0 - 74
Horizontal Directional Drilling Compounds/trenchless			
Negligible	>154	>388	>975
Minor	>97 - 154	>245 - 388	>615 - 975
Moderate	>39 - 97	>97 - 245	>245 - 615
Major	0 - 39	0 - 97	0 - 245
Construction of Access Roads			
Negligible	>79	>198	>497
Minor	>50 - 79	>125 - 198	>314 - 497
Moderate	>20 - 50	>50 - 125	>125 - 314
Major	0 - 20	0 - 50	0 - 125
Stripping of Topsoil & Installation of Stone Capping			
Negligible	>59	>148	>371
Minor	>37 - 59	>93 - 148	>234 - 371
Moderate	>15 - 37	>37 - 93	>93 - 234
Major	0 - 15	0 - 37	0 - 93
Piling			
Negligible	>57	>144	>362
Minor	>36 - 57	>91 - 144	>228 - 362
Moderate	>14 - 36	>36 - 91	>91 - 228
Major	0 - 14	0 - 36	0 - 91
Installation of Equipment			
Negligible	>30	>76	>191
Minor	>19 - 30	>48 - 76	>120 - 191
Moderate	>8 - 19	>19 - 48	>48 - 120
Major	0 - 8	0 - 19	0 - 48
Concrete Pouring			
Negligible	>71	>178	>447
Minor	>45 - 71	>112 - 178	>282 - 447
Moderate	>18 - 45	>45 - 112	>112 - 282
Major	0 - 18	0 - 45	0 - 112
Cable Route with worksite			
Negligible	>65	>163	>411
Minor	>41 - 65	>103 - 163	>259 - 411
Moderate	>16 - 41	>41 - 103	>103 - 25
Major	0 - 16	0 - 41	0 - 103
HDD Crossing			
Negligible	>154	>388	>975
Minor	>97 - 154	>245 - 388	>615 - 975
Moderate	>39 - 97	>97 - 245	>245 - 615
Major	0 - 39	0 - 97	0 - 245
Landfall Construction (without mitigation)			
Negligible	>471	>1183	>2971
Minor	>297 - 471	>746 - 1183	>1875 - 2971
Moderate	>118 - 297	>297 - 746	>746 - 1875
Major	0 - 118	0 - 297	0 - 746
Landfall Construction (with mitigation)			
Negligible	>211	>530	>1330
Minor	>133 - 211	>334 - 530	>839 - 1330

Impact Magnitude	Distance bands from Hornsea Three (m)		
	Day (0700 - 1900)	Evening (1900 - 2300)	Night (2300 - 0700)
Moderate	>53 - 133	>133 - 334	>334 - 839
Major	0 - 53	0 - 133	0 - 334

Table B.2: Construction distance bands and property counts (day).

Impact Magnitude, Day	Distance bands from Hornsea Three (m)	Residential Property Count
Summary of property count within construction noise impact band – open cut sections of the onshore cable corridor		
Minor	>29 - 47	17
Moderate	>12 - 29	12
Major	0 - 12	1
Summary of property count within construction noise impact band – HDD sections of the onshore cable corridor		
Minor	>97 - 154	123
Moderate	>39 - 97	70
Major	0 - 39	11
Summary of property count within construction noise impact band – Access construction		
Minor	>50 - 79	21
Moderate	>20 - 50	27
Major	0 - 2	8
Summary of property count within construction noise impact band – onshore HVDC converter/HVAC substation construction		
Minor	>45 - 71	0
Moderate	>18 - 45	0
Major	0 - 18	0
Summary of property count within construction noise impact band – HDD at the Hornsea Three landfall area (without mitigation)		
Minor	>297 - 471	6
Moderate	>118 - 297	0
Major	0 - 118	0
Summary of property count within construction noise impact band; HDD at the Hornsea Three landfall area (with mitigation)		
Minor	>133 - 211 m	0
Moderate	>53 - 133 m	0
Major	0 - 53	0