Outer Dowsing Offshore Wind

Preliminary Environmental Information Report

Volume 1, Chapter 26: Onshore Noise and Vibration

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OUTER DOWSING OFFSHORE WIND

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Abbreviations and Acronyms

Acronym	Expanded name
AAWT	Annual Average Weekly Traffic
AQTAG09	Air Quality Technical Advisory Group 09
BAEF	Boston Alternative Energy Facility
BBC	Boston Borough Council
BNL	Basic Noise Level
BS	British Standard
CoPA	The Control of Pollution Act 1974
CRTN	Calculation of Road Traffic Noise
DCO	Development Consent Order
DECC	Department of Energy & Climate Change, now the Department for Energy Security and Net Zero (DESNZ)
DESNZ	Department for Energy Security and Net Zero, formerly Department of Business, Energy and Industrial Strategy (BEIS), which was previously Department of Energy & Climate Change (DECC)
DMRB	Design Manual for Roads and Bridges
DRC	Domestic Reverse Charge
ECC	Export Cable Corridor
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
ELDC	East Lindsay District Council
EPA	The Environmental Protection Act 1990
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Technical Group
GT R4 Ltd	The Applicant. The special project vehicle created in partnership between Corio Generation (a wholly owned Green Investment Group portfolio company), Gulf Energy Development and TotalEnergies
HGV	Heavy Goods Vehicle
HVAC	High Voltage Alternating Current
IEMA	The Institute of Environmental Management and Assessment
LCC	Lincolnshire County Council
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority
LN	Lincolnshire Node
MDS	Maximum Design Scenario
NNR	National Nature Reserve
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NPSE	National Policy Statement for England
NSIP	Nationally Significant Infrastructure Project

Acronym	Expanded name
NSR	Noise Sensitive Receptor
NVMP	Noise and Vibration Management Plan
OnRCS	Onshore Reactive Compensation Station
OnSS	Onshore Substation
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
SAC	Special Area of Conservation
SHDC	South Holland District Council
SOAEL	Significant Observed Adverse Effect Level
SoS	Secretary of State
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SWL	Sound Power Level
TCC	Temporary Construction Compounds
VSR	Vibration Sensitive Receptor
WM	Weston Marsh
WMN	Weston Marsh North
WMS	Weston Marsh South

Terminology

Term	Definition
Baseline	The status of the environment at the time of assessment without the development in place.
Cumulative effects	The combined effect of the Project acting cumulatively with the effects of a number of different projects, on the same single receptor/resource. Cumulative effects are those that result from changes caused by other past, present or reasonably foreseeable actions together with the Project.
Cumulative impact	Impacts that result from changes caused by other past, present or reasonably foreseeable actions together with the Project.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for Department for Energy Security and Net Zero (DESNZ).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of an impact with the sensitivity of a receptor, in accordance with defined significance criteria.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the Environmental Impact Assessment (EIA) Regulations, including the publication of an Environmental Statement (ES).
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
Environmental Statement (ES)	The suite of documents that detail the processes and results of the Environmental Impact Assessment (EIA).
Evidence Plan	A voluntary process of stakeholder consultation with appropriate Expert Topic Groups (ETGs) that discusses and, where possible, agrees the detailed approach to the Environmental Impact Assessment (EIA) and information to support Habitats Regulations Assessment (HRA) for those relevant topics included in the process, undertaken during the pre-application period.
Haul Road	The track within the onshore ECC which the construction traffic would use to facilitate construction.
High Voltage Alternating Current (HVAC)	High voltage alternating current is the bulk transmission of electricity by alternating current (AC), whereby the flow of electric charge periodically reverses direction.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Intertidal	Area where the ocean meets the land between high and low tides.
Joint Bay	A joint bay provides a secure environment for the assembly of cable joints as well as bonding and earthing leads. A joint bay is installed between each length of cable.

Term	Definition
Landfall	The location at the land-sea interface where the offshore export cable will come ashore.
Maximum Design Scenario	The maximum design parameters of the combined project assets that result in the greatest potential for change in relation to each impact assessed
Mitigation	Mitigation measures, or commitments, commitments made by the Project to reduce and/or eliminate the potential for significant effects to arise as a result of the Project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts in the case of potentially significant effects.
National Policy Statement (NPS)	A document setting out national policy against which proposals for Nationally Significant Infrastructure Projects (NSIPs) will be assessed and decided upon
Onshore Export Cable Corridor (ECC)	The Onshore Export Cable Corridor (Onshore ECC) is the area within which the export cable running from the landfall to the onshore substation will be situated.
Onshore substation (OnSS)	The Project's onshore substation, containing electrical equipment to enable connection to the National Grid.
Onshore Infrastructure	The combined name for all onshore infrastructure associated with the Project from landfall to grid connection.
Preliminary Environmental Information Report (PEIR)	The PEIR is written in the style of a draft Environmental Statement (ES) and provides information to support and inform the statutory consultation process in the pre-application phase. Following that consultation, the PEIR documentation will be updated to produce the Project's ES that will accompany the application for the Development Consent Order (DCO).
PEIR Boundary	he PEIR Boundary is outlined in Figure 3.1 of Volume 1, Chapter 3: Project Description and comprises the extent of the land and/or seabed for which the PEIR assessments are based upon.
Pre-construction and post-construction	The phases of the Project before and after construction takes place.
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors include species (or groups) of animals or plants, people (often categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.
Statutory consultee	Organisations that are required to be consulted by the Applicant, the Local Planning Authorities and/or The Inspectorate during the pre-application and/or examination phases, and who also have a statutory responsibility in some form that may be relevant to the Project and the DCO application. This includes those bodies and interests prescribed under Section 42 of the Planning Act 2008.
study area	Area(s) within which environmental impact may occur – to be defined on a receptor-by-receptor basis by the relevant technical specialist.
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO.

Term	Definition
	The Applicant is GT R4 Limited (a joint venture between Corio Generation, TotalEnergies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.
The Planning Inspectorate	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
The Project	Outer Dowsing Offshore Wind including proposed onshore and offshore infrastructure.
Transboundary impacts	Transboundary effects arise when impacts from the development within one European Economic Area (EEA) state affects the environment of another EEA state(s)
Transition Joint Bay (TJB)	The offshore and onshore cable circuits are jointed on the landward side of the sea defences/beach in a Transition Joint Bay (TJB). The TJB is an underground camber constructed of reinforced concrete which provides a secure and stable environment for the cable.
Trenchless technique	Trenchless technology is an underground construction method of installing, repairing and renewing underground pipes, ducts and cables using techniques which minimize or eliminate the need for excavation. Trenchless technologies involve methods of new pipe installation with minimum surface and environmental disruptions. These techniques may include Horizontal Directional Drilling (HDD), thrust boring, auger boring, and pipe ramming, which allow ducts to be installed under an obstruction without breaking open the ground and digging a trench.
Trenched technique	Trenching is a construction excavation technique that involves digging a narrow trench in the ground for the installation, maintenance, or inspection of pipelines, conduits, or cables.

Units

Term	Definition
Decibel (dB)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$ Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e., 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L_{Aeq}	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
L_{10} & L_{90}	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this

Term	Definition
	purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
L_{Amax}	L_{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
PPV	Peak Particle Velocity - Vibration is an oscillatory motion. The magnitude of vibration can be defined in terms of displacement (how far from the equilibrium position that something moves), velocity (how fast something moves), or acceleration (the rate of change of velocity). Standards for the assessment of building damage are usually given in terms of peak velocity (usually referred to as Peak Particle Velocity, or PPV) in mm/s.
hr	Hour
km	Kilometre
m	Metre
mm/s	Millimetres per second
mph	Miles Per Hour
km/h	Kilometres Per Hour
m/s	Metres per second

26 Onshore Noise and Vibration

26.1 Introduction

26.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the results to date of the Environmental Impact Assessment (EIA) for the potential impacts of Outer Dowsing Offshore Wind (the Project) on Onshore Noise and Vibration. Specifically, this chapter considers the potential impact of the Project from the landfall, the onshore export cable corridor (onshore ECC), and incorporating the onshore substation (OnSS) during the construction, operation and maintenance, and decommissioning phases.

26.1.2 GT R4 Limited (trading as Outer Dowsing Offshore Wind), hereafter referred to as the 'Applicant', is proposing to develop the Project. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm) approximately 54km from the Lincolnshire coastline in the southern North Sea, export cables to landfall, and connection to the electricity transmission network (see Volume 1, Chapter 3: Project Description for full details).

26.1.3 This chapter describes the scope, relevant legislation, assessment methodology, and the baseline conditions existing at the site and its surroundings. It considers any potential significant environmental effects the proposed development would have on this baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. Cumulative noise and/or vibration effects with other proposed developments that may also have an impact on the sensitive receptors close to the Project are also considered.

26.1.4 This chapter is supported by the following technical appendices:

- Volume 2, Appendix 26.1: Sound Level Meter Calibration Certificates;
- Volume 2, Appendix 26.2: Full baseline survey results;
- Volume 2, Appendix 26.3: Construction Plant Sound Levels; and
- Volume 2, Appendix 26.4: Noise model outputs.

26.1.5 This chapter should be read alongside the following chapters:

- Volume 1, Chapter 21: Onshore Ecology;
- Volume 1, Chapter 22: Onshore Ornithology; and
- Volume 1, Chapter 27: Traffic and Transport.

26.2 Statutory and Policy Context

Legislation

26.2.1 There are two legislative instruments which address the effects of environmental noise regarding construction noise and vibration, and nuisance: the Environmental Protection Act 1990 (EPA), and The Control of Pollution Act 1974 (CoPA).

26.2.2 The EPA provides a requirement for local authorities to investigate noise from industrial, trade or business premises, or vehicles, machinery or equipment in the street, and to determine if the noise is detrimental to health or constitutes a statutory nuisance. If the local authority determines that noise is detrimental to health or constitutes a statutory nuisance, the EPA gives the local authority the power to issue an abatement notice that requires the person responsible for producing the noise to prevent the noise from occurring (see Table 26.1 in which these are considered further).

26.2.3 The CoPA provides two means of controlling construction noise and vibration. Section 60 provides local authority with the power to impose, at any time, operating conditions on the development site. Section 61 allows the developer to negotiate a set of operating procedures with local authority prior to commencement of site works (see Table 26.1 in which these are considered further).

26.2.4 The assessment work completed in this chapter will inform the Secretary of State (SoS) and Lincolnshire County Council (LCC) as to benchmark baseline sound levels and construction sound levels.

National Planning Policy

26.2.5 Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs) is provided by the National Policy Statements (NPSs) EN-1 '*Overarching National Policy Statement for Energy*' (Department of Energy and Climate Change (DECC) 2011a) and EN-3 '*National Policy Statement for Renewable Energy Infrastructure*' (DECC, 2011b) and '*National Policy Statement for Electricity Networks Infrastructure*' (EN-5) (2011c).

26.2.6 The NPS are a series of principal decision-making documents to appropriately assess Nationally Significant Infrastructure Projects (NSIP). As such, this assessment has made explicit reference to the relevant NPS requirements.

26.2.7 In addition to the current NPS, draft NPSs were consulted upon between September and November 2021. The draft NPSs have been reviewed to determine the emerging expectations and changes from previous iterations of the NPSs. This includes the Draft Overarching NPSs EN-1 (2021a), Draft EN-3 (2021b) and Draft EN-5 (2021c).

26.2.8 Details of the policies of relevance to this assessment are provided in Table 26.1 together with an indication of where each requirement is addressed.

26.2.9 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied. With regards to noises, it states that planning policies and decisions should aim to; avoid significant adverse effects, mitigate and reduce to a minimum, other adverse impacts, recognise that development will create some noise, and identify and protect areas of tranquillity.

26.2.10 With regard to significant adverse effects, the NPPF refers to the Noise Policy Statement for England (NPSE). The first aim of the NPSE, states that significant adverse impacts on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between the Lowest Observed Adverse Effect Level (LOAEL), and Significant Observed Adverse Effect Level (SOAEL), and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, this does not mean that such adverse effects cannot occur.

26.2.11 The web-based Planning Practice Guidance (PPG) advises on how planning can manage potential impacts in new development. The section on noise within the PPG includes a table that summarises "the noise exposure hierarchy" which offers "examples of outcomes" relevant to the 'No Observed Effect Level' (NOEL), LOAEL and SOAEL effect levels described in the NPSE. These outcomes are in descriptive form, there is no numerical definition of the NOEL, LOAEL and SOAEL.

Local Planning Policy

26.2.12 LCC provides various environment and planning strategy documents as part of their policies, strategies and plans. There are no known formal overarching policy guidance documents in relation to new development and noise for LCC.

26.2.13 The Project falls within land areas under the Boston Borough Council (BBC), South Holland District Council (SHDC), and East Lindsey District Council (ELDC), all of which are part of the South East Lincolnshire Partnership (SELP) and are covered under the South East Lincolnshire Local Plan 2011-36 as adopted in 2019 (the Local Plan).

26.2.14 The Local Plan describes in Section 7.4, Pollution, that all new development must take into account the potential environmental impacts from noise.

26.2.15 Policy 30: Pollution of the Local Plan, in relation to various potential environmental impacts including noise, states:

"Development proposals will not be permitted where, taking account of any proposed mitigation measures, they would lead to unacceptable adverse impacts upon… noise including vibration…".

26.2.16 As part of the Local Plan renewable energy strategy, it is acknowledged that proposals should consider various potential environmental impacts (including from noise) individually and cumulatively with other similar developments in the context of supporting sustainable development.

Nationally Significant Infrastructure Projects

26.2.17 The relevant legislation and planning policy for offshore renewable energy NSIPs, specifically in relation to Onshore Noise and Vibration, is outlined in Table 26.1 below.

Table 26.1: Legislation and policy context

Legislation/policy	Key provisions	Section where comment addressed
EPA	Part III of the EPA provides powers for Local authorities to issue abatement notices where a statutory nuisance exists.	Statutory nuisance cannot be assessed at this stage of the development and therefore is not considered further in this chapter. The control of significant effects would be expected to minimise the risk of nuisance.

Legislation/policy	Key provisions	Section where comment addressed
CoPA	Sections 60 and 61 of Part III of the CoPA provide powers to Local authorities for controlling noise from construction activities.	Construction noise impacts are considered in Section 26.7 of this chapter.
EN-1 Paragraph 5.11.4 Draft EN-1 Paragraph 5.12.6	Paragraph 5.11.4 of EN-1 is reproduced below: *"Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:* ▪ a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive**,** low frequency or temporal characteristics of the noise; ▪ identification of noise sensitive premises and noise sensitive areas that may be affected; ▪ the characteristics of the existing noise environment; ▪ a prediction of how the noise environment will change with the proposed development; ▪ in the shorter term such as during the construction period; ▪ in the longer term during the operating life of the infrastructure; ▪ at particular times of the day, evening and night (and weekends) as appropriate, and at different times of year. ▪ an assessment of the effect of predicted changes in the noise environment on any noise sensitive receptors, including an assessment of any likely impact on health and well-being where appropriate, and noise-sensitive areas; ▪ if likely to cause disturbance, an assessment of the effect of underwater or subterranean noise;	The assessment has considered all the aspects identified, as detailed in Sections 26.4 to 26.7 of this chapter.

Legislation/policy	Key provisions	Section where comment addressed
	▪ measures to be employed in mitigating noise using best available techniques to reduce noise impacts."	
Draft EN-1 Paragraph 5.12.7	The nature and extent of the noise assessment should be proportionate to the likely noise impact.	
EN-1 Paragraph 5.11.5 Draft EN-1 Paragraph 5.12.8	Applicants should consider the noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation.	Section 26.7 considers the noise impact of increased construction traffic levels on receptors.
EN-1 Paragraph 5.11.6 Draft EN-1 Paragraph 5.12.9	Operational noise, with respect to human receptors, should be assessed using the principles of the relevant guidance and British Standards and other guidance. Further information on assessment of particular noise sources may be contained in the technology specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies.	The assessment has been undertaken in accordance with the principles in the relevant technical guidance and British Standards as outlined in the Guidance section below.
EN-1 Paragraph 5.11.7 Draft EN-1 Paragraph 5.12.10	Some noise impacts will be controlled through environmental permits and parallel tracking is encouraged where noise impacts determined by an environmental permit interface with planning issues (i.e., physical design and location of development). The applicant should consult the EA and/or the SNCB, as necessary, and in particular regarding assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be considered.	Section 26.7 considers the potential noise impacts on ecological receptors.

Legislation/policy	Key provisions	Section where comment addressed
Draft EN-1 Paragraph 5.12.12	Applicants should submit a detailed impact assessment and mitigation plan as part of any development plan, including the use of noise mitigation and noise abatement technologies during construction and operation.	The siting of the proposed OnSSs has taken into account the locations of the nearest sensitive receptors. The embedded measures adopted to avoid and mitigate effects are set out in Section 26.5 The operational and construction noise assessments have mitigated and reduced to a minimum the potential adverse impacts (see Section 26.7).
Draft EN-1 Paragraph 5.12.13	The Secretary of State should consider whether mitigation measures are needed both for operational and construction noise over and above any which may form part of the project application. In doing so the Secretary of State may wish to impose mitigation measures. Any such mitigation measures should take account of the NPPF or any successor to it and planning practice guidance on noise.	
Draft EN-1 Paragraph 5.12.14	Mitigation measures may include one or more of the following: ▪ engineering: reducing the noise generated at source and/or containing the noise generated; ▪ lay-out: where possible, optimising the distance between the source and noise- sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening ▪ by natural or purpose-built barriers, or other buildings; ▪ administrative: using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise limits/ noise levels, differentiating as appropriate between different times of day, such as evenings and late at night, and taking into account. seasonality of wildlife in nearby designated sites; ▪ insulation: mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building.	

Legislation/policy	Key provisions	Section where comment addressed
EN-1 Paragraph 5.11.8 Draft EN-1 Paragraph 5.12.15	The project should demonstrate good design through the selection of the quietest cost-effective plant available; containment of noise within buildings wherever possible, taking into account any other adverse impact that such containment might cause e.g., on landscape and visual impacts; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission.	
EN-1 Paragraph 5.11.9	The proposal should avoid and mitigate adverse impacts on health and quality of life from noise and if possible, contribute to improvements in the above.	
EN-3 Paragraph 2.7.54	The ES should include a noise assessment as set out in Section 5.11 of EN-1. However, the noise created by wind turbines in operation is related to wind speed and is different to general industrial noise and an additional assessment of this noise should be made.	As agreed in the Scoping Opinion with the Inspectorate, operational noise from the 'wind turbines' has been scoped out of the assessment, as significant effects are unlikely to occur.
EN-3 Paragraph 2.7.56	The applicant's assessment of noise from the operation of the wind turbines should use ETSU-R-97, taking account of the latest industry good practice. This should include any guidance on best practice that the Government may from time to time publish.	
NPPF Paragraphs 174(e) and 185	The NPPF states in Paragraph 185 that planning policies and decisions *"should:* ▪ mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; and ▪ identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason." Paragraph 174(e) states:	The design of the Project has taken into account the locations of the sensitive receptors. The embedded measures adopted to avoid and mitigate effects are set out in Section 26.5. The methodology used to identify all effects is set out in Section 26.5.8. The operational and construction noise assessments have mitigated and reduced to a minimum the

Legislation/policy	Key provisions	Section where comment addressed
	"Planning policies and decisions should contribute to and enhance the natural and local environment by: … *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans".*	potential adverse impacts (see Section 26.7).
PPG Paragraph: 003 Reference ID: 30-003-20190722	When determining noise impacts, PPG recommend identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.	
PPG Paragraph: 005 Reference ID: 30-005-20190722	Noise exposure hierarchy table is used in order to establish whether noise is likely to be a concern. This is based upon whether the noise causes any changes in behaviour and attitude, with consideration needing to be given to mitigating noise levels that cause an observable adverse effect.	

Standards and Guidance

26.2.18 A summary of the relevant British Standards and guidance utilised within this chapter is given below.

British Standard 5228:2009 + A1:2014 Part 1: Noise

26.2.19 The impact of construction noise from offshore sources, arising from the Project, upon residential receptors will be determined with reference to British Standard 5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise* (BS 5228-1).

26.2.20 BS 5228-1 sets out a methodology for predicting noise levels arising from a wide variety of construction and related activities and contains tables of sound power levels generated by a wide variety of mobile and fixed plant equipment.

26.2.21 Compliance with BS 5228-1 is expected as a minimum standard when assessing the impact of construction noise upon the existing noise environment at nearby sensitive receptors.

26.2.22 Noise levels generated by construction operations and experienced at local receptors will depend upon a number of variables, the most significant of which are likely to be:

- The amount of noise generated by plant and equipment being used at the development site, generally expressed as a sound power level;
- The periods of operation of the plant at the development site, known as the "on-time";
- The distance between the noise source and the receptor, known as the "stand-off";
- The attenuation due to ground absorption or barrier screening effects; and
- Reflections of noise due to the presence of hard vertical faces such as walls.

26.2.23 BS 5228-1 gives several examples of acceptable noise limits for construction or demolition noise. For this assessment, as baseline noise data is available, it is proposed that the ABC method will be used to determine the threshold value at the receptor locations.

26.2.24 Under the ABC method, a threshold value noise level is determined by establishing the existing ambient noise level at each location. This measured ambient noise level is then rounded to the nearest whole 5dB(A), and the threshold noise value for each receptor is then established from Table E.1 of BS 5228-1. This threshold value is the $L_{Aeq,T}$ noise level that should not be exceeded at the receptor location by operations at the site.

26.2.25 If the threshold value is exceeded, then the effect of construction noise upon nearby receptors may be significant. BS 5228-1 states that the significance of the effect will depend upon *"other project-specific factors, such as the number of receptors affected and the duration and character of the impact."* Professional judgement will be used to determine whether an effect is considered to be significant, and commentary explaining the reasons for this judgement will be provided. In accordance with this method, the threshold noise levels for a potentially significant effect are as detailed in Table 26.2.

Table 26.2: Construction noise residential receptors – example threshold values

Assessment Category and Threshold Value Period	Threshold Value in Decibels (Db)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night-time (23:00-07:00)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75

[A)] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
[B)] Category B: threshold values to use when the ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
[C)] Category C: threshold values to use when the ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.
[D)] 19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays.

26.2.26 Note that the threshold values in Table 26.2 above, are considered to be guideline noise limits externally at the closest noise sensitive window. They are not considered as internal noise limits within the relevant building.

British Standard 5228:2009+A1:2014 Part 2: Vibration

26.2.27 The impact of vibration from onshore sources arising during construction of the Project upon residential receptors, will be determined with reference to British Standard 5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration* (BS 5228-2).

26.2.28 BS 5228-2 provides recommendations for basic methods of vibration control, relating to construction and open sites where work activities/operations generate significant vibration levels.

26.2.29 The majority of people are known to be very sensitive to vibration, the threshold of perception being typically in the Peak Particle Velocity (PPV) range of between 0.14mm/s and 0.30mm/s. Vibration levels above these values can cause disturbance. BS 5228-2 provides guidance on the effects of vibration as shown in Table 26.3.

Table 26.3: Risk of complaints from vibration levels

Vibration Level, mm/s	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30	Vibration might be just perceptible in residential environments.
1.00	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10.00	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

26.2.30 High vibration levels generally arise from 'heavy' construction works such as piling, deep excavation, dynamic ground compaction or drilling.

26.2.31 Annex E of BS 5228-2 contains empirical formulae derived by Hiller and Crabb (2000) from field measurements relating to resultant PPV, with a number of other parameters for vibratory compaction, dynamic compaction, percussive and vibratory piling, the vibration of stone columns and tunnel boring operations. These prediction equations are based on the energy approach. Use of these empirical formulae enables resultant PPV to be predicted and for some activities (vibratory compaction, vibratory piling and vibrated stone columns) they can provide an indicator of the probability of these levels of PPV being exceeded.

26.2.32 The empirical equations for predicting construction-related vibration provide estimates in terms of PPV. Therefore, the consequences of predicted levels in terms of human perception and disturbance can be established through direct comparison with the BS 5228-2:2009+A1:2014 guidance vibration levels shown in Table 26.3.

British Standard 4142:2014+A1:2019

26.2.33 The impact of operational noise from the OnSS options on residential receptors will be determined with reference to British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142).

26.2.34 BS 4142 provides guidance on assessing the potential adverse impact of sound, of an industrial and/or commercial nature, at nearby sensitive receptor locations within the context of the existing sound environment.

26.2.35 Where the specific sound contains tonality, impulsivity and/or other sound characteristics, corrections should be applied depending on the perceptibility. For tonality, a correction of either 0, 2, 4 or 6dB should be added; for impulsivity, a correction of either 0, 3, 6 or 9dB should be added and if the sound contains specific sound features which are neither tonal nor impulsive a penalty of 3dB should be added.

26.2.36 In addition, if the sound contains identifiable operational and non-operational periods that are readily distinguishable against the existing sound environment, a further correction of 3dB may be applied.

26.2.37 The assessment of impacts contained in BS 4142 is undertaken by comparing the sound rating level, i.e., the specific sound level of the source plus any character corrections, to the measured representative background sound level immediately outside the sensitive receptor location. Consideration is then given to the context of the existing sound environment at the sensitive receptor location to assess the potential impact.

26.2.38 Once an initial estimate of the impact is determined, by subtracting the measured background sound level from the rating sound level, BS 4142 states that the following should be considered:

- Typically, the greater the difference, the greater the magnitude of the impact;
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. It is an indication that the specific sound source has a low impact when the rating level does not exceed the background sound level, depending on the context.

26.2.39 BS 4142 outlines guidance for the consideration of the context of the potential impact, including consideration of the existing residual sound levels, location and/or absolute sound levels.

British Standard 8233:2014

26.2.40 The impact of operational noise from the OnSS options on residential receptors will also make reference to British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233).

26.2.41 BS 8233 provides guidance and recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate. However, it is considered the guidance values are useful for context to absolute noise levels. The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as outlined below.

- An ambient daytime noise level of 35dB $L_{Aeq,16hr}$ or less is suitable for daytime resting; and
- An ambient night-time noise level of 30dB $L_{Aeq,8hr}$ or less is suitable for sleeping.

26.2.42 Section G.1 of Annex G within BS 8233:2014 states that:

"If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15dB (Note that the level difference through a window partially open for ventilation can vary significantly depending on the window type and the frequency content of the external noise".

Guidelines for Environmental Noise Impact

26.2.43 The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment', Version 1.2 published in November 2014, addresses the key principles of a noise impact assessment and are applicable to *"all development proposals where noise effects are likely to occur"* and *"are relevant to all types of projects, regardless of size".*

26.2.44 The guidelines provide specific support on how noise impact assessments fit within the EIA process but can also apply to developments which do not require an EIA. They cover:

- How to scope a noise assessment;
- Issues to be considered when defining the baseline noise environment;
- Prediction of changes in noise levels as a result of implementing development proposals; and
- Definition and evaluation of the significance of the effect of changes in noise levels.

Calculation of Road Traffic Noise

26.2.45 The former Department of Transport memorandum Calculation of Road Traffic Noise (CRTN) published in 1988 sets out standard methods and procedures to predict and measure road traffic noise. These procedures were primarily intended to enable entitlement under the Noise Insulation Regulations 1975 to be determined, but they also provide guidance appropriate to the calculation of traffic noise for more general applications, for example the haul route under assessment in this chapter.

26.2.46 Road traffic noise is predicted and measured in terms of a statistical measure. Termed the L_{A10}, this measure of noise is equivalent to the noise level exceeded for 10% of the measurement period. Most legislation that refers to road traffic noise uses this noise index over an 18-hour period, from 06:00 hours to 00:00 hours.

26.2.47 However, in the assessment of the Project, the methodology presented in CRTN cannot be used to assess construction traffic, as the standard states that the calculation algorithms presented in the guidance are not reliable when traffic flows are less than 50 movements per hour.

26.2.48 Therefore, the haul route methodology presented in BS 5228-1 will be used when predicting noise levels from construction traffic associated with the development proposals.

World Health Organisation

26.2.49 The World Health Organisation 2018 Environmental Noise Guidelines for the European Region, published in 2018, do not cover industrial noise. However, the previous 1999 Community Noise Guidelines remain valid for industrial noise, i.e., "… all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid".

26.2.50 The 1999 guidelines are therefore still valid when referring to external daytime (07:00 – 23:00) ambient noise level limits, with an upper limit of 55 dB $L_{Aeq,16hour}$ considered acceptable. External night-time (2300 – 0700) level of 45 dB $L_{Aeq,8hour}$ is when sleep disturbance, with windows open, starts to occur.

26.2.51 The 2018 guidelines also "complement" the WHO Night Noise Guidelines from 2009.

26.2.52 The WHO Night Noise Guidelines 2009 define effect thresholds or *'lowest observed adverse health effect levels'* for both immediate physiological reactions during sleep and long-term adverse health effects. The Guidelines state:

- An $L_{night,outside}$ level of less than 30 dB(A): No effects expected to occur.
- An $L_{night,outside}$ level of 40 dB(A): Adverse effects start to occur. $L_{night,outside}$ 40 dB is equivalent to the lowest observed adverse effect level (LOAEL) for night noise.
- An $L_{night,outside}$ level of 55 dB(A): Adverse effects such as sleep disturbance are likely and occur frequently

Air Quality Technical Advisory Group 09

26.2.53 Air Quality Technical Advisory Group 09 (AQTAG09) provides guidance on the effects of industrial noise on wildlife and is intended to be used to assess the potential adverse impact of sound, of an industrial and/or commercial nature on wildlife (i.e., the OnSS). The guidance assists officers involved with the determination of PPC applications for installations with relevant noise emissions and relate these to the requirements of the Habitats Regulations.

26.2.54 The guidance specifies that, where specific noise from industry, measured at the habitat is below the levels in Table 26.4 it is considered unlikely that it will have an adverse impact on designated species. Where noise levels are exceeded further, more detailed assessment will be required.

Table 26.4: AQTAG Specific Noise Levels

Parameter	Noise Level, dB
$L_{Amax,F}$	80
$L_{Aeq,1hr}$	55

26.3 Consultation

26.3.1 Consultation is a key part of the Development Consent Order (DCO) application process. Consultation regarding Onshore Noise and Vibration has been conducted through the Evidence Plan Process (EPP), Expert Technical Group (ETG) meetings and the EIA scoping process (ODOW, 2022). An overview of the Project consultation process is presented within Volume 1, Chapter 6: Consultation Process.

26.3.2 A summary of the key issues raised during consultation to date, specific to Onshore Noise and Vibration, is outlined in Table 26.5 below, together with how these issues have been considered in the production of this PEIR.

Table 26.5: Summary of consultation relating to Noise and Vibration

Date and Consultation Phase/Type	Comments from Consultee	Section where Comment Addressed
The Inspectorate Scoping Opinion, September 2022	The Inspectorate agrees that, given the array will be 54km from the shore and any onshore noise sensitive receptors, noise from construction and decommissioning of the offshore elements on onshore noise sensitive receptors can be scoped out of the assessment, as significant effects from noise over this distance is unlikely to occur.	Construction and decommissioning assessments of the array have not been included within this chapter.
The Inspectorate Scoping Opinion, September 2022	Given the uncertainty around the location and design of the OnSS (and Onshore Reactive Compensation Station (OnRCS), if required) and thus the potential sensitive receptors that could be affected, the Inspectorate does not agree that operational vibration can be scoped out of the assessment. The Environmental Statement (ES) should provide an assessment of effects associated with vibration for OnSS during operation, where likely significant effects could occur.	Section 26.7 provides further evidence to justify the reasons why an operational vibration assessment of the OnSS has not been undertaken. The proposed plant, at the distances involved, are considered incapable of causing significant vibration levels at the VSRs. Additionally, an OnRCS is no longer part of the proposed development.
The Inspectorate Scoping Opinion, September 2022	The Inspectorate agrees that once buried, there is unlikely to be any significant noise or vibration effects from the underground cabling. The Inspectorate agrees that this matter can be scoped out of the assessment.	Construction and operational assessments of the underground cable have not been included within this chapter.
The Inspectorate Scoping Opinion, September 2022	The Inspectorate agrees that, given the array will be 54km from the shore and therefore a considerable distance from relevant onshore noise sensitive receptors, offshore operational noise affecting onshore NSRs can be scoped out of the assessment as significant effects are unlikely to occur.	An operational assessment of the array has not been included within this chapter.
The Inspectorate Scoping Opinion, September 2022	The Inspectorate agrees that given the localised nature of any noise and vibration effects, significant transboundary effects are unlikely to occur and can be scoped out of the assessment.	Transboundary impacts have not been considered within this chapter.

Date and Consultation Phase/Type	Comments from Consultee	Section where Comment Addressed
The Inspectorate Scoping Opinion, September 2022	The ES should explain the relevant details of the Triton Knoll Electrical System that have been used to inform the baseline in addition to its location. This is to enable understanding of how the Triton Knoll Electrical System (TKES) is also comparable in terms of (for example) size, scale, and levels of noise generation.	The noise and vibration chapter has not referred to the Triton Knoll Electrical System to inform the baseline noise environment. It was anticipated in the ODOW Scoping Report that baseline noise data collected for the TKES would be utilised in the Project, however this became unnecessary.
The Inspectorate Scoping Opinion, September 2022	The scoping report identifies that designated sites such as Special Protection Areas (SPA) and Sites of Special Scientific Interest (SSSI) are of 'medium' sensitivity. The Inspectorate advises the that designated sites with noise-sensitive ecological receptors, such as bird species at coastal sites, should be identified as receptors of 'high' sensitivity.	Table 26.50 defines the sensitively of Ecological receptors as 'high' sensitivity.
The Inspectorate Scoping Opinion, September 2022	The construction noise and vibration assessment should also incorporate effects arising from the construction and use of construction site compounds, where significant effects are likely to occur.	Section 26.7 describes how the noise from site construction compounds have been considered.
The Inspectorate Scoping Opinion, September 2022	In addition to the potential for noise and vibration at railway and major road crossings, the ES should assess the noise and vibration impacts on sensitive receptors at watercourse crossings due to drilling, where likely significant effects could occur.	Section 26.5 states that trenchless techniques have been considered at watercourse crossings.
The Inspectorate Scoping Opinion, September 2022	The Scoping Report states that cumulative noise and vibration will be scoped into the assessment in the ES for construction and operational noise. The cumulative assessment should encompass the effects from all elements of the onshore works including those that are listed as options in Section 3.7 of the Scoping Report, where significant effects are likely to occur.	Section 26.8 outlines the cumulative assessment that has been undertaken as part of this chapter, based on Volume 2, Appendix 5.2: Onshore Cumulative Effects Assessment cumulatively with other identified projects. Some elements of the project, as listed in Section 3.7 of the

Date and Consultation Phase/Type	Comments from Consultee	Section where Comment Addressed
		Scoping Report, are not part of the project description considered in this PEIR.
ETG Meeting with LCC, 13 October 2022	LCC enquired whether East Lindsay and South Holland Environmental Health Teams had provided feedback on the proposed noise and vibration assessments.	The text in the row below described the feedback provided by the relevant LPAs.
Scoping with the relevant Local Planning Authorities (LPAs) via a scoping report, November 2022	No specific comments from Boston Borough Council (BBC), East Lindsay District Council (ELDC) or South Holland District Council (SHDC); however, the Environmental Health Officer (EHO) at SHDC requested that a period of attended (subjective) monitoring should be included to identify the predominant noise sources at each monitoring location.	Table 26.13, Table 26.27 and Table 26.44 outline the prevailing sandscape at each of the monitoring locations were unattended monitoring was undertaken and Table 26.19 details the soundscape at the attended monitoring locations.
ETG Meeting with LCC, 25 January 2023	Query raised on coverage with noise monitoring locations.	N/A

26.3.3 As identified in Volume 1, Chapter 4: Site Selection and Alternatives and Volume 1, Chapter 3: Project Description, the Project design envelope has been refined and will be refined further prior to DCO submission. This process is reliant on stakeholder consultation feedback.

26.3.4 Design amendments to the landfall, cable corridors and OnSS location are of relevance to this chapter:

- Landfall – identification of exact landfall location, construction methods, working times, trenchless drilling locations;
- Cable corridor – identified cable corridor, construction methods, working times, trenchless drilling locations; and
- OnSS – site and footprint locations, change in plant specifications and construction methodologies, change in height of any buildings, amendments on the materials utilised for the construction of any buildings.

26.4 Baseline Environment

Study Area

26.4.1 The existing baseline noise environment has been determined by a number of attended and unattended baseline sound surveys, the methodologies of which were reviewed by LCC, BBC, ELDC and SHDC in a response to a baseline survey scoping document, as outlined in Table 26.5.

26.4.2 For the purposes of this chapter, the study area for the baseline environment has been divided into the following separate Study areas, shown in the figure in brackets:

- The landfall (Figure 26.1);
- The onshore Lincolnshire Node (LN) ECC (Figure 26.3);
- The onshore Weston Marsh (WM) ECC (Figure 26.4);
- The LN OnSS option (Figure 26.7); and
- The WM North (WMN) (Figure 26.9) and WM South (WMS) (Figure 26.10) OnSS options.

26.4.3 Based on the above, the following is provided for each study area within this section:

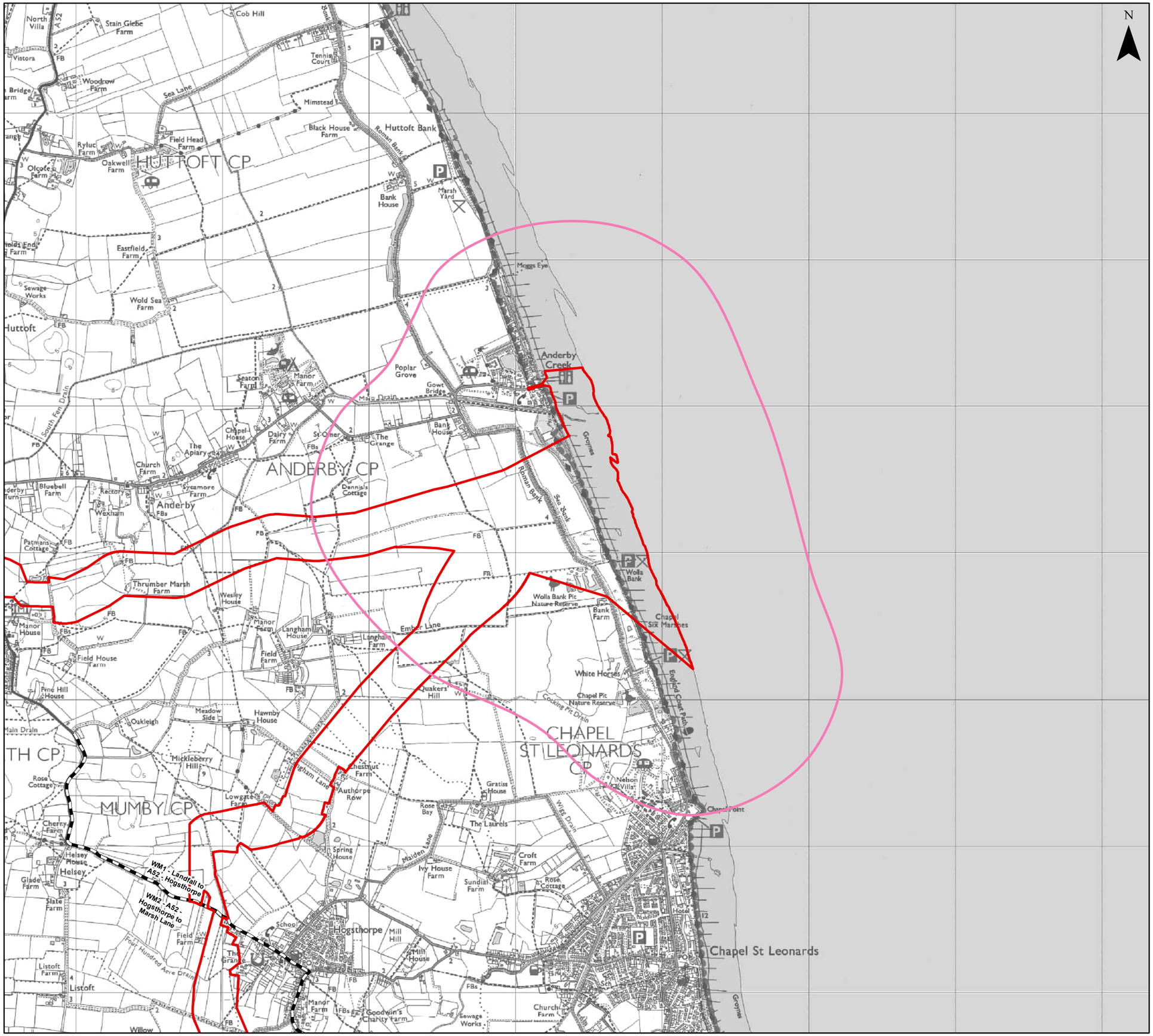
- A description of study area;
- A description of the baseline monitoring locations utilised;
- The monitoring equipment, and the indices measured;
- The measurement duration;
- A description of the weather conditions experienced during the baseline survey;
- The baseline sound survey results;
- A description of the baseline soundscape at each monitoring location; and
- An evaluation of the baseline sound levels.

The Landfall

Study Area Description

26.4.4 The landfall area is located to the south of Anderby Creek. The local environment in the vicinity of the landfall can be characterised as a rural/agricultural land environment, with a small number of individual dwellings located to the south. Anderby Creek comprises a small mixture of residential dwellings and holiday homes.

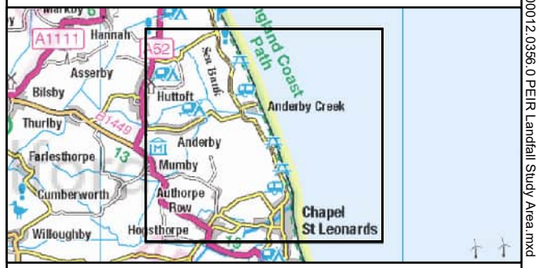
26.4.5 The landfall study area is shown on Figure 26.1 below.



Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Landfall Noise Study Area

Sources:



Coordinate System: British National Grid

0 0.5 1 km

Scale: 1:25,000

Preliminary Environmental Information Report

Landfall Study Area

Figure 26.1

OUTER DOWSING OFFSHORE WIND

Date: 18/04/2023
Produced By: JCS
Revision: 0.1

SLR

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Document Path: \\gisfs1\GIProjects\05356 - GoBe Consultants Ltd\00012 GTR4 Outer Dowsing\Tech\GIS\Dwgs\Wking\2023 01 PEIR\Noise and Vibration\05356_00012_0356_0 PEIR Landfall Study Area.mxd

Baseline Sound Monitoring Locations

26.4.6 Baseline sound levels were proposed to be measured at three locations which are considered representative of the receptors closest to the landfall area. The locations are described in Table 26.6 below and identified in Figure 26.2. The locations were selected based on their proximity to residential locations. Locations 1 and 3 may be considered representative of amenity users at the beach.

Table 26.6: Baseline Sound Monitoring Locations - Landfall

Location ID	Description	OS Grid Ref	
L001	South boundary of Anderby Creek park, representative of the mobile/holiday homes and the other associated residential properties.	555147	375947
L002	At a location representative of the residential properties on Romans Bank/Sea Road, to the west of the Landfall Area.	554736	375785
L003	At a location representative of the nearest coastal residential property to the south of landfall area on Anderby Road.	555549	374694

Legend

- Onshore PEIR Boundary
- Basline Noise Monitoring Location

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Landfall Baseline Sound Monitoring Locations

Figure 26.2

OUTER DOWSING OFFSHORE WIND

Date: 12/04/2023
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Revision: 0.1

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Monitoring Equipment and Indices Measured

26.4.7 The measurements were carried out in accordance with BS 7441-1:2003 as described below utilising the equipment listed in Table 26.7 below.

Table 26.7: Baseline Sound Monitoring Equipment - Landfall

Location ID	Equipment	Serial Number
L001	Cirrus CR:171B Class 1 Sound Level Meter	G079816
	Cirrus CR:515 Acoustic Calibrator	81268
L002	Cirrus CR:171B Class 1 Sound Level Meter	G400059
	Cirrus CR:515 Acoustic Calibrator	99960
L003	Cirrus CR:171B Class 1 Sound Level Meter	G303390
	Cirrus CR:515 Acoustic Calibrator	97661

26.4.8 The sound level meter was calibrated before and after each measurement, and no significant drift was observed. The calibration chain is traceable via the United Kingdom Accreditation Service (UKAS) to National Standards held at the National Physical Laboratory.

26.4.9 The calibration certificates for all the noise monitoring equipment utilised are shown in Volume 2, Appendix 26.1: Sound Level Meter Calibration Certificates.

26.4.10 At the monitoring location, the microphone was placed 1.5m above the ground in free-field conditions, i.e., at least 3.5m from the nearest vertical, reflecting surface with the following noise level indices being recorded. This is in accordance with the measurement procedure outlined in BS4142.

- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period time ($_T$);
- L_{A90}: The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise;
- L_{A10}: The A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe road traffic noise; and
- L_{Amax}: The maximum A-weighted noise level during the measurement period.

Measurement Duration

26.4.11 At Location L001, the prevailing sound levels were measured continuously between 8 and 13 November 2022 with noise levels being logged every 15-minutes. This duration of measured ensured that a representative baseline noise environment would be determined.

26.4.12 At locations L001 and L002, the prevailing sound levels were measured continuously between 3 and 9 February 2023 with noise levels being logged every 15-minutes.

Weather Conditions

26.4.13 The prevailing weather conditions were recorded using a Larson Davis weather station and a summary of the results are shown in Table 26.8; the table also indicates which weather conditions were considered suitable – this is based on the guidance that noise monitoring should not be undertaken if wind speeds are above 5.0m/s or during periods of prolonged precipitation.

26.4.14 The weather station was installed at Location L001 as shown on Figure 26.2.

Table 26.8: Summary of weather conditions – Landfall 8 to 13 November 2022

Date	Average Temperature, °C	Precipitation, mm	Average Wind Speed, m/s	Predominant Wind Direction	Weather Conditions Suitable
08/11/2022	11	0.76	4.5	E	Yes
09/11/2022	10	1	3.3	E	No
10/11/2022	12	0	5.1	E	No
11/11/2022	14	0	4.6	E	Yes
12/11/2022	11	0	1.4	ENE	Yes
13/11/2022	11	0.5	0.8	NE	Yes

26.4.15 A summary of prevailing weather conditions between 3 and 9 February 2023 are shown in Table 26.9; the table also indicates which weather conditions were considered suitable – this is based on the fact that noise monitoring should not be undertaken if wind speeds are above 5.0m/s or during periods of prolonged precipitation.

26.4.16 The weather station was installed at Location L002 as shown on Figure 26.2.

Table 26.9: Summary of weather conditions – Landfall 3 to 9 February 2023

Date	Average Temperature, °C	Precipitation, mm	Average Wind Speed, m/s	Predominant Wind Direction	Weather Conditions Suitable
03/02/2023	11	0	0.8	W	Yes
04/02/2023	8	0	1.2	W	Yes
05/02/2023	3	0	1.7	NNW	Yes
06/02/2023	1	0	1.4	WSW	Yes
07/02/2023	2	0	0.4	WSW	Yes
08/02/2023	2	0	2.3	SW	Yes
09/02/2023	3	0	1.8	WSW	Yes

26.4.17 Table 26.8 and Table 26.9 provide a summary of the measured prevailing weather conditions; however, the results have undergone a more detailed analysis where each 15-minute monitoring period was considered and where periods of inclement weather have been identified. The associated data set has been removed from the survey results shown below.

Survey Results

26.4.18 A summary of the survey results is included in Table 26.10 and are shown in full in Volume 2, Appendix 26.2: Full baseline survey results.

26.4.19 It should be noted that the survey results have been divided into daytime (07:00 to 19:00), evening (19:00 to 23:00) and night-time (23:00 to 07:00) periods to be consistent with BS 5228-1:2009+A1:2014.

26.4.20 The $L_{Aeq,T}$ level is the average ambient noise level during each time period, the L_{A10} and L_{A90} levels shown are the median levels.

Table 26.10: Summary of baseline survey results – location L001

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
08/11/22	Daytime	46.4	39.4	49.4	62.5
	Evening	46.2	39.1	49.6	64.8
	Night-time	37.3	32.3	39.5	60.3
09/11/22	Daytime	45.0	33.5	44.3	78.8
	Evening	36.0	28.5	37.5	65.2
	Night-time	39.3	31.5	41.8	60.4
10/11/22	Daytime	45.2	36.3	47.5	66.3
	Evening	39.8	34.1	42.7	57.0
	Night-time	44.5	36.0	48.3	64.2
11/11/22	Daytime	44.2	35.3	45.0	74.8
	Evening	37.9	32.2	40.2	56.6
	Night-time	33.4	30.5	34.1	53.1
12/11/22 (Saturday)	Daytime	39.8	33.4	40.9	71.3
	Evening	36.8	33.5	37.6	66.1
	Night-time	34.3	32.5	35.1	66.7
13/11/22	Daytime	38.2	31.4	37.9	71.8
	Evening	35.8	33.5	36.5	65.2
	Night-time	33.5	31.8	34.7	50.0

Table 26.11: Summary of baseline survey results – location L002

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
03/02/2023	Day	46.8	34.8	49.4	71.1
	Evening	42.9	29.6	39.8	76.4
	Night-time	34.9	30.4	33.9	62.9
04/02/2023 (Saturday)	Day	45.7	30.4	47.7	72.4
	Evening	39.6	27.9	38.4	62.5
	Night-time	41.7	37.3	40.4	78.9
05/02/2023	Day	47.8	37.2	50.0	79.1
	Evening	44.5	39.2	45.7	68.7
	Night-time	40.0	37.3	40.7	63.3
	Day	46.6	32.2	47.9	76.9

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
06/02/2023	Evening	40.9	32.4	40.4	67.5
	Night-time	37.6	28.9	33.9	71.2
07/02/2023	Day	48.3	30.9	48.8	75.9
	Evening	38.4	24.1	35.9	62.7
	Night-time	36.6	27.9	35.8	69.1
08/02/2023	Day	46.1	35.2	48.2	73.8
	Evening	45.3	30.6	37.2	77.6
	Night-time	38.1	29.3	38.2	67.9
09/02/2023	Day	49.3	30.6	49.0	78.9
	Evening	-	-	-	-
	Night-time	-	-	-	-

Table 26.12: Summary of baseline survey results – location L003

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
03/02/2023	Day	44.0	36.2	47.2	66.5
	Evening	39.3	35.7	41.2	59.1
	Night-time	41.3	37.8	40.8	53.0
04/02/2023 (Saturday)	Day	40.3	31.7	41.2	70.8
	Evening	37.4	30.5	36.9	68.4
	Night-time	43.3	41.6	44.5	61.2
05/02/2023	Day	55.3	42.1	48.2	84.6
	Evening	49.2	46.3	51.2	62.4
	Night-time	37.1	34.9	37.9	54.9
06/02/2023	Day	42.8	33.3	42.7	81.2
	Evening	36.7	31.4	36.1	61.0
	Night-time	36.4	31.5	35.8	59.6
07/02/2023	Day	47.2	31.2	44.0	79.5
	Evening	33.8	26.4	33.1	55.2
	Night-time	32.9	28.3	30.8	66.7
08/02/2023	Day	42.5	34.9	43.7	73.6
	Evening	41.9	32.6	39.2	73.7
	Night-time	36.7	31.5	38.0	63.1
09/02/2023	Day	50.1	33.1	44.2	84.4
	Evening	-	-	-	-
	Night-time	-	-	-	-

Soundscape

26.4.21 The general soundscape at the measurement locations was recorded during equipment installation and collection and is shown in Table 26.13.

Table 26.13: General soundscape

Location	Soundscape
L001	Trees rustling in wind, planes and jets overhead, sound of cows in the field. Occasional car travelling down Roman Bank Road, approximately 30-40mph.
L002	Trees rustling in wind dominant. Occasional car travelling down Roman Bank Road approx. 30mph. Intermittent sound of farmyard machinery next door. Bird song. Planes overhead.
L003	Trees and grass rustling in wind. Birdsong in distance. Gunshots in distance. Occasional car audible driving along Anderby Road.

Evaluation of Landfall Baseline Sound Levels

26.4.22 The noise-sensitive receptors situated close to the landfall area would potentially be impacted by noise during construction operations.

26.4.23 It has been confirmed that the construction of the onshore works and construction-related traffic movements to or from the site of the relevant work shall only take place between 0700 hours and 1900 hours Monday to Saturday with no activity on Sundays or bank holidays. construction hours

26.4.24 Receptors will therefore potentially be impacted during the daytime and weekend periods (after 13:00 on a Saturday) from construction operations, including trenchless drilling techniques. Therefore, it is necessary to evaluate the measured baseline levels in conjunction with the ABC Method contained in BS 5228-1 to calculate the construction noise threshold limits.

26.4.25 With reference to Table 26.10, Table 26.11, and Table 26.12 above, the lowest measured average ambient level at each location during the daytime and at a weekend, and the calculated threshold limits are shown in Table 26.14.

26.4.26 It should be noted that the measured ambient sound levels have been rounded to the nearest decibel.

Table 26.14: Calculated construction noise threshold limits, dB

Location	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$	Calculated Threshold Value $L_{Aeq,T}$
Noise sensitive receptors representative of Location L001	Daytime	38	65
	Weekend	40	55
Noise sensitive receptors representative of Location L002	Daytime	46	65
	Weekend	46	55
Noise sensitive receptors representative of Location L003	Daytime	40	65
	Weekend	40	55
Note: Weekend period defined as between 13:00 and 19:00 on a Saturday			

The Onshore Lincolnshire Node and Weston Marsh ECC

Study Area Description

LN ECC Study Area

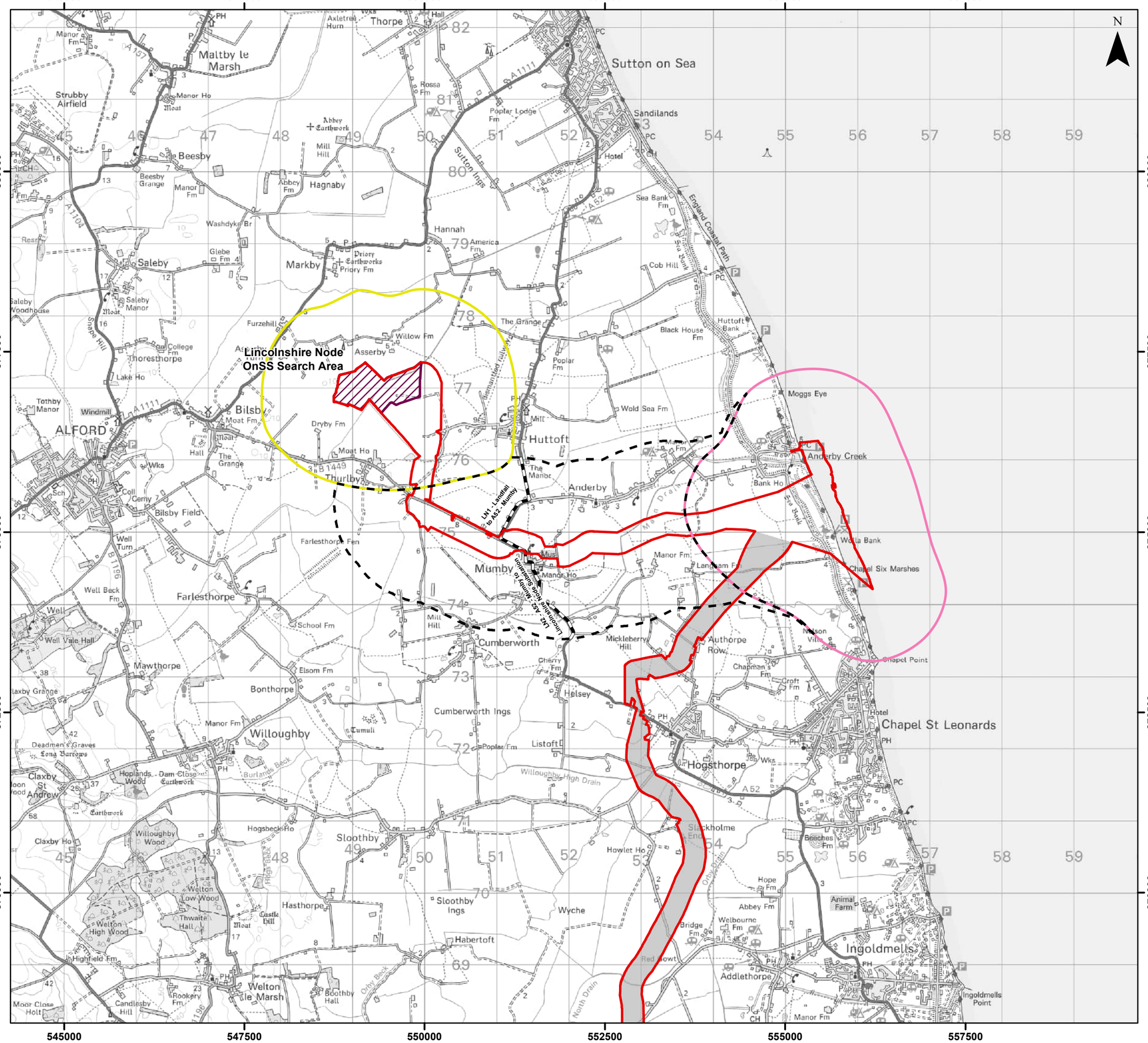
26.4.27 The LN ECC extends in a westerly direction from the Landfall area at Anderby Creek, to the Lincolnshire Node OnSS located to the east of Alford, as shown on Figure 26.3.

26.4.28 The local environment in the vicinity of the study area can be characterised as rural, and includes the small village of Mumby, together with residential dwellings located individually or in hamlets along the ECC.

26.4.29 The LN ECC will have a length of approximately 7.7km and will require the use of trenchless crossing techniques. The noise and vibration study area includes the NSRs located closest to the ECC, where noise from construction operations could have a potential impact.

26.4.30 The LN ECC has been divided into the following two segments:

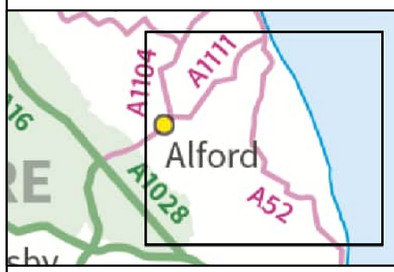
- LN1 - Landfall to A52 – Mumby; and
- LN2 - A52 – Mumby to Lincolnshire Node.



Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Landfall Noise Study Area
- Lincolnshire Node OnSS Search Area Noise Study Area
- Lincolnshire Node ECC Study Area

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Lincolnshire Node ECC Study Area

Figure 26.3

OUTER DOWSING OFFSHORE WIND

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WM ECC Study Area

26.4.31 The Weston Marsh ECC will have a length of approximately 60km, extending from Anderby Creek in the north, to Weston Marsh in the south, as shown on Figure 26.4.

26.4.32 Due to the large total length of the WM ECC, it has been divided up into the following segments:

- WM1 - Landfall to A52 – Hogsthorpe;
- WM2 - A52 – Hogsthorpe to Marsh Lane;
- WM3 - Marsh Lane to A158 – Skegness Road;
- WM4 - A158 – Skegness Road to Low Road;
- WM5 - Low Road to Steeping River;
- WM6 - Steeping River to Ivy House Farm / Marsh Yard;
- WM7 - Ivy House Farm / Marsh Yard to Staples Farm;
- WM8 - Staples Farm to Crowhall Lane;
- WM9 - Crowhall Lane to Church End Lane;
- WM10 - Church End Lane to The Haven;
- WM11 - The Haven to Marsh Road;
- WM12 - Marsh Road to Fosdyke Bridge;
- WM13 - Fosdyke Bridge to Weston Marsh Substation North; and
    - WM14 - Fosdyke Bridge to Weston Marsh Substation South.
    - A1 - Low Road to Steeping River;
    - A2 - Steeping River to Fodder Dike Bank/Fen Bank;
    - A3 - Fodder Dike Bank/Fen Bank to Broadgate;
    - A4 - Broadgate to Ings Drove; and
- A5 - Ings Drove to Church End Lane

26.4.33 The local environment in the vicinity of the WM ECC can be characterised as rural and agricultural, avoiding the towns of Skegness and Boston.

26.4.34 The NSR which are located within the study area primarily comprise of individual dwellings, and a number of small hamlets/villages, where noise from construction operations could have a potential impact.

547500 550000 552500 555000 557500 560000

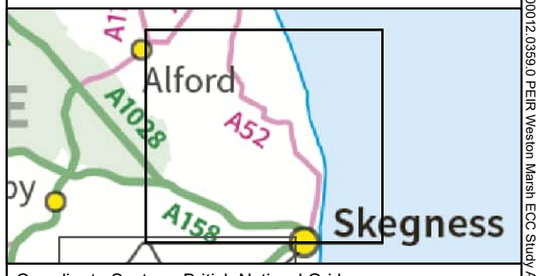
375000 372500 370000 367500 365000

N

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Landfall Noise Study Area
- Weston Marsh ECC Study Area

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh ECC Study Area

Figure 26.4.1

OUTER DOWSING OFFSHORE WIND

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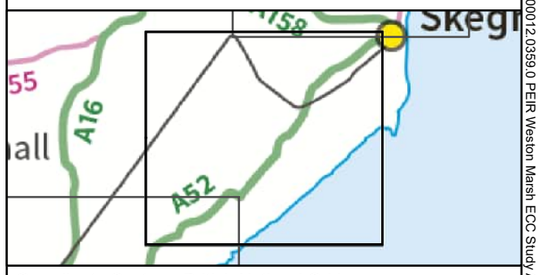
542500 545000 547500 550000 552500 555000

362500 360000 357500 355000 352500 350000

WM4 - A158 Skegness Road to Low Road
A1 - Low Road to Steeping River
WM5 - Low Road to Steeping River
WM6 - Steeping River to Ivy House Farm/Marsh Yard
WM7 - Ivy House Farm/Marsh Yard to Staples Farm
A2 - Steeping River to Fodder Dike Bank/Fen Bank
A3 - Fodder Dike Bank/Fen Bank to Broadgate
A4 - Broadgate to Ings Drove
WM8 - Staples Farm to Crowhall Lane

Toynton St Peter
Halton Fenside
Toynton Ings
Little Steeping
The Ings
Steeping River
Firsby
Irby in the Marsh
Croft End Solar Farm
The Hollies
The Hundreds
Middlemarsh Fm
Industrial Estate
The Woodlands
Hotel
Marsh Fm
Croft
Croft Marsh
Coddingtons Yard
Hare Hill Fm
Halton Holegate Fen
Black Horse Br
Thorpe Dales
Thorpe Fendykes
Thorpe Culvert
Thorpe St Peter
Thorpe Fen
Kent's Br
Royalty Fm East
Royalty Fm
Bellwater Fm
Bell Water Drain
Newbridge Fm
Wainfleet All Saints
Wainfleet Common
Wainfleet Bank
New England
Wainfleet Clough
Clough House Fm
Haven or Steeping River
Cranberry Fm
White Cross Clough
The Deeps
Bethlem Fm
St Catherine's Fm
Wainfleet St Mary Fen
Low Grounds
Merrifield's Fm
Marsh Farm East
Wainfleet St Mary
Pool Decoy
Eastville Fm
Eastville
Blue Br
Fodder Dike
Pepperthorpe Hall
Wainfleet Tofts
Toft House Fm
Pinchbecks Yard
Outmarsh Yard
Orchard Ho
Risdale Fm
Blacks Fm
Slated House Fm
Dickon Hills
Friskney Fen
Friskney Eaudyke
East Fen
Small End
Manor Fm
Friskney
Welsh's Fm
Wrangle Bank Fm
Abbey Hills
Claxy Ho
Fold Hill
Old Fm
Wrangle Common
Friskney Low Ground
Friskney Tofts
Home Fm
Wainfleet Sand
DANGER AREA
Mud & Sand
Danger Area
Rinders Fm
Gask's Fm
Wrangle Bank
Greenfield Fm
Whitehouse Fm
Greens Marsh
Sigtoft Fm
Wrangle Low Ground
Common Fm
King's Hill
Motte & Bailey
Manton Fm
The Grange
Wrangle Lowgate
Judegate Fm
East Toft Fm
Toft Ho
Leake Fold Hill
New Fm
Wrangle
Joy Hill
Wrangle Hall
Hall End
Toft Fm
Leake
Friskney Flats
The Horseshoe
Mud & Sand

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh ECC Study Area

Figure 26.4.2

OUTER DOWSING OFFSHORE WIND

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Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh ECC Study Area

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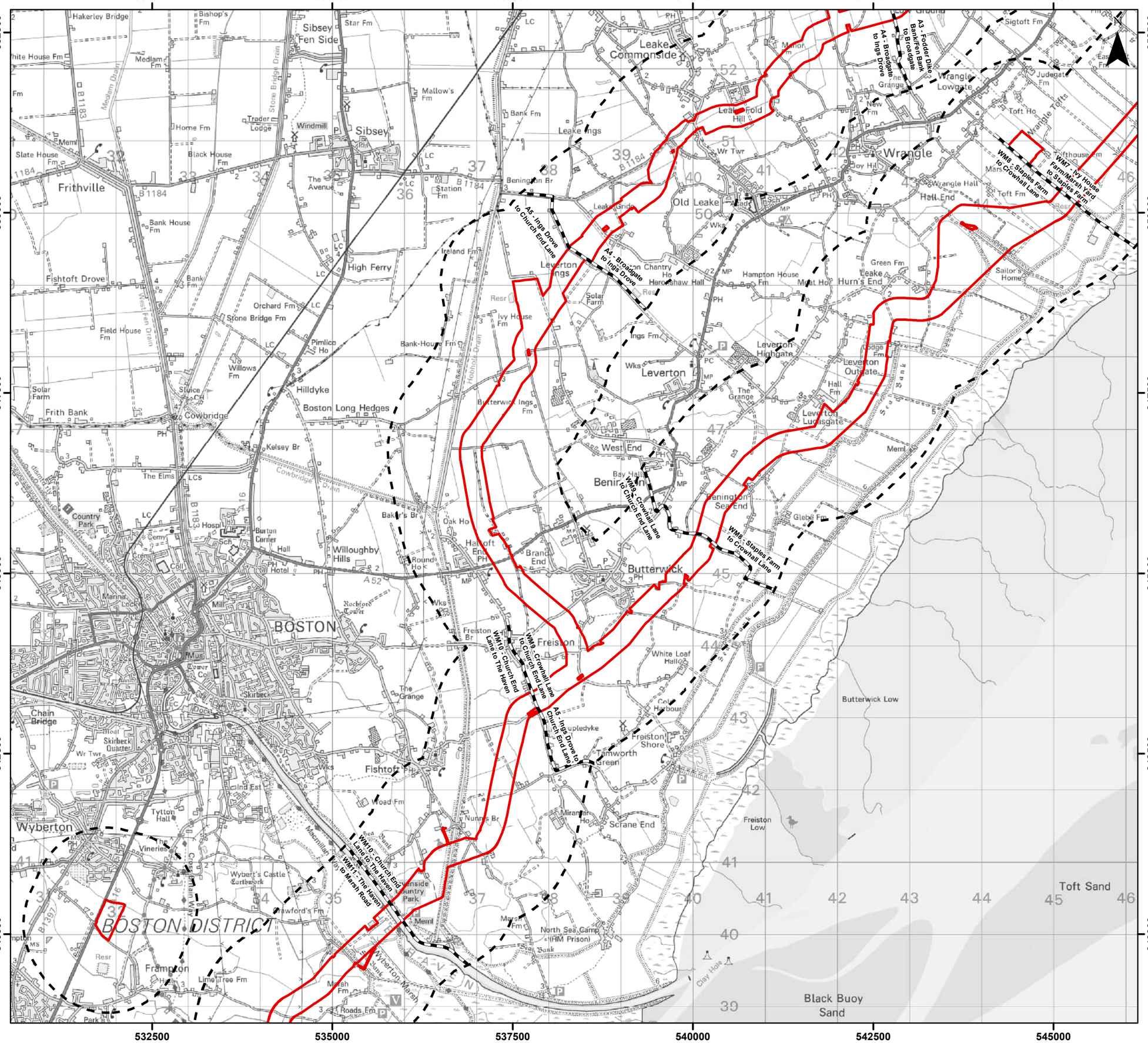

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh ECC Study Area

Sources:

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

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Weston Marsh ECC Study Area

Figure 26.4.3

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525000 527500 530000 532500 535000 537500

337500 335000 332500 330000 327500

N

Weston Marsh North OnSS Search Area

Weston Marsh South OnSS Search Area

WM11 - The Haven to Marsh Road

WM12 - Marsh Road to Fosdyke Bridge

WM13 - Fosdyke to Weston Marsh North Substation Search Area

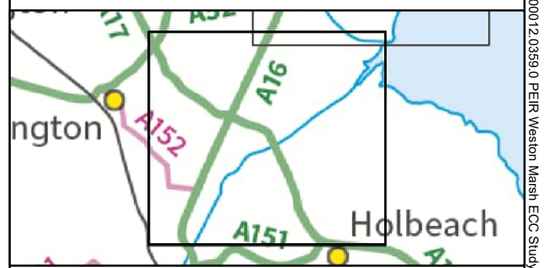
WM14 - Fosdyke Bridge to Weston Marsh South Substation Search Area

WM14 - Fosdyke to Weston Marsh Substation South Search Area

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh North OnSS Search Area
- Weston Marsh South OnSS Search Area
- Weston Marsh North OnSS Search Area Noise Study Area
- Weston Marsh South OnSS Search Area Noise Study Area
- Weston Marsh ECC Study Area

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh ECC Study Area

Figure 26.4.4

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Baseline Sound Monitoring Locations

26.4.35 Baseline sound levels were proposed to be measured at 23 locations along the ECC of the LN and WM onshore ECCs. These locations are described in Table 26.15 below and identified on Figure 26.5 to Figure 26.6.

Table 26.15: Onshore LN and WM ECC Monitoring Locations

Location ID	Description	OS Grid Ref	
LN_ECC001	At a location representative of one of the residential properties located to the north of the PEIR boundary within the A52 to Mumby section of the LN ECC.	551797	374828
LN_ECC002	At a location representative of one of the residential properties located to the west of the PEIR boundary within the A52 to Mumby section of the LN ECC.	549713	375486
WM_ECC001	At a location representative of the farm located to the east of the PEIR boundary within the A52 Hogsthorpe to Marsh Lane section of the WM ECC.	553157	372164
WM_ECC002	At a location representative of the residential properties located to the east of the PEIR boundary within the A52 Hogsthorpe to Marsh Lane section of the WM ECC.	553300	371802
WM_ECC003	At a location representative of the residential properties located to the east of the PEIR boundary within the Marsh Lane to A158 Skegness Road section of the WM ECC.	552971	365945
WM_ECC004	At a location representative of the residential property located to the west of the PEIR boundary within the A158 Skegness Road to Steeping River section of the ECC.	551875	360837
WM_ECC005	At a location representative of the residential property located to the west of the PEIR boundary within the A158 Skegness Road to Steeping River section of the ECC.	551995	360043
WM_ECC006	At a location representative of the residential property located to the north of the PEIR boundary within the Staples Farm to Crowhall Lane section of the ECC.	544145	350314
WM_ECC007	At a location representative of the residential property located to the west of the PEIR boundary within the Staples Farm to Crowhall Lane section of the ECC.	543296	349183
WM_ECC008	At a location representative of the residential property located on the PEIR boundary within the Crowhall Lane to Church End Lane section of the ECC.	539626	344889
WM_ECC009	At a location representative of the residential property located on the PEIR boundary within the Crowhall Lane to Church End Lane section of the ECC.	539146	344445
WM_ECC010	At a location representative of the residential property located to the north of the PEIR boundary within the Church End Lane to the Haven section of the ECC	536913	341402

Location ID	Description	OS Grid Ref	
WM_ECC011	At a location representative of the residential property located on the PEIR boundary within the Haven to Marsh Road section of the ECC.	535541	340093
WM_ECC012	At a location representative of a residential property located to the south of the PEIR boundary within the Low Road to Steeping River section of the ECC.	550350	360547
WM_ECC013	At a location representative of a residential property located to the south of the PEIR boundary within the Low Road to Steeping River section of the ECC.	549343	360133
WM_ECC014	At a location representative of a residential property located to the south of the PEIR boundary within the Steeping River to Fodder Dike Bank section of the ECC.	546868	357252
WM_ECC015	At a location representative of a residential property located to the south of the PEIR boundary within the Fodder Dike Bank to Broadgate section of the ECC.	545981	356047
WM_ECC016	At a location representative of a residential property located to the south of the PEIR boundary on Broadgate along the ECC.	542720	352972
WM_ECC017	At a location representative of a residential property located to the south of the PEIR boundary within the Broadgate to Ings Drove section of the ECC.	541109	351549
WM_ECC018	At a location representative of a residential property located to the south of the PEIR boundary within the Broadgate to Ings Drove section of the ECC.	539813	350870
WM_ECC019	At a location representative of a residential property located to the south-east of the PEIR boundary within the Ings Drove to Church End Lane section of the ECC.	538045	348502
WM_ECC020	At a location representative of a residential property located to the east of the PEIR boundary within the Ings Drove to Church End Lane section of the ECC.	537595	345334
WM_ECC021	At a location representative of a residential property located to the west of the PEIR boundary within the Ings Drove to Church End Lane section of the ECC.	538223	343923

551000 552000 553000 554000

376000 375000 374000

N

LN_ECC001

LN2 - A52 - Mumby to Lincolnshire Node Substation

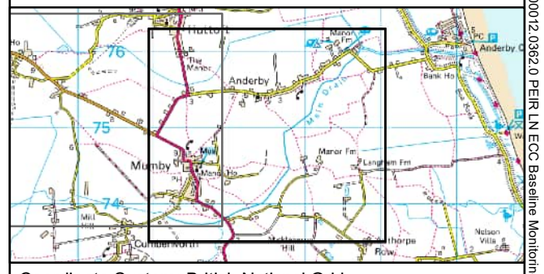
LN1 - Landbell to A52 - Mumby

551000 552000 553000 554000

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

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Lincolnshire Node ECC Baseline Monitoring Locations

Figure 26.5.1

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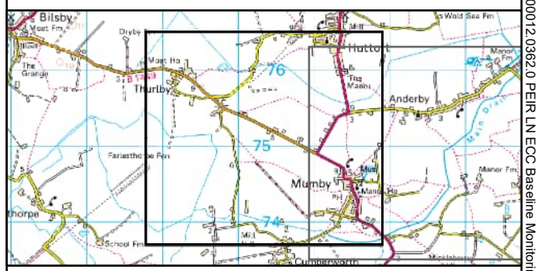
549000
550000
551000
376000
375000
374000
N
LN_ECC002
LN1_Landfall to A52_Mumby
LN2_A52_Mumby to Lincolnshire Node Substation
LN_ECC001

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



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0 0.25 0.5 km

Scale: 1:10,000

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Lincolnshire Node ECC Baseline Monitoring Locations

Figure 26.5.2

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552000
553000
554000
373000
372000
371000
N
WM_ECC001
WM_ECC002
WM1 - Landfall to A52 - Hogsthorpe
WM2 - A52 - Hogsthorpe to Marsh Lane
A52
HIGH STREET
SEA LANE
MAIDEN LANE
LANGHAM ROAD
THAMES STREET
JUBILEE CLOSE
THAMES CLOSE
CARSON CLOSE
RAVENS LANE
MEADOW VIEW
GOODWIN DRIVE
MILL LANE
SOUTH END
ST MARKS CLOSE
HERSEY LANE
LISTOFT LANE
SLOOTHBY HIGH LANE
SOUTH INGS LANE
LOW LANE (TRACK)
Track
Path
Path (um)
GP

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via South of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.1

OUTER DOWSING OFFSHORE WIND

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552000
553000
554000
367000
366000
365000
N
WM_ECC003
WM3 - Marsh Lane to A158 - Skegness Road
WM4 - A158 Skegness Road to Low Road
A158
MARSH
Track
ROAD
GP
HIDES
LANE
CHALK
THE COMMON
YOUNGER'S
YOUNGER'S LANE
HUBBLEY ASH
MILL Hill
Ashington End
Orby Marsh
Burgh Marsh
Burgh le Marsh

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via South of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.2

OUTER DOWSING OFFSHORE WIND

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552000 553000 554000

362000 361000 360000

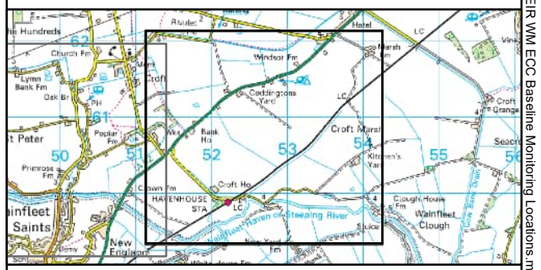
PINCHBECK LANE
Path (um)
Track
CROFT BANK
A52
Layby
WM_ECC004
Weighbridge
GP
Track
CROFT
HAVEN
LANE
WM_ECC005
WM5 - Low Road to Steeping River
WM6 - Steeping River to Ivy House Farm/Marsh Yard
WM4 - A158 Skegness Road to Low Road
A1 - Low Road to Steeping River
ROAD

N

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via South of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.3

OUTER DOWSING OFFSHORE WIND

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543000 544000 545000

350000

349000

WM_ECC006

WM_ECC007

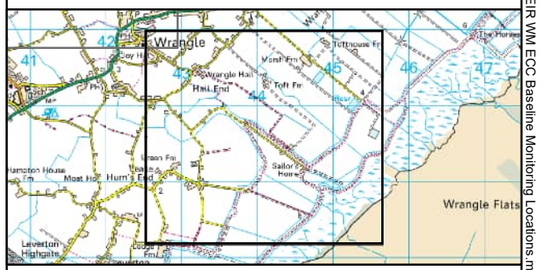
GREEN GATE
GIPSY LANE
MILL LANE
CHURCH LANE
HALL LANE
HALL END ROAD
SEA LANE
OLDFIELD LANE
Track
Path (um)
Ivy Ay
WM1 - Ivy House Farm/Marsh Yard to Staples Farm
WM2 - Staples Farm to Crowhall Lane

N

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via South of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.4

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Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via South of the A52)
- Basline Noise Monitoring Location (Weston Marsh, via North of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.5

OUTER DOWSING OFFSHORE WIND

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535000 536000 537000

342000 341000 340000

N

WM_ECC010

WM_ECC011

WM10 - Church End Lane to The Haven

WM11 - The Haven to Marsh Road

SCALF ROAD

PINTOLD LANE

SOUTHFIELD LANE

CUT END ROAD

WOLD LANE

ROOSDYKE LANE

Track

Path (um)

GP

Post

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via South of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.6

OUTER DOWSING OFFSHORE WIND

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549000 550000 551000

361000

360000

N

WM_ECC012

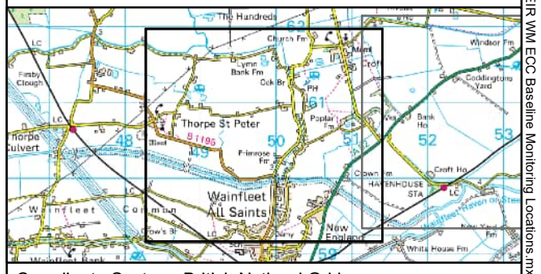
WM_ECC013

LYMN BANK
Track
WASHDIKE LANE
GP
FINGHEECK LANE
SYCAMORE CL
Path (um)
CROFT LANE
GUTHERAM DROVE (TRACK)
WEDLAND
WEDLAND LANE
SKILLSBY ROAD
GREEN LANE
WAINFLEET ROAD
Weighbridge
CHURCH
CROFT
ROAD
B1195
A52
WAINGROFT CLOSE
LIAMS WAY
MILL CLOSE
CROFT CL
BATEMANS CT
CROFT BANK
Path
BREWSTER LANE
COLLISON GATE
HILL FIELD
DRIVE
MATT PITS LANE
WMS - Low Road to Steeping River
WMS - Steeping River to Ivy House Farm/Marsh Yard

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via North of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.7

OUTER DOWSING OFFSHORE WIND

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545000 546000 547000

357000 356000

N

WM_ECC014

WM_ECC015

FEN BANK
GP
Track
A2 - Steeping River to Fodder Dike Bank/Fen Bank
A3 - Fodder Dike Bank/Fen Bank to Broadgate
BURGH ROAD
SCALD GATE
ARMSTRONGS LANE
GRAMBERRY LANE
BURGH ROAD
FAU DIKE ROAD
LOW ROAD
SICKLING LANE
Path (um)
MANTLE GREEN
CHAPEL LANE
FEN DIKE ROAD
SMALL END ROAD
MILL HILL
CHURCH LANE
CHELES CLOSE
BOWMAN AVENUE
THE AVENUE
SHUTEY LANE
FIELD LANE
Path

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via North of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.8

OUTER DOWSING OFFSHORE WIND

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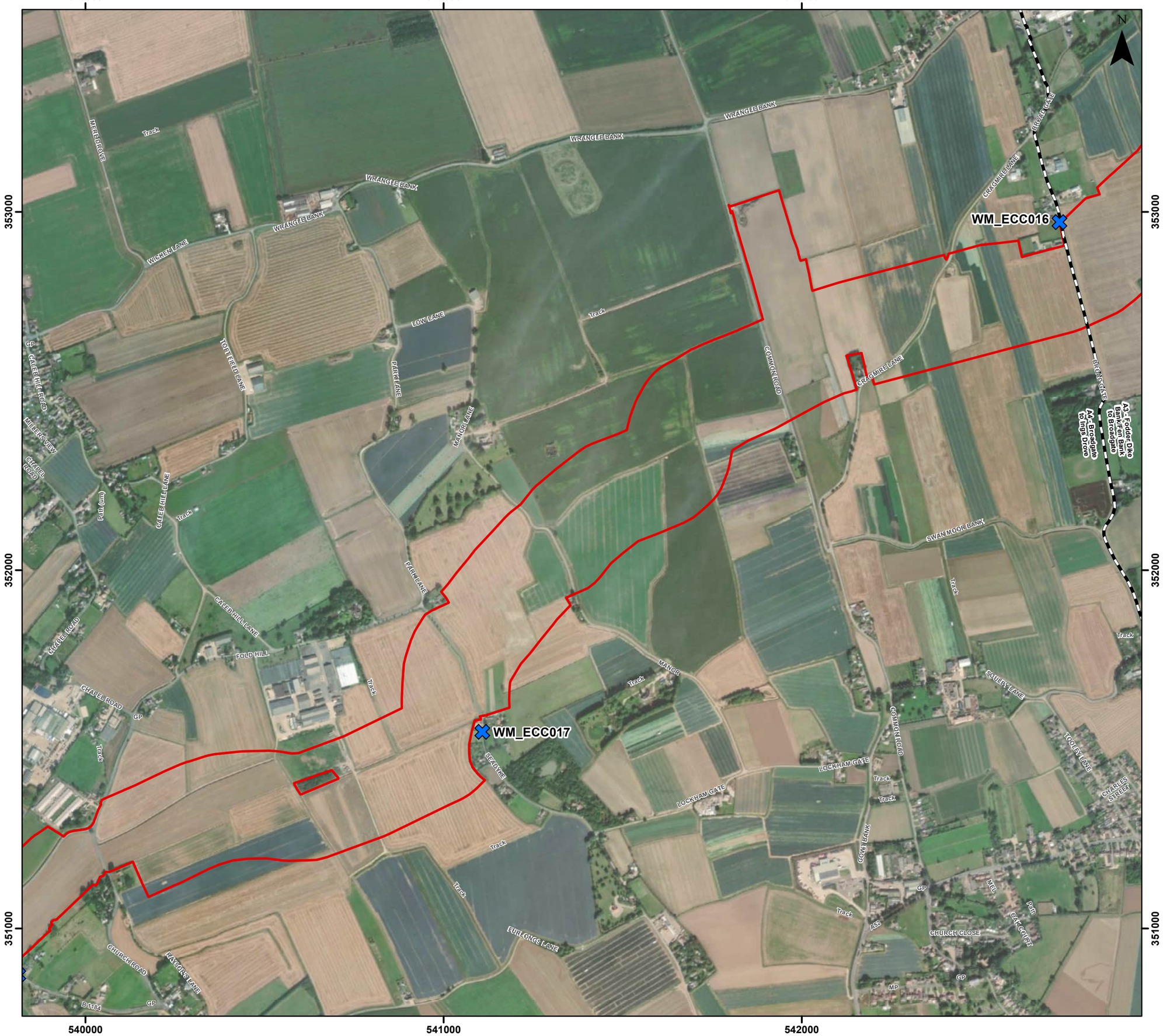

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via North of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.9

OUTER DOWSING OFFSHORE WIND

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538000 539000 540000

351000 350000 349000

N

WM_ECC018

WM_ECC019

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Basline Noise Monitoring Location (Weston Marsh, via North of the A52)

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh ECC Baseline Monitoring Locations

Figure 26.6.10

OUTER DOWSING OFFSHORE WIND

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Monitoring Equipment and Indices Measured

26.4.36 The measurements were carried out utilising the equipment listed in Table 26.16 below.

Table 26.16: Noise Monitoring Equipment – LN and WM ECC

Location ID	Equipment	Serial Number
LN_ECC001	Cirrus CR:171B Class 1 Sound Level Meter	G300561
	Cirrus CR:515 Acoustic Calibrator	87922
LN_ECC002	Cirrus CR:171B Class 1 Sound Level Meter	G300561
	Cirrus CR:515 Acoustic Calibrator	87922
WM_ECC001	Cirrus CR:171B Class 1 Sound Level Meter	G300561
	Cirrus CR:515 Acoustic Calibrator	87922
WM_ECC002	Cirrus CR:171B Class 1 Sound Level Meter	G301839
	Cirrus CR:515 Acoustic Calibrator	93674
WM_ECC003	Cirrus CR:171B Class 1 Sound Level Meter	G300561
	Cirrus CR:515 Acoustic Calibrator	87922
WM_ECC004	Cirrus CR:171B Class 1 Sound Level Meter	G301839
	Cirrus CR:515 Acoustic Calibrator	93674
WM_ECC005	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC006	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC007	Cirrus CR:171B Class 1 Sound Level Meter	G301839
	Cirrus CR:515 Acoustic Calibrator	93674
WM_ECC008	Cirrus CR:171B Class 1 Sound Level Meter	G301839
	Cirrus CR:515 Acoustic Calibrator	93674
WM_ECC009	Cirrus CR:171B Class 1 Sound Level Meter	G301839
	Cirrus CR:515 Acoustic Calibrator	93674
WM_ECC010	Cirrus CR:171B Class 1 Sound Level Meter	G301839
	Cirrus CR:515 Acoustic Calibrator	93674
WM_ECC011	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC012	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC013	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC014	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC015	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC016	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC017	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806

Location ID	Equipment	Serial Number
WM_ECC018	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC019	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC020	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WM_ECC021	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806

26.4.37 The sound level meters were calibrated before and after each measurement, and no significant drift was observed. The calibration chain is traceable via the UKAS to National Standards held at the National Physical Laboratory.

26.4.38 The calibration certificates for all the noise monitoring equipment utilised are shown in Volume 2, Appendix 26.1: Sound Level Meter Calibration Certificates.

26.4.39 At the monitoring locations, the microphone was placed 1.5m above the ground in free-field conditions, i.e., at least 3.5m from the nearest vertical, reflecting surface with the following noise level indices being recorded.

- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period;
- L_{A90}: The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise;
- L_{A10}: The A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe road traffic noise; and
- L_{Amax}: The maximum A-weighted noise level during the measurement period.

Measurement Duration

26.4.40 The baseline sound survey at all the locations associated with the onshore LN and WM ECC consisted of a 1-hour fully attended measurement during a midweek daytime period, with noise levels being logged every 1-minute. Measurements were only taken during the daytime as it is understood that normal construction works associated with the ECC would only take place during the hours between 07:00 and 19:00 Monday to Saturday.

Weather Conditions

26.4.41 The prevailing weather conditions were noted by the qualified acoustician[1] during the attended surveys and are shown in Table 26.17 below; the table also indicates which weather conditions were considered suitable which is based on guidance that noise monitoring should not be undertaken if wind speeds are above 5.0m/s or during periods of prolonged precipitation.

[1] The acoustician holds the I.o.A diploma in acoustics and noise control and has over two years noise surveying experience.

Table 26.17: Summary of weather conditions – LN and WM ECC.

Date	Temperature °C	Precipitation Y/N	Maximum Wind Speed, m/s	Predominant Wind Direction	Weather Conditions Considered Suitable
07/11/22	11	No	4.0	NE	Yes
22/11/22	9	No	2.0	NW	Yes
17/01/23	1	No	1.3	NW	Yes
18/01/23	2	No	3.1	NW	Yes
28/02/23	8	No	3.0	SW	Yes
01/03/23	7	No	4.0	NE	Yes
02/03/23	7	No	2.0	NE	Yes
03/03/23	6	No	4.0	NE	Yes

26.4.42 It can be seen from Table 26.17 that during the completed survey period the weather conditions were suitable for undertaking environmental sound measurements.

Survey Results

26.4.43 A summary of the survey results is shown in Table 26.18 below and detailed in full in Volume 2, Appendix 26.2: Sound Survey Results.

26.4.44 The $L_{Aeq,T}$ level is the logarithmic average ambient noise level, and the L_{A10} and L_{A90} levels are the median levels during each time period. The L_{Amax} is the highest measured L_{Amax} during each period.

Table 26.18: Summary of baseline survey results, dB – Onshore LN and WM ECC

Date	Location	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
07/11/22	LN_ECC001	43.5	38.9	43.7	64.9
	LN_ECC002	46.1	39.0	47.5	65.2
	WM_ECC001	43.1	39.4	44.1	60.6
18/01/23	WM_ECC002	55.6	40.4	51.3	76.6
07/11/22	WM_ECC003	44.1	40.2	45.9	62.0
18/01/23	WM_ECC004	58.8	52.0	61.9	67.5
22/11/22	WM_ECC005	44.0	42.1	45.3	55.3
	WM_ECC006	38.5	35.9	39.1	64.9
17/01/23	WM_ECC007	45.7	37.4	44.1	69.5
	WM_ECC008	45.0	42.0	45.2	66.1
	WM_ECC009	45.8	35.9	44.0	66.2
	WM_ECC010	46.2	33.7	41.1	68.7
22/11/22	WM_ECC011	38.6	31.5	35.2	67.3
28/02/23	WM_ECC012	52.1	44.4	53.9	73.2
	WM_ECC013	54.2	42.0	53.8	76.9
03/03/23	WM_ECC014	56.2	33.9	48.4	81.4

Date	Location	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
	WM_ECC015	45.6	36.5	44.4	68.3
02/03/23	WM_ECC016	47.2	33.8	46.0	68.9
	WM_ECC017	46.0	31.6	41.8	69.6
	WM_ECC018	52.5	42.1	54.4	70.9
	WM_ECC019	51.0	38.5	53.4	68.6
01/03/23	WM_ECC020	64.7	54.8	68.1	77.0
	WM_ECC021	55.6	42.0	52.5	81.1

Soundscape

26.4.45 The general soundscape at the measurement locations was recorded by the qualified acoustician during the attended surveys and is shown in Table 26.19.

Table 26.19: General soundscape

Location	Soundscape
LN_ECC001	Road noise in distance dominant noise source – could be A52 or Long Lane. Trees occasionally rustling in wind, occasional military jet overhead, birdsong.
LN_ECC002	Road noise from Long Lane dominant noise source – non-steady traffic travelling approximately 40mph. Trees rustling in wind and birdsong also audible.
WM_ECC001	Road noise in distance dominant noise source. Bird song, hedges rustling in wind, high altitude aircraft overhead. Resident was undertaking roofing works in back garden and so any drilling/banging was excluded from results.
WM_ECC002	Road noise in distance audible – low. Planes flying low overhead. Gunshots in distance. Cars travelling down Sloothby High Lane around 30mph – approx. 1-2 per minute.
WM_ECC003	Road noise in distance dominant (possibly A158) - steady traffic flow. High altitude aircraft overhead, grass rustling in wind. Occasional car travelling down Youngers Lane – approximately 1 per minute. Gunshots in distance, birdsong, ducks in lake quacking/flying away.
WM_ECC004	Road noise from A52 dominant – steady traffic flow travelling approx. 50mph. Planes overhead. Some military jets. Gunshots in distance. Trees rustling in wind.
WM_ECC005	Road noise in distance dominant noise source. Bird song, trees rustling in the wind. Occasional car driving down Croft Marsh Lane.
WM_ECC006	Road noise in distance dominant noise source. Dogs barking, metal panel on barn occasionally rattling in the wind. People talking in distance, bird song, trees rustling in the wind, gunshots in distance.
WM_ECC007	Road noise in distance audible but very low. Grass and plants rustling in wind. Dog barking in distance. Occasional tractor driving down road

Location	Soundscape
WM_ECC008	Road noise in distance audible but very low. High altitude aircraft overhead. Bird song. Occasional car travelling down Watery Lane approx. speed 30mph. Gunshots in distance. Sound of farmyard machinery in distance.
WM_ECC009	Road noise in distance low but audible. Bird song dominant, trees rustling in wind, planes overhead. Occasional car driving down Sea Lane approx. 20mph.
WM_ECC010	Road noise in distance audible. Bird song, gunshots in distance, dogs barking. Some construction noise in distance – excavator and reverse bleepers. Occasional car driving down Cut End Road, approx. 1-2 per minute at 20mph. Chainsaw sometimes audible in distance. Light aircraft overhead.
WM_ECC011	Sound of extractor fan running in farmyard next door. Dogs barking in houses nearby. Trees rustling in wind and birdsong. Road noise audible in distance but very low. Occasional jet overhead.
WM_ECC012	Trees rustling in wind dominant noise source. Occasional car driving past meter approximately 20mph. High altitude aircraft. Dog barking in distance - occasionally playing with squeaky toy. Birdsong. Gunshots in distance. Occasional car driving down adjacent road approximately 30mph - non steady.
WM_ECC013	Dogs in one of nearby houses barking – constant thought survey. Gunshots nearby. Trees and grass rustling in wind. Cars driving past, approx. 30-40mph.
WM_ECC014	Location predominantly birdsong and trees/grass rustling. Occasional car driving down Old Fen Rd approximately 30mph. Around 1 car a minute. Some gunshots in distance. Cyclists riding past. Occasional HGV driving past around 20-30mph. Some road noise audible in distance.
WM_ECC015	Grass and trees rustling in wind. Birdsong. Gunshots in distance. Aircraft overhead. Road noise in distance.
WM_ECC016	Occasional car driving down Broadgate Road approximately 30mph. Trees and grass rustling in wind. Sound of farmyard machinery in distance. Occasional noise from livestock nearby.
WM_ECC017	Bird song dominant. Grass, hedges and trees occasionally rustling in wind. Road noise in distance. Occasional car passing down road (approximately 30mph) however very little traffic in area.
WM_ECC018	Cars driving down B1184 – dominant noise source. Non steady traffic, speed approximately 30-40mph. Primarily cars but some HGVs driving by. Farmyard machinery in distance. Road noise in distance audible. Birdsong. Dog barking in distance.
WM_ECC019	Occasional car travelling down Ings Road approximately 40-50mph. Grass rustling in wind. Bird song, planes overhead. Farmyard machinery audible in distance. Gunshots in distance.

Location	Soundscape
WM_ECC020	Road noise from A52 dominant. Steady traffic flow, approx. 30-40mph. Mainly cars but some HGVs and tractors passing. Grass rustling in wind. Birdsong. Gunshots in distance.
WM_ECC021	Grass and trees rustling in wind. Birdsong. Occasional car driving past 40 - 50mph. Approx 3-5 per minute. Occasional gunshots in distance. Some distance road noise traffic.

Evaluation of Onshore LN and WM ECC Sound Levels

26.4.46 The noise-sensitive receptors situated close to the onshore LN and WM ECC would potentially be impacted from daytime construction operations, therefore it is necessary to evaluate the measured baseline levels in conjunction with the ABC Method contained in BS 5228-1 to calculate the daytime construction noise threshold values.

26.4.47 With reference to Table 26.2 of this chapter and the measured ambient noise levels, the threshold limits have been calculated at each monitoring location during the daytime and are shown in Table 26.20.

26.4.48 It should be noted that the measured sound levels have been rounded to the nearest decibel.

Table 26.20: Calculated construction noise threshold noise limits, dB

Location	Period	Measured Average Ambient Level $L_{Aeq,T}$	Calculated Threshold Value $L_{Aeq,T}$
LN_ECC001	Daytime	44	65
LN_ECC002		46	65
WM_ECC001		43	65
WM_ECC002		56	65
WM_ECC003		44	65
WM_ECC004		59	65
WM_ECC005		44	65
WM_ECC006		39	65
WM_ECC007		46	65
WM_ECC008		45	65
WM_ECC009		46	65
WM_ECC010		46	65
WM_ECC011		39	65
WM_ECC012		52	65
WM_ECC013		54	65
WM_ECC014		56	65
WM_ECC015		46	65
WM_ECC016		47	65
WM_ECC017		46	65
WM_ECC018		53	65

Location	Period	Measured Average Ambient Level $L_{Aeq,T}$	Calculated Threshold Value $L_{Aeq,T}$
WM_ECC019		51	65
WM_ECC020		65	70
WM_ECC021		56	65

The LN OnSS Option

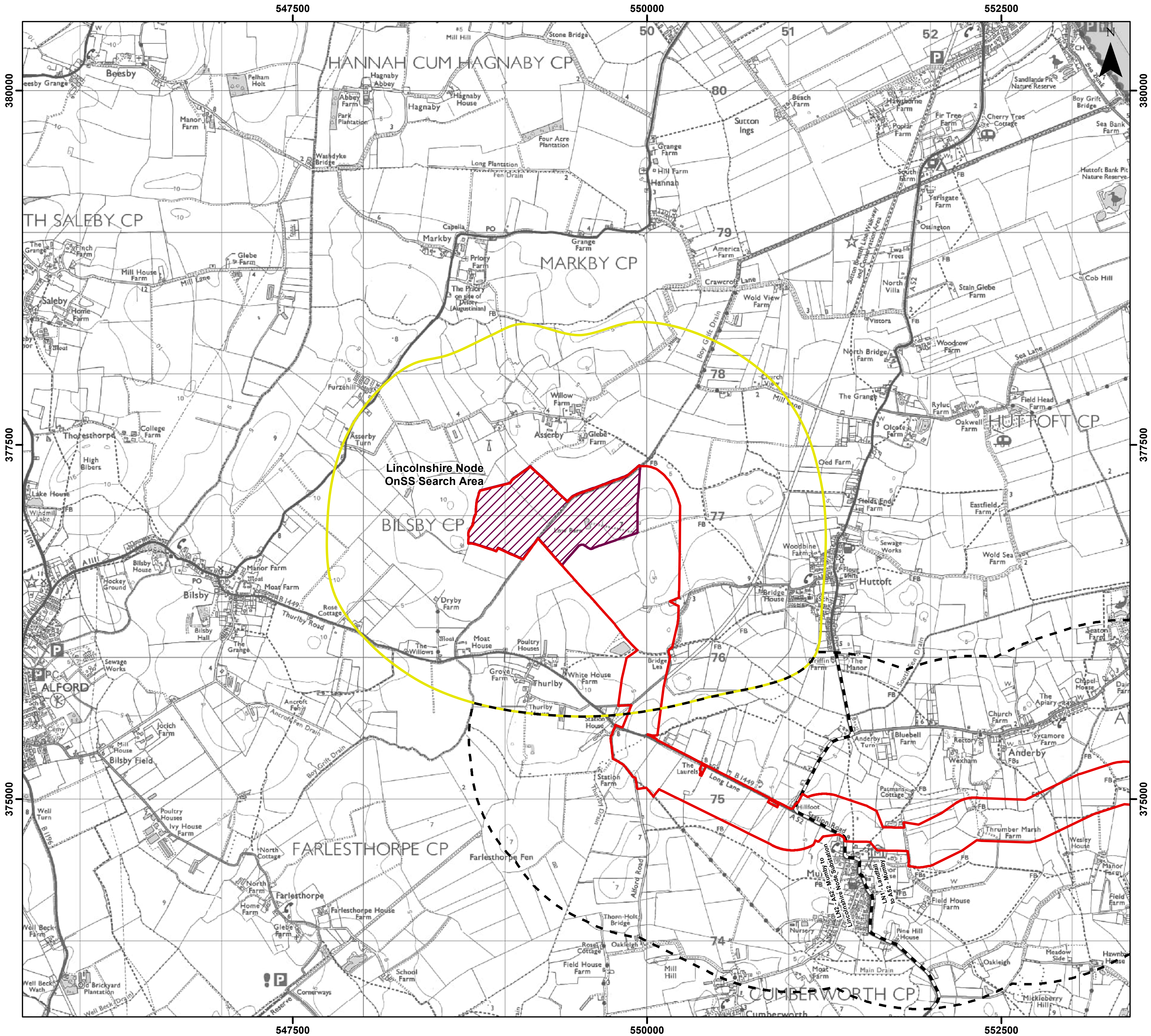
Study Area Description

26.4.49 Lincolnshire Node OnSS is located approximately 3.5km to the northwest of Alford, between the hamlets of Thurlby and Asserby, as shown on Figure 26.7.

26.4.50 The local environment in the vicinity of the study area can be characterised as rural, with land which is predominately used for agricultural purposes.

26.4.51 The study area extends to the residential dwellings located closest to the OnSS, to the north, southeast, and southwest. At its closest point, the OnSS will be located approximately 400m from the receptors.

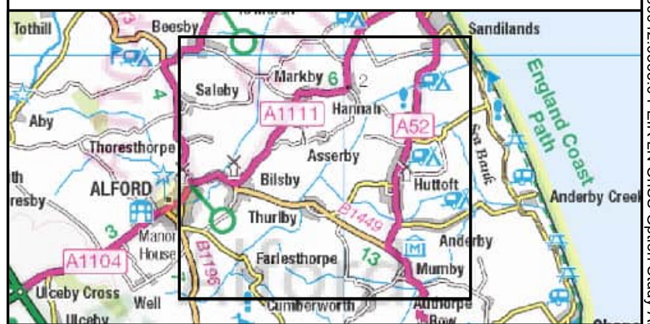
26.4.52 The noise and vibration study area includes the residential dwellings located closest to the LN OnSS, where noise from construction and operational activities, could have a potential impact.



Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Lincolnshire Node OnSS Search Area Noise Study Area
- Lincolnshire Node ECC Study Area

Sources:



Coordinate System: British National Grid

0 0.5 1 km

Scale: 1:25,000

Preliminary Environmental Information Report

Lincolnshire Node OnSS Option Study Area

Figure 26.7

OUTER DOWSING OFFSHORE WIND

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Baseline Sound Monitoring Locations

26.4.53 Baseline sound levels were measured at three locations which are considered representative of the receptors closest to the LN OnSS option. The locations are described in Table 26.21 and identified on Figure 26.8.

Table 26.21: Baseline Sound Monitoring Locations – LN OnSS Option

Location ID	Description	OS Grid Ref	
LN_OnSS001	To the north of the substation zone, representative of the farm and residential property to the north.	549568	377520
LN_OnSS002	At a location representative of the residential property to the southwest of the substation zone.	548519	376417
LN_OnSS003	At a location representative of the residential property to the southeast of the substation zone.	550155	376401

550000

377500

N

LN_OnSS001

Lincolnshire Node
OnSS Search Area

LN_OnSS002

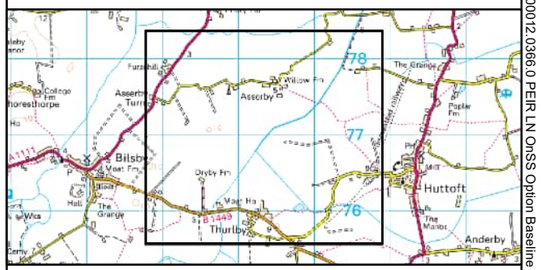
LN_OnSS003

550000

Legend

- Onshore PEIR Boundary
- Lincolnshire Node OnSS Search Area
- Basline Noise Monitoring Location

Sources:



Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Lincolnshire Node OnSS Option Baseline Sound Monitoring Locations

Figure 26.8

OUTER DOWSING OFFSHORE WIND

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Monitoring Equipment and Indices Measured

26.4.54 The measurements were carried out utilising the equipment listed in Table 26.22 below.

Table 26.22: Baseline Sound Monitoring Equipment – LN OnSS Option

Location ID	Equipment	Serial Number
LN_OnSS001	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
LN_OnSS002	Rion NL-52 Class 1 Sound Level Meter	00710362
	Cirrus CR:515 Acoustic Calibrator	94806
LN_OnSS003	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806

26.4.55 The sound level meters were calibrated before and after each measurement, and no significant drift was observed. The calibration chain is traceable via the UKAS to National Standards held at the National Physical Laboratory.

26.4.56 The calibration certificates for all the noise monitoring equipment utilised are shown in Volume 2, Appendix 26.1: Sound Level Meter Calibration Certificates.

26.4.57 At the monitoring location, the microphone was placed 1.5m above the ground in free-field conditions, i.e., at least 3.5m from the nearest vertical, reflecting surface with the following noise level indices being recorded.

- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period;
- L_{A90}: The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise;
- L_{A10}: The A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe road traffic noise; and
- L_{Amax}: The maximum A-weighted noise level during the measurement period.

Measurement Duration

26.4.58 At Location LN_OnSS001, the prevailing sound levels were measured continuously between 8 and 16 November 2022; at Locations LN_OnSS002 and LN_OnSS003 the prevailing sound levels were measured continuously between 23 and 29 November 2022, with noise levels being logged every 15-minutes.

Weather Conditions

26.4.59 The prevailing weather conditions during the period 8 to 16 November 2022 were recorded using a Larson Davis weather station as detailed in Table 26.8 (summary of weather conditions – landfall), as it is considered that the weather conditions at the chosen landfall location were representative of those experienced at the LN OnSS option.

26.4.60 Table 26.8 has provided a summary of the measured prevailing weather conditions during this period. The results have undergone a detailed analysis where each 15-minute monitoring period was considered. Where periods of inclement weather have been identified, the associated data set has been removed from the survey results shown below.

26.4.61 The prevailing weather conditions during the period 23 to 28 November 2022 were recorded using a Larson Davis weather station and a summary of the results is shown in Table 26.23 below. The table also indicates which weather conditions were considered suitable; this is based on guidance that noise monitoring should not be undertaken if wind speeds are above 5.0m/s or during periods of prolonged precipitation.

26.4.62 The weather station was installed at Location LN_OnSS003, as shown Figure 26.8.

26.4.63 Due to poor lighting conditions, the solar charged battery of the weather station ran low during the 24 November, resulting in no data collection during the 25 November and during periods on the 24 and 26 November 2022.

Table 26.23: Summary of weather conditions – LN OnSS location.

Date	Average Temperature °C	Precipitation, mm	Average Wind Speed, m/s	Predominant Wind Direction	Weather Conditions Suitable
23/11/2022	7	0.5	0.1	SW	Yes
24/11/2022	5	0.25	0.1	S	Yes
25/11/2022	-	-	-	-	-
26/11/2022	10	1.78	0.7	S	No
27/11/2022	9	0.5	0.0	SSE	Yes
28/11/2022	6	0	0.0	SSW	Yes

26.4.64 Table 26.23 has provided a summary of the measured prevailing weather conditions during this period. The results have undergone a detailed analysis where each 15-minute monitoring period was considered. Where periods of inclement weather have been identified, the associated data set has been removed from the survey results shown below.

26.4.65 For periods where data was not collected, weather data has been sourced from a local weather station whose data is published online[2] to determine whether any data samples should be excluded.

Survey Results

26.4.66 A summary of the survey results is included in Table 26.24 to Table 26.26 and are shown in full in Volume 2, Appendix 26.2: Sound Survey Results.

26.4.67 It should be noted that the survey results have been divided into daytime (07:00 to 19:00), evening (19:00 to 23:00) and night-time (23:00 to 07:00) periods to be consistent with BS 5228-1.

26.4.68 The $L_{Aeq,T}$ level is the average ambient noise level in each period, the L_{A10} and L_{A90} levels shown are the median levels in each indices during each measurement period.

[2] https://www.wunderground.com/dashboard/pws/IALFOR10/graph/2022-11-26/2022-11-26/weekly (accessed November 2022

Table 26.24: Summary of baseline survey results – location LN_OnSS001

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
08/11/22	Daytime	46.9	42.9	49.2	59.9
	Evening	37.9	32.5	39.7	52.2
	Night-time	35.9	30.9	36.7	60.8
09/11/22	Daytime	45.3	35.5	43.5	72.8
	Evening	36.2	28.0	35.3	65.8
	Night-time	40.4	35.2	41.2	59.5
10/11/22	Daytime	46.1	39.2	45.5	64.7
	Evening	44.7	39.5	47.8	61.2
	Night-time	44.2	39.0	47.1	61.5
11/11/11	Daytime	40.2	36.9	41.8	59.5
	Evening	39.3	35.6	41.1	55.0
	Night-time	29.9	22.0*	28.8	68.9
12/11/22 (Saturday)	Daytime	39.7	31.1	37.6	67.8
	Evening	29.9	24.3	31.3	55.4
	Night-time	28.8	20.4*	26.7	49.4
13/11/22	Daytime	34.6	25.5	34.0	71.1
	Evening	26.3	21.0*	26.8	49.3
	Night-time	28.0	20.0*	22.7	55.2
14/11/22	Daytime	39.3	28.4	36.3	74.9
	Evening	25.7	20.0*	24.9	59.0
	Night-time	32.7	20.6*	28.3	72.4
15/11/22	Daytime	41.5	36.0	42.7	68.1
	Evening	38.3	29.6	36.6	66.0
	Night-time	33.2	26.3	34.1	58.1
16/11/22	Daytime	44.9	30.7	38.8	76.4
	Evening	-	-	-	-
	Night-time	-	-	-	-

*NOTE: Level approaching noise floor of monitoring equipment, therefore caution should exercised when assessing to this level.

Table 26.25: Summary of baseline survey results – location LN_OnSS002

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
23/11/22	Daytime	45.0	39.6	47.1	72.4
	Evening	41.9	36.3	44.2	56.9
	Night-time	35.8	27.0	35.0	64.3
24/11/22	Daytime	50.6	42.9	48.9	84.8
	Evening	42.2	37.1	44.2	58.0

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
	Night-time	42.8	35.7	44.3	65.1
25/11/22	Daytime	45.1	38.7	46.0	83.3
	Evening	38.1	28.6	41.9	57.9
	Night-time	33.1	26.0	34.1	55.3
26/11/11 (Saturday)	Daytime	44.1	40.1	46.2	63.2
	Evening	51.6	46.8	54.5	65.1
	Night-time	50.1	44.1	52.2	64.4
27/11/22	Daytime	41.9	33.5	44.0	72.8
	Evening	36.9	21.6*	40.1	59.0
	Night-time	34.4	22.5*	34.5	62.4
28/11/22	Daytime	41.4	32.0	42.9	66.8
	Evening	29.7	20.6*	32.4	52.3
	Night-time	27.3	16.4*	28.1	57.1
29/11/22	Daytime	39.5	26.7	40.8	66.9
	Evening	-	-	-	-
	Night-time	-	-	-	-

*NOTE: Level approaching noise floor of monitoring equipment, therefore caution should exercised when assessing to this level.

Table 26.26: Summary of baseline survey results – location LN_OnSS003

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
23/11/22	Daytime	43.6	36.6	44.2	73.4
	Evening	38.3	33.0	38.9	63.3
	Night-time	33.9	25.1	31.8	70.2
24/11/22	Daytime	45.2	39.2	45.4	67.6
	Evening	38.4	35.0	40.7	52.8
	Night-time	39.0	33.2	39.0	62.2
25/11/22	Daytime	44.4	35.2	43.7	85.0
	Evening	38.4	35.0	40.7	52.8
	Night-time	32.8	25.4	30.7	75.5
26/11/11 (Saturday)	Daytime	40.3	36.2	42.3	65.1
	Evening	35.9	26.3	35.8	67.4
	Night-time	46.5	40.7	46.9	76.3
27/11/22	Daytime	38.6	30.1	41.0	69.1
	Evening	46.2	42.5	47.8	56.8
	Night-time	38.6	22.1*	28.6	66.8
28/11/22	Daytime	40.2	27.9	42.0	69.4
	Evening	31.5	20.6*	33.4	55.4
	Night-time	32.5	20.0*	28.1	62.9

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
29/11/22	Daytime	40.8	25.9	42.8	68.3
	Evening	-	-	-	-
	Night-time	-	-	-	-
*NOTE: Level approaching noise floor of monitoring equipment, therefore caution should exercised when assessing to this level.					

Soundscape

26.4.69 The general soundscape at the measurement locations was recorded during equipment installation and collection and is shown in Table 26.27.

Table 26.27: General Soundscape

Location	Soundscape
LN_OnSS001	Trees rustling in wind, road noise in distance faintly audible. High altitude aircraft overhead. Occasional high-pitched sound of scraping sheet metal blowing in the wind from an old barn in the distance.
LN_OnSS002	Road noise from B1449 in distance dominant noise source - steady traffic, approx. 60 mph. Jets overhead. Trees rustling in wind.
LN_OnSS003	Jets overhead. Occasional car travelling down road next to field, approximately 3-5 cars per minute. Bird song, high altitude aircraft, trees rustling in the wind.

Evaluation of Landfall Baseline Sound Levels

26.4.70 The noise-sensitive receptors situated close to the LN OnSS option would potentially be impacted from both construction and operational activities, therefore it is necessary to evaluate the measured baseline levels in conjunction with:

- The ABC Method contained in BS 5228:2009+A1:2014 to calculate the daytime, evening, and night-time construction noise threshold limits; and
- BS 4142:2014+A1:2019 to calculate the background sound levels to be utilised for the operational assessment at the residential receptors.

LN OnSS Option - Ambient Levels and Threshold Limits for Construction Noise Assessment

26.4.71 It has been confirmed that the construction of the onshore works and construction-related traffic movements to or from the site of the relevant work shall only take place between 0700 hours and 1900 hours Monday to Saturday with no activity on Sundays or bank holidays.

26.4.72 Receptors will therefore potentially be impacted during the daytime and weekend periods (after 13:00 on a Saturday) from construction operations, including trenchless drilling techniques. Therefore, it is necessary to evaluate the measured baseline levels in conjunction with the ABC Method contained in BS 5228-1 to calculate the construction noise threshold limits.

26.4.73 With reference to Table 26.2 and the lowest measured average ambient level at each monitoring location during the daytime and at a weekend, the calculated threshold limits are shown in Table 26.28.

26.4.74 It should be noted that the measured ambient sound levels have been rounded to the nearest decibel.

Table 26.28: Calculated construction noise threshold limits, dB

Location	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$	Calculated Threshold Value $L_{Aeq,T}$
Noise sensitive receptors representative of Location LN_OnSS001	Daytime	35	65
	Weekend	40	55
Noise sensitive receptors representative of Location LN_OnSS002	Daytime	41	65
	Weekend	44	55
Noise sensitive receptors representative of Location LN_OnSS003	Daytime	39	65
	Weekend	40	55
Note: Weekend period defined as between 13:00 and 19:00 on a Saturday			

LN OnSS Option – Ambient Levels and Residential Receptor Background Sound Levels for Operational Noise Assessment

26.4.75 The representative daytime and night-time background sound levels (L_{A90}) which will be utilised as the bases for the operational noise assessment of the LN OnSS option on the residential receptors are shown in Table 26.29 with the lowest measured average ambient sound level for day- and night-time periods.

26.4.76 It should be noted that the measured background sound levels have been rounded to the nearest decibel.

Table 26.29: Representative background sound levels, dB

Location	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$	Representative Background Sound Level L_{A90}
Noise sensitive receptors representative of Location LN_OnSS001	Daytime	40	34
	Night-time	36	31
	Daytime	40	27

Location	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$	Representative Background Sound Level L_{A90}
Noise sensitive receptors representative of Location LN_OnSS002	Night-time	27	16*
Noise sensitive receptors representative of Location LN_OnSS003	Daytime	38	26
	Night-time	33	20*

*NOTE: Level approaching noise floor of monitoring equipment, therefore caution should exercised when assessing to this level.

The WM North and South OnSS Options

Study Area Description

WMN OnSS

26.4.77 The WMN OnSS is located approximately 9km to the northwest of Spalding, and 4km to the east of Gosberton, as shown on Figure 26.9. The A16 is located to the northwest of the OnSS, with the River Welland located to the southeast.

26.4.78 The local environment within the study area can be characterised as rural, with land which is predominately used for agricultural purposes.

26.4.79 The study area extends to the residential dwellings located closest to the OnSS, to the north, and south. At its closest point, the OnSS will be located approximately 250m from the receptors.

26.4.80 The noise and vibration study area includes the residential dwellings located closest to the WMN OnSS, where construction and operational activities, could have a potential impact.

525000 527500 530000

332500

330000

Weston Marsh North OnSS Search Area

Weston Marsh South OnSS Search Area

WM12 - Marsh Road to Fosdyke Bridge

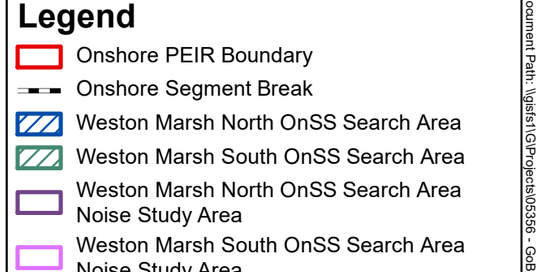
WM13 - Fosdyke to Weston Marsh North Substation Search Area

WM14 - Fosdyke to Weston Marsh Substation South Search Area

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh North OnSS Search Area
- Weston Marsh South OnSS Search Area
- Weston Marsh North OnSS Search Area Noise Study Area
- Weston Marsh South OnSS Search Area Noise Study Area
- Weston Marsh ECC Study Area

Sources:



Coordinate System: British National Grid

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Scale: 1:25,000

Preliminary Environmental Information Report

Weston Marsh North OnSS Option Study Area

Figure 26.9

OUTER DOWSING OFFSHORE WIND

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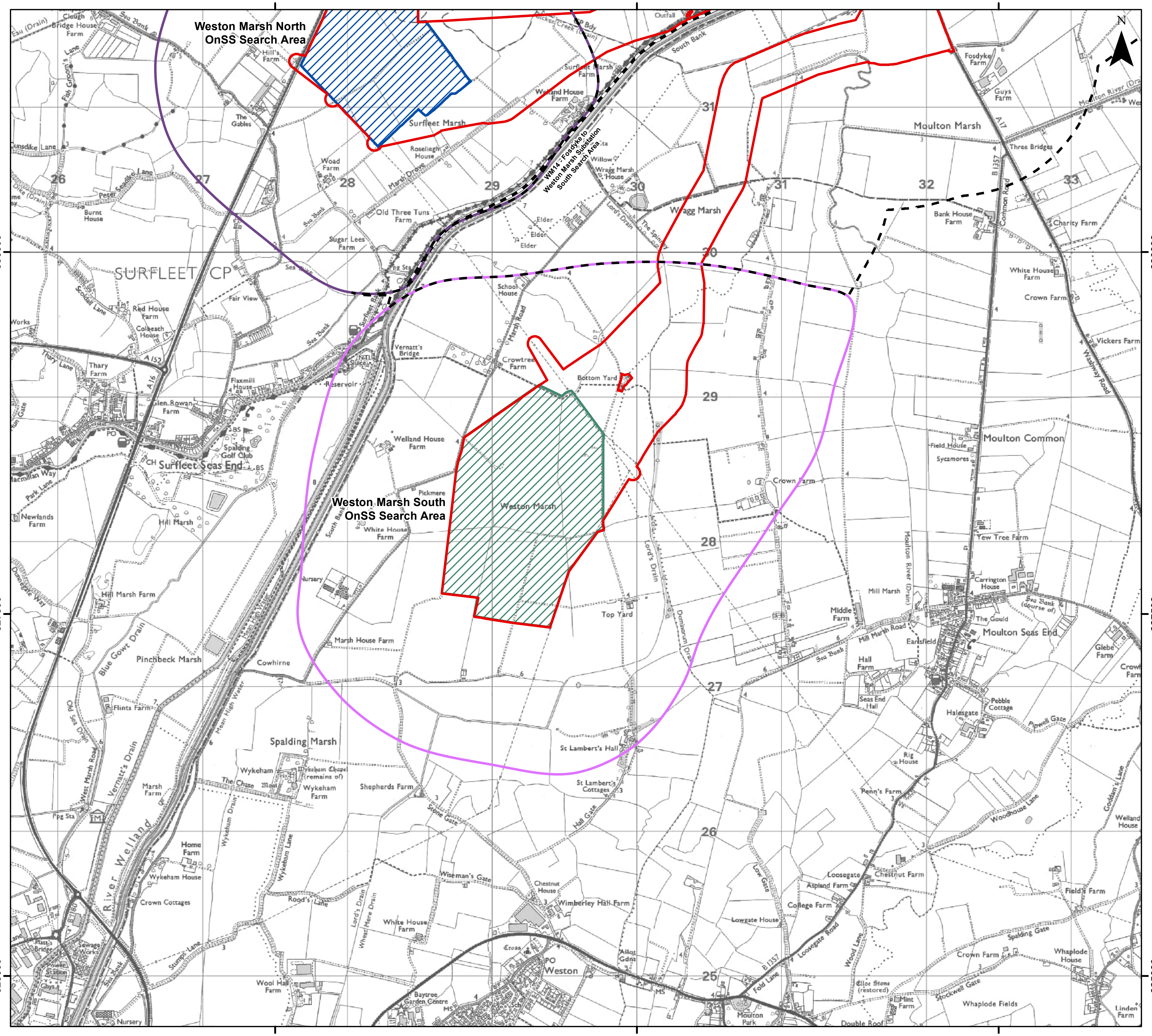
WMS OnSS

26.4.81 The WMS OnSS is located approximately 7.5km to the northwest of Spalding, and 3.5km to the west of Moulton Seas End, as shown on Figure 26.10.

26.4.82 The River Welland and Marsh Road are located to the west of the OnSS, with Hall Gate Road located to the east. The local environment within the study area can be characterised as rural, with land which is predominately used for agricultural purposes.

26.4.83 The study area extends to the residential dwellings located closest to the OnSS, to the north, east, south, and west. At its closest point, the OnSS will be located approximately 250m from the receptors.

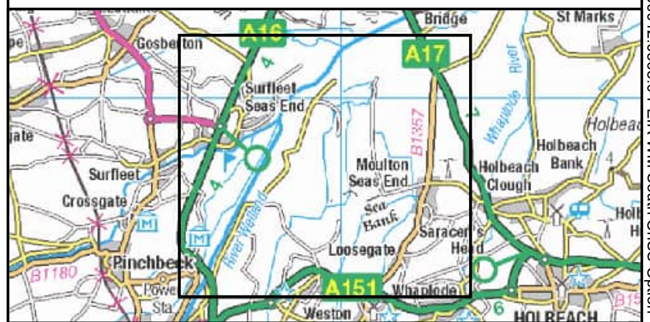
26.4.84 The noise and vibration study area includes the residential dwellings located closest to the WMS OnSS, where construction and operational activities, could have a potential impact.



Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh North OnSS Search Area
- Weston Marsh South OnSS Search Area
- Weston Marsh North OnSS Search Area Noise Study Area
- Weston Marsh South OnSS Search Area Noise Study Area
- Weston Marsh ECC Study Area

Sources:



Coordinate System: British National Grid

0 0.5 1 km

Scale: 1:25,000

Preliminary Environmental Information Report

Weston Marsh South OnSS Option Study Area

Figure 26.10

OUTER DOWSING OFFSHORE WIND

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Baseline Sound Monitoring Locations

26.4.85 Baseline sound levels were proposed to be measured at 10 locations which are considered representative of the receptors closest to the WMN and WMS OnSS options. The locations are described in Table 26.30 and identified on Figure 26.11 and Figure 26.12.

Table 26.30: Baseline Sound Monitoring Locations – WM North and South OnSS Options

Location ID	Description	OS Grid Ref	
WMN_OnSS001	At a location representative of the residential property to the southwest of the substation zone.	527833	330478
WMN_OnSS002	At a location representative of the residential property to the southeast of the substation zone.	528613	330820
WMN_OnSS003	At a location representative of the residential property to the west of the substation zone.	527374	331328
WMN_OnSS004	At a location representative of the residential property to the north of the substation zone.	528486	332442
WMS_OnSS001	At a location representative of the residential property and Wigwam Holidays to the north of the substation zone.	529017	329164
WMS_OnSS002	At a location representative of the residential property to the northeast of the substation zone.	529882	329052
WMS_OnSS003	At a location representative of the residential property to the southeast of the substation zone.	529889	327621
WMS_OnSS004	At a location representative of the residential property to the south of the substation zone.	528830	327155
WMS_OnSS005	At a location representative of the residential property to the south-west of the substation zone.	528125	327719
WMS_OnSS006	At a location representative of the residential property to the west of the substation zone.	528349	328640

527500

332500

330000

N

WMN_OnSS004

WMN_OnSS003

WMN_OnSS002

WMN_OnSS001

Weston Marsh North
OnSS Search Area

MARSH ROAD

MARSH LANE

GOSBERTON ROAD

GOSBERTON BANK

SURFLEET BANK

NEWLANDS ROAD

GONEY GARTH LANE

MARSH GROVE

Weighbridge

A16

A16

A16

Track

Track

Track

Track

Track

Track

Track

Track

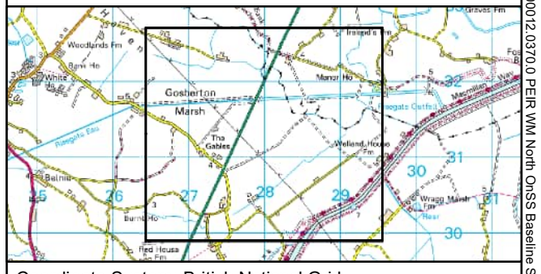
GP

WM14 - Fosdyke to Weston Marsh Substation South Search Area

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh North OnSS Search Area
- Basline Noise Monitoring Location

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

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Weston Marsh North OnSS Baseline Sound Monitoring Locations

Figure 26.11

OUTER DOWSING OFFSHORE WIND

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527500

530000

N

WMS_OnSS001

WMS_OnSS002

WMS_OnSS003

WMS_OnSS004

WMS_OnSS005

WMS_OnSS006

Weston Marsh South OnSS Search Area

RESERVOIR ROAD

MARSH ROAD

STONE GATE

Track

Path

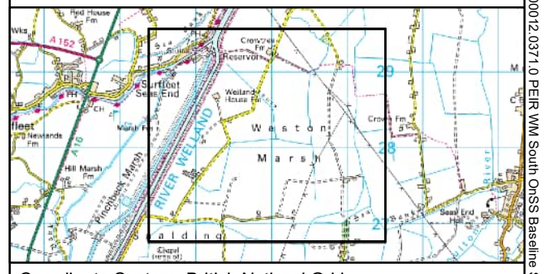
ROAD

327500

Legend

- Onshore PEIR Boundary
- Weston Marsh South OnSS Search Area
- Basline Noise Monitoring Location

Sources:
Aerial Image Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Coordinate System: British National Grid

0 0.25 0.5 km

Scale: 1:10,000

Preliminary Environmental Information Report

Weston Marsh South OnSS Baseline Sound Monitoring Locations

Figure 26.12

OUTER DOWSING OFFSHORE WIND

Date: 13/04/2023
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Monitoring Equipment and Indices Measured

26.4.86 The measurements were carried out utilising the equipment listed in Table 26.31.

Table 26.31: Baseline Sound Monitoring Equipment – WMN and WMS OnSS Options

Location	Equipment	Serial Number
WMN_OnSS001	Cirrus CR:171B Class 1 Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
WMN_OnSS002	Rion NL-52 Class 1 Sound Level Meter	00976174
	Cirrus CR:515 Acoustic Calibrator	94806
WMN_OnSS003	Cirrus CR:171B Class 1 Sound Level Meter	G300561
	Cirrus CR:515 Acoustic Calibrator	87922
WMN_OnSS004	Cirrus CR:171B Class 1 Sound Level Meter	G300561
	Cirrus CR:515 Acoustic Calibrator	87922
WMS_OnSS001	Cirrus CR:171B Class 1 Sound Level Meter	G303356
	Cirrus CR:515 Acoustic Calibrator	97641
WMS_OnSS002	Rion NL-52 Class 1 Sound Level Meter	00710362
	Cirrus CR:515 Acoustic Calibrator	94806
WMS_OnSS003	Norsonic Nor140 Class 1 Sound Level Meter	1403012
	Norsonic 1251 Acoustic Calibrator	31872
WMS_OnSS004	Rion NL-52 Class 1 Sound Level Meter	00710359
	Cirrus CR:515 Acoustic Calibrator	94806
WMN_OnSS005	Cirrus CR:171B Class 1 Sound Level Meter	G300561
	Cirrus CR:515 Acoustic Calibrator	87922
WMS_OnSS006	Cirrus CR:171B Class 1 Sound Level Meter	G400055
	Cirrus CR:515 Acoustic Calibrator	99952

26.4.87 The sound level meters were calibrated before and after each measurement, and no significant drift was observed. The calibration chain is traceable via the UKAS to National Standards held at the National Physical Laboratory.

26.4.88 The calibration certificates for all the noise monitoring equipment utilised are shown in Volume 2, Appendix 26.1: Sound Level Meter Calibration Certificates.

26.4.89 At the monitoring locations, the microphone was placed 1.5m above the ground in free-field conditions, i.e., at least 3.5m from the nearest vertical, reflecting surface with the following noise level indices being recorded.

- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period;
- L_{A90}: The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise;
- L_{A10}: The A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe road traffic noise; and
- L_{Amax}: The maximum A-weighted noise level during the measurement period.

Measurement Duration

26.4.90 At the locations where monitoring was undertaken, sound levels were measured continuously with levels being logged every 15-minutes over the following periods:

- WMN_OnSS001 – between 2 and 9 February 2023;
- WMN_OnSS002 – between 11 and 16 of November 2022;
- WMN_OnSS003 – between 10 and 15 November 2022;
- WMN_OnSS004 – between 2 and 9 February 2023;
- WMS_OnSS001 – between 2 and 9 February 2023;
- WMS_OnSS002 – between 22 and 29 November 2022;
- WMS_OnSS003 – between 8 and 16 November 2022;
- WMS_OnSS004 - between 22 and 29 November 2022;
- WMS_OnSS005 – between 2 and 9 February 2023; and
- WMS_OnSS006 – between 8 and 16 November 2022.

Weather Conditions

26.4.91 The prevailing weather conditions between 8 and 16 November 2022 were recorded using a Larson Davis weather station and are shown in Table 26.32; the table also indicates which weather conditions were considered inclement – this is based on the fact that noise monitoring should not be undertaken if wind speeds are above 5.0m/s or during periods of precipitation.

26.4.92 The weather station was installed at Location WMN_OnSS001 as shown on Figure 26.11.

Table 26.32: Summary of weather conditions – WM north and South OnSS Options 8 to 16 November 2022

Date	Average Temperature, °C	Precipitation, mm	Average Wind Speed, m/s	Predominant Wind Direction	Weather Conditions Suitable
08/11/2022	12	0.51	2.9	SSW	No
09/11/2022	10	0	2.8	SW	Yes
10/11/2022	12	0	3.6	SW	Yes
11/11/2022	14	0	3.0	SW	Yes
12/11/2022	11	0	1.9	SSW	Yes
13/11/2022	11	0.25	0.8	SSW	Yes
14/11/2022	10	0.5	0.4	SSW	No
15/11/2022	10	9.14	2.9	SSW	No
16/11/2022	7	0	2.0	SSW	Yes

26.4.93 The prevailing weather conditions between 22 and 29 November 2022 and the 2 and 9 February 2023 were recorded using a Larson Davis weather station and are shown in Table 26.33; the table also indicates which weather conditions were considered inclement – this is based on the fact that noise monitoring should not be undertaken if wind speeds are above 5.0m/s or during periods of precipitation.

26.4.94 Between 22 and 29 November 2022 the weather station was installed at Location WMS_OnSS004 as shown on Figure 26.11, between 2 and 9 February 2023 the weather station was installed at Location WMN_OnSS001 as shown on Figure 26.11.

Table 26.33: Summary of weather conditions – WM north and South OnSS Options 22 to 29 November 2022 and 3 to 9 February 2023

Date	Average Temperature, °C	Precipitation, mm	Average Wind Speed, m/s	Predominant Wind Direction	Weather Conditions Suitable
22/11/2022	8	0.0	2.0	SW	Yes
23/11/2022	6	5.33	0.6	E	No
24/11/2022	7	4.32	0.4	WSW	No
25/11/2022	7	0.25	0.8	SW	Yes
26/11/2022	9	0.25	0.3	WSW	Yes
27/11/2022	10	7.09	0.1	SW	No
28/11/2022	6	0	0.3	E	Yes
29/11/2022	5	0	0.7	WNW	Yes
02/02/2023	10	0	3	WNW	Yes
03/02/2023	10	0	3	NNW	Yes
04/02/2023	8	0	1	WNW	Yes
05/02/2023	4	0	2	N	Yes
06/02/2023	2	0	1	W	Yes
07/02/2023	2	0.25	1	WSW	Yes
08/02/2023	2	0	2	WSW	Yes
09/02/2023	4	0	2	NNW	Yes

26.4.95 Table 26.32 and Table 26.33 have provided a summary of the measured prevailing weather conditions; however, the results have undergone a more detailed analysis where each 15-minute monitoring period was considered and where periods of inclement weather have been identified, the associated data set has been removed from the survey results shown below.

Survey Results

26.4.96 A summary of the survey results is included in Table 26.34 to Table 26.43 and are shown on full in Volume 2, Appendix 26.2: Full baseline survey results.

26.4.97 It should be noted that the survey results have been divided into daytime (07:00 to 19:00), evening (19:00 to 23:00) and night-time (23:00 to 07:00) periods to be consistent with BS 5228:2009+A1:2014.

26.4.98 The $L_{Aeq,T}$ level is the average ambient noise level in each period, the L_{A10} and L_{A90} levels shown are the median levels in each indices during each measurement period.

Table 26.34: Summary of baseline survey results – location WMN_OnSS001

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
02/02/23	Daytime	54.8	48.7	54.4	67.9
	Evening	48.7	43.1	51.6	57.5
	Night-time	51.7	43.1	51.2	63.6
03/02/23	Daytime	54.9	50.1	55.4	70.1
	Evening	54.9	46.6	59.0	61.0
	Night-time	53.3	41.0	54.7	61.7
04/02/23 (Saturday)	Daytime	52.0	47.4	53.1	69.1
	Evening	48.3	41.5	50.5	57.7
	Night-time	48.4	40.1	51.5	60.7
05/02/23	Daytime	49.6	44.7	51.1	71.1
	Evening	46.0	37.9	48.9	55.7
	Night-time	48.7	34.6	50.9	60.6
06/02/23	Daytime	52.4	46.4	52.8	67.2
	Evening	47.6	38.9	49.6	56.3
	Night-time	51.5	37.2	51.3	62.1
07/02/23	Daytime	57.3	44.0	50.7	70.5
	Evening	47.1	40.6	49.5	55.4
	Night-time	48.4	35.4	51.6	61.5
08/02/23	Daytime	53.2	44.7	51.3	68.4
	Evening	46.2	41.0	48.9	56.3
	Night-time	48.7	37.1	47.8	59.2
09/02/23	Daytime	55.3	49.4	56.1	67.5
	Evening	-	-	-	-
	Night-time	-	-	-	-

Table 26.35: Summary of baseline survey results – location WMN_OnSS002

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
11/11/22	Daytime	46.8	44.7	48.0	66.4
	Evening	44.4	39.9	47.0	57.2
	Night-time	41.3	33.9	43.9	63.5
12/11/22 (Saturday)	Daytime	49.4	39.0	43.7	81.7
	Evening	40.8	36.6	43.8	54.1
	Night-time	37.3	29.8	34.7	73.3

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
13/11/22	Daytime	39.7	32.0	37.8	79.1
	Evening	35.5	30.1	35.3	46.3
	Night-time	33.6	25.8	31.0	61.8
14/11/22	Daytime	43.7	30.5	39.6	78.1
	Evening	33.2	28.1	33.4	62.7
	Night-time	40.0	34.4	41.9	64.9
15/11/22	Daytime	47.2	44.0	48.3	71.2
	Evening	48.3	37.6	42.7	84.5
	Night-time	41.0	34.2	40.3	63.5
16/11/22	Daytime	59.9	44.4	48.6	89.4
	Evening	-	-	-	-
	Night-time	-	-	-	-

Table 26.36: Summary of baseline survey results – location WMN_OnSS003

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
10/11/22	Daytime	54.5	48.6	56.8	72.3
	Evening	53.3	45.9	56.6	70.2
	Night-time	51.2	42.4	53.9	70.6
11/11/22	Daytime	56.0	49.9	57.7	86.0
	Evening	55.4	47.9	58.4	69.2
	Night-time	54.8	43.0	57.2	67.8
12/11/22 (Saturday)	Daytime	59.0	54.0	61.0	74.6
	Evening	56.3	48.6	59.4	67.9
	Night-time	52.6	44.3	55.9	66.4
13/11/22	Daytime	58.9	55.1	61.0	81.2
	Evening	55.7	49.2	58.7	66.4
	Night-time	53.5	38.8	55.6	66.0
14/11/22	Daytime	53.3	47.4	53.6	81.7
	Evening	53.9	46.1	57.3	69.4
	Night-time	55.1	40.8	56.9	68.5
15/11/22	Daytime	58.4	54.0	60.5	71.7
	Evening	56.9	47.3	59.4	82.8
	Night-time	-	-	-	-

Table 26.37: Summary of baseline survey results – location WMN_OnSS004

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
02/02/23	Daytime	65.6	59.5	67.9	92.4
	Evening	61.5	48.3	65.6	76.1
	Night-time	60.2	42.7	62.8	73.6
03/02/23	Daytime	66.2	61.0	68.5	91.0
	Evening	62.6	51.9	66.0	75.7
	Night-time	59.8	40.9	63.3	74.5
04/02/23 (Saturday)	Daytime	64.4	57.4	67.2	93.9
	Evening	60.4	46.4	64.2	80.7
	Night-time	59.8	43.0	63.4	87.9
05/02/23	Daytime	61.2	55.5	64.0	83.7
	Evening	62.0	50.6	65.1	75.3
	Night-time	59.5	39.3	61.8	75.1
06/02/23	Daytime	63.2	57.1	65.5	89.0
	Evening	60.6	48.9	63.3	72.7
	Night-time	60.1	41.6	62.4	72.9
07/02/23	Daytime	62.6	56.7	64.3	87.1
	Evening	61.6	52.1	65.3	74.1
	Night-time	58.4	39.5	61.9	72.7

Table 26.38: Summary of baseline survey results – location WMS_OnSS001

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
02/02/23	Daytime	53.8	40.5	50.5	81.9
	Evening	44.1	37.6	44.1	66.2
	Night-time	49.0	41.0	53.0	65.0
03/02/23	Daytime	50.8	39.2	49.9	80.3
	Evening	39.4	34.5	39.0	69.5
	Night-time	37.0	31.0	38.0	46.0
04/02/23 (Saturday)	Daytime	47.9	37.6	48.2	79.0
	Evening	38.9	34.7	40.1	62.6
	Night-time	42.0	35.0	44.0	58.0
05/02/23	Daytime	45.1	33.1	46.4	79.2
	Evening	37.6	23.6	27.8	67.4
	Night-time	38.0	26.0	32.0	41.0

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
06/02/23	Daytime	51.1	38.8	48.4	83.8
	Evening	39.4	33.1	38.7	66.9
	Night-time	39.0	30.0	34.0	44.0
07/02/23	Daytime	58.8	34.9	50.0	93.9
	Evening	34.9	30.4	36.4	62.6
	Night-time	39.0	30.0	38.0	46.0
08/02/23	Daytime	51.8	40.2	49.9	77.8
	Evening	42.0	37.4	44.4	64.2
	Night-time	43.0	38.0	44.0	50.0
09/02/23	Daytime	62.4	37.5	47.8	95.3
	Evening	-	-	-	-
	Night-time	-	-	-	-

Table 26.39: Summary of baseline survey results – location WMS_OnSS002

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
22/11/22	Daytime	39.4	36.5	39.4	68.7
	Evening	34.7	32.4	36.6	56.6
	Night-time	34.3	27.7	33.1	55.3
23/11/22	Daytime	52.4	37.7	44.1	82.4
	Evening	38.7	35.3	40.2	59.3
	Night-time	35.8	31.7	36.1	63.4
24/11/22	Daytime	51.1	40.9	47.0	80.7
	Evening	37.8	35.2	39.3	60.2
	Night-time	42.5	37.3	39.6	59.6
25/11/22	Daytime	41.5	35.7	39.5	79.4
	Evening	34.6	32.3	35.9	51.7
	Night-time	35.2	31.1	36.5	64.9
26/11/11 (Saturday)	Daytime	48.4	38.0	44.8	83.6
	Evening	49.2	42.6	52.4	64.3
	Night-time	48.3	34.7	42.8	67.3
27/11/22	Daytime	35.7	29.6	35.3	76.9
	Evening	31.0	28.2	32.6	54.7
	Night-time	43.0	28.4	34.6	82.8
28/11/22	Daytime	54.9	29.3	35.0	89.2
	Evening	29.1	26.1	29.9	64.3
	Night-time	27.5	21.4*	25.8	59.3

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
29/11/22	Daytime	43.2	26.0	37.4	71.4
	Evening	-	-	-	-
	Night-time	-	-	-	-
*NOTE: Level approaching noise floor of monitoring equipment, therefore caution should exercised when assessing to this level.					

Table 26.40: Summary of baseline survey results – location WMS_OnSS003

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
08/11/22	Daytime	49.9	41.7	51.4	81.6
	Evening	43.0	37.3	43.5	67.9
	Night-time	38.7	34.7	39.1	65.4
09/11/22	Daytime	47.7	42.0	47.3	77.4
	Evening	38.6	35.8	39.7	60.3
	Night-time	40.8	35.9	42.3	64.3
10/11/22	Daytime	49.5	42.6	49.4	75.5
	Evening	51.9	43.0	55.5	71.2
	Night-time	45.6	38.3	48.5	67.6
11/11/22	Daytime	45.7	39.3	47.2	73.2
	Evening	37.8	35.0	38.7	57.1
	Night-time	37.3	30.4	35.5	74.1
12/11/22 (Saturday)	Daytime	49.8	38.9	44.3	78.5
	Evening	41.9	34.8	42.4	70.1
	Night-time	39.5	28.6	38.1	71.6
13/11/22	Daytime	41.1	32.2	39.9	74.0
	Evening	31.6	28.5	32.6	45.9
	Night-time	37.0	26.5	30.2	73.7
14/11/22	Daytime	47.3	31.4	39.3	81.1
	Evening	33.8	29.4	35.8	52.4
	Night-time	43.8	35.8	45.1	78.2
15/11/22	Daytime	47.8	38.5	46.7	76.6
	Evening	48.6	36.1	42.5	82.6
	Night-time	43.9	36.3	42.7	82.6
16/11/22	Daytime	49.2	42.9	46.2	78.0
	Evening	-	-	-	-
	Night-time		-	-	-

Table 26.41: Summary of baseline survey results – location WMS_OnSS004

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
22/11/22	Daytime	47.6	39.9	45.6	71.1
	Evening	46.1	37.5	41.6	71.5
	Night-time	41.3	34.5	39.4	68.7
23/11/22	Daytime	52.1	42.1	47.5	81.5
	Evening	48.5	39.5	44.5	73.9
	Night-time	39.3	36.0	39.7	57.9
24/11/22	Daytime	53.6	43.4	49.8	86.5
	Evening	40.3	38.2	41.0	68.0
	Night-time	40.7	36.7	40.3	68.0
25/11/22	Daytime	49.0	40.8	47.1	73.6
	Evening	42.8	37.3	40.3	70.6
	Night-time	47.6	35.5	39.9	74.9
26/11/11 (Saturday)	Daytime	47.4	39.5	45.6	73.9
	Evening	42.2	38.4	41.8	71.3
	Night-time	38.3	35.2	38.3	56.4
27/11/22	Daytime	48.1	36.6	44.4	71.7
	Evening	44.4	34.7	38.3	71.7
	Night-time	38.6	33.3	38.6	65.0
28/11/22	Daytime	55.4	32.5	45.4	84.1
	Evening	44.7	27.0	33.4	72.9
	Night-time	25.8	22.0*	27.2	50.1
29/11/22	Daytime	52.5	27.1	53.1	75.5
	Evening	-	-	-	-
	Night-time	-	-	-	-

*NOTE: Level approaching noise floor of monitoring equipment, therefore caution should exercised when assessing to this level.

Table 26.42: Summary of baseline survey results – location WMS_OnSS005

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
02/02/23	Daytime	55.5	41.0	48.0	91.3
	Evening	43.8	39.4	42.9	75.8
	Night-time	46.6	40.0	44.1	79.8
03/02/23	Daytime	53.3	40.7	46.9	90.9
	Evening	44.2	38.2	41.6	75.7
	Night-time	40.4	37.2	41.1	72.5

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
04/02/23 (Saturday)	Daytime	50.9	39.4	43.9	86.7
	Evening	42.3	38.5	42.2	75.0
	Night-time	36.6	32.1	37.3	73.2
05/02/23	Daytime	47.4	34.0	41.8	83.4
	Evening	43.8	34.1	38.6	77.8
	Night-time	43.4	34.0	39.5	80.2
06/02/23	Daytime	55.5	40.1	48.5	89.8
	Evening	44.9	35.9	41.6	76.5
	Night-time	44.8	33.2	38.3	76.5
07/02/23	Daytime	59.6	38.8	47.6	92.2
	Evening	43.0	38.1	42.9	75.4
	Night-time	43.6	35.7	41.9	78.7
08/02/23	Daytime	54.5	40.8	49.2	89.4
	Evening	44.0	40.2	44.0	72.5
	Night-time	46.4	38.2	43.8	78.7
09/02/23	Daytime	61.2	38.4	47.1	102.2
	Evening	-	-	-	-
	Night-time	-	-	-	-

Table 26.43: Summary of baseline survey results – location WMS_OnSS006

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
08/11/22	Daytime	51.9	40.4	47.3	84.2
	Evening	42.9	37.2	43.6	69.9
	Night-time	40.0	34.8	41.7	63.6
09/11/22	Daytime	46.9	39.6	44.5	77.6
	Evening	39.8	36.4	41.9	54.9
	Night-time	40.6	35.3	42.2	61.7
10/11/22	Daytime	46.9	39.1	45.8	80.2
	Evening	46.3	38.6	49.0	61.6
	Night-time	42.2	36.3	44.2	66.8
11/11/22	Daytime	44.6	37.8	44.4	80.9
	Evening	38.1	35.5	39.7	57.8
	Night-time	35.6	29.7	35.8	56.2
12/11/22 (Saturday)	Daytime	41.0	36.8	43.0	64.8
	Evening	38.6	34.4	40.2	61.6
	Night-time	30.7	25.3	29.6	48.6

Date	Period	$L_{Aeq,T}$	Median L_{A90}	Median L_{A10}	L_{Amax}
13/11/22	Daytime	37.2	30.9	37.7	71.0
	Evening	32.2	28.3	33.8	50.1
	Night-time	29.4	24.3	30.3	53.3
14/11/22	Daytime	45.1	29.1	39.3	81.7
	Evening	31.5	27.7	32.0	48.1
	Night-time	38.6	33.6	40.3	57.5
15/11/22	Daytime	45.8	38.4	45.2	77.0
	Evening	48.7	35.7	41.2	84.0
	Night-time	39.2	33.3	40.2	57.3
16/11/22	Daytime	49.9	43.0	47.5	76.6
	Evening	-	-	-	-
	Night-time	-	-	-	-

Soundscape

26.4.99 The general soundscape at the measurement locations was recorded during equipment installation and collection and is shown in Table 26.44.

Table 26.44: General soundscape

Location	Soundscape
WMN_OnSS001	Road noise from A16 dominant. Steady traffic approx 60mph. Planes overhead. Birdsong. Occasional vehicle driving down road nearby.
WMN_OnSS002	Trees rustling in wind, sirens in the distance. Road traffic noise from A16 dominant noise source when no wind. Birdsong.
WMN_OnSS003	Road noise from A16 dominant noise source. Trees rustling in wind. Sound of farmyard machinery. Cows audible. Faint hum from powerline nearby.
WMN_OnSS004	Road noise dominant from A16. Steady flow of traffic approx. 60mph. Mainly cars and HGV's. High altitude aircraft overhead and military jets.
WMS_OnSS001	Farmyard machinery in farm next door dominant noise source. Also some banging. Bird song. Road noise in distance, most likely A16. Trees rustling in wind. Occasional car driving down road approx 30mph.
WMS_OnSS002	Road noise dominant in distance. Bird song, trees rustling in wind. Gunshots in distance. Tractor in nearby field.
WMS_OnSS003	Trees and grass rustling in wind, occasional jet overhead, gunshots in distance. Occasional dog barking.
WMS_OnSS004	Road noise in distance dominant. Gunshots in distance. Dogs barking in back garden. Bird song. Trees rustling in wind. Tractor audible in field opposite.
WMS_OnSS005	Farm machinery and road noise audible in distance - A16. Bird song. Planes overhead. Occasional car travelling down Marsh Road approx 30-40mph.
WMS_OnSS006	Trees and grass rustling in wind, road traffic in distance occasionally audible, gunshots in distance.

Evaluation of WMN and WMS Baseline Sound Levels

26.4.100 The noise-sensitive receptors situated close to the WMN and WMS OnSS options would potentially be impacted from both construction and operational activities, therefore it is necessary to evaluate the measured baseline levels in conjunction with:

- The ABC Method contained in BS 5228:2009+A1:2014 to calculate the daytime and weekend construction noise threshold limits; and
- BS 4142:2014+A1:2019 to calculate the background sound levels to be utilised for the operational assessment at the residential receptors.

WM North and South OnSS Options - Ambient Levels and Threshold Limits for Construction Noise Assessment

26.4.101 It has been confirmed that the construction of the onshore works and construction-related traffic movements to or from the site of the relevant work shall only take place between 0700 hours and 1900 hours Monday to Saturday with no activity on Sundays or bank holidays. construction hours

26.4.102 Receptors will therefore potentially be impacted during the daytime and weekend periods (after 13:00 on a Saturday) from construction operations, including trenchless drilling techniques. Therefore, it is necessary to evaluate the measured baseline levels in conjunction with the ABC Method contained in BS 5228-1 to calculate the construction noise threshold limits.

26.4.103 With reference to Table 26.2 and the lowest measured average ambient level at each monitoring location during the daytime and night-time, the calculated threshold limits are shown in Table 26.45.

26.4.104 It should be noted that the measured ambient sound levels have been rounded to the nearest decibel.

Table 26.45 Calculated construction noise threshold limits, dB

Location	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$	Calculated Threshold Value $L_{Aeq,T}$
Noise sensitive receptors representative of Location WMN OnSS001	Daytime	50	65
	Weekend	52	55
Noise sensitive receptors representative of Location WMN OnSS002	Daytime	40	65
	Weekend	49	55
Noise sensitive receptors representative of Location WMN OnSS003	Daytime	53	65
	Weekend	59	65
Noise sensitive receptors representative of Location WMN OnSS004	Daytime	61	65
	Weekend	64	65
Noise sensitive receptors representative of Location WMS OnSS001	Daytime	45	65
	Weekend	48	55

Location	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$	Calculated Threshold Value $L_{Aeq,T}$
Noise sensitive receptors representative of Location WMS OnSS002	Daytime	36	65
	Weekend	48	55
Noise sensitive receptors representative of Location WMS OnSS003	Daytime	41	65
	Weekend	50	55
Noise sensitive receptors representative of Location WMS OnSS004	Daytime	47	65
	Weekend	47	55
Noise sensitive receptors representative of Location WMS OnSS005	Daytime	47	65
	Weekend	51	55
Noise sensitive receptors representative of Location WMS OnSS006	Daytime	37	65
	Weekend	41	55
Note: Weekend period defined as between 13:00 and 19:00 on a Saturday			

WMN and WMS OnSS Options - Residential Receptor Background Sound Levels

26.4.105 The representative daytime and night-time background sound levels (L_{A90}) which will be utilised as the bases for the operational noise assessment of the WMN and WMS OnSS options on the residential receptors are shown in Table 26.46.

26.4.106 The representative background levels are the lowest daytime and night-time median L_{A90} levels measured and are shown in Table 26.46 with the lowest measured average ambient sound level for day- and night-time periods.

26.4.107 It should be noted that the measured background sound levels have been rounded to the nearest decibel.

Table 26.46: Representative background sound levels, dB

Location	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$	Representative Background Sound Level L_{A90}
Noise sensitive receptors representative of Location WMN_OnSS001	Daytime	49	41
	Night-time	48	35
Noise sensitive receptors representative of Location WMN_OnSS002	Daytime	39	30
	Night-time	34	26
Noise sensitive receptors representative of Location WMN_OnSS003	Daytime	54	47
	Night-time	51	39
Noise sensitive receptors representative of Location WMN_OnSS004	Daytime	62	54
	Night-time	58	39

Location	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$	Representative Background Sound Level L_{A90}
Noise sensitive receptors representative of Location WMS_OnSS001	Daytime	44	32
	Night-time	37	26
Noise sensitive receptors representative of Location WMS_OnSS002	Daytime	35	26
	Night-time	28	21*
Noise sensitive receptors representative of Location WMS_OnSS003	Daytime	40	31
	Night-time	37	27
Noise sensitive receptors representative of Location WMS_OnSS004	Daytime	47	27
	Night-time	26	22*
Noise sensitive receptors representative of Location WMS_OnSS005	Daytime	47	34
	Night-time	37	32
Noise sensitive receptors representative of Location WMS_OnSS006	Daytime	36	29
	Night-time	29	24
*NOTE: Level approaching noise floor of monitoring equipment, therefore caution should exercised when assessing to this level.			

Baseline Data Limitations and Uncertainty

26.4.108 As advised in BS 4142:2014+A1:2019, areas of uncertainty associated with the measurement of baseline sound levels include:

- The complexity and level of variability of the residual acoustic environment;
- The location(s) selected for taking the measurements;
- The distance between sources of sound and the measurement location and intervening ground conditions;
- The number of measurements taken;
- The measurement time intervals;
- The range of times when the measurements have been taken;
- The range of suitable weather conditions during which measurements have been taken;
- The measurement method and variability between different practitioners in the way the method is applied;
- The level of rounding of each measurement recorded; and
- The instrumentation used.

26.4.109 With reference to the above, the measurement uncertainty was minimised during the baseline sound survey as follows:

- Baseline sound measurements were taken at positions representative of the noise-sensitive receptors to the landfall, the LN and WM onshore ECC and the LN, WMN and WMS OnSS options;
- The measurement positions were located away from reflecting surfaces and as far as reasonably practicable leafy vegetation;
- The long-term measurements included daytime and night-time periods for typical midweek and weekend periods;
- The short-term daytime measurements were only completed at the receptors which are not going to be impacted by night-time operations;
- A weather station was installed at six locations representative of the long-term monitoring locations so the prevailing weather conditions could be determined and help inform the assessment; and
- The instrumentation was suitable according to BS EN 61672-1.

26.4.110 Further to above, and following the completion of the baseline monitoring, the following has been noted regarding the baseline data limitations and uncertainty:

- Baseline sound levels were measured at all the locations, and periods reviewed by the relevant LPAs following the submission of a baseline survey scoping document in November 2022;
- The sound level meters were field calibrated before the start of relevant measurement period and at the end of the measurement and no significant drifts in calibration were observed;
- All the sound level meters utilised for the measurements operated normally throughout the survey period and to the best of the Applicant's knowledge were not interfered with; and
- Following analysis of the data, it is considered that the measured baseline sound levels throughout the survey were representative of the prevailing sound climate at the nearest noise-sensitive receptors to the landfall, the LN and WM onshore ECC and the LN, WMN and WMS OnSS options.

26.4.111 With reference to the above, it is therefore considered that the uncertainty and limitations regarding the baseline data were kept to a minimum as far as reasonably practicable.

Worst Case Approach to Establish Baseline

26.4.112 As outlined within this section, the baseline data has been utilised to calculate limits for both the construction and operational assessments. The limits have been based on:

- The lowest average ambient sound levels measured at the relevant locations for the construction noise threshold limits; and

- The lowest median background sound levels measured at the relevant locations for the operational noise from the LN, WMN and WMS OnSS options.

26.4.113 With reference to the above, it is therefore considered a worst case approach has been adopted regarding the baseline data.

Evolution of the Baseline (Future Baseline)

26.4.114 The baseline noise conditions are not expected to evolve significantly between now and the point of impact over the Project lifetime.

26.4.115 It also considered that the other proposed developments in the area, considered within the cumulative assessment, would not have a significant impact on the evolution of the baseline sound levels.

26.4.116 Provided the noise and vibration levels generated by the construction and the operation of the Project development are mitigated suitably (i.e., so, at worst, a minor impact magnitude is predicted) then is it considered that there would be no significant impact on the future baseline due to the construction and operation of the Project development.

26.5 Basis of Assessment

Impacts Scoped in for Assessment

26.5.1 In line with the Scoping Opinion, and based on the receiving environment, expected parameters of the Project (Volume 1, Chapter 3: Project Description), and expected scale of impact/potential for a pathway for effect on the environment, the following impacts have been scoped into the assessment:

- Construction:
  - Impact 1: Temporary noise effects of construction of landfall on human and ecological receptors;
  - Impact 2: Temporary noise effects of construction of the onshore LN and WM ECCs on human and ecological receptors;
  - Impact 3: Temporary noise effects of construction of onshore LN, WMN and WMS OnSS options on human and ecological receptors;
  - Impact 4: Temporary noise effects of construction traffic;
  - Impact 5: Temporary noise and vibration effects of trenchless techniques to include watercourse crossings on human and ecological receptors; and
  - Impact 6: Temporary vibration effects of the foundation construction (piling) of the onshore LN, WMN and WMS OnSS options on human receptors.
- Operation and maintenance:
  - Impact 1: Operational noise effects of the onshore LN, WMN and WMS OnSS options on human and ecological receptors;
  - Impact 2: Vibration effects of the onshore LN, WMN and WMS OnSS options on human. receptors; and

- Cumulative noise and vibration assessment.

- Decommissioning:
  - Impact 1: Noise and vibration effects of all decommissioning activities.

Impacts Scoped Out of Assessment

26.5.2 In line with the Scoping Opinion, and based on the receiving environment, expected parameters of the Project (Volume 1, Chapter 3: Project Description), and expected scale of impact/potential for a pathway for effect on the environment, the following impacts have been scoped out of the assessment:

- Construction:
  - Impact 1: Noise and vibration from construction and decommissioning of the offshore elements on onshore noise sensitive receptors.

- Operation and maintenance:
  - Impact 1: Noise and vibration from the underground cable;
  - Impact 2: Operation of the offshore elements on onshore noise sensitive receptors; and
  - Transboundary noise and vibration effects

Realistic Worst Case Scenario

26.5.3 The maximum design scenarios (MDS) identified in Table 26.47 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the details provided in the project description (Volume 1, Chapter 3). Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the project design envelope, be taken forward in the final design scheme.

26.5.4 It should be noted that the MDS is based on the Project information available at the time of the drafting of the PEIR and will be further defined as the Project develops to the ES stage. It is likely to be necessary to install sheet piles, by vibration piling, as part of the excavation of some joint bays, where ground conditions are found to require this level of support. Following site investigations, this will be further described in the ES.

26.5.5 With regards to trenchless techniques, to represent a MDS for noise and vibration it has been assumed that trenchless techniques will be undertaken at all the major crossing points including water crossings.

Table 26.47: Maximum design scenario for Noise and Vibration for the Project alone

Potential effect	Maximum adverse scenario assessed	Justification
Construction		
Temporary noise effects of construction of landfall (human receptors)	Assumed all elements of plant used in each activity operating in the same location at the same time. Resultant noise level for each activity compared and the noisiest selected. Area source of the combined sound power level for the noisiest activity (site preparation works) positioned at the extents of the onshore PEIR boundary.	No defined landfall area provided, construction activities operating at the extents of the onshore PEIR boundary which will result in greater noise impacts.
	Trenchless drilling works (including vibration piling) modelled as an area source in a drilling compound measuring 40m by 40m. The area source would generate the total noise level from all trenchless drilling operations at the extents of the onshore PEIR boundary.	No defined trenchless drilling area provided, activities operating at the extents of the onshore PEIR boundary which will result in greater noise impacts.
	Weekend assessment undertaken for landfall construction operations including trenchless drilling.	Saturday afternoon (13:00 to 19:00 hours) construction operations are proposed (no evening or night-time construction operations are proposed).
Temporary noise effects of construction of the onshore ECCs	Assumed all elements of plant used in each activity operating in the same location at the same time. Resultant noise level for each activity compared and the noisiest selected. Area source measuring 100m long by 40m wide generating the combined sound power level for the noisiest activity placed at the extents of the onshore PEIR boundary.	Considered an MDS as plant associated with the nosiest phase (site preparation) of onshore ECC construction works operating within a relatively small area. Onshore ECC not defined for PEIR, construction activities operating at the extents of the onshore PEIR boundary which will result in greater noise impacts.

Potential effect	Maximum adverse scenario assessed	Justification
	Weekend assessment undertaken for onshore ECC construction operations including trenchless drilling.	Saturday afternoon (13:00 to 19:00 hours) construction operations are proposed (no evening or night-time construction operations are proposed).
	Trenchless drilling works (including vibration piling) modelled as an area source in a drilling compound measuring 40m by 40m. The area source would generate the total noise level from all trenchless drilling operations at the extents of the onshore PEIR boundary.	No defined trenchless drilling area provided, so activities operating at the extents of the onshore PEIR boundary will result in greater noise impacts.
Temporary noise effects of construction of onshore OnSSs	Assumed all elements of plant used in each phase operating in the same location at the same time. Resultant noise level for each phase compared and the noisiest phase for each workflow selected. Area source of the combined sound power level for the noisiest phase placed at the extents of each OnSS zone. Each area source approximately 25% of the total area of the OnSS zone.	No defined OnSS footprints provided, so activities operating at the extents of each OnSS zone will result in greater noise impacts.
	Weekend assessment undertaken for OnSS construction operations	Saturday afternoon (13:00 to 19:00 hours) construction operations are proposed.
	The construction noise and vibration assessments assume that impact piling will be required to construct OnSS the foundations.	Impact piling is likely to generate relatively high levels of noise and vibration compared to other types of foundation construction methods.
Temporary noise effects of construction traffic	Maximum flows expected on each link within the study area assessed.	The values presented will result in the highest noise impact which would occur during the busiest month for each link. During the majority of the period of the construction works the noise impacts will therefore be lower.

Potential effect	Maximum adverse scenario assessed	Justification
Temporary vibration effects of trenchless drilling	Trenchless drilling and vibratory piling will be carried out at the landfall and various locations along the onshore ECCs. Assessment assumes drilling and piling rig will be positioned at the extents of the onshore PEIR boundary.	No defined landfall area or ECC provided, drilling activities at the extents of the onshore PEIR boundary which will result in greater noise impacts.
Temporary vibration effects of the construction of the OnSS's foundations	Impact piling will be required for the OnSS foundations at each boundary of each OnSS zone closest to each Vibration Sensitive Receptor (VSR).	Impact piling is likely to generate relatively high levels of vibration compared to other types of foundation construction methods. No defined OnSS footprint provided, closest approach will lead to greater vibration impacts.
Operation and Maintenance		
Operational noise effects of the OnSS options	Predictions assume all the equipment is operating within the OnSS footprint area (210m by 190m). The footprint area has then been positioned at the extents of the PEIR boundary at its closest approach to each Noise Sensitive Receptor (NSR) for each OnSS option.	No OnSS design available, placing all the plant within the footprint area at the extents of the PEIR boundary at its closest approach to each NSR, for each OnSS option, will lead to greater noise impacts.
Decommissioning		
Noise and vibration effects of all decommissioning activities	Decommissioning activities are not anticipated to exceed the construction phase worst case criteria assessed. In addition, it is also recognised that policy, legislation and local sensitivities constantly evolve, which will limit the relevance of undertaking an assessment at this stage.	Decommissioning considered less intense than construction operations. Assumed that no night-time or piling operations would be associated with decommissioning works.
Cumulative Effects		
Cumulative noise and vibration effects from	Maximum design parameters/extents of any proposed construction areas have been used for the purposes of defining potential noise and vibration impacts.	This ensures that all potential scenarios and associated impacts have been

Potential effect	Maximum adverse scenario assessed	Justification
temporary concurrent construction activities		assessed for the purposes of providing a worst case cumulative assessment.
Cumulative noise and vibration effects from the concurrent operational developments	Maximum design parameters/extents of any proposed operational developments have been used for the purposes of defining potential noise and vibration impacts.	

Embedded Mitigation

26.5.6 Mitigation measures that were identified and adopted as part of the evolution of the Project design (embedded into the Project design) and that are relevant to Noise and Vibration are listed in Table 26.48. General mitigation measures, which would apply to all parts of the project, are set out first. Thereafter mitigation measures that would apply specifically to Noise and Vibration issues associated with the landfall, ECCs, temporary construction compounds (TCCs), and OnSS options are described separately.

Table 26.48: Embedded mitigation relating to noise and vibration.

Project phase	Mitigation measures embedded into the project design
General	
Project Design	As far as reasonably practicable, routing of the ECC and locations of the TCCs and OnSS to avoid key areas of sensitivity.
Construction	
Construction noise and vibration all onshore elements	Commit to reducing noise to a minor level of effect which may include mitigation such as acoustic screening, limiting traffic movements to specific times or routes. Specific measures will be detailed in the final Noise and Vibration Management Plan.
Operation and Maintenance	
Operational noise from the OnSS options	As far as reasonably practicable, OnSS options sited at locations to avoid key areas of sensitivity.
Decommissioning	
Noise and vibration levels generated by decommissioning operations	Not anticipated that any further mitigation measures would be required, other than those associated with construction operations.

26.5.7 During the detailed design, additional mitigation measures can be specified (and agreed with the LPAs through approval of the final NVMP), to further reduce the noise impact of the Project. These measures relate to the specifics of the detailed design, and so cannot be accurately included in the assessment at this stage. However, examples of what these mitigation measures may be, and an indication of how much mitigation they may provide, are given in Table 26.49 below.

Table 26.49: Potential detailed design mitigation measures relating to noise and vibration.

Mitigation Measure	Indicative Noise Level Reduction	Justification for indicative Noise Level Reduction
Localised acoustic screening providing partial line of sight between noise source and receiver	Up to 5dB(A)	Section F.2.2.2 of BS 5228:2009+A1:2014 states: *'if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5dB when the top of the plant is just visible to the receiver over the*
Localised acoustic screening preventing any line of sight between noise source and receiver	Up to 10dB(A)	

Mitigation Measure	Indicative Noise Level Reduction	Justification for indicative Noise Level Reduction
		noise barrier, and of 10dB when the noise screen completely hides the sources from the receiver'
Fitting more efficient exhaust sound reduction equipment to earth moving plant	5 to 10dB(A)	Table B.1 of BS 5228:2009+A1:2014
Enclose breakers and rock drills in portable or fixed acoustic enclosures with suitable ventilation	Up to 20dB(A)	Table B.1 of BS 5228:2009+A1:2014
Use rotary drills and boring plant inside acoustic shed with adequate ventilation	Up to 15dB(A)	Table B.1 of BS 5228:2009+A1:2014
Reduction of simultaneous use of plant	Up to 3dB(A)	Halving the amount of plant being utilised simultaneously thus halving the sound energy being generated could provide a 3dB reduction.
Re-positioning plant as far away from NSRs as reasonably practicable	Up to 6dB(A)	Doubling the distance between a noise source and a receiver can provide up to a 6dB reduction.
Not using particularly noisy items of plant pieces at night as far as reasonably practicable	Up to 3dB(A)	Halving the amount of plant being utilised simultaneously, thus halving the sound energy being generated, could provide a 3dB reduction.
Limiting or eliminating certain works during more sensitive periods	Varies	Would depend on what works/plant was limited or eliminated.
Use of electric or hybrid construction plant	Varies	Dependant on item of plant.

26.5.8 Final mitigation measures would be informed by detailed design post consent and included within the final NVMP which would be submitted for approval by the LPAs as part of the final CoCP that is secured within the DCO.

26.6 Assessment Methodology

26.6.1 The Noise and Vibration assessment methodologies, set out in the following sections, were approved by The Inspectorate within their Scoping Opinion as outlined in Table 26.5.

Construction Noise and Vibration Assessments

26.6.2 Construction noise and vibration assessments have been undertaken for the landfall area, the LN and WM ECCs and the LN and WM OnSS options. The assessments have been undertaken in conjunction with BS 5228:2009+A1:2014, *Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1 Noise and Part 2 Vibration*.

26.6.3 Where applicable, noise limits have been set at the identified NSRs in conjunction with the measured baseline levels and the ABC Method contained in BS 5228-1:2009+A1:2014.

26.6.4 Construction noise levels have been predicted at the identified NSRs using the Cadna/A noise modelling software and the calculation algorithms contained in BS 5228:2009+A1:2014, Part 1 and assessed against the specified limits.

26.6.5 The assessment includes consideration of noise from the construction activities, including the use of plant and machinery, construction delivery traffic and excavation works at the landfall, along each ECC and each OnSS option substation areas. In addition, trenchless drilling activities have been included at the landfall and along each ECC.

26.6.6 Vibration from piling operations associated with the trenchless drilling activities and construction of the OnSS options have been assessed.

26.6.7 Construction related traffic using the local road network have been assessed accordance with the Design Manual for Roads and Bridges (DMRB). The assessment undertaken includes all roads where it is anticipated that noise levels may change from construction traffic.

26.6.8 For each link, the Basic Noise Level (BNL) has been established for the "*With Construction Traffic"* and *"Without Construction Traffic"* scenarios. The BNL is the $L_{A10,T}$ dB noise level at 10m from the kerb of the road assessed.

26.6.9 The BNL results for each link have been tabulated and the impact and significance can be determined.

26.6.10 It is noted that DMRB has since been superseded by *LA 111 – Noise and Vibration*; however, as the calculations associated with the assessment are being undertaken in conjunction with CRTN and the impact significance contained within *LA 111* is identical to the one contained within DMRB, this method remains valid.

26.6.11 Where adverse impacts have been identified, specific mitigation measures, a suite of measures, or further design refinement have been proposed for consideration. It is anticipated that following provision of this PEIR and prior to submission of the ES, design refinement and/or mitigation options can be applied to reduce any adverse impact to a level that is not significant.

26.6.12 Vibration levels from construction works (i.e., trenchless drilling/piling) have been predicted at the nearest VSRs in accordance with the methodologies contained in BS 5228:2009+A1:2014, Part 2 and assessed against the guidance levels shown in Table B.1 of the guidance.

Operational Noise

26.6.13 Noise generated by the onshore substations has been predicted at the nearest residential NSRs using the Cadna/A noise modelling software and the methodology in ISO 9613-2:1996, *Acoustics – Attenuation of Sound during Propagation Outdoors*, and assessed at any identified residential receptors in accordance with BS 4142:2014+A1:2019 – *Methods for Rating and Assessing Industrial and Commercial Sound*, whereby sound levels associated with the operation of the substation are compared to measured daytime and night-time background sound levels at the closest receptors.

26.6.14 A subjective opinion of the potential acoustic features has also been included, and this considers corrections for tonal, impulsive and/or intermittent characteristics.

26.6.15 The results of the assessment have been used to determine whether noise levels generated by the OnSS would lead to adverse impacts at the nearest NSRs.

26.6.16 With regards to any identified commercial receptors, noise levels from the OnSS have been predicted at the nearest NSRs using the Cadna/A noise modelling software and the methodology in ISO 9613-2:1996, Acoustics – Attenuation of Sound during Propagation Outdoors, and assessed at any identified commercial receptors in accordance with The IEMA *'Guidelines for Environmental Noise Impact Assessment'.*

26.6.17 The assessments indicate whether additional mitigation is required to reduce any identified impacts. As with construction noise, where adverse impacts have been identified, specific mitigation measures are detailed. It is expected that design refinement and/or mitigation options can be applied to the design presented within this PEIR to reduce the impact to a level that is not significant.

Assessment of Ecological Receptors

26.6.18 The noise generated by construction operations and the operational noise from the OnSS on International or National ecological sites situated near the landfall, ECC and OnSS have been predicted and assessed in accordance with the limits contained in AQTAG09 (Air Quality Technical Advisory Group 09), *Guidance on the effects of industrial noise on wildlife,* which is intended to be used to assess the potential adverse impact of sound, of an industrial and/or commercial nature on wildlife.

Cumulative Impact Assessment

26.6.19 The impact of the construction operations associated with the landfall and ECC and the construction and operation of the OnSS are assessed cumulatively with any other planned developments in the vicinity.

Assessment Criteria, Assignment of Significance and Magnitude

26.6.20 The criteria for the construction and operational noise and vibration assessments and the associated assignment of significance is outlined in Table 26.50 to Table 26.58.

Sensitivity of the Environment

26.6.21 The sensitivity/importance of the environment is defined in Table 26.50. The sensitivity/importance of the receptor is a major consideration within the assessment and will be used to inform the significance of effect, as shown in Table 26.58.

Table 26.50: Sensitivity/importance of the environment.

Receptor Sensitivity/Importance	Description/Reason
High	Residential properties (night-time), schools and healthcare buildings (daytime). Designated Ecological Sites such as Special Areas of Conservation (SAC), SPA, SSSI.
Medium	Residential properties (daytime), leisure facilities.
Low	Offices and other non-noise producing employment areas.
Negligible	Industrial areas.

Overall Impact Magnitude

26.6.22 The overall magnitude of impact is defined in Table 26.51. The impact magnitude categories outlined below will be used to inform the significance of effect, as shown in Table 26.58.

Table 26.51: Overall impact magnitude definitions

Magnitude	Description/reason
High	Fundamental, permanent/irreversible changes over the whole receptor, and/or fundamental alteration to key characteristics or features of the particular receptors character or distinctiveness.
Medium	Considerable, permanent/irreversible changes over the majority of the receptor, and/or discernible alteration to key characteristics or features of the particular receptors character or distinctiveness.
Low	Discernible, temporary (throughout project duration) change over a minority of the receptor, and/or limited but discernible alteration to key characteristics or features of the particular receptors character or distinctiveness.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the particular receptor's character or distinctiveness.

Construction Noise Impact Magnitude

26.6.23 The impact of construction noise upon existing residential receptors will be determined with reference to the ABC method presented in BS 5228-1:2009+A1:2014. The impact of construction noise upon existing residential receptors is as detailed in Table 26.52.

Table 26.52: Construction noise impact magnitude

Impact Magnitude	Exceedence in the $L_{Aeq,T}$ Noise Level
High	Threshold value exceeded by 5dB or more.
Medium	Threshold value exceeded by a maximum of 4dB.
Low	Threshold value exceeded by a maximum of 2dB.
Negligible	Threshold value not exceeded.

Construction Traffic Noise Impact Magnitude

26.6.24 The impact of the change in noise level will be determined with reference to the classification of magnitude of impacts used in short-term traffic noise assessments presented in the DMRB Volume 11 Section 3 Part 7 Noise and Vibration and is shown in Table 26.53.

Table 26.53: Construction traffic noise impact magnitude

Impact Magnitude	Description
High	Change in $L_{A10, 18\ hour}$ noise level of 5.0dB or more.
Medium	Change in $L_{A10, 18\ hour}$ noise level between 3.0 and 4.9dB.
Low	Change in $L_{A10, 18\ hour}$ noise level between 0.1 and 2.9dB.
Negligible	No change in $L_{A10, 18\ hour}$ noise level.

Construction Vibration Impact Magnitude

26.6.25 The impact of construction vibration upon existing residential receptors will be determined with reference to BS 5228-2:2009+A1:2014. The impact of construction vibration upon residential receptors is as detailed in Table 26.54.

Table 26.54: Construction vibration impact magnitude.

Impact Magnitude	Description
High	10.00mm/s or more
Medium	Between 1.0 to 9.9mm/s
Low	Between 0.3 to 0.9mm/s
Negligible	Between 0.01 to 0.3mm/s

Operational Noise Impact Magnitude

Residential Receptors

26.6.26 The impact of operational noise from the OnSS upon existing residential receptors will be determined with reference to BS 4142:2014+A1:2019 and absolute noise levels recommended by the World Health Organisation.

26.6.27 Based on the guidance presented in BS 4142:2014+A1:2019 and absolute noise levels recommended by the World Health Organisation, the impact of operational noise upon existing residential receptors is detailed in Table 26.55.

Table 26.55: Operational noise impact magnitude – residential receptors.

Impact Magnitude	Description
High	Rating level is 10dB(A) or more above the rating level limit or change in ambient noise level (L_{Aeq}) of 10dB or more.
Medium	Rating level is between 6 and 9dB(A) above the rating level limit or change in ambient noise level (L_{Aeq}) of between 6 and 9dB.
Low	Rating level is between 1 and 5dB(A) above the rating level limit or change in ambient noise level ($_{LAeq}$) of between 1 and 5dB.

Impact Magnitude	Description
Negligible	Rating level is equal to or below the rating level limit, or no change in ambient noise level (L_{Aeq}).

Commercial Receptors

26.6.28 The impact of operational noise from the OnSS upon existing commercial receptors will be determined with reference to Table 7.10 of the IEMA guidelines.

26.6.29 The impact of operational noise upon existing commercial receptors is detailed in Table 26.56.

Table 26.56: Operational noise impact magnitude – commercial receptors

Impact Magnitude	Description
High	Change in ambient sound level ($L_{Aeq,T}$) of 10dB or more.
Medium	Change in ambient sound level ($L_{Aeq,T}$) between 5.0 and 9.9dB.
Low	Change in ambient sound level ($L_{Aeq,T}$) between 3 and 4.9dB.
Negligible	No change in ambient sound level ($L_{Aeq,T}$) of 2.9dB or less.

Ecological Receptors

26.6.30 The impact of construction and operational noise on ecological receptors will be determined with reference to the AQTAG 09 guidance. The impact of construction noise upon ecological receptors is as detailed in Table 26.57.

Table 26.57: Construction and operational noise impact magnitude – ecological receptors

Impact Magnitude	Exceedence in the $L_{Aeq,T}$ Noise Level
High	Threshold value exceeded by 5dB or more.
Medium	Threshold value exceeded by a maximum of 4dB.
Low	Threshold value exceeded by a maximum of 2dB.
Negligible	Threshold value not exceeded.

Significance of Effect

26.6.31 Sensitivity of the receptor and magnitude of impact have then been considered collectively to determine the potential effect and its significance. The collective assessment represents a 'considered assessment' by the assessor, based on the likely sensitivity of the receptor to the change (e.g., is a receptor present which would be affected by the change), and then the magnitude of that change.

26.6.32 Table 26.58 is used as a guide to determine the level of effect; **major** and **moderate** effects are considered to be 'significant' in terms of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations).

26.6.33 It is considered that the Project would not lead to any beneficial noise and vibration effects; therefore, this has not been considered within Table 26.58.

26.6.34 In addition, based on professional judgement, it is considered that, for the construction phase, operational phase and decommissioning phase, short-term is defined as less than one-month, medium-term is defined as one month to two years, and long-term is defined as greater than three years.

Table 26.58: Matrix to determine effect significance.

		Magnitude of impact			
		Negligible	*Low*	*Medium*	*High*
Sensitivity of receptor	*Negligible*	Negligible (Not significant)	Negligible (Not significant)	Minor (Not significant)	Minor (Not significant)
	Low	Negligible (Not significant)	Minor (Not significant)	Minor (Not significant)	Moderate (Significant)
	Medium	Minor (Not significant)	Minor (Not significant)	Moderate (Significant)	Major (Significant)
	High	Minor (Not significant)	Moderate (Significant)	Major (Significant)	Major (Significant)

Assumptions and Limitations

26.6.35 The main uncertainties and technical difficulties encountered during the completion of the noise and vibration assessment are outlined below. For the purposes of this chapter, they have been divided into:

- Construction Noise and Vibration Assessment; and
- Operational Noise and Vibration Assessment.

Construction Noise and Vibration Assessments

26.6.36 Construction noise and vibration predictions are based on the anticipated programme and construction methods at this stage in the design. These values will be revisited following consultation and as the Project design evolves.

26.6.37 Where elements of the design are not fully developed, it has been necessary to make assumptions based on professional judgement and experience of other Round 4 OFW projects, regarding some aspects of the construction process. These are considered to be precautionary and reflect the level of information that is available at this stage in the development of the Project, noting that only the PEIR boundary has been defined at this stage, with the exact positions of the landfall, ECC, and OnSS boundaries yet to be determined.

26.6.38 With reference to the above, it has therefore been assumed that the construction plant associated with each stage of the development will operate at the extents of the PEIR boundary for the landfall, ECC options, and each OnSS option.

26.6.39 In addition, the details of the nearest NSRs and VSRs to the landfall and ECC construction area have yet to be defined; consequently, the construction noise and vibration impacts have been based on 'stand-off' distances from the extents of the landfall and ECC PEIR boundaries which define where adverse noise and vibration impacts are likely to occur.

26.6.40 The assessments where stand-off distances have been considered are as follows:

- Daytime and weekend construction noise for the landfall and ECC; and
- Daytime and weekend construction noise and vibration for trenchless drilling at the landfall and along each ECC.

26.6.41 With regards to the OnSS options, these areas are more defined, as a consequence the construction noise assessment has assumed that all the construction plant is working in an area equivalent to 25% of each defined OnSS search area.

26.6.42 The OnSS vibration assessment has assumed that the piling rig would be operating at the extents of the PEIR boundary at its closest approach to each VSR.

26.6.43 This approach has been adopted as currently the electrical footprints and associated plant layouts are not available for the Project development and therefore it has had to be assumed that the piling rig could operate anywhere within each OnSS zone.

26.6.44 Further information on the anticipated construction programme is provided in Volume 1, Chapter 3: Project Description.

Operational Noise Assessments

26.6.45 Operational noise predictions have been based on a reasonable worst case scenario, where all the equipment is operating within the OnSS footprint area (210m by 190m); the footprint area has then been positioned at the extents of the PEIR boundary at its closest approach to each NSR for each OnSS option.

26.6.46 This approach has been adopted as currently final substation locations and plant layouts are not available for the Project development and therefore it has had to be assumed that the plant could operate anywhere within each OnSS zone.

26.6.47 It is considered that the above is a very worst case scenario and reflects the level of information that is available at this stage in the development; as the Project develops further this can be refined, subsequently reducing the potential for adverse noise impacts from the operation of the OnSS options.

26.7 Impact Assessment

Construction Noise

26.7.1 A development of this nature has the potential to generate noise and vibration during the construction phases should appropriate mitigation not be employed. However, disruption due to construction-related noise and vibration is a localised phenomenon and is both temporary and intermittent in nature. The techniques available to predict the likely noise and vibration effects from construction sites are necessarily based on quite detailed information on the type and number of plant being used, their location within the site and the length of time they are in operation.

26.7.2 During the construction of the Project, noise from construction activities will inevitably be generated and will, during certain phases of construction, be audible at residential receptors in the vicinity of construction activities. The purpose of this section of the chapter is therefore to:

- Quantify the likely levels of construction noise that can be expected at the nearest residential and ecological receptor locations to construction works;
- Provide comment as to the magnitude of the potential construction noise impacts, the resulting level of effect and whether this is significant in EIA terms; and
- Where relevant, identify those impacts that would require specific mitigation measures in order for the potential noise effects to be reduced to a level considered acceptable.

Construction Noise Plant Levels

26.7.3 With the Project still at an early stage of design, a detailed list of construction plant, operational noise levels and associated on-times for all the construction activities/operations is not yet available. As such, this preliminary assessment has been undertaken utilising a list of indicative plant based on professional judgement gained from experience of other Round 4 projects that are at a further stage of development. Based on this list, the combined sound power level (SWL) has been calculated for each construction activity considering the number of plant and associated on-times, as shown in Table 26.59 and Table 26.60.

26.7.4 A list of indicative construction plant, operational noise levels and associated on-times for all the construction activities/operations have been provided within Volume 2, Appendix 26.3: Construction Plant Sound Levels .

Table 26.59: Combined sound power levels – construction plant for landfall and onshore ECC, dB

Activity	Combined Sound Power Level (SWL)
1. Establish Access and TCC (including trenchless drilling compounds)	120
2. Site Preparation, Including Fencing, Haul Road Construction and Topsoil Strip	120
3. Transition Joint Bay Excavation	116
4. Transition Joint Bay Wall and Base Construction	114
5. Connection of Cables in Transition Bays	115
6. Roof and Backfill over Transition Bay	118

Activity	Combined Sound Power Level (SWL)
7. Trench Excavation and duct installation	118
8. Trench Backfill	119
9. Joint Bay Excavation	116
10. Joint Bay Base Construction	114
11. Pulling and Connection of Cables	114
12. Backfill over Joint Bay	118
13. TCC Operations	109
14. Trenchless Drilling Compound Operations (including piling)	116

Table 26.60: Combined sound power levels – construction plant for OnSS options, dB

Activity	Combined Sound Power Level (SWL)
1. Ground Works	123
2. Building Foundation	119
3. Access Road and Carparks	116
4. Building Fabric and High Voltage Plant	118

26.7.5 The impact of construction noise will be assessed for each study area and design option and has been divided into the following phases:

- The landfall;
- The LN and WM ECCs and TCCs;
- The LN OnSS;
- The WM North OnSS;
- The WM South OnSS; and
- Impacts on ecological receptors.

Landfall Construction Noise Assessment

26.7.6 An indicative summary of the construction works associated with the landfall is given below:

- Construction of the landfall TCC area(s);
- Trenchless drilling works including temporary construction of trenchless drilling exit pits in the intertidal or shallow subtidal;
- Intertidal trenching;
- Construction of a Transition Joint Bay (TJB);
- Installation of offshore export cables (including cable pulling);
- Installation of and jointing to onshore export cables; and
- Backfilling and re-instatement works.

26.7.7 Based on the above, the construction noise assessment for the landfall has considered 'normal' construction activities and trenchless drilling activities separately.

Landfall - Normal Construction Activities

26.7.8 As previously stated in Paragraphs 26.6.39 and 26.6.40 the exact locations of the relevant construction areas with the PEIR boundary are not yet defined; consequently, the predicted construction noise levels for the landfall have therefore assumed the following:

- All the plant associated with Site Preparation (noisiest activity) would be located on the extents of the PEIR boundary; and
- All the plant would be operating in an area measuring 100m long by 40m wide. This is based on the construction might occur within half the typical construction working width (as described in Table 1 of Volume 1, Chapter 3: Project Description) and a reasonable assumption on the working length.

26.7.9 Based on the above, standoff distances have been calculated where adverse noise impacts are likely to be experienced using the Cadna/A noise modelling software; the model has assumed and is based on the following:

- The operational construction plant area (100m by 40m) has been modelled as an area source which emits a total noise level of 120dB (site preparation) at an average height of 2m above ground level;
- Receptor height of 1.5m for daytime and weekend assessments (a night-time assessment has not been considered for normal construction operations);
- Ground absorbency factor of 0.5 between the source and the receivers;
- Downwind propagation between the source and the receiver;
- Flat ground (i.e., no topography) between the source and the receiver; and
- No intervening structures between the source and the receiver.

26.7.10 With reference to Table 26.50 and Table 26.52, the standoff distances have considered the following scenarios:

- A midweek daytime standoff distance outside which there would be a *negligible* magnitude of impact;
- A midweek daytime standoff distance outside which there would be a *low* magnitude of impact;
- A weekend standoff distance outside which there would be a *negligible* magnitude of impact; and
- A weekend standoff distance outside which there would be a *low* magnitude of impact.

26.7.11 With reference to Table 26.58, a *negligible* impact magnitude for receptors of all sensitivities, and a *low* impact magnitude for receptors of medium sensitivity and below, would result in a temporary *'minor adverse'* level of effect, which is not significant in terms of the EIA Regulations.

26.7.12 It must be noted that the standoff distances have been based on the calculated threshold limits contained in Table 26.14.

26.7.13 The standoff distances are shown in Table 26.61 and Figure 26.13.

Table 26.61: Standoff Distances for Landfall Construction Noise

Scenario	Noise Threshold Limit, dB $L_{Aeq,T}$	Standoff Distance to Achieve Negligible Magnitude of Impact, metres*	Standoff Distance to Achieve Low Magnitude of Impact, metres**
Midweek Daytime Construction	65	155	110
Weekend Construction	55	470	340
** Predicted noise level equal to the Threshold limit*			
*** Predicted noise level 3dB above the Threshold limit.*			

552500 555000 557500

377500

375000

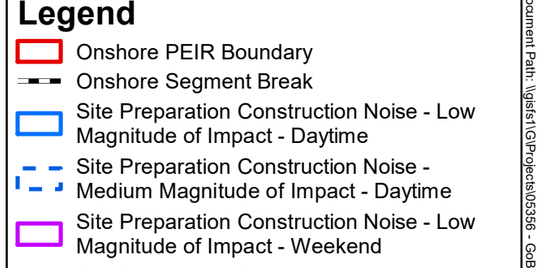
372500

N

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Site Preparation Construction Noise - Low Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Medium Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Low Magnitude of Impact - Weekend
- Site Preparation Construction Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 0.5 1 km

Scale: 1:25,000

Preliminary Environmental Information Report

Standoff Distances for Landfall Construction Noise

Figure 26.13

OUTER DOWSING OFFSHORE WIND

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26.7.14 It must be noted that any NSRs located within the standoff distances shown above could be subject to a temporary *'moderate (significant)'* or *'major (significant)'* level of effect which are considered significant in EIA terms.

26.7.15 It must be noted, however, that the predictions and associated standoff distances have assumed a worst case scenario where the loudest construction activity (site preparation) is being undertaken at the extents of the PEIR boundary.

26.7.16 In reality, for much of the time construction operations would be undertaken at greater distances away from NSRs. For most of the construction phase noise from construction would be lower and therefore would reduce the extents of the standoff distances.

26.7.17 Any identified adverse noise impacts could be reduced further through the use of the potential detailed design mitigation shown in Table 26.49; however, these additional mitigation measures would be determined once more details regarding the construction plant to be utilised and the exact location of the landfall is finalised.

26.7.18 Final mitigation measures would be informed by detailed design post consent and included within the final NVMP which would be submitted for approval by the LPA as part of the final CoCP that is secured within the DCO.

Landfall – Trenchless Drilling

26.7.19 As previously stated in paragraphs 26.6.39 and 26.6.40, the exact location of the relevant trenchless drilling activities within the PEIR boundary are not yet defined; consequently, the predicted trenchless drilling noise levels for the landfall have therefore assumed the following:

- All the plant associated with trenchless drilling activities would be located on the extents of the PEIR boundary; and
- All the plant would be operating in an area measuring 40m long by 40m wide.

26.7.20 Based on the above, standoff distances have been calculated where adverse noise impacts are likely to be experienced using the Cadna/A noise modelling software; the model has assumed and is based on the following:

- The trenchless drilling plant area has been modelled as an area source which emits a daytime total noise level of 116dB (to include piling) at an average height of 2m above ground level;
- Receptor height of 1.5m for daytime and weekend assessments;
- Ground absorbency factor of 0.5 between the source and the receivers;
- Downwind propagation between the source and the receiver;
- Flat ground (i.e., no topography) between the source and the receiver; and
- No intervening structures between the source and the receiver.

26.7.21 With reference to Table 26.50, Table 26.52 and Table 26.58 the standoff distances have considered the following scenarios:

- A midweek daytime standoff distance outside which there would be a *negligible* magnitude of impact;

- A midweek daytime standoff distance outside which there would be a *low* magnitude of impact ;
- A weekend standoff distance outside which there would be a *negligible* magnitude of impact; and
- A weekend standoff distance outside which there would be a *low* magnitude of impact .

26.7.22 With reference to Table 26.58, a *negligible* impact magnitude for receptors of all sensitivities, and a *low* impact magnitude for receptors of medium sensitivity and below, would result in a temporary *'minor adverse'* level of effect, which is not significant in terms of the EIA Regulations.

26.7.23 It must be noted that the standoff distances have been based on the calculated threshold limits contained in Table 26.14.

26.7.24 The standoff distances are shown in Table 26.62 and Figure 26.14.

Table 26.62: Standoff Distances for Landfall Trenchless Drilling

Scenario	Noise Threshold Limit, dB $L_{Aeq,T}$	Standoff Distance to Achieve Negligible Magnitude of Impact, metres*	Standoff Distance to Achieve Minor Magnitude of Impact, metres**
Midweek Daytime Drilling	65	100	70
Weekend Drilling	55	305	220
** Predicted noise level equal to the Threshold limit*			
*** Predicted noise level 3dB above the Threshold limit.*			

552500 555000 557500

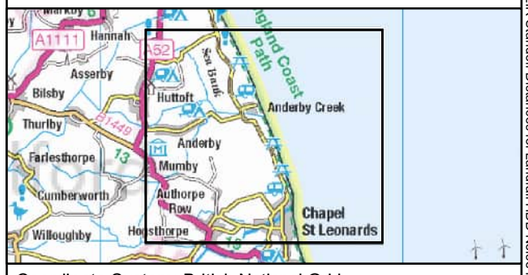
377500 375000 372500

N

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Trenchless Drilling Noise - Low Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Medium Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Low Magnitude of Impact - Weekend
- Trenchless Drilling Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 0.5 1 km

Scale: 1:25,000

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Standoff Distances for Landfall Trenchless Drilling Noise

Figure 26.14

OUTER DOWSING OFFSHORE WIND

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26.7.25 It must be noted that any NSRs located within the standoff distances shown above could be subject to a temporary *'moderate (significant)'* or *'major (significant)'* level of effect which are considered significant in EIA terms.

26.7.26 It must be noted, however, that the predictions have assumed a worst case scenario where trenchless drilling activities are being undertaken at the extents of the PEIR boundary.

26.7.27 In reality, for much of the time trenchless drilling operations would be undertaken at greater distances away from NSRs. For most of the construction phase noise from trenchless drilling would be lower and therefore the extents of the standoff distances would reduce.

26.7.28 Any identified adverse noise impacts could be reduced further through the use of the potential detailed design mitigation shown in Table 26.49; however, these additional mitigation measures would be determined once more details regarding the construction plant to be utilised and the exact location of the landfall are finalised.

26.7.29 Final mitigation measures would be informed by detailed design post consent and included within the final NVMP which would be submitted for approval by LCC as part of the final CoCP that is secured within the DCO.

LN and WM ECC Construction Noise Assessment

26.7.30 Cable construction works are anticipated to take place over an up to 36 month period, and a summary programme of works is described in Volume 1, Chapter 3: Project Description.

26.7.31 Further to this, a summary of the construction works associated with the onshore ECC works is given below.

26.7.32 Site enabling works are required before construction within each ECC section can commence. These may include:

- Fencing;
- Upgrade of existing or installation of new access from the public highway where required;
- Utility diversions where required;
- Archaeological and ecological survey and mitigation works as necessary; and
- Establishment of TCCs, offices, welfare facilities, security, wheel wash, lighting and signage.

26.7.33 Construction activities for each section of the onshore ECC may include:

- Topsoil removal (to edge of working area);
- Temporary haul road installation along all sections of the route;
- Trenchless duct installation below obstacles (roads, railways, watercourse crossings and drains) incorporating trenchless drilling;
- Installation of header or interceptor drains at cable corridor boundaries;
- Trench excavation (up to two, one for each circuit);
- Duct and tile installation;

- Trench backfilling;
- Existing field drainage repairs (where disruption occurs);
- Joint bay installation (including French drains to prevent water pooling above joint bay);
- Cable installation (pulled through ducts from each joint bay);
- Cable jointing; and
- Cable testing and commissioning.

26.7.34 Based on the above, the construction noise assessment for the onshore ECCs has considered 'normal' construction activities and trenchless drilling activities separately.

The LN and WM ECCs – Normal Construction

26.7.35 As previously stated in paragraphs 26.6.39 and 26.6.40 the exact location of the relevant construction areas within the PEIR boundary are not yet defined; consequently, the predicted construction noise levels for the landfall have therefore assumed the following:

- All the plant associated with Site Preparation (noisiest activity) would be located on the extents of the LN and WM ECC PEIR boundaries; and
- All the plant would be operating in an area measuring 100m long by 40m wide. This is based on the construction might occur within half the typical construction working width (as described in Table 1 of Volume 1, Chapter 3: Project Description) and a reasonable assumption on the working length.

26.7.36 Based on the above, standoff distances have been calculated where adverse noise impacts are likely to be experiences using the Cadna/A noise modelling software, the model has assumed and is based on the following:

- The operational construction plant area (100m by 40m) has been modelled as an area source which emits a total noise level of 120dB (site preparation) at an average height of 2m above ground level;
- Receptor height of 1.5m for daytime and weekend assessments (a night-time assessment has not been considered for normal onshore ECC construction operations;
- Ground absorbency factor of 0.5 between the source and the receivers;
- Downwind propagation between the source and the receiver;
- Flat ground (i.e., no topography) between the source and the receiver; and
- No intervening structures between the source and the receiver.

26.7.37 With reference to Table 26.50 and Table 26.52, the standoff distances have considered the following scenarios:

- A midweek daytime standoff distance outside which there would be a *negligible* magnitude of impact;
- A midweek daytime standoff distance outside which there would be a *low* magnitude of impact;

- A weekend standoff distance outside which there would be a *negligible* magnitude of impact; and
- A weekend standoff distance outside which there would be a *low* magnitude of impact.

26.7.38 With reference to Table 26.58, a *negligible* impact magnitude for receptors of all sensitivities, and a *low* impact magnitude for receptors of medium sensitivity and below, would result in a temporary *'minor adverse'* level of effect, which is not significant in terms of the EIA Regulations.

26.7.39 It must be noted that the midweek daytime standoff distances have been based on the calculated threshold limits contained in Table 26.20, with the exception of at WM_ECC020 where the calculated threshold limit of 70dB $L_{Aeq,T}$ however providing a standoff distance to 65dB $L_{Aeq,T}$ represents an MDS for this location.

26.7.40 With regards the weekend threshold limits and standoff distances these have been based on the *Category A Threshold Levels* for weekend construction operations shown in Table 26.2, which is considered representative based on the observations made by the surveyor during the midweek baseline sound survey.

26.7.41 The standoff distances are shown in Table 26.63 and Figure 26.15 and Figure 26.16.

Table 26.63: Standoff Distances for ECC Construction Noise

Scenario	Noise Threshold Limit, dB $L_{Aeq,T}$	Standoff Distance to Achieve Negligible Magnitude of Impact, metres*	Standoff Distance to Achieve Low Magnitude of Impact, metres**
Midweek Daytime Construction	65	155	110
Weekend Construction	55	470	340
** Predicted noise level equal to the Threshold limit*			
*** Predicted noise level 3 dB above the Threshold limit.*			

547500 550000 552500 555000 557500 560000

375000 372500 370000 367500 365000

N

Lincolnshire Node OnSS Search Area

WM2 - A52 - Hogsthorpe to Marsh Lane

WM1 - Landfall to A52 - Hogsthorpe

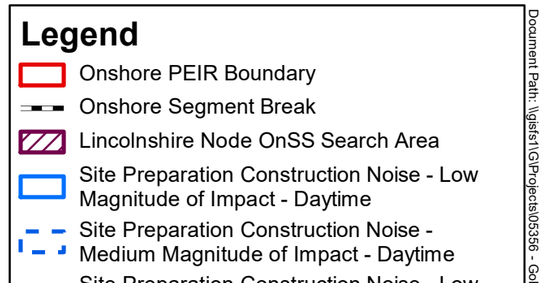
WM3 - Marsh Lane to A158 - Skegness Road

WM4 - A158 Skegness Road to Low Road

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Site Preparation Construction Noise - Low Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Medium Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Low Magnitude of Impact - Weekend
- Site Preparation Construction Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Construction Noise from PEIR Boundary

Figure 26.15.1

OUTER DOWSING OFFSHORE WIND

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542500 545000 547500 550000 552500 555000

362500 360000 357500 355000 352500 350000

WM4 - A158 Skegness Road to Low Road

A1 - Low Road to Steeping River

WM5 - Low Road to Steeping River

WM5 - Low Road to Steeping River

WM6 - Steeping River to Ivy House Farm/Marsh Yard

A2 - Steeping River to Fodder Dike Bank/Fen Bank

A1 - Low Road to Steeping River

A2 - Steeping River to Fodder Dike Bank/Fen Bank

A3 - Fodder Dike Bank/Fen Bank to Broadgate

WM7 - Ivy House Farm/Marsh Yard to Staples Farm

WM6 - Steeping River to Ivy House Farm/Marsh Yard

A4 - Broadgate to Ings Drove

A3 - Fodder Dike Bank/Fen Bank to Broadgate

WM8 - Staples Farm to Crowtail Lane

WM7 - Ivy House Farm/Marsh Yard to Staples Farm

DANGER AREA

Mud & Sand

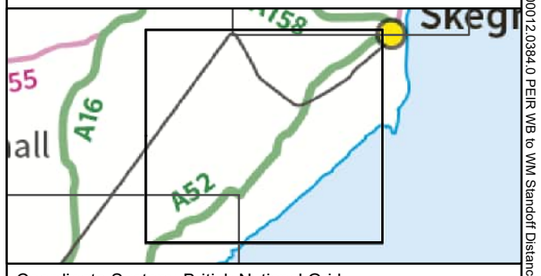
Friskney Flats

Wainfleet Sand

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Site Preparation Construction Noise - Low Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Medium Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Low Magnitude of Impact - Weekend
- Site Preparation Construction Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

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Weston Marsh Standoff Distances for ECC Construction Noise from PEIR Boundary

Figure 26.15.2

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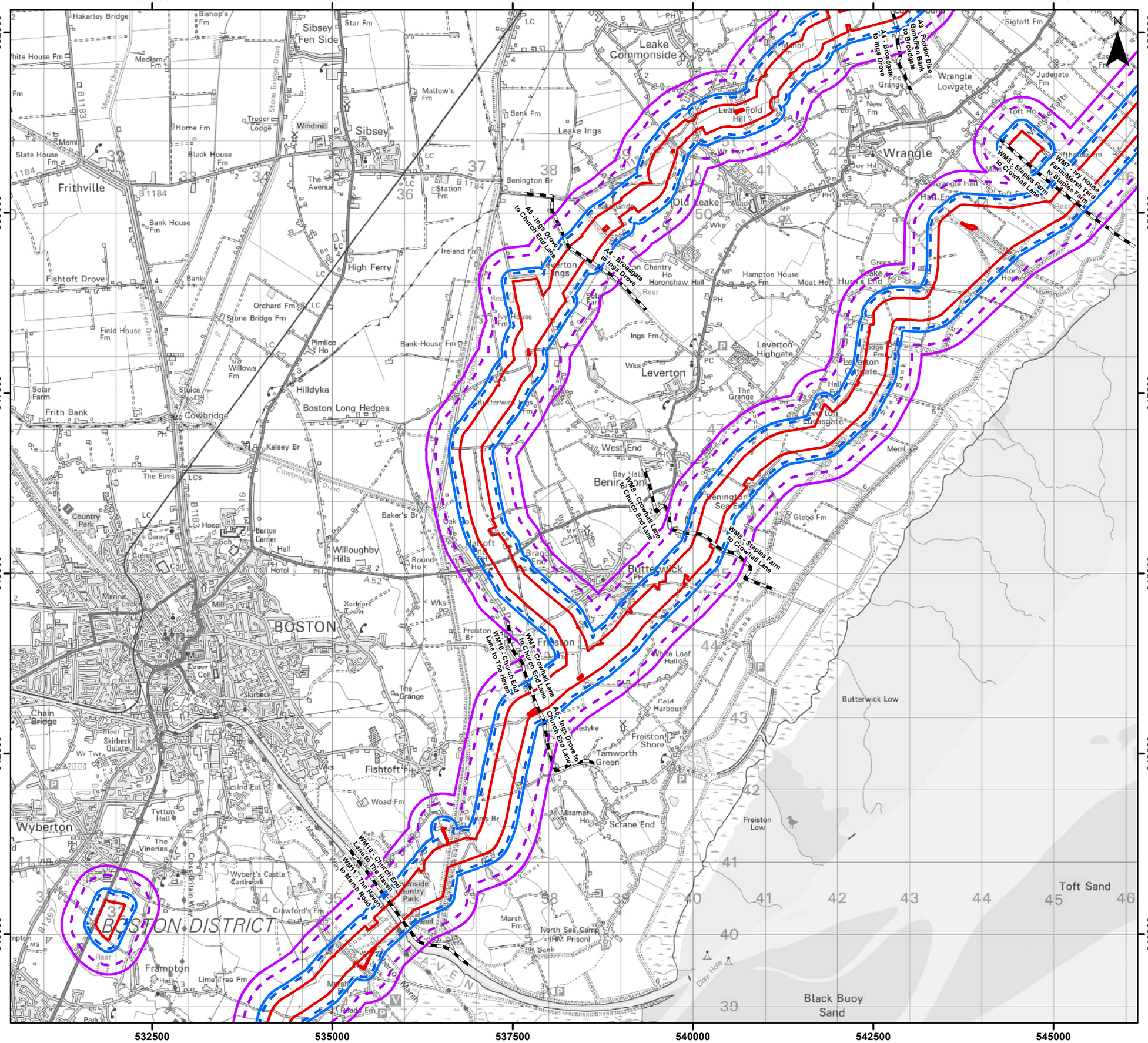

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Site Preparation Construction Noise - Low Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Medium Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Low Magnitude of Impact - Weekend
- Site Preparation Construction Noise - Medium Magnitude of Impact - Weekend

Sources:

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Construction Noise from PEIR Boundary

Figure 26.15.3

OUTER DOWSING OFFSHORE WIND

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525000 527500 530000 532500 535000 537500

337500 335000 332500 330000 327500

Weston Marsh North OnSS Search Area

Weston Marsh South OnSS Search Area

WM12 - Marsh Road to Fosdyke Bridge

WM11 - The Haven to Marsh Road

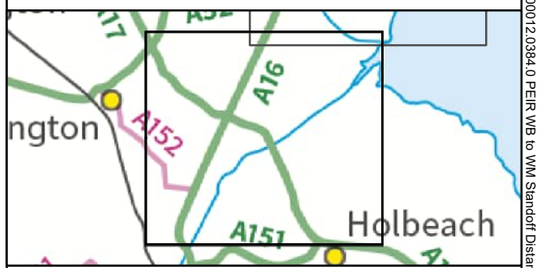
WM13 - Fosdyke to Weston Marsh North Substation Search Area

WM14 - Fosdyke to Weston Marsh South Substation Search Area

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh North OnSS Search Area
- Weston Marsh South OnSS Search Area
- Site Preparation Construction Noise - Low Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Medium Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Low Magnitude of Impact - Weekend
- Site Preparation Construction Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Construction Noise from PEIR Boundary

Figure 26.15.4

OUTER DOWSING OFFSHORE WIND

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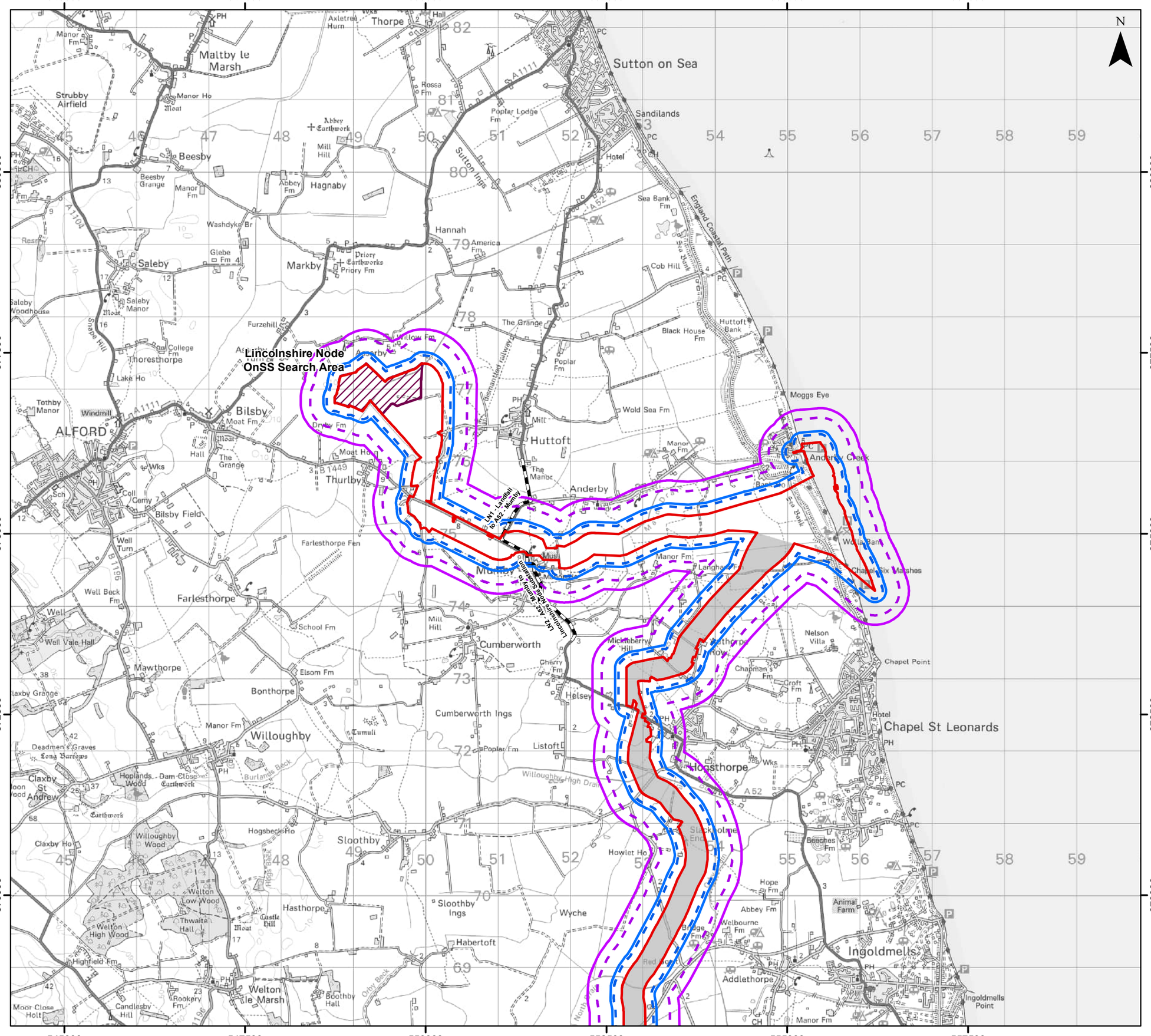
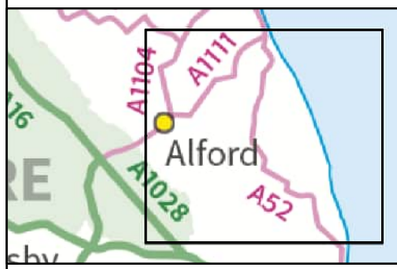


Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Site Preparation Construction Noise - Low Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Medium Magnitude of Impact - Daytime
- Site Preparation Construction Noise - Low Magnitude of Impact - Weekend
- Site Preparation Construction Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Lincolnshire Node Standoff Distances for ECC Construction Noise from PEIR Boundary

Figure 26.16

OUTER DOWSING OFFSHORE WIND

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26.7.42 It must be noted that any NSRs located within the standoff distances shown above could be subject to a temporary *'moderate (significant)'* or *'major (significant)'* level of effect which are considered significant in EIA terms.

26.7.43 It must be noted, however, that the predictions and associated standoff distances have assumed a worst case scenario where the loudest construction activity (site preparation) is being undertaken extents of the PEIR boundary.

26.7.44 In reality, for much of the time construction operations would be undertaken at greater distances away from NSRs. For most of the construction phase noise from construction would be lower and therefore reducing the extents of the standoff distances.

26.7.45 Any identified adverse noise impacts could be reduced further through the use of the potential detailed design mitigation shown in Table 26.49; however, these additional mitigation measures would be determined once more details regarding the construction plant to be utilised and the exact location of the onshore ECC is finalised.

26.7.46 Final mitigation measures would be informed by detailed design post consent and included within the final NVMP which would be submitted for approval by LCC as part of the final CoCP that is secured within the DCO.

The LN and WM ECCs – Trenchless Drilling Activities

26.7.47 As previously stated in paragraphs 26.6.39 and 26.6.40 the exact location of the relevant trenchless drilling with the PEIR boundary are not yet defined; consequently, the predicted trenchless drilling noise levels for the LN and WM ECCs have therefore assumed the following:

- All the plant associated with trenchless drilling activities would be located on the extents of the PEIR ECC boundary;
- All the plant would be operating in an area measuring 40m long by 40m wide; and

26.7.48 Based on the above, standoff distances have been calculated where adverse noise impacts are likely to be experiences using the Cadna/A noise modelling software, the model has assumed and is based on the following:

- The operational construction plant area has been modelled as an area source which emits a daytime total noise level of 116dB (to include piling) at an average height of 2m above ground level;
- Receptor height of 1.5m for daytime and weekend assessments;
- Ground absorbency factor of 0.5 between the source and the receivers;
- Downwind propagation between the source and the receiver;
- Flat ground (i.e., no topography) between the source and the receiver; and
- No intervening structures between the source and the receiver.

26.7.49 With reference to Table 26.50 and Table 26.52 the standoff distances have considered the following scenarios:

- A midweek daytime standoff distance outside which there would be a *negligible* magnitude of impact;

- A midweek daytime standoff distance outside which there would be a *low* magnitude of impact;
- A weekend standoff distance outside which there would be a *negligible* magnitude of impact; and
- A weekend standoff distance outside which there would be a *low* magnitude of impact.

26.7.50 With reference to Table 26.58, a *negligible* impact magnitude for receptors of all sensitivities, and a *low* impact magnitude for receptors of medium sensitivity and below, would result in a temporary *'minor adverse'* level of effect, which is not significant in terms of the EIA Regulations.

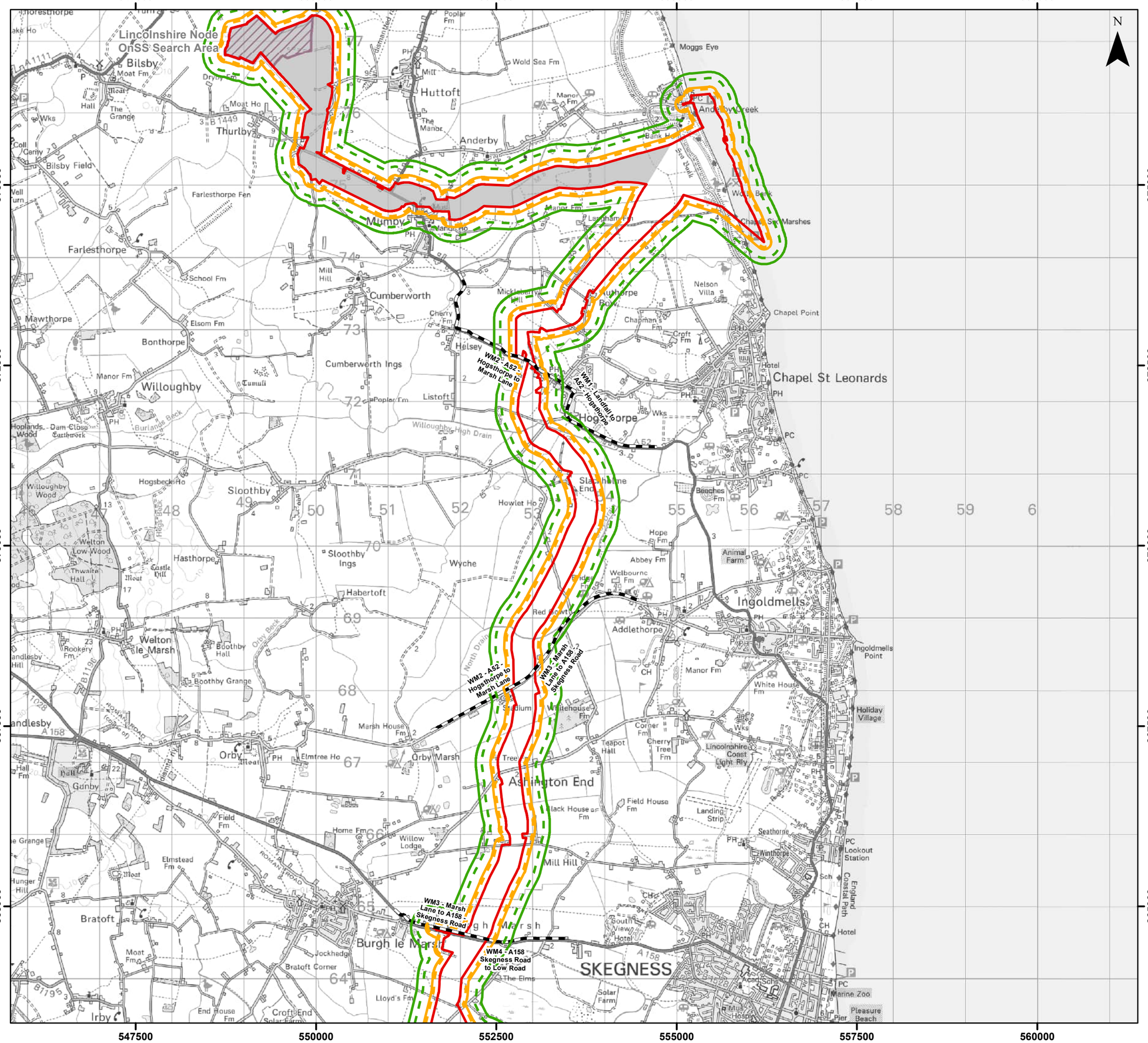
26.7.51 It must be noted that the daytime standoff distances have been based on the calculated threshold limits contained in Table 26.20, with the exception of at WM_ECC020 where the calculated threshold limit of 70dB $L_{Aeq,T}$ however providing a standoff distance to 65dB $L_{Aeq,T}$ represents an MDS for this location.

26.7.52 With regards to the weekend standoff distances, these are based on *Category A Threshold Levels* contained in Table 26.2 which is considered a robust approach as is based on the observations made on the prevailing soundscape at the ECC monitoring locations and the rural nature of the receptors.

26.7.53 The standoff distances are shown in Table 26.64 and Figure 26.17 and Figure 26.18.

Table 26.64: Standoff Distances for ECC Trenchless Drilling

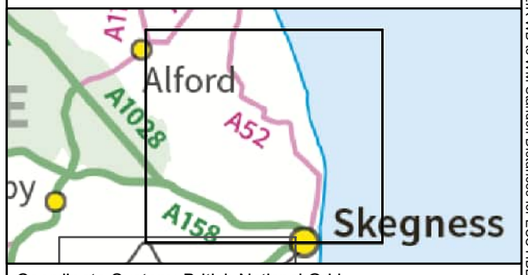
Scenario	Noise Threshold Limit, dB $L_{Aeq,T}$	Standoff Distance to Achieve Negligible Magnitude of Impact, metres*	Standoff Distance to Achieve Minor Magnitude of Impact, metres**
Midweek Daytime Drilling	65	100	70
Weekend Drilling	55	305	220
** Predicted noise level equal to the Threshold limit*			
*** Predicted noise level 3 dB above the Threshold limit.*			



Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Trenchless Drilling Noise - Low Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Medium Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Low Magnitude of Impact - Weekend
- Trenchless Drilling Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Trenchless Drilling Noise from PEIR Boundary

Figure 26.17.1

OUTER DOWSING OFFSHORE WIND

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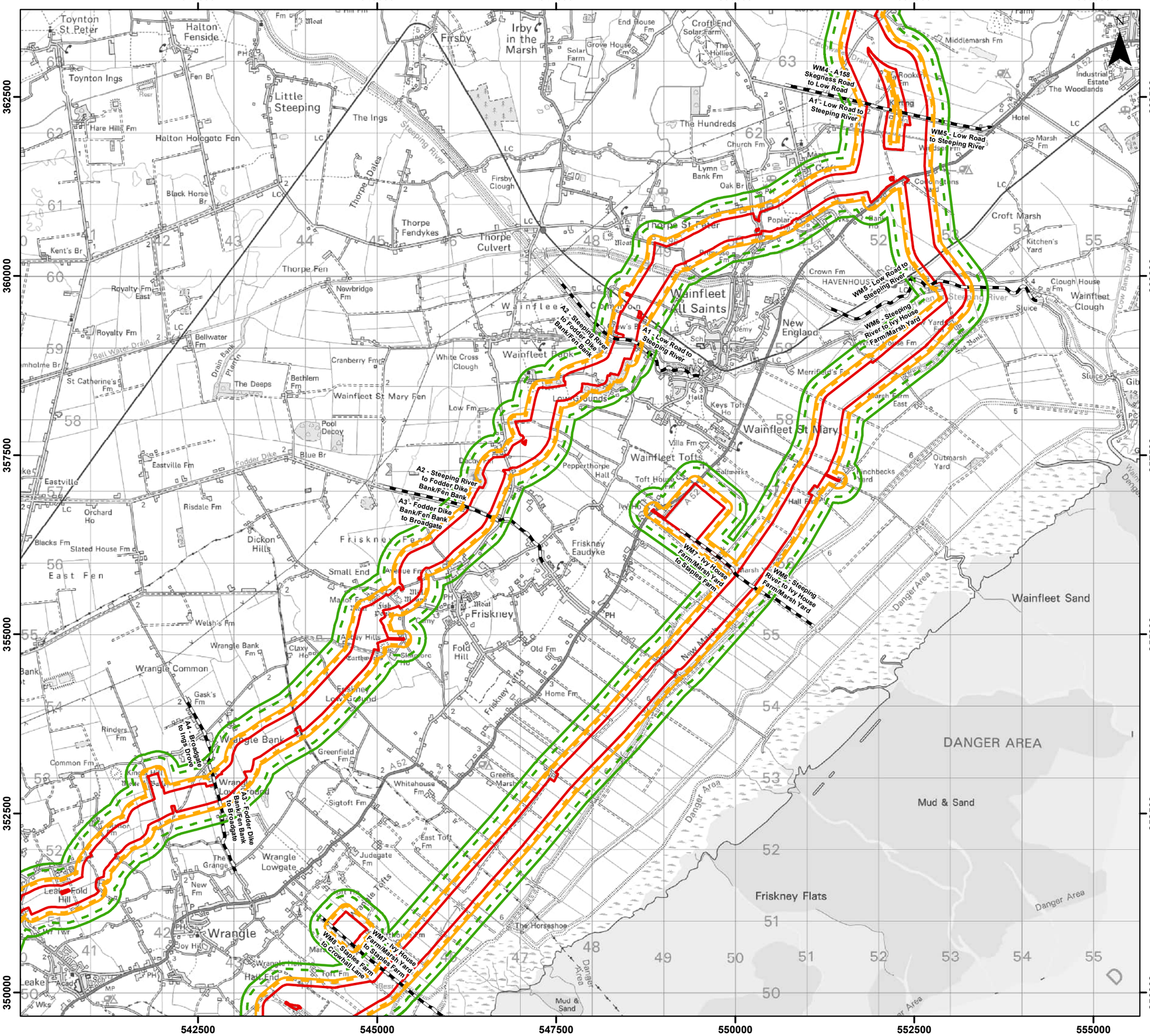
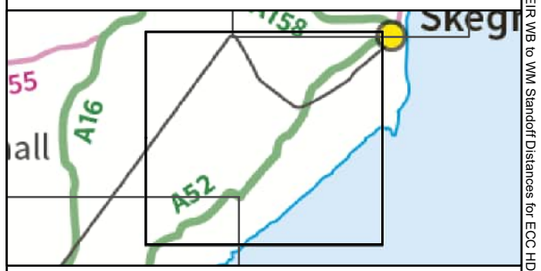


Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Trenchless Drilling Noise - Low Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Medium Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Low Magnitude of Impact - Weekend
- Trenchless Drilling Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Trenchless Drilling Noise from PEIR Boundary

Figure 26.17.2

OUTER DOWSING OFFSHORE WIND

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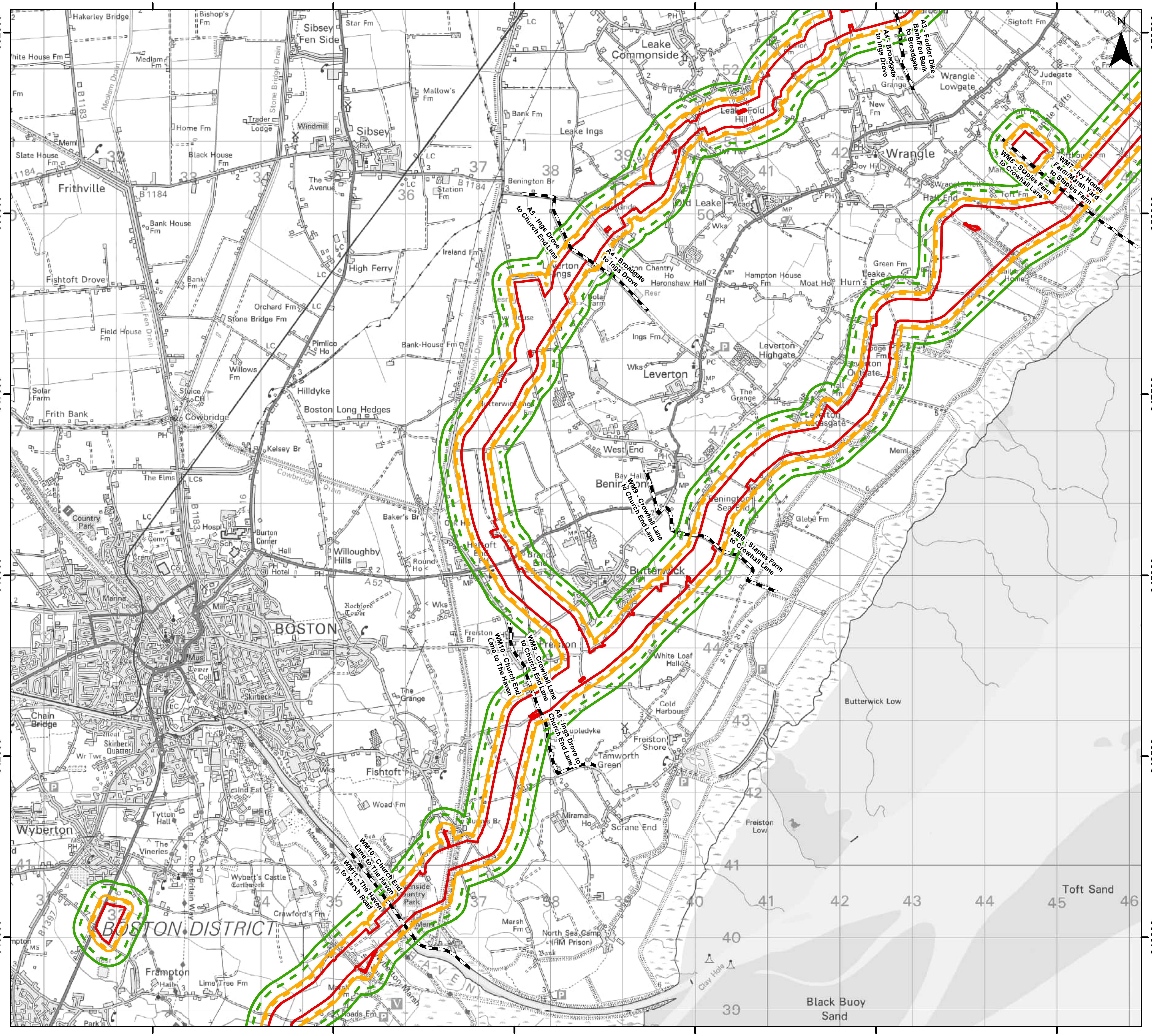
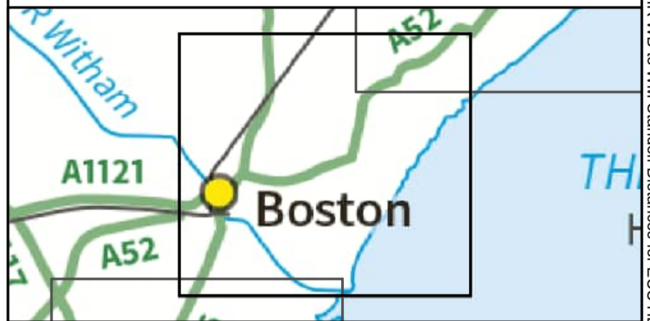


Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Trenchless Drilling Noise - Low Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Medium Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Low Magnitude of Impact - Weekend
- Trenchless Drilling Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Trenchless Drilling Noise from PEIR Boundary

Figure 26.17.3

OUTER DOWSING OFFSHORE WIND

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525000 527500 530000 532500 535000 537500

337500 335000 332500 330000 327500

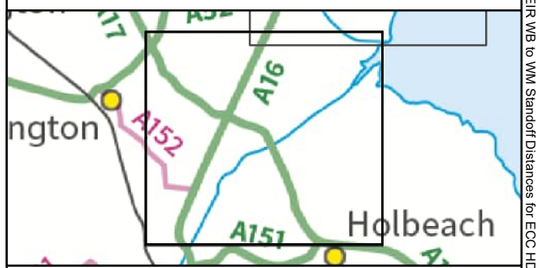
WM12 - Marsh Road to Fosdyke Bridge
WM11 - The Haven to Marsh Road
WM13 - Fosdyke to Weston Marsh North Substation Search Area
WM14 - Fosdyke Bridge to Weston Marsh South Substation Search Area
WM14 - Fosdyke to Weston Marsh Substation South Search Area
Weston Marsh North OnSS Search Area
Weston Marsh South OnSS Search Area

N

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh North OnSS Search Area
- Weston Marsh South OnSS Search Area
- Trenchless Drilling Noise - Low Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Medium Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Low Magnitude of Impact - Weekend
- Trenchless Drilling Noise - Medium Magnitude of Impact - Weekend

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Trenchless Drilling Noise from PEIR Boundary

Figure 26.17.4

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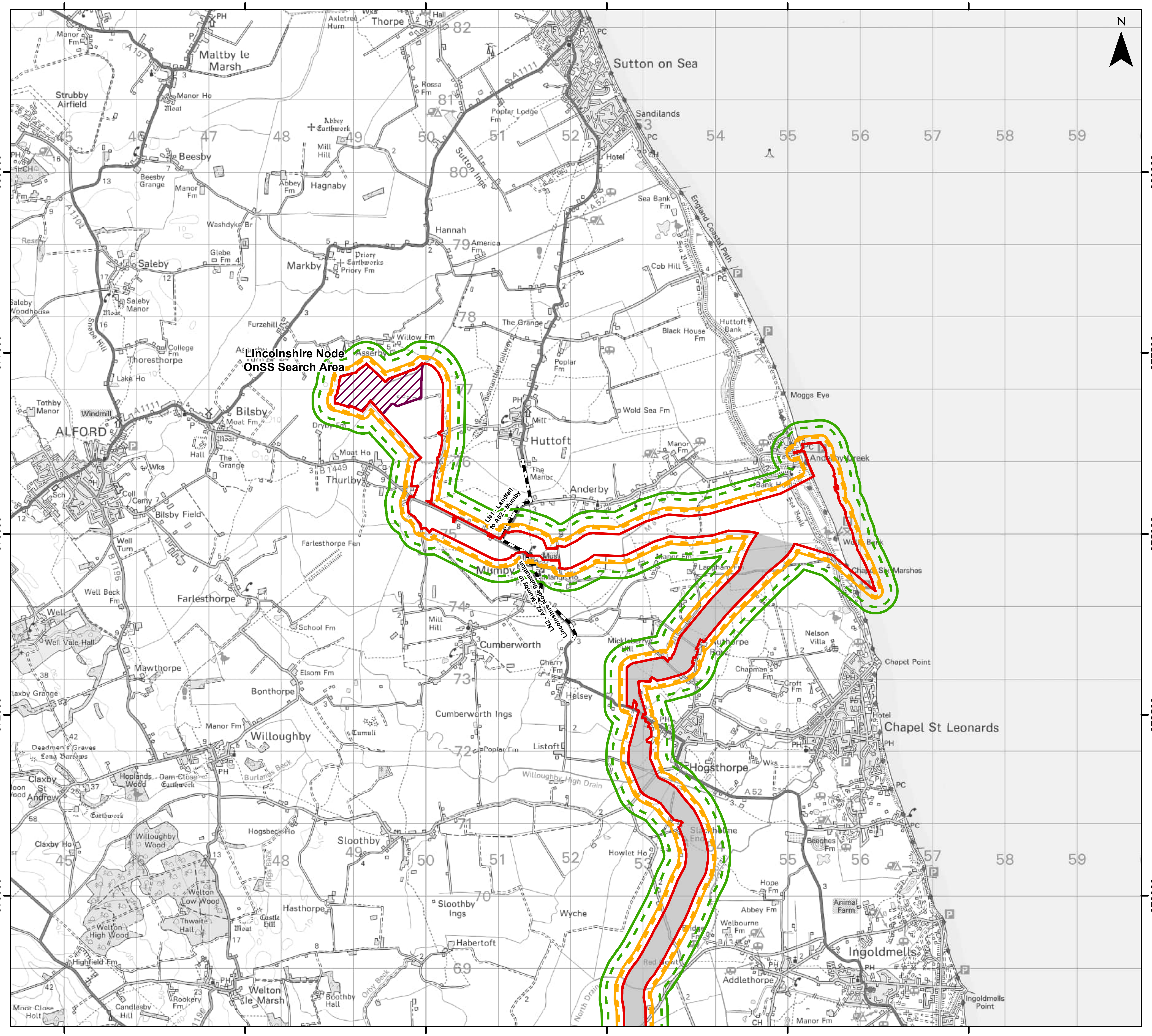

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Trenchless Drilling Noise - Low Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Medium Magnitude of Impact - Daytime
- Trenchless Drilling Noise - Low Magnitude of Impact - Weekend
- Trenchless Drilling Noise - Medium Magnitude of Impact - Weekend

Sources:

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Lincolnshire Node Standoff Distances for ECC Trenchless Drilling Noise from PEIR Boundary

Figure 26.18

OUTER DOWSING OFFSHORE WIND

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26.7.54 It must be noted that any NSRs located within the standoff distances shown above could be subject to a temporary *'moderate (significant)'* or *'major (significant)'* level of effect which are considered significant in EIA terms.

26.7.55 It must be noted, however, that the predictions and associated standoff distances have assumed a worst case scenario where trenchless drilling activities are being undertaken extents of the PEIR boundary.

26.7.56 In reality, for much of the time trenchless drilling operations would be undertaken at greater distances away from NSRs. For most of the construction phase noise from trenchless drilling would be lower and therefore reducing the extents of the standoff distances.

26.7.57 Any identified adverse noise impacts could be reduced further through the use of the potential detailed design mitigation shown in Table 26.49; however, these additional mitigation measures would be determined once more details regarding the construction plant to be utilised and the exact location of the onshore ECC and associated trenchless drilling areas are finalised.

26.7.58 Final mitigation measures would be informed by detailed design post consent and included within the final NVMP which would be submitted for approval by LCC as part of the final CoCP that will be secured within the DCO.

The LN and WM North and South OnSS Options

26.7.59 A summary programme of the OnSS construction works is described in Volume 1, Chapter 3: Project Description.

26.7.60 A summary of the construction works associated with each OnSS is given below.

26.7.61 The likely sequence of activities at each of the OnSS options are:

- Site investigation works, pre-construction archaeological and ecological surveys and mitigation;
- Site enabling works, including:
  - site clearance;
  - site mobilisation, fencing and the establishment of the TCCs;
  - the construction of temporary and permanent access roads;
  - ground works including cable ducting and new site drainage; and
  - ground raising and establishment of the stoned site platform.
- Installation of each of the OnSS option, including:
  - permanent security fencing;
  - the GIS building (if required) and other structures such as control and welfare buildings and lightning rods; and
  - electrical equipment such as switchgear, busbars, capacitors, reactors, reactive power compensation equipment, filters and cooling equipment.

26.7.62 With reference to the above, the predicted construction noise levels for each of the OnSS options have therefore assumed the following:

- All the plant associated with ground works (noisiest activity, see Table 26.60) would be located within the nearest 25% of each OnSS option area closest to each NSR;
- Average source height of 2m, receptor height of 1.5m;
- Ground absorbency factor of 0.5 between the source and the receivers; and
- Downwind propagation between the source and the receiver.

26.7.63 Based on the above, the worst case noise levels from construction operations associated with each OnSS option have been predicted at the nearest NSRs.

26.7.64 For each OnSS a construction zone has been determined; therefore, it has been possible to identify the closest NSRs to each OnSS option.

26.7.65 The NSRs considered for each OnSS option are shown in Table 26.65. The table also shows the grid co-ordinates and the distance from the receptor to the closest working area.

26.7.66 The receptors considered are those that are closest to each OnSS option and therefore would be subject to the greatest potential impacts. It must be noted however that in the majority of cases these receptors are located in close proximity to other NSRs which could also be subject to potential impacts, though not as great.

Table 26.65: NSRs considered – OnSS construction noise

NSR ID	Approximate Grid Reference X/Y		Daytime / Weekend Receptor Sensitivity	Approximate Distance to Closest Working Area (m)
LN_OnSS001	549568	377520	Residential - Medium	350
LN_OnSS002	548519	376417	Residential - Medium	480
LN_OnSS003	550155	376401	Residential - Medium	550
WMN_OnSS001	527833	330478	Residential - Medium	480
WMN_OnSS002	528613	330820	Residential - Medium	250
WMN_OnSS003	527374	331328	Residential - Medium	400
WMN_OnSS004	528486	332442	Residential - Medium	700
WMS_OnSS001	529017	329164	Residential - Medium	280
WMS_OnSS002	529882	329052	Residential - Medium	300
WMS_OnSS003	529889	327621	Residential - Medium	450
WMS_OnSS004	528830	327155	Residential - Medium	400

NSR ID	Approximate Grid Reference X/Y		Daytime / Weekend Receptor Sensitivity	Approximate Distance to Closest Working Area (m)
WMS_OnSS005	528125	327719	Residential - Medium	550
WMS_OnSS006	528349	328640	Residential - Medium	600

26.7.67 The locations of the NSRs described above mirror those utilised for the baseline sound survey and are shown on Figure 26.5 to Figure 26.10.

26.7.68 The predicted noise levels from worst case daytime and weekend OnSS construction operations for each option are shown in Table 26.66 to Table 26.68. The Tables also compares the predicted noise levels to the threshold limits and with reference to Table 26.50, Table 26.52 and Table 26.58 defines the level of effect and significance.

26.7.69 It must be noted that the assessment is based on the calculated threshold limits contained in Table 26.28 and Table 26.45 the predicted noise levels have been rounded to the nearest decibel.

Table 26.66: LN_OnSS Construction Noise – Daytime assessment

NSR ID	Construction Activity	Predicted Noise Level, $L_{Aeq,T}$	Period	Threshold Limit	Diff.	Impact Magnitude	Level of Effect
LN_OnSS 001	Groundworks within OnSS	57	Daytime	65	-8	Negligible	Negligible
			Weekend	55	+2	Low	Minor
LN_OnSS 002		54	Daytime	65	-11	Negligible	Negligible
			Weekend	55	-1	Negligible	Negligible
LN_OnSS 003		53	Daytime	65	-12	Negligible	Negligible
			Weekend	55	-2	Negligible	Negligible

26.7.70 It can be seen from Table 26.66 that the worst case noise magnitude of impact would be *low* for *medium* sensitivity receptors giving rise to a temporary *'minor adverse'* worst case level of effect at the nearest NSRs from LN OnSS construction operations which is not significant in terms of the EIA Regulations.

Table 26.67: WMN_OnSS Construction Noise – Daytime assessment

NSR ID	Construction Activity	Predicted Noise Level, $L_{Aeq,T}$	Period	Threshold Limit	Diff.	Impact Magnitude	Level of Effect
WMN_OnSS 001	Groundworks within OnSS	56	Daytime	65	-9	Negligible	Negligible
			Weekend	55	+1	Low	Minor
WMN_OnSS 002		59	Daytime	65	-6	Negligible	Negligible
			Weekend	55	+4	Medium	Moderate

NSR ID	Construction Activity	Predicted Noise Level, $L_{Aeq,T}$	Period	Threshold Limit	Diff.	Impact Magnitude	Level of Effect
WMN_OnSS 003		56	Daytime	65	-9	Negligible	Negligible
			Weekend	65	-9	Negligible	Negligible
WMN_OnSS 004		51	Daytime	65	-14	Negligible	Negligible
			Weekend	65	-14	Negligible	Negligible

26.7.71 It can be seen from Table 26.67 that the worst case noise magnitude of impact would be *medium* for *medium* sensitivity receptors (at WMN_OnSS002 during the weekend period) giving rise to a temporary *'moderate adverse'* worst case level of effect at the nearest NSRs from WMN OnSS construction operations which is considered significant in terms of the EIA Regulations.

26.7.72 It must be noted, however, that the daytime predictions have assumed a worst case scenario where the loudest construction activity (ground works) is being undertaken in the area of the OnSS closest to each NSR.

26.7.73 In reality, for much of the time construction operations would be undertaken at greater distances away from NSRs. For most of the construction phase noise from construction would be lower and the noise impact and associated effect would therefore be reduced.

26.7.74 Any identified adverse noise impacts could be reduced further through the use of the potential detailed design mitigation shown in Table 26.49; however, these mitigation measures would be determined once the exact construction methods have been confirmed.

26.7.75 Final mitigation measures would be informed by detailed design post consent and included within the final NVMP which would be submitted for approval by LCC as part of the final CoCP that will be secured via a DCO Condition.

Table 26.68: WMS_OnSS Construction Noise – Daytime assessment

NSR ID	Construction Activity	Predicted Noise Level, $L_{Aeq,T}$	Period	Threshold Limit	Diff.	Impact Magnitude	Level of Effect
WMS_OnSS 001	Groundworks within OnSS	58	Daytime	65	-7	Negligible	Negligible
			Weekend	55	+3	Medium	Moderate
WMS_OnSS 002		57	Daytime	65	-8	Negligible	Negligible
			Weekend	55	+2	Low	Minor
WMS_OnSS 003		55	Daytime	65	-10	Negligible	Negligible
			Weekend	55	0	Negligible	Negligible
WMS_OnSS 004		56	Daytime	65	-9	Negligible	Negligible
			Weekend	55	+1	Low	Minor
WMS_OnSS 005		53	Daytime	65	-12	Negligible	Negligible
			Weekend	55	-2	Negligible	Negligible
WMS_OnSS 006		54	Daytime	65	-11	Negligible	Negligible
			Weekend	55	-1	Negligible	Negligible

26.7.76 It can be seen from Table 26.68 that the worst case noise magnitude of impact would be *medium* for *medium* sensitivity receptors (at WMS_OnSS001 during the weekend period) giving rise to a temporary *'moderate adverse'* worst case level of effect at the nearest NSRs from WMS OnSS construction operations which is considered significant in terms of the EIA Regulations.

26.7.77 It must be noted, however, that the daytime predictions have assumed a worst case scenario where the loudest construction activity (ground works) is being undertaken in the area of the OnSS closest to each NSR.

26.7.78 In reality, for much of the time construction operations would be undertaken at greater distances away from NSRs, consequently for most of the construction phase noise from construction would be lower and the noise impact and associated effect would therefore be reduced.

26.7.79 Any identified adverse noise impacts could be reduced further through the use of the potential detailed design mitigation shown in Table 26.49; however, these mitigation measures would be determined once the exact construction methods have been confirmed.

26.7.80 Final mitigation measures would be informed by detailed design post consent and included within the final NVMP which would be submitted for approval by LCC as part of the final CoCP that is secured within the DCO.

Ecological Receptors

26.7.81 With reference to Volume 1, Chapter 21: Onshore Ecology and Volume 1, Chapter 22: Onshore Ornithology it is considered that the identified Internationally and Nationally Designated Sites which have the potential to be impacted from Noise from the Project are as follows:

- The Chapel Point to Wolla Bank SSSI;
- The Greater Wash Spa;
- The Gibraltar Point National Nature Reserve (NNR);
- The Gibraltar Point SSSI;
- The Gibraltar Point Site Ramsar;
- The Gibraltar Point Spa;
- The Wash Ramsar; and
- The Wash SSSI.

26.7.82 The locations of the above identified ecological sites are shown on Figures 21.3 and 21.5 of Volume 1, Chapter 21: Onshore Ecology.

26.7.83 As previously stated in paragraphs 26.6.39 and 26.6.40 the exact location of the relevant construction areas within the PEIR boundary are not yet defined; consequently, construction noise assessment for ecological sites has been based on the following:

- All the plant associated with site preparation (noisiest activity) would be located on the extents of the PEIR boundary; and

- All the plant would be operating in an area measuring 100m long by 40m wide. This is based on the construction might occur within half the typical construction working width (as described in Table 1 of Volume 1, Chapter 3: Project Description) and a reasonable assumption on the working length.

26.7.84 Based on the above standoff distances have been calculated where adverse noise impacts are likely to be experiences using the Cadna/A noise modelling software, the model has assumed and is based on the following:

- The operational construction plant area (100m by 40m) has been modelled as an area source which emits a total noise level of 120dB (site preparation) at an average height of 2m above ground level.;
- Receptor height of 0.5 (considered representative of nesting birds);
- Ground absorbency factor of 0.5 between the source and the receivers;
- Downwind propagation between the source and the receiver;
- Flat ground (i.e., no topography) between the source and the receiver; and
- No intervening structures between the source and the receiver.

26.7.85 With reference to Table 26.50, Table 26.57 and Table 26.58 the standoff distances have considered the following scenarios.

- A standoff distance outside which there would be a *negligible* magnitude of impact; and
- A standoff distance outside which there would be a *low* magnitude of impact.

26.7.86 The standoff distances are shown in Table 26.69 and Figure 26.19, Figure 26.20 and Figure 26.21.

Table 26.69: Standoff Distances for Construction Noise on Ecological Receptors

Scenario	AQTAG09 Noise Limit, dB $L_{Aeq,T}$	Standoff Distance to Achieve Negligible Magnitude of Impact, metres*	Standoff Distance to Achieve Low Magnitude of Impact, metres**
Construction Noise	55	470	420
** Predicted noise level equal to the Threshold limit*			
*** Predicted noise level 1 dB above the Threshold limit.*			

552500 555000 557500

377500

375000

372500

N

WM1 - Landfall to A52 - Hogsthorpe

WM2 - A52 - Hogsthorpe to Marsh Lane

HUTTOFT CP

ANDERBY CP

MUMBY CP

CHAPEL ST LEONARDS CP

Huttoft Bank

Anderby Creek

Chapel St Leonards

Hogsthorpe

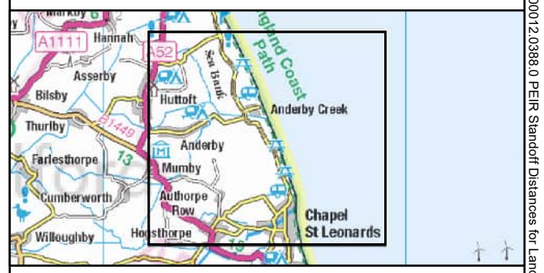
Anderby

Huttoft

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Site Preparation Construction Noise - Low Magnitude of Impact - Ecology
- Site Preparation Construction Noise - Medium Magnitude of Impact - Ecology

Sources:



Coordinate System: British National Grid

0 0.5 1 km

Scale: 1:25,000

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Standoff Distances for Landfall Construction Noise on Ecological Receptors

Figure 26.19

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547500 550000 552500 555000 557500 560000

375000 372500 370000 367500 365000

N

Lincolnshire Node OnSS Search Area

WM2 - A52 - Hogsthorpe to Marsh Lane

WM1 - Landfall to A52 - Hogsthorpe

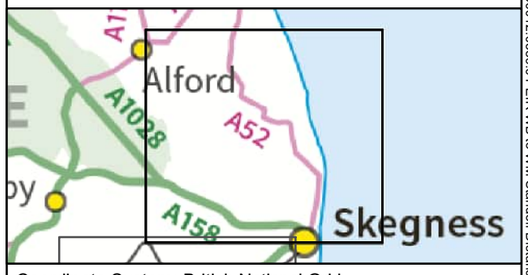
WM3 - Marsh Lane to A158 - Skegness Road

WM4 - A158 Skegness Road to Low Road

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Site Preparation Construction Noise - Low Magnitude of Impact - Ecology
- Site Preparation Construction Noise - Medium Magnitude of Impact - Ecology

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Construction Noise on Ecological Receptors

Figure 26.20.1

OUTER DOWSING OFFSHORE WIND

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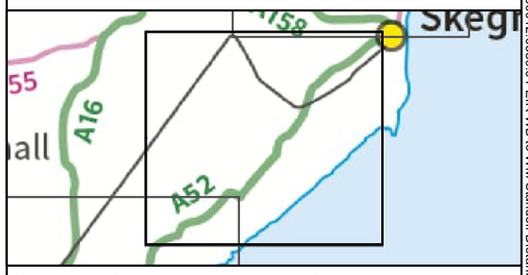
Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Site Preparation Construction Noise - Low Magnitude of Impact - Ecology
- Site Preparation Construction Noise - Medium Magnitude of Impact - Ecology

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

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Weston Marsh Standoff Distances for ECC Construction Noise on Ecological Receptors

Figure 26.20.2

OUTER DOWSING OFFSHORE WIND

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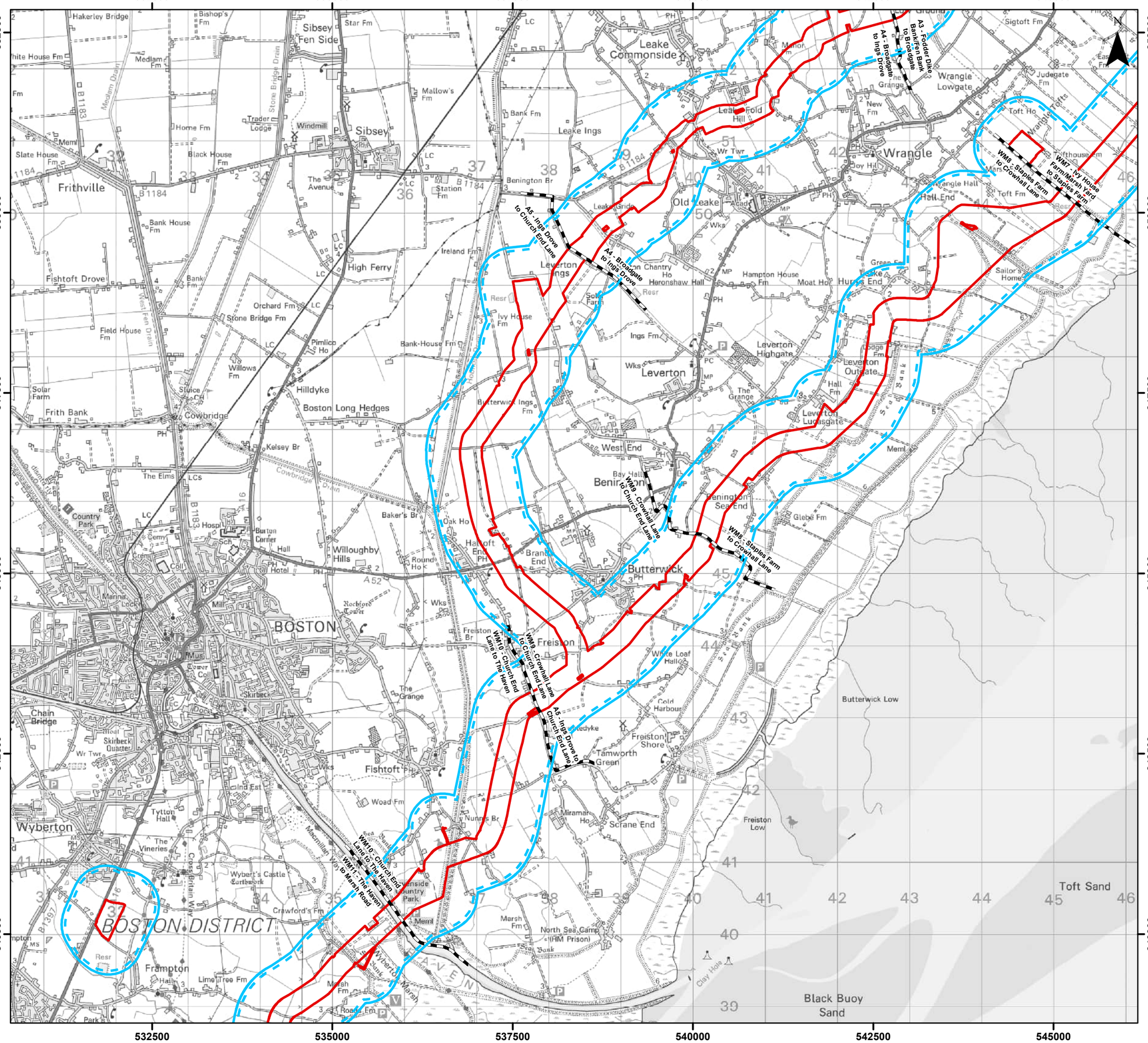

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Site Preparation Construction Noise - Low Magnitude of Impact - Ecology
- Site Preparation Construction Noise - Medium Magnitude of Impact - Ecology

Sources:

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Construction Noise on Ecological Receptors

Figure 26.20.3

OUTER DOWSING OFFSHORE WIND

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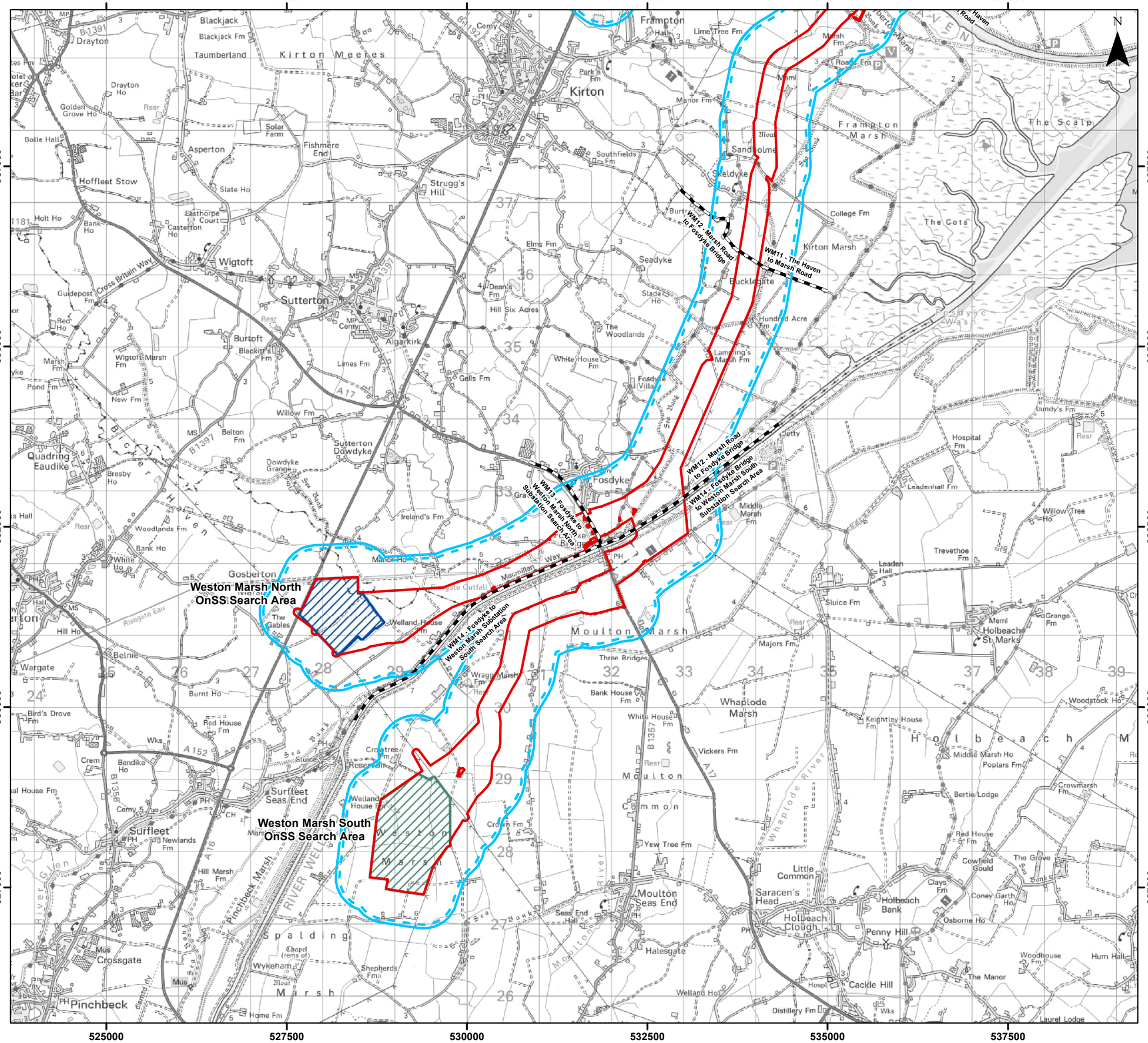
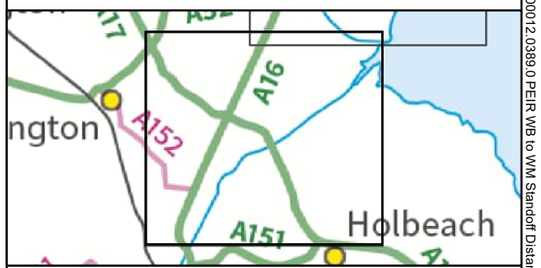


Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh North OnSS Search Area
- Weston Marsh South OnSS Search Area
- Site Preparation Construction Noise - Low Magnitude of Impact - Ecology
- Site Preparation Construction Noise - Medium Magnitude of Impact - Ecology

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for ECC Construction Noise on Ecological Receptors

Figure 26.20.4

OUTER DOWSING OFFSHORE WIND

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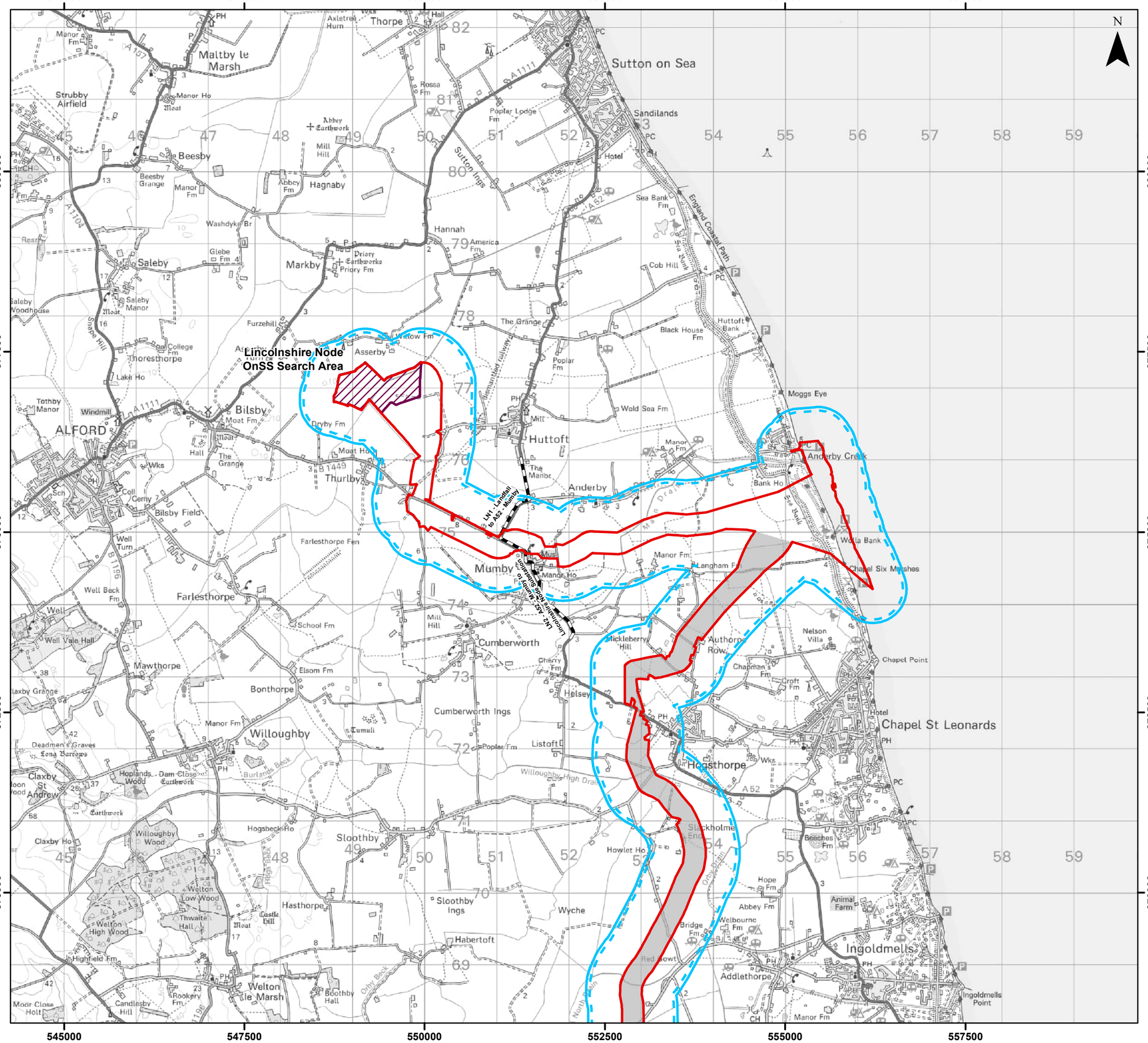
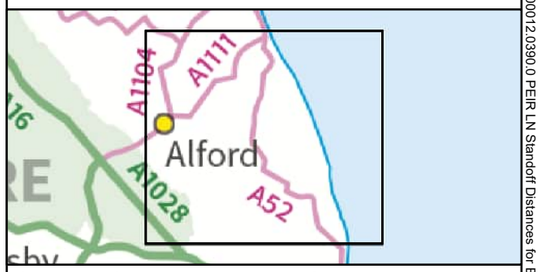


Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Site Preparation Construction Noise - Low Magnitude of Impact - Ecology
- Site Preparation Construction Noise - Medium Magnitude of Impact - Ecology

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Lincolnshire Node Standoff Distances for ECC Construction Noise on Ecological Receptors

Figure 26.21

OUTER DOWSING OFFSHORE WIND

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26.7.87 It must be noted that any ecological receptors located within the standoff distances shown above could be subject to a temporary '*moderate adverse'* or *'major adverse'* level of effect which are considered significant in EIA terms.

26.7.88 It must be noted, however, that the predictions and associated standoff distances have assumed a worst case scenario where construction activities are being undertaken extents of the PEIR boundary.

26.7.89 In reality, for much of the time construction operations would be undertaken at greater distances away from the ecological receptors, consequently for most of the construction phase noise from construction operations would be lower and therefore reducing the extents of the standoff distances.

26.7.90 Any identified adverse noise impacts could be reduced further through the use of the potential detailed design mitigation shown in Table 26.49; however, these additional mitigation measures would be determined once more details regarding the construction plant to be utilised and the exact location of the landfall ECC is finalised.

26.7.91 Final mitigation measures would be informed by detailed design post consent and included within the final NVMP which would be submitted for approval by LCC as part of the final CoCP that will be secured via DCO condition.

26.7.92 With reference to Table 26.4 the AQTAG09 guidance also provided limits for maximum noise levels (L_{Amax}), however it is considered that the 55dB $L_{Aeq,T}$ limit is more onerous and if this is met it is likely that the maximum noise level limit will not be exceeded, with the exception of the noise generated by impact piling operations.

26.7.93 However, it has been assumed that impact piling operations would only be potentially associated with the foundations for the LN and WMN and WMS OnSS options which are located approximately 2km from the closest identified ecological receptor, therefore it is considered that these piling operations would not cause an exceedance in the 80dB L_{Amax} noise limits.

Construction Vibration

26.7.94 Ground level plant is not considered to generate significant levels of vibration, with levels below those which would be likely to cause cosmetic damage.

26.7.95 However, the following construction vibration activities have been considered:

- The underground drilling activities associated with the trenchless drilling, operations at the landfall and at various locations along the onshore ECC options;
- The vibratory piling activities associated with the trenchless drilling operations at the landfall and at various locations along the onshore ECC options (potentially including some joint bays, to be confirmed following ground infestigations); and
- Piling associated with the OnSS option foundations.

26.7.96 The potential vibration impact of these working methods has been assessed upon the closest vibration sensitive receptors (VSRs) to each construction activity.

Trenchless Drilling – Underground Drilling

26.7.97 Underground drilling will be utilised at the landfall and at a number of locations, used as an alternative methodology to open-cut trenching to cross significant environmental and physical features such as watercourses, utilities, and roads.

26.7.98 Depending on the progress rates and techniques employed, vibration effects due to tunnelling and drilling are relatively short-lived; in addition, levels of vibration are found to decrease rapidly with distance.

26.7.99 Desktop predictions of ground borne vibration due to drilling works have therefore been undertaken. The predictions have been completed in accordance with calculation algorithms associated tunnelling operations included in Table E.1 of BS 5228-2:2009+A1:2014 Part 2 Vibration.

26.7.100 The results of the desktop predictions have shown that at distances more than 55m away from tunnelling works, the vibration levels generated are unlikely to cause complaints, i.e., with reference to Table 26.3 PPV vibration levels would be between 0.3 and 1.0mm/s.

26.7.101 With reference to Table 26.50 and Table 26.54 , as a worst case, any VSRs located more than 55m away from trenchless drilling would be subject to a daytime vibration level which would lead to a *low* impact magnitude.

26.7.102 The results of the desktop predictions have shown that at distances more than 140m away from tunnelling works, the vibration levels generated are likely to below the perceivable vibration level, i.e., with reference to Table 26.3 PPV vibration levels would be below 0.3mm/s.

26.7.103 With reference to Table 26.50 and Table 26.54, any VSRs located more than 140m away from trenchless drilling would be subject to a vibration level which would lead to a *negligible* impact magnitude.

26.7.104 With reference to Table 26.58, a *negligible* impact magnitude for receptors of all sensitivities, and a *low* impact magnitude for receptors of medium sensitivity and below, would result in a temporary *'minor adverse'* level of effect, which is not significant in terms of the EIA Regulations.

Standoff Distances

26.7.105 As previously stated in paragraphs 26.6.39 and 26.6.40 the exact location of the where trenchless drilling will take place within the landfall and ECC PEIR boundaries are not yet defined; consequently, a daytime standoff distance of 55m from the PEIR boundary outside of which only a *'minor adverse'* level of effect would be experienced at worst is shown in Figure 26.22 and Figure 26.23.

26.7.106 It must be noted that any VSRs located within the standoff distances shown in the figures could be subject to a temporary '*moderate adverse'* or *'major adverse'* level of effect which are considered significant in EIA terms.

26.7.107 It must be noted, however, that the predictions and associated standoff distances have assumed a worst case scenario where trenchless drilling activities are being undertaken extents of the PEIR boundary.

26.7.108 In reality, for much of the time, trenchless drilling operations would be undertaken at greater distances away from VSRs. For most of the construction phase vibration from trenchless drilling would be lower and therefore reducing the extents of the standoff distances.

26.7.109 It also should be noted that drilling would be temporary in nature, and worst case vibration levels could be tolerated if warning has been given to the residents of the relevant VSRs prior to the commencement of the trenchless drilling operations.

547500 550000 552500 555000 557500 560000

375000 372500 370000 367500 365000

Lincolnshire Node OnSS Search Area

WM2 - A52 - Hogsthorpe to Marsh Lane

WM1 - Landfall to A52 - Hogsthorpe

WM3 - Marsh Lane to A158 - Skegness Road

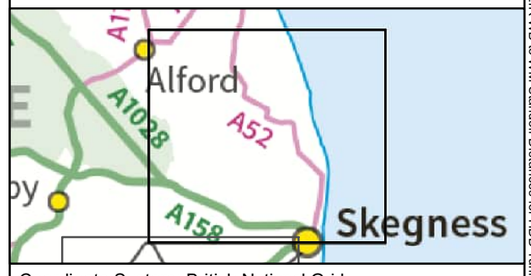
WM4 - A158 Skegness Road to Low Road

N

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Trenchless Drilling Vibration - Low Magnitude of Impact
- Trenchless Drilling Vibration - Medium Magnitude of Impact

Sources:



Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

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Weston Marsh Standoff Distances for Trenchless Drilling Tunneling Vibration from PEIR Boundary
Figure 26.22.1

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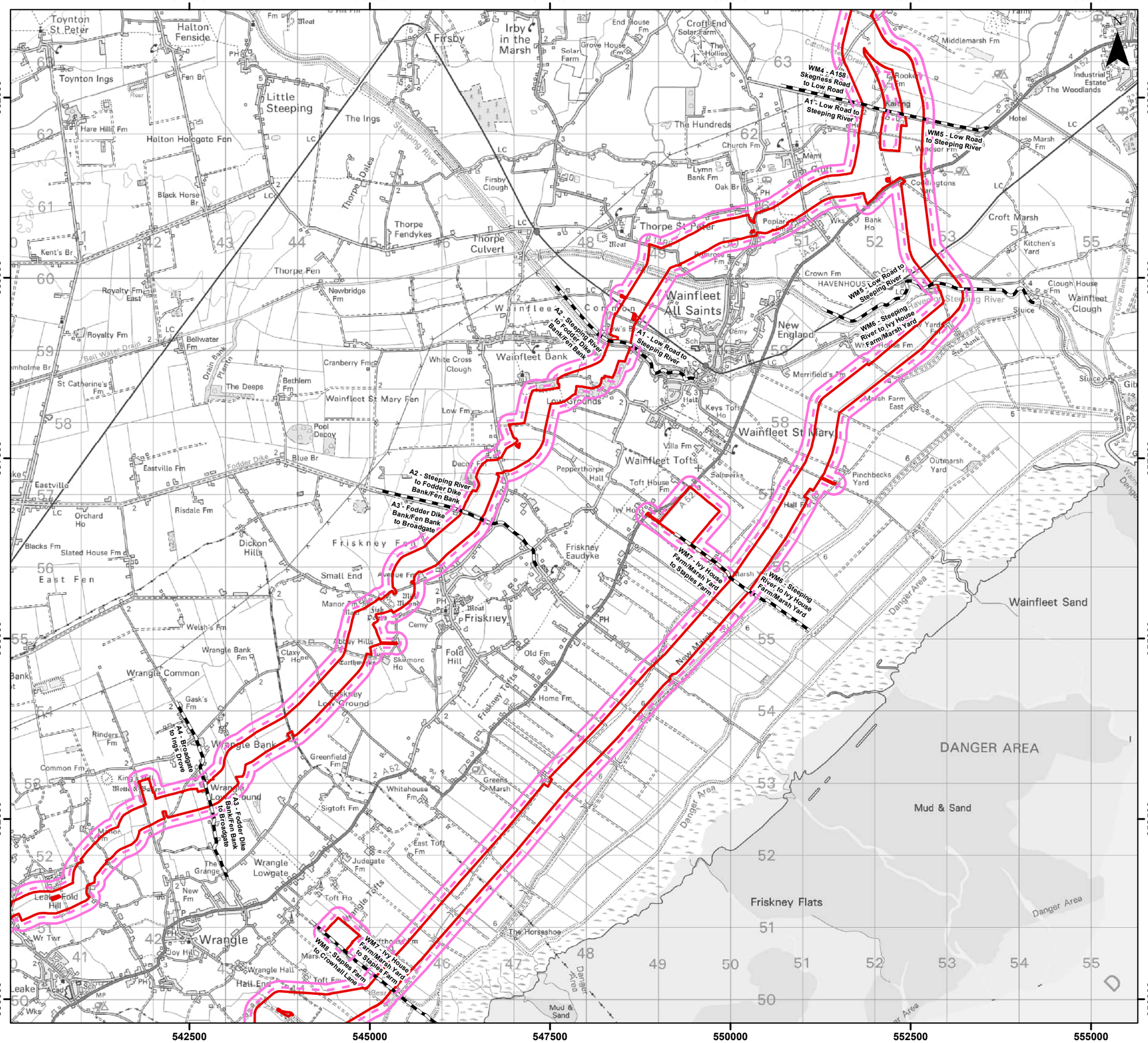

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Trenchless Drilling Vibration - Low Magnitude of Impact
- Trenchless Drilling Vibration - Medium Magnitude of Impact

Sources:

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for Trenchless Drilling Tunneling Vibration from PEIR Boundary
Figure 26.22.2

OUTER DOWSING OFFSHORE WIND

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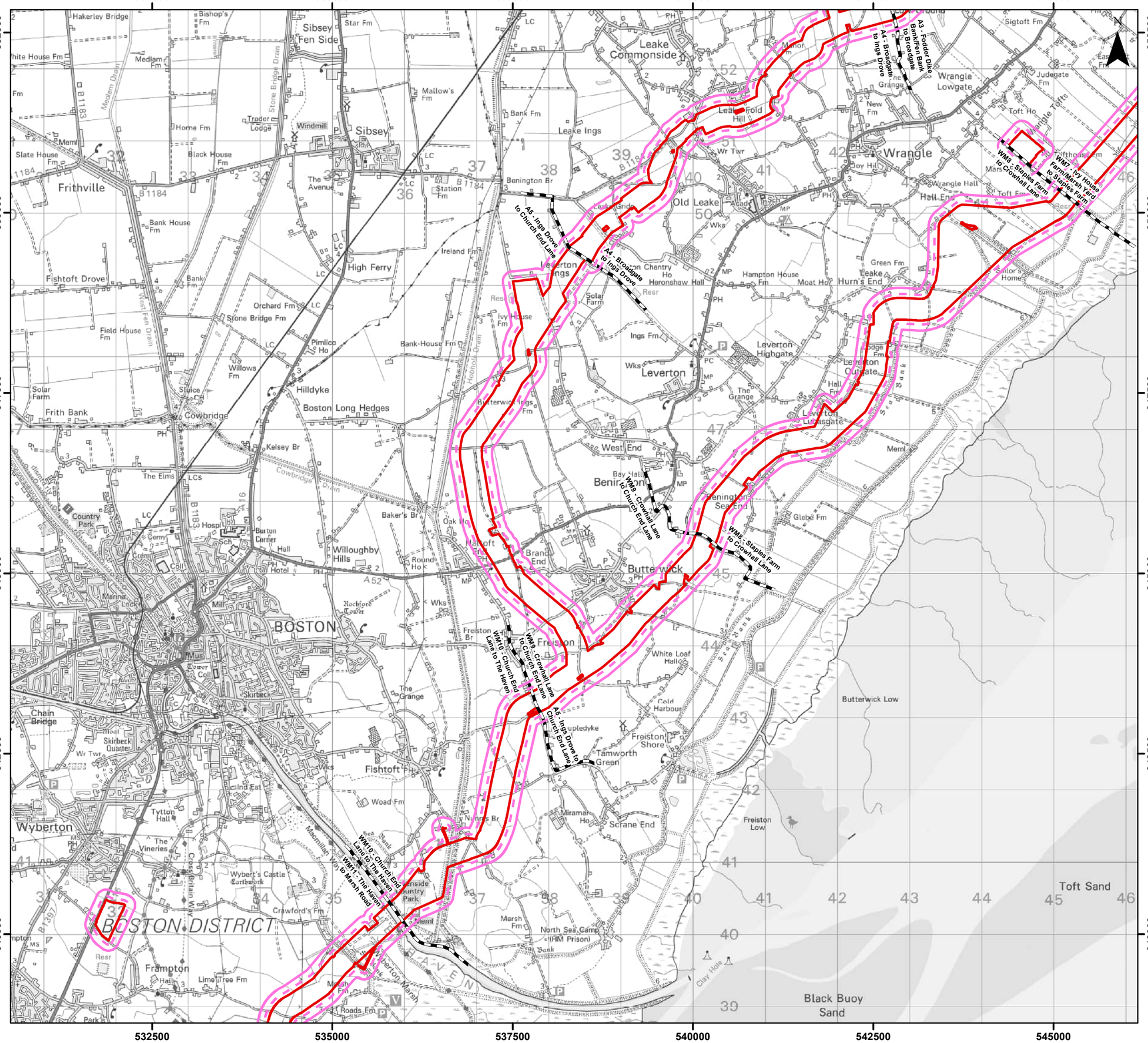

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Trenchless Drilling Vibration - Low Magnitude of Impact
- Trenchless Drilling Vibration - Medium Magnitude of Impact

Sources:

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for Trenchless Drilling Tunneling Vibration from PEIR Boundary
Figure 26.22.3

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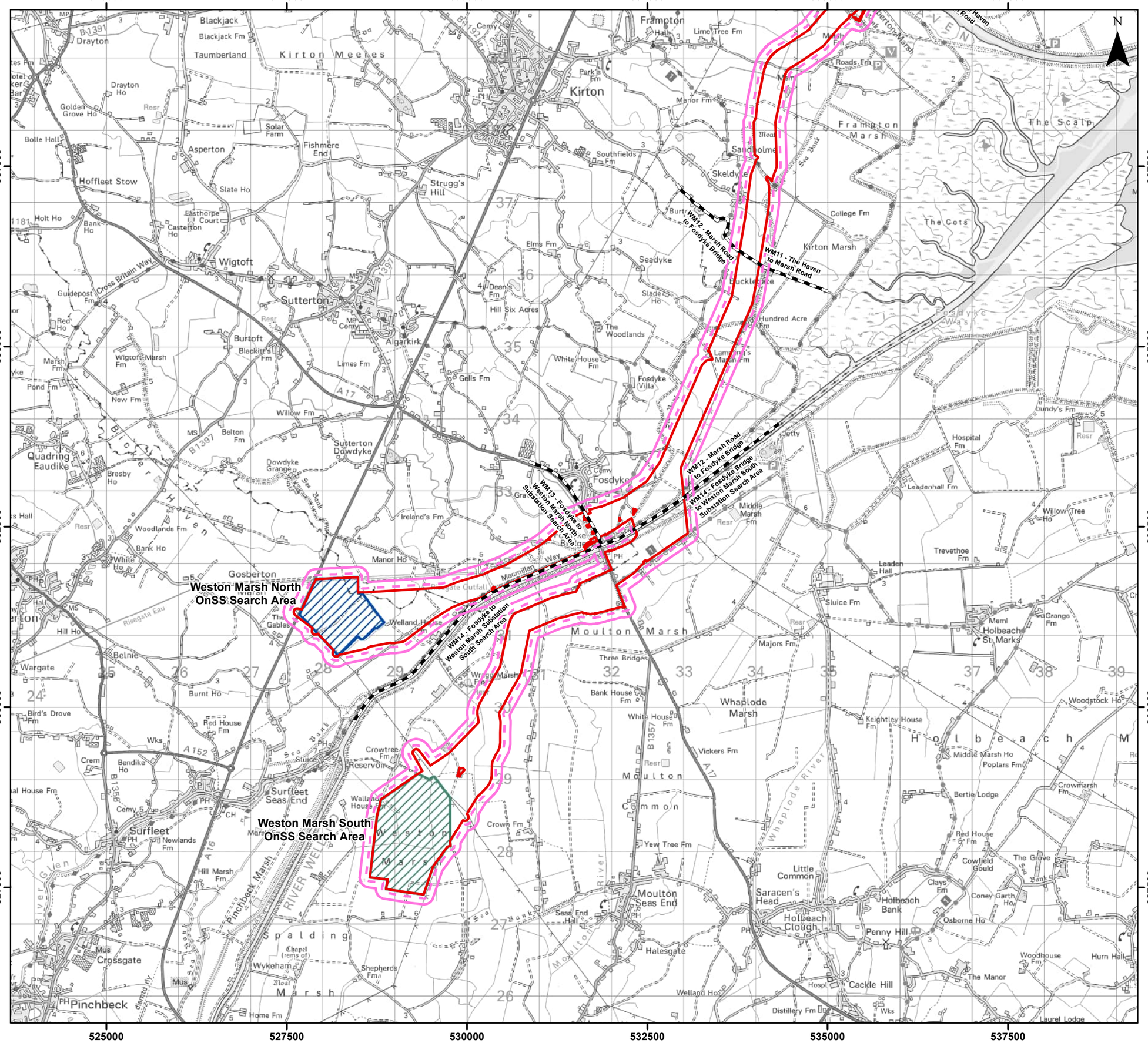

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh North OnSS Search Area
- Weston Marsh South OnSS Search Area
- Trenchless Drilling Vibration - Low Magnitude of Impact
- Trenchless Drilling Vibration - Medium Magnitude of Impact

Sources:

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for Trenchless Drilling Tunneling Vibration from PEIR Boundary
Figure 26.22.4

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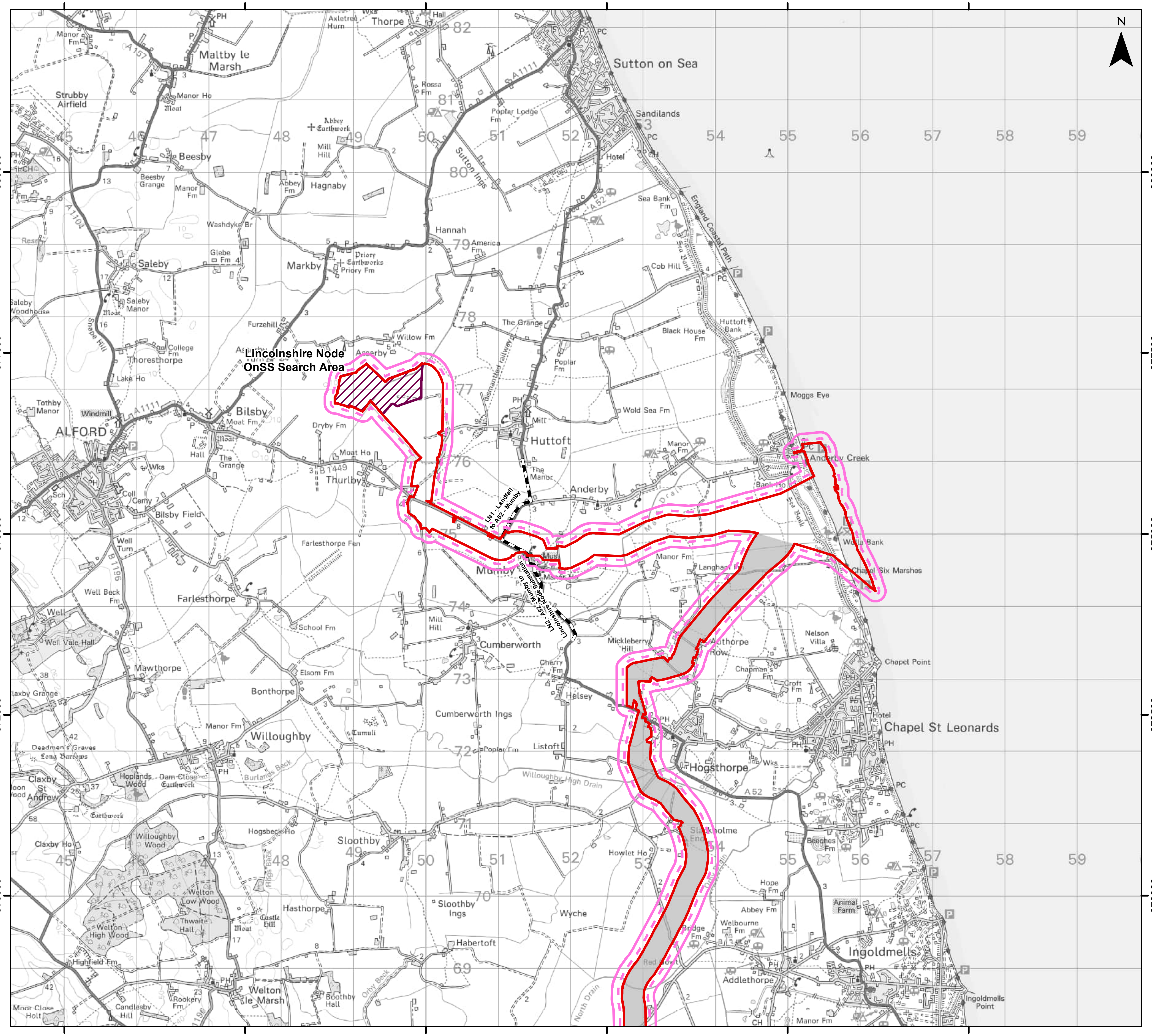

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Trenchless Drilling Vibration - Low Magnitude of Impact
- Trenchless Drilling Vibration - Medium Magnitude of Impact

Sources:

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

Preliminary Environmental Information Report

Lincolnshire Node Standoff Distances for Trenchless Drillling Tunneling Vibration from PEIR Boundary
Figure 26.23

OUTER DOWSING OFFSHORE WIND

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26.7.110 As part of the trenchless drilling operations, vibratory piling will be utilised to install sheet piles; it has also been assumed that this operation would only take place during the daytime. This would also apply where ground conditions dictate that it is necessary to install sheet piles to support joint bay excavations.

26.7.111 Depending on the progress rates and techniques employed, vibration effects due to piling installation are relatively short-lived, in addition, levels of vibration are found to decrease rapidly with distance.

26.7.112 Desktop predictions of ground borne vibration due to vibratory piling have therefore been completed in accordance with Table E.1 of BS 5228-2:2009+A1:2014 Part 2 Vibration.

26.7.113 The results of the desktop predictions have shown that at distances more than 75m away from piling works, the vibration levels generated are unlikely to cause complaints, i.e. with reference to Table 26.3 PPV vibration levels would be between 0.3 and 1.0mm/s (at a 95% confidence level).

26.7.114 With reference to Table 26.50 and Table 26.54, as a worst case, any VSRs located more than 75m away from trenchless drilling would be subject to a daytime vibration level which would lead to a *low* impact magnitude.

26.7.115 The results of the desktop predictions have shown that at distances more than 190m away from piling works, the vibration levels generated are likely to below the perceivable vibration level, i.e., with reference to Table 26.3 PPV vibration levels would be below 0.3mm/s (at a 95% confidence level).

26.7.116 With reference to Table 26.50 and Table 26.54, as a worst case, any VSRs located more than 190m away from trenchless drilling would be subject to a daytime vibration level which would lead to a *negligible* impact magnitude.

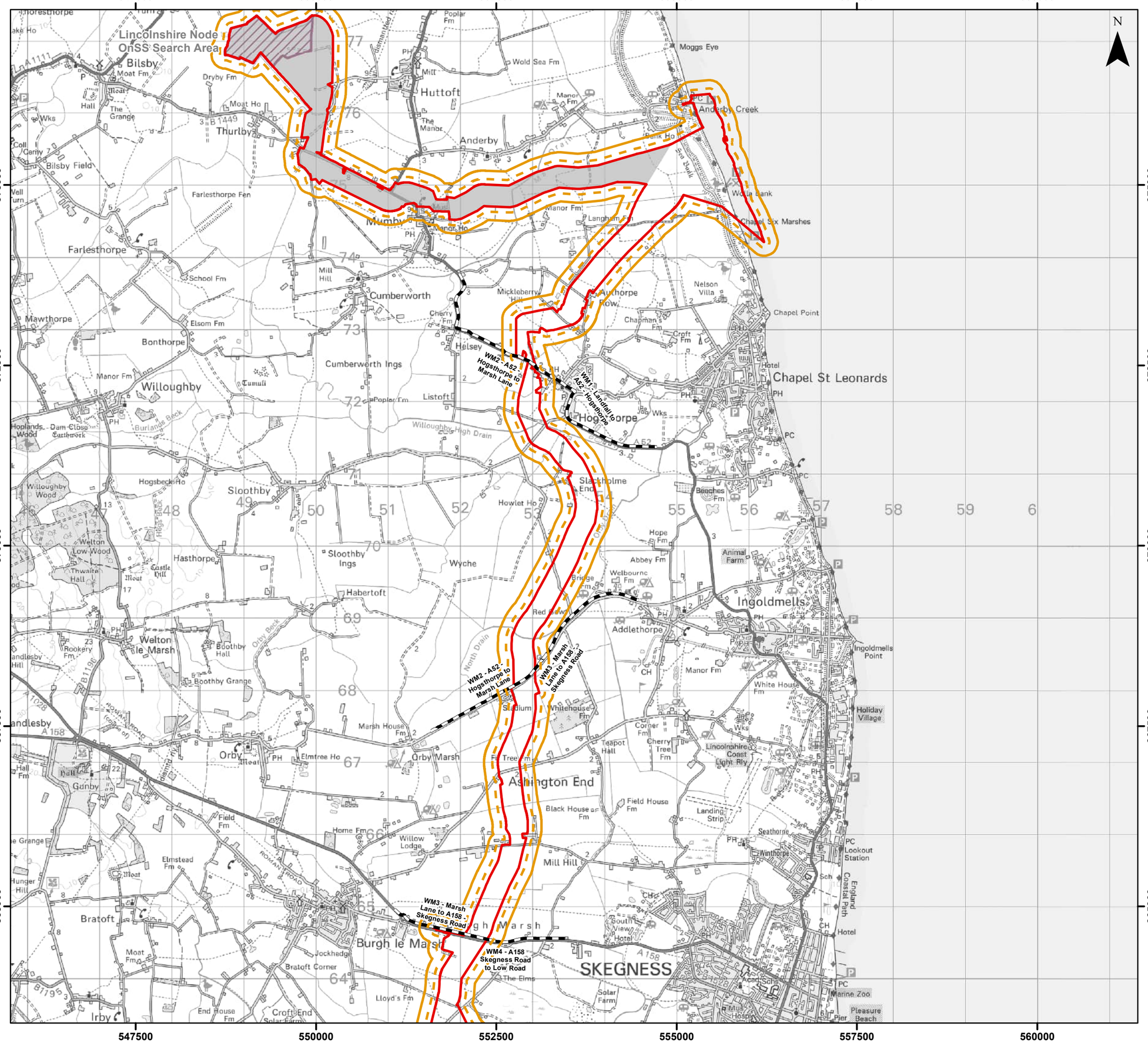
26.7.117 With reference to Table 26.58, a *negligible* impact magnitude for receptors of all sensitivities, and a *low* impact magnitude for receptors of medium sensitivity and below, would result in a temporary *'minor adverse'* level of effect, which is not significant in terms of the EIA Regulations.

26.7.118 As previously stated in paragraphs 26.6.39 and 26.6.40 the exact location of the where trenchless drilling will take place within the landfall and ECC PEIR boundaries are not yet defined; consequently, a daytime standoff distance of 75m from the PEIR boundary outside of which only a *'minor adverse'* level of effect would be experienced at worst is shown in to Figure 26.24 and Figure 26.25.

26.7.119 It must be noted that any VSRs located within the standoff distances shown in the figures could be subject to a temporary *'moderate adverse'* or *'major adverse'* level of effect which are considered significant in EIA terms.

26.7.120 It must be noted, however, that the predictions and associated standoff distances have assumed a worst case scenario where trenchless drilling activities are being undertaken extents of the PEIR boundary.

26.7.122 It also should be noted that drilling would be temporary in nature, and worst case vibration levels could be tolerated if warning has been given to the residents of the relevant VSRs prior to the commencement of the trenchless drilling vibratory piling operations.


547500
550000
552500
555000
557500
560000
375000
372500
370000
367500
365000
N
Lincolnshire Node OnSS Search Area
WM2 - A52 - Hogsthorpe to Marsh Lane
WM1 - Landfall to A52 - Hogsthorpe
WM3 - Marsh Lane to A158 - Skegness Road
WM4 - A158 Skegness Road to Low Road
Bilsby
Thurlby
Huttoft
Anderby
Moggs Eye
Anderby Creek
Mumby
Farlesthorpe
Cumberworth
Mawthorpe
Bonthorpe
Willoughby
Helsey
Authorpe Row
Chapel Point
Chapel St Leonards
Hogsthorpe
Cumberworth Ings
Listoft
Sloothby
Slackholme End
Ingoldmells
Addlethorpe
Welton le Marsh
Orby
Orby Marsh
Ashington End
Burgh le Marsh
Bratoft
SKEGNESS
Habertoft
Wyche
Sloothby Ings
Hasthorpe
Gunby
Irby
Legend
Onshore PEIR Boundary
Onshore Segment Break
Lincolnshire Node OnSS Search Area
Vibratory Piling Vibration - Low Magnitude of Impact
Vibratory Piling Vibration - Medium Magnitude of Impact
Sources:
Alford
A1028
A52
A158
Skegness
Coordinate System: British National Grid
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Scale: 1:50,000
Preliminary Environmental Information Report
Weston Marsh Standoff Distances for Trenchless Drilling Vibratory Piling from PEIR Boundary
Figure 26.24.1
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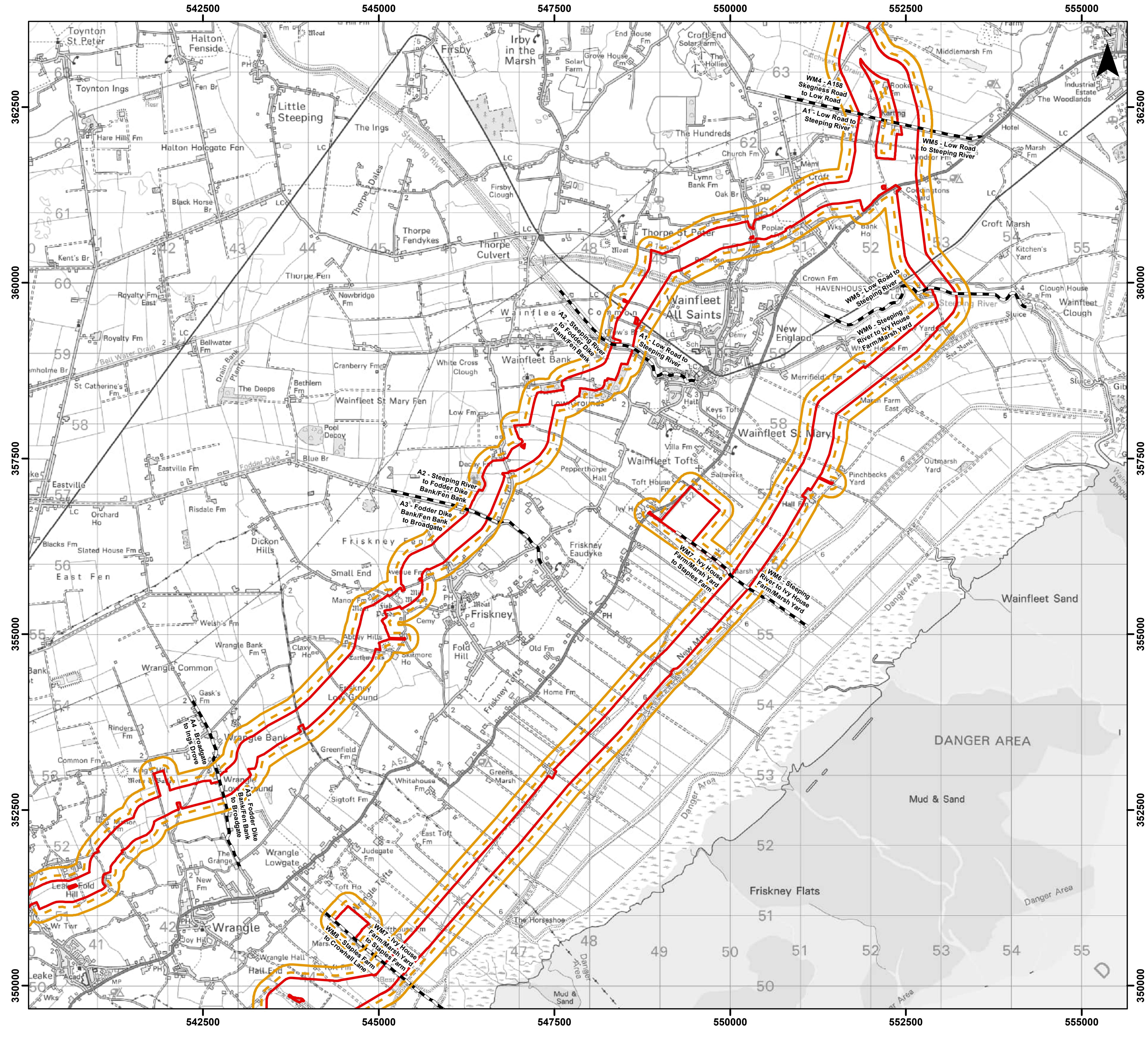
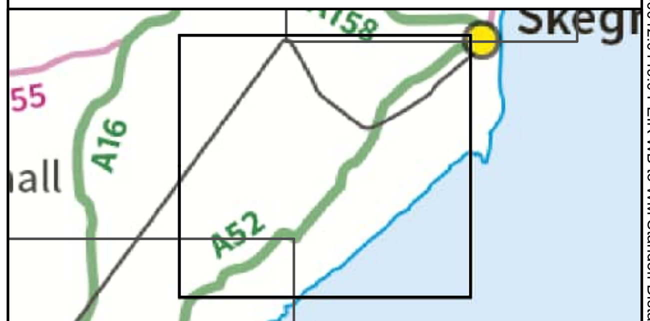


Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Vibratory Piling Vibration - Low Magnitude of Impact
- Vibratory Piling Vibration - Medium Magnitude of Impact

Sources:



Coordinate System: British National Grid

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Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for Trenchless Drilling Vibratory Piling from PEIR Boundary

Figure 26.24.2

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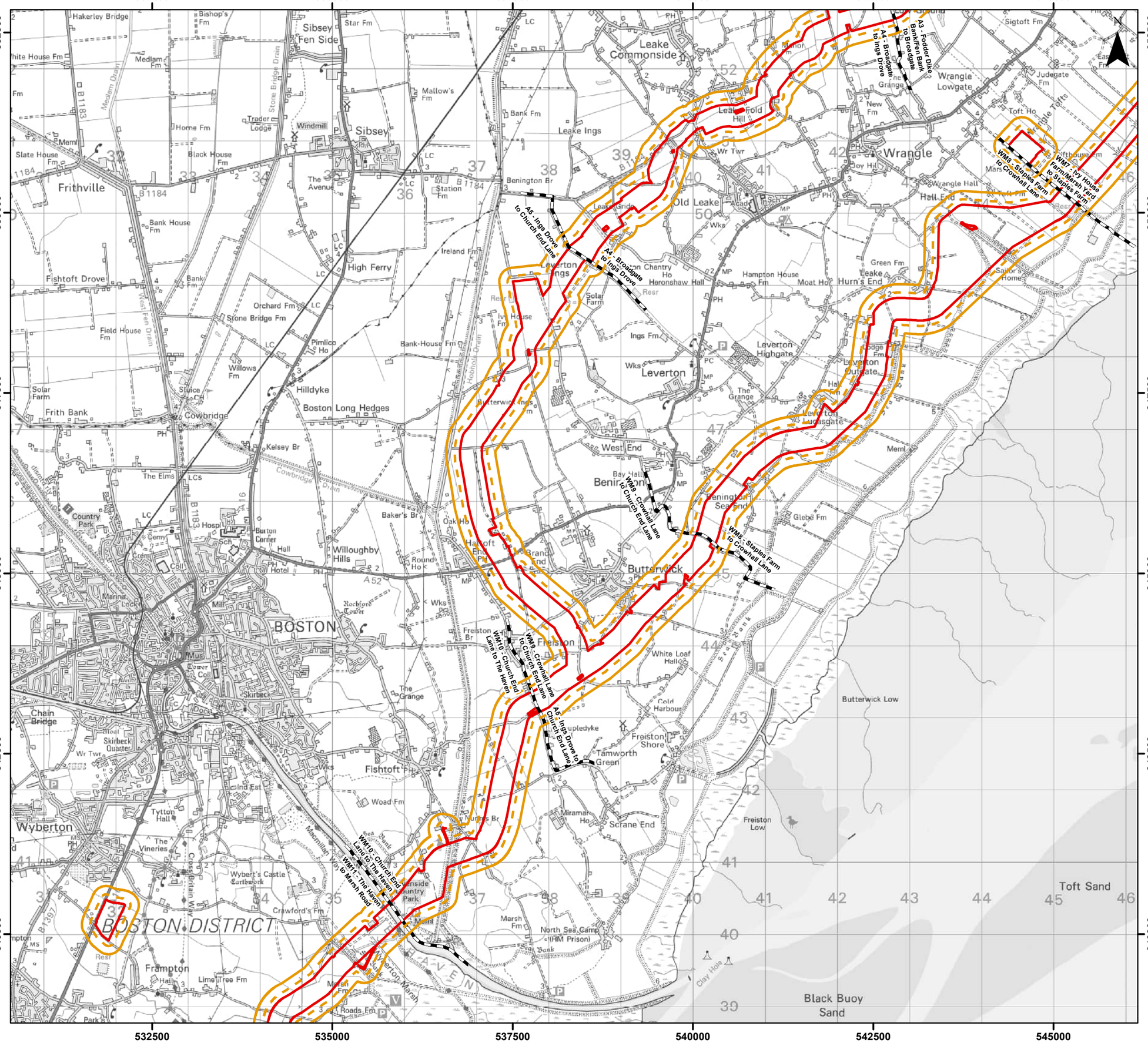

Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Vibratory Piling Vibration - Low Magnitude of Impact
- Vibratory Piling Vibration - Medium Magnitude of Impact

Sources:

Coordinate System: British National Grid

0 1 2 km

Scale: 1:50,000

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Weston Marsh Standoff Distances for Trenchless Drilling Vibratory Piling from PEIR Boundary
Figure 26.24.3

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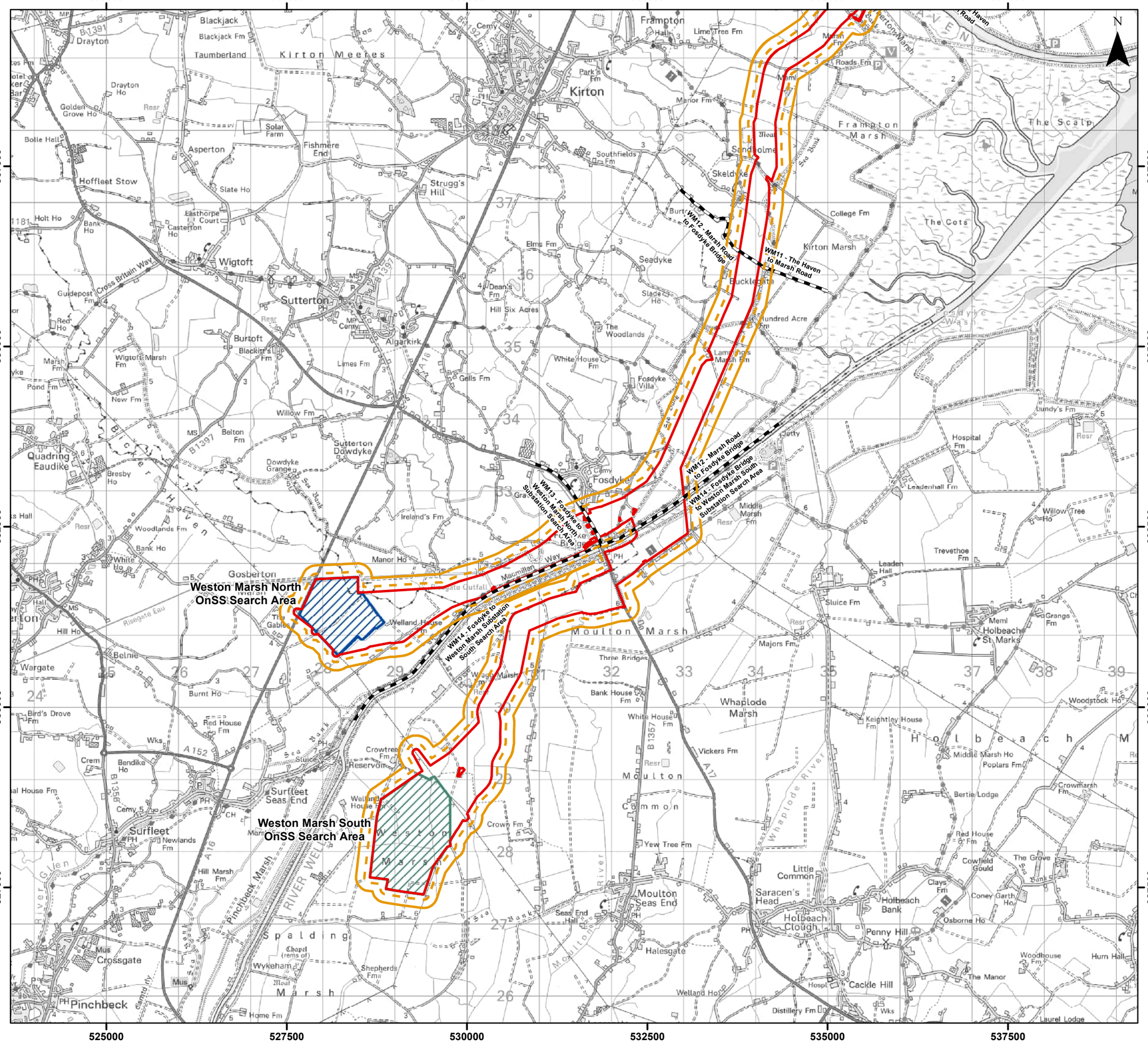
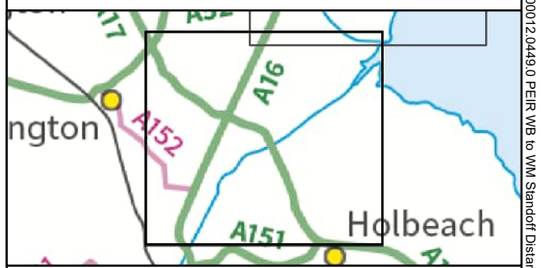


Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Weston Marsh North OnSS Search Area
- Weston Marsh South OnSS Search Area
- Vibratory Piling Vibration - Low Magnitude of Impact
- Vibratory Piling Vibration - Medium Magnitude of Impact

Sources:



Coordinate System: British National Grid

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Scale: 1:50,000

Preliminary Environmental Information Report

Weston Marsh Standoff Distances for Trenchless Drilling Vibratory Piling from PEIR Boundary
Figure 26.24.4

OUTER DOWSING OFFSHORE WIND

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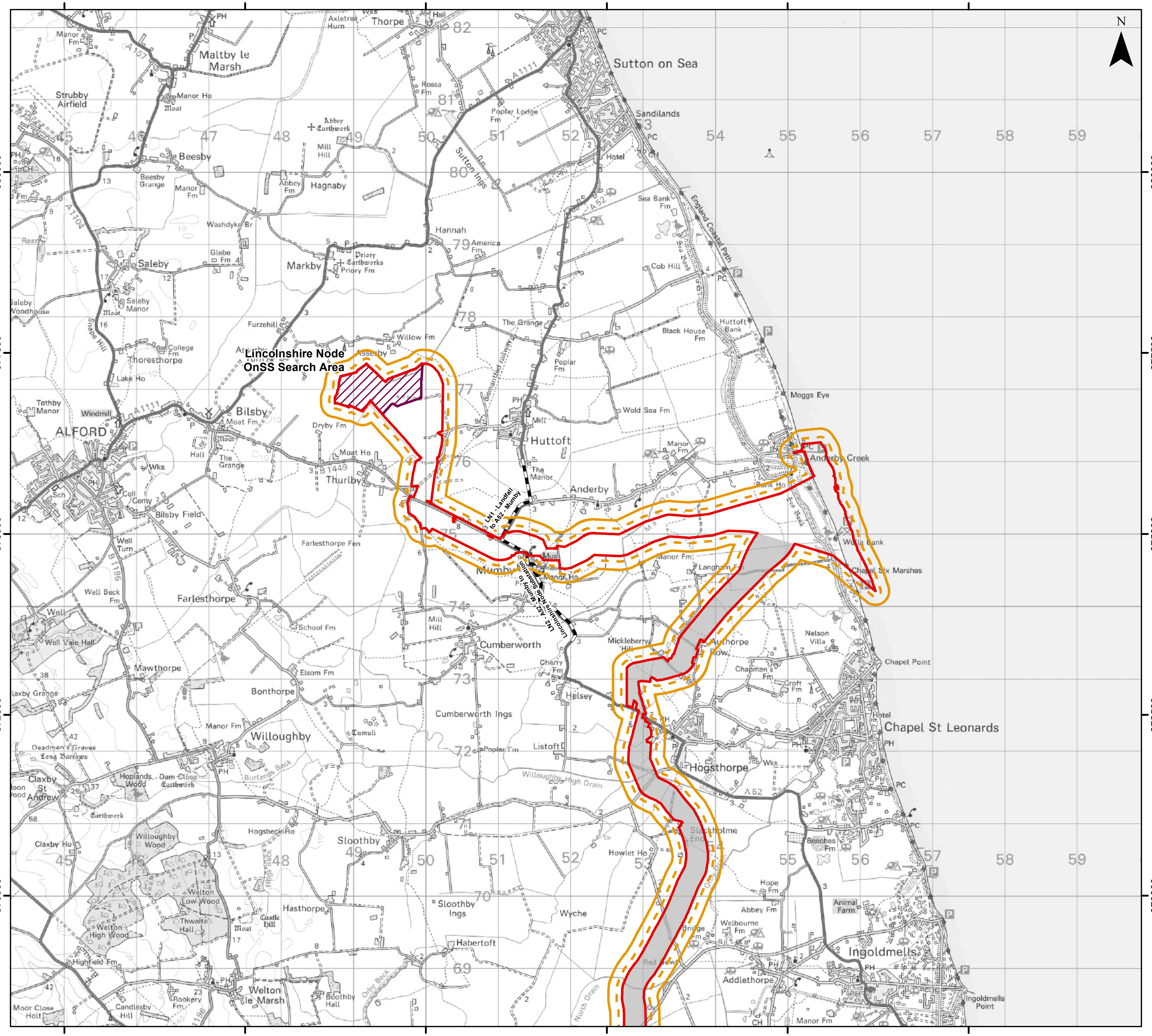
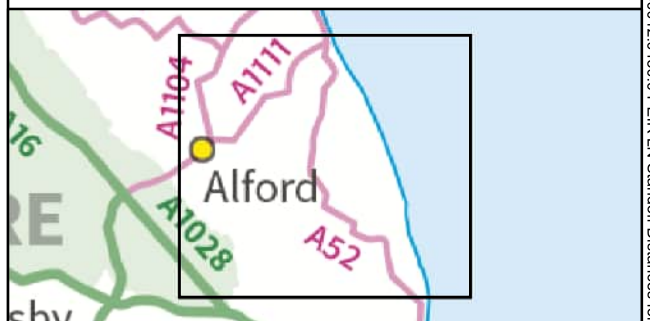


Legend

- Onshore PEIR Boundary
- Onshore Segment Break
- Lincolnshire Node OnSS Search Area
- Vibratory Piling Vibration - Low Magnitude of Impact
- Vibratory Piling Vibration - Medium Magnitude of Impact

Sources:



Coordinate System: British National Grid

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Scale: 1:50,000

Preliminary Environmental Information Report

Lincolnshire Node Standoff Distances for Trenchless Drillling Vibratory Piling from PEIR Boundary
Figure 26.25

OUTER DOWSING OFFSHORE WIND

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OnSS Foundations

26.7.123 The most significant source of vibration during the construction works will be the potential for percussive piling operations associated with the LN, WMS and WMN OnSS foundations.

26.7.124 BS 5228-2:2009+A1:2014 Part 2 Vibration provides guidance for the prediction of an upper estimate of vibration from piling operations which is based on the energy per blow or cycle (determined by the type of piler and ram weight), the distance of the receptor from piling and generalised soil conditions.

26.7.125 Based on the calculation formulae provided in Table E.1 in Annex E of BS 5228-2:2009+A1:2014, percussive pling standoff distances have been calculated from the piling location to achieve a PPV level of 0.3mm/s, i.e., below the level of perceptibility.

26.7.126 The standoff distances shown in Table 26.70 below have been calculated for 200, 300 and 500kJ hammer energies.

Table 26.70: Estimated standoff distances from percussive piling

Threshold Value, PPV mm/s	Hammer Energy	Standoff Distance (m)
0.3	200kJ	66
	300kJ	78
	500kJ	95

The standoff distances have been based on percussive piling 'at refusal'.

26.7.127 It must be noted, however, that the hammer energies utilised are out of the valid prediction range included within BS 5228-2:2009+A1:2014 which states that the limit of the equation utilises a maximum hammer energy of 85kJ.

26.7.128 Therefore, the standoff distances shown should be treated with a large degree of caution. It also should be noted that trying to accurately predict the vibration levels generated from large hammer energies through predominately unknown ground conditions over distances over 100m is extremely difficult.

26.7.129 Further to the above, the closest VSR to the OnSS extents is approximately 250m at the WMN OnSS (Location 002), this would suggest that the PPV levels from piling at all the VSRs located around the OnSS areas would be well below 0.3mm/s, however it is not possible to determine this accurately through prediction.

26.7.130 As noted in Volume 1, Chapter 3: Project Description, at this stage in the Project development process, decisions on exact locations of infrastructure and the precise technologies and construction methods that will be employed have not been finalised. This includes the requirement for percussive piling during construction as well as the type of piler and ram weight (if required). These will be determined during detailed design that will take place between a decision on the application for development consent and the start of construction.

26.7.131 It is anticipated that the PPV levels from piling operations would be below 1.0mm/s at the nearest VSR to the OnSS options, and that percussive piling works would only take place during the daytime period. The Final NVMP will include predictions for PPV arising from percussive piling operations that will be informed by detailed design, for approval by LCC (through approval of the Final NVMP and CoCP secured by DCO Requirement), in advance of any percussive piling taking place.

26.7.132 On the basis that that levels from piling operations would be below 1.0mm/s at the nearest VSRs to the OnSS options, the nearest receptors would be *medium* sensitivity (see Table 26.65), and the piling works would only take place during the daytime period only, then with reference to Table 26.50, Table 26.54 and Table 26.58, as a worst case, this would lead to a *low* impact magnitude for *medium* sensitivity receptors, equating to a temporary *'minor adverse'* level of effect which is not significant in terms of the EIA Regulations.

Construction Traffic Noise Assessment – Local Road Network

26.7.133 Construction traffic from the development proposals may temporarily alter noise levels near the affected local road network. In accordance with the DMRB Volume 11 Section 3 Part 7 Noise and Vibration, a noise assessment has been undertaken to include the identified affected links.

26.7.134 The most affected links have been identified within Volume 1, Chapter 27: Traffic and Transport and shown on Figure 2 in Volume 2, Appendix 27.1: Traffic and Transport Baseline Technical Report.

26.7.135 With reference to Volume 1, Chapter 27: Traffic and Transport for each link the Annual Average Weekly Traffic (AAWT) and percentage of Heavy Goods Vehicles (HGVs) have been determined "With Scheme" (with the development proposals) and "Without Scheme" (without the development proposals).With reference to Volume 1, Chapter 27: Traffic and Transport, for each link the AAWT and percentage of HGVs have been determined "With Scheme" (with the development proposals) and "Without Scheme" (without the development proposals).

26.7.136 Based on the traffic numbers described above the BNL has been established for the "With Scheme" and "Without Scheme". Scenarios for the base year 2022 and base year including the development have been assessed. The BNL is the dB $L_{A10, 18hr}$ noise level at 10m from the kerb of the road assessed.

26.7.137 The assessment of each link is shown in Table 26.71. As the significant majority of receptors along the highway routes are residential receptors, and only daytime and weekend construction is proposed, the receptors along the traffic links have been categorised as *medium* sensitivity. The table also compares the predicted changes in noise levels to the defined threshold limits and with reference to Table 26.50, Table 26.53 and Table 26.58, defines the level of effect and significance.

Table 26.71: Construction traffic noise assessment

Link	Without Scheme				With Scheme				Change in BNL, dB	Impact Magnitude	Level of Effect and Significance
	AAWT	% HGV	Average Speed km/h	BNL dB	AAWT	% HGV	Average Speed km/h	BNL dB			
Sea Lane (Staples Farm)	1203	7.1	99	63.7	1376	14.7	99	65.3	+1.7	Low	Minor (not significant)
David's Lane	672	11.2	82	60.4	791	19.7	82	62.3	+1.9	Low	Minor (not significant)
Church End Road	1759	6.1	94	64.7	1794	7.4	94	65.0	+0.3	Low	Minor (not significant)
TCC11/ Cut End Road	244	7.1	85	55.5	321	21.6	85	58.8	+3.2	Medium	Moderate (significant)
TCC12/ Wyberton Roads	237	5.0	79	54.5	343	29.2	79	59.4	+4.9	Medium	Moderate (significant)
TCC13/ Skeldyke Road	353	5.8	70	55.5	460	20.3	70	59.1	+3.5	Medium	Moderate (significant)
TCC14/ Wash Road	222	3.9	40	50.3	266	10.3	40	53.0	+2.7	Low	Minor (not significant)
B1449 Thurlby Road	4535	5.7	94	68.7	4674	7.3	94	69.2	+0.4	Low	Minor (not significant)
B1449 Long Lane	2721	6.0	79	65.3	2869	8.6	79	66.0	+0.7	Low	Minor (not significant)
A1104	7894	5.2	66	68.6	8017	6.2	66	68.9	+0.3	Low	Minor (not significant)
A52 (south of Hogsthorpe)	4085	4.3	90	67.7	4277	4.3	90	67.9	+0.2	Low	Minor (not significant)

Link	Without Scheme				With Scheme				Change in BNL, dB	Impact Magnitude	Level of Effect and Significance
	AAWT	% HGV	Average Speed km/h	BNL dB	AAWT	% HGV	Average Speed km/h	BNL dB			
A52 between Marsh Lane and Skegness	4098	4.3	52	64.2	4292	4.3	52	64.4	+0.2	Low	Minor (not significant)
S Ings Lane	1189	6.5	90	62.7	1218	7.5	90	63.0	+0.3	Low	Minor (not significant)
Marsh Lane (between ECC and A52)	4886	4.9	101	69.6	4891	4.9	101	69.6	+0.0	Low	Minor (not significant)
Marsh Lane (between ECC and A158)	4886	4.9	74	67.2	4941	5.4	74	67.3	+0.2	Low	Minor (not significant)
A158 Skegness Road	13899	4.8	52	69.6	14109	6.1	52	70.0	+0.4	Low	Minor (not significant)
A158 Skegness Road	13899	4.8	94	73.5	14241	6.7	94	73.9	+0.4	Low	Minor (not significant)
A52 (east of Croft)	8508	4.7	83	70.4	8776	6.8	83	70.9	+0.5	Low	Minor (not significant)
A52 (Wainfleet)	8508	4.7	86	70.6	8815	6.8	86	71.1	+0.6	Low	Minor (not significant)
A52 (Holland Lane)	5127	6.4	79	68.1	5397	9.0	79	68.8	+0.7	Low	Minor (not significant)
A52 (Wrangle)	6788	6.7	88	70.2	7077	8.7	88	70.7	+0.5	Low	Minor (not significant)

Link	Without Scheme				With Scheme				Change in BNL, dB	Impact Magnitude	Level of Effect and Significance
	AAWT	% HGV	Average Speed km/h	BNL dB	AAWT	% HGV	Average Speed km/h	BNL dB			
A52 (Butterwick)	9051	5.9	64	69.1	9285	6.7	64	69.4	+0.3	Low	Minor (not significant)
A52 Wainfleet Road (Haltoft End)	12163	4.9	65	70.3	12517	6.3	65	70.7	+0.4	Low	Minor (not significant)
A52 Wainfleet Road (Haltoft End)	12163	4.9	65	70.3	12645	7.0	65	70.9	+0.7	Low	Minor (not significant)
Church Lane	1137	6.7	56	59.6	1190	9.4	56	60.4	+0.8	Low	Minor (not significant)
Brewster Lane	38	5.9	49	44.1	61	12.5	49	47.6	+3.5	Medium	Moderate (significant)
Mill Lane	336	3.9	60	53.9	359	5.2	60	54.5	+0.6	Low	Minor (not significant)
Mill Lane (at Brewery)	573	1.9	38	53.6	596	2.7	38	54.1	+0.5	Low	Minor (not significant)
Boston Road	1404	5.3	65	60.9	1498	8.5	65	61.9	+1.0	Low	Minor (not significant)
Church Lane	46	10.1	49	45.9	68	28.2	49	50.4	+4.5	Medium	Moderate (significant)
Low Road (north)	1178	4.1	61	59.6	1249	7.8	61	60.7	+1.1	Low	Minor (not significant)
Scald Gate	28	6.0	41	42.1	78	45.6	41	52.4	+10.3	High	Major (significant)

Link	Without Scheme				With Scheme				Change in BNL, dB	Impact Magnitude	Level of Effect and Significance
	AAWT	% HGV	Average Speed km/h	BNL dB	AAWT	% HGV	Average Speed km/h	BNL dB			
Low Road (south)	280	4.6	61	53.4	328	18.6	61	56.8	+3.3	Medium	Moderate (significant)
Ivy Lane	56	6.1	53	46.1	104	49.4	53	54.4	+8.2	High	Major (significant)
Skirmore Road	47	8.5	36	44.9	68	5.9	36	45.7	+0.8	Low	Minor (not significant)
Howgarth Lane	136	3.8	52	49.2	202	24.4	52	54.8	+5.6	High	Major (significant)
Low Road	890	5.8	67	59.3	955	10.0	67	60.5	+1.2	Low	Minor (not significant)
Broadgate	347	6.1	51	53.9	413	15.9	51	56.7	+2.8	Low	Minor (not significant)
Common Road	226	5.9	85	55.0	291	19.7	85	58.1	+3.2	Medium	Moderate (significant)
Common Road (near A52)	265	6.5	39	51.9	330	18.6	39	55.6	+3.6	Medium	Moderate (significant)
Ings Road	310	5.5	79	55.8	459	25.7	79	60.4	+4.6	Medium	Moderate (significant)
West End Road	638	7.4	53	57.0	787	18.8	53	60.1	+3.0	Medium	Moderate (significant)
A16 (south of Boston)	23194	5.4	50	71.9	23430	5.7	50	72.0	+0.1	Low	Minor (not significant)
A16 (south of Boston)	23194	5.4	50	71.9	23494	6.0	50	72.1	+0.2	Low	Minor (not significant)

Link	Without Scheme				With Scheme				Change in BNL, dB	Impact Magnitude	Level of Effect and Significance
	AAWT	% HGV	Average Speed km/h	BNL dB	AAWT	% HGV	Average Speed km/h	BNL dB			
A17 (south of River Welland)	21118	6.8	63	72.9	21278	7.2	63	73.0	+0.1	Low	Minor (not significant)
A17 (north of River Welland)	21118	6.8	77	74.2	21375	7.6	77	74.4	+0.2	Low	Minor (not significant)
A17 (north of A16)	19763	6.9	77	73.9	19941	7.7	77	74.1	+0.2	Low	Minor (not significant)
A17 (west of A1221)	25097	12.8	64	74.9	25396	13.7	64	75.1	+0.2	Low	Minor (not significant)
A16 (south of A17)	16853	9.2	64	72.5	16990	9.6	64	72.6	+0.1	Low	Minor (not significant)
A1121	9125	7.0	64	69.4	9244	7.9	64	69.6	+0.2	Low	Minor (not significant)
A16 (south of the A155)	7358	5.8	90	70.5	7661	8.7	90	71.2	+0.7	Low	Minor (not significant)
A16 (north of the A155)	10188	7.8	96	72.7	10492	9.8	96	73.3	+0.5	Low	Minor (not significant)
A16 (between A158 and A1028)	6001	8.8	96	70.6	6366	13.1	96	71.5	+1.0	Low	Minor (not significant)
A16 (north of A1028)	9714	6.8	96	72.4	10057	9.7	96	73.0	+0.7	Low	Minor (not significant)
A1028	6415	4.4	96	70.2	6591	6.7	96	70.7	+0.5	Low	Minor (not significant)

Link	Without Scheme				With Scheme				Change in BNL, dB	Impact Magnitude	Level of Effect and Significance
	AAWT	% HGV	Average Speed km/h	BNL dB	AAWT	% HGV	Average Speed km/h	BNL dB			
A158 (between A1028 and A16)	12367	3.2	96	72.8	12587	4.6	96	73.2	+0.3	Low	Minor (not significant)
A158 (west of A16)	7934	17.9	103	73.6	8274	20.4	103	74.1	+0.5	Low	Minor (not significant)
A1104	4747	7.0	98	69.5	4761	6.9	98	69.5	+0.0	Low	Minor (not significant)
A16 (Boston)	40320	5.6	64	75.4	40524	5.7	64	75.6	+0.1	Low	Minor (not significant)
Gunby Lane	1160	37.4	70	64.9	1169	37.6	70	64.9	+0.0	Low	Minor (not significant)
B1195	1233	5.9	68	60.9	1254	6.2	68	61.0	+0.1	Low	Minor (not significant)
B1195	912	5.9	67	59.4	933	6.3	67	59.6	+0.2	Low	Minor (not significant)
Lincoln Road, Skegness	9000	3.1	55	67.5	9209	8.5	55	69.0	+1.5	Low	Minor (not significant)

26.7.138 It can be seen from Table 26.71 that:

- The worst case magnitude of impact would be *high* for three *medium* sensitivity receptors (Scald Gate, Ivy Lane, and Howgarth Lane) and the level of effect for these NSRs from noise levels generated by construction related traffic would be temporary *'major adverse'*, which is significant in terms of the EIA Regulations;
- Ten other *medium* sensitivity receptors (Cut End Road, Wyberton Roads, Skeldyke Road, Brewster Lane, Church Lane, Low Road, Common Road, Common Road (near A52), Ings Road, and West End Road) would experience a magnitude of impact of *medium,* and the level of effect for these NSRs from noise levels generated by construction related traffic would be temporary *'moderate adverse'*, which is significant in terms of the EIA Regulations; and
- Otherwise, the magnitude of impact would be *low* for *medium* sensitivity receptors and the level of effect at the nearest NSRs from noise levels generated by construction related traffic would be temporary *'minor adverse'*, which is not significant in terms of the EIA Regulations.

26.7.139 With regards to mitigation measures to reduce the identified impacts, there are no physical measures that could easily be implemented due to the fact that access routes on the public highway and associated NSRs are not within the redline boundary and/or are on private land. Re-routing the construction traffic away from the most affected links where adverse impacts have been identified would remove any impacts; however, this may add traffic to other links which in-turn may lead to increased noise impacts on these routes.

26.7.140 With regards to the identified adverse impacts the following should also be noted:

- The noise level generated by construction traffic would be temporary in nature and the assessment has been based on a maximum design scenario where the maximum flows on each link has been assessment, in reality the flows on the roads are likely to be lower and therefore reducing the identified impacts;
- The assessment has predicted a change in noise levels 10m away from the kerb of the road assessed, it is considered that in the majority of cases the NSRs located close to each haul route would 'front-on' to the road; consequently, the noise levels within the main amenity spaces (rear gardens) would be reduced due to the noise attenuation provided by the properties themselves; and
- With regards to internal noise levels, the building fabric of each NSR would provide noise attenuation from construction traffic, as a minimum a partially open window would provide approximately 15dB[3] and a standard single glazed window would provide approximately 20dB of attenuation, consequently the noise impacts experienced in internal amenity areas (living/dining rooms) would be considerably less than externally.

[3] It is suggested within Section G.1 of BS 8233:2014 that the noise attention provided by a partially open window is approximately 15 dB.

Operational Phase

Residential Receptor Assessment

26.7.141 An assessment has been made in accordance with the guidance contained in BS 4142:2014+A1:2019 to determine whether noise emissions associated with the operation of the proposed OnSS options are likely to give rise to adverse impacts at the closest residential receptors to each option.

26.7.142 Noise levels from each OnSS option have been predicted at the nearest residential receptors, The modelling has been undertaken on the basis of the type, quantity and size of plant that is likely to be required at a OnSS of the size in the application. It should, however, be noted that the final design of the OnSS has not been determined and so a MDS has been assessed.

26.7.143 In conjunction with the MDS shown in Table 26.47, the modelling has assumed that all the equipment is operating within the OnSS footprint area (210m by 190m); the footprint area has then been positioned at the extents of the PEIR boundary at its closest approach to each NSR for each OnSS option.

26.7.144 The operational noise levels of the plant associated with the OnSS have been provided by the Applicant and are shown in Table 26.72 below.

Table 26.72: Operational plant associated with the OnSS

OnSS Option	Item of Plant	Sound Power Level (SWL) dB	Quantity
All Options (High Voltage Alternating Current (HVAC))	Variable Shunt Reactor	90	4
	Fixed Shunt Reactor	90	4
	DRC	90	4
	DRC Transformer	90	4
	DRC Reactor	90	4
	Super Grid Transformer	90	4
	Harmonic Filter	90	8
	MV/LV Transformer	90	4

26.7.145 The predicted specific noise levels are shown in Table 26.73 and have been based on the following assumptions:

- All the plant is operating simultaneously 100% of the time;
- All sources modelled as point sources at a height of 2.5m above ground level for each source;
- As no 1/3 octave band data all predictions have been undertaken in the 500 Hz frequency band;
- G = 0 hard ground within the OnSS areas;
- G = 0.9 soft ground between each OnSS area and each receptor;

- A daytime receiver height of 1.5m and a night-time receiver height of 4m, approximate height of a ground floor and first floor window respectively at all the NSRs considered; and
- A reflection factor of 3.

26.7.146 The following meteorological inputs have also been used:

- Downwind propagation between each OnSS option and the receiver (NSRs);
- Relative Humidity = 70%; and
- Air Temperature = 10°c.

26.7.147 It must be noted that the NSRs described in Table 26.73 have previously been identified in Table 26.65, and are shown in Figure 26.11, and Figure 26.12.

26.7.148 The noise model outputs are shown in Volume 2, Appendix 26.4 Noise Model Outputs. The predicted noise levels have been rounded to the nearest decibel.

Table 26.73: Predicted specific sound level from OnSS options, dB

OnSS Option	Receptor	Period	Receptor Sensitivity	Predicted Specific Sound Level, L_{Aeq}, T dB
LN_OnSS	LN_OnSS001	Daytime	Medium	38
		Night-time	High	42
	LN_OnSS002	Daytime	Medium	34
		Night-time	High	36
	LN_OnSS003	Daytime	Medium	33
		Night-time	High	36
WMN_OnSS	WMN_OnSS001	Daytime	Medium	36
		Night-time	High	40
	WMN_OnSS002	Daytime	Medium	40
		Night-time	High	44
	WMN_OnSS003	Daytime	Medium	37
		Night-time	High	42
	WMN_OnSS004	Daytime	Medium	31
		Night-time	High	31
WNS_OnSS	WMS_OnSS001	Daytime	Medium	40
		Night-time	High	44
	WMS_OnSS002	Daytime	Medium	39
		Night-time	High	42
	WMS_OnSS003	Daytime	Medium	36
		Night-time	High	40
	WMS_OnSS004	Daytime	Medium	37
		Night-time	High	42
	WMS_OnSS005	Daytime	Medium	34
		Night-time	High	39
	WMS_OnSS006	Daytime	Medium	34
		Night-time	High	37

26.7.149 In conjunction with BS 4142:2014+A1:2019, the acoustic character of the sound being generated by the source needs to be considered at the nearest NSRs, which requires corrections for tonal, impulsive or intermittent sounds to be added to the specific levels where required.

26.7.150 In the absence of octave band or third octave band operational data for the OnSS options, it is considered that a +6dB character correction would need to be added to the specific sound levels to account for the potential tonal aspects of the sound being generated by the OnSS.

26.7.151 However, it is considered that no further character corrections would apply as the sound being generated by the OnSS is neither intermittent nor impulsive in nature.

26.7.152 With reference to the above, 6 dB has been added to the predicted specific sound level shown in Table 26.73 to calculate the rating level (L_{Ar}) at each NSR to each OnSS option.

26.7.153 Rating level limits (taking into account the representative background sound levels for the residential properties) have been established below for the residential properties to compare the rating levels to, and assessments undertaken in accordance with BS 4142:2014+A1:2019, which states:

"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

26.7.154 The standard does not indicate at what level background and rating levels are low but the previous version of BS 4142:1997 stated:

"The method is not suitable for assessing the noise measured inside buildings or when the background and rating noise levels are both very low. NOTE. For the purposes of this standard, background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low".

26.7.155 With reference to Table 26.29 and Table 26.46, it can be seen that the representative background sound level measured at the substation options during the night-time (with the exception of at WMN_OnSS001, WMN_OnSS003 and WMN_OnSS004) was 21-31dB L_{A90}, and therefore considered to be low as defined in conjunction with BS 4142:2014+A1:2019.

26.7.156 In recognition of this, the substation for the approved Triton Knoll project, which is located approximately 10km to the northwest of the Weston Marsh North substation option, had conditions placed on the operational noise levels permissible at the nearest noise sensitive receptor, limiting the rating level of the substation operation to 35dB $L_{Ar,T}$. It is therefore proposed to use either the representative background sound level or these limits (whichever is higher) for operational noise from the substation in this assessment; the predicted rating level from the substation operations will be assessed against this limit.

26.7.157 In view of the above and in addition to the rating level, the change in the absolute $L_{Aeq,T}$ sound level is also presented. For the assessment, to be robust, when undertaking the calculation, the lowest baseline ambient sound level presented in Table 26.29 and Table 26.46 has been used.

26.7.158 The results of this assessments are shown in Table 26.74, Table 26.75 and Table 26.76, where the predicted rating levels and background sound levels have been rounded to the nearest decibel.

26.7.159 The absolute $L_{Aeq,T}$ sound level has been calculated by logarithmically adding the predicted specific sound level from each OnSS option to the baseline ambient (residual $L_{Aeq,T)}$ level at each NSR considered to calculate the absolute level.

26.7.160 The absolute level is then compared to the measured baseline ambient (residual $L_{Aeq,T}$) levels and any changes assessed accordingly.

Table 26.74: BS 4142:2014+A1:2019 LN_OnSS operational assessment for residential receptors

Receptor	Period	Rating Level Limit, dB $L_{Ar,T}$	Predicted Specific Sound Level, L_{Aeq}	Rating Level, $L_{Ar,T}$	Difference	Measured Residual $L_{Aeq,T}$	Calculated Ambient $L_{Aeq,T}$	Change in $L_{Aeq,T}$
LN_OnSS001	Daytime	35	38	44	+9	40	42	+2
	Night-time	35	42	48	+13	36	43	+7
LN_OnSS002	Daytime	35	34	40	+5	40	41	+1
	Night-time	35	36	42	+7	27	37	+10
LN_OnSS003	Daytime	35	33	39	+4	38	39	+1
	Night-time	35	36	42	+7	33	38	+5

Table 26.75: BS 4142:2014+A1:2019 WMN_OnSS operational assessment for residential receptors

Receptor	Period	Rating Level Limit, dB $L_{Ar,T}$	Predicted Specific Sound Level, L_{Aeq}	Rating Level, $L_{Ar\ T}$	Difference	Measured Residual $L_{Aeq,T}$	Calculated Ambient $L_{Aeq,T}$	Change in $L_{Aeq,T}$
WMN_OnSS001	Daytime	41	36	42	+1	49	49	+0
	Night-time	35	40	46	+11	48	49	+1
WMN_OnSS002	Daytime	35	40	46	+11	39	43	+4
	Night-time	35	44	50	+15	34	44	+10
WMN_OnSS003	Daytime	47	37	43	-4	54	54	+0
	Night-time	39	42	48	+9	51	52	+1
WMN_OnSS004	Daytime	54	31	37	-17	62	62	+0
	Night-time	39	31	37	-2	58	58	+0

Table 26.76: BS 4142:2014+A1:2019 WMS_OnSS operational assessment for residential receptors

Receptor	Period	Rating Level Limit, dB $L_{Ar,T}$	Predicted Specific Sound Level, L_{Aeq}	Rating Level, $L_{Ar\ T}$	Difference	Measured Residual $L_{Aeq,T}$	Calculated Ambient $L_{Aeq,T}$	Change in $L_{Aeq,T}$
WMS_OnSS001	Daytime	35	40	46	+11	44	46	+2
	Night-time	35	44	50	+15	37	45	+8
WMS_OnSS002	Daytime	35	39	45	+10	35	41	+6
	Night-time	35	42	48	+13	28	42	+14
WMS_OnSS003	Daytime	35	36	42	+7	40	42	+2
	Night-time	35	40	46	+11	37	42	+5
WMS_OnSS004	Daytime	35	37	43	+8	47	47	+0
	Night-time	35	42	48	+13	26	42	+16
WMS_OnSS005	Daytime	35	34	40	+5	47	47	+0
	Night-time	35	39	45	+10	37	41	+4
WMS_OnSS006	Daytime	35	34	40	+5	36	38	+2
	Night-time	35	37	43	+8	29	38	+9

26.7.161 It can be seen from the sixth column of Table 26.74, Table 26.75 and Table 26.76 that during the daytime and night-time the predicted rating levels are between 17dB below and 15dB above the rating level limits at the NSRs considered to each OnSS option.

26.7.162 With reference to Table 26.50, Table 26.55 and Table 26.58 when referring to the difference between the operational rating level and the rating level limits, this would equate to *negligible* to *high* magnitude of impact upon high sensitivity receptors resulting in a maximum level of effect of a permanent *'Major Adverse'* which is considered significant in terms of the EIA Regulations.

26.7.163 In addition when the when the specific $L_{Aeq,T}$ sound level of the OnSS is added to the existing baseline ambient $L_{Aeq,T}$ sound level, as a worst case the OnSS is calculated to increase the baseline ambient $L_{Aeq,T}$ sound level by a maximum of 16dB (as shown in the ninth column of Table 26.74, Table 26.75 and Table 26.76.) With reference to Table 26.50, Table 26.55 and Table 26.58 this would equate to *medium* and high *magnitude* of impact upon high sensitivity receptors resulting in a level of effect of a permanent *'Moderate Adverse'* or *'Major Adverse'* which is considered significant in terms of the EIA Regulations.

26.7.164 With reference to Table 26.75 it can be seen that at receptor WMN_OnSS004 the predicted rating levels are below the rating level limits during both the daytime and night-time periods, this is due to the fact that the measured baseline levels at this location were relatively high when compared to the other receptor locations.

26.7.165 Where the rating level does not exceed the rating level limit, this would equate to *a negligible magnitude* of impact upon high sensitivity receptors resulting in a level of effect of a permanent *'Minor Adverse'* which is not considered significant in terms of the EIA Regulations.

26.7.166 Based on the above it is considered logical that the WMN_OnSS should be located on the boundary of the footprint as close to receptor WMN_OnSS004 as possible; however it must be noted that even when the WMN_OnSS is positioned at this location the predicted rating levels are over the rating levels limits at a number of the other receptors located close to the WMN_OnSS i.e. at receptor WMN_OnSS002, the predicted night-time rating level (when the OnSS is located at its nearest approach to WNN_OnSS004) is 41dB, which is 6dB over the rating limit and would result in a level of effect of permanent *'Major Adverse'* which is considered significant in terms of the EIA Regulations.

26.7.167 With consideration to the above, further mitigation measures are considered in the following section to reduce the identified impacts from operational noise associated with the OnSS along with the resulting residual effects.

OnSS Operational Noise Mitigation Measures

26.7.168 The operational noise assessment for the OnSS options has indicated that mitigation measures are required to reduce the identified impacts.

26.7.169 The noise model allows the contribution from each noise source to be determined at each of the NSRs considered.

26.7.170 Table 26.77 below, outlines the noise reduction required at each of the identified noise sources within the OnSS to reduce the specific noise level at the nearest NSRs to a level where the identified impacts would be significantly reduced.

Table 26.77: OnSS mitigation requirements, dB

OnSS Option	Item of Plant	Mitigation Required	Possible Measure
All Options (HVAC)	Variable Shunt Reactors	-15	Noise enclosure around equipment
	Fixed Shunt Reactors	-15	Noise enclosure around equipment
	Domestic Reverse Charge (DRC)	-15	Noise enclosure around equipment
	DRC Transformers	-15	Noise enclosure around equipment
	DRC Reactors	-15	Noise enclosure around equipment
	Super Grid Transformers	-15	Noise enclosure around equipment
	Harmonic Filters	-15	Equipment covered/screened
	MV/LV Transformers	-15	Noise enclosure around equipment

Mitigated Operational Assessment

26.7.171 Table 26.78, Table 26.79 and Table 26.80 repeats the operational assessment for each OnSS option assuming that the mitigation measures shown in Table 26.77 have been implemented.

Table 26.78: BS 4142:2014+A1:2019 LN_OnSS operational assessment for residential receptors, including mitigation, dB

Receptor	Period	Rating Level Limit, dB $L_{Ar,T}$	Predicted Specific Sound Level, L_{Aeq}	Rating Level, $L_{Ar,T}$	Difference	Measured Residual $L_{Aeq,T}$	Calculated Ambient $L_{Aeq,T}$	Change in $L_{Aeq,T}$
LN_OnSS001	Daytime	35	23	29	-6	40	40	+0
	Night-time	35	27	33	-2	36	37	+1
LN_OnSS002	Daytime	35	19	25	-10	40	40	+0
	Night-time	35	21	27	-8	27	28	+1
LN_OnSS003	Daytime	35	18	24	-11	38	38	+0
	Night-time	35	21	27	-8	33	33	+0

Table 26.79: BS 4142:2014+A1:2019 WMN_OnSS operational assessment for residential receptors, including mitigation, dB

Receptor	Period	Rating Level Limit, dB $L_{Ar,T}$	Predicted Specific Sound Level, L_{Aeq}	Rating Level, $L_{Ar,T}$	Difference	Measured Residual $L_{Aeq,T}$	Calculated Ambient $L_{Aeq,T}$	Change in $L_{Aeq,T}$
WMN_OnSS001	Daytime	41	21	27	-14	49	49	+0
	Night-time	35	25	31	-4	48	48	+0
WMN_OnSS002	Daytime	35	25	31	-4	39	39	+0
	Night-time	35	29	35	0	34	35	+1
WMN_OnSS003	Daytime	47	22	28	-19	54	54	+0
	Night-time	39	27	33	-6	51	51	+0
WMN_OnSS004	Daytime	54	16	22	-32	62	62	+0
	Night-time	39	16	22	-17	58	58	+0

Table 26.80: BS 4142:2014+A1:2019 WMS_OnSS operational assessment for residential receptors, including mitigation, dB

Receptor	Period	Rating Level Limit, dB $L_{Ar,T}$	Predicted Specific Sound Level, L_{Aeq}	Rating Level, $L_{Ar\ T}$	Difference	Measured Residual $L_{Aeq,T}$	Calculated Ambient $L_{Aeq,T}$	Change in $L_{Aeq,T}$
WMS_OnSS001	Daytime	35	25	31	-4	44	44	+0
	Night-time	35	29	35	0	37	38	+1
WMS_OnSS002	Daytime	35	24	30	-5	35	35	+0
	Night-time	35	27	33	-2	28	31	+3
WMS_OnSS003	Daytime	35	21	27	-8	40	40	+0
	Night-time	35	25	31	-4	37	37	+0
WMS_OnSS004	Daytime	35	22	28	-7	47	47	+0
	Night-time	35	27	33	-2	26	30	+4
WMS_OnSS005	Daytime	35	19	25	-10	47	47	+0
	Night-time	35	24	30	-5	37	37	+0
WMS_OnSS006	Daytime	35	19	25	-10	36	36	+0
	Night-time	35	22	28	-7	29	30	+1

26.7.172 It can be seen from the sixth column of Table 26.78, Table 26.79 and Table 26.80, that assuming the mitigation measures have been correctly implemented, the worst case predicted rating levels are at most equal to the rating level limits during the daytime and the night-time at all the NSRs considered.

26.7.173 With reference to Table 26.50, Table 26.55 and Table 26.58 when referring to the difference between the rating level and the baseline background sound levels, for the majority of receptors this would equate to *negligible* magnitude of impact upon *high* sensitivity receptors resulting in a level of effect of a permanent *'Minor Adverse'* which is not considered significant in terms of the EIA Regulations.

26.7.174 However, as outlined in paragraphs 26.7.153, 26.7.154 and 26.7.155, the measured background sound levels are considered objectively low and therefore the change in the absolute $L_{Aeq,T}$ sound levels need to be considered.

26.7.175 As shown in the ninth column of Table 26.78, Table 26.79 and Table 26.80, the mitigated noise levels being generated by the OnSS options causes a change in the baseline ambient noise levels at the NSRs of up to 4dB(A) at night; with reference to Table 26.50, Table 26.55 and Table 26.58 when referring to the change in ambient noise levels this would equate to a maximum *low* magnitude of impact upon *high* sensitivity receptors resulting in a level of effect of a permanent *'Moderate Adverse'* which is considered significant in terms of the EIA Regulations.

26.7.176 It should be noted that in only two instances at night does the ambient sound level increase by 3dB(A) or more. It is only in these instances that a change in sound level is likely to be perceptible[4]. It has subsequently been considered in context that these development activities will be largely indistinguishable for most of the time as the lowest baseline ambient sound level presented in Table 26.29 and Table 26.46 has been used in the assessment.

26.7.177 In addition, and with reference to the desirable internal noise levels contained in BS 8233:2014 a worst case night-time external predicted noise level of 29dB(A) would equate to an internal level of 16dB(A) when accounting for the attenuation provided by a partially open window of approximately 13dB[5].

26.7.178 An internal level of 16dB(A) is well below the desirable ambient night-time noise level of 30dB $L_{Aeq, 8hrs}$ or less is suitable for sleeping contained in BS 8233:2014 (see paragraph 26.2.41).

26.7.179 With reference to the WHO Night Noise Guidelines 2009, an external level of 29dB(A) would be below the '*lowest observed adverse health effect levels*' and therefore no effects would be expected to occur (see paragraph 26.2.52).

26.7.180 With reference to all of the above, it is considered that the mitigation measures recommended would be sufficient to reduce the noise from the OnSS so a *negligible* magnitude of impact would be experienced upon all the *high* sensitivity receptors considered, resulting in a level of effect of a permanent *'Minor Adverse'* which is not considered significant in terms of the EIA Regulations.

[4] Section 2.7 of the IEMA *Guidelines for Environmental Noise Impact Assessment* state that a change or difference in noise level of 1 dB is just perceptible under laboratory conditions, 3 dB is perceptible under most normal conditions

[5] It is suggested within Section G.1 of BS 8233:2014 that the noise attention provided by a partially open window is approximately 15 dB.

Ecological Receptor Assessment

26.7.181 With reference to Volume 1, Chapter 21: Onshore Ecology and Volume 1, Chapter 22 Onshore Ornithology, it has been determined that there are no International or National ecological sites situated within 2 kilometres from the OnSS options.

26.7.182 Therefore, with a total *mitigated* sound power level of the OnSS of 91dB(A) (sum of 36 sources at 75dB(A)), the sound pressure level at 2 kilometres would be 17dB(A) due to geometric attenuation only. In reality, air absorption and ground absorption would result in a level significantly below this.

26.7.183 In view of the above it is considered that the operational noise generated by the OnSS options would be significantly below the limit of 55dB $L_{Aeq,1hr}$ contained in the AQTAG09 guidance, therefore a detailed assessment has not been undertaken. This is further justified with reference to Table 26.78, Table 26.79 and Table 26.80 which show that the predicted noise levels from the OnSS are well below this level at the NSRs located close to each OnSS option.

26.7.184 With reference to Table 26.50, Table 26.57 and Table 26.58 it can be that the operational noise being generated by the OnSS options would equate to a *negligible* magnitude of impact would be experienced upon *high* sensitivity receptors, resulting in a level of effect of a permanent *'Minor Adverse'* which is not considered significant in terms of the EIA Regulations.

Operational Vibration

26.7.185 The minimum distance to the nearest VSR from the boundary of any if the OnSS options is 250m (NSR WMN_OnSS002). For vibration to be perceived over this distance a substantial force would need to be applied which can only be achieved through a very high-energy impact, for example the predicted vibration level for percussive piling using a 500kJ hammer[6] impact would be 0.09mm/s which with reference to Table 26.3 is below the level of perceptibility.

26.7.186 The OnSS options do not contain any mechanically moving parts that are capable of generating a fraction of the energy required to transmit such levels of vibration. Therefore, operational vibration has not been considered any further in this assessment.

Decommissioning Phase

26.7.187 Details surrounding the decommissioning phase are yet to be fully clarified. In addition, it is also recognised that policy, legislation and local sensitivities constantly evolve, which will limit the relevance of undertaking an assessment at this stage. Nevertheless, decommissioning activities are not anticipated to exceed the construction phase worst case criteria which have been assessed. In addition, there is potential for onshore cables to remain in-situ which would see a reduction in impacts and resulting level of effect and significance in comparison to the assessment of construction effects.

[6] It must be noted, however, that the example hammer energy is out of the valid prediction range included within BS5228-2:2009+A1:2014 Part 2 which states that the limit of the equation utilises a maximum hammer energy of 85 kJ and this should be considered an approximation.

26.7.188 Decommissioning activities are expected to occur for up to three years, however this will be driven primarily by offshore works. Landfall infrastructure is expected to be left in-situ where appropriate, to abate potential future impacts. This will be reviewed over the design life of Project, and adapt to local sensitivities, policy and legalisation.

26.7.189 The decommissioning methodology would be finalised nearer to the end of the lifetime of Project, to be in line with current guidance, policy and legislation. Any such methodology would be agreed with the relevant authorities and statutory consultees. The draft DCO includes a requirement to submit a written decommissioning plan for onshore infrastructure within six months of the permanent cessation of the transmission works.

26.8 Cumulative Impact Assessment

26.8.1 This cumulative impact assessment for Noise and Vibration has been undertaken in accordance with the methodology provided in Volume 2, Appendix 5.2: Onshore Cumulative Impact Assessment.

26.8.2 The projects and plans selected as relevant to the assessment of impacts to noise and vibration are based upon an initial screening exercise undertaken on a long list. Each project, plan or activity has been considered and scoped in or out on the basis of effect-receptor pathway, data confidence and the temporal and spatial scales involved. For the purposes of assessing the impact of the Project on noise and vibration in the region, the cumulative effect assessment technical note submitted through the EIA Evidence Plan and forming Volume 1, Appendix 5.2 of this PEIR screened in a number of projects and plans as presented in Table 26.81.

Table 26.81: Projects considered within the Noise and Vibration cumulative effect assessment

Development type	Project	Status	Data confidence assessment/phase	Tier
Energy from Waste	Boston Alternative Energy Facility	Awaiting Secretary of State decision.	High – Published information.	Tier 1

26.8.3 The cumulative MDS for the Project is outlined in Table 26.82.

Table 26.82: Cumulative MDS

Impact	Scenario	Justification
Cumulative noise impact	Peak hour operational traffic from Boston Alternative Energy Facility utilising the same routes as construction traffic for the Project.	Boston Noise and Vibration and Traffic and Transport chapters identify traffic links in common with the Project.

26.8.4 From analysis of the Traffic and Transport chapter of the Boston Alternative Energy Facility (BAEF) Environmental Statement, and comparing Table 10.7 therein to available data for the Project, it can be seen that the traffic link which is present in both is the A16 south of Boston.

26.8.5 It can be seen from Table 26.71 that the predicted change in BNL along this route from the Project construction traffic is +0.1dB, resulting in a *low* magnitude of impact for the medium sensitivity receptor, resulting in temporary *'minor adverse'* level of effect, which is not significant in terms of the EIA Regulations.

26.8.6 Table 26.83 overleaf shows the cumulative traffic noise assessment for the traffic link of the A16 to the south of Boston.

Table 26.83: Cumulative traffic noise assessment

Link	Without Scheme				With Scheme and Peak BAEF Traffic				Change in BNL, dB	Impact Magnitude	Level of Effect and Significance
	AAWT	% HGV	Average Speed km/h	BNL dB	AAWT	% HGV	Average Speed km/h	BNL dB			
A16 (south of Boston)	23194	5.4%	50	71.9	24106	7.0%	50	72.5	+0.6	Low	Minor (not significant)

26.8.7 It can be seen from Table 26.83 that the magnitude of impact would be *low* for *medium* sensitivity receptors and the level of effect at the nearest NSRs from noise levels generated by cumulative traffic from the Project construction and peak hour BAEF operation would be temporary *'minor adverse'*, which is not significant in terms of the EIA Regulations.

26.8.8 This cumulative magnitude of impact and level of effect are the same as from solely the Project construction traffic; therefore, the cumulative implications are no greater than those from only the Project.

26.9 Transboundary Effects

26.9.1 There are no national transboundary implications with regards to local noise and vibration; transboundary effects have been scoped out of the assessment from the consultation and the Planning Inspectorate comments shown in Table 26.5.

26.10 Conclusions

26.10.1 This assessment has considered the potential noise and vibration effects arising from onshore activities associated with the Project. Consideration has been given to potential worst case effects arising from onshore construction, operational and decommissioning activities based upon available information. Worst case parameters have been adopted to provide a robust assessment.

26.10.2 The approach undertaken was based upon the Planning Inspectorate Scoping Opinion which was subsequently agreed with LCC at the ETG meeting on 13 October 2022. The assessment has considered feedback received in response to the consultation with stakeholders that was undertaken in September 2022.

26.10.3 A summary of the impacts, mitigation measures and the resultant residual effects are described in Table 26.84.

26.10.4 It should be noted that the mitigation measures described in Table 26.84 are in addition to the mitigation measures described in Table 26.48.

Table 26.84: Summary of effects

Description of effect	Effect	Additional mitigation measures	Residual impact
Construction			
Noise levels generated from landfall construction	Temporary ***Major Adverse*** **(significant)**	Relevant detailed design measures relating to noise mitigation, as outlined in Table 26.49.	Temporary ***Minor Adverse*** **(not significant)**
Noise levels from landfall trenchless drilling	Temporary ***Major Adverse*** **(significant)**	Relevant detailed design measures relating to noise mitigation, as outlined in Table 26.49.	Temporary ***Minor Adverse*** **(not significant)**
Noise levels generated from onshore ECC option construction	Temporary ***Major Adverse*** **(significant)**	Relevant detailed design measures relating to noise mitigation, as outlined in Table 26.49.	Temporary ***Minor Adverse*** **(not significant)**

Description of effect	Effect	Additional mitigation measures	Residual impact
Noise levels generated from onshore ECC trenchless drilling	Temporary ***Major Adverse*** **(significant)**	Relevant detailed design measures relating to noise mitigation, as outlined in Table 26.49.	Temporary ***Minor Adverse*** **(not significant)**
Noise levels generated by OnSS construction	Temporary ***Moderate Adverse*** **(significant)**	Relevant detailed design measures relating to noise mitigation, as outlined in Table 26.49.	Temporary ***Minor Adverse*** **(not significant)**
Vibration levels generated by trenchless drilling operations	Temporary ***Major Adverse*** **(significant)**	Notification of trenchless drilling works given to any receptors within 55m of the trenchless drilling operations during the daytime and weekend periods.	Temporary ***Minor Adverse*** **(not significant)**
Vibration levels generated by trenchless drilling vibratory piling operations.	Temporary ***Moderate Adverse*** **(significant)**	Notification of piling works given to any receptors within 75m of the trenchless drilling operations.	Temporary ***Minor Adverse*** **(not significant)**
Vibration levels generated by OnSS piling operations	Temporary ***Minor Adverse*** **(not significant)**	Implementation of NVMP	Temporary ***Minor Adverse*** **(not significant)**
Noise levels generated by construction traffic on the local road network	Temporary ***Major Adverse*** **(significant)**	Re-routing of traffic to less sensitive routes if possible.	Temporary ***Minor Adverse*** **(not significant)**
Operation and Maintenance			
Operational noise levels generated by the OnSS on residential receptors	Permanent ***Major Adverse*** **(significant)**	Reduction in operational noise levels through the use of acoustic enclosures, silencers and covers	Permanent ***Minor Adverse*** **(not significant)**
Operational noise levels generated by the OnSS on ecological receptors	Permanent ***Minor Adverse*** **(not significant)**	Reduction in operational noise levels through the use of acoustic enclosures, silencers and covers	Permanent ***Minor Adverse*** **(not significant)**
Decommissioning			
Noise and vibration levels generated by decommissioning activities	Not anticipated to exceed construction phase worst case criteria. Potential impacts reduced as it is assumed that no night-time or piling decommissioning operations are required.		

Description of effect	Effect	Additional mitigation measures	Residual impact
Cumulative			
Noise levels generated by construction traffic on the local road network combined with operational traffic from the Boston Alternative Energy Facility	Temporary ***Minor Adverse*** **(not significant)**	None required	Temporary ***Minor Adverse*** **(not significant)**

26.10.5 It can be seen from Table 26.84 that, assuming that the recommended mitigation measures have been correctly implemented, there would be a *'minor adverse'* residual level of effect for all the potential construction and operational noise and vibration impacts considered with the proposed Project, which is not considered significant in terms of the EIA Regulations.

26.11 References

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