AQUIND Limited

PEIR CHAPTER 23

Noise and Vibration

CONTENTS

TABLES

FIGURES

APPENDICES

23 NOISE AND VIBRATION

23.1 SCOPE OF THE ASSESSMENT

23.1.1 INTRODUCTION

23.1.1.1 This chapter provides the preliminary noise and vibration assessment of the Proposed Development. The Proposed Development that forms the basis of this assessment is described in Chapter 3 - Description of the Proposed Development.

23.1.1.2 This preliminary noise and vibration assessment will consider the potential for impacts associated with the following activities:

- Operational noise from the Converter Station and FOC infrastructure;
- Construction and decommissioning noise and vibration from the Converter Station and FOC infrastructure; and
- Construction, maintenance, repair and decommissioning noise and vibration from the Onshore Cable Corridor.

23.1.1.3 FOC infrastructure is anticipated to be located adjacent to the Converter Station (up to two Telecommunications buildings) and within approximately 1 km of Landfall (up to two Optical Regenerations Stations), and other associated equipment for auxiliary power supply, and security fencing, as described in Chapter 3. However, as the locations are not yet confirmed, the assessment of these elements of the Proposed Development will be considered in the ES when further details are available.

23.1.2 STUDY AREA

23.1.2.1 The study area is defined by the proximity of receptors to the Proposed Development, rather than by a given distance. The paragraphs below describe the Proposed Development and the nearby sensitive receptors in each which describes the study area.

Section 1 - Lovedean (Converter Station Area)

23.1.2.2 The Converter Station is located within a sparsely populated area, with a small number of receptors located sporadically in all directions and it is these receptors which define the study area.

Section 2 - Anmore

23.1.2.3 The part of the Onshore Cable Corridor within Section 2 is in a sparsely populated area with a small number of receptors situated along Edney's Lane and White Horse Lane to the west. The southern boundary of Section 2 coincides with the onset of a more densely populated residential area to the south of Anmore Road.

Section 3 - Denmead/Kings Pond Meadow

Options 3a) Kings Pond Meadow and 3b) Anmore

23.1.2.4 The proposed Onshore Cable Corridor options through Kings Pond Meadow/Anmore passes through a less densely populated area, with receptors largely confined to the north-east and north-west of the Section. To the south, the route then adjoins the B2150, though there are few receptors along this section of the highway.

Option 3c) Highways Route

23.1.2.5 The proposed Onshore Cable Corridor for this option would run from Anmore Road and along the residential streets of Martin Avenue and Mill Road in Denmead, both of which have receptors in proximity along the extent. The route then adjoins Hambledon Road (B2150).

Section 4 - Hambledon Road to Burnham Road

23.1.2.6 The Onshore Cable Corridor passes along Hambledon Road (B2150) and into Waterlooville, with a substantial residential development immediately to the north-east, for approximately 1.3 km, and another development immediately to the south-west for approximately 500 m. The route then follows Maurepas Way to the south of Waterlooville Town Centre, after which it passes within 150 m of a residential development to the west.

23.1.2.7 The Onshore Cable Corridor adjoins London Road and is located immediately adjacent to residential receptors to the east, for the remainder of the section. Residential receptors are located to the west of the route for approximately 800 m of its length. It should also be noted that there are a number of commercial units along London Road, comprising local retail, offices and public houses.

Section 5 - Farlington

Option 5a) Farlington Avenue

23.1.2.8 This option for the Onshore Cable Corridor passes between residential receptors for the full length of the Farlington Avenue and a short section of Havant Road to the north east of Drayton, and the remaining 300 m section of Eastern Road. The receptors are located immediately adjacent to the route on both sides of the carriageway.

Option 5b) Pump Station Route

i) Burnham Road and Ainsdale Road

23.1.2.9 This option for the Onshore Cable Corridor passes to the rear of residential receptors on Burnham Road and then between residential receptors along Ainsdale Road, at which point it would enter open land owned by Portsmouth Water, and follow an easement strip heading southwards with residential receptors, a recreation ground, a primary school and a scout hut on both sides of the route. The route joins a short

section of Havant Road, and the remaining 300 m section of Eastern Road where there are residential receptors are located immediately adjacent to the route on both sides of the carriageway.

ii) Blake Road

23.1.2.10 This option for the Onshore Cable Corridor is similar to 5b(i), although it remains on Farlington Avenue further to the south, before turning on to Blake Road. There are residential receptors on both sides of Blake Road.

iii) Recreation Grounds

23.1.2.11 This option for the Onshore Cable Corridor is similar to 5b(i) and (ii), although it remains on Farlington Avenue further to the south, before turning in to a pedestrian access in to the recreation ground. The primary school and recreation ground play area are located to the south of the route before it turns southwards to follow the easement strip to Havant Road.

iv) Evelegh Road

23.1.2.12 This option for the Onshore Cable Corridor is similar to 5b(i), (ii) and (iii), although it leaves Farlington Avenue further to the south. There are residential receptors on the southern side of Evelegh Road, and a primary school on the northern side.

Option 5c) Portsdown Hill Road

23.1.2.13 This option for the Onshore Cable Corridor would extend the route in Section 4 along Portsdown Hill Road further to the east, from its junction with Farlington Avenue to the field to the north of the covered reservoirs immediately to the east of the eastern ends of Burnham Road and Ainsdale Road. There are residential receptors to the south of Portsdown Hill Road (on Birkdale Avenue and Troon Crescent) along this section, and residential receptors to the northern side of Portsdown Hill Road (on Hoylake Road). From the eastern extent of the Onshore Cable Corridor on Portsdown Hill Road, the route would turn southwards, to enter open land owned by Portsmouth Water, and follow an easement strip heading southwards with residential receptors, a recreation ground, a primary school and a scout hut on both sides of the route. The route joins a short section of Havant Road, and the remaining 300 m section of Eastern Road where there are residential receptors are located immediately adjacent to the route on both sides of the carriageway.

Section 6 - Zetland Field and Sainsbury's Car Park

Option 6a) A2030 and Fitzherbert Road

23.1.2.14 For this option, the Onshore Cable Corridor would continue southwards along Eastern Road (A2030) and in proximity to the rear of residential receptors on Copsey Close, Copsey Grove and Lealand Road, to the west of the carriageway, and Waterworks Road and Nutbourne Road to the east. The route would then turn east on to Fizherbert Road, with a recreation area (Zetland Field) to the north and a petrol

filling station to the south, before turning southwards in to the car park west of the Sainsbury's foodstore, with no sensitive receptors in proximity.

Option 6b) Zetland Field and Fitzherbert Road

23.1.2.15 For this option, the Onshore Cable Corridor would leave Eastern Road (A2030) at the northern end of Zetland Field and run southwards before crossing Fitzherbert Road and continuing southwards through Sainsbury's car park. The receptors for this route are similar to that for option 6a) above, albeit the route is slightly further east, and further away from residential receptors on Lealand Road.

Section 7 - Farlington Junction to Airport Service Road

23.1.2.16 This Onshore Cable Corridor in this section passes under the railway line and head southwards to the southern edge of Farlington Playing Fields. From here, it is anticipated that the route would continue via HDD passing under the A27 and crossing Langstone Harbour to Portsea Island, emerging in a car park west of Kendall's Wharf. From the car park, the route would either: continue west for a short distance to meet Eastern Road (A2030) and then head southwards along Eastern Road; or head southwards via the sports grounds east of Eastern Road, to join Eastern Road at the southern end of Langstone Harbour Sports Ground. As the route continues south towards Airport Service Road, it passes mostly commercial and industrial buildings.

Section 8 - Great Salterns Golf Course to Velder Avenue/Moorings Way

Option 8a) Eastern Road

23.1.2.17 For this option, the Onshore Cable Corridor continues south along Eastern Avenue, with a hotel, caravan park and Portsmouth College identified as the only receptors within the initial 1 km. The route continues along Eastern Road and passes adjacent to residential receptors for approximately 350 m after which the route joins Milton Road.

Option 8b) Minor Roads and Moorings Way

23.1.2.18 This option for the Onshore Cable Corridor is the same as 8a), though turns south-eastwards to route through a combination of some or all of the following roads: Eastern Avenue, Salterns Avenue and Shore Avenue, where there is potential for each of the two circuits to take a different route in this area, before both circuits continue eastwards along Moorings Way. Each of these roads are local and residential, with receptors immediately adjacent on both sides on all roads except Moorings Way, where residential receptors are located on the southern side only.

Option 8c) Milton Common

23.1.2.19 This option for the Onshore Cable Corridor is the same as 8a) for the initial 1 km, after which the route crosses Milton Common either: southwards, via the footpath along the sea defences towards the eastern side of Milton Common and following the

eastern end of Moorings Way southwards towards Furze Lane; or continuing in the verge to the east of Eastern Road on the western side of Milton Common, before heading south across the western side of Milton Common (to the east of Shore Avenue) and turning east on to Moorings Way. There are no receptors in proximity until the route joins Moorings Way to the south of the Common, where there are receptors on the southern side for approximately 825 m along the latter route, and along the western side for approximately 100 m along the former.

Section 9 - Velder Avenue/Moorings Way to Bransbury Road

Option 9a) Highways Route

23.1.2.20 For this option, the Onshore Cable Corridor continues on from option 8a) heading south along Milton Road with receptors immediately adjacent on both sides of the carriageway, save for approximately 370 m to the west of Milton Road where Milton Park is located. The route then turns east on to Bransbury Road, which features residential receptors to the south of the carriageway and Bransbury Park to the north.

Option 9b) Allotments

23.1.2.21 This option for the Onshore Cable Corridor would continue on from options 8b) or 8c) southwards via Furze Lane, or through the University of Portsmouth playing fields, where it joins Locksway Road/Longshore Way. From here, the route could head south to the southern-most car park of the Thatched House public house, where HDD would be used to continue the route under the Allotments, emerging in the open space to the east of Kingsley Road, and on in to Bransbury Park via Yeo Court. Alternatively, the route could run along Waterlock Gardens/Seaway Crescent and/or Locksway Road/Meryl Road to enter the allotments, following allotment pathways towards the western side of the allotments, and on in to the open space to the east of Kingsley Road, and on in to Bransbury Park via Yeo Court. The route then continues through Bransbury Park, and turns east on to Bransbury Road to the junction with Henderson Road. There are residential receptors immediately adjacent to the route, initially, along Moorings Way with additional receptors between the university grounds and the allotments, on the western side of Kingsley Road and either side of Yeo Court. There are residential receptors on the southern side of Bransbury Road, and a mix of commercial and residential receptors on the northern side.

Option 9c) Ironbridge Lane

23.1.2.22 This option is similar to Option 9b). However, upon exiting the University of Portsmouth grounds/Furze Lane, the Onshore Cable Corridor continues westwards on Locksway Road, where there are residential properties (and some commercial) fronting the road, until the junction with Ironbridge Lane. The route then turns south and runs along Ironbridge Lane. There is the option of using Tideway Gardens in conjunction with Ironbridge Lane before entering Bransbury Park via the entrance

opposite the southern end of Ironbridge Lane and/or Kingsley Road/Yeo Court. Both Tideway Gardens and Ironbridge Lane are residential roads.

Section 10 - Eastney (Landfall)

23.1.2.23 The Onshore Cable Route passes along Fort Cumberland Road which has receptors immediately adjacent on both sides of the carriageway. Southsea Leisure Park, which accommodates a number of static caravans used for seasonal and permanent accommodation, is located to the south of the proposed Landfall at the car park south of Fort Cumberland Road. From here, the cables head southwards via HDD, towards the English Channel.

23.1.2.24 At the Landfall location the Onshore Cable Route abuts both the Solent Maritime SAC and the Solent and Dorset Coast pSPA.

23.2 LEGISLATION, POLICY AND GUIDANCE

23.2.1.1 This assessment has been informed by current legislation, policy and guidance relevant to noise and vibration. These are summarised below, with full details provided in Appendix 23.1.

23.2.1.2 Legislation relevant to the control of noise emanating from construction sites is provided by the Control of Pollution Act 1974.

23.2.2 LEGISLATION

- Section 61 of the Control of Pollution Act 1974 allows developers and a local authority enter into a prior agreement such that noise and vibration levels during demolition and construction works are discussed and agreed prior to the works being undertaken. The Section 61 consent usually details proposed working methods, plant lists and expected noise and vibration levels that may be generated during the works. Assuming the local authority is in agreement with the contents of the application, consent is granted for the works which can be subject to conditions.

23.2.2.1 Planning Policy A summary of planning policy is provided below. Please see Appendix 23.1 for full details.

23.2.3 NATIONAL POLICY

National Policy Statement

- The Overarching National Policy Statement for Energy (NPS EN-1) (Department of Energy and Climate Change, 2011) sets out national policy for energy infrastructure for which environmental impacts, such as those relating to noise and vibration, can arise.
- NPS EN-1 outlines the aims for new development with respect to noise, guidance on the appropriate methodology content and an approach to establishing

mitigation measures. NPS EN-1 also makes reference to the Noise Policy Statement for England.

Noise Policy Statement for England

- The Noise Policy Statement for England ('NPSE') was published in 2010 and seeks to clarify the main principles and aims of existing policy documents, legislation and guidance that relate to noise. The NPSE states its vision as being to "Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".

National Planning Policy Framework

- The NPPF was published by central government in July 2018 and replaces all previous policy documents, including Planning Policy Guidance Note 24 ('PPG 24'). The NPPF references the NPSE.

Local Policy

Portsmouth City Council

- The Portsmouth City Local Plan (adopted 2012) makes reference to noise and vibration in a number of policies, which have now been revoked. Of the saved policies that remain, none make reference to noise which would be relevant to the Proposed Development.

Havant Borough Council

- Havant Borough Core Strategy (adopted 2011) makes reference to noise in Policy DM10 Pollution, details of which are provided in Appendix 23.1.

Winchester City Council

- The Winchester City Council Local Plan 2036 is currently in consultation. Current policy is determined by the Joint Core Strategy (adopted 2013), which makes reference to noise in development allocations which are not in proximity to the Site.

East Hampshire District Council

- The East Hampshire District Council Local Plan comprises the Joint Core Strategy (adopted 2014) and the Housing and Employment allocations document. Policy CP27 Pollution makes reference to noise, the details of which are provided in Appendix 23.1.

23.2.4 GUIDANCE

23.2.4.1 A summary of relevant guidance is provided below. Please see Appendix 23.1 for full details.

- Operational noise from the Converter Station – BS 4142: 2014 Method for rating and assessing industrial and commercial sound, World Health Organisation – Guidelines for Community Noise, 1999 and BS 8233:2014 Guidance on sound insulation and noise reduction for buildings;
- Construction noise from the Converter Station and Cable Route – BS 5228:2009+A1 2014 Code of practice for noise and vibration control on construction and open sites: Part 1 Noise; and
- Construction vibration from the Converter Station and Onshore Cable Route - BS 5228:2009+A1 2014 Code of practice for noise and vibration control on construction and open sites: Part 2 Vibration.

23.3 SCOPING OPINION AND CONSULTATION

23.3.1 SCOPING OPINION

23.3.1.1 As detailed within Chapter 1 Introduction and Chapter 5 Consultation, a Scoping Opinion was received by the Applicant from PINS (on behalf of the SoS) on 07 December 2018, including formal responses from statutory consultees and the MMO. The responses from PINS in relation to noise and vibration, and how those requirements should be addressed by the Applicant, are set out below in Table 23.1 – Scoping Opinion Response.

23.3.1.2 Appendix 5.3 provides a complete set of responses in the PEIR to the contents of the Scoping Opinion.

Table 23.1 – Scoping Opinion Response

Consultee	Scoping Opinion Ref	Summary of Comment Received	How this has been addressed by the Applicant
Alan Banting – PCC	29 November 2018 Scoping Response – Section 7	No objections raised to the submitted noise and vibration scope, though PCC note that an assessment of the noise and vibration effects on ecology should be undertaken in the ES during the Construction Stage.	This assessment would be undertaken by the ecology consultant, with input from the noise and vibration consultant.

Consultee	Scoping Opinion Ref	Summary of Comment Received	How this has been addressed by the Applicant
PINS	07 December 2018 Paragraph 26.4.1	The results of the completed surveys regarding the existing noise climate should be fully reported in the ES and/or in an associated Technical Appendix. Effort should be made to agree the noise monitoring locations with relevant consultation bodies e.g. EHDC and HCC.	The results will be presented in the ES and the monitoring locations have been agreed with the relevant local authorities.
	7 December 2018 Paragraph 26.4.1	The ES should clearly present the assessment methodologies applied and how significant effects as a result of changes in noise/vibration levels have been determined.	This will be presented in the ES.
	07 December 2018 Paragraph 26.4.5	Any proposed mitigation measures for noise and vibration impacts should be detailed in the ES, including their method of delivery, such as through a Construction Environmental Management Plan ('CEMP'). The CEMP and mitigation measures, as appropriate, must be secured in the DCO.	This will be presented in the ES.

23.3.2 CONSULTATION

23.3.2.1 Consultation is a key part of the DCO application process and will continue to be undertaken once the PEIR is made available and will continue until the DCO application submission. A summary of the consultation undertaken to date for the noise and vibration assessment is detailed in Table 23.2 below.

Table 23.2 – Consultation Undertaken to Date

Contact at body/ organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
WCC Environmental Health Officer (Phil Tidridge)	31 August 2017 Telecommunication	Initial telephone call to identify a point of contact. Mr Tidridge agreed that further correspondence should be with him.

Contact at body/ organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
		Low frequency noise was raised as a potential concern and WSP agreed to arrange a meeting to discuss further once an appropriate level of detail was available. Mr Tidridge confirmed that WCC does not have specific planning criteria relating to substations.
WCC Environmental Health Officer (Phil Tidridge) **EHDC Environmental Health Officer (Charlotte Adcock)**	18 July 2018 Meeting at WCC	WSP presented to the LPAs on how the Converter Station operates and identified the main sources of noise. WSP and WCC discussed and agreed the modelling and assessment methodology for the Converter Station and shared initial modelling results. Assessment criteria were agreed which are based on BS 4142 but with the consideration of noise limits across the octave band spectrum*. It was agreed that the noise limits would be set equal to the background noise level at each receptor, which itself would be derived in accordance with BS 4142.
*The frequency range is split into bands, each one covering a defined range of frequencies. These 'bands' together are called the octave band spectrum.		

23.3.2.2 Full details of project consultation for all disciplines are presented within Chapter 5 - Consultation.

23.4 METHODS OF ASSESSMENT

23.4.1.1 The assessment methodology used in this PEIR is based on the guidance outlined in Section 23.3 and is, in the most part, aligns with the methodology set out in Chapter 4 - EIA Methodology.

23.4.1.2 The sensitivity of residential receptors is high and the sensitivity of commercial and ecologically sensitive receptors is considered medium to low, subject to professional judgment.

23.4.1.3 The overall significance will be assessed using the matrix shown in Table 23.2 Significance Matrix. This uses sensitivity of the receptor and magnitude of change to determine significance.

Table 23.3 – Significance Matrix

		Value/Sensitivity			
		High	Medium	Low	Negligible
Magnitude/Scale of Change	Large	Major	Major to Moderate	Minor to Moderate	Negligible
	Medium	Moderate	Moderate	Minor	Negligible
	Small	Minor	Minor to Negligible	Negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

23.4.1.4 The following terms have been used to define the significance of the effects identified where a major and moderate impacts is considered significant and minor and negligible impacts are considered insignificant:

- **Major effect:** where the Proposed Development could be expected to have a considerable effect (either positive or negative) on the noise and/or vibration climate at sensitive receptors;
- **Moderate effect:** where the Proposed Development could be expected to have a noticeable effect (either positive or negative) on the noise and/or vibration climate at sensitive receptors;
- **Minor effect:** where the Proposed Development could be expected to result in a small, barely noticeable effect (either positive or negative) on the noise and/or vibration climate at sensitive receptors; and
- **Negligible:** where no discernible effect is expected as a result of the Proposed Development on receptors (i.e. the effect is insignificant).

23.4.2 CONSTRUCTION OF THE CONVERTER STATION, ONSHORE CABLE ROUTE AND OPTICAL REGENERATION STATION

23.4.2.1 Based on the advice in Section E.2 of British Standard 5228-1:2009+A1 2014, the approach taken to deriving the magnitude of the impact is based on absolute noise limits, as presented in Table 23.4 – Assessment Criteria for Construction Noise.

Table 23.4 – Assessment Criteria for Construction Noise

Construction Noise Level, dB	Magnitude of Change
≤65 dB $L_{Aeq,10hour}$	Negligible
66 dB to 70 dB $L_{Aeq,10hour}$	Small negative
71 dB and 75 dB $L_{Aeq,10hour}$	Medium negative
≥76 dB $L_{Aeq,10hour}$	Large negative

23.4.2.2 British Standard BS 5228-2:2009+A1 2014 describes ranges of vibration in terms of peak particle velocities ('PPV') and the corresponding effects on people that might be expected. These are set out in Table B1 of Annex B to the British Standard. Taking this guidance into account, the approach to deriving the magnitude of vibration impacts is to compare the vibration to be experienced to the criteria set out in Table 23.5 – Assessment Criteria for Construction Vibration.

Table 23.5 – Assessment Criteria for Construction Vibration

PPV Vibration Level from Construction	Magnitude of Change
≤0.3 mm·s^{-1}	Negligible
0.4 t^{o} 1.0 mm·s^{-1}	Small negative
1.1 - 5 mm·s^{-1}	Medium negative
≥5.1 mm·s^{-1}	Large negative

23.4.2.3 The above construction vibration criteria are derived for human comfort.

23.4.2.4 Using GIS software and the specialist noise modelling software CadnaA, a model of the Converter Station and surrounding area has been generated. It includes topographical information and address point data to identify all sensitive receptors. The model will be developed for use in the construction noise assessment and will be based upon the following information:

- A programme of construction works for the Converter Station, Onshore Cable Route and Optical Regeneration Station indicating the onset and duration of major activities and their approximate location within the Site Boundary; and
- A schedule of construction plant required for each of the programmed activities, including the associated sound power levels and "on-time" (the percentage of time each plant item will be in operation over the course of the working day).

23.4.2.5 The model will predict the likely noise levels from construction activities at the closest receptors to the Converter Station, the Onshore Cable Route and the Optical Regeneration Station (i.e. the Study Area). These levels will be compared to criteria in Table 23.4 above.

23.4.2.6 BS 5228-2:2009+A1 2014 provides algorithms which assist in predicting levels of vibration from limited construction activities. Where appropriate algorithms exist, they will be used to predict vibration levels at the closest receptors to works (i.e. those receptors within the Study Area).

23.4.2.7 The predicted construction noise and vibration levels will be compared against the criteria in Table 23.4 and 23.5. Mitigation measures will be provided where an exceedance is predicted.

23.4.2.8 Whilst a preliminary assessment of construction traffic impacts is presented in the transport chapter, noise associated with construction vehicle movements will be considered once the Onshore Cable Route has been finalised and the roads to be used by the vehicles have been confirmed. At this stage, traffic flow data in the formats required for the noise assessment will be available to allow an assessment of both peak hour flows and also the 18-hour Annual Average Weekday Traffic (AAWT) flows.

23.4.2.9 Night-time working during the Construction Stage is being considered to mitigate potential transport impacts. Whilst this needs to be explored further, it is understood that any night-time working will not be carried out in residential areas. The ES will include an assessment of any night-time working at the closest residential receptors, even where these are some distance from the works.

23.4.3 OPERATION OF THE CONVERTER STATION AND OPTICAL REGENERATION STATION

23.4.3.1 A preliminary acoustic model of the proposed Converter Station has been generated to predict the likely noise levels at the noise sensitive receptors within the study area. The model, generated using CadnaA noise mapping software, is based upon the following information:

- indicative technical drawings of the indicative Converter Station layout including elevations and the approximate location and height of external plant items and associated buildings;
- a preliminary estimate of the sound reduction offered by the building envelope and for any enclosures in which items of noise-generating plant are to be installed;
- sound power level data for each proposed external item of plant;
- preliminary proposed site levels for the Converter Station and topographical data for any proposed changes to the landscape in proximity to the station; and
- topographical data for the area between the site and the nearest noise sensitive receptors.

23.4.3.2 To present a worst-case assessment it has been assumed that all plant will be operating continuously over the 24-hour period whilst in practice there will be periods when fewer plant are operational as the demand profile changes. Again, to assess the worst-case scenario at this stage, the predicted Converter Station noise levels will be compared to the night-time criteria, which are lower than those derived for the daytime. All receptors within the study area for the Converter Station are residential.

23.4.3.3 The predicted noise levels from the Converter Station at the nearest noise sensitive receptors (from the indicative Converter Station location) have been compared to the typical background sound level at the receptors at night, as derived from the measured noise levels. The assessment criteria to derive the magnitude of impact associated with the operation of the Converter Station are shown in Table 23.6 below, with reference to the following receptor specific noise limits (see Figure 23.1 for the location of the receptors). Note that the method for deriving the noise limits has been agreed with the relevant LPAs (see Table 23.2):

- The Haven (to the north of the indicative Converter Station location): 27dB $L_{Ar,T}$ criterion;
- Hillcrest (to the north of the indicative Converter Station location): 27dB $L_{Ar,T}$ criterion;
- Millfield Farm (to the west of the indicative Converter Station location): 27dB $L_{Ar,T}$ criterion;
- Little Denmead Farm (to the south of the indicative Converter Station location): 27dB $L_{Ar,T}$ criterion;
- Holme Cottage (to the south of the indicative Converter Station location): 27dB $L_{Ar,T}$ criterion;
- Lower Chapters (to the south of the indicative Converter Station location): 27dB $L_{Ar,T}$ criterion;
- The Arrows (to the south of the indicative Converter Station location): 27dB $L_{Ar,T}$ criterion; and
- Broadway Farm House (to the south-east of the indicative Converter Station location): 34dB $L_{Ar,T}$ criterion.

Table 23.6 – Assessment Criteria for the Operation of the Converter Station

Converter Station Noise Level, dB L_{Aeq}	Magnitude of Change
≤ assessment criterion	Negligible
0.1 to 3.0 dB above assessment criterion	Small negative
3.1 to 5.0 dB above assessment criterion	Medium negative
≥5.1 dB above assessment criterion	Large negative

23.4.3.4 Preliminary mitigation, as set out below, has been incorporated into the noise modelling:

- All six transformers are placed in an enclosure achieving 20 dB attenuation;
- All six sets of transformer fans are fitted with attenuators and louvred enclosures achieving 10 dB attenuation; and

- AC filter reactors are in an enclosure achieving 10 dBA attenuation.

23.4.3.5 Should the predicted noise levels from the Converter Station exceed the assessment criterion, further forms of mitigation shall be explored and recommended as the assessment progresses. Any mitigation would target the dominant sources of noise at each receptor in the study area.

23.4.3.6 As the assessment progresses, the octave band noise levels from the converter station will be predicted and these will be compared with assessment criteria which will be expanded in include values across the octave band spectrum, as agreed with the LPAs (both WCC and EHDC). This will allow for any required mitigation to target the correct octave bands.

23.4.3.7 The intervening distance between the indicative Converter Station location (see Section 23.5) and the nearest receptors are such that vibration levels from the operation of the plant within the Converter Station are not anticipated to be of significance. Consequently, they are not considered further.

23.4.3.8 The plant items required for the FOC infrastructure to be located within approximately 1 km of Landfall, have not been confirmed at this stage, although there will be significantly less plant required at this location than for the Converter Station. The plant items within the Optical Regeneration Station that have the potential to generate noise may be cooling fans for the optical termination and the signal amplifiers. There may also be associated auxiliary power generators. It is not possible to undertake an assessment at this stage as the location of the building, proposed plant and operating conditions are not confirmed. A full assessment will be included in the ES.

23.4.4 ASSUMPTIONS AND LIMITATIONS

23.4.4.1 It is anticipated that the following modelling assumptions and limitations will apply to the assessments of the Converter Station and the Onshore Cable Route:

General modelling assumptions

- The ground within the Converter Station compound is modelled with a ground absorption coefficient of G = 0 (i.e. acoustically reflective ground), to reflect the site's hard standing.
- The intervening land between the Converter Station and the nearest sensitive receptors is modelled with a ground absorption coefficient of G = 1 (i.e. acoustically absorptive ground) to reflect the local ground cover, which is predominantly green-field.
- The ground absorption along the Onshore Cable Route is yet to be determined and will be confirmed once the exact route has been finalised.
- Residential receptors are modelled at a height of 8 m, to reflect a typical two-storey property.

- For the daytime predictions the receiver height is taken as 1.5 m above local ground (i.e. ground floor). For the night-time predictions the receiver height is taken as 4.5 m (i.e. first floor) above the local ground height.

Operation of the Converter Station

23.4.4.2 The Converter Station has been assumed to be operating at full capacity 24 hours a day.

Decommissioning

23.4.4.3 During Converter Station decommissioning works, it is assumed that similar levels of noise and vibration would be experienced when compared to those generated during construction for the Converter Station. When decommissioned, the Onshore Cables may be left in situ. Alternatively, the cables may be reclaimed, and similar activities to those assumed for construction are likely, therefore, resulting in similar noise and vibration levels to those generated during construction.

23.5 BASELINE ENVIRONMENT

23.5.1.1 This Section provides details of the environmental noise survey which has been undertaken in the study area for the Converter Station. Given the considerable distance between the indicative Converter Station location and Landfall, the changeable noise climate (see Section 23.1) and the transient nature of the cabling route construction works and limited construction period expected for the Optical Regeneration Station, it is not considered essential to obtain baseline noise levels along the Onshore Cable Route and in the Landfall area.

23.5.1.2 Details of the survey equipment used are provided in Appendix 23.2 and the meteorological conditions throughout the measurement period have been provided in Appendix 23.3.

23.5.1.3 The receptors within the Converter Station study area and their approximate distances from the indicative Converter Station location are provided, below (see Figure 23.1 for the location of the receptors):

- The Haven – 250 m;
- Hillcrest – 200 m;
- Millfield Farm – 240 m;
- Little Denmead Farm – 420 m;
- Holme Cottage – 760 m;
- Lower Chapters – 890 m;
- The Arrows – 1 km; and
- Broadway Farm House – 620 m.

23.5.1.4 Unattended noise measurements were undertaken at four locations which are considered to be representative of sensitive receptors in proximity to the indicative Converter Station location, which are identified on Figure 23.1. Measurements took place between Wednesday 28 June 2017 at 1400 hours and Thursday 6 July 2017 at 1100 hours to establish the existing noise climate. Details of the measurement locations are given, below:

- **Measurement Position 1 – representative of Little Denmead Farm**
  Located on the fence line, between the out buildings from the farm and open fields. The nearest roads are Old Mill Lane approximately 500 m to the west and Broadway Lane approximately 70 m to the east. Noise from Lovedean substation was noted to be barely perceptible during survey attendance in the daytime.
- **Measurement Position 2 – representative of The Haven/Hillcrest/Millfield Farm**
  Located on the fence line to the south of the receptor approximately 25 m from Old Mill Lane. Dominant noise sources were noted as being sporadic road traffic on Old Mill Lane and the low level audible 'hum' of electrically generated noise from Lovedean substation.
- **Measurement Position 3 – representative of Holme Cottage/Lower Chapters/The Arrows**
  Located to the south-east of the receptor approximately 7 m from the kerbside of an unnamed local road. Noise levels in this area were deemed to be particularly low, with the dominant noise source noted to be sporadic car movements along the unnamed road. Noise from Lovedean substation was subjectively barely perceptible during the daytime attended measurements.
- **Measurement Position 4 – representative of Broadway Cottages**
  Located at the fence line of the north-west boundary of the receptors to the north of Broadway Farm, adjacent to open farm land. The measurement location was approximately 30 m from Broadway Lane. Dominant noise sources were Road traffic on Broadway Lane and Lovedean substation, which is located approximately 180 m to the north-west.

23.5.1.5 All measurements were undertaken in the free-field, at a height of 1.5 m above local ground level and all microphones were protected with a windshield throughout the survey. Whilst the measurements were undertaken at a height of 1.5 m above the ground, they are also considered representative of noise levels which may be experienced at the first floor of the receptors.

23.5.1.6 The sound level meters were calibrated before and after measurements, with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrator which had been calibrated not more than one year prior to the survey.

23.5.2 RESULTS

23.5.2.1 A summary of the time-averaged ambient noise levels and typical background noise levels for each day and night period are presented in Tables 23.7 to 23.10 below.

23.5.2.2 Full results of the noise survey are presented in tabular form in Appendix 23.4.

Table 23.7 – Summary of Measured Noise Levels, Measurement Position 1

Day/Date	Daytime (07:00 – 23:00)		Night time (23:00 – 07:00)	
	Average Ambient Noise Level $L_{Aeq,16h}$ (dB)	Typical Background Noise Level $L_{A90,15min}$ (dB)	Average Ambient Noise Level $L_{Aeq,8h}$ (dB)	Typical Background Noise Level $L_{A90,15min}$ (dB)
28 June 2017	46	36	44	32
29 June 2017	45	31	43	35
30 June 2017	45	35	43	27
01 July 2017	46	34	45	20
02 July 2017	45	33	43	22
03 July 2017	46	33	43	23
04 July 2017	46	31	41	28
05 July 2017	42	32	41	31
06 July 2017	46	38	-	-

Table 23.8 – Summary of Measured Noise Levels, Measurement Position 2

Day/Date	Daytime		Night time	
	(07:00 – 23:00)		(23:00 – 07:00)	
	Average Ambient Noise Level $L_{Aeq,16h}$ (dB)	Typical Background Noise Level $L_{A90,15min}$ (dB)	Average Ambient Noise Level $L_{Aeq,8h}$ (dB)	Typical Background Noise Level $L_{A90,15min}$ (dB)
28 June 2017	39	31	38	25
29 June 2017	41	31	39	22
30 June 2017	42	31	40	25
01 July 2017	42	34	46	27
02 July 2017	43	33	35	23
03 July 2017	41	34	36	23
04 July 2017	40	32	38	22
05 July 2017	40	35	38	29
06 July 2017	44	40	-	-

Table 23.9 – Summary of Measured Noise Levels, Measurement Position 3

Day/Date	Daytime		Night time	
	(07:00 – 23:00)		(23:00 – 07:00)	
	Average Ambient Noise Level $L_{Aeq,16h}$ (dB)	Typical Background Noise Level $L_{A90,15min}$ (dB)	Average Ambient Noise Level $L_{Aeq,8h}$ (dB)	Typical Background Noise Level $L_{A90,15min}$ (dB)
28 June 2017	50	32	43	26
29 June 2017	43	28	41	19
30 June 2017	44	28	40	24
01 July 2017	42	33	38	25
02 July 2017	44	29	37	20
03 July 2017	44	34	42	21
04 July 2017	42	29	37	23
05 July 2017	42	29	38	28
06 July 2017	42	37	-	-

Table 23.10 – Summary of Measured Noise Levels, Measurement Position 4

Day/Date*	Daytime (07:00 – 23:00)		Night time (23:00 – 07:00)	
	Average Ambient Noise Level $L_{Aeq,16h}$ (dB)	Typical Background Noise Level $L_{A90,15min}$ (dB)	Average Ambient Noise Level $L_{Aeq,8h}$ (dB)	Typical Background Noise Level $L_{A90,15min}$ (dB)
28 June 2017	59	31	34	29
29 June 2017	39	31	34	25
30 June 2017	44	32	36	28
01 July 2017	42	32	35	28
02 July 2017	42	34	35	27
03 July 2017	41	33	34	29
*The battery of the sound level meter used at MP4 ran out on 04 July 2017. The data gathered are considered robust and suitable for use in this assessment.				

23.5.2.3 The typical L_{A90} is taken as the most frequently occurring integer value of the measured background noise levels recorded every 15 minutes over the daytime or night time periods. These values have been derived in accordance with the methodology in BS 4142 and it is these which have been used to set the noise criteria for the operational Converter Station, as agreed with the relevant LPAs.

23.5.3 BASELINE NOISE CLIMATE

23.5.3.1 The baseline noise climate across the Site Boundary has the potential to vary considerably, particularly along the Onshore Cable Route as is passes through both rural and urban areas. The dominant sources expected to influence the noise climate within the study area are summarised below.

23.5.3.2 Lovedean substation is situated in close proximity to the indicative Converter Station location and is one of the dominant noise sources in the area. Other sources of noise include road traffic on Old Mill Lane, Broadway Lane and unnamed local roads to the north and south of the indicative Converter Station location.

23.5.3.3 The expected baseline noise climate along the Onshore Cable Route is as follows:

- Section 2: Road traffic noise on Edney's Lane and Anmore Road with few other sources of noise expected.

- Section 3: Options 3a) and 3b): Road traffic on Hambledon Road.
- Section 3: Option 3c): B2150, though noise from the industrial units adjacent to Soake Road is anticipated to contribute to the local noise climate.
- Section 4: Between Hambledon Road and Waterlooville town centre road traffic on the B2150. For the remainder of this section road traffic on London Road and possibly the commercial premises fronting it would contribute to the noise climate.
- Section 5: Option 5a): Road traffic on Portsdown Hill Road (B2177) and Farlington Avenue.
- Section 5: Option 5b): Where the route does not follow the same path as Option 5a), low levels of road traffic noise.
- Section 5: Option 5c): Road traffic noise on Portsdown Hill Road which would reduce in level as the route continues south of the road until it meets the alignment of option 5b.
- Section 6: Options 6a) and 6b): Not applicable - no sensitive receptors in proximity.
- Section 7: Limited sensitive receptors which may be exposed to road traffic from the A27 and local roads.
- Section 8: Option 8a): Limited sensitive receptors which may be exposed to road traffic from Eastern Road and Velder Avenue.
- Section 8: Option 8b): Limited sensitive receptors which may be exposed to road traffic from local roads.
- Section 8: Option 8c): Limited sensitive receptors which may be exposed to road traffic from local roads.
- Section 9: Option 9a): Road traffic on Milton Road and Bransbury Road.
- Section 9: Option 9b): Road traffic on Moorings Way and local roads and general noise associated with the university, and Bransbury Road.
- Section 9: Option 9c): Road traffic on Moorings Way and local roads and general noise associated with the university, and Bransbury Road.
- Section 10: Road traffic on Fort Cumberland Road and local roads.

Future Baseline

23.5.3.4 Given the surrounding rural area, the existing noise climate across the indicative Converter Station location is relatively low, although the Lovedean substation and distant local roads contribute to the baseline noise climate in the area. Along the Onshore Cable Corridor, the noise climate will vary due to it passing through both rural areas (where noise levels will typically be relatively low) and urban areas (which may be subject to higher noise levels due to the presence of roads, commercial areas etc). The proposed Landfall area will, in part be exposed to road traffic noise and it is expected that noise levels will be relatively low close to the shore. These various sources are not expected to change significantly without the Proposed Development in place.

23.5.3.5 As such, no significant changes are expected to the noise climate should the Proposed Development not go ahead.

23.6 PREDICTED IMPACTS

23.6.1.1 Noise modelling will be undertaken to predict levels which may arise during the Construction Stage. Vibration levels during the Construction Stage will also be predicted, where sensitive receptors are close to the works. A preliminary assessment of typical construction impacts, which one might expect, is provided below and this is in relation to vibration impacts on humans only. Vibration criteria relevant to building damage are considerably higher than those set out in Table 23.5. Given the works required to construct the Proposed Development and the distance between the relevant receptors and those works, it is not considered relevant to carry out an assessment of the risk of building damage. As such, this has been scoped out of the assessment and criteria are not provided.

23.6.1.2 As stated above, preliminary noise modelling has been undertaken to predict levels from the operation of the Converter Station. The model will continue to be refined as more information becomes available and an updated assessment presented in the ES.

23.6.2 SECTION 1 – LOVEDEAN (CONVERTER STATION AREA)

Construction

23.6.2.1 The distance between the nearest receptors and the indicative Converter Station location are such that vibration levels from construction activities are anticipated to be less than 0.3 mm/s. As such, construction vibration impacts are expected to be **negligible**.

23.6.2.2 It is anticipated that there may be construction noise impacts at the nearest receptors resulting from sub-structure works, and the transit and installation of the transformers, though these will be short-term and temporary. During these works, heavy construction plant are likely to be in operation for limited periods. Such plant may have a noise level of 85 dB $L_{Aeq,T}$ at 10 m[1] and several similar sized plant items may be in operation at any one time. Assuming four plant items operating simultaneously, a noise level of 65 dB $L_{Aeq,T}$ may be experienced at the closest residential property. Construction noise levels are likely, therefore, to result in a **negligible** to **minor negative** (insignificant) effect.

[1] British Standard 5228 Part 1 (Table C1, Item 10)

Operation

23.6.2.3 As described in 23.4.3 above, a preliminary worst-case assessment was undertaken to identify potentially significant effects and where further mitigation would be required. The noise sources included in the preliminary noise modelling are shown in the table below and the location of each plant item is identified on Figure 23.2.

Table 23.11 – External Converter Station Noise Sources

Plant Item	Unmitigated Noise Level (dB_{LWA})	No. of Plant	Notes
Auxiliary Transformer	80	2	
AC filter capacitor	80	6	
AC filter reactor	80	6	Mitigation includes enclosures achieving 10dB attenuation
Transformer	101	6	Mitigation includes enclosures achieving 20dB attenuation
Cooling fan bank	89	22	
Air conditioning unit	72	4	
Transformer fans	90	6	Mitigation includes a louvred enclosure achieving 10dB attenuation

23.6.2.4 The preliminary noise levels resulting from the external Converter Station plant items at the receptors within the study area are shown in the table below.

Table 23.12 – Preliminary Converter Station Noise Levels (External Plant Only)

Receptor	Preliminary Predicted Noise Level, dB L_{Aeq}	Criterion	Difference
The Haven	31.0	27	+4.0
Hillcrest	27.6		+0.6
Millfield Farm	38.0		+11.0
Little Denmead Farm	23.5		-3.5

Receptor	Preliminary Predicted Noise Level, dB L_{Aeq}	Criterion	Difference
Holme Cottage	20.7		-6.3
Lower Chapters	20.8		-6.2
The Arrows	21.5		-5.5
Broadway Farm House	25.1	34	-8.9

23.6.2.5 At Millfield Farm the Converter Station noise levels are dominated by the cooling fan bank and at The Haven and Hillcrest the noise levels are dominated by the transformers and, to a lesser extent, the filter capacitors and filter reactors.

23.6.2.6 The preliminary assessment shows that there will be a **negligible** effect at most residential receptors as a result of the Converter Station. However, at Hillcrest there will be a **minor negative** (insignificant) effect, at The Haven, a **moderate negative** (significant) effect and at Millfield Farm there will be a **major negative** (significant) effect.

23.6.2.7 As stated above, as the design evolves additional mitigation is to be explored to reduce the adverse effects of the Proposed Development.

23.6.3 SECTIONS 2-9 - ONSHORE CABLE CORRIDOR

Construction

23.6.3.1 It is anticipated that there may be noise impacts at nearby receptors and vibration impacts at those receptors immediately adjacent to the cable route, during excavation of any hard-standing. During these works, it is possible that a breaker would be in use. Such an item of plant may have a noise level of 90 dB $L_{A,eq,T}$ at 10 m^2 and other large construction plant may also be in operation. Whilst the cable route is not finalised, it is possible to calculate that the breakout of the hard-standing (the breaker only operating) will generate an approximate noise level of 65 dB $L_{Aeq,t}$ at a distance of 175 m from the works. It is likely that there will be receptors (both residential and commercial) within 175 m of the works, and potentially within 10 m of the works where properties front a road being used for the Cable Route where a noise level of up to 90 dB $L_{Aeq,T}$ may be experienced for short periods. At worst, it is considered that there will be a **major negative** (significant) effect at residential areas during cable works and a **major negative** (significant) to **minor negative** (insignificant) effect at

[2] British Standard 5228 Part 1 (Table C1, Item 9)

commercial and ecologically sensitive receptors. However, due to the linear nature of the Onshore Cable Route these impacts will be short-term and temporary.

23.6.3.2 The use of a breaker may also result in vibration being experienced at receptors very close to the Onshore Cable Route. The prediction of vibration requires an understanding of ground conditions etc, so it is not possible to predict at this stage. However, based on experience of similar construction works, it is anticipated that a level of greater 1.1 mm/s may be experienced at residential receptors closest to the works. At worst, it is considered that there could be a **moderate negative** (insignificant) effect.

23.6.3.3 Noise associated with construction vehicle movements will be considered once the Onshore Cable Route has been finalised and the roads to be used by the vehicles have been confirmed. The preliminary assessment presented in the transport chapter provides baseline traffic flow data for many roads which may be used by construction vehicles and the expected percentage increase resulting from construction traffic. In most instances, the percentage increase in the AM and PM peak hours is low. The noise effects of construction traffic will be assessed in the ES when a complete set of baseline data is available and the construction traffic numbers have been confirmed.

23.6.4 SECTION 10 – EASTNEY (LANDFALL)

Construction

23.6.4.1 With the exception of the anticipated FOC infrastructure (including Optical Regeneration Station plant and auxiliary generator), it is anticipated that any construction noise and vibration impacts at Landfall would be associated with the Onshore Cable Route. The preliminary assessment set out above for the Onshore Cable Route will also apply to the Landfall area. At worst, there is likely to be a **major negative** (significant) effect at residential areas during cable installation works and a **major negative** (significant) to **minor negative** (insignificant) effect at commercial and ecologically sensitive receptors.

23.6.4.2 Noise levels generated during the construction of the FOC infrastructure would be similar in nature to those generated during the construction of the Converter Station, however would not be of the same scale.

23.6.4.3 The FOC infrastructure will be located within 1 km of the Landfall as described in Chapter 3 – Description of the Proposed Development. However, as the location is not yet confirmed, the assessment of this element of the Proposed Development will be included within the ES, as more design information becomes available.

23.6.4.4 Construction noise levels are, at worst, likely to result in a **major negative** (significant) to **minor negative** (insignificant) effect at the closest commercial receptors and a **major negative** (significant) effect at the closest residential receptors.

Operation

23.6.4.5 It is not possible to undertake a preliminary assessment of noise from the operation of the Optical Regeneration Station. The design will be kept under review, for elements such as the location of the proposed Optical Regeneration Station building(s) in the vicinity of the Landfall site, and further assessment will be undertaken, where required.

23.7 PROPOSED MITIGATION

23.7.1.1 Potential mitigation measures are set out, below.

23.7.2 SECTION 1 – LOVEDEAN (CONVERTER STATION AREA)

Construction

23.7.2.1 As a minimum, the following mitigation measures will be adopted. These measures will be most important to observe when plant are working close to the extremities of the Site and, therefore, closest to the sensitive receptors.

- The contractor will comply with the requirements of the Control of Pollution Act 1974 (with particular reference to Part III), the Health and Safety at Work Act 1974 and the Control of Noise at Work Regulations 2005.
- Modern, silenced and well-maintained plant will be used at all times, conforming to standards set out in the EU Directives.
- Consideration will be given to avoiding the use of percussive plant where non-percussive methods are available for a given activity.
- Equipment and vehicles to be shut down when not in use.
- Unless agreed in advance all deliveries will be during the construction site hours and on a “just-in-time” basis to avoid/minimise vehicles waiting outside or on the site with engines running.
- Loading and unloading of vehicles, dismantling of equipment such as scaffolding or moving equipment or materials around the site will be conducted in such a manner as to minimise noise.
- Semi-static equipment is to be sited and oriented as far as is reasonably practicable away from noise sensitive receptors and will have localised screening, if deemed necessary.
- The preferred method of piling is auger piling. However, percussive piling may be considered where ground conditions preclude the use of other methods or where sheet piling is required for temporary works, and prior agreement will be sought from the relevant LPA.
- Where necessary, any permanent noise barriers would be constructed as early as possible in the construction programme.
- Cutting operations or other noisy tasks will be minimised through off-site fabrication where practicable.

- Localised shielding of noisy operations may be required in the form of site hoarding and noise barriers local to the specific works.
- With the exception of night-time construction works which may be required in rural areas away from residential receptors, wherever practical, noisy works, which are audible at the Site Boundary, will be undertaken during the following hours (unless otherwise agreed with the relevant LPAs) - between 0800 and 1800 Monday to Friday and between 0800 and 1300 on Saturdays.
- Personnel will be instructed on Best Practice Mitigation Measures to reduce noise and vibration as part of their site induction training.
- Shouting and raised voices shall be kept to a minimum. Use of radios is to be prohibited except where two-way radios are required for reasons of safety and communication.
- Deviation from approved method statements will only be permitted with prior approval from the principal contractor and other relevant parties. This will be facilitated by formal review before any deviation is undertaken.
- Where possible, construction plant should access the site via arterial roads or main carriageways, in order to minimise noise and vibration at dwellings on the surrounding local road network.
- A contact number which the public may use shall be displayed prominently on the site board and any noise complaints will be reported to the principal contractor and immediately investigated.

23.7.2.2 In addition, the principal contractor for construction will also be encouraged to register the site under the Considerate Constructors Scheme that is recognised by industry and the Government for encouraging construction firms to be sensitive to the environment.

Operation

23.7.2.3 The cooling fan bank is the dominant noise source at Millfield Farm where the preliminary assessment shows there is likely to be a major negative effect. The illustrative site layout, provided in Chapter 3 Description of the Proposed Development, indicates that the fans are to be located between the two converter halls, which is likely to prove the most effective measure to receptors other than Millfield Farm which has a direct line of sight to the cooling fan bank. Additional measures to reduce levels at Millfield Farm could include minimising the height of the fans, whilst allowing for maintenance clearance, and the application of attenuators. If necessary, an acoustic barrier of sufficient height to obscure the fans from view and an absorptive surface to the building to reduce reverberant noise could be explored.

23.7.2.4 The two main sources of noise from the filter bank are the filter capacitors and filter reactors. Sound shields are commonly attached to the filter reactors as a means of attenuating noise, though this may be supplemented with an acoustic barrier around

the AC filter bank area, of sufficient height to obscure both the capacitors and reactors from view of the nearest receptors.

23.7.2.5 Additional mitigation measures will be explored with the Project's engineers with the aim of reducing levels such that the agreed operational noise criteria are achieved at all receptors.

23.7.3 SECTIONS 2-9 - ONSHORE CABLE CORRIDOR

Construction

23.7.3.1 The advice outlined for the construction of the Converter Station, should also apply for the Onshore Cable Route, however, the increased proximity of receptors to the Cable Route along some of the more densely populated residential areas, may require additional measures to minimise disruption. Where construction works are anticipated in built-up areas, a programme of community liaison may be advised, such that local residents are kept abreast of any noisy and disruptive works, in advance.

23.7.4 SECTION 10 – EASTNEY (LANDFALL)

Construction

23.7.4.1 The advice outlined for the construction of the Onshore Cable Route will also apply for the Onshore Cable Route and the Landfall area.

Operation

23.7.4.2 At this stage, it is not known whether mitigation may be required to reduce noise levels from the operation of the Optical Regeneration Station. A full assessment will be presented in the ES and, where necessary, mitigation measures will be provided.

23.8 SUMMARY AND CONCLUSIONS

23.8.1.1 This PEIR Chapter presents a detailed review of the relevant noise and vibration legislation and guidance for the Proposed Development, along with details of all consultation which has taken place with the relevant LPAs.

23.8.2 BASELINE

23.8.2.1 Details of the existing noise climate around the Converter Station, Onshore Cable Route and Landfall are presented, along with the methodology and results from the baseline noise survey, which has been undertaken in proximity to the indicative Converter Station location. Existing noise sources in proximity to the Converter Station Area include the surrounding road network and Lovedean substation. The existing noise climate in proximity to the cable route is anticipated to be dominated by traffic on the surrounding road network. At the Landfall area, road traffic is anticipated to include the noise climate close to the residential areas with relatively low noise levels being expected in the area of the proposed Optical Regeneration Station.

23.8.3 ASSESSMENT

23.8.3.1 A preliminary assessment of the potential impacts associated with the construction, operation and decommissioning of the Proposed Development has been undertaken.

23.8.3.2 The sources of noise and vibration during construction of the Converter Station are likely to be the plant associated with substructure works at the converter station. Noise impacts from the construction of the Converter Station are predicted to be **negligible** to **minor negative** (insignificant). Vibration impacts from the construction of the Converter Station are predicted to be **negligible**.

23.8.3.3 The sources of noise and vibration during construction of the Onshore Cable Route are likely to be the plant associated with excavation. Noise impacts from construction of the Onshore Cable Route are predicted to be up to **major negative** (significant). Vibration impacts are predicted to be up to **moderate negative** (significant).

23.8.3.4 Noise impacts associated with construction traffic are not possible to assess at this stage as a full set of baseline traffic flow data is being developed. However, the preliminary assessment in the transport chapter shows that the percentage increase on roads as a result of construction traffic during AM and PM peak hours is low. A full assessment will be presented in the ES.

23.8.3.5 The dominant sources of noise during the operation of the Converter Station are anticipated to be the converter transformers; the cooling fan bank; the AC filter bank; and noise egress from the converter halls. The preliminary predicted noise levels from the external plant associated with the Converter Station have been calculated at the residential receptors within the study area in order to identify potentially significant effects which would require further mitigation. This preliminary assessment has shown that the anticipated noise levels at the residential receptors to the south of the Converter Station give rise to a **negligible** effect. At Hillcrest to the north of the Converter Station a **minor negative** effect is predicted. At The Haven (also to the north of the Converter Station) a **moderate negative** effect is predicted. At Millfield Farm (to the west) a **major negative** effect is predicted. The exceedance of the criterion at Millfield Farm is a result of the cooling fan bank being located between the two converter halls and the exceedance at Hillcrest and The Haven are mostly due to the noise emanating from the transformers.

23.8.3.6 A full assessment of the construction noise and vibration from the Converter Station and the Onshore Cable Route, along with operational noise from the Converter Station will be provided in the ES Chapter, once the design of the station and the location of the Onshore Cable Route have all been finalised.

23.8.3.7 There is currently insufficient detail to assess the preliminary noise impacts associated with the operation of the FOC infrastructure within approximately 1 km of the proposed Landfall. A full assessment will be presented in the ES.

23.8.4 MITIGATION

23.8.4.1 Noise mitigation will be developed as the Converter Station design evolves with a view to the criteria being achieved at all receptors.

23.8.4.2 Consideration has been given to the range of potential mitigation options which may be deployed to minimise noise and vibration impacts during the construction of the Converter Station and Onshore Cable Route, and noise impacts during the operation of the Converter Station. Further detailed consideration will be given to the appropriate forms of mitigation once the design of the Converter Station, the specification of its associated plant and the location of the Onshore Cable Route have all been finalised.

23.9 ASSESSMENTS AND SURVEYS STILL TO BE UNDERTAKEN

23.9.1.1 The design parameters for the Converter Station and the options for the selection of associated plant are yet to be finalised. As such, the assessment of noise from the Converter Station, taking into account the final design parameters and plant options, will be included within the ES.

23.9.1.2 In addition, the construction methodology, programme and construction plant schedule are also to be determined. The assessment of construction noise and vibration for both the Converter Station Area and the Onshore Cable Route will be undertaken taking these into account and included within the ES.

23.9.1.3 It is not anticipated that any further surveys will be required.