



FIVE
ESTUARIES
OFFSHORE WIND FARM

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VOLUME 6, PART 6, ANNEX 9.2: ONSHORE AIRBORNE NOISE CONSTRUCTION SOUND POWER DETAILS

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Five Estuaries Offshore Wind Farm Limited
Five Estuaries Offshore Wind Farm – Onshore Airborne Noise
Construction Sound Power Details

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Contents

1	INTRODUCTION	2
2	SOUND POWER DATA	3
2.1	Landfall.....	3
	Beach Operations TCC.....	3
	Landfall HDD Compound.....	5
	Beach Compound	5
2.2	ECC.....	5
2.3	OnSS.....	14
2.4	Road Improvements to Bentley Road and A120 Junction.....	16
3	METHODOLOGY	17
4	NOISE IMPACT AT NSRs	19
4.1	Landfall.....	19
4.2	ECC.....	19
4.3	OnSS.....	28
4.4	Road Improvements to Bentley Road and A120 Junction.....	29
5	REFERENCES	30

1 Introduction

- 1.1.1 Bow Acoustics has been appointed by SLR Consulting Limited on behalf of Five Estuaries Offshore Wind Farm Limited to conduct an airborne noise and vibration assessment of the onshore elements of the proposed Five Estuaries Offshore Wind Farm (hereafter referred to as 'the Proposed Development'). This report provides details of the sound power levels of the construction activities associated with the Proposed Development and is written as an annex to the Noise and Vibration chapter of the Environmental Impact Assessment Report (EIAR).
- 1.1.2 The study area for the noise and vibration assessment of the onshore elements of the Proposed Development is separated into three main areas:
- the Landfall, where the offshore export cables are brought ashore and jointed to the onshore export cables in the Transition Joint Bays (TJBs);
 - the Export Cable Corridor (ECC); and
 - the Onshore Substation (OnSS).
- 1.1.3 The construction activities reflect the above three areas of assessment. Further details regarding the construction of the Proposed Development are described in Volume 6 Part 3, Chapter 1: Onshore Project Description.

2 Sound Power Data

2.1 Landfall

2.1.1 Landfall construction activities will take place in three potential locations:

- Beach works Temporary Construction Compound (TCC) off Manor Way;
- Landfall Horizontal Directional Drilling (HDD) compound; and
- Beach and intertidal area (Landfall exit pit sheet piling area).

2.1.2 Each area will host different construction activities, as described below.

Beach Works TCC

2.1.3 A beach works TCC at Manor Way may be required to support beach operations, to allow laydown of equipment / materials and to provide a hard standing area for the use of plant. The beach works TCC would be located at the end of Manor Way, to the east of Sluice Cottages, at a distance of between 30m and just over 400m.

2.1.4 The following sequence of construction activities will take place at the beach works TCC:

- Beach works TCC establishment (see Table 1);
- Beach works TCC operations (see Table 2); and then
- Beach works TCC removal (see Table 3).

2.1.5 Each of the above activities will involve the usage of multiple items of plant for a percentage of the working day, which is defined in British Standard 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites' (BS 5228)⁽¹⁾ as weekdays 0700 hours to 1900 hours and Saturday mornings 0700 hours to 1300 hours. Set out in the tables below for each of the construction activities are the plant type, the number used, the sound pressure level (SPL) at a reference 10 m from one item of plant, the percentage of the working day that the plant will be operating and an overall sound power level. The overall sound power level combines all the individual sound pressure levels logarithmically and accounts for the number of plant and the time that they are generating noise, assuming a single total source for all noise.

Table 1: Establish Beach Works TCC Plant Sound Power Details

Plant description	N ^e	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
D6 dozer	1	81	100	Table C2 – Ref 12
30T excavator	2	75	100	Table C2 – Ref 16
20T Dumper	3	87	100	Table C2 – Ref 31
Smooth drum vibro road roller	1	75	100	Table C5 – Ref 20
21T excavator	1	78	100	Table C2 – Ref 3
5T forward tipping dumper	1	78	100	Table C4 – Ref 7
Loading shovel	1	80	100	Table C2 – Ref 27
Tractor & fencing kit	1	80	100	Table C4 – Ref 74
Tractor & trailer	1	79	70	Table C4 – Ref 75
Tractor & fuel bowser	1	89	10	Table C6 – Ref 36
Tractor & water bowser	1	83	25	Table C6 – Ref 38

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
Grader	1	86	100	Table C6- Ref 31
Telehandler	1	79	70	Table C4 – Ref 54
Mobile self-contained welfare unit	2	66	25	Table C4 – Ref 78
Mobile generator	2	74	25	Table C4 – Ref 84
Temporary lighting	6	65	25	Table C4 – Ref 86
Road surface paver & roller	1	84	25	Table C5 – Ref 32
Total Sound Power Level: 122 dB LWA				

Table 2: Beach Works TCC Operations Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
Generator	2	74	100	Table C4 - Ref 84
Telehandler	1	79	75	Table C4 - Ref 54
Road sweeper	1	76	10	Table C4 - Ref 90
Total Sound Power Level: 109 dB LWA				

Table 3: Removal of Beach Works TCC Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
D6 dozer	2	81	100	Table C2 - Ref 12
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	2	87	100	Table C2 - Ref 31
Smooth drum vibro road roller	1	75	50	Table C5 - Ref 20
21T excavator	1	78	100	Table C2 - Ref 3
5T forward tipping dumper	1	78	100	Table C4 - Ref 7
Loading shovel	2	80	100	Table C2 - Ref 27
Tractor & fencing kit	1	80	50	Table C4 - Ref 74
Tractor & trailer	1	79	50	Table C4 - Ref 75
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Tractor & soil tiller, roller, seeder	1	80	25	Table C4 - Ref 74
Mobile self-contained welfare unit	2	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
Temporary lighting	6	65	25	Table C4 - Ref 86
Total Sound Power Level: 121 dB LWA				

Landfall HDD Compound

- 2.1.6 The Landfall compound zone is located just under 1 km from the nearest Noise Sensitive Receptor (NSR). It is situated a minimum distance of approximately 940m south of the dwellings off Church Lane, Great Holland; at least 1.1 km from the dwellings off Second Avenue, Frinton-on-Sea and approximately 1 km from Sluice Cottages, Holland-on-Sea. Great Holland Lodge and Lodge Farm, located off the B1032 Clacton Road are located just over 1km north west of the Landfall compound zone.
- 2.1.7 As there are no NSRs situated within the defined study area of 650 m around the Landfall compound zone, there would be no likely significant effects (LSE). Therefore, no further consideration is necessary of the construction activities that would take place in this area.

Beach and Intertidal Area

- 2.1.8 For an intertidal exit a small compound may be required on the beach. A reception pit may be constructed at the end point of the HDD to allow pullback of the HDD into the bores and allow installation of the offshore export cable. This compound may be able to be situated at an onshore location where direct access to the beach is available in close proximity to the HDD exit locations. It is assumed that a Landfall HDD exit compound on the beach would not consist of hard standing and would only comprise a fenced off area on the beach. Any vehicular traffic to this compound would run directly on the beach sediments. The beach compound will be located at end of the cable route leg.
- 2.1.9 The nearest NSRs to the beach compound are those off Second Avenue, Frinton-on-Sea, situated at least 1 km north east. All other NSRs are located at a distance of more than 1 km away from the beach compound. As discussed above there would be no LSE at this distance and no further consideration is necessary of the construction activities that would take place within the beach compound area.

2.2 ECC

- 2.2.1 The ECC is divided into seven sections that naturally fall between key obstacle crossing, as set out below. The sections may not be constructed in sequence order.
- **Section 1** extends from Landfall in the south to the Great Eastern Mainline spur railway crossing in the north with an approximate length of 4 km;
 - **Section 2** extends from the Great Eastern Mainline spur railway crossing in the south to the B1033 Thorpe Road in the north with an approximate length of 1 km;
 - **Section 3** extends from the B1033 Thorpe Road crossing in the south to the crossing of B1035 Thorpe Road or Swan Road in the north, with an approximate length of 5 km;
 - **Section 4** is subdivided into two:
 - **Section 4A** extends from the crossing of B1033 Thorpe Road crossing in the south to the crossing of Tendring Brook in the north and has an approximate length of 1.4 km;
 - **Section 4B** extends from the crossing of Tendring Brook in the south to the crossing of the A120 in the north and has an approximate length of 3.6 km;
 - **Section 5** extends from the crossing of the A120 in the east to the crossing of Bentley Road in the west and has an approximate length of 2.8 km;
 - **Section 6** extends from the crossing of Bentley Road in the southeast to the crossing of Ardeigh Road in the northwest and has an approximate length of 2.7 km; and

- **Section 7** extends from the crossing of Ardleigh Road in the southeast to the OnSS location in the northwest and has an approximate length of just over 400 m. In addition this section includes the 400kV cable between the OnSS and the EACN substation.
- 2.2.2 Construction within the ECC will typically move along the length of the section as work progresses. The exception to this are works that are restricted to a fixed area, such as the construction and removal of TCCs. Each section will contain one TCC.
- 2.2.3 ECC construction work tasks taking place within each section of the ECC comprise:
- construction of TCC for section (see Table 4);
 - construction of haul roads, and off-route haul roads, where present (see Table 5);
 - installation of cable ducting, either by trenching (see paragraph 2.2.4) or trenchless techniques (see paragraph 2.2.5);
 - removal of haul roads (see Table 13); and then
 - removal of TCC (see Table 13).
- 2.2.4 These construction tasks would take place in the above order and would be typically sequential. The installation of cable ducting may comprise several sub-tasks or activities. In the case of ducting being installed by trenching techniques, the following activities would take place:
- trench excavation and duct installation (see Table 6);
 - trench backfilling (see Table 7); and
 - trench reinstatement (see Table 8).
- 2.2.5 Where there are obstacles within the section of the ECC that cannot be crossed using a trench, an alternative trenchless technique will be used, such as HDD. In the case of ducting being installed by trenchless techniques, the following activities would take place:
- HDD compound construction (see Table 9);
 - HDD rig mobilisation to the entry or exit pit of bore number 1 (see Table 10);
 - pilot drilling bore number 1 (see Table 11);
 - reaming bore number 1 (see Table 11);
 - demobilisation of HDD rig once reaming complete (see Table 12);
 - mobilisation of HDD rig to bore number 2 (see Table 10);
 - the above four steps are repeated until sufficient bores are drilled and reamed;
 - HDD compound removal (see Table 13).
- 2.2.6 For the case of the construction of VE ECC only (Scenario 1), ducting for four circuits would be installed in the MDS, which equates to 12 bores. For the cumulative case, both VE and North Falls will each install ducting for two circuits, which would be six bores each, totalling 12 bores. HDD may occur anywhere along the ECC as not all obstacles may have been identified.
- 2.2.7 In addition to the above, as part of the cable duct installation works, joint bays will be constructed at key locations along the ECC. Joint bays are used to connect cables and will be constructed at the end of a run of cable or at key locations to permit a continuous run of cable. Cable drum lengths of 500m are assumed. A joint bay may be constructed anywhere along the ECC. The works associated with joint bays comprise:
- joint bay excavation (see Table 14);
 - joint bay construction (see Table 15);
 - joint bay cable jointing (see Table 16); and
 - joint bay backfilling (see Table 17).
- 2.2.8 The plant details for each of the construction activities are set out in the tables below, using the same principles as discussed for the beach operations TCC. It is noted that up to two HDDs may take place at the same time, which has been accounted for in the plant listed in Table 11. Also,

Section 6 will contain two haul road; therefore 3 dB has been added to the sound power level in Table 5 for Section 6 haul road construction only, which equates to doubling the entire list of plant within the table.

Table 4: Construction of TCC Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
D6 dozer	1	81	100	Table C2 - Ref 12
30T excavator	2	75	100	Table C2 - Ref 16
20T Dumper	3	87	100	Table C2 - Ref 31
Smooth drum vibro road roller	1	75	100	Table C5 - Ref 20
21T excavator	1	78	100	Table C2 - Ref 3
5T forward tipping dumper	1	78	100	Table C4 - Ref 7
Loading shovel	1	80	100	Table C2 - Ref 27
Tractor & fencing kit	1	80	100	Table C4 - Ref 74
Tractor & trailer	1	79	70	Table C4 - Ref 75
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Grader	1	86	100	Table C6- Ref 31
Telehandler	1	79	70	Table C4 - Ref 54
Mobile self-contained welfare unit	2	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	6	65	25	Table C4 - Ref 86
Road surface paver & roller	1	84	25	Table C5 - Ref 32
Total Sound Power Level: 122 dB L_{WA}				

Table 5: Construction of Haul Road Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
D6 dozer	1	81	100	Table C2 - Ref 12
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	3	87	100	Table C2 - Ref 31
Smooth drum vibro road roller	1	75	100	Table C5 - Ref 20
21T excavator	1	78	100	Table C2 - Ref 3
5T forward tipping dumper	1	78	100	Table C4 - Ref 7
Loading shovel	1	80	100	Table C2 - Ref 27
Tractor & fencing kit	1	80	100	Table C4 - Ref 74
Tractor & trailer	1	79	70	Table C4 - Ref 75

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Grader	1	86	100	Table C6 - Ref 31
Telehandler	1	79	70	Table C4 - Ref 54
Mobile self-contained welfare unit	1	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	12	65	25	Table C4 - Ref 86
Total Sound Power Level: 122 dB L_{WA}				

Table 6: Open Trenching Works (Trench Excavation) Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	2	87	100	Table C2 - Ref 31
21T excavator	2	78	100	Table C2 - Ref 3
5T forward tipping dumper	2	78	100	Table C4 - Ref 7
Loading shovel	2	80	50	Table C2 - Ref 27
Trench roller	2	73	50	Table C2 - Ref 40
Tractor & trailer	1	79	50	Table C4 - Ref 75
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Telehandler	1	79	50	Table C4 - Ref 54
Mobile self-contained welfare unit	1	66	25	Table C4 - Ref 78
Crawler crane	1	75	10	Table C4 - Ref 52
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	8	65	25	Table C4 - Ref 86
Pump	2	78	100	Table C6 - Ref 41
Total Sound Power Level: 121 dB L_{WA}				

Table 7: Open Trenching Works (Trench Backfilling) Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	2	87	100	Table C2 - Ref 31

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
21T excavator	2	78	100	Table C2 - Ref 3
5T forward tipping dumper	2	78	100	Table C4 - Ref 7
Loading shovel	2	80	100	Table C2 - Ref 27
Trench roller	2	73	75	Table C2 - Ref 40
Tractor & trailer	1	79	25	Table C4 - Ref 75
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Telehandler	1	79	25	Table C4 - Ref 54
Mobile self-contained welfare unit	1	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	8	65	25	Table C4 - Ref 86
Pump	2	78	100	Table C6 - Ref 41
Total Sound Power Level: 121 dB L_{WA}				

Table 8: Open Trenching Works (Trench Reinstatement) Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
D6 dozer	2	81	100	Table C2 - Ref 12
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	2	87	100	Table C2 - Ref 31
Smooth drum vibro roller	1	75	50	Table C5 - Ref 20
21T excavator	1	78	100	Table C2 - Ref 3
5T forward tipping dumper	1	78	100	Table C4 - Ref 7
Loading shovel	2	80	100	Table C2 - Ref 27
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Mobile self-contained welfare unit	1	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	8	65	25	Table C4 - Ref 86
Total Sound Power Level: 121 dB L_{WA}				

Table 9: HDD Compound Construction Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
D6 dozer	1	81	60	Table C2 - Ref 12
30T excavator	1	75	100	Table C2 - Ref 16
20T dumper	2	87	100	Table C2 - Ref 31
Smooth drum vibro road roller	1	75	80	Table C5 - Ref 20
21T excavator	1	78	100	Table C2 - Ref 3
5T forward tipping dumper	1	78	80	Table C4 - Ref 7
Tractor & fencing kit	1	80	50	Table C4 - Ref 74
Tractor & trailer	1	79	70	Table C4 - Ref 75
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Grader	1	86	80	Table C6- Ref 31
Telehandler	1	79	70	Table C4 - Ref 54
Mobile self-contained welfare unit	2	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	6	65	25	Table C4 - Ref 86
Total Sound Power Level: 121 dB L_{WA}				

Table 10: HDD Rig Mobilisation Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	1	87	100	Table C2 - Ref 31
Mobile generator	1	74	100	Table C4 - Ref 84
Telehandler	2	79	75	Table C4 - Ref 54
Vibratory piling rig	1	88	10	Table C3 - Ref 8
Mounting supports for directional drill (hydraulic hammer)	1	87	25	Table C4 - Ref 92
Smooth drum vibro road roller	1	75	100	Table C5 - Ref 20
Grader	1	86	100	Table C6- Ref 31
Temporary lighting	6	65	25	Table C4 - Ref 86
Total Sound Power Level: 119 dB L_{WA}				

Table 11: HDD Pilot Drilling and Reaming (Two HDD Rigs) Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
Generator	1	74	100	Table C4 - Ref 84
Telehandler	2	79	75	Table C4 - Ref 54
Directional drill generator	2	77	100	Table C4 - Ref 96
Mud pump	2	80	100	Provided by Riggall & Assoc. based on historic data.
Mixing tank	2	75	100	
Cuttings / recycling tank	2	80	100	
Total Sound Power Level: 117 dB LWA (Two HDD Rigs)				

Table 12: HDD Rig Demobilisation Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	1	87	100	Table C2 - Ref 31
Mobile generator	1	74	100	Table C4 - Ref 84
Telehandler	2	79	75	Table C4 - Ref 54
Vibratory piling rig	1	88	10	Table C3 - Ref 8
Smooth drum vibro road roller	1	75	100	Table C5 - Ref 20
Grader	1	86	100	Table C6- Ref 31
Temporary lighting	6	65	25	Table C4 - Ref 86
Total Sound Power Level: 119 dB LWA				

Table 13: HDD Compound Removal, TCC Removal and Haul Road Removal Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
D6 dozer	2	81	100	Table C2 - Ref 12
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	2	87	100	Table C2 - Ref 31
Smooth drum vibro road roller	1	75	50	Table C5 - Ref 20
21T excavator	1	78	100	Table C2 - Ref 3
5T forward tipping dumper	1	78	100	Table C4 - Ref 7
Loading shovel	2	80	100	Table C2 - Ref 27
Tractor & fencing kit	1	80	50	Table C4 - Ref 74
Tractor & trailer	1	79	50	Table C4 - Ref 75

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Tractor & soil tiller, roller, seeder	1	80	25	Table C4 - Ref 74
Mobile self-contained welfare unit	2	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	6	65	25	Table C4 - Ref 86
Total Sound Power Level: 121 dB L_{WA}				

Table 14: Excavation of Joint Bay Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	2	87	100	Table C2 - Ref 31
Smooth drum vibro roller	1	75	10	Table C5 - Ref 20
21T excavator	1	78	50	Table C2 - Ref 3
5T forward tipping dumper	1	78	50	Table C4 - Ref 7
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Mobile self-contained welfare unit	1	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	4	65	25	Table C4 - Ref 86
Pump	2	78	100	Table C6 - Ref 41
Total Sound Power Level: 119 dB L_{WA}				

Table 15: Construction of Joint Bay Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
Tractor & trailer	1	79	50	Table C4 - Ref 75
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Mobile concrete pump / cement mixer truck	1	80	50	Table C4 - Ref 20
Telehandler	1	79	50	Table C4 - Ref 54
Mobile self-contained welfare unit	1	66	25	Table C4 - Ref 78
Mobile generator	2	74	50	Table C4 - Ref 84

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
Temporary lighting	4	65	25	Table C4 - Ref 86
Pump	2	78	100	Table C6 - Ref 41
Total Sound Power Level: 114 dB L_{WA}				

Table 16: Jointing of ECC Cable Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & cable drum trailer	1	80	50	Table C4 - Ref 74
Cable winch	1	83	50	Assumed value
Mobile self-contained welfare unit	1	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	4	65	25	Table C4 - Ref 86
Pump	2	78	100	Table C6 - Ref 41
Total Sound Power Level: 114 dB L_{WA}				

Table 17: Roof and Backfilling Over Joint Bay Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
D6 dozer	2	81	100	Table C2 - Ref 12
30T excavator	2	75	100	Table C2 - Ref 16
20T dumper	2	87	100	Table C2 - Ref 31
21T excavator	1	78	100	Table C2 - Ref 3
5T forward tipping dumper	1	78	100	Table C4 - Ref 7
Loading shovel	1	80	100	Table C2 - Ref 27
Trench roller	1	73	75	Table C2 - Ref 40
Tractor & fuel bowser	1	89	10	Table C6 - Ref 36
Tractor & water bowser	1	83	25	Table C6 - Ref 38
Mobile self-contained welfare unit	1	66	25	Table C4 - Ref 78
Mobile generator	2	74	25	Table C4 - Ref 84
Temporary lighting	4	65	25	Table C4 - Ref 86
Pump	2	78	100	Table C6 - Ref 41
Total Sound Power Level: 121 dB L_{WA}				

2.2.9 As set out in paragraph 2.2.4, the majority of construction activities are sequential. During the installation of cable ducting some activities may have the potential to occur at the same time as others, in nearby locations. It would not be possible for multiple construction activities to take place in the exact same location at the same time as work is reliant on the previous activity being completed first and there would be too much plant in one space at one time. The following activities have been identified to potentially operate concurrently and nearby:

- Group 1
 - Trench excavation, with sound power level of 121 dB (see Table 6);
 - Trench backfilling, with sound power level of 121 dB (see Table 7); and
 - HDD duct installation, with sound power level of between 117 dB and 121 dB (see Table 9 to Table 13).
- Group 2
 - Trench excavation, with sound power level of 121 dB (see Table 6);
 - Trench backfilling, with sound power level of 121 dB (see Table 7); and
 - Excavation of joint bay OR construction of a joint bay with a maximum sound power level of 119 dB (see Table 14 and Table 15).
- Group 3
 - Joint bay backfilling with sound power level of 121 dB (see Table 17); and
 - Trench reinstatement with sound power level of 121 dB (see Table 8).

2.2.10 Therefore, the worst case noise level from concurrent construction activities would occur under Group 1, when trench excavation, backfilling and HDD compound construction could occur near to each other. Upon excavation, a trench will remain open to enable cable ducting to be installed. The minimum section of open trench is likely to be 100m, meaning that the closest that backfilling works can be to trenching works would be 100m. It is therefore assumed that the three concurrent construction activities associated with Group 1 will occur 100m apart from each other.

2.3 OnSS

2.3.1 There are six key construction activities associated with the OnSS:

- Site enabling works: site clearance, ground works and formation of site platform (see Table 18);
- Construction of TCC (see Table 4).
- Access road construction (see Table 19);
- Building foundation works (see Table 20);
- Building fabrication and HV plant installation (see Table 21); and
- TCC removal (see Table 13).

2.3.2 Each of the above activities will involve the usage of multiple items of plant for a percentage of the working day. Set out in the tables below for each of the construction activities are the plant type, the number used, the SPL at a reference 10 m from one item of plant, the percentage of the working day that the plant will be operating and an overall sound power level. The overall sound power level combines all the individual sound pressure levels logarithmically and accounts for the number of plant and the time that they are generating noise, assuming a single total source for all noise.

Table 18: OnSS Site Enabling Works Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB L _{Aeq}	Percent of working day operating	Source BS 5228
32T excavator (earthworks)	6	75	100	Table C2 - Ref 16
44T tracked excavator breaking rubble	4	82	100	Table C1 - Ref 12
28T Dozer	4	79	75	Table C2 - Ref 11

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
Air compressor	4	75	100	Table C3 - Ref 19
29T dump truck tipping	8	79	70	Table C2 - Ref 30
Mobile generator	2	74	100	Table C4 - Ref 84
Crusher	2	90	80	Table C9 - Ref 14
Total Sound Power Level: 123 dB LWA				

Table 19: Access Road Construction Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
30T excavator	2	75	100	Table C2 - Ref 16
29T dump truck	4	79	70	Table C2 - Ref 30
Asphalt spreader with support lorry	1	80	100	Library data
Smooth drum vibro roller	2	75	70	Table C5 - Ref 20
Grader	1	82	100	Table C5 - Ref 7
Mobile generator	2	74	100	Table C4 - Ref 84
Total Sound Power Level: 116 dB LWA				

Table 20: OnSS Building Foundation Works Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
Large rotary bored piling rig	1	83	100	Table C3 - Ref 14
Tracked drilling rig with hydraulic drifter	1	82	100	Table C3 - Ref 15
Crane mounted auger	1	79	100	Table C3 - Ref 16
Mini piling rig	2	76	100	Table C3 - Ref 17
Compressor for mini piling	1	75	100	Table C3 - Ref 19
Dump truck	4	79	50	Table C2 - Ref 30
Truck mixer with pump	2	75	10	Table C4 - Ref 28
Excavator (earthworks)	3	75	80	Table C2 - Ref 16
Grinder	5	80	50	Table C4 - Ref 93
Compressor	2	75	100	Table C3 - Ref 19
Mobile generator	5	74	100	Table C4 - Ref 84
Total Sound Power Level: 119 dB LWA				

Table 21: OnSS Building Fabrication and HV Installation Works Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
Mobile crane	1	71	50	Table C4 - Ref 41
Lorry	3	77	25	Table C4 - Ref 53
MEWP	2	67	75	Table C4 - Ref 57
Dump truck	4	79	10	Table C2 - Ref 30
Compressor	1	75	100	Table C2 - Ref 16
Forklift truck	2	71	50	Table C2 - Ref 35
Grinder	5	80	50	Table C4 - Ref 93
Pneumatic chipper/drill	3	83	50	Table C1 - Ref 6
Scaffolding	1	72	25	Library data
Mobile generator	2	74	100	Table C4 - Ref 84
Total Sound Power Level: 117 dB LWA				

2.4 Road Improvements to Bentley Road and A120 Junction

- 2.4.1 Bentley Road widening and improvements of the junction of the A120 and Bentley Road are expected to require simultaneous working on up to three the different sections of Bentley Road. The plant listed in Table 22 is for each phase of work. In addition, a crusher may be needed to be located within TCC11. The single crusher has a sound pressure level at 10m of 90 dB, as per Table C9, Ref 14 of BS 5228-1, and would operate for 80% of the working day.

Table 22: Bentley Road Widening and A120 Junction Improvements Plant Sound Power Details

Plant description	Nº	SPL at 10m, dB LAeq	Percent of working day operating	Source BS 5228
30T excavator	2	75	100	Table C2 - Ref 16
29T dump truck	4	79	70	Table C2 - Ref 30
Asphalt spreader with support lorry	1	80	100	Library data
Smooth drum vibro roller	2	75	70	Table C5 - Ref 20
Grader	1	82	100	Table C5 - Ref 7
Lorry	3	77	25	Table C4 - Ref 53
MEWP	2	67	75	Table C4 - Ref 57
Mobile generator	2	74	100	Table C4 - Ref 84
Total Sound Power Level: 116 dB LWA				

3 Methodology

- 3.1.1 Construction noise impacts have been calculated following the methodology set out in BS 5228-1. When considering a specific construction activity, or group of concurrent construction activities, as discussed in Section 2, the appropriate total sound power level which can be found at the bottom of each of the tables above has been used to calculate a distance at which construction noise level reaches impact magnitudes discussed in the EIAR. These distances have been applied to the appropriate area where the specific construction activity could take place and the NSRs within are deemed to be exposed to that magnitude of impact during the specific construction activity.
- 3.1.2 The first step in the process is to combine the noise from all plant associated with a construction activity, taking into account the number of each items of plant, the level of noise they generate and the amount of time the plant will operate in the day. Each construction activity contained in Table 1 to Table 21 lists this information, together with the source of the data which is typically from a table found within Annex C of BS 5228-1. The total sound power level for the construction activity is calculated following the procedure detailed in Annex F.2 of BS 5228-1, as summarised below in Equation 1 and Equation 2.

$$L_{W,i} = L_{P,i} + 28 + (10 \times \log n_i) + \left(10 \times \log \left(\frac{p_i}{100}\right)\right) \quad \text{Equation 1 - Plant Sound Power Level}$$

$$L_W = 10 \times \log \left(10^{L_{W,1}/10} + 10^{L_{W,2}/10} + \dots + 10^{L_{W,n}/10}\right) \quad \text{Equation 2 - Total Activity Sound Power Level}$$

Where:

- $L_{W,i}$ sound power level of the i^{th} item of plant
- $L_{P,i}$ sound pressure level of one item of the i^{th} plant at 10m distance
- n_i number of the same items of plant
- p_i percentage of the working day the i^{th} item of plant will be in operation
- L_W total sound power level for all items of plant within the construction activity
- $L_{W,1}$ sound power level of the first item of plant within the construction activity
- $L_{W,2}$ sound power level of the second item of plant within the construction activity
- $L_{W,n}$ sound power level of the last item of plant within the construction activity

- 3.1.3 The propagation of sound is calculated using the total activity sound power level at a single point on the boundary of the area where the construction activity would take place. For example, TCC construction (see Table 4) is applied to the areas designated for the TCCs and not the entire ECC corridor or other areas. By combining the sound power levels in this way, it is assumed that all plant would be situated within a single point, rather than spread out over the construction area to present a worst case scenario.
- 3.1.4 The BS 5228-1 method of calculating sound propagation using plant sound power level, as described in Annex F.2.3 of the standard accounts for hard and soft ground differently, as per Equation 3 and Equation 4, respectively. Sound will attenuate more rapidly when propagating across soft ground than compared with hard ground.

$$K_h' = (20 \times \log R) + 8 \quad \text{Equation 3 - Distance Adjustment for Hard Ground}$$

$$K_s' = (25 \times \log R) + 1 \quad \text{Equation 4 - Distance Adjustment for Soft Ground}$$

Where:

- K_h' distance adjustment for hard ground
- K_s' distance adjustment for soft ground
- R distance between the calculation point and the construction activity

- 3.1.5 For the case of the Proposed Development construction works are being carried out in rural areas and sound would be propagating across grassland and fields, which is soft ground. There will be limited areas of water and concrete, which is hard ground; however, as a worst case scenario the calculation assumes that the intervening ground will be 50% hard and 50% soft. Where the calculation distance, R, is 25m or less 100% hard ground is assumed in line with BS 5228-1. The calculation assumes no screening or reflections.

4 Noise Impact at NSRs

4.1 Landfall

4.1.1 Impact 1 set out in Section 9.10 of the EIAR details the NSRs impacted by Landfall construction noise.

4.2 ECC

4.2.1 Impact 2 set out in Section 9.10 of the EIAR details the noise impacts associated with the construction of the ECC. Due to the number of construction activities and the wide area upon which they will be taking place, there are too many receptors to detail in the EIAR. Set out below are the names of the properties that would be exposed to the impact magnitudes during ECC construction tasks, as summarised above in paragraph 2.2.3, prior to any mitigation. In addition, the EIAR considers regular evening and night-time work, which has been identified to be HDD drilling or reaming (see Table 11) separately as the impact thresholds are different during these periods than during the daytime.

4.2.2 It is reiterated that for haul road construction, the number of NSRs in each construction noise impact magnitude in Table 23 and Table 24, do not take into account the duration of exposure discussed in the EIAR. These table assumes that NSRs would be exposed to the same level of construction noise for a period of 10 or more days in any 15 consecutive days, or for a total number of days exceeding 40 in any 6 consecutive months. Whereas, the noise associated with the construction of temporary haul roads is transient and unlikely to be at the maximum predicted level for more than a few hours when works are at the closest point to the NSR.

4.2.3 Therefore, the construction noise experienced at NSRs from the construction and removal of haul roads would only be at its maximum for less than one day and would quickly diminish as plant progresses along the ECC. As the period of exposure to high levels of construction noise would be less than 10 days, these activities would result in a low impact.

Table 23: Dwellings Exposed to High Impact Magnitude During ECC Haul Road Construction

NSR name	NSR name	NSR name	NSR name	NSR name
1 Abbotts Hall Cottages	2 Hawkins Farm Cottages	6 Ronson Drive	Great Holland Lodge	Richmond Cottage
1 Barkers Cottages	2 Hill Cottages	8 Ronson Drive	Great Holland Mill	Ring Cottage
1 New Hall Cottages	2 New Hall Cottages	80 Landermere Road	Great Holland Mill 2	Seawinds
10 Ronson Drive	2 Ronson Drive	99 Landermere Road	Grounds of Tudor Cottage	Shoremist Cottage
101 Landermere Road	3 New Hall Cottages	Beckwith Farm	Hall Farm Barn Conversion	St Mary's Church Little Bromley
103 Landermere Road	4 Little Clacton Road	Caravan at Barkers Cottages	Lodge Farm	Tudor Cottage
12 Ronson Drive	4 Ronson Drive	Dairy House Farm	New House Farm	Valley Farm
2 Abbotts Hall Cottages	5 Little Clacton Road	Damonts Farm	Normans Farm	Valley Farm
2 Barkers Cottages	6 Little Clacton Road	Dankeer	Paynes Cottage	Wesley Cottage

Table 24: Dwellings Exposed to Medium Impact Magnitude During ECC Haul Road Construction

NSR name	NSR name	NSR name	NSR name	NSR name
1 Arch Cottages	1 Viscount Way	2 Little Clacton Road	5 Henderson Road	Oakley House
1 Dairy House Farm Cottages	105 Landermere Road	2 Valley Farm Cottages	7 Cattermole Way	St Mary's Church Little Bromley
1 Henderson Road	14 Ronson Drive	3 Henderson Road	Cross Cottage	Tanzara
1 Little Clacton Road	16 Ronson Drive	3 Little Clacton Road	Frost Farm	Tending Lodge
1 Ronson Drive	2 Arch Cottages	3 Viscount Way	Frost Farm Cottages	The Firs Care Home
1 Valley Farm Cottages	2 Dairy House Farm Cottages	4 New Hall Cottages	Little Bromley Hall	

Table 25: Dwellings Exposed to Low Impact Magnitude During ECC Haul Road Construction

NSR name	NSR name	NSR name	NSR name	NSR name
1 Cattermole Way	4 Ellis Road	78b Landermere Road	Hiskeys Farm	Sunny Meadows
10 Chaplin Drive	4 Henerson Road	8 Chaplin Drive	Hiskeys House	Sunny Skies
107 Landermere Road	4 White Lodge Cres	8 Henderson Road	Laurel Lea	Sunny Views
11 Henderson Road	5 Cattermole Way	9 Henderson Road	Leighmark	The Chestnuts
15 Henderson Road	5 Viscount Way	93 Landermere Road	Molecatchers Cottage	The Lions Den (derelict pub)
17 Henderson Road	5 White Lodge Cres	95 Landermere Road	New Property 2 Lonsdale Road	The Veldt
19 Henderson Road	6 Chaplin Drive	97 Landermere Road	New Property 3 Lonsdale Road	Unknown Little Clacton Road
2 Ellis Road	6 Ellis Road	Arch Cottages	New Property 4 Lonsdale Road	Unknown2 Little Clacton Road
2 Henderson Road	6 Henderson Road	Bradfield Lodge	Rainbows End	Vesey Farm
2 White Lodge Cres	6 White Lodge Cres	Coach House, Little Bromley Hall	Sunny Bays	Water Tower Cottage
3 Cattermole Way	7 Henderson Road	Focus Farm	Sunny Dreams	White Cottage
3 White Lodge Cres	7 Viscount Way	Hempstall's Farm	Sunny Fields	White Lodge
				Wolves Hall Farm

Table 26: Dwellings Exposed to High Impact Magnitude During ECC TCC Construction

NSR name	NSR name	NSR name	NSR name	NSR name
1 Abbotts Hall Cottages	2 Abbotts Hall Cottages	3 New Hall Cottages	Cyprus Cottage	New House Farm
1 Barkers Cottages	2 Barkers Cottages	Caravan at Barkers Cottages	Great Holland Lodge	Unknown Little Clacton Road
1 New Hall Cottages	2 New Hall Cottages	Cross Cottage	Lodge Farm	Unknown2 Little Clacton Road
				White Lodge

Table 27: Dwellings Exposed to Medium Impact Magnitude During ECC TCC Construction

NSR name	NSR name	NSR name	NSR name	NSR name
1 Hawkins Farm Cottages, Paynes Lane	Meadows End	Sunny Dreams	Sunny Skies	The Lions Den (derelict pub)
1 Hawkins Farm Cottages	Rainbows End	Sunny Fields	Sunny Views	The Veldt
4 New Hall Cottages	Sunny Bays	Sunny Meadows		

Table 28: Dwellings Exposed to Low Impact Magnitude During ECC TCC Construction

NSR name	NSR name	NSR name	NSR name	NSR name
1 Elm Grove	Abbotts Hall	Chanak	Helidi Cottage	Shieldings
2 Elm Grove	Beaulieu	Donsal	Linzi	Sunbeams
3 Elm Grove	Berriedale	Elmcroft	Malyno	The Chestnuts
4 Elm Grove	Brick Layers Cottage	Farway	Molecatchers Cottage	Tiverton
4 West End Cottage	Brookfield	Ferncote	Mon Respose	Water Tower Cottage
			Rosina	Yonder House

Table 29: Dwellings Exposed to High Impact Magnitude During ECC Duct Installation

NSR name	NSR name	NSR name	NSR name	NSR name
1 Arch Cottages	14 Ronson Drive	3 New Hall Cottages	Dairy House Farm	Oakley House
1 Barkers Cottages	16 Ronson Drive	4 Little Clacton Road	Damonts Farm	Paynes Cottage

NSR name	NSR name	NSR name	NSR name	NSR name
1 Dairy House Farm Cottages	2 Arch Cottages	4 Ronson Drive	Dankeer	Ring Cottage
1 Little Clacton Road	2 Barkers Cottages	5 Little Clacton Road	Frost Farm	Seawinds
1 New Hall Cottages	2 Dairy House Farm Cottages	6 Little Clacton Road	Frost Farm Cottages	Shoremist Cottage
1 Ronson Drive	2 Hill Cottages	6 Ronson Drive	Great Holland Lodge	Tanzara
1 Valley Farm Cottages	2 Little Clacton Road	7 Cattermole Way	Great Holland Mill	The Firs Care Home
10 Ronson Drive	2 New Hall Cottages	8 Ronson Drive	Great Holland Mill 2	Tudor Cottage
101 Landermere Road	2 Ronson drive	80 Landermere Road	Grounds of Tudor Cottage	Valley Farm
103 Landermere Road	2 Valley Farm Cottages	99 Landermere Road	Hall Farm Barn Conversion	Valley Farm
105 Landermere Road	3 Henderson Road	Beckwith Farm	Lodge Farm	Wesley Cottage
12 Ronson Drive	3 Little Clacton Road	Caravan at Barkers Cottages	Normans Farm	

Table 30: Dwellings Exposed to High Impact Magnitude During ECC Duct Installation

NSR name	NSR name	NSR name	NSR name	NSR name
1 Cattermole Way	19 Henderson Road	4 New Hall Cottages	9 Henderson Road	St Mary's Church Little Bromley
1 Hawkins Farm Cottages, Paynes Lane	2 Ellis Road	5 Cattermole Way	Arch Cottages	Sunny Views
1 Viscount Way	2 Hawkins Farm Cottages	5 Henderson Road	Bradfield Lodge	Unknown Little Clacton Road
107 Landermere Road	2 Henderson Road	5 Viscount Way	Leighmark	Unknown2 Little Clacton Road
11 Henderson Road	3 Cattermole Way	5 White Lodge Cres	Molecatchers Cottage	Vesey Farm
15 Henderson Road	3 Viscount Way	7 Henderson Road	New Property 4 Lonsdale Road	White Cottage
17 Henderson Road	4 Henderson Road	7 Viscount Way	Rainbows End	White Lodge
			Richmond Cottage	Wolves Hall Farm

Table 31: Dwellings Exposed to Low Impact Magnitude During ECC Duct Installation

NSR name	NSR name	NSR name	NSR name	NSR name
1 Chaplin Drive	3 White Lodge Cres	76 Landermere Road	Cornlands	Longshots Meadow
1 Ellis Road	31 Ellis Road	77 Landermere Road	Cromwell Lodge	Malyno
1 Elm Grove	33 Ellis Road	78 Landermere Road	Cyprus Cottage	Maple Tree Cottage
1 Parsonage Lane	35 Ellis Road	78a Landermere Road	Davara, White Lodge Cres	Meadlow Cottage
1 White Lodge Cres	37 Ellis Road	78b Landermere Road	Donsal	Meadow View, New Town Road
10 Chaplin Drive	39 Ellis Road	79 Landermere Road	Droskyn	Meadows End
10 Cross Way	4 Palmerston Road	8 Chaplin Drive	Dypaca	Mon Respose
10 Ellis Road	4 Chaplin Drive	8 Cross Way	East Quest	New property 1, Lonsdale Road
10 Main Road, Great Holland	4 Ellis Road	8 Ellis Road	Elmcroft	New Property 2 Lonsdale Road
10 Parsonage Lane	4 Elm Grove	8 Henderson Road	Fair Rigg, 3 Palmerston Road	New Property 3 Lonsdale Road
109 Landermere Road	4 Paolozzi Way	8 Paolozzi Way	Fairlands, White Lodge Cres	Oak Cottage
11 Chaplin Drive	4 Parsonage Lane	8 Parsonage Lane	Farway	Oakely House, Lodge Lane
11 Ellis Road	4 West End Cottage	81 Landermere Road	Ferncote	Pantiles
12 Ellis Road	4 White Lodge Cres	83 Landermere Road	Ferndene	Possible new dwelling off Parsonage Lane
14 Ellis Road	5 Chaplin Drive	85 Landermere Road	Flame Trees	Rosina
15 Chaplin Drive	5 Ellis Road	87 Landermere Road	Focus Farm	Shieldings
15 Ellis Road	5 Kenilworth Grove	89 Landermere Road	Foggey Cottage	Speyside Lodge
16 Ellis Road	5 Lodge Lane	9 Chaplin Drive	Folly Farm, 77 Frinton Road	Sunbeams
17 Chaplin Drive	5 Palmerston Road	9 Ellis Road	Glendale	Sunny Bays

NSR name	NSR name	NSR name	NSR name	NSR name
17 Ellis Road	5 Paronage Lane	9 Parsonage Lane	Gooses Paddock, Spencer Road	Sunny Dreams
18 Ellis Road	6 Chaplin Drive	91 Landermere Road	Greenacres, Spencer Road	Sunny Fields
188 Thorpe Road	6 Cross Way	93 Landermere Road	Greenacres, White Lodge Cres	Sunny Meadows
19 Chaplin Drive	6 Ellis Road	95 Landermere Road	Greyfriars	Sunny Skies
19 Ellis Road	6 Henderson Road	97 Landermere Road	Hannam's Hall	Tendring Lodge
190 Thorpe Road	6 Kenilworth Grove	Abbotts Hall	Hartlands	Tendring Meadows Care Home NE block
2 Chaplin Drive	6 Paolozzi Way	Acorn Cottage	Hazeldene	The Chestnuts
2 Cross Way	6 Parsonage Lane	Alison	Helidi Cottage	The Lions Den (derelict pub)
2 Elm Grove	6 White Lodge Cres	Barker's Farm	Hempstall's Farm	The Lodge, Birch Hoe Farm
2 Palmerston Road	62 Landermere Road	Beaulieu	Hiskeys Farm	The Old Barn
2 Paolozzi Way	64 Landermere Road	Berriedale	Hiskeys House	The Old Post Office
2 Parsonage Lane	66 Landermere Road	Birch Hoe Farm	Hodgenolls Farmhouse	The Old Rectory, Little Bromley
2 White Lodge Cres	68 Landermere Road	Brambles	Holly Tree Cottage	The Rondavaal, Lodge Lane
21 Chaplin Drive	7 Palmerston Road	Brick Layers Cottage	Holly Tree Cottage, Spencer Road	The Veldt
21 Ellis Road	7 Chaplin Drive	Brockett's Hall	Home Cottage, Spencer Road	The Willows
23 Chaplin Drive	7 Ellis Road	Brocketts Lodge	Jimilda Lonsdale Road	Tiverton
23 Ellis Road	7 Parsonage Lane	Brookfield	Laurel Lea	Toadstools
2a Palmerston Road	70 Landermere Road	Chanak	Linzi	Trellech
3 Chaplin Drive	72 Landermere Road	Chart End, 1 Palmerston Road	Little Acres, White Lodge Cres	Triangle Farm, Badley Hall Road
3 Ellis Road	73 Landermere Road	Coach House, Little Bromley Hall	Little Bromley Hall	Walnut House
3 Elm Grove	74 Landermere Road	Conifers	Little Haven, Spencer Road	Yonder House

NSR name	NSR name	NSR name	NSR name	NSR name
3 Parsonage Lane	75 Frinton Road	Copperkin, New Town Road	Llodia House, New Town Road	

Table 32: Dwellings Exposed to High Impact Magnitude During ECC Evening HDD Works

NSR name	NSR name	NSR name	NSR name	NSR name
1 Arch Cottages	2 Arch Cottages	Arch Cottages	Molecatchers Cottage	Tanzara
1 Barkers Cottages	2 Barkers Cottages	Caravan at Barkers Cottages		

Table 33: Dwellings Exposed to Medium Impact Magnitude During ECC Evening HDD Works

NSR name	NSR name	NSR name	NSR name	NSR name
4 West End Cottage	Birch Hoe Farm	Brick Layers Cottage	Walnut House	

Table 34: Dwellings Exposed to Low Impact Magnitude During ECC Evening HDD Works

NSR name	NSR name	NSR name	NSR name	NSR name
5 Lodge Lane	Brook Cottage	Millstone Farm Swan Road	Tendring Lodge	The Old Barn
Brambles	Hannam's Hall	Oakely House, Lodge Lane	The Lodge, Birch Hoe Farm	The Rondavaal, Lodge Lane

Table 35: Dwellings Exposed to High Impact Magnitude During ECC Night-time HDD Works

NSR name	NSR name	NSR name	NSR name	NSR name
1 Arch Cottages	Barkers Hall, Whitehall Lane	Caravan at Barkers Cottages	Mayfields Lodge	Tendring Lodge
1 Barkers Cottages	Birch Hoe Farm	Church Farm, Lodge Lane	Millstone Farm Swan Road	Tendring Primary School
2 Arch Cottages	Bradley Hall Farm Whitehall Lane	Church View, Lodge Lane	Molecatchers Cottage	The Barn Bradley Hall Farm
2 Barkers Cottages	Brambles	Comraich, Lodge Lane	Oakely House, Lodge Lane	The Cedars Whitehall Lane
4 West End Cottage	Brick Layers Cottage	Cyprus Cottage	Old School House, Tendring Primary	The Gig House, Whitehall Lane

NSR name	NSR name	NSR name	NSR name	NSR name
5 Lodge Lane	Brook Cottage	Hannam's Hall	Outback Whitehall Lane	The Lodge, Birch Hoe Farm
Arch Cottages	Brookside Cottage	Hempstall's Farm	Pantiles	The Old Barn
Barker's Farm	Burnt Ash Farm	Mayfields Farm	Pond Farm Swan Road	The Rondavaal, Lodge Lane
			Tanzara	Walnut House

Table 36: Dwellings Exposed to Medium Impact Magnitude During ECC Night-time HDD Works

NSR name	NSR name	NSR name	NSR name	NSR name
1 Abbots Hall Cottages	Cross Cottage	Hodgenolls Farmhouse	Scats Barn	White Cross Lodge, The Street
2 Abbots Hall Cottages	Crossman's Farm	Hogen House	The Barn Swan Road	White House Whitehall Lane
Ankerdene House, Whitehall Lane	Elm Farm Swan Road	Lucas Farm Lucas Lane	Trafalgar, Whitehall Lane	Yew Tree Cottage, Thorpe Road
Brambles, The Street	Hillside Cottage, Thorpe Road	Oakwood House, Whitehall Lane	Walnut Tree Cottage, Whitehall Lane	Yew Tree Farm, Thorpe Road
Burnt Ash Cottage	Hodgenolls Cottage	Park Farmhouse	Water Tower Cottage	

Table 37: Dwellings Exposed to Low Impact Magnitude During ECC Night-time HDD Works

NSR name	NSR name	NSR name	NSR name	NSR name
1 Barn Owl Road Kirby Cross	2 Lucas Lane	5 Woodland Close Kirby Cross	Hillsdale 4 Tendring Road	Swallow Tye Cottage, Tendring Road
1 Council Houses, Whitehall Lane	2 Rose Cottages, Colchester Road	6 Barn Owl Road Kirby Cross	Holly Lodge 2 Hollyview Close	Swan House, Swan Road
1 Farm Close Kirby Cross	2 The Green	6 Council Houses The Street	Holly Tree Cottage, The Street	Tendring Meadows Care Home NE block
1 Goose Green Cottages	2 Thorpe Park Cottages	6 Council Houses, Whitehall Lane	Hollywood Farmhouse, Crow Lane	Tendring Meadows Care Home North block
1 Lucas Lane	2 Woodland Close Kirby Cross	6 The Green	Homeleigh Lucas Lane	Tendring Meadows Care Home North West block

NSR name	NSR name	NSR name	NSR name	NSR name
1 Rose Cottages, Colchester Road	2 Woodpecker Way Kirby Cross	6 Woodland Close Kirby Cross	Honeysuckle Cottage, The Street	Thatched Cottage 178 Thorpe Road
1 The Green	20 Barn Owl Road Kirby Cross	6 Woodpecker Way Kirby Cross	Inverell, The Green	The Cottage 2 Tendring Road
1 Thorpe Park Cottages	201 Thorpe Road	7 Barn Owl Road Kirby Cross	Ivy Cottage, Chapel Road	The Cottage, The Street
1 Woodland Close Kirby Cross	203 Thorpe Road	7 The Green	Jabulani, The Street	The Cygnet, Chapel Road
10 Barn Owl Road Kirby Cross	205 Thopre Road	7 Woodland Close Kirby Cross	Jasmin Cottage, Tendring Road	The Firs Care Home
10 The Green	209 Thorpe Road	8 Barn Owl Road Kirby Cross	Lily Pond House The Street	The Firs, Colchester Road
11 Barn Owl Road Kirby Cross	215 Thorpe Road	8 Farm Close Kirby Cross	Lindfield Cottage, Lucas Lane	The Gables, Chapel Road
11 The Green	217 Thorpe Road	8 The Green	Meadow View Lodge, The Street	The Gables, The Street
12 Barn Owl Road Kirby Cross	219 Thorpe Road	8 The Row The Street	Millington House Colchester Road	The Hollies, The Street
12 The Green	22 Barn Owl Road Kirby Cross	9 Barn Owl Road Kirby Cross	Myrtle Cottage, The Street	The Homestead, Tendring Road
14 Barn Owl Road Kirby Cross	221 Thorpe Road	9 The Green	Nearby, The Green	The Maples, Tendring Road
16 Barn Owl Road Kirby Cross	24 Barn Owl Road Kirby Cross	Abbotts Hall	New House Farm	The New House, Crow Lane
179 Thorpe Road Kirby Cross	26 Barn Owl Road Kirby Cross	Autumn House, The Street	Oakwood, Tendring Road	The Old Post Office, The Street
18 Barn Owl Road Kirby Cross	28 Barn Owl Road Kirby Cross	Bat Hall, The Green	Old Rectory Cottage, The Street	The Old Rectory, The Street
180A Thorpe Road Kirby Cross	3 Barn Owl Road Kirby Cross	Bay Trees, The Street	One Sunnysdene, The Street	The Olde Post House Chapel Road
180B Thorpe Road Kirby Cross	3 Council Houses, Whitehall Lane	Birch Cottage, The Street	Osbornes, the Green	The Rectory, The Steet
181 Thorpe Road Kirby Cross	3 Tendring Road	Birchdale Cottage, The Street	Owl Lodge, The Street	The Robins 175 Thorpe Road Kirby Cross
182 Thorpe Road	3 The Green	Bradfield Lodge	Pantiles, The Street	The Row The Street
183 Thorpe Road Kirby Cross	3 Thorpe Park Cottages	Briarfield 3 Hollyview Close	Park Fruit Farm	Thorpe Green House, Colchester Road

NSR name	NSR name	NSR name	NSR name	NSR name
184 Thorpe Road	3 Woodland Close Kirby Cross	Cedars, Tendring Road	Peartree Cottage, Chapel Road	Thorpe Park Cottage
185 Thorpe Road	30 Barn Owl Road Kirby Cross	Clare House, The Green	Pemamija 3 The Street	Thorpe Park House
186 Thorpe Road	32 Barn Owl Road Kirby Cross	Copperfields, The Street	Pond Farm, The Green	Trenwith House, The Street
187 Thorpe Road	4 Barn Owl Road Kirby Cross	Deers Glade 5 Hollyview Close	Qui Si Sana, The Street	Twin Ridges, The Street
188 Thorpe Road	4 Council Houses The Street	Easterley, The Street	Rambles, The Street	Vine Cottage
189 Thorpe Road	4 Council Houses, Whitehall Lane	Ferndale, The Street	Rectory Cottage The Street	Warmans Gate, Tendring Road
190 Thorpe Road	4 Hollyview Close	Fieldview House, The Green	Romaris, Lucas Lane	Wayside Cottage, The Street
191 Thorpe Road	4 The Green	Foggy Cottage	Romford House, The Green	Wheelwrights Pyghtle 1 Hollyview Close
193 Thorpe Road	4 Thorpe Park Cottages	Gladwyn House 180 Thorpe Road	Rose Cottage, Chapel Road	White Cottage, The Green
195 Thorpe Road	4 Woodland Close Kirby Cross	Golden Privet, The Street	Rose Cottage, The Street	White Ladies, 205 Thorpe Road
197 Thorpe Road	4 Woodpecker Way Kirby Cross	Goose Cottage	Rosewood, The Street	White Oaks 173 Thorpe Road Kirby Cross
199 Thorpe Road	5 Barn Owl Road Kirby Cross	Greenfields 1 Tendring Road	Sandalwood, The Street	Willow Farm Cottage, Swan Road
2 Barn Owl Road Kirby Cross	5 Council Houses The Street	Grove Cottage, The Street	Six N Seven, Tendring Road	Willow Green Cottage Colchester Road
2 Council Houses The Street	5 Council Houses, Whitehall Lane	High View, Chapel Road	Squirrels, The Street	Willow Lodge, Tendring Road
2 Council Houses, Whitehall Lane	5 Goose Green Cottage	Hill House Hill House Lane	St Martins, The Street	Willowcroft, Tendring Road
2 Goose Green Cottages	5 The Green	Hillhouse Farm, Hillhouse Lane	Stables at Hill House Farm Hill House Lane	Willows, Tendring Road
			Sunnyside, The Street	Wolves Hall Farm

4.3 OnSS

4.3.1 Impact 3 set out in Section 9.10 of the EIAR details the NSRs impacted by OnSS construction noise.

4.4 Road Improvements to Bentley Road and A120 Junction

- 4.4.1 Impact 4 set out in Section 9.10 of the EIAR details the NSRs impacted by construction noise associated with the road improvements to Bentley Road and the Junction of the A120 with Bentley Road.

5 References

1. British Standards Institution. 2014. 'British Standard 5228-1: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites'.