H2Teesside Project

Planning Inspectorate Reference: EN070009

Land within the boroughs of Redcar and Cleveland and Stockton-on-Tees, Teesside and within the borough of Hartlepool, County Durham

Document Reference 7.4: Change Application Report – Appendices

The Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

Applicant: H2 Teesside Ltd

Date: 16 October 2024

Rev: 0

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1A.0 AIR QUALITY

1A.1 Introduction

1A.1.1 This Appendix 1A provides a review of specific Proposed Development changes identified by the air quality screening assessment in Section 4 of the Change Report deemed to require a re-examination of the air quality assessment as reported in the Original ES.

1A.1.2 ES Chapter 8: Air Quality [APP-060] formed part of the Original ES and should be read alongside the following documents submitted with the DCO Application [EN070009]:

- ES Appendix 8A: Air Quality - Construction Assessment [APP-190]; and
- ES Appendix 8B: Air Quality - Operational Phase [APP-191].

1A.1.3 In this Appendix 1A, we review the potential need for changes to ES Chapter 8: Air Quality [APP-060] and ES Appendix 8B: Air Quality – Operational Phase [APP-191] due to the Proposed Development changes as detailed in Section 2.3 of the Change Report.

1A.1.4 No changes are required to ES Appendix 8A: Air Quality – Construction Assessment [APP-190], as the Proposed Development changes would not affect baseline conditions during the construction phase.

1A.1.5 This assessment only considers changes in baseline conditions or potential effects since the Original ES was prepared; if no change is listed then conditions are the same as those as presented in the Original ES.

1A.1.6 There are seven updated Figures included with this Appendix 1A for the Change Report. These are revised versions of ES Figures 8-4 to 8-13, reflecting changes to the buildings (refer to Figures 8-4 and 8-5) and new contours generated from re-modelling taking into account the Proposed Development changes (refer to Figures 8-6 to 8-13).

1A.2 ES Chapter 8 Air Quality

Introduction of the Changes

1A.2.1 Proposed Development Changes 2, 3, 4, 6 and 9 would not change the outcomes of the air quality assessment.

1A.2.2 Proposed Development Change 1 would add an additional emission source on site and change the source release locations. This is likely to make minor changes to the quantitative air quality assessment of the operational phase of the Proposed Development, but not sufficient to change the conclusions of the assessment as reported in the Original ES.

1A.2.3 Proposed Development Changes 5 and 7 would remove or alter the buildings considered within the dispersion modelling assessment, including associated site layout alterations. This is likely to make minor changes to the quantitative air quality assessment of the operational phase of the Proposed Development, but not

sufficient to change the conclusions of the assessment as reported in the Original ES.

1A.2.4 Sources of Information/ Data

1A.2.5 In undertaking the Air Quality assessment of the Changes, the Applicant has used Air Quality data which has been updated from the data used in the Environmental Statement. The update to the Air Quality data has arisen because of further development of the technical solutions used in the process and has meant some model inputs parameters have changed, such as some of the flows and pollutant emissions rate, as well as consideration of different flare operational case.

1A.2.6 The following sources of information have been reviewed and have informed the updated assessment:

- the updated physical parameters for the modelling of emissions from the Proposed Development's point sources have been sourced from the concept design data provided by the Applicant (including the latest site layout) and are summarised in Appendix 8B: Air Quality – Operational Phase at the end of this Change Report Appendix 1A.

Assumptions and Limitations

1A.2.7 To minimise the likelihood of under-estimating the predicted ground level process contributions (PCs) to ground level concentrations from the main stack, the following conservative assumptions have been made for the operational phase of the Proposed Development, in addition to the assumptions as listed in the Original ES:

- the modelling is based on the layout and dimensions updated to reflect Proposed Development Changes 5 and 7 and provided by the Applicant for this Change Report. It is not proportionate to sensitivity test all the different building locations. he effect of buildings on pollutant dispersal is greatest in the immediate area within the site. It is considered unlikely that alterations to building layouts and dimensions would notably change offsite operational predictions of pollutant contributions and therefore effects are unlikely to change from not significant.

Proposed Development Design and Impact Avoidance

Stack Heights

1A.2.8 Dispersion modelling has been undertaken to verify that the optimal stack heights determined in the Original ES remain valid at the current design stage. This was achieved by comparing updated maximum impacts on human health and ecological receptors, ensuring that impacts at sensitive locations would still be considered to be acceptable. For the flares, the final release height is based on the results of the stack height assessment with the flares in emergency mode, as well as consideration of the minimum release height required for safety and design reasons.

1A.2.9 Details of the stack height determination results are presented in updated Appendix 8B: Air Quality – Operational Phase, at the end of this Appendix 1A.

Impacts and Likely Significant Effects

Operation

1A.2.10 The magnitude of impact of point source emissions at human health receptors has been determined from model outputs at discrete receptor locations, as well as at the maximum anywhere outside the site boundary. This has been re-assessed since the Original ES to include Proposed Development Changes 1, 5 and 7 in the model inputs.

1A.2.11 The results are presented below as the maximum concentration of the atmospheric pollutants during normal operations that occurs at sensitive receptors, as well as at the maximum anywhere outside the site boundary. The predicted concentrations at other locations within the Study Area and for different scenarios are reported in the updated Appendix 8B: Air Quality – Operational Phase in this Change Report, Tables 1A-7 to 1A-41, as well as presented as isopleths in Figures 8-6 to 8-13.

Table 1A-1: Results of Operational Impact Assessment for Human Health Impacts during Normal Operations (ES Table 8-8)

SPECIES	LOCATION	AIR QUALITY ASSESSMENT LEVEL (AQAL) ($\mu G/m^3$)	PREDICTED CONCENTRATION (PC) ($\mu G/m^3$)	PC/AQAL (%)	MAGNITUDE OF IMPACT	BACKGROUND CONCENTRATION (BC) ($\mu G/m^3$)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT WITH BC ($\mu G/m^3$)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) ($\mu G/m^3$)	PEC/AQAL (%)	SIGNIFICANCE OF EFFECT
Maximum NO_2 hourly mean (as the 99.79th percentile) – Normal Operation	Most affected sensitive receptor (O_3)	200	1.0	0.5%	**Imperceptible**	26.6	33.0	34.0	17.0%	**Not Significant**
	Maximum anywhere outside site boundary		3.1	1.5%	**Imperceptible**	26.6	29.0	32.1	16.1%	**Not Significant**
Maximum NO_2 annual mean	Most affected sensitive receptor (O_3)	40	0.1	0.2%	**Imperceptible**	13.3	14.6	14.6	36.6%	**Not Significant**
	Maximum anywhere outside		0.2	0.6%	**Very Low**	13.3	14.6	14.9	37.2%	**Not Significant**

SPECIES	LOCATION	AIR QUALITY ASSESSMENT LEVEL (AQAL) (µG/m^3)	PREDICTED CONCENTRATION (PC) (µG/m^3)	PC/AQAL (%)	MAGNITUDE OF IMPACT	BACKGROUND CONCENTRATION (BC) (µG/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT WITH BC (µG/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µG/m^3)	PEC/AQAL (%)	SIGNIFICANCE OF EFFECT
	site boundary									
Maximum CO 8-hour rolling average – Normal Operation	Most affected sensitive receptor (O_2)	10,000	0.1	<0.1%	**Imperceptible**	221.8	263.7	263.8	2.6%	**Not Significant**
	Maximum anywhere outside site boundary		0.3	<0.1%	**Imperceptible**	221.8	242.8	243.1	2.4%	**Not Significant**

1A.2.12 Operational air quality results for the worst affected ecological receptor (Teesmouth and Cleveland Coast Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar site, located adjacent to the Main Site) are presented in Table 1A-1-2. Results at all other ecological receptors are presented in updated Appendix 8B: Air Quality – Operational Phase at the end of this Appendix 1A.

Table 1A-2: Results of Operational Impact Assessment for Designated Habitats (ES Table 8-9)

SPECIES	AQAL ($\mu G/M^3$)	PC ($\mu G/M^3$)	PC/AQAL (%)	BC ($\mu G/M^3$)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT WITH BC ($\mu G/M^3$)	PEC ($\mu G/M^3$)	PEC/AQAL (%)	SIGNIFICANCE OF EFFECT
Worst case receptor NO_x daily mean (as the 100^{th} percentile)	75	2.9	3.8%	41.4	40.4	43.2	57.7%	**Not Significant**
Worst case receptor NO_x annual mean	30	0.3	1.1%	20.7	22.6	22.9	76.5%	**Need for further assessment**
Worst case receptor NH_3 annual mean	3	0.01	0.4%	1.3	1.3	1.3	43.8%	**Not Significant**
Worst case receptor Nitrogen Deposition	10	0.11	1.1%	12.5	12.8	12.9	129.2%	**Need for further assessment**
Worst case receptor Acid Deposition	0.856 Min CL Min N/ 4.856 Min CL Max N / 4 Min CL Max S	0.008	<0.1%	1.00	1.01	1.03	5.5%	**Not Significant**

1A.2.13 Details on how the conclusion on significance was reached for the effects on ecological receptor that couldn't be screened out from the need for further assessment are presented in Appendix 3A.0 Ecology and Nature Conservation.

1A.2.14 Overall, air quality concentration changes as compared to those reported in the Original ES are imperceptible and thus the conclusions on the significance of effects presented herein are the same as those reported in the Original ES, i.e. **not significant** both for impacts upon human health and designated habitats.

1A.3 Appendix 8B: Air Quality – Operational Phase

Introduction of the Changes

1A.3.1 This assessment considers Proposed Development Changes 1, 5 and 7 as the only relevant changes that will affect emissions - the model parameters have been updated to reflect these changes. The assessment has considered updated emissions from the boilers, flares and emergency diesel generators during the same operational scenarios as presented in the Original ES.

1A.3.2 In undertaking the Air Quality assessment of the Changes, the Applicant has used Air Quality data which has been updated from the data used in the Environmental Statement. The update to the Air Quality data has arisen because of further development of the technical solutions used in the process and has meant some model inputs parameters have changed, such as some of the flows and pollutant emissions rate, as well as consideration of different flare operational case.

Scope

Combustion Plant and Carbon Capture Plant

1A.3.3 The scenarios and sources included in this assessment are the same as in the Original ES, but with updated parameters, including a second flare:

- start-up – including Fired Heaters (natural gas fired), flares (to include pilot and flares operating as in Emergency scenario, in 3 different modes, referred to as scenario 1, 2 and 3), and Auxiliary Boilers (natural gas fired);
- normal operation – including auxiliary boilers (hydrogen and tailings gas fired) and flares in normal operation (pilot and purge only); and
- emergency – including Emergency flares operation (in 3 different modes, referred to as scenario 1, 2 and 3) and emergency diesel generators.

1A.3.4 The dispersion of emissions has been predicted using the latest version of the atmospheric dispersion model (ADMS) (Version 6). The results are presented in both tabular format within this Appendix and as contours of PCs overlaid on mapping of the surrounding area - the following figures have been produced showing the predicted isopleths:

- Figure 6: Annual Mean NO_2 Process Contribution for the Proposed Development during Normal Operations for Phase 1 and 2 Combined – for the Worst Affected Meteorological Year of 2022 [APP-101].

- Figure 7: 99.79th Percentile 1h NO_2 Process Contribution for the Proposed Development during Normal Operations for Phase 1 and 2 Combined – for the Worst Affected Meteorological Year of 2018 [APP-102].
- Figure 8: Maximum 8h Rolling CO Process Contribution for the Proposed Development during Emergency Operations for Phase 1 and 2 Combined – for the Worst Affected Meteorological Year of 2018 [APP-103].
- Figure 9: Maximum 1h CO Process Contribution for the Proposed Development during Start Up for Phase 1 and 2 Combined – for the Worst Affected Meteorological Year of 2021 [APP-104].
- Figure 10: Annual Mean NOx Process Contribution for the Proposed Development during Normal Operations for Phase 1 and 2 Combined – for the Worst Affected Meteorological Year of 2022 [APP-105].
- Figure 11: Annual Mean NH_3 Process Contribution for the Proposed Development during Normal Operations for Phase 1 and 2 Combined – for the Worst Affected Meteorological Year of 2022 [APP-106].
- Figure 12: Nitrogen Deposition from Process Contribution for the Proposed Development during Normal Operations for Phase 1 and 2 Combined – for the Worst Affected Meteorological Year of 2022 [APP-107].
- Figure 13: Acid Deposition from Process Contribution for the Proposed Development during Normal Operations for Phase 1 and 2 Combined – for the Worst Affected Meteorological Year of 2022 [APP-108].

1A.3.5 The dispersion modelling assessment has concentrated on the combustion emissions associated with the operation of the Fired Heaters (start-up only), auxiliary boilers, operational flares (both normal and emergency) and emergency diesel generators of oxides of nitrogen (NO_x), nitrogen dioxide (NO_2), ammonia (NH_3), carbon monoxide (CO), Particulate Matter (PM_{10} and $PM_{2.5}$) and sulphur dioxide (SO_2).

Sources of Information

1A.3.6 The data that has been used within this assessment includes pertinent information from:

- ES Chapter 4: Proposed Development [APP-056];
- data on emissions to atmosphere from the operational process, supplied by the Applicant or derived from achievable emission levels set out in industry sector guidance;
- details on the Proposed Development site layout;
- Ordnance Survey mapping (OS, 2023);
- baseline air quality data from project specific monitoring, published sources and Local Authorities; and
- meteorological data supplied by ADM Ltd (ADM Ltd, 2023).

Methodology

1A.3.7 Most sections of the methodology have not changed as compared to those included in the Original ES. The only the methodology sections that have been amended are presented below.

Emissions Data

1A.3.8 Updated stack positions and emissions inventory are presented in Table 1A-3 and Table 1A-4. Emission parameters for the second flare (Change 1) have been assumed to be the same as for the original flare.

Table 1A-3: Emissions Inventory per Unit (ES Table 8B-2)

PARAMETER	UNIT	FIRED HEATER (START-UP)	FLARE (NORMAL OPERATION)	FLARE (EMERGENCY) SCENARIO 1	FLARE (EMERGENCY) SCENARIO 2	FLARE (EMERGENCY) SCENARIO 3	AUXILIARY BOILER (START UP)	AUXILIARY BOILER (NORMAL OPERATION)	EMERGENCY DIESEL GENERATORS
Stack Position	M (Easting, Northing National Grid)	Phase 1 – 456360, 525375 Phase 2 – 456558, 525792	Phase 1 – 456477, 525580 Phase 2 - 456588, 525536			Phase 1 – 456477, 525580 Phase 2 - 456588, 525536	Phase 1 – 456421, 525325 Phase 2 – 456634, 525765	Phase 1 – 456421, 525325 Phase 2 – 456634, 525765	Phase 1 – 456542, 525209 Phase 2 – 456441, 525830
Release Height (above ground level)	m	35	66.4*	99.9*	97.7*	100.6*	70	70	10
Effective internal stack diameter	m	0.9	0.9*	11.5*	10.8*	11.8*	1.9	1.9	0.92
Flue temperature	°C	200	1,000	1,000	1,000	1,000	259	155	600
Flue H_2O content	%	18.0	-	0.0045	-	-	-	29.3	-
Flue O_2 content (wet)	%	1.6	0	0.05	0.05	0.05	-	1.6	-
Stack gas exit velocity	m/s	16.6	20	20	20	20	16.5	16.1	15.0

PARAMETER	UNIT	FIRED HEATER (START-UP)	FLARE (NORMAL OPERATION)	FLARE (EMERGENCY) SCENARIO 1	FLARE (EMERGENCY) SCENARIO 2	FLARE (EMERGENCY) SCENARIO 3	AUXILIARY BOILER (START UP)	AUXILIARY BOILER (NORMAL OPERATION)	EMERGENCY DIESEL GENERATORS
Stack flow (actual)	Am^3/s	10.5	1.0	-	-	-	46.7	45.7	10.0
Stack flow (normalised)	kNm^3/hr	18.3	-	-	-	-	61.0	77.5	-

* This is the representative higher effective Stack Height (m) and diameter used for air quality modelling purposes only, calculated following a standardised industry method and allowing for consideration of the height of the flame.

1A.3.9 The modelled pollutant emission rates (in grams per second (g/s)) have been calculated based on normal flow and BAT emission levels (boiler and fired heater), g/kW-hr Tier 2 emission levels (emergency diesel generator) or by mass balance (flares). The emission limits assumed to apply to the Proposed Development are shown in Table 1A-4.

Table 1A-4:Emissions Concentrations and the Assessed Emission Rate per Units

POLLUTANT	UNIT (SOURCE)	FIRED HEATER (START-UP)	FLARE (NORMAL OPERATION)	FLARE (EMERGENCY) SCENARIO 1	FLARE (EMERGENCY) SCENARIO 2	FLARE (EMERGENCY) SCENARIO 3	AUXILIARY BOILER (START UP)	AUXILIARY BOILER (NORMAL OPERATION)	EMERGENCY DIESEL GENERATORS (8.89 MWTH)
Oxides of Nitrogen Long-term	mg/Nm^3 (ELV/BAT)	200	-	-	-	-	100	75	-
Oxides of Nitrogen Short-term	mg/Nm^3 (ELV/BAT)	200	-	-	-	-	100	106.25	-
Carbon monoxide	mg/Nm^3 (ELV/BAT)	100	-	-	-	-	100	-[a]	-
Particulate Matter	mg/Nm^3 (ELV/BAT)	-	-	-	-	-	-[b]	-[b]	-
Ammonia	mg/Nm^3 (ELV/BAT)	-[c]	-	-	-	-	-[c]	3	-
Sulphur Dioxide	mg/Nm^3 (ELV/BAT)	3.9	-	-	-	-	-[b]	-[b]	-
Oxides of Nitrogen	g/kW-hr (Tier 2)	-	-	-	-	-	-	-	6.4
Carbon monoxide	g/kW-hr (Tier 2)	-	-	-	-	-	-	-	3.5
Particulate Matter	g/kW-hr (Tier 2)	-	-	-	-	-	-	-	0.2

POLLUTANT	UNIT (SOURCE)	FIRED HEATER (START-UP)	FLARE (NORMAL OPERATION)	FLARE (EMERGENCY) SCENARIO 1	FLARE (EMERGENCY) SCENARIO 2	FLARE (EMERGENCY) SCENARIO 3	AUXILIARY BOILER (START UP)	AUXILIARY BOILER (NORMAL OPERATION)	EMERGENCY DIESEL GENERATORS (8.89 MWTH)
Oxides of Nitrogen Long-term	g/s	1.02	0.010	21.97	19.23	23.00	1.69	1.61	5.51
Oxides of Nitrogen Short-term	g/s	1.02	-	21.97	19.23	23.00	1.69	2.29	5.51
Carbon monoxide	g/s	0.51	0.048	100.17	87.66	104.85	1.69	-	3.01
Particulate Matter	g/s	-	0.0009[d]	8.72	7.63	9.13	-	-	0.17
Ammonia	g/s	-	-	-	-	-	-	0.0646	-
Sulphur Dioxide	g/s	0.02	-	-	-	-	-	-	-

[a] Negligible emissions from Hydrogen. [b] Negligible emissions from Hydrogen/Natural gas. [c] No SCR at start up. [d] Negligible emissions

Building Downwash Effects

1A.3.10 The location and dimensions of the buildings included in the air quality model have been updated to take into account the latest site layout. Table 1A-5 presents the updated building list.

Table 1A-5: **Buildings Incorporated into the Modelling Assessment (ES Table 8B-7)**

BUILDING MODEL ID	BUILDING CENTRE GRID REFERENCE (X, Y)	HEIGHT (m)	LENGTH (m)	WIDTH (m)	ANGLE (°)
Tank2P2	456592, 525846	22	15	15	112
Tank1P2	456571, 525855	22	15	15	112
ASU_P2	456516, 525951	40	85	57	112
VAU121-A_P1_AuxBoilerandBFWP1	456421, 525323	15	35	15	112
DV113-B	456596, 525687	52	6	6	112
PAU110-A_P2	456591, 525824	15	20	18	112
PAU110-A_P1	456398, 525298	15	20	18	112
VAU115-A	456513, 525672	25	50	26	112
VAU121-A_P2	456635, 525767	15	35	15	112
PAU122-A_P2	456606, 525776	20	12	20	112
PAU122-A_P1	456419, 525348	20	12	20	112
Compressor shelter H2 storage P2	456584, 525628	15	17	37	112
Compressor Shelter H2 storage P1	456506, 525470	15	17	37	112
Raw water treatment P2	456717, 525779	20	53	17	112

BUILDING MODEL ID	BUILDING CENTRE GRID REFERENCE (X, Y)	HEIGHT (m)	LENGTH (m)	WIDTH (m)	ANGLE (°)
Raw water treatment P1	456278, 525322	20	17	53	112
Demin Water plant package P2	456631, 525807	15	38	24	112
Demin Water plant package P1	456299, 525241	15	38	24	112
Cooling water unit P1	456273, 525408	17	32	32	112
Cooling water unit P2	456458, 525786	17	32	32	112
DV111-A_P1	456374, 525360	31	6	6	112
DV111-A_P2	456578, 525793	31	6	6	112
PAU112_P2	456543, 525717	19	27	35	112
VAU111-A_SUB_U1_P2	456557, 525752	32	27	33	112
PAU112_P1	456401, 525440	19	27	35	112
GHR_ATR_AnalyserP1	456387, 525405	23	27	33	112

Calculation of Deposition at Sensitive Ecological Receptors

1A.3.11 As well as the conversion factors used in the Original ES, deposition from ammonia was also considered in this updated assessment. The additional conversion rates and factors used in the assessment are detailed in Table 1A-6.

Table 1A-6: Conversion Factors – Calculation of Nutrient Nitrogen Deposition

POLLUTANT	DEPOSITION VELOCITY GRASSLAND (m/s)	DEPOSITION VELOCITY WOODLAND (m/s)	DEPOSITION CONVERSION FACTOR	
			Nutrient Nitrogen (µg/m^2/s to kgN/ha/yr)	Acid (µg/m^2/s to keq/ha/yr)
NH_3	0.02	0.03	259.7	18.5

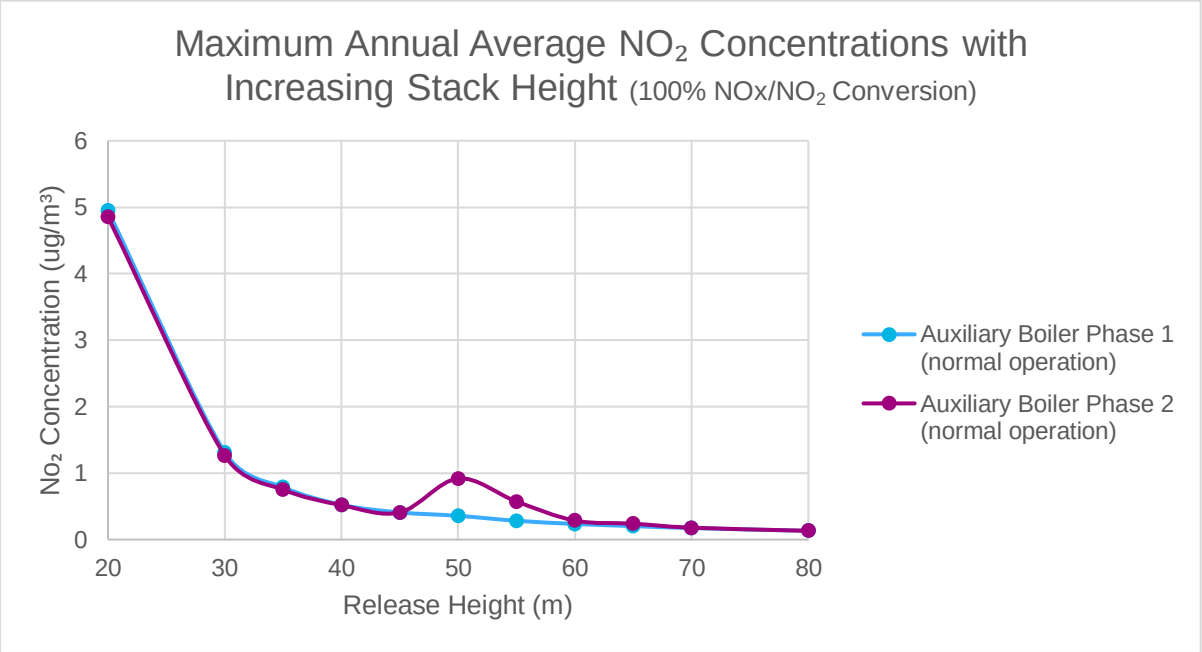
Operational Emissions Modelling Results

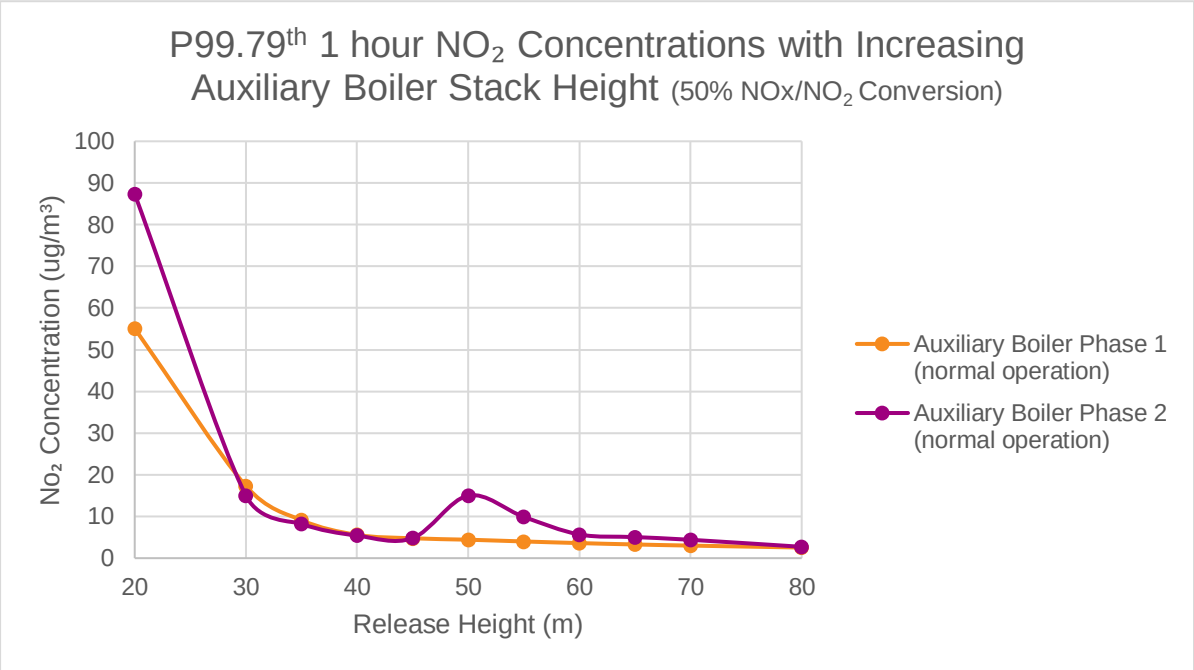
Evaluation of Stack Height

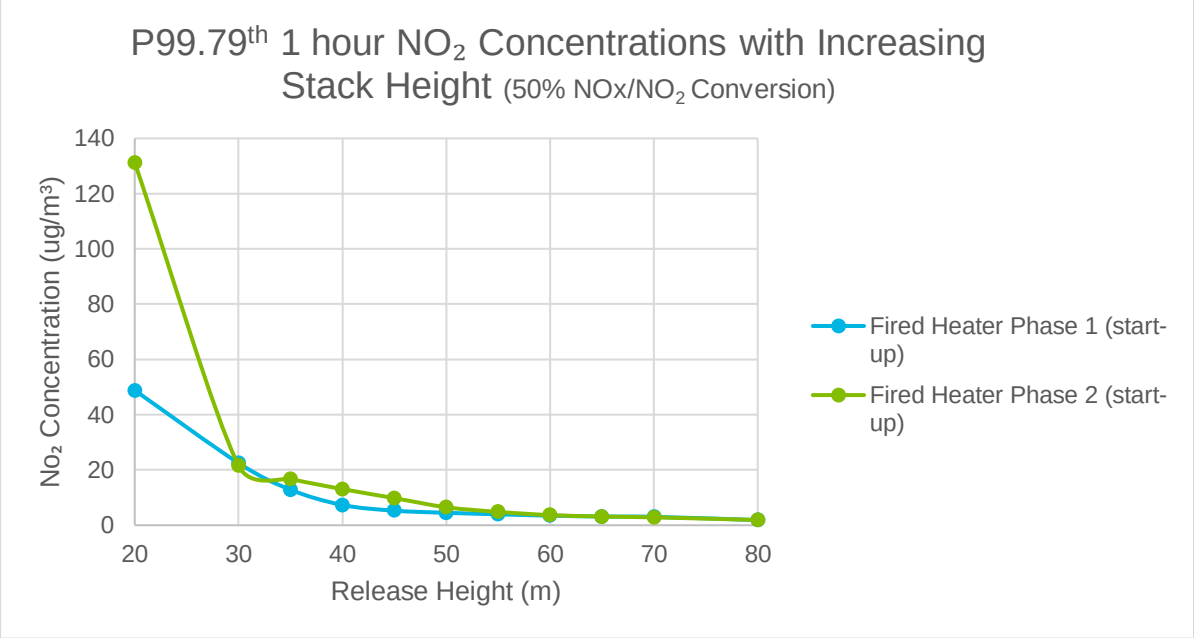
1A.3.12 Emissions from the Auxiliary Boilers, flares and Fired Heaters stacks have been modelled at various heights, following the same methodology as the Original ES. Graphs for the results showing the predicted ground level concentrations for the annual mean and maximum one hour NO_2 concentrations are presented in Plate 1A-1. The purpose of the graphs is to confirm the optimum release height determined during the Original ES. This illustrates that no changes from the optimum stack heights determined from the Original ES are necessary, but discussions on small differences in the curves' shapes are included in the two paragraphs below.

1A.3.13 For emissions from the flares, there is a predicted steady decline in ground level impacts with respect in an increase in release height, although there is no clear release height at which the rate of decline diminishes. This is due to the minimum height being at 65 m for safety reasons.

1A.3.14 The slight jump in NO_2 concentrations for the Phase 2 Auxiliary Boiler at 50 m and 55 m is due to the building downwash caused by the proximity and height of building VAU111-A_SUB_U1_P2.




P99.79th 1 hour NO2 Concentrations with Increasing Auxiliary Boiler Stack Height (50% NOx/NO2 Conversion)
No2 Concentration (ug/m3)
100
90
80
70
60
50
40
30
20
10
0
20
30
40
50
60
70
80
Release Height (m)
Auxiliary Boiler Phase 1 (normal operation)
Auxiliary Boiler Phase 2 (normal operation)


P99.79th 1 hour NO2 Concentrations with Increasing Stack Height (50% NOx/NO2 Conversion)
No2 Concentration (ug/m3)
140
120
100
80
60
40
20
0
20
30
40
50
60
70
80
Release Height (m)
Fired Heater Phase 1 (start-up)
Fired Heater Phase 2 (start-up)

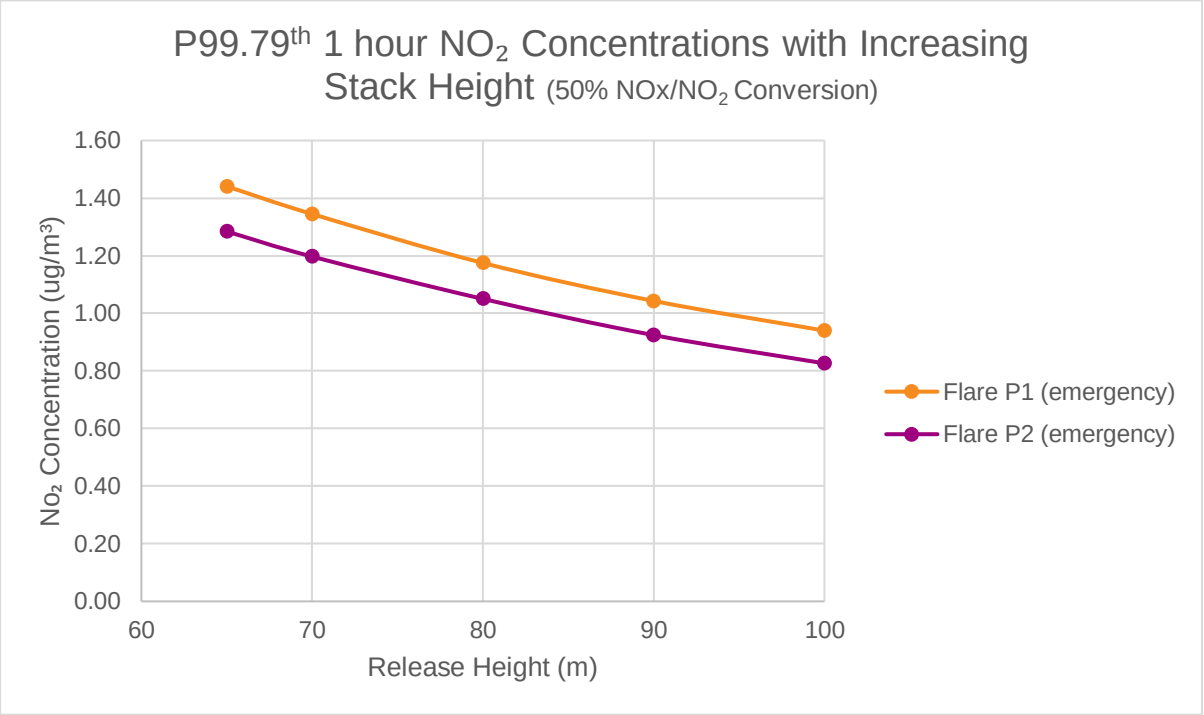


Plate 1A-1: Predicted Maximum Process Contribution to Ground Level NO_2 Concentrations at Stack Release Heights of 20 m to 100 m (ES Plate 8B-2)

Human Health Receptor Results

1A.3.15 Updated results at human health receptors are presented below.

Nitrogen Dioxide Emissions

1A.3.16 The maximum predicted annual mean NO_2 concentration that occurs anywhere within the Study Area as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is 0.2 µg/m^3 - this occurs close to the northern boundary of the site, within the dunes of the Teesmouth and Cleveland Coast SSSI, SPA and Ramsar site. The annual mean NO_2 predicted environmental concentration (i.e. the process contribution, existing background concentration and the process contributions of other committed developments) is 14.9 µg/m^3 and therefore is below the annual mean NO_2 Air Quality Assessment Level (AQAL) of 40 µg/m^3. NO_2 emissions from the Proposed Development are therefore not predicted to lead to a risk of the annual mean AQALs being exceeded anywhere within the Study Area.

1A.3.17 The discrete receptor most affected by long term emissions from the Proposed Development (including Proposed Development Changes 1, 5 and 7) is receptor O2, Cleveland Links, with a predicted annual mean NO_2 concentration as a result of the Proposed Development of 0.1 µg/m^3, representing 0.2% of the AQAL.

Table 1A-7: Predicted Change in Annual Mean NO_2 Concentrations – Normal Operation (ES Table 8B-14)

RECEPTOR	AQAL ($\mu g/m^3$)	PC ($\mu g/m^3$)	PC/AQAL (%)	BC ($\mu g/m^3$)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT ($\mu g/m^3$)	PEC ($\mu g/m^3$)	PEC/AQAL (%)
O1	40	0.1	0.1%	13.3	14.2	14.3	35.7%
O2	40	0.1	0.2%	13.3	14.4	14.4	36.1%
O3	40	0.1	0.2%	13.3	14.6	14.6	36.6%
O4	40	0.1	0.1%	13.3	14.4	14.5	36.2%
O5	40	0.1	0.1%	13.3	14.2	14.3	35.7%
O6	40	<0.1	0.1%	13.3	14.4	14.4	36.0%
O7	40	<0.1	0.1%	13.3	14.1	14.1	35.4%
O8	40	<0.1	0.1%	13.3	14.3	14.3	35.8%
O9	40	<0.1	0.1%	13.3	14.1	14.1	35.2%

1A.3.18 The maximum predicted hourly mean NO_2 concentration (as the 99.79th percentile of hourly averages) during normal operation that occurs anywhere within the Study Area as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is 3.1 µg/m^3 - this occurs again just to the north of the Proposed Development. The predicted environmental concentration (i.e. the process contribution, the existing background concentration and the process contribution from other committed developments) is 32.1 µg/m^3 and therefore is well below the hourly mean NO_2 AQAL of 200 µg/m^3.

1A.3.19 During the Start Up Scenario 1, the maximum predicted hourly mean NO_2 concentration (as the 99.79th percentile of hourly averages) during that occurs anywhere within the Study Area (2 km) as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is 9.7 µg/m^3, and this occurs to the north of the Proposed Development. The predicted environmental concentration (i.e., the process contribution the existing background concentration and the process contribution from other committed developments) is 38.7 µg/m^3 and therefore is well below the hourly mean NO_2 AQAL of 200 µg/m^3.

1A.3.20 During the Start Up Scenario 2, the maximum predicted hourly mean NO_2 concentration (as the 99.79th percentile of hourly averages) during that occurs anywhere within the Study Area (2 km) as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is 9.2 µg/m^3, and this occurs to the north of the Proposed Development. The predicted environmental concentration (i.e., the process contribution the existing background concentration and the process contribution from other committed developments) is 38.2 µg/m^3 and therefore is well below the hourly mean NO_2 AQAL of 200 µg/m^3.

1A.3.21 During the Start Up Scenario 3, the maximum predicted hourly mean NO_2 concentration (as the 99.79th percentile of hourly averages) during that occurs anywhere within the Study Area (2 km) as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is 9.7 µg/m^3, and this occurs to the north of the Proposed Development. The predicted environmental concentration (i.e., the process contribution the existing background concentration and the process contribution from other committed developments) is 38.7 µg/m^3 and therefore is well below the hourly mean NO_2 AQAL of 200 µg/m^3.

1A.3.22 During the Emergency Scenario 1, the maximum predicted hourly mean NO_2 concentration (as the 99.79th percentile of hourly averages) during that occurs anywhere within the Study Area as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is 87.7 µg/m^3, and this occurs to the north of the operational Proposed Development. The predicted environmental concentration (i.e., the process contribution, the existing background concentration and the process contribution from other committed developments) is 116.8 µg/m^3 and therefore is well below the hourly mean NO_2 AQAL of 200 µg/m^3.

1A.3.23 During the Emergency Scenario 2, the maximum predicted hourly mean NO_2 concentration (as the 99.79th percentile of hourly averages) during that occurs anywhere within the Study Area as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is 78.2 µg/m^3, and this occurs to the

north of the operational Proposed Development. The predicted environmental concentration (i.e., the process contribution, the existing background concentration and the process contribution from other committed developments) is 107.2 µg/m^3 and therefore is well below the hourly mean NO_2 AQAL of 200 µg/m^3.

1A.3.24 During the Emergency Scenario 3, the maximum predicted hourly mean NO_2 concentration (as the 99.79th percentile of hourly averages) during that occurs anywhere within the Study Area as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is 78.2 µg/m^3, and this occurs to the north of the operational Proposed Development. The predicted environmental concentration (i.e., the process contribution, the existing background concentration and the process contribution from other committed developments) is 107.2 µg/m^3 and therefore is well below the hourly mean NO_2 AQAL of 200 µg/m^3.

1A.3.25 The discrete receptor most affected by short term emissions from the Proposed Development is receptor O2, Cleveland Golf Links, with a predicted hourly mean NO_2 Process Contribution as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) of 1.0 µg/m^3, and a Predicted Environmental Concentration (PEC) of 32.2 µg/m^3 during normal operation.

1A.3.26 NO_2 emissions from the Proposed Development (including Proposed Development Changes 1, 5 and 7) are therefore not predicted to lead to a risk of the hourly mean air quality standard being exceeded anywhere within the Study Area.

Table 1A-8: Predicted Change in Hourly Mean NO_2 Concentrations (as the 99.79th Percentile of Hourly Averages) – Normal Operation (ES Table 8B-15)

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	200	0.9	0.5%	26.6	31.3	32.2	16.1%
O2	200	1.0	0.5%	26.6	31.4	32.3	16.2%
O3	200	1.0	0.5%	26.6	33.0	34.0	17.0%
O4	200	0.9	0.5%	26.6	32.5	33.5	16.7%
O5	200	0.8	0.4%	26.6	30.8	31.6	15.8%
O6	200	0.7	0.4%	26.6	30.2	30.9	15.5%
O7	200	0.7	0.3%	26.6	30.6	31.3	15.6%
O8	200	0.7	0.3%	26.6	30.1	30.8	15.4%
O9	200	0.7	0.3%	26.6	30.1	30.8	15.4%

Table 1A-9: Predicted Change in Hourly Mean NO_2 Concentrations (as the 99.79th Percentile of Hourly Averages) – Start Up Scenario 1

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	200	2.0	1.0%	26.6	31.3	33.3	16.6%
O2	200	2.2	1.1%	26.6	31.4	33.6	16.8%
O3	200	2.0	1.0%	26.6	33.0	35.0	17.5%
O4	200	1.9	0.9%	26.6	32.5	34.4	17.2%
O5	200	2.0	1.0%	26.6	30.8	32.8	16.4%
O6	200	1.6	0.8%	26.6	30.2	31.7	15.9%
O7	200	1.8	0.9%	26.6	30.6	32.3	16.2%
O8	200	1.5	0.7%	26.6	30.1	31.6	15.8%
O9	200	1.7	0.8%	26.6	30.1	31.8	15.9%

Table 1A-10: Predicted Change in Hourly Mean NO_2 Concentrations (as the 99.79th Percentile of Hourly Averages) – Start Up Scenario 2

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	200	2.0	1.0%	26.6	31.3	33.3	16.6%
O2	200	2.2	1.1%	26.6	31.4	33.5	16.8%
O3	200	2.0	1.0%	26.6	33.0	34.9	17.5%
O4	200	1.9	0.9%	26.6	32.5	34.4	17.2%
O5	200	2.0	1.0%	26.6	30.8	32.8	16.4%
O6	200	1.6	0.8%	26.6	30.2	31.7	15.9%
O7	200	1.7	0.9%	26.6	30.6	32.3	16.2%
O8	200	1.5	0.7%	26.6	30.1	31.6	15.8%
O9	200	1.6	0.8%	26.6	30.1	31.7	15.9%

Table 1A-11: Predicted Change in Hourly Mean NO_2 Concentrations (as the 99.79th Percentile of Hourly Averages) – Start Up Scenario 3

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	200	2.0	1.0%	26.6	31.3	33.3	16.6%
O2	200	2.2	1.1%	26.6	31.4	33.6	16.8%
O3	200	2.0	1.0%	26.6	33.0	35.0	17.5%
O4	200	1.9	0.9%	26.6	32.5	34.4	17.2%
O5	200	2.0	1.0%	26.6	30.8	32.8	16.4%
O6	200	1.6	0.8%	26.6	30.2	31.7	15.9%
O7	200	1.8	0.9%	26.6	30.6	32.4	16.2%
O8	200	1.5	0.7%	26.6	30.1	31.6	15.8%
O9	200	1.6	0.8%	26.6	30.1	31.7	15.9%

Table 1A-12: Predicted Change in Hourly Mean NO_2 Concentrations (as the 99.79th Percentile of Hourly Averages) – Emergency Scenario 1

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	200	9.7	4.9%	26.6	31.3	41.0	20.5%
O2	200	7.7	3.8%	26.6	31.4	39.0	19.5%
O3	200	12.5	6.2%	26.6	33.0	45.5	22.7%
O4	200	12.2	6.1%	26.6	32.5	44.7	22.4%
O5	200	6.2	3.1%	26.6	30.8	37.0	18.5%
O6	200	9.4	4.7%	26.6	30.2	39.6	19.8%
O7	200	5.7	2.9%	26.6	30.6	36.3	18.2%
O8	200	7.4	3.7%	26.6	30.1	37.5	18.8%
O9	200	5.4	2.7%	26.6	30.1	35.5	17.8%

Table 1A-13: Predicted Change in Hourly Mean NO_2 Concentrations (as the 99.79th Percentile of Hourly Averages) – Emergency Scenario 2

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	200	9.7	4.9%	26.6	31.3	41.0	20.5%
O2	200	7.7	3.8%	26.6	31.4	39.0	19.5%
O3	200	12.5	6.2%	26.6	33.0	45.5	22.7%
O4	200	12.2	6.1%	26.6	32.5	44.7	22.4%
O5	200	6.2	3.1%	26.6	30.8	37.0	18.5%
O6	200	9.4	4.7%	26.6	30.2	39.6	19.8%
O7	200	5.7	2.9%	26.6	30.6	36.3	18.2%
O8	200	7.4	3.7%	26.6	30.1	37.5	18.8%
O9	200	5.4	2.7%	26.6	30.1	35.5	17.8%

Table 1A-14: Predicted Change in Hourly Mean NO_2 Concentrations (as the 99.79th Percentile of Hourly Averages) – Emergency Scenario 3

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	200	9.7	4.9%	26.6	31.3	41.0	20.5%
O2	200	7.7	3.8%	26.6	31.4	39.0	19.5%
O3	200	12.5	6.2%	26.6	33.0	45.5	22.7%
O4	200	12.2	6.1%	26.6	32.5	44.7	22.4%
O5	200	6.2	3.1%	26.6	30.8	37.0	18.5%
O6	200	9.4	4.7%	26.6	30.2	39.6	19.8%
O7	200	5.7	2.9%	26.6	30.6	36.3	18.2%
O8	200	7.4	3.7%	26.6	30.1	37.5	18.8%
O9	200	5.4	2.7%	26.6	30.1	35.5	17.8%

Carbon Monoxide Emissions

1A.3.27 The maximum eight hour rolling mean CO PC that is predicted to occur anywhere in the Study Area as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is less than 1% of the relevant AQAL for every scenario. In addition, the maximum predicted PEC at any receptor is 2.6%. This is predicted to occur during the Start-Up and Emergency scenarios, and during normal operation the PC and PECs are predicted to be lower. It is considered that PC of CO would be unlikely to give rise to significant effects at any receptor location during all modelled scenarios.

Table 1A-15: Predicted Change in Maximum 8 Hour Rolling Mean CO Concentrations – Normal Operation (ES Table 8B-18)

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	10,000	0.1	<0.1%	221.8	250.3	250.4	2.5%
O2	10,000	0.1	<0.1%	221.8	263.7	263.8	2.6%
O3	10,000	0.1	<0.1%	221.8	240.7	240.8	2.4%
O4	10,000	0.1	<0.1%	221.8	240.0	240.1	2.4%
O5	10,000	0.1	<0.1%	221.8	253.2	253.3	2.5%
O6	10,000	0.1	<0.1%	221.8	249.9	250.0	2.5%
O7	10,000	0.1	<0.1%	221.8	247.8	247.9	2.5%
O8	10,000	<0.1	<0.1%	221.8	244.5	244.6	2.4%
O9	10,000	0.1	<0.1%	221.8	245.1	245.1	2.5%

Table 1A-16: Predicted Change in Maximum 8 Hour Rolling Mean CO Concentrations – Start Up Scenario 1

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	10,000	18.6	0.2%	221.8	250.4	269.0	2.7%
O2	10,000	22.1	0.2%	221.8	263.8	285.9	2.9%
O3	10,000	14.3	0.1%	221.8	240.7	255.0	2.6%
O4	10,000	14.8	0.1%	221.8	240.0	254.9	2.5%
O5	10,000	19.2	0.2%	221.8	253.3	272.4	2.7%
O6	10,000	17.5	0.2%	221.8	249.9	267.5	2.7%
O7	10,000	14.8	0.1%	221.8	247.9	262.6	2.6%
O8	10,000	18.7	0.2%	221.8	244.5	263.2	2.6%
O9	10,000	13.7	0.1%	221.8	245.1	258.7	2.6%

Table 1A-17: Predicted Change in Maximum 8 Hour Rolling Mean CO Concentrations – Start Up Scenario 2

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	10,000	18.3	0.2%	221.8	250.4	268.7	2.7%
O2	10,000	21.5	0.2%	221.8	263.8	285.2	2.9%
O3	10,000	14.2	0.1%	221.8	240.7	254.9	2.5%
O4	10,000	14.5	0.1%	221.8	240.0	254.6	2.5%
O5	10,000	18.3	0.2%	221.8	253.3	271.5	2.7%
O6	10,000	16.7	0.2%	221.8	249.9	266.7	2.7%
O7	10,000	14.0	0.1%	221.8	247.9	261.9	2.6%
O8	10,000	17.6	0.2%	221.8	244.5	262.2	2.6%
O9	10,000	12.9	0.1%	221.8	245.1	258.0	2.6%

Table 1A-18: Predicted Change in Maximum 8 Hour Rolling Mean CO Concentrations – Start Up Scenario 3

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	10,000	18.7	0.2%	221.8	250.4	269.1	2.7%
O2	10,000	22.3	0.2%	221.8	263.8	286.0	2.9%
O3	10,000	14.2	0.1%	221.8	240.7	255.0	2.5%
O4	10,000	14.9	0.1%	221.8	240.0	254.9	2.5%
O5	10,000	19.4	0.2%	221.8	253.3	272.7	2.7%
O6	10,000	17.7	0.2%	221.8	249.9	267.7	2.7%
O7	10,000	15.0	0.1%	221.8	247.9	262.9	2.6%
O8	10,000	18.9	0.2%	221.8	244.5	263.5	2.6%
O9	10,000	13.9	0.1%	221.8	245.1	259.0	2.6%

Table 1A-19: Predicted Change in Maximum 8 Hour Rolling Mean CO Concentrations – Emergency Scenario 1

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	10,000	19.8	0.2%	221.8	250.4	270.1	2.7%
O2	10,000	22.6	0.2%	221.8	263.8	286.4	2.9%
O3	10,000	23.1	0.2%	221.8	240.7	263.8	2.6%
O4	10,000	18.3	0.2%	221.8	240.0	258.4	2.6%
O5	10,000	19.6	0.2%	221.8	253.3	272.9	2.7%
O6	10,000	18.3	0.2%	221.8	249.9	268.2	2.7%
O7	10,000	15.1	0.2%	221.8	247.9	262.9	2.6%
O8	10,000	19.2	0.2%	221.8	244.5	263.7	2.6%
O9	10,000	13.9	0.1%	221.8	245.1	259.0	2.6%

Table 1A-20: Predicted Change in Maximum 8 Hour Rolling Mean CO Concentrations – Emergency Scenario 2

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	10,000	19.4	0.2%	221.8	250.4	269.8	2.7%
O2	10,000	22.0	0.2%	221.8	263.8	285.7	2.9%
O3	10,000	23.1	0.2%	221.8	240.7	263.8	2.6%
O4	10,000	18.3	0.2%	221.8	240.0	258.3	2.6%
O5	10,000	18.7	0.2%	221.8	253.3	271.9	2.7%
O6	10,000	17.5	0.2%	221.8	249.9	267.5	2.7%
O7	10,000	14.4	0.1%	221.8	247.9	262.2	2.6%
O8	10,000	18.2	0.2%	221.8	244.5	262.7	2.6%
O9	10,000	13.1	0.1%	221.8	245.1	258.2	2.6%

Table 1A-21: Predicted Change in Maximum 8 Hour Rolling Mean CO Concentrations – Emergency Scenario 3

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	10,000	19.8	0.2%	221.8	250.4	270.2	2.7%
O2	10,000	22.8	0.2%	221.8	263.8	286.5	2.9%
O3	10,000	23.1	0.2%	221.8	240.7	263.8	2.6%
O4	10,000	18.3	0.2%	221.8	240.0	258.4	2.6%
O5	10,000	19.8	0.2%	221.8	253.3	273.1	2.7%
O6	10,000	18.5	0.2%	221.8	249.9	268.4	2.7%
O7	10,000	15.3	0.2%	221.8	247.9	263.1	2.6%
O8	10,000	19.5	0.2%	221.8	244.5	264.0	2.6%
O9	10,000	14.1	0.1%	221.8	245.1	259.2	2.6%

Particulate Matter (PM_{10})

1A.3.28 The maximum predicted change in 90.41st percentile of 24-hour PM_{10} PC that is predicted to occur anywhere in the Study Area as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is below 1% for all scenarios, while at the point of maximum impact it is up to 4.4%. This is predicted to occur during Start-up operation scenario, and during emergency operation. It is considered that the PC of PM_{10} would be unlikely to give rise to significant effects at any receptor location during all modelled scenarios.

Table 1A-22: Predicted Change in 24 Hour Mean PM_{10} Concentrations (as the 90.41st Percentile of 24 Hour averages) – Start Up Scenario 1

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	50	<0.1	<0.1%	19.2	19.3	19.3	38.6%
O2	50	0.1	0.1%	19.2	19.2	19.3	38.6%
O3	50	<0.1	0.1%	19.2	19.2	19.3	38.5%
O4	50	<0.1	<0.1%	19.2	19.2	19.3	38.5%
O5	50	<0.1	0.1%	19.2	19.2	19.3	38.6%
O6	50	<0.1	<0.1%	19.2	19.3	19.3	38.5%
O7	50	<0.1	0.1%	19.2	19.2	19.3	38.5%
O8	50	<0.1	<0.1%	19.2	19.3	19.3	38.5%
O9	50	<0.1	0.1%	19.2	19.2	19.3	38.5%

Table 1A-23: Predicted Change in 24 Hour Mean PM_{10} Concentrations (as the 90.41st Percentile of 24 Hour averages) – Start Up Scenario 2

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	50	<0.1	0.1%	19.2	19.3	19.3	38.6%
O2	50	0.1	0.1%	19.2	19.2	19.3	38.6%
O3	50	<0.1	0.1%	19.2	19.2	19.3	38.5%
O4	50	<0.1	<0.1%	19.2	19.2	19.3	38.5%
O5	50	0.1	0.1%	19.2	19.2	19.3	38.6%
O6	50	<0.1	<0.1%	19.2	19.3	19.3	38.5%
O7	50	<0.1	0.1%	19.2	19.2	19.3	38.5%
O8	50	<0.1	<0.1%	19.2	19.3	19.3	38.5%
O9	50	<0.1	0.1%	19.2	19.2	19.3	38.5%

Table 1A-24: Predicted Change in 24 Hour Mean PM_{10} Concentrations (as the 90.41st Percentile of 24 Hour averages) – Start Up Scenario 3

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	50	<0.1	<0.1%	19.2	19.3	19.3	38.6%
O2	50	0.1	0.1%	19.2	19.2	19.3	38.6%
O3	50	<0.1	0.1%	19.2	19.2	19.3	38.5%
O4	50	<0.1	<0.1%	19.2	19.2	19.3	38.5%
O5	50	<0.1	0.1%	19.2	19.2	19.3	38.6%
O6	50	<0.1	<0.1%	19.2	19.3	19.3	38.5%
O7	50	<0.1	0.1%	19.2	19.2	19.3	38.5%
O8	50	<0.1	<0.1%	19.2	19.3	19.3	38.5%
O9	50	<0.1	0.1%	19.2	19.2	19.3	38.5%

Table 1A-25: Predicted Change in 24 Hour Mean PM_{10} Concentrations (as the 90.41st Percentile of 24 Hour averages) – Emergency Scenario 1

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	50	0.2	0.3%	19.2	19.3	19.4	38.8%
O2	50	0.2	0.4%	19.2	19.2	19.4	38.9%
O3	50	0.1	0.3%	19.2	19.2	19.4	38.8%
O4	50	0.1	0.3%	19.2	19.2	19.4	38.7%
O5	50	0.1	0.3%	19.2	19.2	19.4	38.7%
O6	50	0.1	0.2%	19.2	19.3	19.4	38.7%
O7	50	0.1	0.2%	19.2	19.2	19.3	38.7%
O8	50	0.1	0.1%	19.2	19.3	19.3	38.7%
O9	50	0.1	0.2%	19.2	19.2	19.3	38.7%

Table 1A-26: Predicted Change in 24 Hour Mean PM_{10} Concentrations (as the 90.41st Percentile of 24 Hour averages) – Emergency Scenario 2

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	50	0.2	0.3%	19.2	19.3	19.4	38.8%
O2	50	0.2	0.4%	19.2	19.2	19.4	38.9%
O3	50	0.1	0.3%	19.2	19.2	19.4	38.8%
O4	50	0.1	0.2%	19.2	19.2	19.4	38.7%
O5	50	0.1	0.3%	19.2	19.2	19.4	38.8%
O6	50	0.1	0.2%	19.2	19.3	19.4	38.7%
O7	50	0.1	0.2%	19.2	19.2	19.3	38.7%
O8	50	0.1	0.1%	19.2	19.3	19.3	38.7%
O9	50	0.1	0.2%	19.2	19.2	19.3	38.7%

Table 1A-27: Predicted Change in 24 Hour Mean PM_{10} Concentrations (as the 90.41st Percentile of 24 Hour averages) – Emergency Scenario 3

RECEPTOR	AQAL (µg/m^3)	PC (µg/m^3)	PC/AQAL (%)	BC (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PEC (µg/m^3)	PEC/AQAL (%)
O1	50	0.2	0.3%	19.2	19.3	19.4	38.8%
O2	50	0.2	0.4%	19.2	19.2	19.4	38.9%
O3	50	0.1	0.3%	19.2	19.2	19.4	38.8%
O4	50	0.1	0.3%	19.2	19.2	19.4	38.7%
O5	50	0.1	0.3%	19.2	19.2	19.4	38.7%
O6	50	0.1	0.2%	19.2	19.3	19.4	38.7%
O7	50	0.1	0.2%	19.2	19.2	19.3	38.7%
O8	50	0.1	0.1%	19.2	19.3	19.3	38.7%
O9	50	0.1	0.2%	19.2	19.2	19.3	38.7%

Sulphur Dioxide

1A.3.29 The maximum SO_2 PC that is predicted to occur anywhere in the Study Area as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7) is less than 1% of the relevant AQALs for Short-term (24-hour mean, 1 hour mean and 15-minute mean) impacts. This is predicted to occur during Start-Up scenario. It is considered that the PC of SO_2 would be unlikely to give rise to significant effects at any receptor location during all modelled scenarios.

Table 1A-28: Predicted Change in 15 Minute Mean SO2 Concentrations (as the 99.9th Percentile of 15 Minute averages) – Start-Up Scenario 1

RECEPTOR	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/AQAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/AQAL (%)
O1	260	0.1	<0.1%	4	9.2	9.3	3.6%
O2	260	0.1	<0.1%	4	8.6	8.7	3.4%
O3	260	0.1	<0.1%	4	7.1	7.2	2.8%
O4	260	0.1	<0.1%	4	7.1	7.2	2.8%
O5	260	0.1	<0.1%	4	8.5	8.5	3.3%
O6	260	0.1	<0.1%	4	11.8	11.9	4.6%
O7	260	0.1	<0.1%	4	8.9	8.9	3.4%
O8	260	0.1	<0.1%	4	11.7	11.8	4.5%
O9	260	0.1	<0.1%	4	8.6	8.6	3.3%

Table 1A-29: Predicted Change in 1 Hour Mean SO_2 Concentrations (as the 99.73rd Percentile of 1 Hour averages) – Start-Up Scenario 1

RECEPTOR	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/AQAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/AQAL (%)
O1	350	0.1	<0.1%	4	6.9	7.0	2.0%
O2	350	0.1	<0.1%	4	6.5	6.6	1.9%
O3	350	0.1	<0.1%	4	5.8	5.8	1.7%
O4	350	0.1	<0.1%	4	5.7	5.8	1.7%
O5	350	<0.1	<0.1%	4	6.5	6.5	1.9%
O6	350	<0.1	<0.1%	4	8.7	8.7	2.5%
O7	350	<0.1	<0.1%	4	6.6	6.6	1.9%
O8	350	<0.1	<0.1%	4	8.8	8.9	2.5%
O9	350	<0.1	<0.1%	4	6.6	6.6	1.9%

Table 1A-30: Predicted Change in 24-Hour Mean SO_2 Concentrations (as the 99.18th Percentile of 24-Hour averages) – Start-Up Scenario 1

RECEPTOR	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/AQAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/AQAL (%)
O1	125	<0.1	<0.1%	4	4.9	4.9	3.9%
O2	125	<0.1	<0.1%	4	4.7	4.7	3.8%
O3	125	<0.1	<0.1%	4	4.4	4.4	3.5%
O4	125	<0.1	<0.1%	4	4.4	4.4	3.5%
O5	125	<0.1	<0.1%	4	4.6	4.7	3.7%
O6	125	<0.1	<0.1%	4	5.6	5.6	4.5%
O7	125	<0.1	<0.1%	4	4.7	4.7	3.8%
O8	125	<0.1	<0.1%	4	5.6	5.6	4.5%
O9	125	<0.1	<0.1%	4	4.7	4.7	3.8%

Table 1A-31: Predicted Change in 15 Minute Mean SO_2 Concentrations (as the 99.9th Percentile of 15 Minute averages) – Start-Up Scenario 2

RECEPTOR	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/AQAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/AQAL (%)
O1	260	0.1	<0.1%	4	9.2	9.3	3.6%
O2	260	0.1	<0.1%	4	8.6	8.7	3.4%
O3	260	0.1	<0.1%	4	7.1	7.2	2.8%
O4	260	0.1	<0.1%	4	7.1	7.2	2.8%
O5	260	0.1	<0.1%	4	8.5	8.5	3.3%
O6	260	0.1	<0.1%	4	11.8	11.9	4.6%
O7	260	0.1	<0.1%	4	8.9	8.9	3.4%
O8	260	0.1	<0.1%	4	11.7	11.8	4.5%
O9	260	0.1	<0.1%	4	8.6	8.6	3.3%

Table 1A-32: Predicted Change in 1 Hour Mean SO_2 Concentrations (as the 99.73rd Percentile of 1 Hour averages) – Start-Up Scenario 2

RECEPTOR	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/AQAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/AQAL (%)
O1	350	0.1	<0.1%	4	6.9	7.0	2.0%
O2	350	0.1	<0.1%	4	6.5	6.6	1.9%
O3	350	0.1	<0.1%	4	5.8	5.8	1.7%
O4	350	0.1	<0.1%	4	5.7	5.8	1.7%
O5	350	<0.1	<0.1%	4	6.5	6.5	1.9%
O6	350	<0.1	<0.1%	4	8.7	8.7	2.5%
O7	350	<0.1	<0.1%	4	6.6	6.6	1.9%
O8	350	<0.1	<0.1%	4	8.8	8.9	2.5%
O9	350	<0.1	<0.1%	4	6.6	6.6	1.9%

Table 1A-33: Predicted Change in 24-Hour Mean SO_2 Concentrations (as the 99.18th Percentile of 24-Hour averages) – Start-Up Scenario 2

RECEPTOR	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/AQAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/AQAL (%)
O1	125	<0.1	<0.1%	4	4.9	4.9	3.9%
O2	125	<0.1	<0.1%	4	4.7	4.7	3.8%
O3	125	<0.1	<0.1%	4	4.4	4.4	3.5%
O4	125	<0.1	<0.1%	4	4.4	4.4	3.5%
O5	125	<0.1	<0.1%	4	4.6	4.7	3.7%
O6	125	<0.1	<0.1%	4	5.6	5.6	4.5%
O7	125	<0.1	<0.1%	4	4.7	4.7	3.8%
O8	125	<0.1	<0.1%	4	5.6	5.6	4.5%
O9	125	<0.1	<0.1%	4	4.7	4.7	3.8%

Table 1A-34: Predicted Change in 15 Minute Mean SO_2 Concentrations (as the 99.9th Percentile of 15 Minute averages) – Start-Up Scenario 3

RECEPTOR	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/AQAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/AQAL (%)
O1	260	0.1	<0.1%	4	9.2	9.3	3.6%
O2	260	0.1	<0.1%	4	8.6	8.7	3.4%
O3	260	0.1	<0.1%	4	7.1	7.2	2.8%
O4	260	0.1	<0.1%	4	7.1	7.2	2.8%
O5	260	0.1	<0.1%	4	8.5	8.5	3.3%
O6	260	0.1	<0.1%	4	11.8	11.9	4.6%
O7	260	0.1	<0.1%	4	8.9	8.9	3.4%
O8	260	0.1	<0.1%	4	11.7	11.8	4.5%
O9	260	0.1	<0.1%	4	8.6	8.6	3.3%

Table 1A-35: Predicted Change in 1 Hour Mean SO_2 Concentrations (as the 99.73rd Percentile of 1 Hour averages) – Start-Up Scenario 3

RECEPTOR	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/AQAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/AQAL (%)
O1	350	0.1	<0.1%	4	6.9	7.0	2.0%
O2	350	0.1	<0.1%	4	6.5	6.6	1.9%
O3	350	0.1	<0.1%	4	5.8	5.8	1.7%
O4	350	0.1	<0.1%	4	5.7	5.8	1.7%
O5	350	<0.1	<0.1%	4	6.5	6.5	1.9%
O6	350	<0.1	<0.1%	4	8.7	8.7	2.5%
O7	350	<0.1	<0.1%	4	6.6	6.6	1.9%
O8	350	<0.1	<0.1%	4	8.8	8.9	2.5%
O9	350	<0.1	<0.1%	4	6.6	6.6	1.9%

Table 1A-36: Predicted Change in 24-Hour Mean SO_2 Concentrations (as the 99.18th Percentile of 24-Hour averages) – Start-Up Scenario 3

RECEPTOR	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/AQAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/AQAL (%)
O1	125	<0.1	<0.1%	4	4.9	4.9	3.9%
O2	125	<0.1	<0.1%	4	4.7	4.7	3.8%
O3	125	<0.1	<0.1%	4	4.4	4.4	3.5%
O4	125	<0.1	<0.1%	4	4.4	4.4	3.5%
O5	125	<0.1	<0.1%	4	4.6	4.7	3.7%
O6	125	<0.1	<0.1%	4	5.6	5.6	4.5%
O7	125	<0.1	<0.1%	4	4.7	4.7	3.8%
O8	125	<0.1	<0.1%	4	5.6	5.6	4.5%
O9	125	<0.1	<0.1%	4	4.7	4.7	3.8%

Ecological Receptors Results

Oxides of Nitrogen and Ammonia Emissions – Critical Levels

1A.3.30 The assessment results show that the predicted 24-hour average NOx impacts are below the screening criteria for the need for further assessment at all receptors.

1A.3.31 The assessment results show that the predicted annual and annual average NH3 impacts are below the screening criteria for the need for further assessment at all receptors.

1A.3.32 PCs of more than 1% of the long-term critical level for NOx occur at the adjacent Teesmouth and Cleveland Coast Ramsar, SPA, SSSI and Ramsar, but PECs are predicted to stay below 70% of the Critical Level at these locations, except at the Teesmouth and Cleveland Coast SSSI (OE6), where it is predicted to be pf 76.5% of the critical level. Although this is above the second screening criteria, it is below 100% of the critical level.

1A.3.33 Details on how the conclusion on significance was reached for the effects on ecological receptor that couldn't be screened out from the need for further assessment are presented in Appendix 3A.0 Ecology and Nature Conservation.

Nitrogen and acid deposition – Critical Loads

1A.3.34 The Environment Agency and Natural England have agreed that depositional impacts that are below 1% of the relevant lower critical load for a site can be regarded as likely to be insignificant. Guidance from the IAQM clarifies that the 1% threshold is not intended to be precise to a set number of decimal places but to the nearest whole number (paragraph 5.5.2.6 of Institute of Air Quality Management, 2020).

1A.3.35 The assessment results show that the predicted nitrogen and acid deposition impacts are below the criteria for likely significance at all receptors, as PCs are less than 1% of their respective critical loads at all receptors except for the nitrogen deposition at the Teesmouth and Cleveland Coast Ramsar, SPA, SSSI (OE1, OE2 and OE6). However, at sensitive features in the Ramsar/SPA (i.e. bird nesting locations), the PC is less than 1% of the critical load (See Figure 8-12), and therefore impacts can be regarded as likely to be insignificant there as well, according to the EA screening criteria.

1A.3.36 Details on how the conclusion on significance was reached for the effects on ecological receptor that couldn't be screened out from the need for further assessment are presented in Appendix 3A.0 Ecology and Nature Conservation.

Table 1A-37: NO_x Annual Mean Dispersion Modelling Results for Ecological Receptors (ES Table 8B-29)

RECEPTOR	SITE NAME	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/EAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/EAL (%)
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	30	0.3	1.1%	16.5	18.4	18.7	62.5%
OE2	Teesmouth and Cleveland Coast SPA, SSSI		0.3	1.1%	17.0	18.9	19.2	64.1%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI		0.1	0.3%	20.9	22.2	22.3	74.3%
OE4	Eston Pumping Station LWS		0.1	0.2%	18.3	20.2	20.3	67.7%
OE5	Teesmouth NNR		<0.1	0.1%	21.2	22.2	22.3	74.2%
OE6	Teesmouth and Cleveland Coast SSSI		0.3	1.1%	20.7	22.6	22.9	76.5%
OE7	North York Moors SPA and SSSI		<0.1	<0.1%	6.6	6.9	6.9	22.9%

RECEPTOR	SITE NAME	AQAL ($\mu g/m^3$)	PROCESS CONTRIBUTION (PC) ($\mu g/m^3$)	PC/EAL (%)	BACKGROUND CONCENTRATION (BC) ($\mu g/m^3$)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT ($\mu g/m^3$)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) ($\mu g/m^3$)	PEC/EAL (%)
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar		<0.1	<0.1%	7.0	7.3	7.3	24.2%
OE9	Cliff Ridge SSSI		<0.1	<0.1%	6.6	6.9	6.9	22.9%
OE10	Durham Coast SSSI and Durham Coast NNR		<0.1	<0.1%	7.9	8.2	8.2	27.3%
OE11	Durham Coast SSSI		<0.1	<0.1%	8.0	8.3	8.3	27.7%
OE12	Hart Bog SSSI		<0.1	<0.1%	8.1	8.3	8.3	27.6%
OE13	Langbaurgh Ridge SSSI		<0.1	<0.1%	7.1	7.4	7.4	24.7%
OE14	Lovell Hill Pools SSSI		<0.1	0.1%	9.6	10.1	10.1	33.7%
OE15	Roseberry Topping SSSI		<0.1	<0.1%	6.8	7.1	7.1	23.7%
OE16	Saltburn Gill SSSI		<0.1	<0.1%	8.9	9.2	9.2	30.7%

Table 1A-38: Maximum 24-hour NO_x Dispersion Modelling Results for Ecological Receptors (ES Table 8B-30)

RECEPTOR	SITE NAME	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/EAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/EAL (%)
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	75	2.7	3.6%	33.0	38.2	40.9	54.5%
OE2	Teesmouth and Cleveland Coast SPA, SSSI		2.9	3.8%	34.0	33.0	35.8	47.8%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI		0.8	1.1%	41.8	47.4	48.2	64.3%
OE4	Eston Pumping Station LWS		1.3	1.7%	36.6	37.3	38.6	51.5%
OE5	Teesmouth NNR		0.7	0.9%	42.4	42.8	43.5	58.0%
OE6	Teesmouth and Cleveland Coast SSSI		2.9	3.8%	41.4	40.4	43.2	57.7%

RECEPTOR	SITE NAME	AQAL ($\mu g/m^3$)	PROCESS CONTRIBUTION (PC) ($\mu g/m^3$)	PC/EAL (%)	BACKGROUND CONCENTRATION (BC) ($\mu g/m^3$)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT ($\mu g/m^3$)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) ($\mu g/m^3$)	PEC/EAL (%)
OE7	North York Moors SPA and SSSI		0.2	0.2%	13.2	16.2	16.4	21.9%
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar		0.1	0.2%	14.0	16.6	16.8	22.4%
OE9	Cliff Ridge SSSI		0.1	0.1%	13.2	16.2	16.3	21.8%
OE10	Durham Coast SSSI and Durham Coast NNR		0.2	0.2%	15.8	18.6	18.7	25.0%
OE11	Durham Coast SSSI		0.2	0.2%	16.0	18.8	19.0	25.3%
OE12	Hart Bog SSSI		0.1	0.2%	16.2	18.6	18.7	25.0%
OE13	Langbaurgh Ridge SSSI		0.1	0.1%	14.2	17.4	17.5	23.3%
OE14	Lovell Hill Pools SSSI		0.3	0.4%	19.2	22.9	23.2	30.9%

RECEPTOR	SITE NAME	AQAL ($\mu g/m^3$)	PROCESS CONTRIBUTION (PC) ($\mu g/m^3$)	PC/EAL (%)	BACKGROUND CONCENTRATION (BC) ($\mu g/m^3$)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT ($\mu g/m^3$)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) ($\mu g/m^3$)	PEC/EAL (%)
OE15	Roseberry Topping SSSI		0.1	0.2%	13.6	16.6	16.7	22.3%
OE16	Saltburn Gill SSSI		0.1	0.2%	17.8	20.1	20.2	26.9%

Table 1A-39: NH_3 Annual Mean Dispersion Modelling Results for Ecological Receptors

RECEPTOR	SITE NAME	AQAL (µg/m^3)	PROCESS CONTRIBUTION (PC) (µg/m^3)	PC/EAL (%)	BACKGROUND CONCENTRATION (BC) (µg/m^3)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/EAL (%)
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	3	0.01	0.4%	1.2	1.2	1.2	40.4%
OE2	Teesmouth and Cleveland Coast SPA, SSSI		0.01	0.4%	1.2	1.2	1.2	40.4%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI		<0.01	0.1%	1.3	1.3	1.3	43.4%
OE4	Eston Pumping Station LWS		<0.01	0.1%	1.4	1.4	1.4	46.8%
OE5	Teesmouth NNR		<0.01	<0.1%	1.3	1.3	1.3	43.4%
OE6	Teesmouth and Cleveland Coast SSSI		0.01	0.4%	1.3	1.3	1.3	43.8%
OE7	North York Moors SPA and SSSI		<0.01	<0.1%	0.9	0.9	0.9	30.0%

RECEPTOR	SITE NAME	AQAL ($\mu g/m^3$)	PROCESS CONTRIBUTION (PC) ($\mu g/m^3$)	PC/EAL (%)	BACKGROUND CONCENTRATION (BC) ($\mu g/m^3$)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT ($\mu g/m^3$)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) ($\mu g/m^3$)	PEC/EAL (%)
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar		<0.01	<0.1%	1.5	1.5	1.5	50.0%
OE9	Cliff Ridge SSSI		<0.01	<0.1%	1.4	1.4	1.4	46.7%
OE10	Durham Coast SSSI and Durham Coast NNR		<0.01	<0.1%	1.5	1.5	1.5	50.0%
OE11	Durham Coast SSSI		<0.01	<0.1%	1.6	1.6	1.6	53.3%
OE12	Hart Bog SSSI		<0.01	<0.1%	1.6	1.6	1.6	53.3%
OE13	Langbaurgh Ridge SSSI		<0.01	<0.1%	1.6	1.6	1.6	53.3%
OE14	Lovell Hill Pools SSSI		<0.01	<0.1%	1.3	1.3	1.3	43.4%
OE15	Roseberry Topping SSSI		<0.01	<0.1%	1.4	1.4	1.4	46.7%
OE16	Saltburn Gill SSSI		<0.01	<0.1%	1.1	1.1	1.1	36.7%

Table 1A-40: Dispersion Modelling Results for Ecological Receptors – Nutrient Nitrogen Deposition (Kg/Ha/Yr)

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KGN/HA/YR)	PC % CRITICAL LOAD	BACKGROUND NITROGEN DEPOSITION (KGN/HA/YR)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (KGN/HA/YR)	PEC (KGN/HA/YR)	PEC % CRITICAL LOAD
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	Coastal stable dune grassland (calcareous type)	10	0.11	1.1%	12.5	12.8	12.9	129.2%
OE2	Teesmouth and Cleveland Coast SPA, SSSI	Coastal stable dune grassland (calcareous type)	10	0.11	1.1%	12.5	12.8	12.9	129.2%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI	Sub-Atlantic semi-dry calcareous grassland	10	0.03	0.3%	12.5	12.6	12.7	126.7%

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KGN/HA/YR)	PC % CRITICAL LOAD	BACKGROUND NITROGEN DEPOSITION (KGN/HA/YR)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (KGN/HA/YR)	PEC (KGN/HA/YR)	PEC % CRITICAL LOAD
OE4	Eston Pumping Station LWS	Sub-Atlantic semi-dry calcareous grassland	10	0.02	0.2%	12.7	13.0	13.0	130.4%
OE5	Teesmouth NNR	Coastal stable dune grassland (calcareous type)	10	0.01	0.1%	13.5	13.7	13.7	136.7%
OE6	Teesmouth and Cleveland Coast SSSI	Coastal stable dune grassland (calcareous type)	10	0.11	1.1%	12.5	12.8	12.9	129.2%
OE7	North York Moors SPA and SSSI	Dry heaths, Raised and blanket bogs, Valley mires, poor fens and	5	<0.01	0.1%	15.5	15.6	15.6	311.5%

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KGN/HA/YR)	PC % CRITICAL LOAD	BACKGROUND NITROGEN DEPOSITION (KGN/HA/YR)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (KGN/HA/YR)	PEC (KGN/HA/YR)	PEC % CRITICAL LOAD
		transition mires							
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar	Coastal stable dune grassland (calcareous type)	10	<0.01	<0.1%	13.5	13.5	13.5	135.4%
OE10	Durham Coast SSSI and Durham Coast NNR	Coastal stable dune grassland (calcareous type)	10	<0.01	<0.1%	13.5	13.5	13.5	135.4%
OE11	Durham Coast SSSI	Coastal stable dune grassland (calcareous type)	10	<0.01	<0.1%	13.5	13.5	13.5	135.4%

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KGN/HA/YR)	PC % CRITICAL LOAD	BACKGROUND NITROGEN DEPOSITION (KGN/HA/YR)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (KGN/HA/YR)	PEC (KGN/HA/YR)	PEC % CRITICAL LOAD
OE12	Hart Bog SSSI	Raised and blanket bogs, Valley mires, poor fens and transition mires	5	<0.01	0.1%	14.8	14.8	14.8	296.3%
OE14	Lovell Hill Pools SSSI	Outstanding dragonfly assemblage and Coenagrion pulchellum	10	<0.01	<0.1%	13.5	13.6	13.6	135.7%
OE16	Saltburn Gill SSSI	Carpinus and Quercus mesic deciduous forest	15	0.01	<0.1%	21.8	21.8	21.9	145.7%

Table 1A-41: Dispersion Modelling Results for Ecological Receptors – Acid Deposition N (Keq/Ha/Yr)

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD (CL) RANGE	PC (KEQ/HA/YR)	PC % CRITICAL LOAD	BACKGROUND ACID DEPOSITION (KEQ/HA/YR)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (KEQ/HA/YR)	PEC (KEQ/HA/YR)	PEC % CRITICAL LOAD
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.008	<0.1%	1.00	1.01	1.03	5.5%
OE2	Teesmouth and Cleveland Coast SPA, SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.008	<0.1%	1.00	1.01	1.03	5.5%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.002	<0.1%	0.89	0.90	0.91	4.8%

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD (CL) RANGE	PC (KEQ/HA/YR)	PC % CRITICAL LOAD	BACKGROUND ACID DEPOSITION (KEQ/HA/YR)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (KEQ/HA/YR)	PEC (KEQ/HA/YR)	PEC % CRITICAL LOAD
OE4	Eston Pumping Station LWS	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.002	<0.1%	0.91	0.93	0.93	5.0%
OE5	Teesmouth NNR	No Sensitive Features							
OE6	Teesmouth and Cleveland Coast SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.008	<0.1%	1.00	1.01	1.03	5.5%
OE7	North York Moors SPA and SSSI	Calcareous grassland	Min CL min N 0.321 Min CL Max N 0.469 Min CL Max S 0.148	<0.001	<0.1%	1.26	1.26	1.26	250.6%

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD (CL) RANGE	PC (KEQ/HA/YR)	PC % CRITICAL LOAD	BACKGROUND ACID DEPOSITION (KEQ/HA/YR)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (KEQ/HA/YR)	PEC (KEQ/HA/YR)	PEC % CRITICAL LOAD
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	<0.001	<0.1%	0.84	0.84	0.84	4.5%
OE10	Durham Coast SSSI and Durham Coast NNR	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	<0.001	<0.1%	0.84	0.84	0.84	4.5%
OE11	Durham Coast SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	<0.001	<0.1%	0.84	0.84	0.84	4.5%

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD (CL) RANGE	PC (KEQ/HA/YR)	PC % CRITICAL LOAD	BACKGROUND ACID DEPOSITION (KEQ/HA/YR)	FUTURE YEAR WITHOUT PROPOSED DEVELOPMENT (KEQ/HA/YR)	PEC (KEQ/HA/YR)	PEC % CRITICAL LOAD
OE12	Hart Bog SSSI	Calcareous grassland	Min CL min N 0.321 Min CL Max N 0.469 Min CL Max S 0.148	<0.001	<0.1%	0.82	0.82	0.82	175.6%
OE14	Lovell Hill Pools SSSI	No Sensitive Features							
OE16	Saltburn Gill SSSI	Calcareous grassland	Min CL min N 0.142 Min CL Max N 2.639 Min CL Max S 2.448	<0.001	<0.1%	0.81	0.82	0.82	30.9%

Conclusions

1A.3.37 Emissions from the Fired Heater stacks, Auxiliary Boilers, flares and emergency generator stacks (including accounting for Proposed Development Changes 1, 5 and 7) would result in small increases in ground-level concentrations of the modelled pollutants. Taking into account available information on background concentrations within the modelled domain, predicted operational concentrations of the modelled pollutants would be within current environmental standards for the protection of human health.

1A.3.38 The impacts associated with emissions from the Proposed Development do not exceed the first stage screening thresholds for annual mean and daily mean NO_x concentrations. The critical levels at ecological receptors would also not be exceeded.

1A.3.39 The impacts associated with emissions from the Proposed Development (including Proposed Development Changes 1, 5 and 7) do not exceed the first stage screening thresholds for most ecological receptors. Details on how the conclusion on significance was reached for the effects on ecological receptors that couldn't be screened out from the need for further assessment (as the levels are beyond 1%) are presented in Appendix 3A.0 Ecology and Nature Conservation.

Annex B: Cumulative Assessment Inputs and In-Combination Results

In Combination Assessment Results – Ecological Receptors

1A.3.40 The In-combination assessment results below have been considered in the updated Report to inform Habitat Regulations Assessment submitted alongside this Change Application Report.

1A.3.41 The in-combination results presented in Table 1A-42 to Table 1A-46 were primarily impacted by Change 1 (the addition of the second flare stack), but also to a lesser extent by Change 5 and Change 7. Although the in-combination impacts have been slightly affected by the Proposed Development changes and the first stage screening thresholds for annual mean NO_x concentrations is exceeded, the critical levels would not be exceeded. The first stage screening threshold for 24-hour NO_x concentrations are not exceeded.

Table 1A-42: Annual Mean NOx Dispersion Modelling In-Combination Results for Ecological Receptors (ES Table 8B-40)

RECEPTOR	SITE NAME	AQAL (µg/m^3)	PREDICTED CONCENTRATION (PC) (µg/m^3)	PC/EAL (%)	BACKGROND CONCENTRATION (BC) (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/EAL (%)
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	30	2.5	8.2%	16.5	19.0	63.2%
OE2	Teesmouth and Cleveland Coast SPA, SSSI		2.5	8.2%	17.0	19.5	64.9%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI		1.4	4.6%	20.9	22.3	74.3%
OE4	Eston Pumping Station LWS		2.1	6.9%	18.3	20.4	67.9%
OE5	Teesmouth NNR		1.8	6.1%	21.2	23.0	76.8%
OE6	Teesmouth and Cleveland Coast SSSI		2.5	8.2%	20.7	23.2	77.2%
OE7	North York Moors SPA and SSSI		0.3	0.9%	6.6	6.9	22.9%

RECEPTOR	SITE NAME	AQAL ($\mu g/m^3$)	PREDICTED CONCENTRATION (PC) ($\mu g/m^3$)	PC/EAL (%)	BACKGROND CONCENTRATION (BC) ($\mu g/m^3$)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) ($\mu g/m^3$)	PEC/EAL (%)
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar		0.3	0.9%	7.0	7.3	24.2%
OE9	Cliff Ridge SSSI		0.3	0.9%	6.6	6.9	22.9%
OE10	Durham Coast SSSI and Durham Coast NNR		0.3	0.9%	7.9	8.2	27.3%
OE11	Durham Coast SSSI		0.3	1.0%	8.0	8.3	27.7%
OE12	Hart Bog SSSI		0.2	0.6%	8.1	8.3	27.6%
OE13	Langbaurgh Ridge SSSI		0.3	1.0%	7.1	7.4	24.7%
OE14	Lovell Hill Pools SSSI		0.5	1.7%	9.6	10.1	33.7%
OE15	Roseberry Topping SSSI		0.3	1.0%	6.8	7.1	23.7%
OE16	Saltburn Gill SSSI		0.3	1.0%	8.9	9.2	30.7%

Table 1A-43: Maximum 24-hour NOx Dispersion Modelling In-Combination for Ecological Receptors (ES Table 8B-41)

RECEPTOR	SITE NAME	AQAL (µg/m^3)	PREDICTED CONCENTRATION (PC) (µg/m^3)	PC/EAL (%)	BACKGROND CONCENTRATION (BC) (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/EAL (%)
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	75	14.7	19.6%	33.0	47.7	63.6%
OE2	Teesmouth and Cleveland Coast SPA, SSSI		17.0	22.6%	34.0	51.0	68.0%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI		6.4	8.6%	41.8	48.2	64.3%
OE4	Eston Pumping Station LWS		7.1	9.4%	36.6	43.7	58.2%
OE5	Teesmouth NNR		12.5	16.7%	42.4	54.9	73.2%
OE6	Teesmouth and Cleveland Coast SSSI		20.0	26.7%	41.4	61.4	81.9%
OE7	North York Moors SPA and SSSI		3.2	4.3%	13.2	16.4	21.9%

RECEPTOR	SITE NAME	AQAL ($\mu g/m^3$)	PREDICTED CONCENTRATION (PC) ($\mu g/m^3$)	PC/EAL (%)	BACKGROND CONCENTRATION (BC) ($\mu g/m^3$)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) ($\mu g/m^3$)	PEC/EAL (%)
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar		2.8	3.7%	14.0	16.8	22.4%
OE9	Cliff Ridge SSSI		3.1	4.2%	13.2	16.3	21.8%
OE10	Durham Coast SSSI and Durham Coast NNR		2.9	3.9%	15.8	18.7	25.0%
OE11	Durham Coast SSSI		3.0	4.0%	16.0	19.0	25.3%
OE12	Hart Bog SSSI		2.5	3.4%	16.2	18.7	25.0%
OE13	Langbaurgh Ridge SSSI		3.3	4.4%	14.2	17.5	23.3%
OE14	Lovell Hill Pools SSSI		4.0	5.3%	19.2	23.2	30.9%
OE15	Roseberry Topping SSSI		3.1	4.1%	13.6	16.7	22.3%
OE16	Saltburn Gill SSSI		2.4	3.2%	17.8	20.2	26.9%

Table 1A-44: Annual Mean NH_3 Dispersion Modelling In-Combination results for ecological receptors

RECEPTOR	SITE NAME	AQAL (µg/m^3)	PREDICTED CONCENTRATION (PC) (µg/m^3)	PC/EAL (%)	BACKGROND CONCENTRATION (BC) (µg/m^3)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) (µg/m^3)	PEC/EAL (%)
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	3	0.01	0.4%	1.2	1.2	40.4%
OE2	Teesmouth and Cleveland Coast SPA, SSSI		0.01	0.4%	1.2	1.2	40.4%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI		<0.01	0.1%	1.3	1.3	43.4%
OE4	Eston Pumping Station LWS		<0.01	0.1%	1.4	1.4	46.8%
OE5	Teesmouth NNR		<0.01	<0.1%	1.3	1.3	43.4%
OE6	Teesmouth and Cleveland Coast SSSI		0.01	0.4%	1.3	1.3	43.8%
OE7	North York Moors SPA and SSSI		<0.01	<0.1%	0.9	0.9	30.0%

RECEPTOR	SITE NAME	AQAL ($\mu g/m^3$)	PREDICTED CONCENTRATION (PC) ($\mu g/m^3$)	PC/EAL (%)	BACKGROND CONCENTRATION (BC) ($\mu g/m^3$)	PREDICTED ENVIRONMENTAL CONCENTRATION (PEC) ($\mu g/m^3$)	PEC/EAL (%)
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar		<0.01	<0.1%	1.5	1.5	50.0%
OE9	Cliff Ridge SSSI		<0.01	<0.1%	1.4	1.4	46.7%
OE10	Durham Coast SSSI and Durham Coast NNR		<0.01	<0.1%	1.5	1.5	50.0%
OE11	Durham Coast SSSI		<0.01	<0.1%	1.6	1.6	53.3%
OE12	Hart Bog SSSI		<0.01	<0.1%	1.6	1.6	53.3%
OE13	Langbaurgh Ridge SSSI		<0.01	<0.1%	1.6	1.6	53.3%
OE14	Lovell Hill Pools SSSI		<0.01	<0.1%	1.3	1.3	43.4%
OE15	Roseberry Topping SSSI		<0.01	<0.1%	1.4	1.4	46.7%
OE16	Saltburn Gill SSSI		<0.01	<0.1%	1.1	1.1	36.7%

Table 1A-45: Dispersion Modelling In-Combination Results for Ecological Receptors - Nutrient Nitrogen Deposition (Kg/Ha/Yr)

RECEPTOR ID	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KG/HA/YR)	PC % CRITICAL LOAD	BACKGROUND NITROGEN DEPOSITION (KG/HA/YR)	PEC (KG/HA/YR)	PEC % CRITICAL LOAD
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	Coastal stable dune grassland (calcareous type)	10	0.42	4.2%	12.5	13.0	129.5%
OE2	Teesmouth and Cleveland Coast SPA, SSSI	Coastal stable dune grassland (calcareous type)	10	0.42	4.2%	12.5	13.0	129.5%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI	Sub-Atlantic semi-dry calcareous grassland	10	0.21	2.1%	12.5	12.7	126.7%

RECEPTOR ID	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KG/HA/YR)	PC % CRITICAL LOAD	BACKGROUND NITROGEN DEPOSITION (KG/HA/YR)	PEC (KG/HA/YR)	PEC % CRITICAL LOAD
OE4	Eston Pumping Station LWS	Sub-Atlantic semi-dry calcareous grassland	10	0.31	3.1%	12.7	13.1	130.5%
OE5	Teesmouth NNR	Coastal stable dune grassland (calcareous type)	10	0.27	2.7%	13.5	13.8	137.8%
OE6	Teesmouth and Cleveland Coast SSSI	Coastal stable dune grassland (calcareous type)	10	0.42	4.2%	12.5	13.0	129.5%
OE7	North York Moors SPA and SSSI	Dry heaths, Raised and blanket bogs, Valley mires, poor fens and transition mires	5	0.04	0.9%	15.5	15.6	311.5%
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar	Coastal stable dune grassland (calcareous type)	10	0.04	0.4%	13.5	13.5	135.4%

RECEPTOR ID	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KG/HA/YR)	PC % CRITICAL LOAD	BACKGROUND NITROGEN DEPOSITION (KG/HA/YR)	PEC (KG/HA/YR)	PEC % CRITICAL LOAD
OE10	Durham Coast SSSI and Durham Coast NNR	Coastal stable dune grassland (calcareous type)	10	0.04	0.4%	13.5	13.5	135.4%
OE11	Durham Coast SSSI	Coastal stable dune grassland (calcareous type)	10	0.04	0.4%	13.5	13.5	135.4%
OE12	Hart Bog SSSI	Raised and blanket bogs, Valley mires, poor fens and transition mires	5	0.05	0.9%	14.8	14.8	296.3%
OE14	Lovell Hill Pools SSSI	Outstanding dragonfly assemblage and Coenagrion pulchellum	10	0.03	0.3%	13.5	13.6	135.7%
OE16	Saltburn Gill SSSI	Carpinus and Quercus mesic deciduous forest	15	0.09	0.6%	21.8	21.9	145.7%

Table 1A-46: Dispersion Modelling In-Combination Results for Ecological Receptors - Acid Deposition N (Keq/Ha/Yr)

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KEQ/HA/YR)	PC % CRITICAL LOAD	BACKGROUND ACID DEPOSITION (KEQ/HA/YR)	PEC (KEQ/HA/YR)	PEC % CRITICAL LOAD
OE1	Teesmouth and Cleveland Coast Ramsar, SPA, SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.030	<0.1%	1.00	1.03	5.5%
OE2	Teesmouth and Cleveland Coast SPA, SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.030	<0.1%	1.00	1.03	5.5%
OE3	Coatham Marsh LWS and Teesmouth and Cleveland Coast SPA, SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.015	<0.1%	0.89	0.91	4.8%

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KEQ/HA/YR)	PC % CRITICAL LOAD	BACKGROUND ACID DEPOSITION (KEQ/HA/YR)	PEC (KEQ/HA/YR)	PEC % CRITICAL LOAD
OE4	Eston Pumping Station LWS	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.022	<0.1%	0.91	0.93	5.0%
OE5	Teesmouth NNR	No Sensitive Features						
OE6	Teesmouth and Cleveland Coast SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.030	<0.1%	1.00	1.03	5.5%
OE7	North York Moors SPA and SSSI	Calcareous grassland	Min CL min N 0.321 Min CL Max N 0.469 Min CL Max S 0.148	0.003	0.6%	1.26	1.26	251.2%

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KEQ/HA/YR)	PC % CRITICAL LOAD	BACKGROUND ACID DEPOSITION (KEQ/HA/YR)	PEC (KEQ/HA/YR)	PEC % CRITICAL LOAD
OE8	North Cumbria Coast SPA, Durham Cost SAC, Northumbria Coast Ramsar	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.003	<0.1%	0.84	0.84	4.5%
OE10	Durham Coast SSSI and Durham Coast NNR	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.003	<0.1%	0.84	0.84	4.5%
OE11	Durham Coast SSSI	Calcareous grassland	Min CL min N 0.856 Min CL Max N 4.856 Min CL Max S 4.0	0.003	<0.1%	0.84	0.84	4.5%

RECEPTOR	SITE NAME	MOST STRINGENT CRITICAL LOAD CLASS APPLICABLE FOR THE SITE	LOWER VALUE OF APPLICABLE CRITICAL LOAD RANGE	PC (KEQ/HA/YR)	PC % CRITICAL LOAD	BACKGROUND ACID DEPOSITION (KEQ/HA/YR)	PEC (KEQ/HA/YR)	PEC % CRITICAL LOAD
OE12	Hart Bog SSSI	Calcareous grassland	Min CL min N 0.321 Min CL Max N 0.469 Min CL Max S 0.148	0.003	0.7%	0.82	0.82	176.3%
OE14	Lovell Hill Pools SSSI	No Sensitive Features						
OE16	Saltburn Gill SSSI	Calcareous grassland	Min CL min N 0.142 Min CL Max N 2.639 Min CL Max S 2.448	0.007	0.2%	0.81	0.82	31.2%

2A.0 NOISE AND VIBRATION

2A.1 Introduction

2A.1.1 This Appendix 2A provides a review of specific Proposed Development changes identified by the noise and vibration screening assessment in Section 4 of the Change Report, deemed enough to require a re-examination of the noise and vibration assessment as presented in the Original ES.

2A.1.2 Chapter 11: Noise and Vibration [APP-063] formed part of the Original ES and should be read alongside the following documents submitted with the DCO Application [EN070009]:

- Appendix 11A: Construction Noise Assessment Methodology [APP-198];
- Appendix 11B: Operational Noise Information [APP-199]; and
- Appendix 11C: Baseline Sound Monitoring and Survey Information [APP-200].
- Figure 11-1: Noise Sensitive Receptors

2A.1.3 This Appendix 2A of this Change Report reviews the need for changes to ES Chapter 11: Noise and Vibration [APP-063] and ES Appendix 11A: Construction Noise Assessment Methodology [APP-198] as a result of the Proposed Development changes.

2A.1.4 No updates are required to ES Appendix 11B and 11C [APP-199 and APP-200] as a result of the Proposed Development changes.

2A.1.5 This assessment only considers potential effects since the Original ES was prepared; if no change is listed then conditions are the same as those presented in the Original ES.

2A.1.6 There is one figure accompanying this Appendix 2A to the Change Report - this is an amended version of ES Figure 11-2 because new contours have been produced from re-modelling following the consideration of the Proposed Development Changes.

2A.2 ES Chapter 11 Noise and Vibration

Introduction of the Changes

2A.2.1 Proposed Development Changes 1, 5, 7 and 9 are not expected to affect the noise assessment outcomes as reported in the Original ES, as they either would not impact predicted noise and or vibration effects.

2A.2.2 Proposed Development Change 4 involves the addition of a new temporary construction compound on land at Navigator Terminals. Proposed Development Change 4 would result in a negative impact on NSR H4, with the distance to the nearest construction compound being reduced from 1,309 m as reported in the Original ES to 37 m. This would increase the predicted daytime noise level from 50 to 76 dB $L_{Aeq,\ 12h}$ and change the Negligible effect as reported in the Original ES to a Moderate effect.

2A.2.3 Proposed Development Changes 2, 3 and 6 would result in positive or no change in significance of effects for all receptors. Change 2 would lead to a positive change where construction works would be moved further from noise sensitive receptors (NSRs). Change 3 would involve removing the RBT Satellite Compound. Change 6 would reduce the number of plant items and % on-time of equipment for some activities. Table 2A-11 and 2A-12 in Section 2A.3 of this Appendix (updated versions of Table 11A-1 and Table 11A-4) show an updated list of plant and equipment.

Assessment Methodology and Significance Criteria

2A.2.4 Proposed Development Changes 2, 3, and 4 would result in changes to the distances to NSRs as reported in ES Table 11-2 – these changes are presented in Table 2A-1.

Table 2A-1: Key Representative Noise Sensitive Receptors (ES Table 11-2)

RECEPTOR	ADDRESS	ASSESSED FOR	APPROX. DISTANCE FROM PROPOSED MAIN SITE	APPROX. DISTANCE FROM PROPOSED CLOSEST COMPOUND SITE	APPROX. DISTANCE FROM PROPOSED CLOSEST PIPELINE CONSTRUCTION WORKS
H1	Manor House Farm, Cowpen Bewley, Billingham	Construction noise for the Connection Corridors.	7410 m	1254 m	71 m
H1 Trenchless Pipeline worst affected	Orchard House, Cowpen Bewley, Billingham	Above Ground Pipeline Construction noise for the Connection Corridors.	7597 m	1358 m	98 m
H4	Seal Sands Office	Construction noise for the Main Site and Connection Corridors. Operational noise for the Main Site.	1707 m	37 m	37 m
H1 is representative of the receptor group at Cowpen Bewley, Billingham					

Proposed Development Design and Impact Avoidance

Construction

2A.2.5 A Final CEMP(s) would be prepared, including setting out provisions to ensure that noise and vibration impacts relating to construction activities are minimised based on the measures outlined above. To assist in the preparation of the Final CEMP(s), a detailed noise and vibration assessment would be undertaken, if required, once the EPC Contractor(s) is appointed to identify specific mitigation measures for the Proposed Development (including construction traffic). The detailed noise and vibration assessment would model for the Proposed Development plus Proposed Development Change 4 which is identified to have a negative impact on NSR H4.

Impacts and Likely Significant Effects

Construction Noise Predictions

2A.2.6 The assessment of the Proposed Development construction effects as reported in the Original ES has been updated to include Changes 2, 3, 4 and 6. Details regarding the noise prediction methodology, including a full list of indicative construction plant and associated sound power levels (Lw) for each construction phase, have been updated and are provided in this Appendix 2A.

2A.2.7 Proposed Development Changes 2 to 4, would result in changes to the distances of NSRs to construction works that were presented in ES Table 11-18 of the Original ES – refer to the amended Table 2A-2. Where the distances to the NSRs are reduced, the predicted noise levels increase, and where the distances to the NSRs are increased the predicted noise levels reduce.

Table 2A-2: Distances Between Noise Sensitive Receptors and the Nearest Construction Activities (ES Table 11-18)

RECEPTOR	ADDRESS	APPROXIMATE MINIMUM DISTANCE TO CONSTRUCTION (m)									
		THE MAIN SITE	ABOVE GROUND PIPELINE CONSTRUCTION	BURIED PIPELINE CONSTRUCTION	TRENCHLESS CROSSINGS	COMPOUNDS					
						BEWLEY	BILLINGHAM	GREATHAM	NORTH TEES	SEAL SANDS	WILTON
H1	Manor House Farm, Cowpen Bewley, Billingham	7410	1403	71	212	1254	2618	2536	5700	4568	9630
H1 Buried Pipeline worst affected	Eastmost property on Cowpen Lane towards A1185, Bewley, Billingham	7314	1388	57	279	1202	2640	2470	5650	4495	9559
H1 Trenchless Pipeline worst affected	Orchard House, Cowpen Bewley, Billingham	7597	1456	167	98	1358	2639	2696	5895	4742	9846
H2	Cresswell Road, Grangetown	4426	1473	3364	5220	7005	8017	5740	4065	3984	2817
H3	Kirkleatham Village	4307	468	3218	5137	10160	11624	8749	5623	6372	1437
H4	Seal Sands Office	1707	48	2685	37	4853	6886	3387	37	1039	4221
H5	Marsh House Farm, Warrenby	1384	1474	947	2821	8724	10691	7261	3553	4793	2468

RECEPTOR	ADDRESS	APPROXIMATE MINIMUM DISTANCE TO CONSTRUCTION (m)									
		THE MAIN SITE	ABOVE GROUND PIPELINE CONSTRUCTION	BURIED PIPELINE CONSTRUCTION	TRENCHLESS CROSSINGS	COMPOUNDS					
						BEWLEY	BILLINGHAM	GREATHAM	NORTH TEES	SEAL SANDS	WILTON
H6	58 Broadway West, Redcar	1916	444	1157	3061	8745	10572	7304	3748	4807	1296
H6	83 Broadway West, Redcar	1953	80	1104	2794	8585	10284	7104	3622	4611	938
H7	Bran Sands Waste Water Treatment Plant site offices	827	340	22	1780	7480	9300	6030	2495	3500	1800

2A.2.8 Updated noise predictions at NSRs due to Proposed Development Changes 2.E, 3, 4 and 6 are set out in Table 2A-3 (updated ES Table 11-19).

Table 2A-3: Predicted Free-field Construction Noise Levels for the Main Site and Compounds (ES Table 11-19)

TIME PERIOD	PREDICTED FREE-FIELD NOISE LEVEL FOR DAYTIME CONSTRUCTION ACTIVITY dB $L_{Aeq,12h}$						
	H1	H2	H3	H4*	H5	H6	H7*
STANDARD WORKING HOURS (07:00 TO 19:00 WEEKDAY, 07:00 TO 13:00 SATURDAY)	38	42	44	76	47	50	58
EXTENDED WORKING HOURS (OUTSIDE OF STANDARD WORKING HOURS)	34	27	29	N/A	35	35	N/A
*Total Noise Level. (predicted construction noise + existing ambient noise level (57dB) = Total Noise Level)							

2A.2.9 Updated indicative predicted construction noise levels due to Change 2.A are shown in Table 2A-4 and Table 2A-5 as related to standard working hours and extended working hours respectively.

Table 2A-4: Standard Working Hours (07:00 to 19:00 Weekday, 07:00 to 13:00 Saturday) Construction Noise Predictions away from the Main Site (ES Table 11-20)

RECEPTOR	PREDICTED FREE-FIELD NOISE LEVEL FOR DAYTIME CONSTRUCTION ACTIVITY dB $L_{Aeq,12h}$						
	H1	H2	H3	H4*	H5	H6	H7*
Trenchless (Horizontal Directional Drilling)	68	N/A	N/A	66	22	29	57
Receptors are marked as N/A where they are more than 3000 m away from construction activity *Total Noise Level. (predicted construction noise + existing ambient noise level (57dB) = Total Noise Level)							

Table 2A-5: Extended Working Hours Construction Noise Predictions away from the Main Site (for Residential Noise Sensitive Receptors only) (ES Table 11-21)

RECEPTOR	PREDICTED FREE-FIELD NOISE LEVEL FOR DAYTIME CONSTRUCTION ACTIVITY dB $L_{Aeq,12h}$				
	H1	H2	H3	H5	H6
Trenchless (Horizontal Directional Drilling)	68	N/A	N/A	22	29
Receptors are marked as N/A where they are more than 3000 m away from construction activity or where activity does not occur in extended hours					

Construction Noise Effects

Daytime Effects

2A.2.10 Updated worst-case construction noise effects for the Main Site and Temporary Construction Compounds are set out in Table 2A-6 (updated ES Table 11-22).

Table 2A-6: Indicative Construction Noise (free field) Effects for The Main Site and Compounds – Daytime and Saturday (07:00 to 13:00) (ES Table 11-22)

RECEPTOR	CLASSIFICATION OF EFFECTS
	MAIN SITE CONSTRUCTION WORKS
H4	MODERATE

2A.2.11 Table 2A-6 indicates that Proposed Development Change 4 would increase the noise effects at non-residential receptor H4 (Seal Sands Office during daytime construction hours and Saturday (07:00 to 13:00) from Negligible to Moderate Adverse (Significant). This is due to the construction compound being moved closer to NSR H4 than reported in the ES Chapter 11 assessment (as reported in Table 2A-1 and Table 2A-2 which has adversely impacted the predicted values in Table 2A-3). The significance of effects at all other receptors in ES Table 11-22 remain the same as reported in the Original ES.

2A.2.12 Updated worst-case noise effects for Pipeline Construction are set out in Table 2A-7 (updated ES Table 11-23).

Table 2A-7: Indicative Construction Noise Effects for Pipeline Construction - Daytime and Saturday (07:00 to 13:00) (ES Table 11-23)

RECEPTOR	CLASSIFICATION OF EFFECTS						
	H1	H2	H3	H4	H5	H6	H7
Trenchless (Horizontal Directional Drilling)	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

2A.2.13 The significance of effect at NSR H1 during Trenchless works (HDD) would reduce from Major Adverse (Significant) (as reported in ES Chapter 11 [APP-063]) to Minor Adverse (Not Significant) as a result of the reduction in the HDD works extent as part of Change 2.A. The HDD working area has moved slightly further away from the closest NSRs at H1.

2A.2.14 Table 2A-8 summarises the updated likely residual significant effects during the construction of the Main Site and Temporary Construction Compounds on noise and vibration receptors following implementation of mitigation (updated ES Table 11-34).

Table 2A-8: Residual Noise Effects (ES Table 11-34)

DEVELOPMENT STAGE	ENVIRONMENTAL EFFECT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT PRIOR TO MITIGATION	MITIGATION/ ENHANCEMENT (IF IDENTIFIED)	CLASSIFICATION OF RESIDUAL EFFECT AFTER MITIGATION	NATURE OF EFFECT(S) (LT/ MT/ ST AND P/ T AND D/ IN)
Construction	Noise effects during construction of the Main Site and Compounds.	**Moderate Adverse (Significant) for NSR H4** during the daytime, and Negligible during the daytime, evening and weekends and night-time at all other receptors, due to Change 4.	Further detailed assessment to determine if further mitigation is required.	**Minor Adverse (Not Significant)** or less at all receptors on the basis that similar construction techniques to those used in indicative calculations are used and the construction noise thresholds (as stated in ES Chapter 11 paragraph 11.6.3) are met for NSR H4, pursuant to Requirement 20 in the DCO.	St, T, D
Construction	Noise effects during construction of the Connection Corridors.	Up to **Major Adverse** (**Significant**) effects at the NSR H1 during the daytime for Buried Pipeline Construction Works Up to **Moderate Adverse** (**Significant**) effects at the non-residential NSR H4 for the Buried Pipeline Construction Works and ROW Fencing	Further detailed assessment particularly regarding working outside of daytime working hours.	**Minor Adverse** or less (**Not Significant**) on the basis that BS 5228 ABC noise limits are met.	St, T, D

DEVELOPMENT STAGE	ENVIRONMENTAL EFFECT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT PRIOR TO MITIGATION	MITIGATION/ ENHANCEMENT (IF IDENTIFIED)	CLASSIFICATION OF RESIDUAL EFFECT AFTER MITIGATION	NATURE OF EFFECT(S) (LT/ MT/ ST AND P/ T AND D/ IN)
		Up to **Major Adverse** (**Significant**) effects during the evening and weekend period at NSR H1 for the Buried Pipeline Construction Works, Trenchless Construction for Pipelines, Testing and Street Works and, during Saturday 13:00 to 16:00 for ROW Fencing and Prep Up to **Moderate Adverse** (**Significant**) effects at NSR H3 for Above Ground Pipeline Construction Methods (only Saturday 13:00 to 16:00). Up to **Major Adverse** (**Significant**) effects during the night-time period at NSR H1 for Buried Pipeline Construction Works and Testing and Street Works.			

2A.3 Appendix 11A Construction Noise Levels and Assumptions

Introduction of the Changes

11A.1.1 Proposed Development Changes 2, 3, 4 and 6 would result in changes to construction noise levels and assumptions.

2A.3.1 The only relevant Proposed Development change which would results in changes to the construction plant and equipment list is Change 6.

Construction Noise Information

11A.2.1 Proposed Development Change 6 would reduce the number of plant items and % on-time of equipment for some activities – Table 2A-9 and Table 2A-10 shows an updated list of plant and equipment (updated ES Table 11A-1 and ES Table 11A-4).

2A.3.2 The construction noise models have been updated and run to include Proposed Development Changes 2, 3, 4, and 6. The updated free-field predicted construction noise levels for trenchless crossings (HDD) construction works are shown in Table 2A-11. For the Main Site and Temporary Construction Compounds quarterly average monthly free-field predictions for standard hours are presented in Table 2A-11; and for Main Site and Temporary Construction Compound quarterly average monthly free-field predictions for non-standard hours are presented in Table 2A-13.

Table 2A-9: Plant and Equipment Associated with Construction of Temporary Compound Works (ES Table 11A-1)

ACTIVITY	PLANT	NO.	% ON-TIME	UNWEIGHTED OCTAVE BAND SOUND POWER LEVEL [L_W dB]								OVERALL SOUND POWER LEVEL [L_{WA} dB]	REFERENCE
				63	125	250	500	1K	2K	4K	8K		
Establishment Clearing Site	Tracked Excavator (22t)	1	67	108	111	104	101	100	98	97	94	106	BS 5228: Tab C.2 #3
Establishment Excavation/Earthworks	Tracked Excavator (25t)	1	67	123	112	107	101	98	96	92	85	105	BS 5228: Tab C.2 #19
Construction Compound Establishment Distribution of Material	Tipper Lorry	1	67	101	106	106	106	102	101	96	94	108	BS 5228: Tab C.2 #34
Establishment Pumping Surface Water	Diesel Water Pump	2	50	109	111	105	103	104	103	97	91	109	BS 5228: Tab C.11 #1

Table 2A-10: Plant and Equipment Associated with General Site Activity Works (ES Table 11A-4) (for Temporary Construction Compounds only)

ACTIVITY	PLANT	NO.	% ON-TIME	UNWEIGHTED OCTAVE BAND SOUND POWER LEVEL [LW dB]								OVERALL SOUND POWER LEVEL [L_{WA} dB]	REFERENCE
				63	125	250	500	1K	2K	4K	8K		
Concreting	Cement Mixer Truck	1	33	111	102	94	97	98	106	88	83	108	BS 5228: Tab C.4 #20
Pumping Concrete	Truck Mounted Concrete Pump	1	33	111	105	103	103	102	103	95	91	108	BS 5228: Tab C.4 #29
Grinding Steel	Angle Grinder	3	33	85	79	80	88	98	105	101	101	108	BS 5228: Tab C.4 #93
Lifting	Tracked Mobile Crane (100t)	1	67	101	99	94	95	102	94	86	77	103	BS 5228: Tab C.4 #52
Access	Cherry Picker	1	67	106	104	90	91	88	87	86	77	95	BS 5228: Tab C.4 #57
Fuel Deliveries	Fuel Tanker	1	10	107	101	99	103	100	95	87	78	104	BS 5228: Tab C.4 #15
Pumping water	Water Tanker with Vacuum Pump	1	67	109	110	95	100	99	102	101	94	107	BS 5228: Tab C.4 #89
Cleaning Roads	Road Sweeper	1	50	108	103	97	103	99	95	89	86	104	BS 5228: Tab C.4 #90
Scaffolding	Various	1	10	98	104	94	89	94	101	105	98	108	Based on C.4.#92
Note, Batching plant, breaker mounted on wheeled backhoe and tracked crusher are on Main Site only.													

Noise Level Predictions for Pipeline Construction Works (Worst-Case per Receptor, Free-field)

Table 2A-11: Trenchless Crossings (HDD) Construction Works (ES Table 11A-13)

ACTIVITY	PREDICTED FREE-FIELD NOISE LEVEL FOR CONSTRUCTION ACTIVITY dB $L_{Aeq, T}$						
	H1	H2	H3	H4*	H5	H6	H7*
Setup/anchors	60	-	-	57	12	20	27
Drilling and Pullback	68	-	-	65	22	29	37
Mud Processing	55	-	-	52	11	17	25
Other	43	-	-	40	-	6	13
Lorry Movements	65	-	-	63	18	26	35
Lifting	45	-	-	42	-	6	15
Pipe Storage and Stringing	56	-	-	54	11	18	26
Fabrication and Ancillary Works	60	-	-	57	14	21	30
Temporary power supply	52	-	-	49	-	14	22
* The values reported in Table 2A-4 are the Total Noise Level (i.e. the predicted construction noise level (as stated in this table) + the existing ambient noise level (57dB)							

Noise Level Predictions for Main Site and Compound Construction Quarterly Average Monthly (Free-Field) Predictions

Table 2A-12: Main Site and Compound Construction Quarterly Average Monthly Free-field Predictions for Standard Hours (ES Table 11A-17)

RECEPTOR	PREDICTED FREE-FIELD NOISE LEVEL FOR CONSTRUCTION ACTIVITY dB $L_{Aeq, T}$																			
	2025				2026				2027				2028				2029			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
H1	37	37	37	37	37	37	37	37	37	38	38	38	38	38	38	38	38	31	31	31
H2	40	40	40	40	40	40	40	40	40	42	42	42	42	42	42	42	42	35	35	35
H3	42	42	42	42	43	42	42	42	42	44	44	44	44	44	44	44	44	36	36	36
H4*	74	74	74	74	74	74	74	74	74	76	76	76	76	75	75	75	75	69	69	69
H5	46	46	47	47	47	45	44	44	44	46	46	46	46	46	46	46	46	41	41	41
H6	49	49	49	49	49	49	49	49	49	50	50	50	50	50	50	50	50	44	44	44
H7*	50	50	50	50	50	49	49	49	49	51	51	51	51	51	51	51	51	44	44	44

Note: Levels reported in this table include operational Phase 1 from 2028 onwards

* The values reported in Table 2A-3 are the Total Noise Level (the predicted construction noise level (as stated in this table) + the existing ambient noise level (57dB)

Table 2A-13: Main Site Compound Construction Quarterly Average Monthly Free Field Predictions for Non-Standard Hours (ES Table 11A-18)

RECEPTOR	PREDICTED FREE-FIELD NOISE LEVEL FOR CONSTRUCTION ACTIVITY dB $L_{Aeq, T}$																			
	2025				2026				2027				2028				2029			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
H1	25	25	25	25	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	34
H2	26	26	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
H3	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
H5	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	35
H6	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38

Note: Levels reported in this table include operational Phase 1 from 2028 onwards.

3A.0 ECOLOGY AND NATURE CONSERVATION

3A.1 Introduction

3A.1.1 Appendix 3A provides a review of specific Proposed Development changes identified by the ecology screening assessment presented in Section 4 of the Change Report, deemed enough to require a re-examination of the ecological assessment as presented in the Original ES.

3A.1.2 Chapter 12: Ecology and Nature Conservation [APP-064] formed part of the Original ES and should be read alongside the following documents submitted with the DCO Application [EN070009]:

- Appendix 12A: Phase 1 habitat and botanical survey report [APP-201];
- Appendix 12B: Great Crested Newt Survey Report [APP-202];
- Appendix 12C: Bat Survey Report [APP-203];
- Appendix 12D: Reptile Survey Report [APP-204];
- Appendix 12E: Invertebrate Survey Report [APP-205];
- Appendix 12F: Water Vole and Otter Report [APP-206]; and
- Appendix 12G: Aquatic Ecology Survey Report [APP-207].

3A.1.3 This Appendix 3A of the Change Report reviews the need for changes to ES Chapter 12: Ecology and Nature Conservation [APP-064] as a result of the Proposed Development changes.

3A.1.4 No updates are required for ES Appendices from 12A to 12G [APP-201 and APP-207] as a result of the Proposed Development changes.

3A.1.5 This assessment only considers changes in baseline conditions or potential effects since the Original ES was prepared; if no change is listed then conditions are the same as those presented in the Original ES.

3A.1.6 There are no figures accompanying this Appendix 3A to the Change Report.

3A.2 ES Chapter 12 Ecology and Nature Conservation

Introduction of the Changes

3A.2.1 Proposed Development Change 1, addition of second flare stack, may affect air quality within the Zone of Influence, potentially impacting designated sites and habitats. While minor adjustments to the air quality operational phase assessment have been undertaken (refer to Appendix 1A of this Change Report), they do not alter the conclusions as related to air quality or ecology as reported in the Original ES.

3A.2.2 Proposed Development Change 2, Order Limits Reductions, and Change 6, Reduction in plant at temporary construction compounds, primarily reduces habitat loss, including grassland, swamp, and open mosaic habitats at various locations,

with some reductions in noise and visual disturbance. Most affected habitats are of local or district importance, while some, such as bare ground, are of negligible significance.

3A.2.3 Proposed Development Change 3, Removal of temporary construction compound at RBT, further reduces the loss of bare ground and decreases noise and visual disturbance at Bran Sands Bay.

3A.2.4 Proposed Development Changes 4, 5, 7 and 9 would not result in any changes to the ecological assessment as reported in the Original ES.

Baseline Conditions

Statutory Designated Sites

3A.2.5 The Order Limits have been revised, primarily resulting in land take reductions (as associated with Change 2). Consequently, distances from statutory and non-statutory designated sites to the Main Site and connection corridors have mostly decreased. Any changes in proximity are considered negligible due to the initial rounding of distances. Therefore, adjustments to Tables 12-3 and 12-4 of the Original ES are not considered necessary.

Habitats

3A.2.6 An Extended Phase 1 Habitat Survey of all land within the Proposed Development Site was undertaken between October 2022 and December 2023. The areas now included or excluded from the Proposed Development Site (as related to Change 2 and 8) were visited during these surveys, and no further survey visits are required to assess areas affected by the Proposed Development changes.

3A.2.7 Full methodology and survey results are presented within Appendix 12A: Extended Phase 1 Habitat and Botanical Survey Report [APP-201]. The vegetation and broad habitat types within the Proposed Development Site were recorded in accordance with the categories specified for a Phase 1 Vegetation and Habitat Survey (JNCC, 2010). Dominant plant species were recorded for each habitat present using nomenclature according to Stace (2010).

3A.2.8 Habitats of Principal Importance (HPI) or those listed within LBAP for relevant local authorities were identified during the desk study. The site was also appraised for its suitability to support protected and notable species, with reference to the CIEEM Guidelines for Preliminary Ecological Appraisal (CIEEM, 2017). The locations of any invasive non-native plant species were also recorded during the survey.

Proposed Development Design and Impact Avoidance

Construction

3A.2.9 The requirement for a Horizontal Directional Drilling (HDD) crossing at the Brinefields has been removed (Change 2.F) reducing potential noise and visual disturbance affecting the qualifying bird species of the Teesmouth and Cleveland Coast SPA and Ramsar. The risk of the HDD collapse is also removed at this location.

Operation

3A.2.10 Air quality impacts on designated sites were modelled from the Production Facility alone, and in combination with other known cumulative plans and projects. Appendix 1A contains the updated cumulative assessment and In-Combination results. The methodology and list of developments considered in the assessment has not changed from the Original ES. However, as the Proposed Development's model inputs have changed, the cumulative assessment results have also been updated.

3A.2.11 The impacts on international wildlife sites are presented in an updated Report to Inform Appropriate Assessment and conclude that no air quality effects are expected on any international wildlife site as a result of the Proposed Development (including Proposed Development Changes 1, 5 and 7).

3A.2.12 According to Appendix 1A of this Change Report, the highest predicted annual mean NO_x concentration within the Study Area due to the Proposed Development (including Proposed Development Changes 1, 5 and 7) is 0.3 µg/m³, occurring near the northern boundary, within the dunes of the Teesmouth and Cleveland Coast SSSI site. The predicted environmental concentration for NO_x at this location is 22.3 µg/m³, well below the annual mean NO_x AQAL of 30 µg/m³. Therefore, NO_x emissions from the Proposed Development (including Proposed Development Changes 1, 5 and 7) are not expected to be significant anywhere within the Study Area.

3A.2.13 Teesmouth & Cleveland Coast SSSI is designated for its calcareous dune habitats in addition to its bird interest. The assessment of impacts on bird interest is identical to that for the Teesmouth & Cleveland Coast SPA and Ramsar site presented in the updated Report to Inform Appropriate Assessment and reaches a conclusion of no likely significant effect for the same reasons.

3A.2.14 The nitrogen dose at the maximum point of impact within the Teesmouth & Cleveland Coast SSSI is at the threshold of insignificance of 1% of the critical load (being 1.1% of the critical load). It should be noted that The Environment Agency and Natural England have agreed that depositional impacts that are below 1% of the relevant critical load for a site can be regarded as likely to be insignificant. Guidance from the IAQM clarifies that the 1% threshold is not intended to be precise to a set number of decimal places but to the nearest whole number (paragraph 5.5.2.6 of Institute of Air Quality Management, 2020).

3A.2.15 The PEC will also exceed the critical load being a maximum of 12.92 kgN/ha/yr at Coatham Sands/Dunes (OE6). This is due to the fact that current nitrogen deposition exceeds the critical load.

3A.2.16 The SSSI was designated in 2015 when the background nitrogen dose to short vegetation according to APIS was 13.07 to 13.53 kgN/ha/yr at Coatham Sands/Dunes and North Gare Sands. Moreover, APIS shows that in the years prior to 2015 (prior to designation) the background nitrogen deposition dose to short vegetation was higher; for example being 14.69 to 14.77 kgN/ha/yr in 2003 at Coatham Sands/Dunes and North Gare Sands. The calcareous dune habitat has thus

developed and persisted in close proximity to an operational steel works and other industrial facilities when nitrogen deposition rates were considerably higher than the lower critical load of 10 kgN/ha/yr, or than is forecast to be the case under the 'in combination' assessment (13.67 kgN/ha/yr maximum).

3A.2.17 Since total nitrogen deposition is forecast to remain on an improving trend even when growth is considered 'in combination' and would therefore remain below historic nitrogen deposition rates under which the habitat in question developed, no significant effect on the SSSI is predicted. This is particularly the case given that the predicted PC is based on conservative assumptions and as noted in 1A.3.34 above, guidance from the IAQM clarifies that the 1% threshold is not intended to be precise to a set number of decimal places but to the nearest whole number (paragraph 5.5.2.6 of Institute of Air Quality Management, 2020).

3A.2.18 The DCO Ecology ES Chapter showed that a net improvement in nitrogen deposition is forecast and nitrogen deposition rates are forecast to be materially lower than in earlier decades, with the habitat structure having been extensively changed due to slag deposition and movement from at least the 1940s to the early 2000s. Much of the dunes north of the Proposed Development's site (i.e. Coatham Dunes) have developed on slag deposits from the various historic industrial activities in that area (notably Warrenby Slag Works). In these decades N deposition will have been much higher than it is now due to much higher NOx emissions (and was certainly higher in 2003 than it is now according to APIS). For example, UK N deposition reduced from 465 kt N in 1990 to 278 kt N in 2017 (Samuel J. Tomlinson et al., 2021).

3A.2.19 Therefore, no likely significant effect will arise on Teesmouth & Cleveland Coast SSSI, based on the small contribution of the proposed project, the fact that nitrogen deposition is modelled to remain below historic levels (thus denoting a net improvement even when cumulative deposition is considered), and the fact that much of the dune interest developed when pollution levels were higher than at present.

Essential Mitigation and Enhancement Measures

Construction Phase

Essential Mitigation

3A.2.20 A District Level Licence (DLL) will be used to avoid significant effects upon great crested newt (GCN). An updated Impact Assessment and Conservation Payment Certificate (IACPC) has been signed and the first payment has been made to Natural England.

4A.0 ORNITHOLOGY

4A.1 Introduction

4A.1.1 Appendix 4A provides a review of specific Proposed Development changes identified by the ornithology screening assessment in Section 4 of the Change Report, deemed enough to require a re-examination of the ornithological assessment as presented in the Original ES.

4A.1.2 Chapter 13: Ornithology [APP-065] formed part of the Original ES and should be read alongside the following document submitted with the DCO Application [EN070009]:

- Appendix 13A: Ornithology Baseline Report [APP-208]; and
- Supplementary Baseline Ornithology Report (Document Ref 6.4.25.1A).

4A.1.3 This Appendix 4A of this Change Report reviews the need for changes to ES Chapter 13: Ornithology [APP-065] as a result of the Proposed Development changes.

4A.1.4 No updates are required for ES Appendix 13A [APP-208] as a result of the Proposed Development changes.

4A.1.5 This assessment only considers changes in baseline conditions or potential effects that have arisen since the preparation of the Original ES, as well as the updated baseline detailed in the Supplementary Baseline Ornithology Report (Document Ref 6.4.25.1A), which is provided as part of this submission. The supplementary baseline does not introduce any significant changes to the assessment of effects as outlined in the revised ES. If no changes are noted, the conditions remain consistent with those presented in the Original ES.

4A.1.6 There are no figures accompanying this Appendix 4A to the Change Report.

4A.2 ES Chapter 13 Ornithology

Introduction of the Changes

4A.2.1 Proposed Development Changes 1, 4, 5, 7 and 9 would have no impact on the ornithological assessment presented in the Original ES, as they either do not affect key ornithological features or are located further away from such features. Predicted noise levels also remain below significant thresholds for important bird habitats.

4A.2.2 Proposed Development Change 2, 3 and 6 are anticipated to result in positive outcomes as compared to the outcomes as presented in the Original ES.

4A.2.3 Change 2 would reduce potential noise and visual disturbance affecting the qualifying bird species of the Teesmouth and Cleveland Coast SPA. Change 3 would reduce construction noise at Bran Sands Bay by 10dB due to the removal of the RBT Satellite Compound, although the Original ES proposed mitigation measures that would have reduced the predicted noise impact such that the effects of the compound would not have been significant. Change 6 would reduce noise and

visual impacts on bird species but would not alter the significance of the effects as previously reported in the Original ES.

Sources of Information/ Data

Field Surveys

4A.2.4 Since the Original ES was produced, further monthly wetland bird surveys have been carried out at Dabholm Gut, Navigator Terminals foreshore and Greenabella Marsh between January and March 2024. The findings of these further survey visits are presented in the Supplementary Baseline Ornithology Report submitted alongside this Change Application and summarised in Section 4A.1.5 of this Appendix 4A and are considered in the assessments as presented herein of the Proposed Development changes.

Baseline Conditions

Species Records

Summary of Relevant Species and Assemblages

4A.2.5 The findings of additional monthly wetland bird surveys showed new peak counts of SPA qualifying bird species (redshank, turnstone, shoveler, wigeon and herring gull) recorded from Dabholm Gut, Navigator Terminals foreshore and Greenabella Marsh between January and March 2024. The higher counts of these five SPA species make no difference to conclusions of the ornithology assessment as presented in the Original ES except for herring gull (included in Table 4A-1) which previously did not exceed 1% of the Teesmouth and Cleveland Coast SPA population threshold.

4A.2.6 A new herring gull peak count of 20 individuals on 12 March 2024 was recorded at low tide at Navigator Terminals Foreshore (Seal Sands) which exceeds 1% of the Teesmouth and Cleveland Coast SPA population.

Table 4A-1: Summary of Relevant Ornithological Species Features Requiring Further Assessment of Impacts and Effects (ES Table 13-7)[1]

FEATURE	DESCRIPTION OF FEATURE KEY LOCATIONS AND THEIR DISTANCE FROM THE PROPOSED DEVELOPMENT	VALUE	RATIONALE FOR VALUATION	RELEVANCE TO ASSESSMENT OF THE PROPOSED DEVELOPMENT		SCOPING IN OR OUT FOR ASSESSMENT
				MAIN SITE	CONNECTION CORRIDORS	
Teesmouth and Cleveland Coast SPA / Ramsar site qualifying species						
Redshank (non-breeding)	Present throughout the year with peak counts recorded during early-spring and late-autumn. Breeds at Brinefields, Cowpen Marsh and RSPB Saltholme. Regularly forages at Dabholm Gut, Navigator Terminals foreshore, Bran Sands Bay, Greenabella Marsh and Seal Sands Bay. Roosts on Seal Sands Bay peninsula. The closest regularly used foraging site is within approximately 350 km of the Main Site and 50 m of the Connection Corridors.	Local	A 'Common' migrant and winter visitor in Cleveland (Brown, 2022).	Operation	Construction	In
Northumbria Coast SPA qualifying breeding and non-breeding species not already named above						
Turnstone (non-breeding)	Regularly forages on Bran Sands Bay and Seal Sands Bay. Roosts on Seal Sands Bay peninsula, Dabholm Gut and the islands within Bran Sands Bay.	Borough	A 'Fairly Common' migrant and winter visitor	Not relevant This species is regularly recorded at locations that are sufficiently	Not relevant This species is regularly recorded at locations that are	Out

[1] New text is highlighted in red.

FEATURE	DESCRIPTION OF FEATURE KEY LOCATIONS AND THEIR DISTANCE FROM THE PROPOSED DEVELOPMENT	VALUE	RATIONALE FOR VALUATION	RELEVANCE TO ASSESSMENT OF THE PROPOSED DEVELOPMENT		SCOPING IN OR OUT FOR ASSESSMENT
				MAIN SITE	CONNECTION CORRIDORS	
	The turnstones recorded within the Survey Area are highly unlikely to contribute to the population for which the Northumberland Coast SPA is designated because their foraging range is typically within 3km of roost sites. The closest regularly used foraging and roosting site is within approximately 550 m of the Main Site and 250 m of the Connection Corridors.		(Brown, 2022).	distant and hence not susceptible to potential impact from the Proposed Development.	sufficiently distant and hence not susceptible to potential impact from the Proposed Development.	
Teesmouth and Cleveland Coast SPA/ Ramsar site qualifying non-breeding assemblage species						
Herring Gull	Present throughout the year. Regularly forages along the Teesside coast and river including Navigator Terminals foreshore where peak where a peak count of 20 individuals on 12 March 2024. Regularly roosts on the islands in Bran Sands Bay and Seal Sands Bay peninsula. Peak count recorded in March. Has bred at the Main Site and regularly breeds at Hartlepool Headland.	Local	A 'Common' resident and winter visitor in Cleveland (Brown, 2022).	Construction Operation Decommissioning	Construction	In

FEATURE	DESCRIPTION OF FEATURE KEY LOCATIONS AND THEIR DISTANCE FROM THE PROPOSED DEVELOPMENT	VALUE	RATIONALE FOR VALUATION	RELEVANCE TO ASSESSMENT OF THE PROPOSED DEVELOPMENT		SCOPING IN OR OUT FOR ASSESSMENT
				MAIN SITE	CONNECTION CORRIDORS	
	The closest regularly used foraging and roosting site is within the Main Site and 100 m of the Connection Corridors.					

Proposed Development Design and Impact Avoidance

Construction

4A.2.7 The need for the HDD crossing at the Brinefields has been removed (Change 2.F) thereby reducing potential noise and visual disturbance affecting the qualifying bird species of the Teesmouth and Cleveland Coast SPA. The predicted noise impact reported in the updated assessment at other nearby locations, also within the Teesmouth and Cleveland Coast SPA, would be mitigated to a level that is not significant.

4A.2.8 Proposed Development Change 3 removes the temporary construction compound near Bran Sands bay, thereby reducing potential noise and visual impacts affecting the qualifying bird species of the Teesmouth and Cleveland Coast SPA and Ramsar site. The predicted noise impact reported in the updated assessment at other nearby locations, also within the Teesmouth and Cleveland Coast SPA, would be mitigated to a level that is not significant.

4A.2.9 Proposed Development Change 4 introduces a temporary construction compound near Navigator Terminals foreshore, thereby increasing potential noise and visual disturbance affecting the qualifying bird species of the Teesmouth and Cleveland Coast SPA and Ramsar site. However, the predicted noise impact would be mitigated through the measures referred to in the Report to Inform HRA to a level that is not significant.

4A.2.10 Thus, with the application of the mitigation measures as detailed in the Original ES, no significant effects are anticipated as a result of Change 4.

Residual Effects and Conclusions

4A.2.11 Mitigation measures to reduce noise and visual disturbance to herring gulls near the Navigator Terminals foreshore temporary compound near are described in Table 4A-2.

Table 4A-2: Summary of Residual Effects During Construction (ES Table 13-11)[2]

ORNITHOLOGICAL FEATURE	VALUE	DESCRIPTION OF POTENTIAL IMPACTS	POTENTIAL EFFECTS / SIGNIFICANCE	MITIGATION MEASURES	RESIDUAL EFFECTS / SIGNIFICANCE
Designated nature conservation sites					
Statutory designated sites (SPA and Ramsar site) adjacent to the Proposed Development: Teesmouth and Cleveland Coast SPA; and, Teesmouth and Cleveland Coast Ramsar site	International	*Connection corridors* Habitat losses within functionally linked land resulting in losses of breeding, roosting and/or feeding habitats. Noise, visual and lighting disturbance of breeding and non-breeding birds resulting in displacement of birds from regularly used habitats.	**Significant (Moderate Adverse)**	At Greatham Creek crossing the timing of works within and adjacent to the SPA would be completed between September and November inclusive to avoid the most sensitive periods for breeding and wintering birds. The same timing would be put in place for pipeline installation on existing racking between Saltholme Substation and Cowpen Bewley Road to avoid impacts on SPA qualifying birds present within Pipeline Pools and RSPB Saltholme Reserve; The use of acoustic measures (e.g. barriers, enclosures etc.) to minimise noise to below significance/disturbance thresholds at HDD locations. At the temporary construction compound near Navigator Terminals foreshore noise and visual disturbance would be mitigated at ground level through the use of acoustic and visual closed-board fencing. The noise contour plots	**Not Significant (Minor Adverse)**

[2] New text is highlighted in red.

ORNITHOLOGICAL FEATURE	VALUE	DESCRIPTION OF POTENTIAL IMPACTS	POTENTIAL EFFECTS / SIGNIFICANCE	MITIGATION MEASURES	RESIDUAL EFFECTS / SIGNIFICANCE
				accompanying the HRA have been updated accordingly to include the predicted construction-phase noise emissions for this location; and the acoustic and visual mitigation measures will be secured through updates to the FCEMP in due course. Works to install pipelines using open cut methods through Brinefields; and between Saltholme Substation and Cowpen Bewley Woodland Park would occur during the breeding season and under the supervision of an ECoW to prevent disturbance or displacement of non-breeding SPA birds from feeding and roosting habitats while ensuring that breeding birds are not disturbed and their nests are protected.	
Gadwall, wigeon, lapwing, sanderling, black-headed gull and herring gull (non-breeding)	Local	*Connection Corridors* Habitat losses resulting in losses of roosting and/or feeding habitats. Noise and visual disturbance of non-breeding birds resulting in	**Not Significant (Minor Adverse)**	At the Greatham Creek crossing the timing of works within and adjacent to the SPA would be completed between September and 30 November inclusive to avoid the most sensitive periods for breeding and wintering birds. The use of acoustic measures (e.g. barriers, enclosures etc.) to minimise noise to below significance/disturbance thresholds at HDD locations.	**Not Significant (Minor Adverse)**

ORNITHOLOGICAL FEATURE	VALUE	DESCRIPTION OF POTENTIAL IMPACTS	POTENTIAL EFFECTS / SIGNIFICANCE	MITIGATION MEASURES	RESIDUAL EFFECTS / SIGNIFICANCE
		displacement of birds from regularly used habitats.		At the temporary construction compound near Navigator Terminals foreshore noise and visual disturbance would be mitigated at ground level through the use of acoustic and visual closed-board fencing. The noise contour plots accompanying the HRA have been updated accordingly to include the predicted construction-phase noise emissions for this location; and the acoustic and visual mitigation measures will be secured through updates to the FCEMP in due course. Works to install pipelines using open cut methods through Brinefields; and between Saltholme Substation and Cowpen Bewley Woodland Park would occur during the breeding season and under the supervision of an ECoW to prevent disturbance or displacement of non-breeding SPA birds from feeding and roosting habitats while ensuring that breeding birds are not disturbed and their nests are protected.	

5A.0 LANDSCAPE AND VISUAL AMENITY

5A.1 Introduction

5A.1.1 Appendix 5A provides a review of specific Proposed Development changes identified by the landscape screening assessment provided in Section 4 of the Change Report, deemed enough to require a re-examination of the landscape and visual amenity assessment as presented in the Original ES.

5A.1.2 Chapter 16: Landscape and Visual Amenity [APP-069] formed part of the Original ES and should be read alongside the following document submitted with the DCO Application [EN070009]:

- ES Appendix 16A Landscape and Visual Methodology [APP-211];
- ES Appendix 16B Landscape Character [APP-212]; and
- ES Appendix 16C Potential Viewpoints [APP-213].

5A.1.3 This Appendix 5A of this Change Report reviews the need for changes to ES Chapter 16: Landscape and Visual Amenity [APP-069] as a result of the Proposed Development changes.

5A.1.4 No updates are required for ES Appendices 16A to 16C [APP-211 to APP-213] as a result of the Proposed Development changes.

5A.1.5 This assessment only considers changes in baseline conditions or potential effects since the Original ES was prepared; if no change is listed then conditions are the same as those presented in the Original ES.

5A.1.6 The photomontages, Figures 16-7-1a to 16-7-4f, accompanying this Appendix A to the Change Report have been updated to reflect changes to the landscape as associated with the Proposed Development changes.

5A.2 ES Chapter 16 Landscape and Visual Amenity

Introduction of the Changes

5A.2.1 Proposed Development Changes 2, 5 and 6 would not alter the outcomes of the landscape and visual assessment as reported in the Original ES as they involve minor reductions in Order Limits, construction activities and building dimensions.

5A.2.2 Proposed Development Change 1 would introduce a second flare, adding a visible element to the view – however, this would remain consistent with the industrial character of the prevailing landscape. Proposed Development Change 4 would add a temporary construction compound on land at Navigator Terminals, visible within an already industrialised area. The increased height of the flash vessel associated with Change 7 would make it slightly more noticeable but would not alter the view's character.

5A.2.3 Proposed Development Change 3 would remove the RBT Satellite Compound, which would have been visible from the north. Change 9 would remove an AGI that would have been visible from the north.

5A.2.4 None of these Proposed Development changes would affect the overall conclusions of the landscape and visual impact assessment as presented in the Original ES.

Assessment Methodology and Significance Criteria

Study Area

5A.2.5 Change 1 would introduce a second flare at Phase 2 of the Proposed Development. The dimensions of this second flare would be same as the initial flare already assessed in the Original ES. The Zone of Theoretical Visibility (ZTV) is based on a grid of points at 50 m apart within the Main Site footprint, therefore the addition of the second flare does not change the outcome of the ZTV or the defined Study Area.

Sources of Information/Data

5A.2.6 Additional surveys were carried out in April and May 2024 to re-capture the baseline to account for the demolition of the Redcar Blast Furnace at the following viewpoints:

- VP2 – The Cliff, Seaton Carew;
- VP3 - Zinc Works Road Hartlepool;
- VP4 – North Gare Sands;
- VP5 – South Gare Breakwater;
- VP6 - Cowpen Bewley Woodland Park;
- VP7 - England Coast Path, Warrenby;
- VP8 - Redcar Seafront;
- VP9 - Coatham Marsh Nature Reserve;
- VP10 - Easton Nab;
- VP11 - Longbeck Lane; and
- VP12 - Marske by the Sea.

Impacts and Likely Significant Effects

Potential Landscape Effects at Construction (and Decommissioning)

5A.2.7 The potential landscape impacts of the Proposed Development relate to direct/ physical change to the landscape and indirect change resulting from the visibility of proposed structures (temporary and permanent) and influence on perceptual qualities such as tranquillity.

5A.2.8 During construction, potential impacts of the Proposed Development may result from the following:

- movement of plant and heavy goods vehicles, both within the Proposed Development Site and in the surrounding area;
- temporary stockpiling and storage of materials on-site;

- establishment of site compounds, including the temporary construction compound on land at Navigator Terminals (Change 4), resulting in temporary structures to serve the workforce;
- crane activity to assist high level construction works on the Main Site;
- building construction including new stacks on the Main Site (Change 1);
- clearance of vegetation within the Main Site and Connection Corridors; and
- temporary external lighting to illuminate site operations after dark on the Main Site and along the Connection Corridors.

Potential Landscape Effects at Operation

5A.2.9 During the Proposed Development operational phase, potential impacts may result from the following:

- introduction of permanent large-scale structures and buildings within the Main Site, including the two flare stacks at a height of up to 100 m AGL (Change 1);
- introduction of ancillary structures and elements including access roads, security fencing, car parking etc; and
- introduction of pipelines and associated structures within the Connection Corridors.

Assessment of Landscape Effects during Construction (and Decommissioning)

5A.2.10 The Main Site is situated on the site of the former Redcar steelworks where land-use in the vicinity includes numerous large-scale industrial buildings and structures. The main feature of change during Proposed Development construction would be the introduction of tall cranes and other machinery and temporary structures across the Proposed Development Site.

5A.2.11 The landscape assessment considers all elements of the Proposed Development and is undertaken based on the maximum dimensions and parameters as described within ES Chapter 4: Proposed Development [APP-056] and amended following the relevant changes. The approach to constructing the proposed Connection Corridors is subject to review and may involve installation above and / or below ground or may include reuse of existing pipelines. A worst-case approach is taken to different stages of the assessment, with the construction stage assessment undertaken based on the installation of underground pipelines due to the higher levels of disturbance resulting from these construction methods, such as vegetation removal across a working corridor, excavations, and trenching.

5A.2.12 Table 5A-1 provides an assessment of the anticipated magnitude of landscape impacts and the classification of effects on each landscape receptor during the Proposed Development construction phase.

5A.2.13 Table 5A-1 has been updated to reflect the removal of temporary construction compound at RBT (Change 3) and addition of temporary construction compound on land at Navigator Terminals (Change 4).

Table 5A-1: Assessment of Landscape Effects – Construction (and Decommissioning) (ES Table 16-5)

LANDSCAPE TYPE	RECEPTOR SENSITIVITY	DESCRIPTION OF IMPACT	MAGNITUDE OF IMPACT	CLASSIFICATION OF EFFECT
National Character Area (NCA) 23: Tees Lowland	Medium	Construction activities associated with the Proposed Development would directly impact the NCA. Construction activities and temporary construction compound on land at Navigator Terminals (Change 4) would be viewed in context with other large-scale industrial developments. Due to the presence of large-scale industrial development which lies within this NCA, and the type of construction activities being undertaken, it is considered that the Proposed Development would have very limited potential to affect the landscape character and perception of the NCA in the short term during the day-time and night-time context. Impacts would be over a small geographical extent and reversible.	No changes to the Original ES.	No changes to the Original ES.
Marine Character Area (MCA) 22: Tyne, Tees and Wear Estuaries and Coastal Waters	Medium	Part of the Proposed Development lies within this MCA, potentially resulting in localised direct change. The majority of the construction works would occur outside, but in proximity to this MCA, introducing views of construction activity and temporary structures adjacent to the coast and river, including the removal of temporary construction compound at RBT (Change 3) and addition of temporary construction compound (Change 4) on land at Navigator Terminals. However, as a result of the existing context of large-scale industrial development, it is considered that the Proposed Development would have very limited potential to influence the overall character, perception, and tranquillity of the MCA during the day-time and night-time context. Impacts would be over a small geographical extent, temporary in nature and reversible.	No changes to the Original ES.	No changes to the Original ES.
East Billingham to Teesmouth	Medium	Parts of the Connection Corridor network lie within this LCA, including the temporary construction compound on land at Navigator Terminals (Change 4) and other temporary construction compounds, above ground and below ground	No changes to the Original ES.	No changes to the Original ES.

LANDSCAPE TYPE	RECEPTOR SENSITIVITY	DESCRIPTION OF IMPACT	MAGNITUDE OF IMPACT	CLASSIFICATION OF EFFECT
Landscape Character Area (LCA)		pipelines, HDD stringing sites at Cowpen Bewley and Greatham Creek, and several AGIs. As such, direct change would occur during the construction of the pipelines and AGIs due to increased activity from construction vehicles and plant, and vegetation removal and trenching within a working corridor. Direct change would also occur along or adjacent to existing road and pipeline corridors, which would limit the impression of change in these areas. Due to the presence of existing large-scale industrial development and above ground pipelines within this LCA, and the type of construction activities being undertaken, it is considered that the Proposed Development would have limited potential to affect the overall character and perception of this LCA during the day time and night-time context. Impacts would be over a medium geographical extent and would be temporary and reversible.		

Operation

5A.2.14 During the Proposed Development operational phase, potential impacts may result from the following:

- introduction of permanent large-scale structures and buildings within the Main Site, including the flare stacks (Change 1) at a height of 100 m AGL;
- introduction of ancillary structures and elements including access roads, security fencing, car parking etc.;
- introduction of pipelines and associated structures (including AGIs) within the Connection Corridors;
- Updates to building dimensions at the Main Site (Change 7).

5A.2.15 As outlined above in relation to the construction phase, the landscape assessment considers all elements of the Proposed Development and is undertaken based on the maximum dimensions and parameters currently proposed. The approach to the proposed Connection Corridors is subject to review and may involve installation above and / or below ground or may include reuse of existing pipelines. A worst-case approach is taken for different stages of the assessment, with the operation stage assessment undertaken based on pipelines being above ground.

5A.2.16 The Original ES provides an assessment of the anticipated magnitude of landscape impacts and the classification of effects on each landscape receptor during the operation of the Proposed Development. The findings of the Original ES have been reviewed and it is considered that no changes are required due to the introduction of the Proposed Development changes.

Decommissioning

5A.2.17 The impacts on landscape character arising as a result of decommissioning of the Proposed Development are considered (using professional judgement) to be similar to those identified at the construction stage. This is due to the scale and nature of the Proposed Development in relation to the existing industrial structures and complexes present in the wider landscape and the large-scale of the LCAs.

Effects on Visual Amenity

5A.2.18 Potential visual effects of the Proposed Development in comparison with the future baseline visual context are considered in Table 5A-2 by reference to representative viewpoints. The assessments contained within Table 5A-2 should be read in conjunction with ES Figures 16-6-1a to 16-6-15a [APP-170] and ES Figures 16-6-1b to 16-6-14b [APP-171] which illustrate the existing baseline situation at each viewpoint for winter and summer views.

5A.2.19 Table 5A-2 has been updated to reflect:

- Change 1 – Addition of second flare stack for Phase 2;
- Change 3 – Removal of temporary construction compound at RBT;

- Change 4 – Addition of temporary construction compound on land at Navigator;
- Change 7 – Updates to building dimensions at the Main Site; and
- the updated photography and photomontages.

16.7.4 A series of photomontages have been prepared (ES Figures 16-7-1a to 16-7-4c: Photomontages [APP-172]) which illustrate the likely visibility of the Proposed Development at four of the assessed viewpoints. The photomontages represent the heights of key elements of the Proposed Development with the flare being a worst-case height of 100 m AGL (108 m AOD), with all other structures on the Main Site at a height of 70 m AGL or below. The two flares are shown at a maximum degree of separation as a worst-case for views along the coastline from the north and south.

16.7.5 The photomontages have been updated to reflect Change 1 and Change 7. Refer to Figure 16-7-1a to 16-7-4f (Document Ref 6.3.93) for updated photography and photomontages for the following viewpoints:

- Viewpoint 2 – The Cliff, Seaton Carew;
- Viewpoint 5 - South Gare Breakwater;
- Viewpoint 7 - England Coast Path, Warrenby; and
- Viewpoint 8 – Redcar Seafront.

Construction (and decommissioning)

5A.2.20 For Viewpoints 1, 6, and 10 to 14, the construction of Change 1 and Change 7 would not result in a perceptible change within both the daytime and nighttime views. The impact of the changes is assessed as very low, covering a small geographic extent, and is long-term but reversible.

5A.2.21 For Viewpoints 2, 3, 4, 8, and 9, the Proposed Development would similarly maintain the overall context and balance of the view in both daytime and nighttime conditions. The impact is considered low, extending over a small to medium geographic area, with long-term but reversible effects.

5A.2.22 For Viewpoint 5 (Table 5A-2), while the Proposed Development would be noticeable, it would not disrupt the overall balance of the view during the day or at night. The impact is assessed as low, affecting a large geographic extent, but is long-term and reversible.

5A.2.23 For Viewpoint 7 (Table 5A-2), the increased massing of structures associated with the operational Main Site would become a prominent feature from this location, occupying a significant portion of the view and altering its overall balance in both daytime and nighttime contexts. The impact is assessed as medium, covering a medium geographic extent, long-term but reversible.

Operation

5A.2.24 For Viewpoints 1, 6, and 10 to 14, the Proposed Development would not significantly alter the overall context or balance of features within both the daytime and nighttime views. The impact is assessed as very low, covering a small geographic extent, and is long-term but reversible.

5A.2.25 For Viewpoints 2, 3, 4, 8, and 9, the Proposed Development would similarly maintain the overall context and balance of the view in both daytime and nighttime conditions. The impact is considered low, extending over a small to medium geographic area, with long-term but reversible effects.

5A.2.26 For Viewpoint 5 (Table 5A-2), while the Proposed Development would be noticeable, it would not disrupt the overall balance of the view during the day or at night. The impact is assessed as low, affecting a large geographic extent, but is long-term and reversible.

5A.2.27 For Viewpoint 7 (Table 5A-2), the increased massing of structures associated with the operational Main Site would become a prominent feature from this location, occupying a significant portion of the view and altering its overall balance in both daytime and nighttime contexts. The impact is assessed as medium, covering a medium geographic extent, long-term but reversible.

Table 5A-2: Viewpoint Assessment (ES Table 16-7)

VIEWPOINT 5- SOUTH GARE BREAKWATER				
Grid reference	**Receptor type**	**Elevation (m AOD)**	**Approx. distance from Main Site (km)**	**Direction of view**
455623, 527394	Recreational (users of the beach, boat users at Tees Mouth, and users of the Teesdale Way)	9	1.2	South
Visual susceptibility to change		**Value of view**		**Sensitivity of receptor**
No changes to the Original ES.		No changes to the Original ES.		No changes to the Original ES.
Size/scale, duration and reversibility of impact at construction				
The temporary construction compound on land at Navigator Terminals (Change 4) would be screened by landform and existing industrial development at Seal Sands. Construction operations associated with Change 1 would be seen in the context of existing large-scale structures in the distance and vertical structures within the middle ground of the view. The				

VIEWPOINT 5- SOUTH GARE BREAKWATER		
introduction of cranes and the gradual increase in the construction of the flare would be apparent, however, the key characteristics of the view would remain unchanged within the daytime and night-time context. The magnitude of impact would be very low, over a small geographical extent, short-term, and reversible.		
Magnitude of impact at construction		No changes to the ratings as assessed in the Original ES.
Significance of effect at construction	Recreational	No changes to the ratings as assessed in the Original ES.
Size/scale, duration and reversibility of impact at operation		
Medium distance view towards Change 1, where the flare would appear against a backdrop of elevated landform, which would decrease its visibility. The flare stack (Change 1) would be visible against the skyline, however, would be viewed simultaneously with existing tall vertical elements within the wider view to the left and right of the Proposed Development. Change 1 would be seen in the context of other industrial structures including stacks and flares and would not form the focus of the view. Change 1 would be noticeable but would not change the overall balance of the view within the daytime and night-time context. The magnitude of impact would be low, over a small geographical extent, long-term, and reversible.		
Magnitude of impact at operation		No changes to the ratings as assessed in the Original ES.
Significance of effect at operation	Recreational	No changes to the ratings as assessed in the Original ES.

VIEWPOINT 7- ENGLAND COAST PATH, WARRENBY				
Grid reference	**Receptor type**	**Elevation (m AOD)**	**Approx. distance from Main Site (km)**	**Direction of view**
458128, 525592	Recreational	5	1.3	West
Visual susceptibility to change		**Value of view**		**Sensitivity of receptor**
No changes to the Original ES.		No changes to the Original ES.		No changes to the Original ES.
Size/scale, duration and reversibility of impact at construction				
Medium distance views of construction activities associated with Change 1. Low level activities would be largely screened by intervening sand dunes and localised landforms. Higher level activities and lighting would be visible within the middle ground of the view. The use of high-level cranes and the movement of construction activity would result in a perceptible increase in construction activity within the daytime and night-time context, but not to the extent that it would become a prominent feature in the view. The magnitude of impact is assessed to be Minor, over a small geographic extent, short-term and reversible.				
Magnitude of impact at construction				No changes to the ratings as assessed in the Original ES.
Significance of effect at construction		Recreational		No changes to the ratings as assessed in the Original ES.
Size/scale, duration and reversibility of impact at operation				
Medium distance views of the flare (Change 1) would be highly visible from this location. The flare would extend the increase in massing of structures associated with the operational Main Site would become a prominent structure from this location, occupying a large proportion and altering the overall balance of the view in the daytime and night-time context. The impact is assessed to be Medium, over a medium geographic extent, long term and reversible.				
Magnitude of impact at operation				No changes to the Original ES.
Significance of effect at operation		Recreational		No changes to the Original ES.

VIEWPOINT 7- ENGLAND COAST PATH, WARRENBY				
VIEWPOINT 8- REDCAR SEAFRONT				
Grid reference	**Receptor type**	**Elevation (m AOD)**	**Approx. distance from Main Site (km)**	**Direction of view**
45988, 525470	Recreational users and residential	6	3.1	West
Visual susceptibility to change		**Value of view**		**Sensitivity of receptor**
No changes to the Original ES.		No changes to the Original ES.		No changes to the Original ES.
Size/scale, duration and reversibility of impact at construction				
Medium distance view directed towards construction activity associated with the Main Site would be visible on the headland in the centre of the view for residents on Newcomen Terrace. Construction operations, including low level activities, would be clearly visible from the beach and seafront, and add dynamic elements and disturbance into the view. There would be no visibility of any construction activity associated with the Connection Corridors and Temporary Construction Compounds (TCC) due to intervening landform. Construction activity would be set within a wide, open view that contains some detracting elements in the background, however, these would be less apparent for users of the beach and seafront. The presence of cranes and construction activity would be readily apparent, although would not alter the overall balance of features within the daytime and night-time context where other tall structures are present. The impact is assessed to be Medium, over a small geographic extent, short term and reversible.				
Magnitude of impact at construction				No changes to the Original ES.
Significance of effect at construction		Recreational users and residential		No changes to the Original ES.
Size/scale, duration and reversibility of impact at operation				
At operation the Main Site would be visible in the view. The stacks and flares (Change 1) would be visible, with the operational Main Site forming a visible feature in the centre of the view that would be noticeable to residents and recreational users of the beach and seafront. Due to the presence of existing industrial structures in the wider view, and other existing tall elements to left and right of the Proposed Development, The Proposed Development would not alter the overall balance of the view within the day-time and night-time context. The impact is assessed to be Low, over a small geographic extent, long term and reversible.				

VIEWPOINT 7- ENGLAND COAST PATH, WARRENBY		
Magnitude of impact at operation		No changes to the Original ES.
Significance of effect at operation	Recreational users and residential	No changes to the Original ES.