East Anglia ONE North and East Anglia TWO Offshore Windfarms

Air Quality Deadline 3 Clarification Note

Applicants: East Anglia ONE North Limited and East Anglia TWO Limited
Document Reference: ExA.AS-16.D3.V1
SPR Reference: EA1N_EA2-DWF-ENV-REP-IBR-001146

Date: 15th December 2020
Revision: Version 01
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Applicable to East Anglia ONE North and East Anglia TWO

Revision Summary				
Rev	**Date**	**Prepared by**	**Checked by**	**Approved by**
01	15/12/2020	Paolo Pizzolla	Lesley Jamieson / Ian Mackay	Rich Morris

Description of Revisions			
Rev	**Page**	**Section**	**Description**
01	n/a	n/a	Submitted to the Examining Authority at Deadline 3

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Glossary of Acronyms

APIS	Air Pollution Information System
CCS	Construction Consolidation Sites
CEH	Centre for Ecology & Hydrology
DCO	Development Consent Order
EEA	European Environment Agency
EMEP	European Monitoring and Evaluation Programme
ES	Environmental Statement
g/s	Grams per second
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
kW	Kilowatt
LCV	Light Commercial Vehicles
N	Nitrogen
NOx	Nitrogen Oxide
NRMM	Non-Road Mobile Machinery
O_3	Ozone
S	Sulphur
SoCG	Statement of Common Ground
SO_2	Sulphur dioxide
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest

Glossary of Terminology

Applicants	East Anglia TWO Limited / East Anglia ONE North Limited
Critical Load	A habitat-specific estimate of exposure to air pollutants below which specific environmental receptors will not experience significant adverse effects (based on present knowledge). Critical Levels for the protection of vegetation and ecosystems apply irrespective of habitat type and are based on the concentration of the relevant pollutants in air.
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
Landfall	The area (from Mean Low Water Springs) where the offshore export cables would make contact with land, and connect to the onshore cables.
National electricity grid	The high voltage electricity transmission network in England and Wales owned and maintained by National Grid Electricity Transmission
National Grid infrastructure	A National Grid substation, cable sealing end compounds, cable sealing end (with circuit breaker) compound, underground cabling and National Grid overhead line realignment works to facilitate connection to the national electricity grid, all of which will be consented as part of the proposed East Anglia TWO project Development Consent Order but will be National Grid owned assets.
National Grid overhead line realignment works	Works required to upgrade the existing electricity pylons and overhead lines (including cable sealing end compounds and cable sealing end (with circuit breaker) compound) to transport electricity from the National Grid substation to the national electricity grid.
Onshore cable corridor	The corridor within which the onshore cable route will be located.
Onshore cable route	This is the construction swathe within the onshore cable corridor which would contain onshore cables as well as temporary ground required for construction which includes cable trenches, haul road and spoil storage areas.
Onshore development area	The area in which the landfall, onshore cable corridor, onshore substation, landscaping and ecological mitigation areas, temporary construction facilities (such as access roads and construction consolidation sites), and the National Grid Infrastructure will be located.
Onshore infrastructure	The combined name for all of the onshore infrastructure associated with the proposed East Anglia TWO project from landfall to the connection to the national electricity grid.
Onshore substation	The East Anglia TWO substation and all of the electrical equipment within the onshore substation and connecting to the National Grid infrastructure.

1 Introduction

1. This clarification note has been prepared by East Anglia TWO Limited and East Anglia ONE North Limited (the Applicants) to clarify aspects of the East Anglia TWO and East Anglia ONE North Development Consent Order (DCO) applications (the Applications).

2. This clarification note relates to air quality matters associated with the East Anglia TWO project and the East Anglia ONE North project (the Projects) and addresses queries raised during the preparation of the Statement of Common Ground (SoCG) with East Suffolk Council and Suffolk County Council (the Councils).

This document is applicable to both the East Anglia ONE North and East Anglia TWO DCO applications, and therefore is endorsed with the yellow and blue icon used to identify materially identical documentation in accordance with the Examining Authority's procedural decisions on document management of 23rd December 2019 (PD-004). Whilst this document has been submitted to both Examinations, if it is read for one project submission there is no need to read it for the other project submission.

1.1 Purpose

3. In preparing the SoCG with the Councils, clarification was sought with regard to the assessment presented in ***Chapter 19 Air Quality*** of the Environmental Statement (ES) (APP-067). The ***Air Quality Clarification Note*** submitted to the Examinations at Deadline 1 (REP1-040) provided clarification on the following:

- Consideration of the latest Institute of Air Quality Management (IAQM) ecological guidance document;
- Impacts to ecological receptors arising from airborne Nitrogen Oxide (NOx) concentrations and acid deposition;
- Impacts to ecological receptors as a result of Non-Road Mobile Machinery (NRMM) emissions;
- Clarification of discrepancies between the worst-case traffic forecasts used in the air quality and ***Chapter 26 Traffic and Transport*** (APP-074);
- Assessment of haul road traffic emissions; and
- Assessment of impacts associated with diverted traffic.

4. The ***Air Quality Clarification Note*** submitted to the Examinations at Deadline 1 (REP1-040) provided a qualitative assessment of NRMM emissions. However, during an SoCG meeting with the Council (7th October 2020), the Councils

requested that a quantitative assessment be undertaken. A quantitative assessment of NRMM emissions is now provided within ***section 2*** of this clarification note.

5. It should be noted that exact details regarding construction of the Projects (e.g. equipment types, the location of equipment and the duration of individual tasks) will not be fully determined until the detailed design stage. This is often the case for Nationally Significant Infrastructure Projects during the pre-consent stages and it is therefore considered that there is little precedent for an assessment such as that presented within this clarification note.

6. In order to undertake the assessment, it has been necessary to make a number of worst case assumptions that overstate the impacts that will ultimately occur during construction. For example, as the locations of the Horizontal Directional Drilling (HDD) rigs have not yet been determined, the assessment has assumed that they will be located at the perimeter of the onshore development area and therefore much closer to receptors than they will eventually be during construction. Further information is provided in ***Section 2***.

2 Quantitative Assessment of Non-Road Mobile Machinery Emissions

8. As noted in ***Chapter 19 Air Quality*** of the ES (APP-067), the Department for Environment, Food and Rural Affairs (Defra) technical guidance (2018) states that exhaust emissions from NRMM on construction sites is unlikely to have a significant impact on air quality. The Councils Joint Local Impact Report (REP1-132) states that:

> *"These schemes could require considerably more NRMM than most construction projects and potential impacts should have been quantitatively assessed".*

9. In the vicinity of ecological receptors, the Projects would utilise predominantly earthmoving plant, with the primary activities along the onshore cable route comprising temporary haul road construction, excavation and backfilling and haul road removal works. In areas where trenchless techniques may be employed, similar earth-moving plant would be required in addition to diesel power generation, which are standard items of plant used widely on construction sites.

10. The Councils have requested that a quantitative assessment is undertaken to consider the potential for air quality impacts on ecological receptors associated with NRMM emissions. As such, impacts on the Leiston-Aldeburgh Site of Special Scientific Interest (SSSI) and Sandlings Special Protection Area (SPA) have been considered.

2.1 Methodology

2.1.1 Assessment scope and scenarios

11. The methodology for the assessment was agreed with the Councils via e-mail (20th October 2020) prior to commencement. The assessment considered the impact of emissions from the following activities:

- Generators and NRMM used for trenchless technique works (e.g. HDD);
- Generators and NRMM used for the onshore cable works;
- NRMM and generators used within the Construction Consolidation Sites (CCSs); and
- Emissions from vehicles travelling along the haul road.

12. The assessment has been undertaken for Scenario 1 (i.e. the Projects constructed simultaneously) as this is considered to represent the worst-case scenario with regard to air quality. In addition, the following scenarios have been

considered as the methodology for the crossing of the Sandlings SPA has not yet been finalised:

- Scenario A – the Sandlings SPA is crossed using open trenching;
- Scenario B – the Sandlings SPA is crossed using trenchless techniques (e.g. HDD) outside of the 200m buffer around the SPA crossing boundary and with no seasonal restriction; and
- Scenario C – the Sandlings SPA is crossed using trenchless techniques (e.g. HDD) within the 200m buffer around the SPA crossing boundary, with a seasonal restriction between 14th February to 31st August applied to such works due to possible impacts on breeding birds.

13. The Projects are not yet at the detailed design stage, and therefore the locations of emission sources are not yet known. For example, at the landfall trenchless technique cable works could occur anywhere within the area of Work No. 8 (APP-011) and the final location will be dependent on geotechnical considerations. The exact location of plant required for a trenchless technique which may be used for the SPA crossing is also not known. As such, conservative assumptions have been made with regard to the location of emission sources and their proximity to ecological receptors.

14. As presented within ***Chapter 6 Project Description*** (APP-054), the onshore cable route would be subdivided into sections of 500m to 2km lengths between the CCSs, and work would be undertaken in a practical, logical and sequential manner (e.g. topsoil stripping would be undertaken prior to construction of the haul road in advance of trench excavation). The sections of the onshore cable route which are in the vicinity of ecological receptors are Section 1 and Section 2, in addition to the Landfall area of works (***Figure 6.2*** of the ES (APP-097)). To provide a conservative assessment, it has been assumed that all plant and machinery would be operating along the length of each cable route section at any one time.

15. Impacts are considered in relation to airborne NOx only, and its contribution to nutrient nitrogen and acid deposition. As all plant would be expected to use ultra-low sulphur diesel, the contribution to concentrations of SO_2 and its acidifying impacts have been assumed to be negligible. This approach was agreed with the Councils.

2.1.2 Calculation of Emissions

16. The number and types of plant utilised at the Landfall, for the onshore cable route works and at the SPA trenchless technique crossing sites were obtained from indicative information provided by the project engineers. As the detailed design of some aspects of work have yet to be finalised (particularly trenchless technique

cable works), indicative plant types and engine sizes are based on those used for the East Anglia ONE project.

17. The types of plant and the number of each item of plant used will vary throughout the construction programme, depending on the specific activity undertaken. To provide a conservative assessment, the maximum number of each type of plant that could be used across the three-year construction phase has been included in the model, and all NRMM was assumed to be in operation continuously for a full calendar year. This is likely to significantly overstate emissions, as some construction activities are undertaken for a short duration (e.g. 1-2 months) and the amount of plant used on site would therefore vary throughout any given year. The durations of trenchless technique works were obtained from information provided by the project engineers.

18. The number of items of each type of plant considered in the assessment are detailed in ***Table 2.1*** and generators are listed in ***Table 2.2***. Note that HDD rigs are not explicitly included in the list of plant as they are powered by generators.

Table 2.1 Items of Plant Used at the Landfall and in Section 1 and 2 of the Onshore Cable Route

Plant Type	Maximum Number of Plant Items Used During Construction		
	Landfall	Section 1	Section 2
D6 Dozer	2	2	2
30T excavator	2	6	6
20T Dumper	3	8	8
Smooth Drum vibrio road roller	1	2	2
21T excavator	2	3	3
5T Forward Tipping Dumper	2	3	3
Loading shovel	2	3	3
Trench Roller	1	2	2
Tractor & fencing kit	1	1	1
Tractor & trailer	1	1	1
Tractor & Fuel bowser (or self-propelled)	1	1	1
Tractor & Water bowser (for dust suppression)	1	1	1

Plant Type	Maximum Number of Plant Items Used During Construction		
	Landfall	**Section 1**	**Section 2**
Tractor & cable drum trailer	0	1	1
Tractor & soil tiller, roller, seeder	1	1	1
Cement mixer	1	1	1
Mobile crane	1	1	1
Grader	1	1	1
Cable laying tracked crane	1	0	0
Cable winch	0	1	1
Pre-cast concrete truck	1	1	1
Mobile concrete pump	1	1	1
Telehandler	1	2	2
Mobile self-contained welfare unit	2	2	2
Crawler Crane	1	2	2
Temporary lighting	2	3	3
Road surface paver & roller	0	1	1
Pump	2	2	2

Table 2.2 Generator Sources

Area	Size (kVA)	Number
Landfall HDD	300	1
	150	1
	150	1
	40	1
	45	1
	470	2

Area	Size (kVA)	Number
	45	1
SPA Crossing trenchless technique	350	1
	300	1
	45	1
	8	2
	45	1
Cable Route	45	1
	30	10
Cable Testing - onshore cables	750	3
Cable Testing - offshore cables	750	6
CCS	200	8

19. Generators will be used at the transition bays to test the onshore and offshore cables following installation. The onshore and offshore cables will be tested for up to 4 and 6 days respectively, and therefore their contribution to annual mean concentrations has been adjusted accordingly. For the consideration of their short-term impacts, as the testing would be undertaken following completion of the landfall trenchless technique works, the 24-hour mean concentrations experienced as a result of the testing have been considered separately to those experienced whilst trenchless works are undertaken.

20. Emissions from NRMM have been calculated using the methodology detailed in the European Monitoring and Evaluation Programme (EMEP) / European Environment Agency (EEA) guidebook Part B Section 1.A.4 Non Road Mobile Machinery (2019a). Pollutant emission factors are provided based on the size (in kilowatt (kW)) of the engine, which are provided as ranges, and the emissions standard (Stage I to V, with Stage V being the latest and most stringent emission standard). As the specific make and model of each item of plant is not known at this stage, it is assumed that all plant falls into the category of 130-560kW, and that all items of plant have a maximum power rating of 560kW, with the exception of temporary lighting rigs and pumps which are stated by the project engineers to be <8kW each. This is likely to considerably overstate the power requirement of plant used on site as it is expected that most plant items would have engine

sizes below 560kW (for example, indicative engine sizes of a Caterpillar D6 dozer, 20T excavator and 20T dumper are 161kW, 204kW and 252kW respectively).

21. All items of plant are assumed to operate at 68% load; as plant would not be used continually at high engine load across the working day. This load factor takes into account a working scenario whereby plant would operate at 80% load for 80% of the time and 20% load for 20% of the time. This is considered to be conservative as some plant may not be used continually throughout each day. All plant is assumed to operate at the Stage IV emission standard, with the exception of the temporary lighting rigs and pumps as these smaller engines were unregulated until the Stage V emissions standards came into force. These are therefore based on Stage I emission standards. Whilst the Applicants understand that the Councils have a preference for Stage V plant to be used, the Stage V emission standards provide more stringent regulation on particulate matter emissions and would not result in lower emissions of NOx. As such, Stage V plant would not affect the outcome of this assessment.

22. These parameters, in combination with the NOx emission factors (in grams per kW hour (g/kWh)), have been used to calculate the total annual emissions, which have then been converted to an emission rate (in grams per second (g/s)) for input into the dispersion model, as detailed in ***Table 2.3***.

Table 2.3 NRMM Input Data

Location	Number of Plant Items	Engine Size (kW)	NOX Emission Factor (g/kWh)	Deterioration Factor	Load Factor	Total NOx Emission (g/s) for Line Source
Section 1	48	560	0.4	0.008	0.68	2.07
	5	2.2	11.2	0.024	0.68	
Section 2	48	560	0.4	0.008	0.68	2.07
	5	2.2	11.2	0.024	0.68	
HDD Landfall	30	560	0.4	0.008	0.68	1.30
	4	2.2	11.2	0.024	0.68	
Medium CCS Plant	7	560	0.4	0.008	0.68	0.17
Small CCS Plant	2	560	0.4	0.008	0.68	0.09

Location	Number of Plant Items	Engine Size (kW)	NOX Emission Factor (g/kWh)	Deterioration Factor	Load Factor	Total NOx Emission (g/s) for Line Source
SPA Trenchless Technique	4	560	0.4	0.008	0.68	0.17

23. As recommended in the EMEP / EEA guidance (EMEP / EEA, 2019a) a deterioration factor should be applied to account for the effect of engine wear on emissions. The deterioration factors have been applied for the appropriate emissions stages, as detailed in the guidance.

24. Emissions from generators have been calculated using emission factors from the EMEP / EEA guidebook Part B 1.a.4 Small Combustion (EMEP / EEA, 2019b). The generator capacities are based on information provided by the project engineers; where generator sizes were provided as a range, the larger sizes have been included in the assessment. Generators are assumed to operate at 80% load and at 40% electrical efficiency. Emission parameters such as temperature, exhaust gas flow rates and heights are based on specifications for representative generator types (predominantly Cummins generators). The generator input data are presented in ***Table 2.4***.

Table 2.4 Generator Input Data

Area	Size (kVA)	Number	NOx Emission rate (g/s)	Stack Height (m)	Temperature (C)	Stack Diameter (m)	Velocity (m/s)
Landfall HDD	300	1	0.15	2.2	500	0.2	23.82
	150	1	0.07	2.4	519	0.2	15.38
	150	1	0.07	2.4	519	0.2	15.38
	40	1	0.02	1.9	492	0.1	24.68
	45	1	0.02	1.9	492	0.1	24.68
	470	2	0.29	5	482	0.3	22.26
	45	1	0.02	1.9	492	0.1	24.68
SPA Crossing Trenchless Technique	350	1	0.17	2.4	574	0.2	34.11
	300	1	0.15	2.6	491	0.15	23.82
	45	1	0.02	1.9	492	0.1	24.68

Area	Size (kVA)	Number	NOx Emission rate (g/s)	Stack Height (m)	Temperature (C)	Stack Diameter (m)	Velocity (m/s)
	8	2	0.004	0.7	400	0.1	21.22
	45	1	0.02	1.9	492	0.1	24.68
Cable Route	45	1	0.02	1.9	492	0.1	24.68
	30	10	0.01	1.5	550	0.2	1.21
Cable Testing - onshore cables	750	3	0.37	2.6	532	0.3	31.96
Cable Testing - offshore cables	750	6	0.37	2.6	532	0.3	31.96
CCS	200	8	0.10	2.2	544	0.2	18.09

25. Time-varying files have been included in the dispersion model to account for seasonal variations in emissions (in Scenarios A and C which are subject to breeding bird season restrictions) and to account for the working hours and durations of activities. It has been assumed that generators associated with HDD rigs will operate 24/7 for 8 months for both the Projects under cumulative construction Scenario 1.

26. Emissions from vehicles travelling along the haul road have been calculated using Defra's Emission Factor Toolkit in the same manner as that presented in ***Chapter 19 Air Quality*** (APP-067). Emissions from the public road network were also included. The number of vehicles travelling along the haul road is presented in ***Table 2.5***.

Table 2.5 Movements on the Haul Road

Access	Section	Peak daily two-way HGV movements	Average daily two-way HGV movements	Peak daily two-way LCVs movements
Access 1	Landfall location and Onshore cable route section 1	106	88	152
Access 2	Onshore cable route section 2	52	44	78

Access	Section	Peak daily two-way HGV movements	Average daily two-way HGV movements	Peak daily two-way LCVs movements
Access 5 or 6	Onshore cable route section 3b	9	8	14
Access 9	Onshore cable route section 3a	49	41	72
Access 10	Onshore cable route section 4, Onshore substation and National Grid infrastructure	177	147	338

2.1.3 Location of Emission Sources

27. Emission sources are represented in the dispersion model as follows:

- NRMM in the HDD compounds, transition bays, the onshore cable route and the CCSs are represented as line sources;
- Generators are represented as point sources; and
- The haul road is represented as a road source.

28. Line and road sources along the onshore cable route are included along the centre of the Projects' Order limits.

29. As described above, the final locations of the CCS and HDD compounds are yet to be finalised. Therefore, sources at the landfall and the SPA crossing, and generators used for the onshore cable route works have been situated in the most conservative location with regard to ecological receptors (i.e. at the closest point) within each of the works areas. Locations of the emission sources in each scenario are shown in ***Figures 1 – 3***, ***Appendix 1***.

2.1.4 Meteorological Data

30. Five years (2015-2019) of hourly sequential meteorological data from the Wattisham recording station are used in the assessment to predict effects across a range of dispersion conditions; wind roses are shown in ***Figure 4.4***.

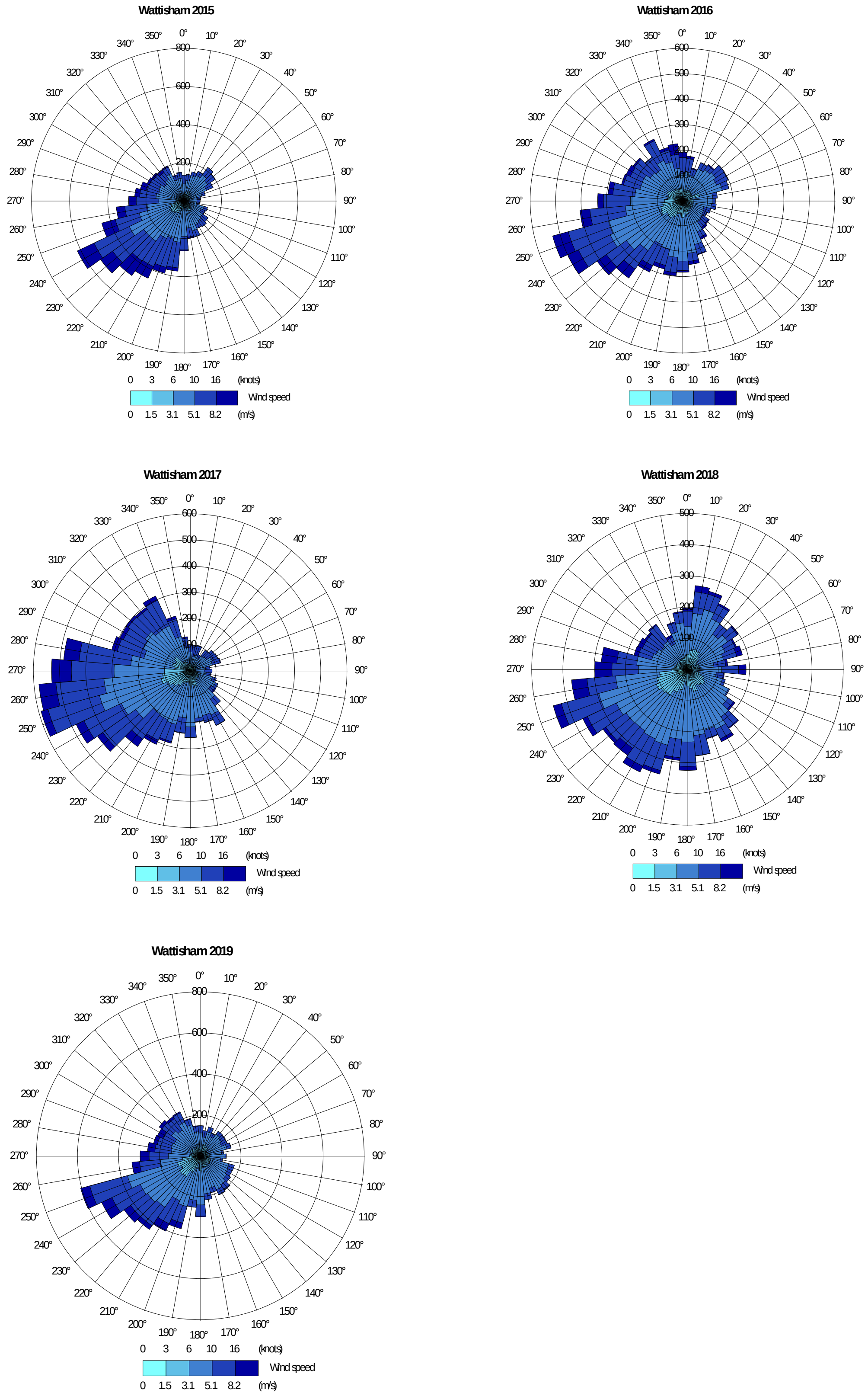


Figure 4.4 Wind Roses of Meteorological Data from the Wattisham Station

31. Potential impacts have been predicted for each of the five years of modelled data and the highest values were reported.

2.1.5 Receptors and Critical Loads and Levels

32. Receptors are included within the dispersion model at locations within the designated sites closest to the emission sources. The habitats and appropriate Critical Loads have been determined in consultation with the project ecologist and using information on Air Pollution Information System (APIS) (Centre for Ecology & Hydrology (CEH), 2020). Locations of receptors and the assigned habitats are shown in ***Table 2.6***. It should be noted that receptors E8 and E10 are located in an area of supralittoral sediment; this habitat does not have a comparable Critical Load value for nitrogen or acid deposition on APIS. As such, results were presented for these receptors without comparison to a Critical Load.

Table 2.6 Receptor Locations, Habitats and Associated Nutrient Nitrogen and Acid Critical Loads

						Nutrient Nitrogen Critical Loads		Acid Critical Loads		
ID	Site	Location	X	Y	Habitat	Min CL	Max CL	Min CL min N	Min CL Max N	Min CL max S
E1	Leiston-Aldeburgh SSSI	Landfall	647222	260498	Acid grassland	8	15	0.223	0.703	0.48
E2	Leiston-Aldeburgh SSSI	Landfall	647256	260488	Acid grassland	8	15	0.223	0.703	0.48
E3	Leiston-Aldeburgh SSSI Sandlings SPA	Landfall	647057	260707	Broadleaved woodland	10	20	0.142	1.234	1.092
E4	Leiston-Aldeburgh SSSI	Landfall	647475	260583	Broadleaved woodland	10	20	0.142	1.234	1.092
E5	Leiston-Aldeburgh SSSI	Landfall	647477	260614	Broadleaved woodland	10	20	0.142	1.234	1.092
E6	Leiston-Aldeburgh SSSI	Landfall	647496	260601	Broadleaved woodland	10	20	0.142	1.234	1.092
E7	Leiston-Aldeburgh SSSI	Landfall	647527	260602	Broadleaved woodland	10	20	0.142	1.234	1.092
E8	Leiston-Aldeburgh SSSI	Landfall	647664	260722	Supralittoral sediment	-	-	-	-	-
E9	Leiston-Aldeburgh SSSI Sandlings SPA	Cable route	647209	261453	Broadleaved woodland	10	20	0.142	1.234	1.092
E10	Leiston-Aldeburgh SSSI	Cable route	647634	261385	Supralittoral sediment	-	-	-	-	-
E11	Leiston-Aldeburgh SSSI	Cable route	645522	260668	Broadleaved woodland	10	20	0.142	1.234	1.092

						Nutrient Nitrogen Critical Loads		Acid Critical Loads		
	Sandlings SPA									
E12	Leiston-Aldeburgh SSSI Sandlings SPA	Crossing	646319	262136	Dwarf shrub heath	10	20	0.714	1.372	0.48
E13	Leiston-Aldeburgh SSSI Sandlings SPA	Crossing	646592	262261	Dwarf shrub heath	10	20	0.714	1.372	0.48
E14	Leiston-Aldeburgh SSSI Sandlings SPA	Crossing	646621	261931	Dwarf shrub heath	10	20	0.714	1.372	0.48
E15	Leiston-Aldeburgh SSSI Sandlings SPA	Crossing	646620	261891	Dwarf shrub heath	10	20	0.714	1.372	0.48
E16	Leiston-Aldeburgh SSSI Sandlings SPA	Crossing	646600	262061	Dwarf shrub heath	10	20	0.714	1.372	0.48
E17	Leiston-Aldeburgh SSSI/ Sandlings SPA	Crossing	646647	262084	Dwarf shrub heath	10	20	0.714	1.372	0.48
E18	Leiston-Aldeburgh SSSI/ Sandlings SPA	Crossing	646694	262109	Dwarf shrub heath	10	20	0.714	1.372	0.48
E19	Leiston-Aldeburgh SSSI/ Sandlings SPA	Crossing	646610	262024	Dwarf shrub heath	10	20	0.714	1.372	0.48

						Nutrient Nitrogen Critical Loads		Acid Critical Loads		
E20	Leiston-Aldeburgh SSSI/ Sandlings SPA	Crossing	646664	262051	Dwarf shrub heath	10	20	0.714	1.372	0.48
E21	Leiston-Aldeburgh SSSI/ Sandlings SPA	Crossing	646714	262075	Dwarf shrub heath	10	20	0.714	1.372	0.48

33. Critical Levels apply regardless of habitat type. The annual mean Critical Level for NOx is 30 µg.m^{-3}. There is a 24-hour Critical Level for NOx; IAQM guidance (2020) recommends that this is only considered where specifically requested by the regulator, for example in Environmental Permit applications where high, short-term peaks may occur. Given that modelled sources may give rise to short-term variations in concentrations, it was considered appropriate to consider the 24-hour mean Critical Level in the assessment.

34. The IAQM guidance states that the short-term NOx Critical Level of 75µg.m^{-3} was derived for use where concentrations of ozone (O_3) or sulphur dioxide (SO_2) are at or above their Critical Levels, otherwise a 200 µg.m^{-3} Critical Level should apply. The guidance notes that, given that O_3 and SO_2 concentrations in the UK are generally low, the 200 µg.m^{-3} threshold is appropriate. Therefore, this threshold has been adopted for the purposes of the assessment within this clarification note.

2.1.6 Background Concentrations

35. Background concentrations of NOx were obtained from Defra background mapping (Defra, 2020). Background nutrient nitrogen and acid deposition values were obtained from APIS (CEH, 2020). The background values used in the assessment are detailed in ***Table 2.7***.

36. Guidance provided by Defra and the Environment Agency (2016) recommends that, for consideration of short-term averaging times, the background is twice the annual mean background contribution. For the consideration of short-term emissions from the haul road, which are relatively constant, the annual mean contribution from this source has also been doubled and included as part of the background component.

Table 2.7 Background Values Used in the Assessment

Receptor ID	Annual Mean NOx Background (µg.m^{-3})	Short Term NOx Background (µg.m^{-3})	Background Nutrient Nitrogen Deposition (kgN/ha/yr)	Background Acid Deposition (N) (keq/ha/yr)	Background Acid Deposition (S) (keq/ha/yr)
E1	7.23	14.64	11.5	0.8	0.1
E2	7.23	14.64	11.5	0.8	0.1
E3	7.23	14.65	19.9	1.4	0.2
E4	7.23	14.65	19.9	1.4	0.2
E5	7.23	14.66	19.9	1.4	0.2
E6	7.23	14.64	19.9	1.4	0.2

Receptor ID	Annual Mean NOx Background (µg.m^{-3})	Short Term NOx Background (µg.m^{-3})	Background Nutrient Nitrogen Deposition (kgN/ha/yr)	Background Acid Deposition (N) (keq/ha/yr)	Background Acid Deposition (S) (keq/ha/yr)
E7	7.23	14.63	19.9	1.4	0.2
E8	7.23	14.62	11.5	0.8	0.1
E9	7.27	15.02	19.9	1.4	0.2
E10	7.27	14.79	11.5	0.8	0.1
E11	7.43	15.10	21	1.4	0.2
E12	7.60	15.74	14.9	1.1	0.1
E13	7.60	15.91	14.9	1.1	0.1
E14	7.35	15.07	14.9	1.1	0.1
E15	7.35	15.04	14.9	1.1	0.1
E16	7.60	15.79	14.9	1.1	0.1
E17	7.60	15.85	14.9	1.1	0.1
E18	7.60	15.96	14.9	1.1	0.1
E19	7.60	15.79	14.9	1.1	0.1
E20	7.60	15.84	14.9	1.1	0.1
E21	7.60	15.92	14.9	1.1	0.1

2.1.7 Conversion of NOx to NO_2

37. The calculation of nutrient nitrogen and acid deposition requires the conversion of NOx concentrations to NO_2. For all non-road sources, this was carried out using a conversion factor of 70% NOx to NO_2 for annual mean concentrations, as stated in Environment Agency technical guidance (Environment Agency, 2006).

38. Road NOx was converted to NO_2 using the Defra NOx to NO_2 calculator, as detailed in ***Chapter 19 Air Quality*** (APP-067).

2.1.8 Impact Significance

39. Guidance provided by the IAQM (2020) states that, where impacts are below 1% of the relevant annual mean Critical Load or Level, or 10% of a short-term Critical Level, these can be considered to be insignificant. Contributions in exceedance of these values do not necessarily constitute significant impacts; the guidance

recommends that the significance of ecological impacts is made by an ecologist. As such, the conclusion as to the significance of impacts presented within this clarification note is provided in the ***Deadline 3 Onshore Ecology Clarification Note*** (document reference ExA.AS-15.D3.V1).

2.2 Results

40. This section presents the results for each of the assessed scenarios in graphical form. Tabulated assessment results for each scenario are presented in ***Appendix 2***.

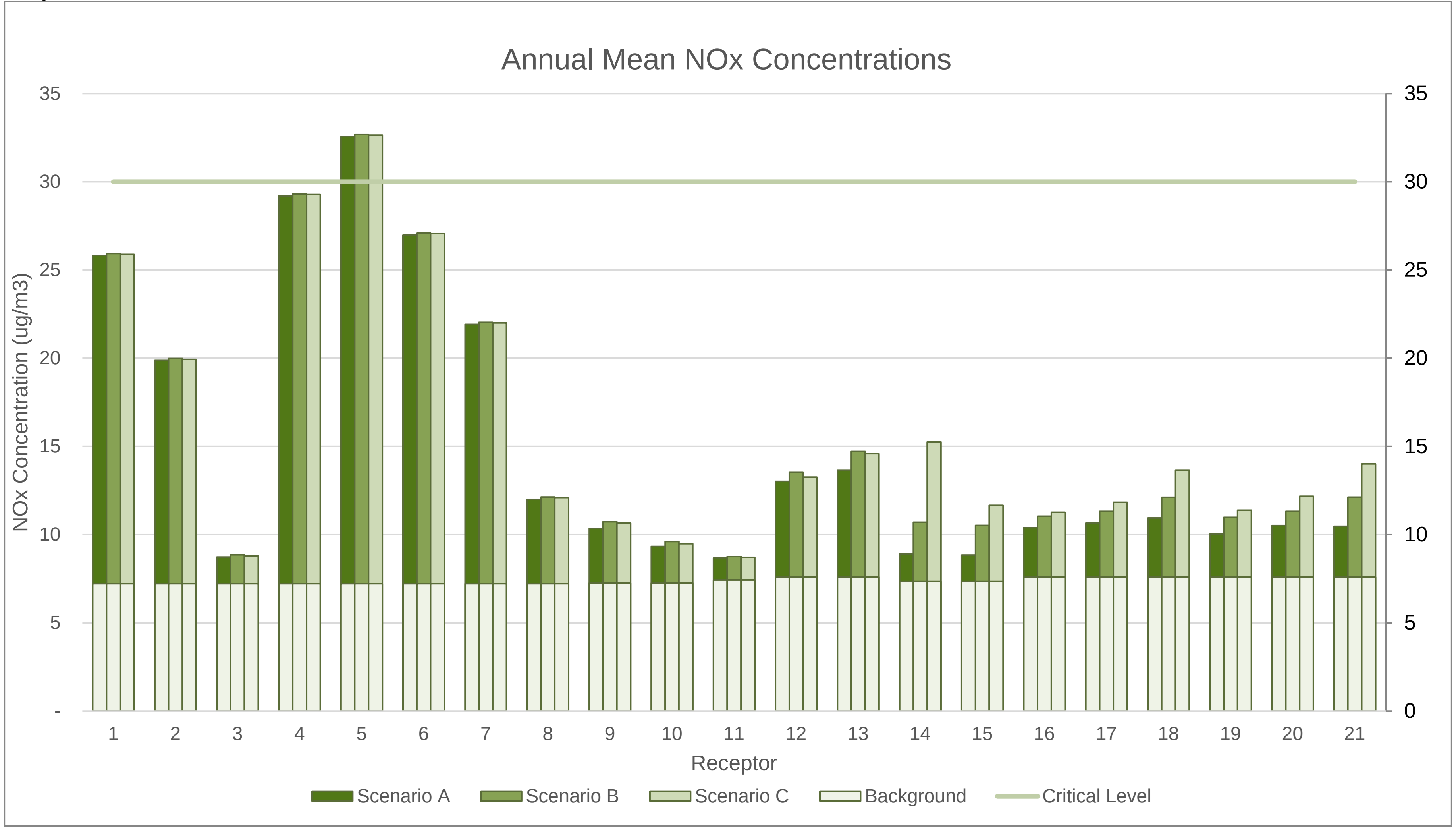
41. It should be noted that the assessment is considered to be conservative on the following bases:

- All moving plant is assumed to have an engine size at the highest end of the range for the Stage IV emission standard (560 kW). It is likely that most plant would have considerably smaller engine sizes;
- It is assumed that the maximum number of each item of NRMM is in use for the duration of construction, and that each item of plant is used continually throughout the working day. Plant is assumed to be working at 80% load for 80% of the time, and at 20% load for 20% of the time;
- The largest generator engine capacity of those provided by the project engineers are used, and generators are assumed to operate at 80% load;
- HDD compounds, CCS locations and cable route generators are assumed to be situated in the closest location within each of the works areas to ecological receptors. Any increase in distance to ecological receptors would result in a reduction in impacts.

2.2.1 Critical Levels

42. The results for the assessment of the annual mean NOx Critical Level are presented in ***Graph 2.1***.

Graph 2.1 Predicted Annual Mean NOx Concentrations



43. As shown in ***Graph 2.1***, the Projects are predicted to give rise to contributions greater than 1% of the Critical Level at all receptors in all scenarios. Impacts would therefore be significant. However, the annual mean Critical Level is not predicted to be exceeded at any receptors with the exception of receptor E5, located immediately downwind of the landfall HDD compound.

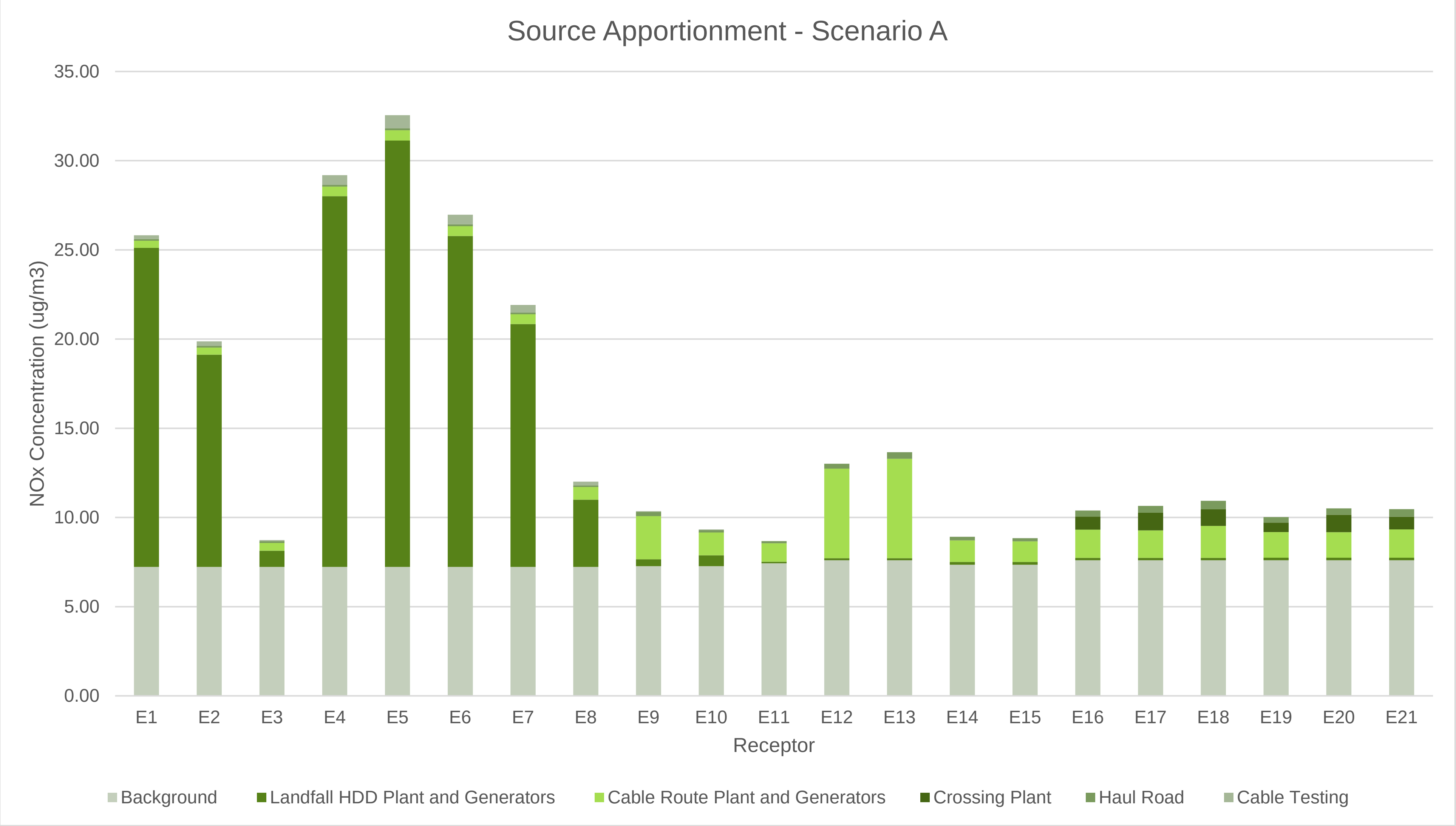
44. Of the three scenarios for the SPA crossing, scenario C is generally predicted to give rise to the highest annual mean concentrations, most likely due to the proximity of the emission sources to the SPA, despite seasonal restrictions. Scenario A, the trenched technique crossing method, is predicted to have the lowest impact of the three scenarios.

45. Under construction Scenario 1, the landfall HDD works would have a duration of approximately up to 20 months, and therefore annual mean impacts of these works would be temporary. The remaining aspects of the Projects could be undertaken for up to 36 months (including land reinstatement), and therefore these impacts would persist for longer.

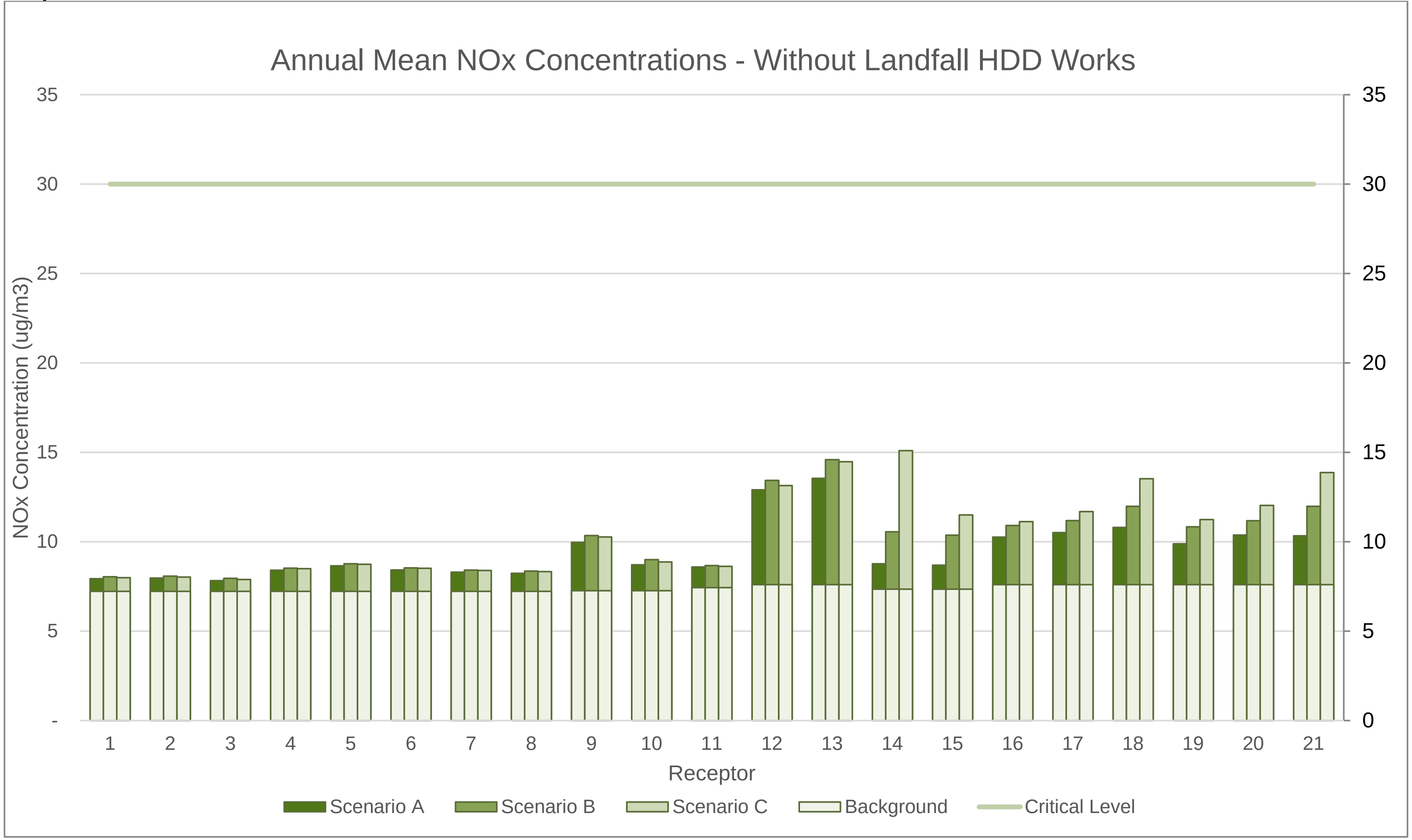
46. Source apportionment has been undertaken to determine the relative contribution from sources associated with the landfall trenchless technique works and other emission sources. This is presented in ***Graph 2.2*** for Scenario A. However, there is no variation in the contribution from landfall HDD plant between the assessment scenarios, as only the SPA crossing methodologies have been varied.

47. As shown in ***Graph 2.2***, the predominant contribution to the total NOx concentration at receptors in the vicinity of the landfall (E1 – E8) is from the HDD works, which are anticipated to be 20 months in duration. The total annual mean NOx concentrations expected to be experienced at receptors following completion of the HDD works is presented in ***Graph 2.3*** for each Scenario.

Graph 2.2 Source Apportionment of Annual Mean NOx Concentrations



Graph 2.3 Predicted Annual Mean NOx Concentrations – Without Landfall HDD Works

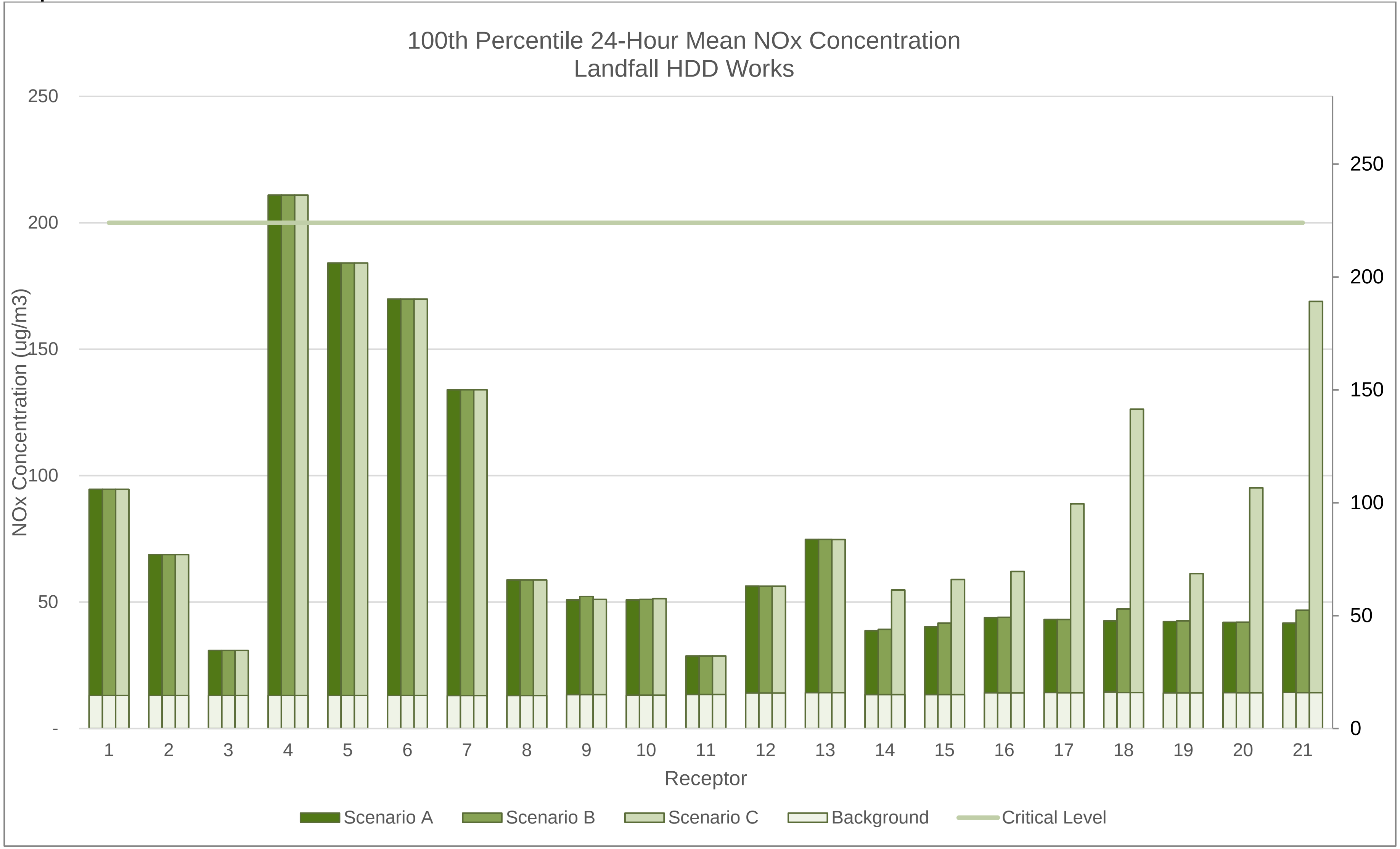


48. As shown in ***Graph 2.3***, whilst annual mean NOx contributions are above 1% of the Critical Level at all receptors, there are not predicted to be any exceedances of the annual mean Critical Level at any receptors following completion of the landfall HDD works. Total concentrations are predicted to be ‘well below’, or less than 75% of, the annual mean Critical Level at all receptors.

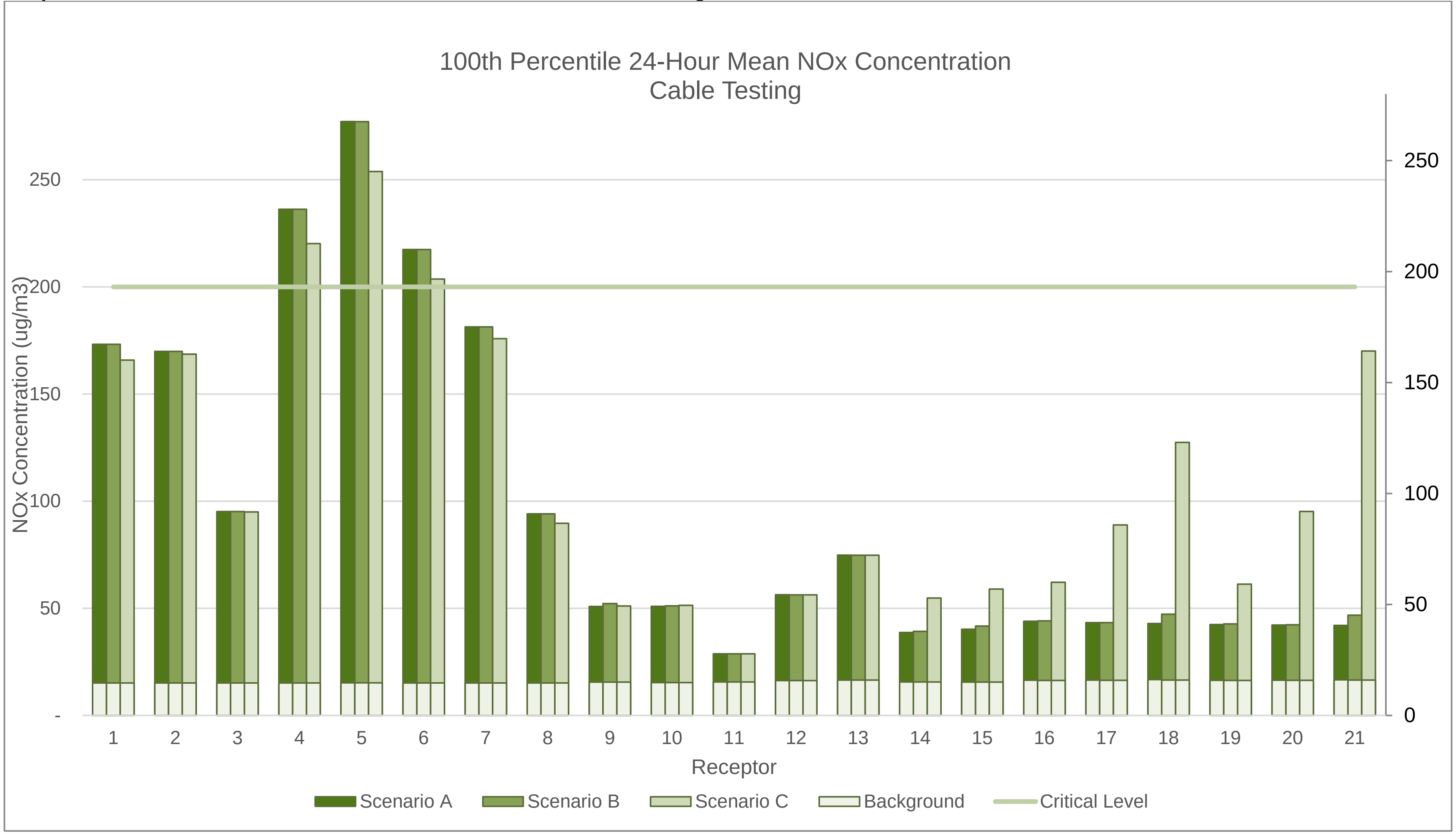
49. As such, predicted exceedances of the annual mean Critical Level, based on an assessment which included a high degree of conservatism with regard to plant engine sizes and location, would be short-lived and the annual mean Critical Level is unlikely to be exceeded for the remainder of the construction phase.

50. Results of the assessment of the 24-hour mean Critical Level are presented in ***Graph 2.4*** and ***Graph 2.5***. As discussed in ***Section 2.1***, this has been undertaken for two scenarios: with landfall HDD works and with cable testing generators, as these works would not be undertaken concurrently.

Graph 2.4 Predicted 24-Hour Mean NOx Concentration – Landfall HDD Works



Graph 2.5 Predicted 24-Hour Mean NOx Concentration – Cable Testing



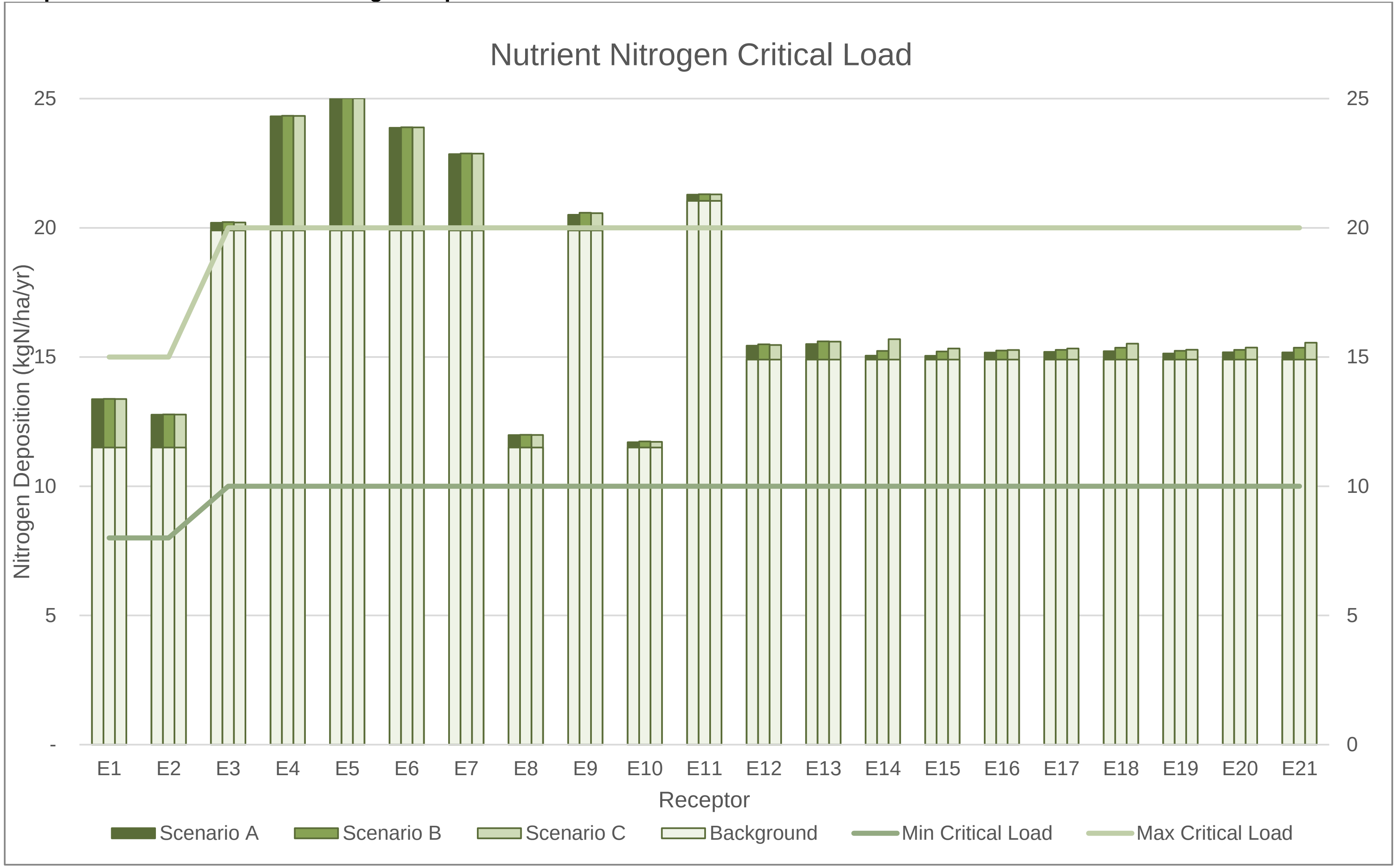
51. As shown in ***Graph 2.4*** and ***Graph 2.5***, the conservative assessment undertaken shows that the Projects' contribution to the short-term Critical Level would be greater than 10% at the majority of receptors and therefore impacts could not be considered insignificant. The Critical Level was predicted to be exceeded at one receptor closest to the landfall works for the HDD scenario and at three receptors in the cable testing scenario. However, within the assessment it is assumed that all generators would be used continually for the duration of the cable testing works. Furthermore, the cable testing scenarios would be undertaken for a maximum of six days, and therefore, in the event that the conservative modelled scenario is realised, few exceedances would occur, and these would occur only whilst the testing is undertaken. Similarly, to annual mean NOx, the landfall HDD and cable testing generators have the biggest effect on 24-hour mean NOx concentrations. It is therefore considered that, following completion of the landfall HDD works and cable testing, there would not be any exceedances of the 24-hour mean Critical Level for the remainder of the construction phase.

52. As for annual mean NOx concentrations, Scenario C was predicted to give rise to the highest 24-hour NOx concentrations of all three scenarios; again, this is likely due to the proximity of the emission sources to the receptor.

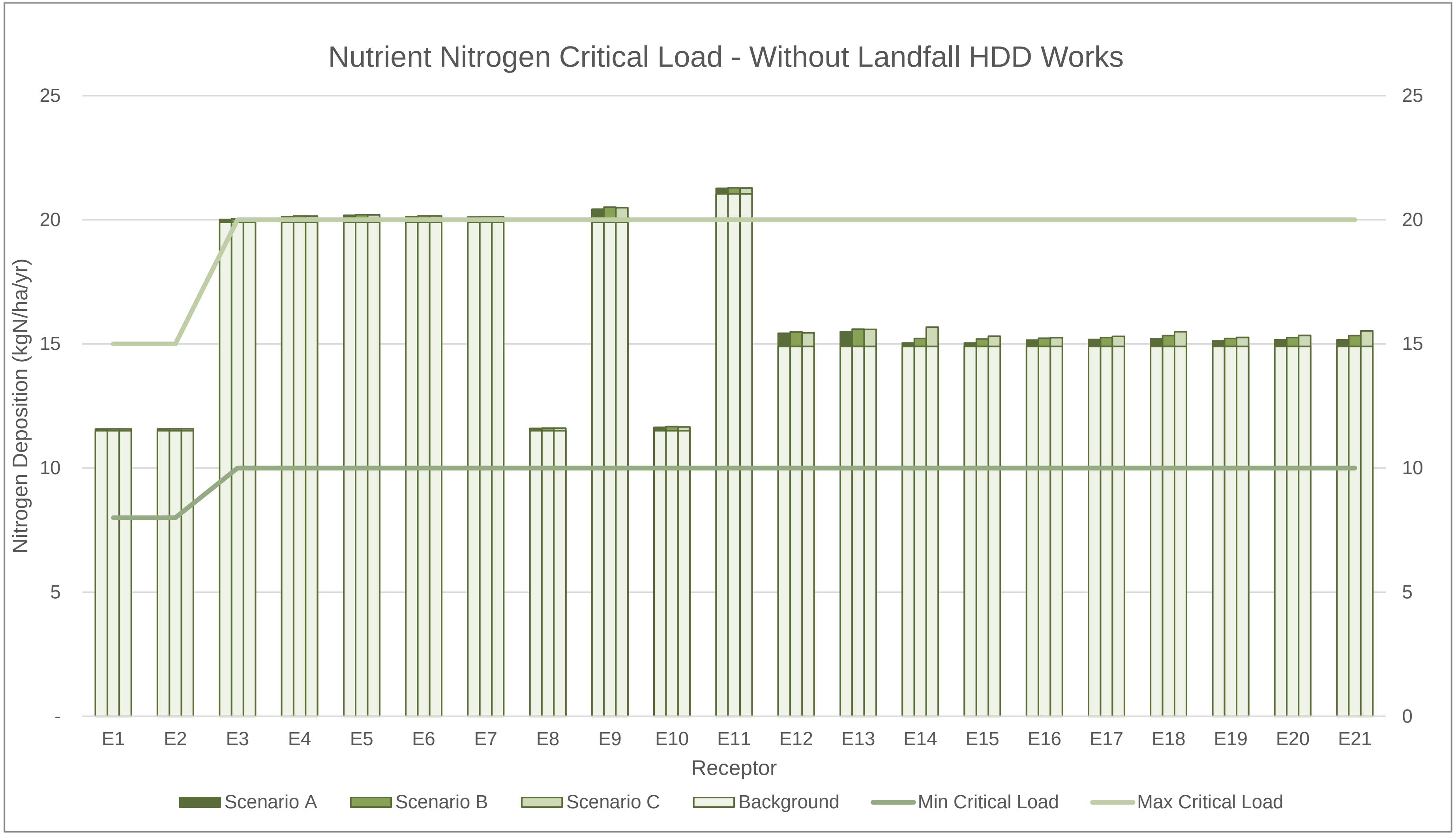
2.2.2 Critical Loads

53. The results of the nutrient nitrogen Critical Load assessment are presented in ***Graph 2.6*** and ***Graph 2.7*** for the scenarios both with and without landfall HDD works.

Graph 2.6 Predicted Nutrient Nitrogen Deposition – with Landfall HDD



Graph 2.7 Predicted Nutrient Nitrogen Deposition – Without Landfall HDD

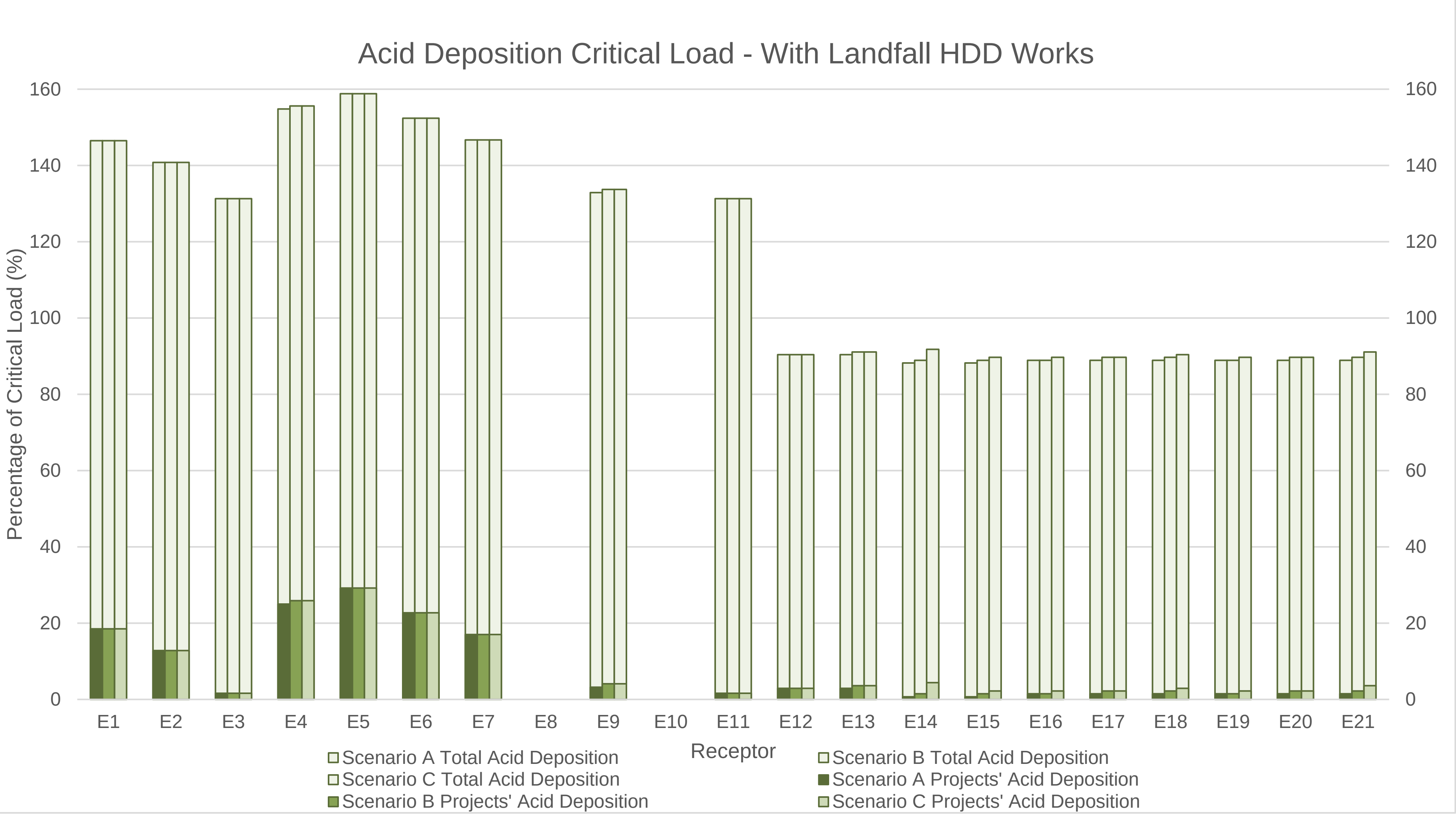


54. As shown in ***Graph 2.6***, contributions from the Projects were predicted to be greater than 1% of the lowest Critical Loads in all scenarios, and therefore these impacts could not be considered insignificant. Background deposition is in exceedance of the lowest Critical Loads at all habitats. As described above, the results in ***Graph 2.6*** include the contribution from the landfall HDD works which are expected to occur for up to a year, following which the emission sources from these works would no longer be in operation. Impacts are therefore considered to be temporary.

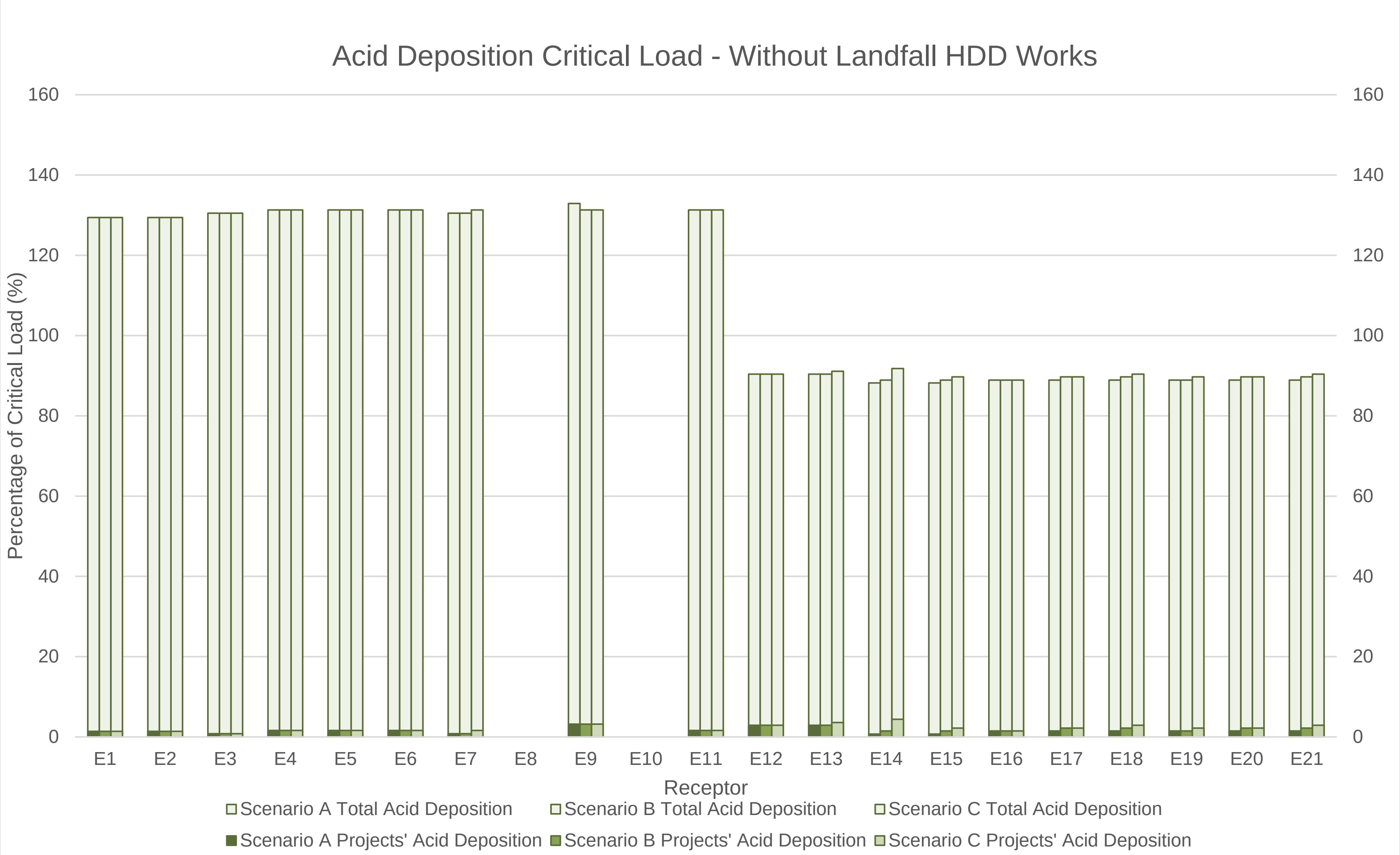
55. ***Graph 2.7*** shows the predicted Critical Load results in the absence of the landfall HDD works, in which a lower contribution from the Projects is predicted at receptors at the landfall. Contributions from the Projects were below 1% at some receptors and therefore these effects would be not significant.

56. Acid deposition and exceedances of the Critical Load are calculated based on contributions from both nitrogen and sulphur. As such, increases in acid deposition cannot be directly compared to the Critical Load value for the respective pollutant. As such, acid deposition results, based on nitrogen contributions generated by the Projects, are presented as the percentage of the Projects' contributions to the Critical Load, and as the total acid deposition (including background) as a percentage of the Critical Load in ***Graph 2.8*** and ***Graph 2.9*** for the with and without landfall HDD works respectively.

Graph 2.8 Predicted Acid Deposition Results



Graph 2.9 Predicted Acid Deposition Results – Without Landfall HDD



57. As shown in ***Graph 2.8***, greater acid deposition generated by the Projects was experienced at receptors closest to landfall. However, all receptors were predicted to experience increases in acid deposition in excess of 1% of the minimum Critical Load values and therefore impacts could not be considered insignificant. ***Graph 2.9*** shows that acid deposition generated by the Projects reduced without the temporary landfall HDD works; some receptors are predicted to experience impacts below 1% of the Critical Load, and therefore at some receptors impacts would be not significant.

3 Conclusions

58. At the request of the Councils, a quantitative assessment has been undertaken to consider impacts of emissions from NRMM and generators used during the concurrent construction of the Projects (Scenario 1). The assessment considers three separate scenarios to account for the different options for the crossing of the Sandlings SPA.

59. The number and types of plant expected to be used during construction were provided by the project engineers. Given that the Projects are not yet at the detailed design stage, a number of conservative assumptions have been made with regards to plant engine sizes, working methodologies and the location of works in relation to ecological receptors. It is therefore considered to be unlikely that the modelled scenarios would be realised.

60. Receptors have been selected based on proximity to the works to be undertaken, and the appropriate habitats and Critical Loads were determined in consultation with the project ecologist.

61. All scenarios show that the landfall HDD works, which have been assumed to occur immediately adjacent to the Leiston-Aldeburgh SSSI, would give rise to elevated NOx concentrations and nitrogen and acid deposition. This is largely due to the assumed proximity of the emission sources to the receptors, as there would be limited dispersion of pollutants between source and receptor. As landfall HDD impacts would only occur for up to 20 months, the longer-term impacts which would be experienced for the remaining years of construction of the Projects are also presented. These show a significant reduction in concentrations and deposition.

62. Of the three assessed scenarios for the SPA crossing, scenario C is predicted to give rise to the highest impacts due to the proximity of the emission sources to the receptors and that 24-hour working would be employed. Scenario A, where the SPA would be crossed by trenching, is the most favourable scenario.

63. The contribution of the Projects to Critical Levels and Loads would be greater than 1% in a number of scenarios, and therefore impacts could not be considered insignificant. However, the overall significance of impacts has been determined by an ecologist and is presented in the ***Deadline 3 Onshore Ecology Clarification Note*** (document reference ExA.AS-15.D3.V1).

4 References

Air Quality Consultants (2020) Performance of Defra’s Emission Factor Toolkit 2013 – 2019.

Department for the Environment Food and Rural Affairs (Defra) (2018) Local Air Quality Management Technical Guidance Document Local Air Quality Management.TG (16) London: Defra.

East Suffolk Council and Suffolk County Council (2020) Appendix B – Early Draft Local Impact Report for EA1N and EA2 Windfarms.

Environment Agency and Defra (2016) Air Emissions Risk Assessment for your Environmental Permit https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit.

Highways England (2019) Design Manual for Roads and Bridges LA 105 Air Quality.

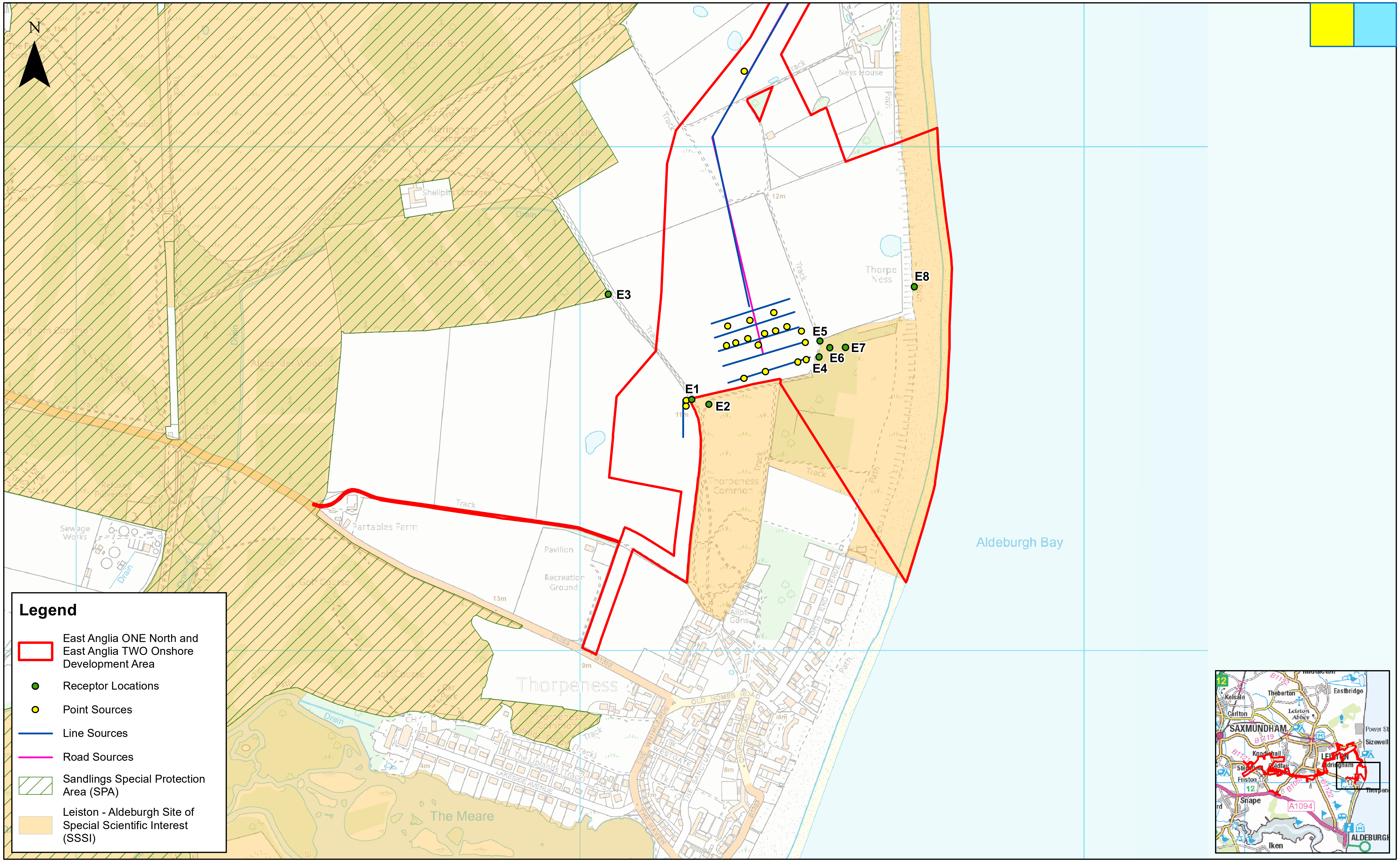
Institute of Air Quality Management and Environmental Protection UK (2017) Land Use Planning and Development Control: Planning for Air Quality.

Institute of Air Quality Management (2020) A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites.

Natural England (2018) Natural England’s approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001).

Appendix 1: Figures

- Figure 1 - NRMM Emissions Assessment – Scenario A
- Figure 2 - NRMM Emissions Assessment – Scenario B
- Figure 3 - NRMM Emissions Assessment – Scenario C



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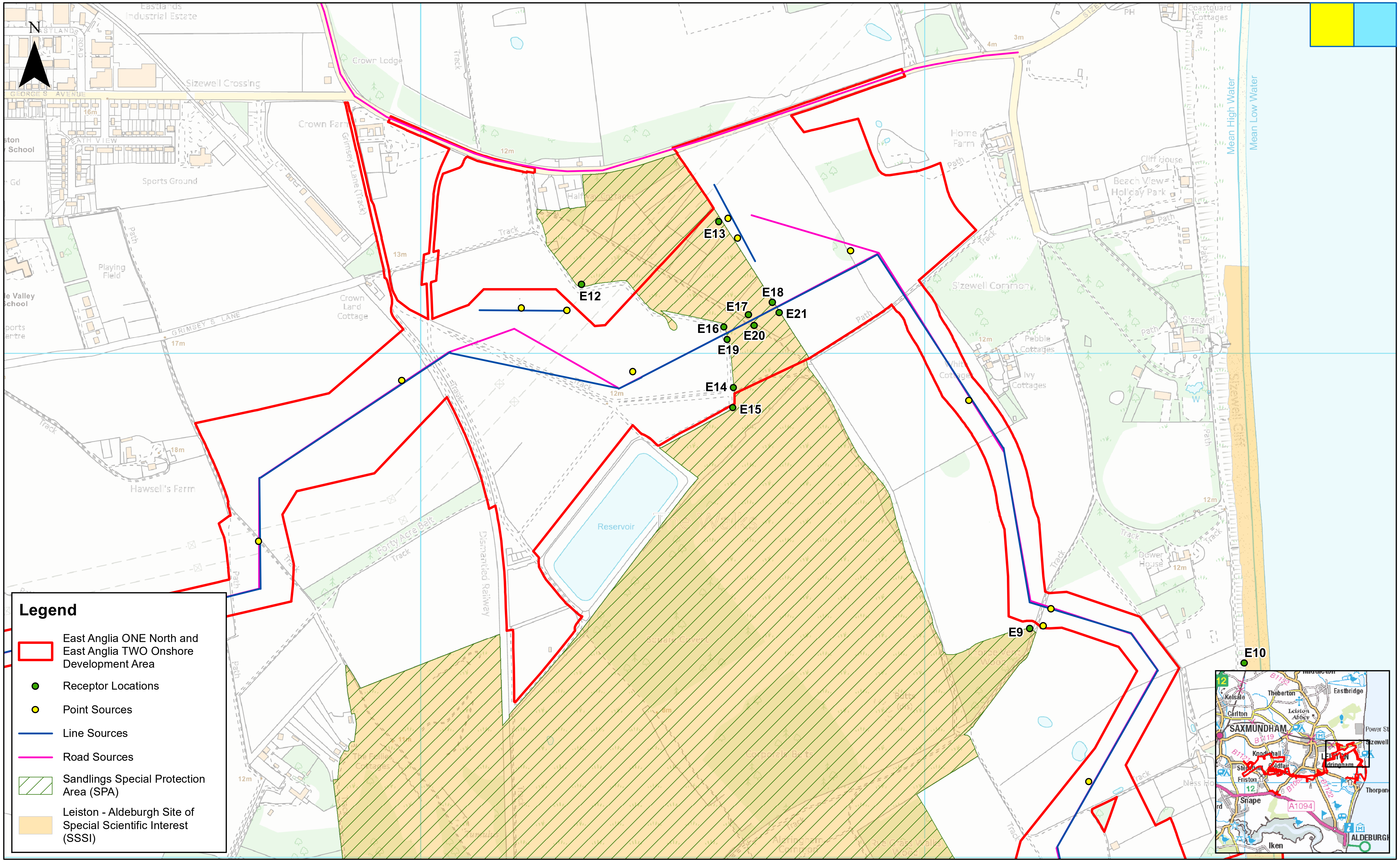

Legend

🟥 East Anglia ONE North and East Anglia TWO Onshore Development Area

● Receptor Locations

● Point Sources

— Line Sources

— Road Sources

▨ Sandlings Special Protection Area (SPA)

🟧 Leiston - Aldeburgh Site of Special Scientific Interest (SSSI)

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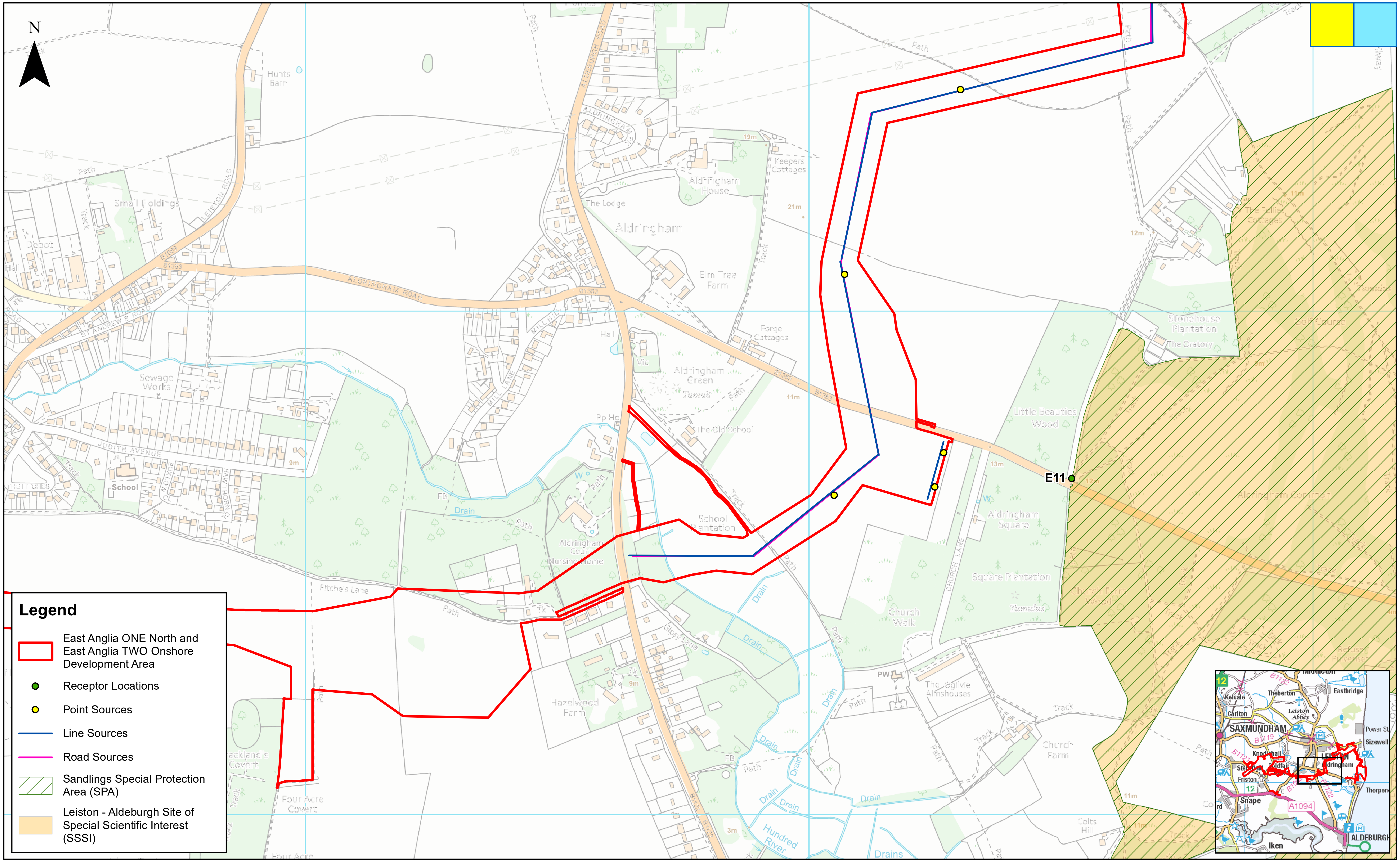

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—	Line Sources
—	Road Sources
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🟧	Leiston - Aldeburgh Site of Special Scientific Interest (SSSI)

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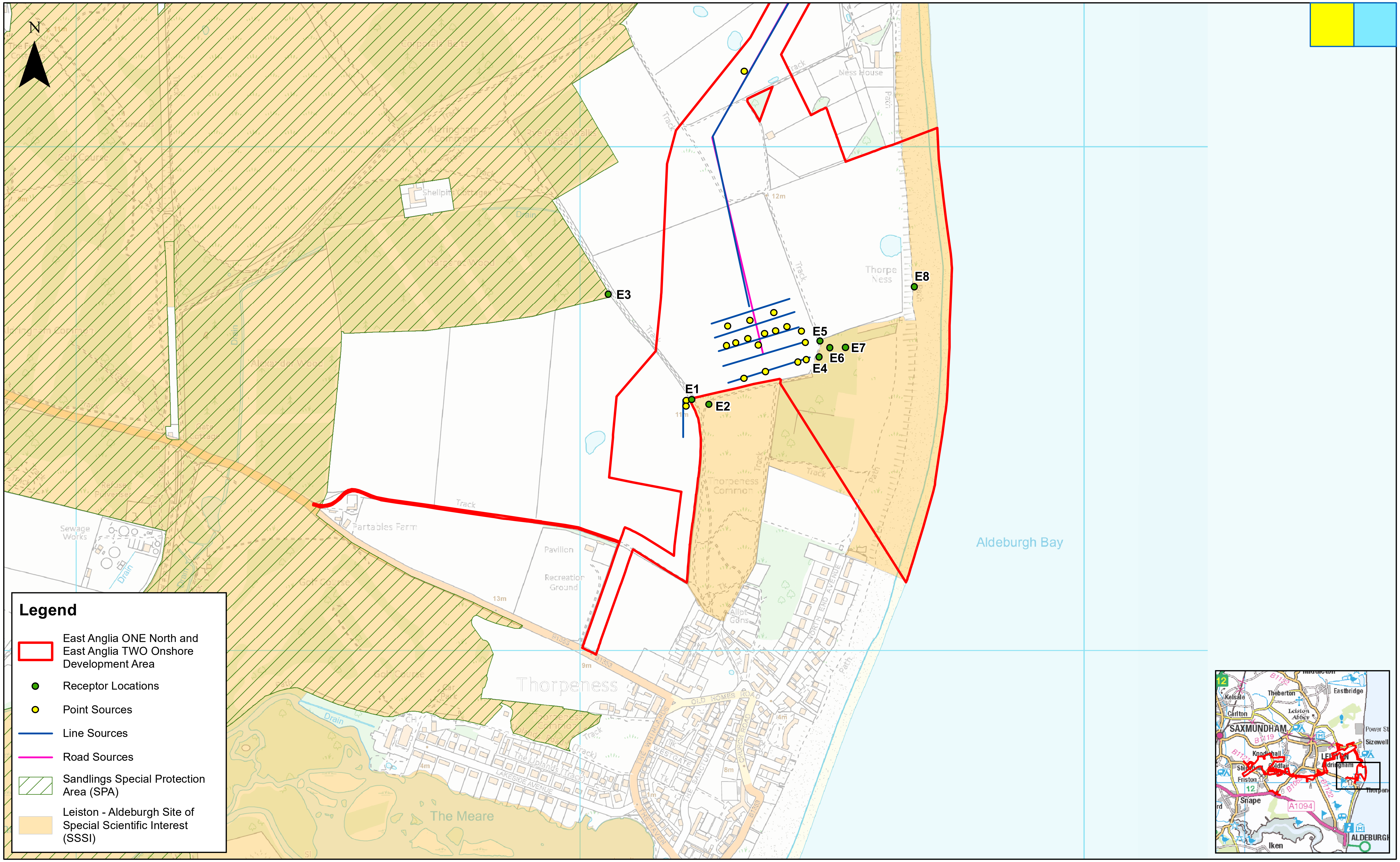

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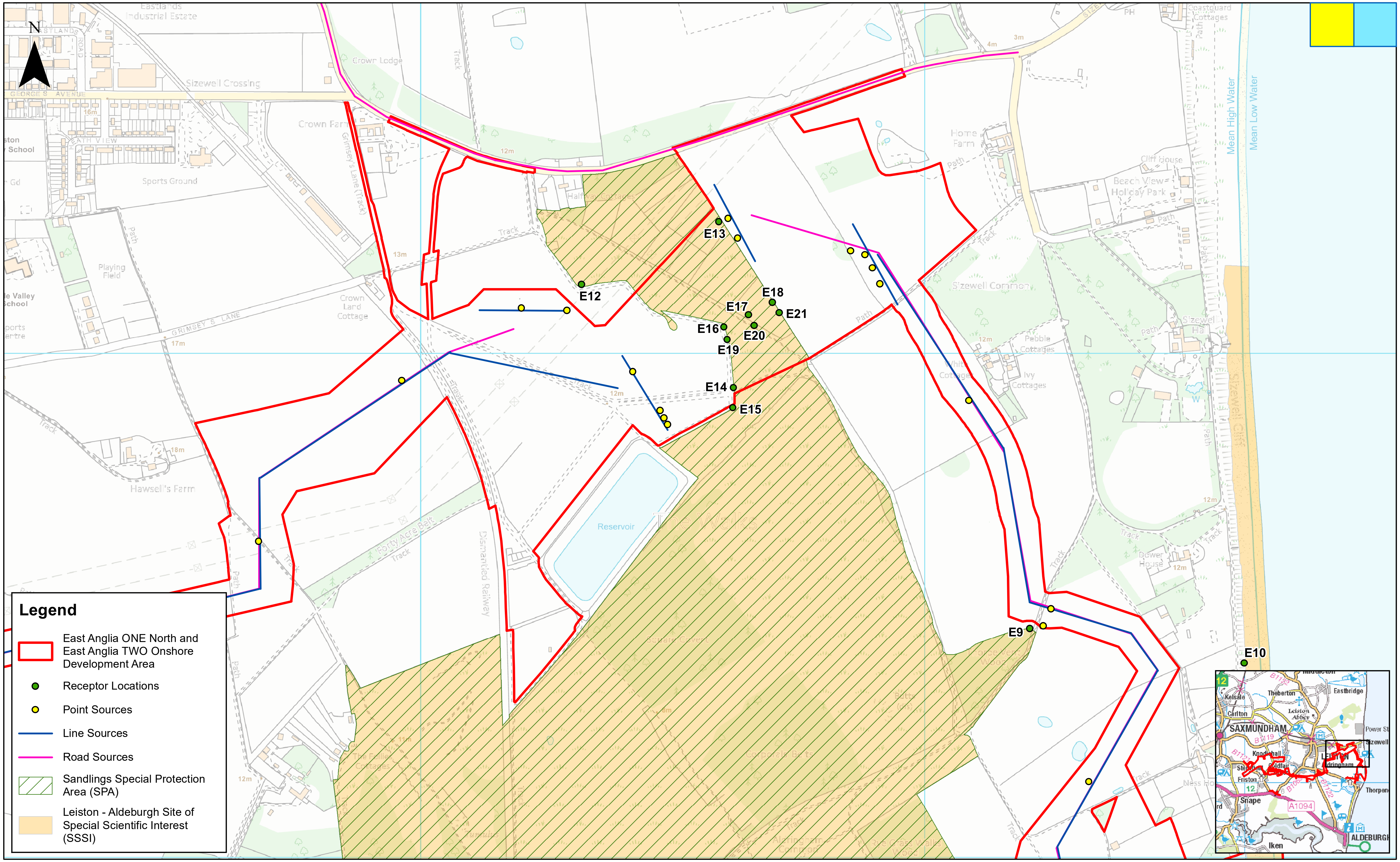

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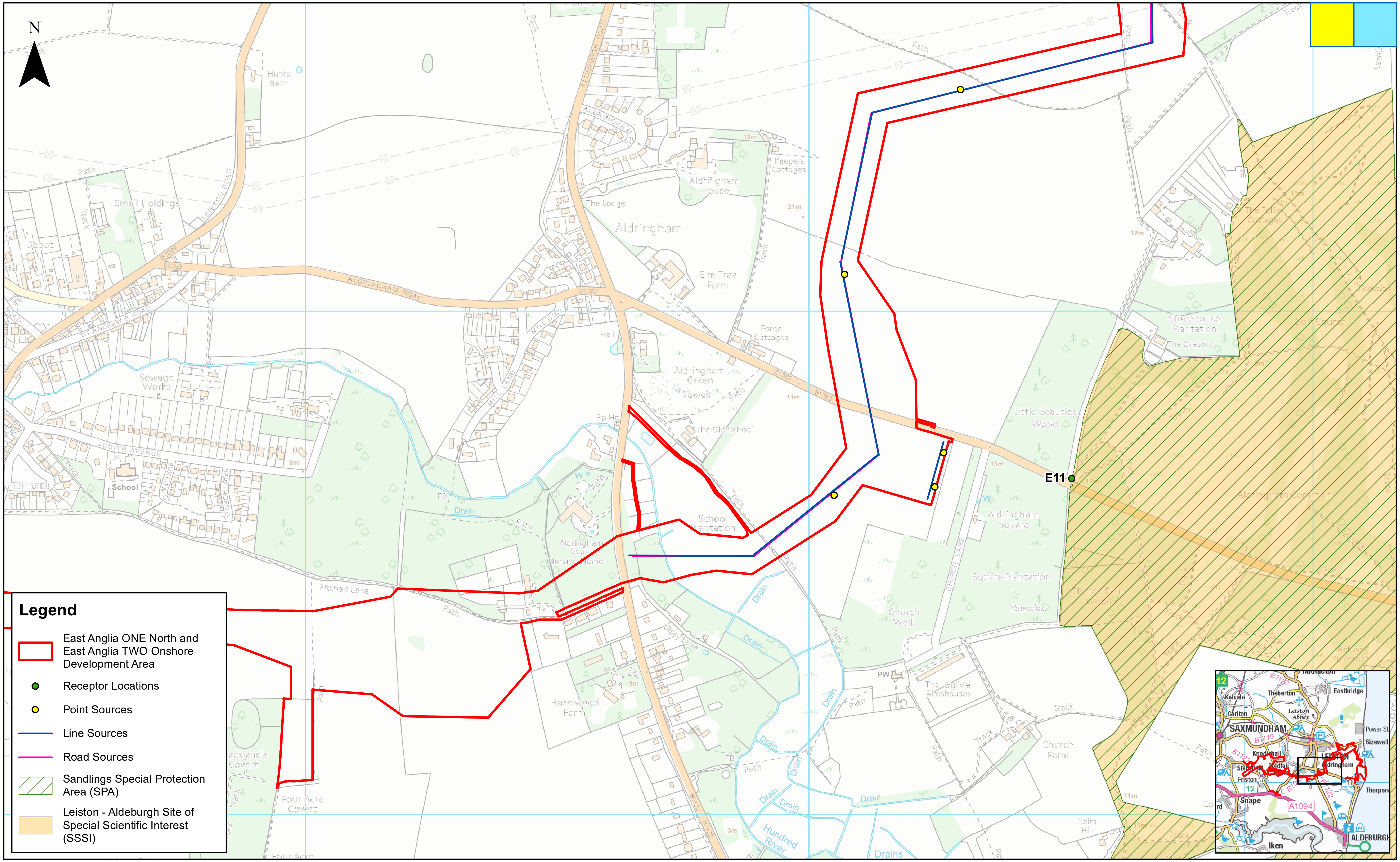

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—	Line Sources
—	Road Sources
▨	Sandlings Special Protection Area (SPA)
▭	Leiston - Aldeburgh Site of Special Scientific Interest (SSSI)

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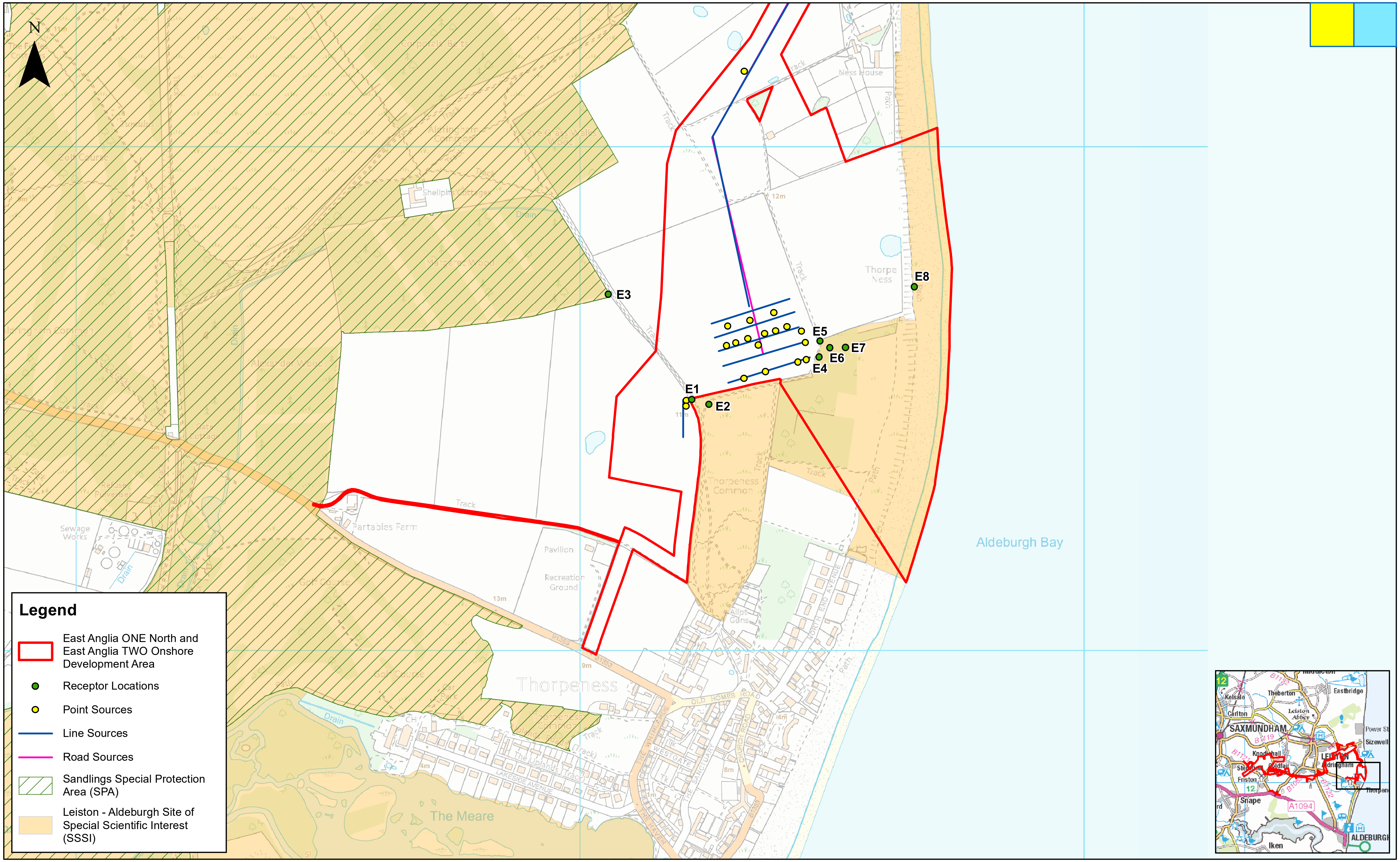

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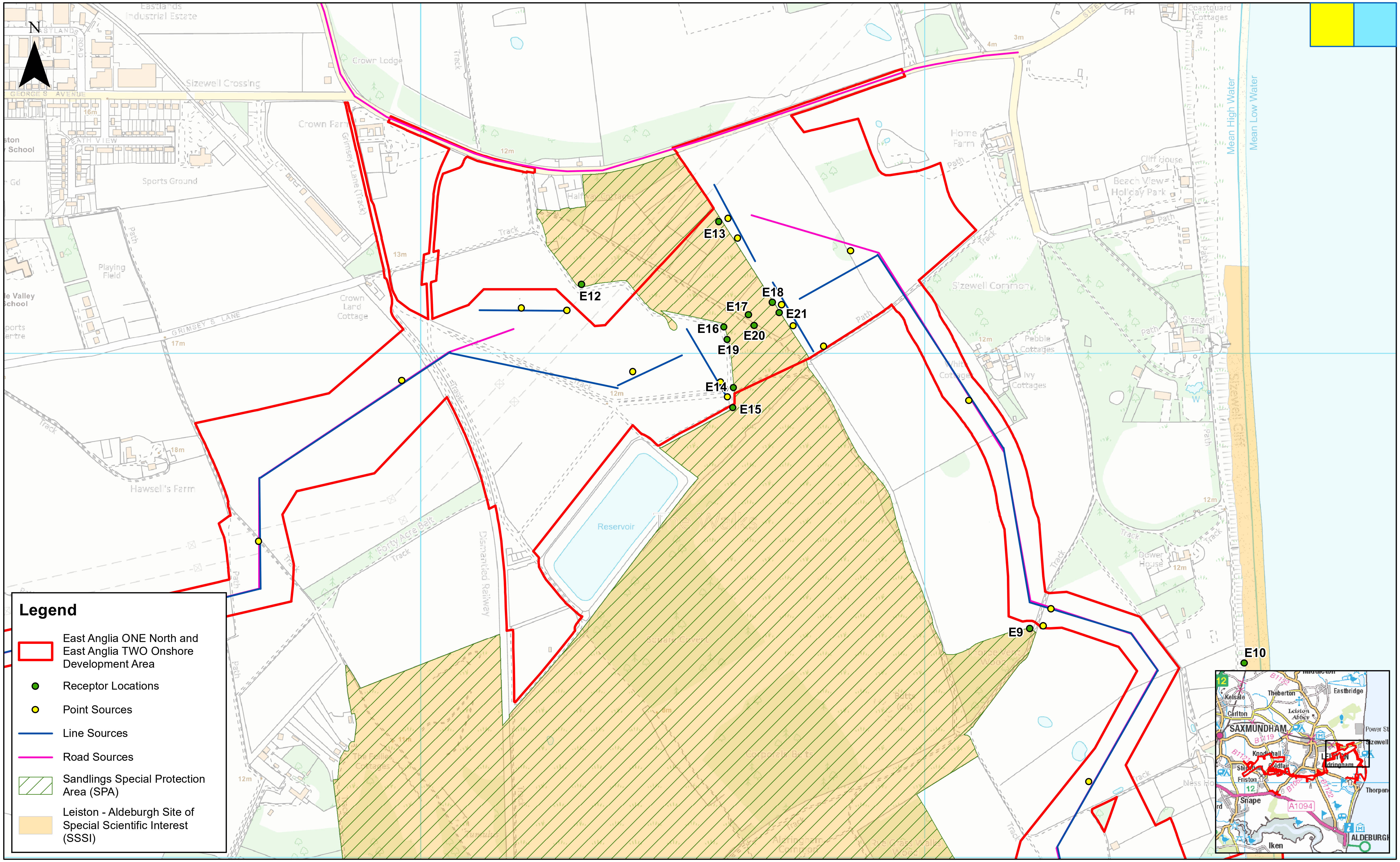

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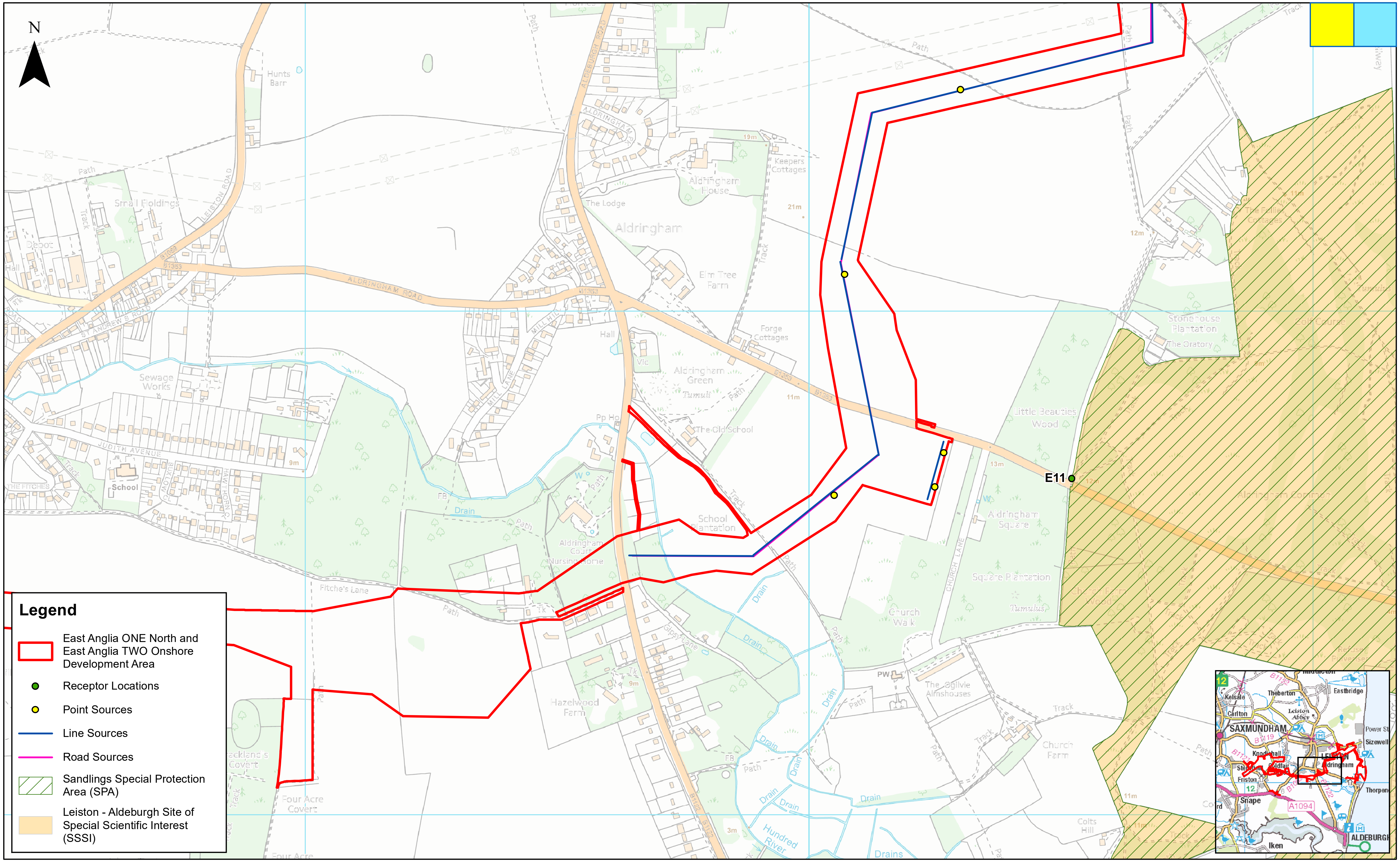

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Appendix 2: Tabulated NRMM Assessment Results

Glossary of Acronyms

BG	Background
ESC	East Suffolk Council
HDD	Horizontal Directional Drill
HGV	Heavy Goods Vehicles
LCV	Light Commercial Vehicles
NOx	Nitrogen Oxide
NRMM	Non-Road Mobile Machinery

1 Introduction

1. This appendix to the ***Air Quality Deadline 3 Clarification Note*** (document reference ExA.AS-16.D3.V1) has been produced by the Applicants to inform a response to East Suffolk Council (ESC) regarding the potential for impacts as a result of Non-Road Mobile Machinery (NRMM) and generators used during construction of the East Anglia ONE North and East Anglia TWO projects (the Projects).

2. A quantitative assessment was undertaken at the request of ESC. This appendix presents the tabulated assessment results as detailed in the ***Air Quality Deadline 3 Clarification Note*** (document reference ExA.AS-16.D3.V1).

2 Tabulated Results

3. The results of the assessment are presented below.

Table 1 Scenario A Predicted Annual Mean NOx Concentrations – With and Without Landfall HDD Works

	Annual Mean NOx - with Landfall HDD					Annual Mean NOx - without Landfall HDD				
Receptor name	**Project-generated NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOx/ Critical Level**	**Project-generated NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOX/ Critical Level**
E1	18.59	7.23	25.82	62%	86%	0.71	7.23	7.93	2%	26%
E2	12.64	7.23	19.87	42%	66%	0.74	7.23	7.97	2%	27%
E3	1.51	7.23	8.73	5%	29%	0.59	7.23	7.82	2%	26%
E4	21.96	7.23	29.19	73%	97%	1.18	7.23	8.41	4%	28%
E5	25.32	7.23	32.55	84%	108%	1.42	7.23	8.65	5%	29%
E6	19.75	7.23	26.98	66%	90%	1.20	7.23	8.42	4%	28%
E7	14.69	7.23	21.92	49%	73%	1.08	7.23	8.30	4%	28%
E8	4.78	7.23	12.01	16%	40%	1.01	7.23	8.23	3%	27%
E9	3.08	7.27	10.35	10%	35%	2.70	7.27	9.96	9%	33%
E10	2.06	7.27	9.33	7%	31%	1.45	7.27	8.71	5%	29%
E11	1.24	7.43	8.67	4%	29%	1.15	7.43	8.59	4%	29%
E12	5.42	7.60	13.02	18%	43%	5.30	7.60	12.90	18%	43%
E13	6.07	7.60	13.66	20%	46%	5.94	7.60	13.54	20%	45%

	Annual Mean NOx - with Landfall HDD					**Annual Mean NOx - without Landfall HDD**				
Receptor name	**Project-generated NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOx/ Critical Level**	**Project-generated NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOX/ Critical Level**
E14	1.57	7.35	8.92	5%	30%	1.42	7.35	8.77	5%	29%
E15	1.50	7.35	8.85	5%	29%	1.34	7.35	8.69	4%	29%
E16	2.80	7.60	10.40	9%	35%	2.66	7.60	10.26	9%	34%
E17	3.06	7.60	10.65	10%	36%	2.92	7.60	10.51	10%	35%
E18	3.34	7.60	10.94	11%	36%	3.20	7.60	10.80	11%	36%
E19	2.43	7.60	10.03	8%	33%	2.29	7.60	9.89	8%	33%
E20	2.92	7.60	10.52	10%	35%	2.78	7.60	10.37	9%	35%
E21	2.88	7.60	10.47	10%	35%	2.73	7.60	10.33	9%	34%

Table 2 Scenario B Predicted Annual Mean NOx Concentrations – With and Without Landfall HDD Works

	Annual Mean NOx - with Landfall HDD					Annual Mean NOx - without Landfall HDD				
Receptor name	**Project-generated NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOx/ Critical Level**	**Project-generated NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOX/ Critical Level**
E1	18.70	7.23	25.93	62%	86%	0.81	7.23	8.04	3%	27%
E2	12.75	7.23	19.98	43%	67%	0.85	7.23	8.08	3%	27%
E3	1.64	7.23	8.86	5%	30%	0.73	7.23	7.95	2%	27%
E4	22.08	7.23	29.30	74%	98%	1.29	7.23	8.52	4%	28%
E5	25.44	7.23	32.67	85%	109%	1.54	7.23	8.77	5%	29%
E6	19.86	7.23	27.09	66%	90%	1.31	7.23	8.54	4%	28%
E7	14.80	7.23	22.03	49%	73%	1.19	7.23	8.42	4%	28%
E8	4.91	7.23	12.13	16%	40%	1.13	7.23	8.36	4%	28%
E9	3.47	7.27	10.74	12%	36%	3.08	7.27	10.35	10%	34%
E10	2.35	7.27	9.61	8%	32%	1.73	7.27	9.00	6%	30%
E11	1.33	7.43	8.76	4%	29%	1.24	7.43	8.67	4%	29%
E12	5.95	7.60	13.54	20%	45%	5.83	7.60	13.43	19%	45%
E13	7.11	7.60	14.71	24%	49%	6.99	7.60	14.59	23%	49%

Receptor name	Annual Mean NOx - with Landfall HDD					Annual Mean NOx - without Landfall HDD				
	Project-generated NOx (µg/m³)	BG NOx (µg/m³)	Total NOx (µg/m³)	Project NOx/ Critical Level	Total NOx/ Critical Level	Project-generated NOx (µg/m³)	BG NOx (µg/m³)	Total NOx (µg/m³)	Project NOx/ Critical Level	Total NOX/ Critical Level
E14	3.36	7.35	10.71	11%	36%	3.20	7.35	10.55	11%	35%
E15	3.18	7.35	10.52	11%	35%	3.02	7.35	10.36	10%	35%
E16	3.45	7.60	11.05	11%	37%	3.31	7.60	10.91	11%	36%
E17	3.72	7.60	11.32	12%	38%	3.58	7.60	11.18	12%	37%
E18	4.52	7.60	12.12	15%	40%	4.38	7.60	11.98	15%	40%
E19	3.38	7.60	10.98	11%	37%	3.24	7.60	10.83	11%	36%
E20	3.72	7.60	11.32	12%	38%	3.58	7.60	11.17	12%	37%
E21	4.53	7.60	12.13	15%	40%	4.38	7.60	11.98	15%	40%

Table 3 Scenario C Predicted Annual Mean NOx Concentrations – With and Without Landfall HDD Works

	Annual Mean NOx - with Landfall HDD					Annual Mean NOx - without Landfall HDD				
Receptor name	Project-generated NOx (µg/m³)	BG NOx (µg/m³)	Total NOx (µg/m³)	Project NOx/ Critical Level	Total NOx/ Critical Level	Project-generated NOx (µg/m³)	BG NOx (µg/m³)	Total NOx (µg/m³)	Project NOx/ Critical Level	Total NOX/ Critical Level
E1	18.65	7.23	25.88	62%	86%	0.77	7.23	7.99	3%	27%
E2	12.70	7.23	19.93	42%	66%	0.80	7.23	8.03	3%	27%
E3	1.57	7.23	8.80	5%	29%	0.66	7.23	7.89	2%	26%
E4	22.05	7.23	29.28	73%	98%	1.26	7.23	8.49	4%	28%
E5	25.41	7.23	32.64	85%	109%	1.51	7.23	8.74	5%	29%
E6	19.84	7.23	27.06	66%	90%	1.29	7.23	8.51	4%	28%
E7	14.78	7.23	22.00	49%	73%	1.16	7.23	8.39	4%	28%
E8	4.88	7.23	12.10	16%	40%	1.10	7.23	8.33	4%	28%
E9	3.39	7.27	10.65	11%	36%	3.00	7.27	10.27	10%	34%
E10	2.22	7.27	9.49	7%	32%	1.60	7.27	8.87	5%	30%
E11	1.28	7.43	8.71	4%	29%	1.19	7.43	8.63	4%	29%
E12	5.66	7.60	13.25	19%	44%	5.54	7.60	13.14	18%	44%
E13	7.00	7.60	14.59	23%	49%	6.87	7.60	14.47	23%	48%

	Annual Mean NOx - with Landfall HDD					Annual Mean NOx - without Landfall HDD				
Receptor name	Project-generated NOx (µg/m³)	BG NOx (µg/m³)	Total NOx (µg/m³)	Project NOx/ Critical Level	Total NOx/ Critical Level	Project-generated NOx (µg/m³)	BG NOx (µg/m³)	Total NOx (µg/m³)	Project NOx/ Critical Level	Total NOX/ Critical Level
E14	7.90	7.35	15.25	26%	51%	7.75	7.35	15.10	26%	50%
E15	4.31	7.35	11.65	14%	39%	4.15	7.35	11.50	14%	38%
E16	3.67	7.60	11.27	12%	38%	3.53	7.60	11.13	12%	37%
E17	4.23	7.60	11.83	14%	39%	4.09	7.60	11.69	14%	39%
E18	6.07	7.60	13.66	20%	46%	5.92	7.60	13.52	20%	45%
E19	3.78	7.60	11.38	13%	38%	3.64	7.60	11.24	12%	37%
E20	4.58	7.60	12.18	15%	41%	4.43	7.60	12.03	15%	40%
E21	6.42	7.60	14.02	21%	47%	6.27	7.60	13.87	21%	46%

Table 4 Scenario A Predicted 24-Hour NOx Concentrations – Landfall HDD and Cable Testing

	24-Hour NOx - Landfall HDD					24-Hour NOx – Cable Testing				
Receptor name	Project-generated 100th Percentile 24 Hour NOx (µg/m^3)	BG NOx (µg/m^3)	Total 100%ile 24-hour NOx (µg/m^3)	Project NOx/ Critical Level	Total NOX/ Critical Level	Project-generated 100th Percentile 24 Hour NOx (µg/m^3)	BG NOx (µg/m^3)	Total 100%ile 24-hour NOx (µg/m^3)	Project NOx/ Critical Level	Total NOX/ Critical Level
E1	80.00	14.64	94.64	40%	47%	158.56	14.64	173.19	79%	87%
E2	54.13	14.64	68.77	27%	34%	155.23	14.64	169.87	78%	85%
E3	16.22	14.65	30.86	8%	15%	80.52	14.65	95.17	40%	48%
E4	196.33	14.65	210.98	98%	105%	221.55	14.65	236.19	111%	118%
E5	169.45	14.66	184.11	85%	92%	262.46	14.66	277.13	131%	139%
E6	155.17	14.64	169.81	78%	85%	202.80	14.64	217.45	101%	109%
E7	119.34	14.63	133.97	60%	67%	166.71	14.63	181.34	83%	91%
E8	44.12	14.62	58.74	22%	29%	79.46	14.62	94.09	40%	47%
E9	35.85	15.02	50.87	18%	25%	35.85	15.02	50.87	18%	25%
E10	36.11	14.79	50.90	18%	25%	36.14	14.79	50.93	18%	25%
E11	13.64	15.10	28.73	7%	14%	13.64	15.10	28.73	7%	14%
E12	40.58	15.74	56.32	20%	28%	40.58	15.74	56.32	20%	28%

	24-Hour NOx - Landfall HDD					24-Hour NOx – Cable Testing				
Receptor name	Project-generated 100th Percentile 24 Hour NOx (µg/m³)	BG NOx (µg/m³)	Total 100%ile 24-hour NOx (µg/m³)	Project NOx/ Critical Level	Total NOX/ Critical Level	Project-generated 100th Percentile 24 Hour NOx (µg/m³)	BG NOx (µg/m³)	Total 100%ile 24-hour NOx (µg/m³)	Project NOx/ Critical Level	Total NOX/ Critical Level
E13	58.89	15.91	74.80	29%	37%	58.89	15.91	74.80	29%	37%
E14	23.63	15.07	38.70	12%	19%	23.63	15.07	38.70	12%	19%
E15	25.18	15.04	40.22	13%	20%	25.18	15.04	40.22	13%	20%
E16	27.96	15.88	43.83	14%	22%	28.08	15.88	43.96	14%	22%
E17	27.18	15.95	43.13	14%	22%	27.37	15.95	43.32	14%	22%
E18	26.46	16.15	42.61	13%	21%	26.73	16.15	42.89	13%	21%
E19	26.47	15.82	42.29	13%	21%	26.60	15.82	42.41	13%	21%
E20	26.09	15.90	42.00	13%	21%	26.29	15.90	42.20	13%	21%
E21	25.67	16.04	41.70	13%	21%	25.96	16.04	42.00	13%	21%

Table 5 Scenario B Predicted 24-Hour NOx Concentrations – Landfall HDD and Cable Testing

	24-Hour NOx - Landfall HDD					24-Hour NOx – Cable Testing				
Receptor name	**Project-generated 100th Percentile 24 Hour NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total 100%ile 24-hour NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOX/ Critical Level**	**Project-generated 100th Percentile 24 Hour NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total 100%ile 24-hour NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOX/ Critical Level**
E1	80.00	14.64	94.64	40%	47%	158.56	14.64	173.19	79%	87%
E2	54.13	14.64	68.77	27%	34%	155.23	14.64	169.87	78%	85%
E3	16.22	14.65	30.86	8%	15%	80.52	14.65	95.17	40%	48%
E4	196.33	14.64	210.98	98%	105%	221.55	14.64	236.19	111%	118%
E5	169.45	14.66	184.12	85%	92%	262.46	14.66	277.13	131%	139%
E6	155.18	14.64	169.82	78%	85%	202.80	14.64	217.45	101%	109%
E7	119.34	14.63	133.97	60%	67%	166.71	14.63	181.34	83%	91%
E8	44.14	14.62	58.76	22%	29%	79.46	14.62	94.09	40%	47%
E9	37.20	15.02	52.22	19%	26%	37.20	15.02	52.22	19%	26%
E10	36.30	14.79	51.09	18%	26%	36.33	14.79	51.12	18%	26%
E11	13.64	15.10	28.73	7%	14%	13.64	15.10	28.73	7%	14%
E12	40.58	15.71	56.29	20%	28%	40.58	15.71	56.29	20%	28%

Receptor name	24-Hour NOx - Landfall HDD Project-generated 100th Percentile 24 Hour NOx (µg/m³)	BG NOx (µg/m³)	Total 100%ile 24-hour NOx (µg/m³)	Project NOx/ Critical Level	Total NOX/ Critical Level	24-Hour NOx – Cable Testing Project-generated 100th Percentile 24 Hour NOx (µg/m³)	BG NOx (µg/m³)	Total 100%ile 24-hour NOx (µg/m³)	Project NOx/ Critical Level	Total NOX/ Critical Level
E13	58.90	15.89	74.79	29%	37%	58.90	15.89	74.79	29%	37%
E14	24.20	15.03	39.23	12%	20%	24.20	15.03	39.23	12%	20%
E15	26.68	15.02	41.70	13%	21%	26.68	15.02	41.70	13%	21%
E16	28.39	15.59	43.98	14%	22%	28.52	15.59	44.11	14%	22%
E17	27.53	15.61	43.14	14%	22%	27.72	15.61	43.33	14%	22%
E18	31.64	15.64	47.27	16%	24%	31.64	15.64	47.27	16%	24%
E19	27.03	15.58	42.61	14%	21%	27.16	15.58	42.74	14%	21%
E20	26.49	15.60	42.08	13%	21%	26.69	15.60	42.28	13%	21%
E21	31.17	15.62	46.79	16%	23%	31.17	15.62	46.79	16%	23%

Table 6 Scenario C Predicted 24-Hour NOx Concentrations – Landfall HDD and Cable Testing

Receptor name	24-Hour NOx - Landfall HDD					24-Hour NOx – Cable Testing				
	Project-generated 100th Percentile 24 Hour NOx (µg/m³)	BG NOx (µg/m³)	Total 100%ile 24-hour NOx (µg/m³)	Project NOx/ Critical Level	Total NOX/ Critical Level	Project-generated 100th Percentile 24 Hour NOx (µg/m³)	BG NOx (µg/m³)	Total 100%ile 24-hour NOx (µg/m³)	Project NOx/ Critical Level	Total NOX/ Critical Level
E1	80.00	14.64	94.64	40%	47%	151.17	14.64	165.81	76%	83%
E2	54.13	14.64	68.77	27%	34%	153.96	14.64	168.60	77%	84%
E3	16.22	14.65	30.86	8%	15%	80.29	14.65	94.94	40%	47%
E4	196.33	14.64	210.98	98%	105%	205.56	14.64	220.21	103%	110%
E5	169.45	14.66	184.11	85%	92%	239.16	14.66	253.83	120%	127%
E6	155.17	14.64	169.82	78%	85%	188.98	14.64	203.63	94%	102%
E7	119.34	14.63	133.97	60%	67%	161.19	14.63	175.82	81%	88%
E8	44.14	14.62	58.76	22%	29%	75.02	14.62	89.64	38%	45%
E9	36.06	15.02	51.07	18%	26%	36.06	15.02	51.07	18%	26%
E10	36.57	14.79	51.36	18%	26%	36.59	14.79	51.38	18%	26%
E11	13.64	15.10	28.73	7%	14%	13.64	15.10	28.73	7%	14%
E12	40.58	15.71	56.29	20%	28%	40.58	15.71	56.29	20%	28%

	24-Hour NOx - Landfall HDD					24-Hour NOx – Cable Testing				
Receptor name	**Project-generated 100th Percentile 24 Hour NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total 100%ile 24-hour NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOX/ Critical Level**	**Project-generated 100th Percentile 24 Hour NOx (µg/m^3)**	**BG NOx (µg/m^3)**	**Total 100%ile 24-hour NOx (µg/m^3)**	**Project NOx/ Critical Level**	**Total NOX/ Critical Level**
E13	58.89	15.89	74.77	29%	37%	58.89	15.89	74.77	29%	37%
E14	39.77	15.03	54.81	20%	27%	39.77	15.03	54.81	20%	27%
E15	43.94	15.02	58.96	22%	29%	43.94	15.02	58.96	22%	29%
E16	46.54	15.59	62.13	23%	31%	46.54	15.59	62.13	23%	31%
E17	73.28	15.61	88.89	37%	44%	73.28	15.61	88.89	37%	44%
E18	110.64	15.64	126.28	55%	63%	111.76	15.64	127.40	56%	64%
E19	45.67	15.58	61.25	23%	31%	45.67	15.58	61.25	23%	31%
E20	79.62	15.60	95.21	40%	48%	79.62	15.60	95.21	40%	48%
E21	153.32	15.62	168.94	77%	84%	154.46	15.62	170.08	77%	85%

Table 7 Scenario A Predicted Nutrient Nitrogen Deposition – With and Without Landfall HDD

	Nutrient Nitrogen - with Landfall HDD						Nutrient Nitrogen - without Landfall HDD					
Receptor name	**Project NN Dep (kgN/ha/yr)**	**Project Impact/ Min CL**	**Project Impact/ Max CL**	**BG Dep (kgN/ha/yr)**	**Total Dep/ Min CL**	**Total Dep/ Max CL**	**Project NN Dep (kgN/ha/yr)**	**Project Impact/ Min CL**	**Project Impact/ Max CL**	**BG Dep (kgN/ha/yr)**	**Total Dep/ Min CL**	**Total Dep/ Max CL**
E1	1.87	23%	12%	12	167%	89%	0.07	0.8%	0.5%	12	145%	77%
E2	1.27	16%	8%	12	160%	85%	0.07	0.9%	0.5%	12	145%	77%
E3	0.30	3%	1%	20	202%	101%	0.11	1.1%	0.6%	20	200%	100%
E4	4.42	44%	22%	20	243%	122%	0.23	2.3%	1.1%	20	201%	101%
E5	5.09	51%	25%	20	250%	125%	0.28	2.8%	1.4%	20	202%	101%
E6	3.97	40%	20%	20	239%	119%	0.23	2.3%	1.2%	20	201%	101%
E7	2.95	30%	15%	20	229%	114%	0.21	2.1%	1.1%	20	201%	101%
E8	0.48	-	-	12	-	-	0.10	-	-	12	-	-
E9	0.61	6%	3%	20	205%	103%	0.53	5.3%	2.6%	20	204%	102%
E10	0.20	-	-	12	-	-	0.14	-	-	12	-	-
E11	0.24	2%	1%	21	213%	106%	0.22	2.2%	1.1%	21	213%	106%
E12	0.54	5%	3%	15	154%	77%	0.53	5.3%	2.6%	15	154%	77%
E13	0.60	6%	3%	15	155%	78%	0.59	5.9%	2.9%	15	155%	77%

	Nutrient Nitrogen - with Landfall HDD						Nutrient Nitrogen - without Landfall HDD					
Receptor name	Project NN Dep (kgN/ha/yr)	Project Impact/ Min CL	Project Impact/ Max CL	BG Dep (kgN/ha/yr)	Total Dep/ Min CL	Total Dep/ Max CL	Project NN Dep (kgN/ha/yr)	Project Impact/ Min CL	Project Impact/ Max CL	BG Dep (kgN/ha/yr)	Total Dep/ Min CL	Total Dep/ Max CL
E14	0.15	2%	1%	15	151%	75%	0.14	1.4%	0.7%	15	150%	75%
E15	0.15	1%	1%	15	150%	75%	0.13	1.3%	0.6%	15	150%	75%
E16	0.27	3%	1%	15	152%	76%	0.26	2.6%	1.3%	15	152%	76%
E17	0.30	3%	1%	15	152%	76%	0.28	2.8%	1.4%	15	152%	76%
E18	0.32	3%	2%	15	152%	76%	0.30	3.0%	1.5%	15	152%	76%
E19	0.24	2%	1%	15	151%	76%	0.22	2.2%	1.1%	15	151%	76%
E20	0.28	3%	1%	15	152%	76%	0.27	2.7%	1.3%	15	152%	76%
E21	0.28	3%	1%	15	152%	76%	0.26	2.6%	1.3%	15	152%	76%

Table 8 Scenario B Predicted Nutrient Nitrogen Deposition – With and Without Landfall HDD

	Nutrient Nitrogen - with Landfall HDD						Nutrient Nitrogen - without Landfall HDD					
Receptor name	**Project NN Dep (kgN/ha/yr)**	**Project Impact/ Min CL**	**Project Impact/ Max CL**	**BG Dep (kgN/ha/yr)**	**Total Dep/ Min CL**	**Total Dep/ Max CL**	**Project NN Dep (kgN/ha/yr)**	**Project Impact/ Min CL**	**Project Impact/ Max CL**	**BG Dep (kgN/ha/yr)**	**Total Dep/ Min CL**	**Total Dep/ Max CL**
E1	1.88	23%	13%	11.5	167%	89%	0.08	1.0%	0.5%	11.5	145%	77%
E2	1.28	16%	9%	11.5	160%	85%	0.08	1.0%	0.5%	11.5	145%	77%
E3	0.32	3%	2%	19.9	202%	101%	0.14	1.4%	0.7%	19.9	200%	100%
E4	4.44	44%	22%	19.9	243%	122%	0.25	2.5%	1.3%	19.9	202%	101%
E5	5.12	51%	26%	19.9	250%	125%	0.30	3.0%	1.5%	19.9	202%	101%
E6	3.99	40%	20%	19.9	239%	119%	0.26	2.6%	1.3%	19.9	202%	101%
E7	2.98	30%	15%	19.9	229%	114%	0.23	2.3%	1.2%	19.9	201%	101%
E8	0.49	-	-	11.5	-	-	0.11	-	-	11.5	-	-
E9	0.68	7%	3%	19.9	206%	103%	0.61	6.1%	3.0%	19.9	205%	103%
E10	0.23	-	-	11.5	-	-	0.17	-	-	11.5	-	-
E11	0.26	3%	1%	21.0	213%	107%	0.24	2.4%	1.2%	21.0	213%	106%
E12	0.59	6%	3%	14.9	155%	77%	0.58	5.8%	2.9%	14.9	155%	77%
E13	0.71	7%	4%	14.9	156%	78%	0.70	7.0%	3.5%	14.9	156%	78%

Receptor name	Nutrient Nitrogen - with Landfall HDD Project NN Dep (kgN/ha/yr)	Project Impact/ Min CL	Project Impact/ Max CL	BG Dep (kgN/ha/yr)	Total Dep/ Min CL	Total Dep/ Max CL	Nutrient Nitrogen - without Landfall HDD Project NN Dep (kgN/ha/yr)	Project Impact/ Min CL	Project Impact/ Max CL	BG Dep (kgN/ha/yr)	Total Dep/ Min CL	Total Dep/ Max CL
E14	0.33	3%	2%	14.9	152%	76%	0.32	3.2%	1.6%	14.9	152%	76%
E15	0.32	3%	2%	14.9	152%	76%	0.30	3.0%	1.5%	14.9	152%	76%
E16	0.35	3%	2%	14.9	152%	76%	0.33	3.3%	1.6%	14.9	152%	76%
E17	0.38	4%	2%	14.9	153%	76%	0.35	3.5%	1.8%	14.9	153%	76%
E18	0.46	5%	2%	14.9	154%	77%	0.43	4.3%	2.2%	14.9	153%	77%
E19	0.34	3%	2%	14.9	152%	76%	0.32	3.2%	1.6%	14.9	152%	76%
E20	0.38	4%	2%	14.9	153%	76%	0.35	3.5%	1.8%	14.9	153%	76%
E21	0.46	5%	2%	14.9	154%	77%	0.43	4.3%	2.2%	14.9	153%	77%

Table 9 Scenario C Predicted Nutrient Nitrogen Deposition – With and Without Landfall HDD

	Nutrient Nitrogen - with Landfall HDD						Nutrient Nitrogen - without Landfall HDD					
Receptor name	Project NN Dep (kgN/ha/yr)	Project Impact/ Min CL	Project Impact/ Max CL	BG Dep (kgN/ha/yr)	Total Dep/ Min CL	Total Dep/ Max CL	Project NN Dep (kgN/ha/yr)	Project Impact/ Min CL	Project Impact/ Max CL	BG Dep (kgN/ha/yr)	Total Dep/ Min CL	Total Dep/ Max CL
E1	1.87	23%	12%	12	167%	89%	0.07	0.9%	0.5%	12	145%	77%
E2	1.28	16%	9%	12	160%	85%	0.08	1.0%	0.5%	12	145%	77%
E3	0.31	3%	2%	20	202%	101%	0.13	1.3%	0.6%	20	200%	100%
E4	4.43	44%	22%	20	243%	122%	0.25	2.5%	1.2%	20	201%	101%
E5	5.11	51%	26%	20	250%	125%	0.30	3.0%	1.5%	20	202%	101%
E6	3.99	40%	20%	20	239%	119%	0.25	2.5%	1.3%	20	202%	101%
E7	2.97	30%	15%	20	229%	114%	0.23	2.3%	1.1%	20	201%	101%
E8	0.49	-	-	12	-	-	0.11	-	-	12	-	-
E9	0.67	7%	3%	20	206%	103%	0.59	5.9%	2.9%	20	205%	102%
E10	0.22	-	-	12	-	-	0.16	-	-	12	-	-
E11	0.25	2%	1%	21	213%	106%	0.23	2.3%	1.2%	21	213%	106%
E12	0.56	6%	3%	15	155%	77%	0.55	5.5%	2.8%	15	155%	77%
E13	0.70	7%	3%	15	156%	78%	0.68	6.8%	3.4%	15	156%	78%

	Nutrient Nitrogen - with Landfall HDD						Nutrient Nitrogen - without Landfall HDD					
Receptor name	Project NN Dep (kgN/ha/yr)	Project Impact/ Min CL	Project Impact/ Max CL	BG Dep (kgN/ha/yr)	Total Dep/ Min CL	Total Dep/ Max CL	Project NN Dep (kgN/ha/yr)	Project Impact/ Min CL	Project Impact/ Max CL	BG Dep (kgN/ha/yr)	Total Dep/ Min CL	Total Dep/ Max CL
E14	0.79	8%	4%	15	157%	78%	0.77	7.7%	3.9%	15	157%	78%
E15	0.43	4%	2%	15	153%	77%	0.41	4.1%	2.1%	15	153%	77%
E16	0.37	4%	2%	15	153%	76%	0.35	3.5%	1.7%	15	152%	76%
E17	0.43	4%	2%	15	153%	77%	0.41	4.1%	2.0%	15	153%	77%
E18	0.62	6%	3%	15	155%	78%	0.59	5.9%	2.9%	15	155%	77%
E19	0.38	4%	2%	15	153%	76%	0.36	3.6%	1.8%	15	153%	76%
E20	0.47	5%	2%	15	154%	77%	0.44	4.4%	2.2%	15	153%	77%
E21	0.65	7%	3%	15	156%	78%	0.62	6.2%	3.1%	15	155%	78%

Table 10 Scenario A Predicted Acid Deposition – With and Without Landfall HDD

Receptor name	Acid Deposition – With Landfall HDD			Acid Deposition – Without Landfall HDD		
	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)
E1	0.13	18.5	146.5	0.005	1.4	129.4
E2	0.09	12.8	140.8	0.01	1.4	129.4
E3	0.02	1.6	131.3	0.01	0.8	130.5
E4	0.31	25	154.8	0.02	1.6	131.3
E5	0.36	29.2	158.8	0.02	1.6	131.3
E6	0.28	22.7	152.4	0.02	1.6	131.3
E7	0.21	17	146.7	0.01	0.8	130.5
E8	0.03	-	-	0.01	-	-
E9	0.04	3.2	132.9	0.04	3.2	132.9
E10	0.01	-	-	0.01	-	-
E11	0.02	1.6	131.3	0.02	1.6	131.3
E12	0.04	2.9	90.4	0.04	2.9	90.4
E13	0.04	2.9	90.4	0.04	2.9	90.4

Receptor name	Acid Deposition – With Landfall HDD			Acid Deposition – Without Landfall HDD		
	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)
E14	0.01	0.7	88.2	0.01	0.7	88.2
E15	0.01	0.7	88.2	0.01	0.7	88.2
E16	0.02	1.5	88.9	0.02	1.5	88.9
E17	0.02	1.5	88.9	0.02	1.5	88.9
E18	0.02	1.5	88.9	0.02	1.5	88.9
E19	0.02	1.5	88.9	0.02	1.5	88.9
E20	0.02	1.5	88.9	0.02	1.5	88.9
E21	0.02	1.5	88.9	0.02	1.5	88.9

Table 11 Scenario B Predicted Acid Deposition – With and Without Landfall HDD

Receptor name	Acid Deposition – With Landfall HDD			Acid Deposition – Without Landfall HDD		
	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)
E1	0.13	18.5	146.5	0.01	1.4	129.4
E2	0.09	12.8	140.8	0.01	1.4	129.4
E3	0.02	1.6	131.3	0.01	0.8	130.5
E4	0.32	25.9	155.6	0.02	1.6	131.3
E5	0.36	29.2	158.8	0.02	1.6	131.3
E6	0.28	22.7	152.4	0.02	1.6	131.3
E7	0.21	17	146.7	0.02	0.8	130.5
E8	0.03	-	-	0.01	-	-
E9	0.05	4.1	133.7	0.04	3.2	131.3
E10	0.02	-	-	0.01	-	-
E11	0.02	1.6	131.3	0.02	1.6	131.3
E12	0.04	2.9	90.4	0.04	2.9	90.4
E13	0.05	3.6	91.1	0.05	2.9	90.4

Receptor name	Acid Deposition – With Landfall HDD			Acid Deposition – Without Landfall HDD		
	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)
E14	0.02	1.5	88.9	0.02	1.5	88.9
E15	0.02	1.5	88.9	0.02	1.5	88.9
E16	0.02	1.5	88.9	0.02	1.5	88.9
E17	0.03	2.2	89.7	0.03	2.2	89.7
E18	0.03	2.2	89.7	0.03	2.2	89.7
E19	0.02	1.5	88.9	0.02	1.5	88.9
E20	0.03	2.2	89.7	0.03	2.2	89.7
E21	0.03	2.2	89.7	0.03	2.2	89.7

Table 12 Scenario C Predicted Acid Deposition – With and Without Landfall HDD

Receptor name	Acid Deposition – With Landfall HDD			Acid Deposition – Without Landfall HDD		
	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)
E1	0.13	18.5	146.5	0.01	1.4	129.4
E2	0.09	12.8	140.8	0.01	1.4	129.4
E3	0.02	1.6	131.3	0.01	0.8	130.5
E4	0.32	25.9	155.6	0.02	1.6	131.3
E5	0.36	29.2	158.8	0.02	1.6	131.3
E6	0.28	22.7	152.4	0.02	1.6	131.3
E7	0.21	17	146.7	0.02	1.6	131.3
E8	0.03	-	-	0.01	-	-
E9	0.05	4.1	133.7	0.04	3.2	131.3
E10	0.02	-	-	0.01	-	-
E11	0.02	1.6	131.3	0.02	1.6	131.3
E12	0.04	2.9	90.4	0.04	2.9	90.4
E13	0.05	3.6	91.1	0.05	3.6	91.1

Receptor name	Acid Deposition – With Landfall HDD			Acid Deposition – Without Landfall HDD		
	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)	Project Acid dep (keq/ha/yr)	Project Impact/ CL (%)	Total Deposition/ CL (%)
E14	0.06	4.4	91.8	0.06	4.4	91.8
E15	0.03	2.2	89.7	0.03	2.2	89.7
E16	0.03	2.2	89.7	0.02	1.5	88.9
E17	0.03	2.2	89.7	0.03	2.2	89.7
E18	0.04	2.9	90.4	0.04	2.9	90.4
E19	0.03	2.2	89.7	0.03	2.2	89.7
E20	0.03	2.2	89.7	0.03	2.2	89.7
E21	0.05	3.6	91.1	0.04	2.9	90.4