Figure 22: NH_3 – Annual Mean – Met Year 2020

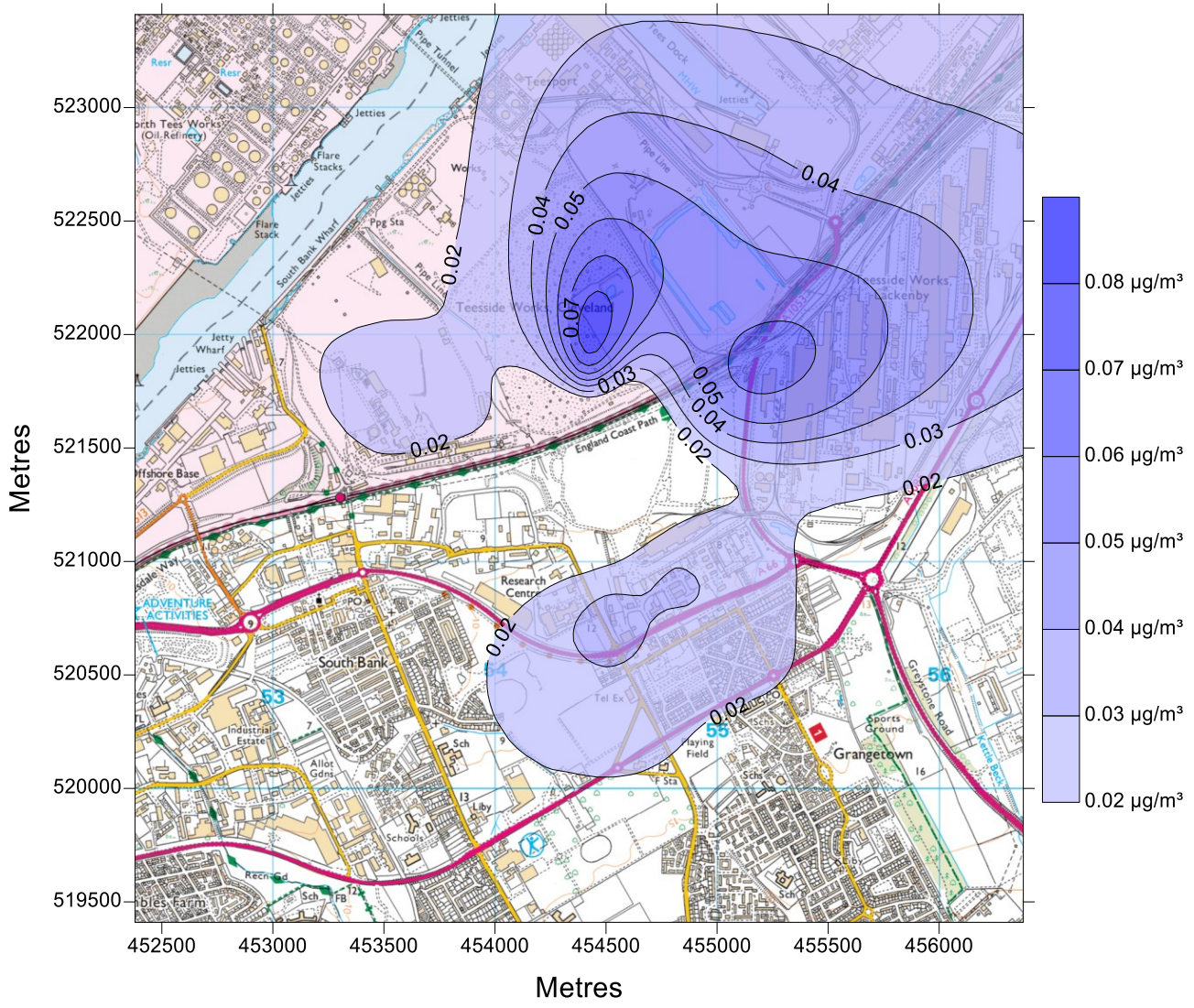


Figure 23: NH_3 – 100th Percentile – Met Year 2018

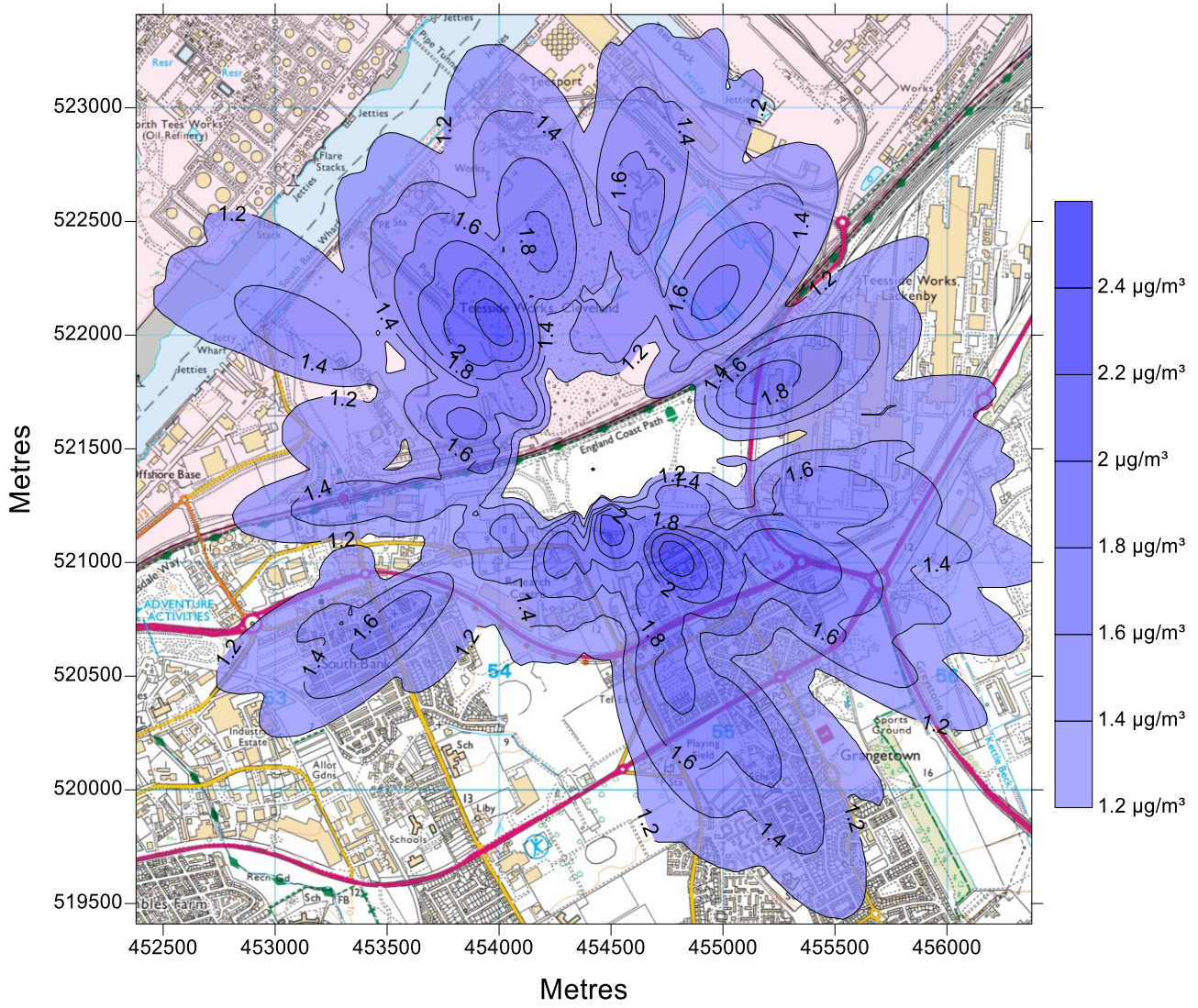


Figure 24: HCl – 100th Percentile – Met Year 2018

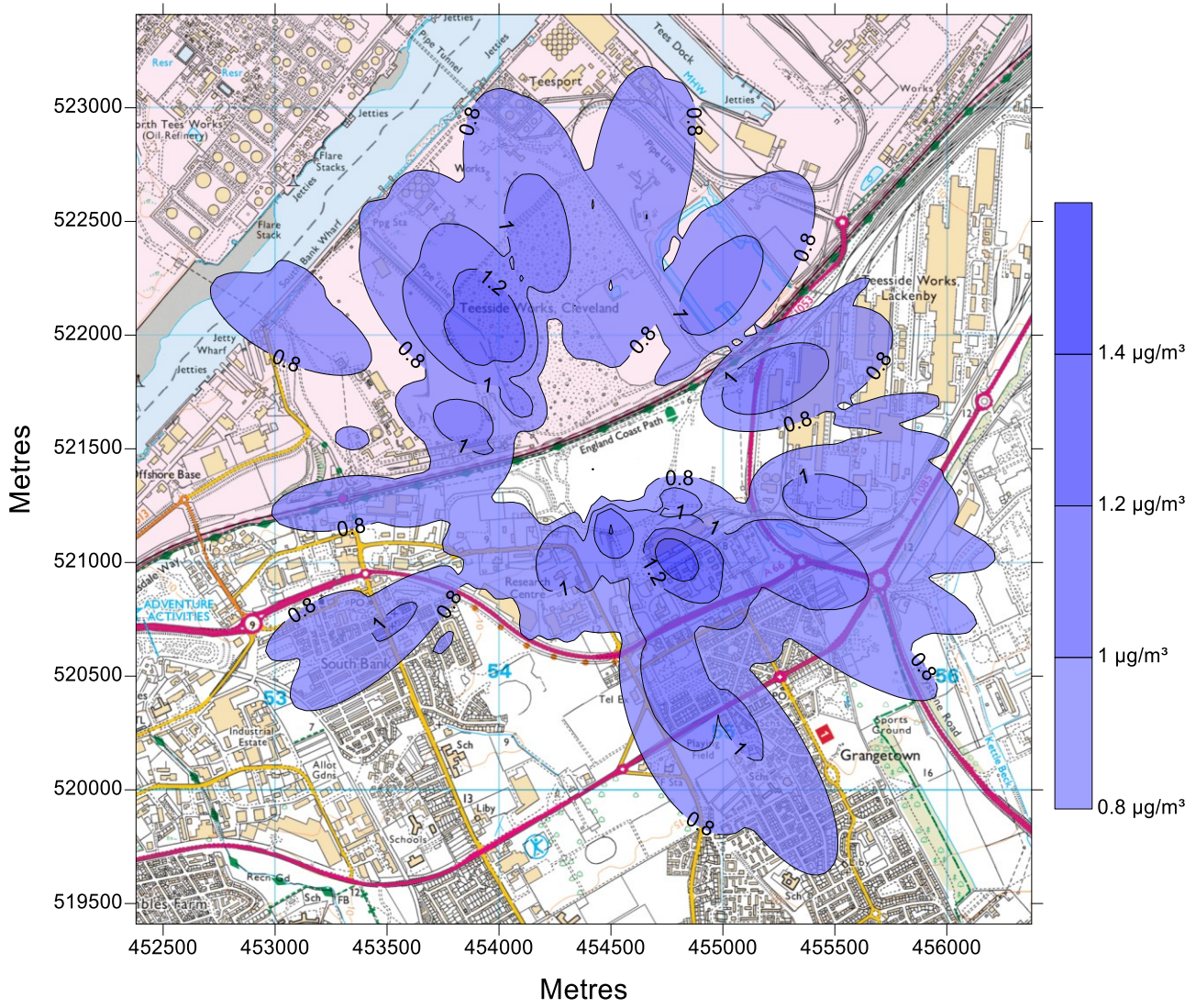


Figure 25: HF – Annual Mean – Met Year 2020

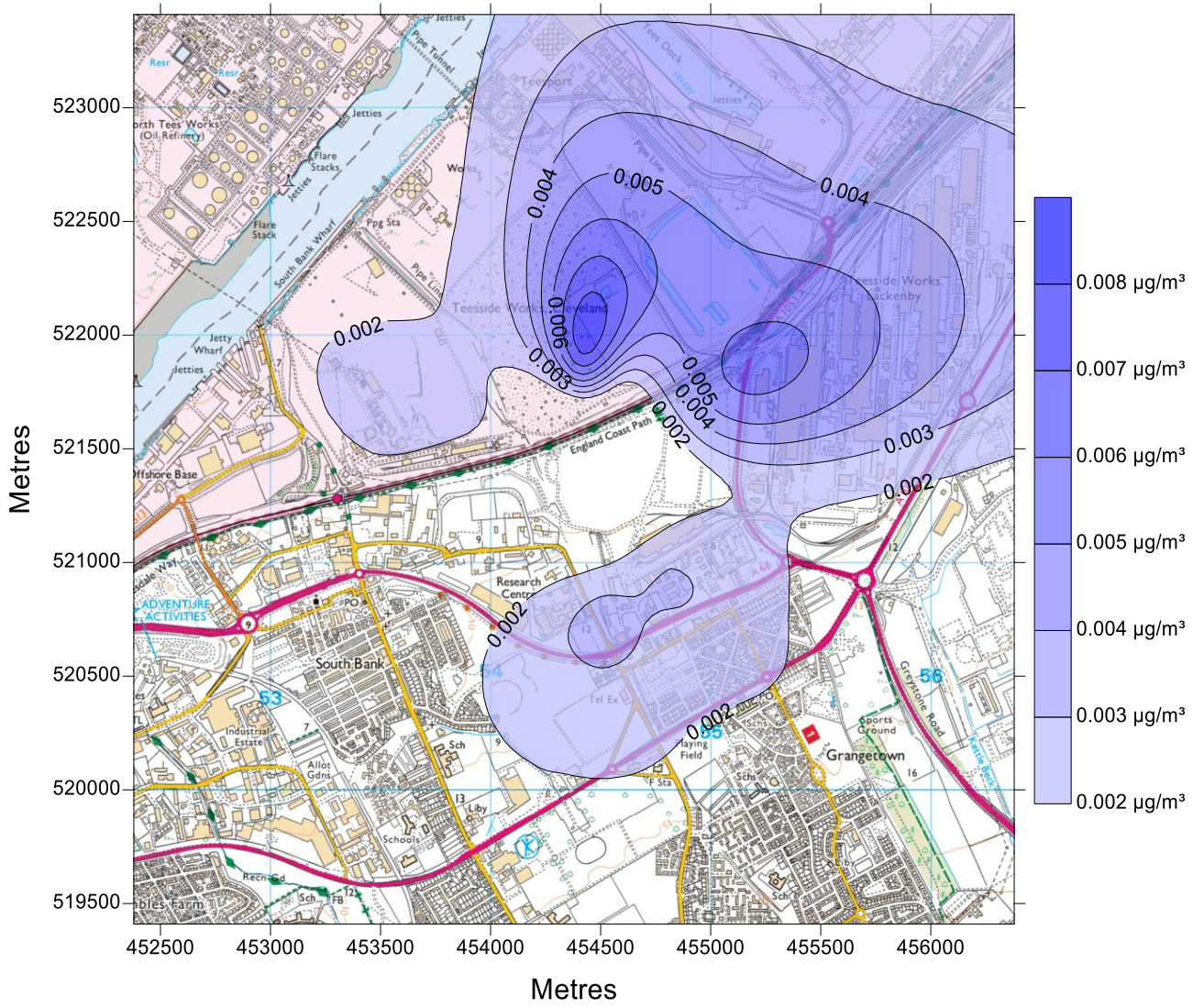


Figure 26: HF – 100th Percentile – Met Year 2018

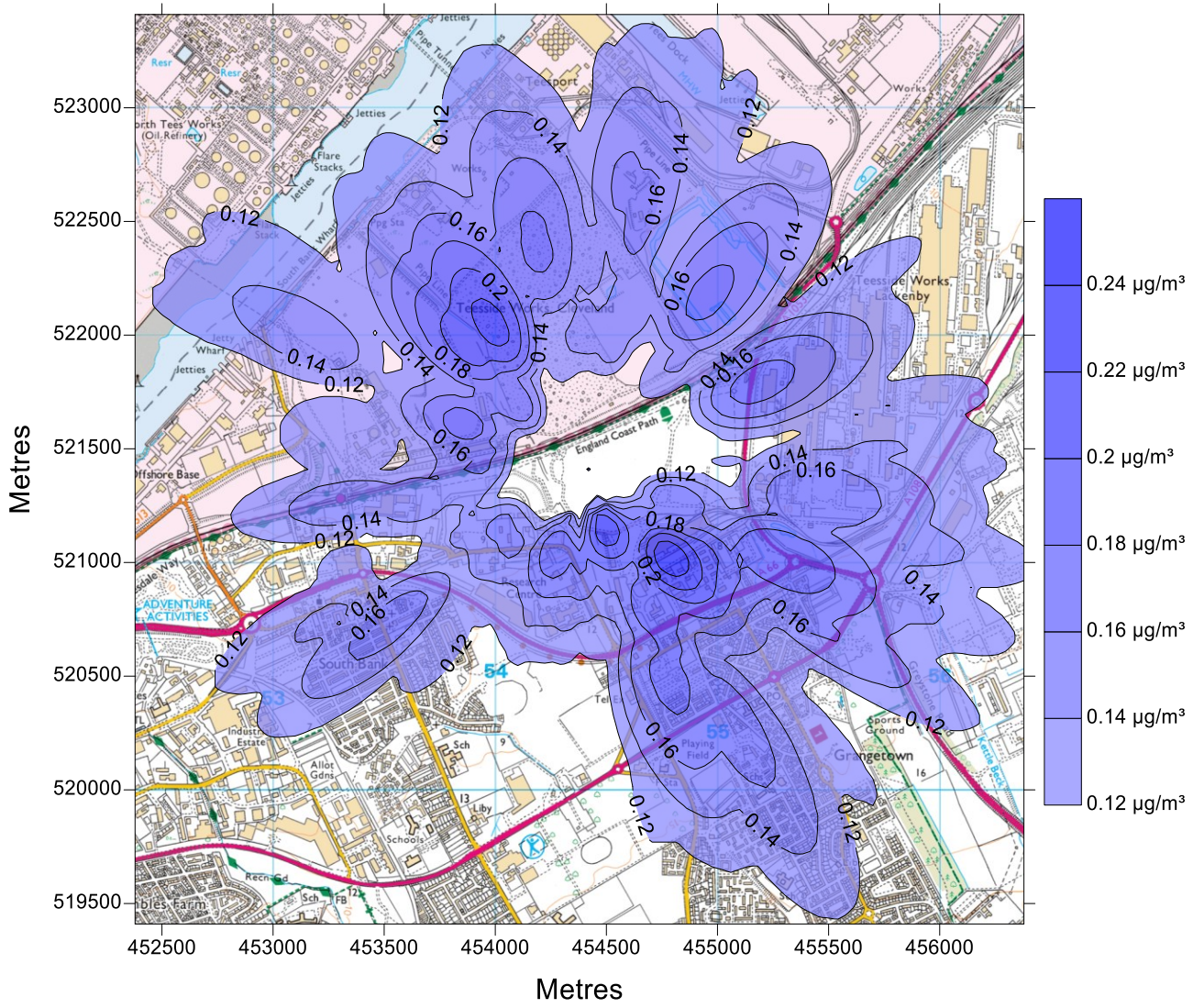


Figure 27: Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V – Annual Mean – Met Year 2020

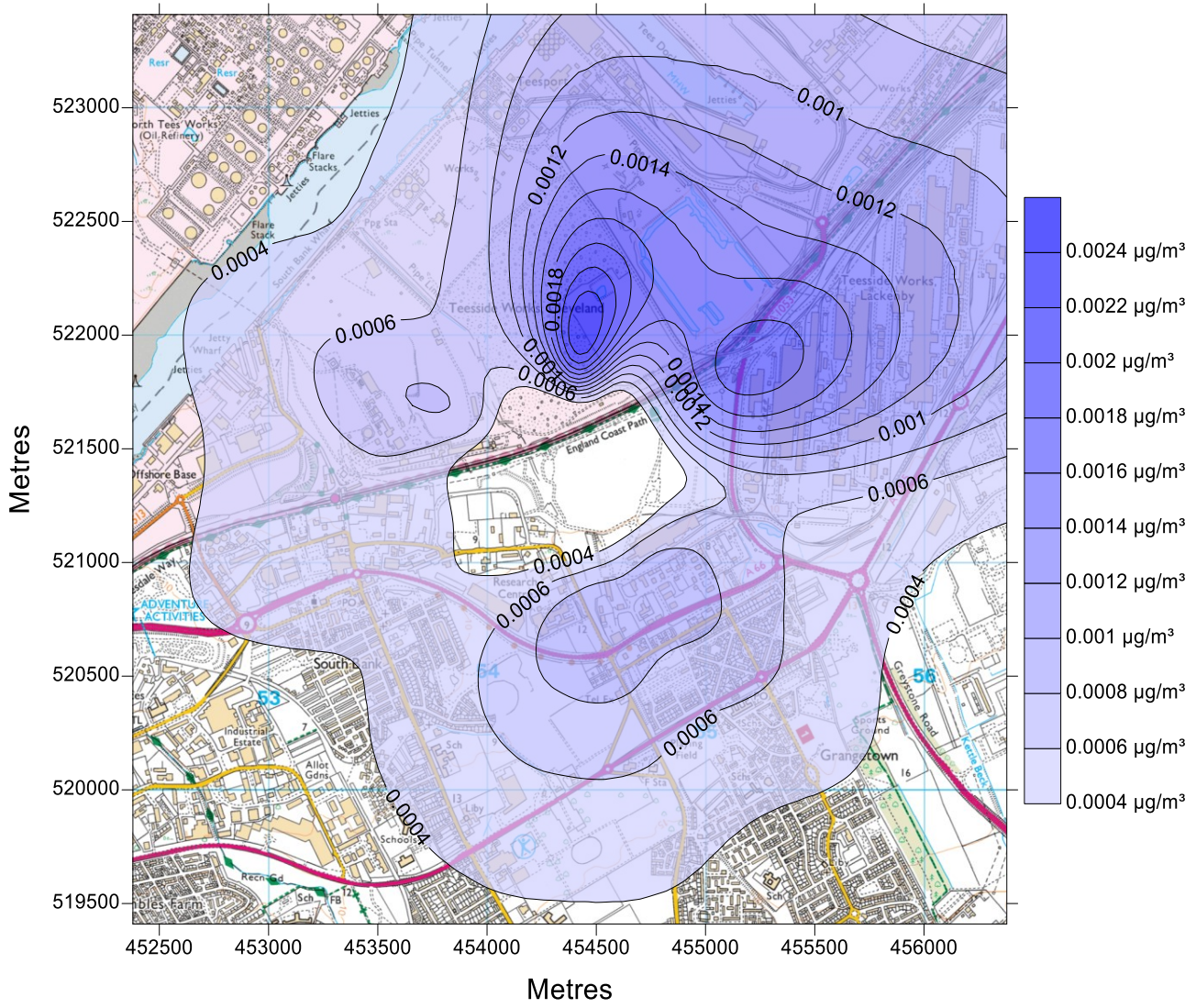


Figure 28: Sb, Cr, Co, Cu, Mn - 100th Percentile – Met Year 2018

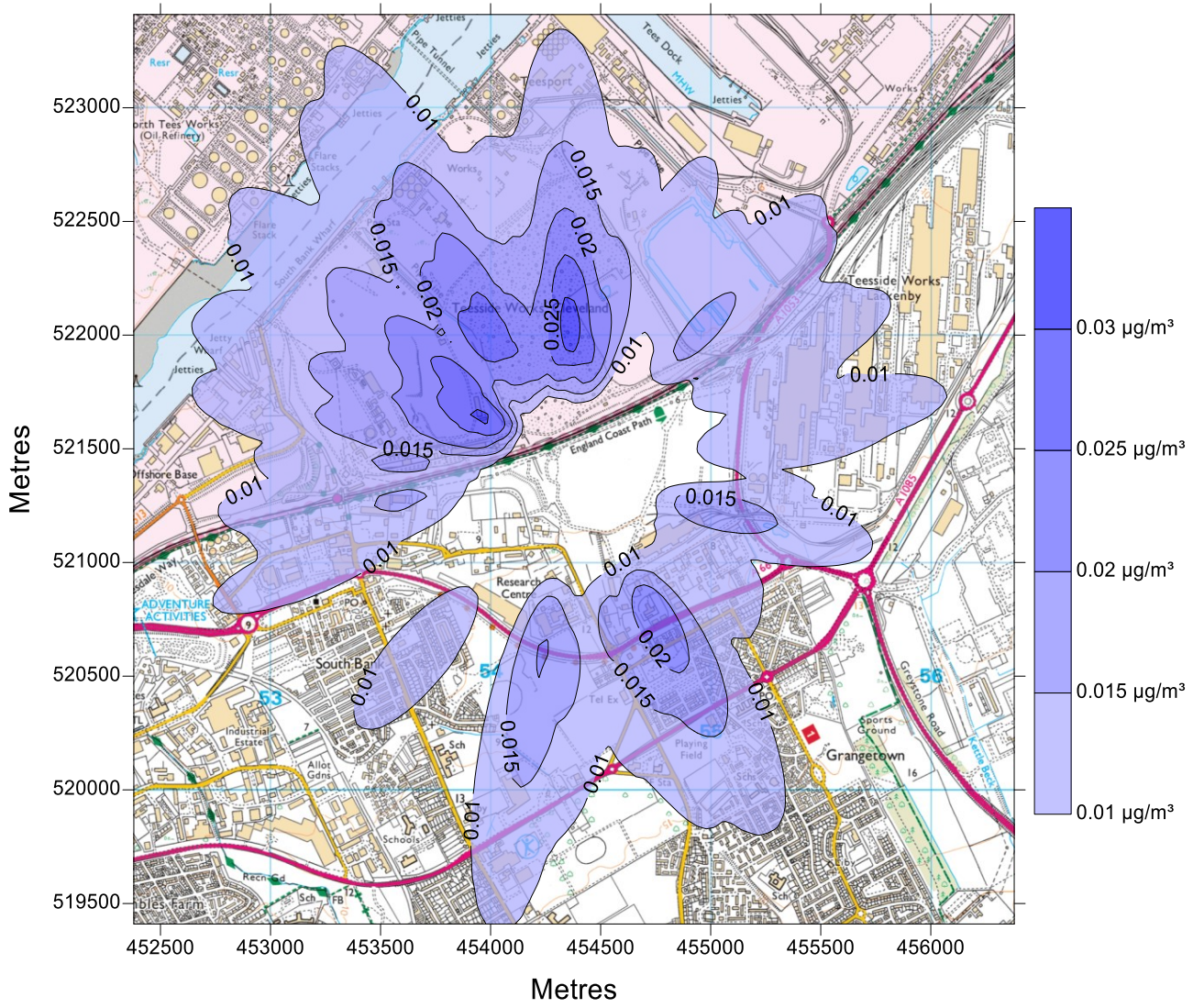


Figure 29: V – 24 hour, 100th Percentile – Met Year 2016

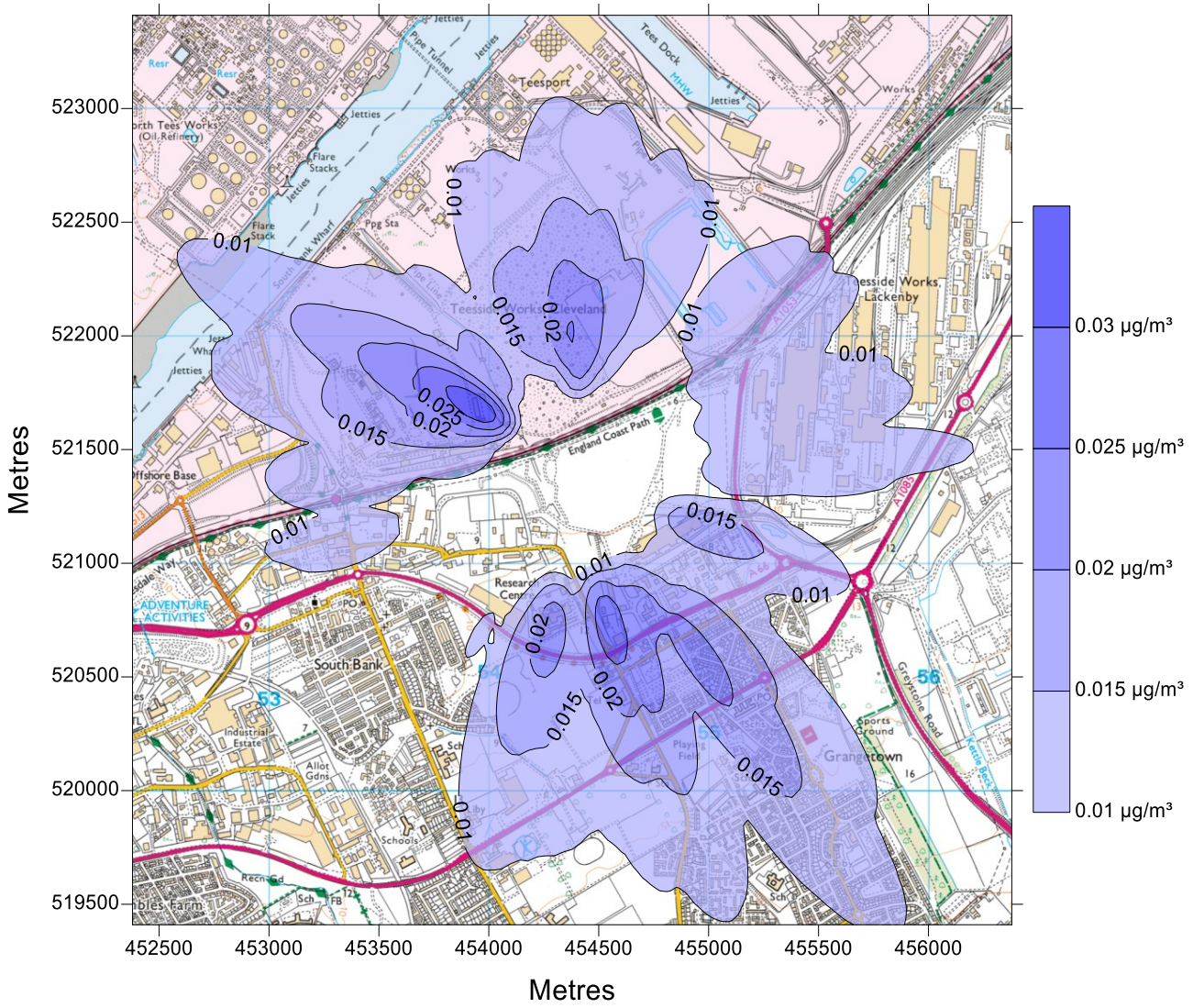


Figure 30: Cd, Tl and Hg – Annual Mean – Met Year 2020

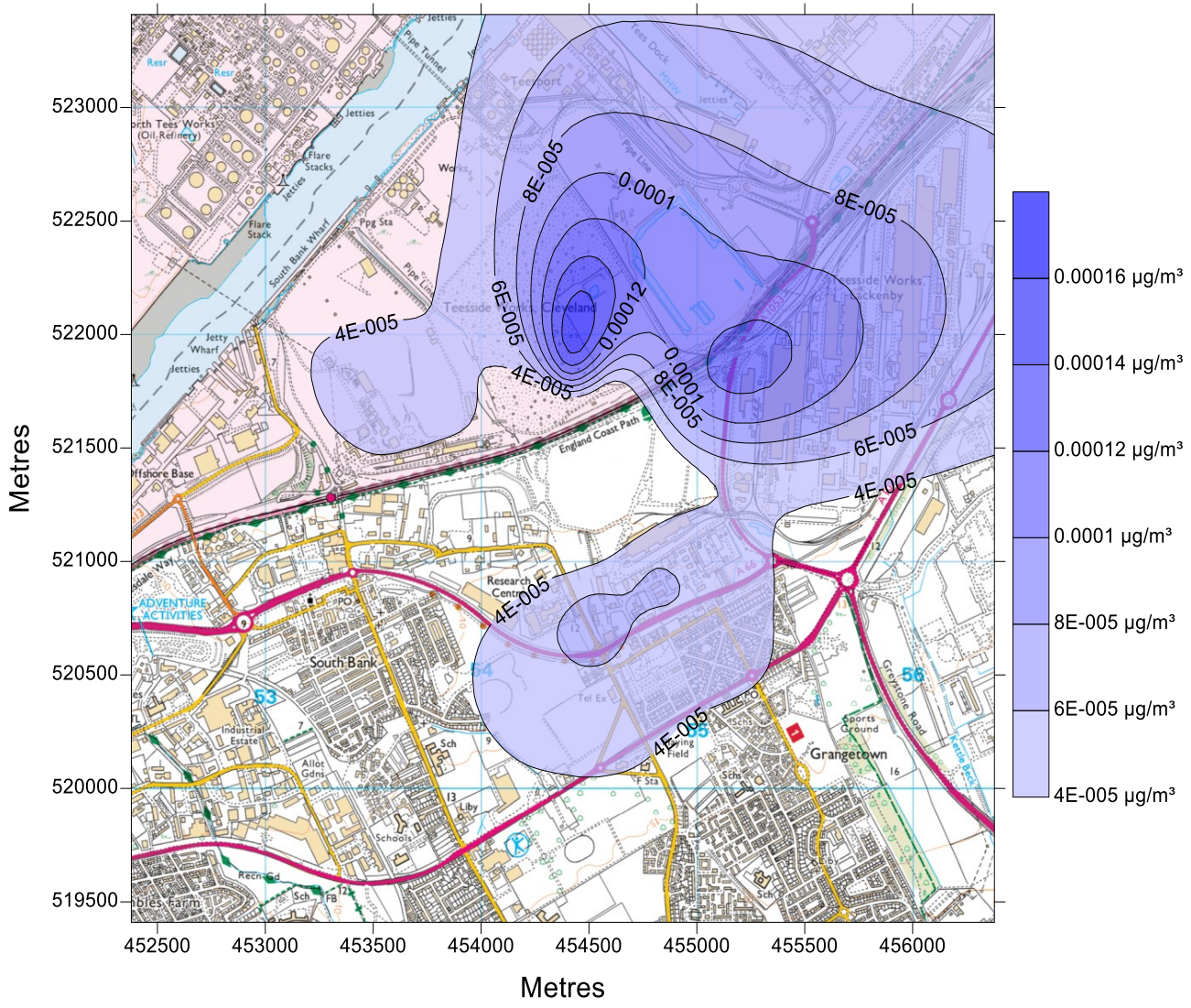


Figure 31: Hg and Tl - 100th Percentile – Met Year 2018

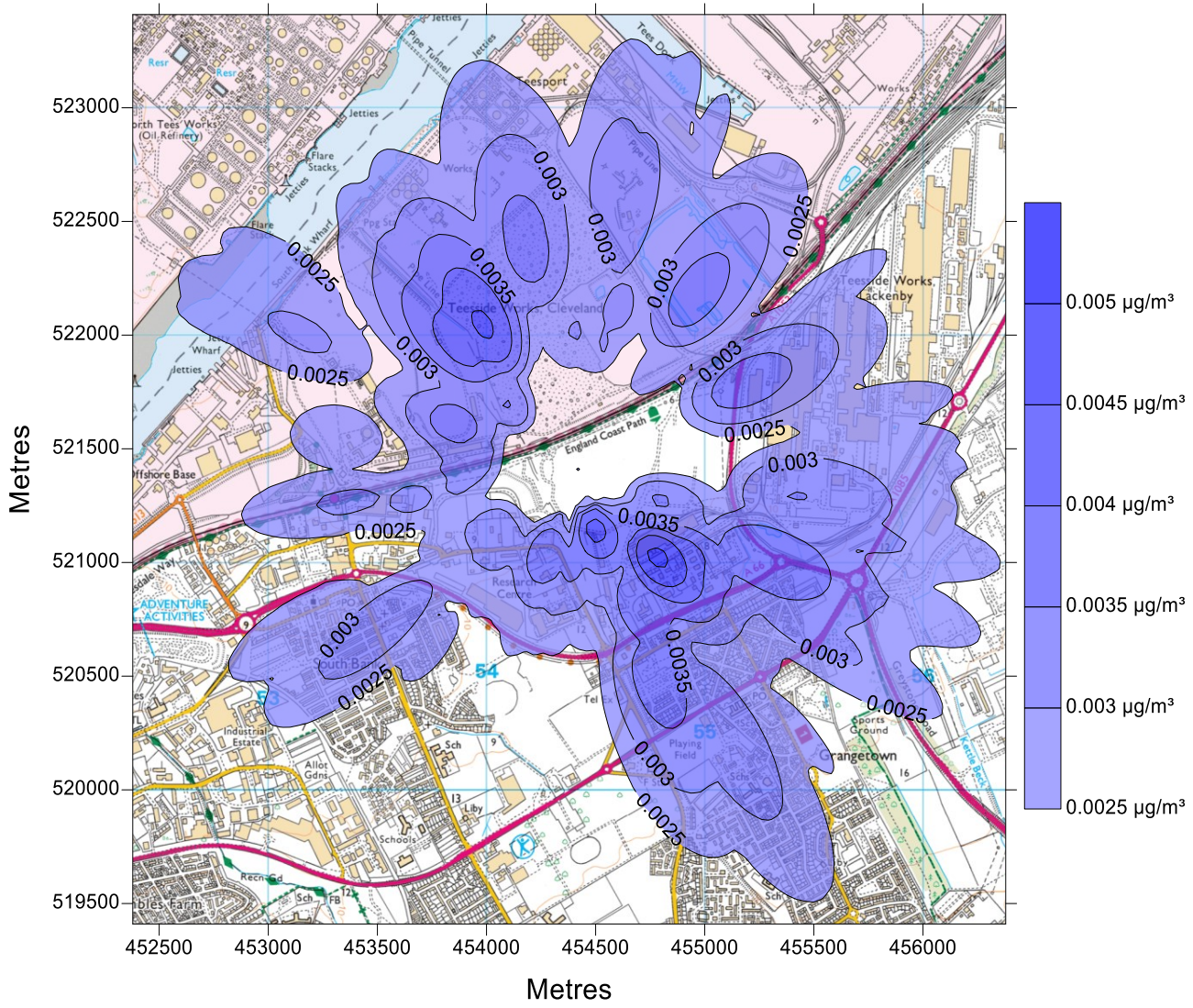
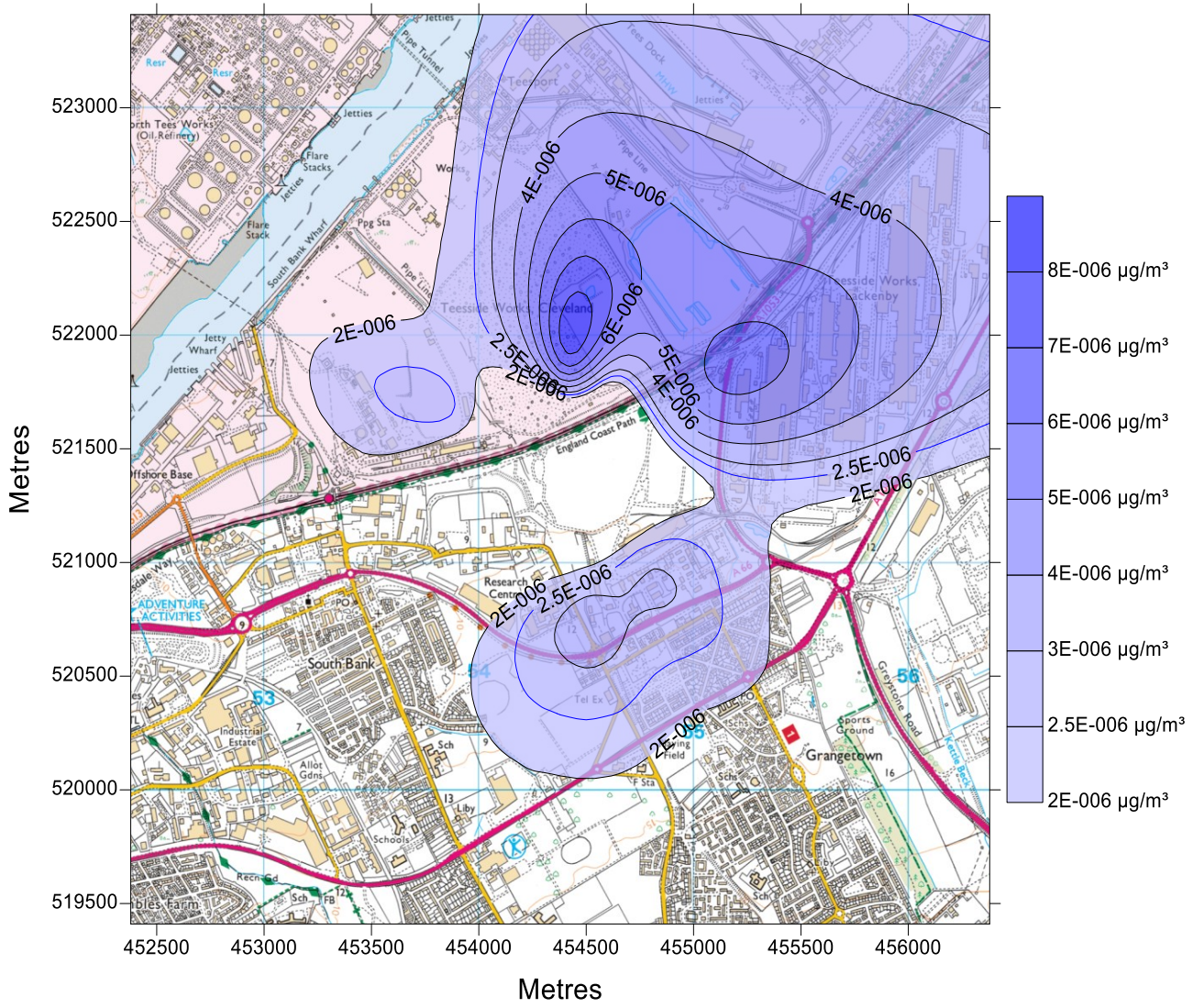


Figure 32: PAH (as B[a]P) – Annual Mean – Met Year 2020



4. ASSESSMENT OF AIR QUALITY IMPACTS – POTENTIALLY SENSITIVE HUMAN RECEPTOR LOCATIONS

4.1. Model Setup

4.1.1. This assessment considered the effect of emissions from the Installation on the potentially sensitive human receptors identified in Table 1. Modelling was undertaken with the following settings:

- buildings effects were included;
- complex terrain was included (Terrain File One (which was used for all receptors bar NYM1) and Terrain File Two (which was used for NYM1 only) - See Section 2.17);
- emission rates for pollutants were as outlined in Table 10a of Section 2.11.;
- NO_X to NO_2 conversion rates were taken into account (refer to Section 2.24.);
- stack heights of 90m were used;
- a surface roughness of 0.5m was used for the dispersion site and 0.3m for the met measurement site (a value of 0.5m was used for the dispersion site and met measurement site when using the 2020 NWP met data); and
- 5 years of hourly sequential meteorological data from Loftus recording station for the period 2016 – 2020 (inclusive) and 2020 NWP data was used.

4.2. Results – Group 1, 2 and 3 Metals

4.2.1. Due to the number of potentially sensitive human receptors, and the varying screening methodology, the results have been split into two sections. This section focuses on Group 1, 2 and 3 metals only, the remaining pollutants are discussed in Section 4.3.

4.2.2. Based on Stage 1 screening (i.e., long-term PCs greater than 1% of their AQS are potentially significant and short-term PCs greater than 10% of their AQS are potentially significant), all metals with short-term averaging periods screened out. The metals with potentially significant impacts were As, Cd, Cr(VI), Co and Ni (all annual mean). Consequently, PECs were considered for these metals.

4.2.3. Following calculation of the PECs, all metals with the exception of Cr(VI) screened out (i.e., the PECs were all less than 100% of their respective AQSs). Step 2 screening indicates that where the PC exceeds 1% of the long standard, the maximum emissions data in Appendix A of the EA's Group 3 metals assessment guidance can be used to revise the predictions, and the PEC then compared against the AQS. The guidance states that Cr(VI) comprises 0.03% of the Group 3 metals. Consequently, the emission rate for Cr(VI) has been recalculated based on these percentages.

4.2.4. Following Step 2 screening for Cr(VI), all Group 1, 2 and 3 metals screen out as being not significant at all potentially sensitive human receptors for stack heights of 90m (for the Installation's A1 and A2 emission points).

4.2.5. The results of the screening assessments for Group 1, 2 and 3 metals may be found in Table 21, with any potentially significant impacts highlighted in bold.

Table 21: Predicted Maximum GLCs at Potentially Sensitive Human Receptors for Group 1, 2 and 3 Metals

	Pollutant	Sb (annual)	Sb (1-hour)	As (annual)	Cd (annual)	Cr (annual)	Cr (1-hour)	Cr VI (annual) [a]	Co (annual)	Co (1-hour)	Cu (annual)	Cu (1-hour)
	AQS (µg/m³)	5	150	0.003	0.005	5	150	0.0002	0.2	6	10	200
	Maximum PC (µg/m³)	0.00212	0.0570	**0.00212**	**0.000141**	0.00212	0.0570	0.000000609	**0.00212**	0.0570	0.00212	0.0570
	Max PC as % of AQS	0.042%	0.038%	**71%** [b]	**2.82%**	0.042%	0.038%	0.30%	**1.06%**	0.95%	0.021%	0.029%
	Background Concentration (µg/m³)	n/a	n/a	0.000788 [c]	0.000647 [c]	n/a	n/a	n/a	0.000177 [c]	n/a	n/a	n/a
	Max PEC as % of AQS	n/a	n/a	97%	16%	n/a	n/a	n/a	1.15%	n/a	n/a	n/a
HSR1	Industrial activity off John Boyle Road	0.000249	0.0560	**0.000249**	**0.0000166**	0.000249	0.0560	0.0000000872	0.000249	0.0560	0.000249	0.0560
HSR2	Industrial activity off Stapylton Street	0.00152	0.0570	**0.00152**	0.000101	0.00152	0.0570	0.000000456	0.00152	0.0570	0.00152	0.0570
HSR3	Industrial activity off Eston Road	0.000895	0.0553	**0.000895**	0.0000595	0.000895	0.0553	0.000000261	0.000895	0.0553	0.000895	0.0553
HSR4	Residential properties off Cheetham Street	0.00135	0.0546	**0.00135**	0.0000900	0.00135	0.0546	0.000000405	0.00135	0.0546	0.00135	0.0546
HSR5	Residential properties off Elgin Avenue	0.00126	0.0434	**0.00126**	0.0000836	0.00126	0.0434	0.000000377	0.00126	0.0434	0.00126	0.0434
HSR6	Residential properties off Passfield Crescent	0.000816	0.0440	**0.000816**	0.0000542	0.000816	0.0440	0.000000243	0.000816	0.0440	0.000816	0.0440
HSR7	Golden Boy Green Community Centre	0.000730	0.0486	**0.000730**	**0.0000485**	0.000730	0.0486	0.000000216	0.000730	0.0486	0.000730	0.0486
HSR8	Residential properties off Lawson Close	0.000841	0.0504	**0.000841**	0.0000559	0.000841	0.0504	0.000000248	0.000841	0.0504	0.000841	0.0504
HSR9	Industrial activity NNW of Site	0.000897	0.0499	**0.000897**	0.0000596	0.000897	0.0499	0.000000268	0.000897	0.0499	0.000897	0.0499
HSR10	Grangetown Primary School	0.00113	0.0541	**0.00113**	0.0000749	0.00113	0.0541	0.000000337	0.00113	0.0541	0.00113	0.0541
HSR11	Large car park off Tees Dock Road	0.00212	0.0469	**0.00212**	0.000141	0.00212	0.0469	0.000000609	**0.00212**	0.0469	0.00212	0.0469
HSR12	Saint Peter's Catholic College	0.000738	0.0448	**0.000738**	**0.0000490**	0.000738	0.0448	0.000000219	0.000738	0.0448	0.000738	0.0448
HSR13	Tesco Extra store entrance	0.000704	0.0470	**0.000704**	**0.0000468**	0.000704	0.0470	0.000000215	0.000704	0.0470	0.000704	0.0470
HSR14	Industrial activity off Tees Dock Road	0.00103	0.0414	**0.00103**	0.0000687	0.00103	0.0414	0.000000309	0.00103	0.0414	0.00103	0.0414
HSR15	Industrial activity ENE of Site	0.00140	0.0352	**0.00140**	0.0000930	0.00140	0.0352	0.000000419	0.00140	0.0352	0.00140	0.0352
HSR16	Allotments South Garden	0.000523	0.0351	**0.000523**	**0.0000347**	0.000523	0.0351	0.000000154	0.000523	0.0351	0.000523	0.0351

Table 21: Predicted Maximum GLCs at Potentially Sensitive Human Receptors for Group 1, 2 and 3 Metals (cont.)

	Pollutant	Pb (annual)	Mn (annual)	Mn (1-hour)	Hg (annual)	Hg (1-hour)	Ni (annual)	Tl (annual)	Tl (1-hour)	V (annual)	V (24-hour)
	AQS (µg/m³)	0.25	1	1,500	0.25	7.5	0.02	1	30	5	1
	Maximum PC (µg/m³)	0.00212	0.00212	0.0570	0.000141	0.00379	**0.00212**	0.000141	0.00379	0.00212	0.0233
	Max PC as % of AQS	0.85%	0.21%	0.0038%	0.056%	0.051%	**11%**	0.014%	0.013%	0.042%	2.33%
	Background Concentration (µg/m³)	n/a	n/a	n/a	n/a	n/a	0.00124 (c)	n/a	n/a	n/a	n/a
	Max PEC as % of AQS	n/a	n/a	n/a	n/a	n/a	17%	n/a	n/a	n/a	n/a
HSR1	Industrial activity off John Boyle Road	0.000249	0.000249	0.0560	0.0000166	0.00372	**0.000249**	0.0000166	0.00372	0.000249	0.00865
HSR2	Industrial activity off Stapylton Street	0.00152	0.00152	0.0570	0.000101	0.00379	**0.00152**	0.000101	0.00379	0.00152	0.0197
HSR3	Industrial activity off Eston Road	0.000895	0.000895	0.0553	0.0000595	0.00367	**0.000895**	0.0000595	0.00367	0.000895	0.0231
HSR4	Residential properties off Cheetham Street	0.00135	0.00135	0.0546	0.0000900	0.00363	**0.00135**	0.0000900	0.00363	0.00135	0.0182
HSR5	Residential properties off Elgin Avenue	0.00126	0.00126	0.0434	0.0000836	0.00289	**0.00126**	0.0000836	0.00289	0.00126	0.0233
HSR6	Residential properties off Passfield Crescent	0.000816	0.000816	0.0440	0.0000542	0.00292	**0.000816**	0.0000542	0.00292	0.000816	0.0114
HSR7	Golden Boy Green Community Centre	0.000730	0.000730	0.0486	0.0000485	0.00323	**0.000730**	0.0000485	0.00323	0.000730	0.0124
HSR8	Residential properties off Lawson Close	0.000841	0.000841	0.0504	0.0000559	0.00335	**0.000841**	0.0000559	0.00335	0.000841	0.0126
HSR9	Industrial activity NNW of Site	0.000897	0.000897	0.0499	0.0000596	0.00332	**0.000897**	0.0000596	0.00332	0.000897	0.0191
HSR10	Grangetown Primary School	0.00113	0.00113	0.0541	0.0000749	0.00359	**0.00113**	0.0000749	0.00359	0.00113	0.0196
HSR11	Large car park off Tees Dock Road	0.00212	0.00212	0.0469	0.000141	0.00312	**0.00212**	0.000141	0.00312	0.00212	0.0123
HSR12	Saint Peter's Catholic College	0.000738	0.000738	0.0448	0.0000490	0.00298	**0.000738**	0.0000490	0.00298	0.000738	0.0114
HSR13	Tesco Extra store entrance	0.000704	0.000704	0.0470	0.0000468	0.00312	**0.000704**	0.0000468	0.00312	0.000704	0.0148
HSR14	Industrial activity off Tees Dock Road	0.00103	0.00103	0.0414	0.0000687	0.00275	**0.00103**	0.0000687	0.00275	0.00103	0.0126
HSR15	Industrial activity ENE of Site	0.00140	0.00140	0.0352	0.0000930	0.00234	**0.00140**	0.0000930	0.00234	0.00140	0.00956
HSR16	Allotments South Garden	0.000523	0.000523	0.0351	0.0000347	0.00233	**0.000523**	0.0000347	0.00233	0.000523	0.00942

Notes to Table 21

(a) Modelled in accordance with the Step 2 screening guidance (i.e., at the revised emission rate calculated with Cr(VI) comprising 0.03% of the Group 3 metals).

(b) It is worth noting that the maximum predicted PC for As occurs in a car park off Tees Dock Road (i.e., HSR11) and is therefore not necessarily a receptor representative of public exposure. Furthermore, As comprises 5% of the Group 3 metals (which, in line with the Step 2 screening guidance, would give a revised maximum GLC of 0.000102 µg/m³ (i.e., a PC and PEC of 3.38% and 30% of the AQS, respectively)).

(c) Background concentrations taken from the urban industrial site at Scunthorpe Low Santon, 2019 data (refer to Section 3.4., for further details on this monitoring station).

4.3. Results – Remaining Pollutants

4.3.1. This section focuses on all pollutants excluding the Group 1, 2 and 3 Metals which are discussed in Section 4.2.

4.3.2. Based on Stage 1 screening (i.e., long-term PCs greater than 1% of their AQS are potentially significant and short-term PCs greater than 10% of their AQS are potentially significant), all pollutants with short-term averaging periods screened out all locations. Potentially significant impacts were observed at two locations for long term impacts of NO_2 and VOC (as benzene) and 11 locations for PAH (as B[a]P). Consequently, PECs were considered for these pollutants.

4.3.3. Following the calculation of the PECs, impacts of NO_2 and VOC at the two potentially sensitive human receptor locations were classed as 'negligible'. For PAH (as B[a]P), the human receptor location with the highest potentially significant PC could be categorised a 'slight'. Consequently, no further assessments are required.

4.3.4. The results of this assessment may be found in Table 22, with any potentially significant impacts highlighted in bold.

Table 22: Predicted Maximum GLCs at Potentially Sensitive Human Receptors for All Remaining Pollutants

	Pollutant	NO_2 (annual mean)	NO_2 (99.79th %ile)	SO_2 (99.18th %ile)	SO_2 (99.73rd %ile)	SO_2 (99.90th %ile)	PM_{10} (annual)	PM_{10} (90.41st %ile)	$PM_{2.5}$ (annual)	CO (8-hour)	VOC (annual)
	AQS (µg/m³)	40	200	125	350	266	40	50	20	10,000	5
	Maximum PC (µg/m³)	**0.494**	4.86	1.77	4.03	4.77	0.0353	0.103	0.0353	6.18	**0.0706**
	Max PC as % of AQS	**1.24%**	2.43%	1.42%	1.15%	1.79%	0.088%	0.21%	0.18%	0.062%	**1.41%**
	Background Concentration (µg/m³)	24.8 [(a)]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.358 [(a)]
	Max PEC as % of AQS	63%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9%
	IAQM Impact Descriptor	Negligible	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Negligible
HSR1	Industrial activity off John Boyle Road	0.0579	2.51	0.514	2.01	3.06	0.00414	0.0179	0.00414	3.71	0.00828
HSR2	Industrial activity off Stapylton Street	0.354	4.86	1.77	4.03	4.77	0.0253	0.103	0.0253	6.18	**0.0506**
HSR3	Industrial activity off Eston Road	0.208	4.49	1.62	3.70	4.49	0.0149	0.0492	0.0149	5.44	0.0298
HSR4	Residential properties off Cheetham Street	0.315	3.87	1.59	3.29	3.78	0.0225	0.0860	0.0225	5.07	0.0450
HSR5	Residential properties off Elgin Avenue	0.293	3.59	1.64	3.05	3.51	0.0209	0.0751	0.0209	4.87	0.0418
HSR6	Residential properties off Passfield Crescent	0.190	3.43	0.856	2.92	3.45	0.0136	0.0559	0.0136	5.17	0.0271
HSR7	Golden Boy Green Community Centre	0.170	2.98	0.750	2.51	2.98	0.0121	0.0506	0.0121	4.53	0.0243
HSR8	Residential properties off Lawson Close	0.196	2.89	0.937	2.43	2.99	0.0140	0.0617	0.0140	3.50	0.0279
HSR9	Industrial activity NNW of Site	0.209	2.81	1.41	2.38	2.95	0.0149	0.0471	0.0149	4.36	0.0298
HSR10	Grangetown Primary School	0.262	2.78	1.25	2.37	2.90	0.0187	0.0710	0.0187	3.58	0.0375
HSR11	Large car park off Tees Dock Road	**0.494**	2.58	1.11	2.20	3.93	0.0353	0.102	0.0353	3.22	**0.0706**
HSR12	Saint Peter's Catholic College	0.172	2.41	0.809	2.02	2.50	0.0123	0.0518	0.0123	2.78	0.0245
HSR13	Tesco Extra store entrance	0.164	2.52	1.25	2.15	2.65	0.0117	0.0407	0.0117	3.40	0.0234
HSR14	Industrial activity off Tees Dock Road	0.240	2.26	0.822	1.94	2.52	0.0172	0.0643	0.0172	2.73	0.0344
HSR15	Industrial activity ENE of Site	0.325	1.94	0.815	1.63	2.61	0.0232	0.0693	0.0232	2.24	0.0465
HSR16	Allotments South Garden	0.122	1.84	0.581	1.55	1.98	0.00869	0.0361	0.00869	2.93	0.0174

Table 22: Predicted Maximum GLCs at Potentially Sensitive Human Receptors for All Remaining Pollutants (cont.)

	Pollutant	NH_3 (annual)	NH_3 (1-hour)	HCl (1 hour)	HF (annual)	HF (1-hour)	PAH (as B[a]P) (annual)	PCB (annual)	PCB (1-hour)	Dioxins & Furans (annual)
	AQS (µg/m³)	180	2,500	750	16	160	0.00025	0.2	6	n/a
	Maximum PC (µg/m³)	0.0706	1.89	1.14	0.00706	0.189	**0.00000706**	0.000000000564	0.0000000151	0.000000000283
	Max PC as % of AQS	0.039%	0.076%	0.15%	0.044%	0.12%	**2.82%**	0.00000028%	0.00000025%	n/a
	Background Concentration (µg/m³)	n/a	n/a	n/a	n/a	n/a	0.000206 [(a)]	n/a	n/a	n/a
	Max PEC as % of AQS	n/a	n/a	n/a	n/a	n/a	85%	n/a	n/a	n/a
	IAQM Impact Descriptor	n/a	n/a	n/a	n/a	n/a	Slight	n/a	n/a	n/a
HSR1	Industrial activity off John Boyle Road	0.00828	1.86	1.12	0.000828	0.186	0.000000828	0.0000000000661	0.0000000149	0.0000000000331
HSR2	Industrial activity off Stapylton Street	0.0506	1.89	1.14	0.00506	0.189	**0.00000506**	0.000000000404	0.0000000151	0.000000000203
HSR3	Industrial activity off Eston Road	0.0298	1.84	1.10	0.00298	0.184	**0.00000298**	0.000000000238	0.0000000147	0.000000000119
HSR4	Residential properties off Cheetham Street	0.0450	1.81	1.09	0.00450	0.181	**0.00000450**	0.000000000359	0.0000000145	0.000000000180
HSR5	Residential properties off Elgin Avenue	0.0418	1.44	0.866	0.00418	0.144	**0.00000418**	0.000000000334	0.0000000115	0.000000000167
HSR6	Residential properties off Passfield Crescent	0.0271	1.46	0.876	0.00271	0.146	**0.00000271**	0.000000000216	0.0000000117	0.000000000109
HSR7	Golden Boy Green Community Centre	0.0243	1.61	0.968	0.00243	0.161	0.00000243	0.000000000194	0.0000000129	0.0000000000972
HSR8	Residential properties off Lawson Close	0.0279	1.67	1.00	0.00279	0.167	**0.00000279**	0.000000000223	0.0000000134	0.000000000112
HSR9	Industrial activity NNW of Site	0.0298	1.66	1.00	0.00298	0.166	**0.00000298**	0.000000000238	0.0000000133	0.000000000119
HSR10	Grangetown Primary School	0.0375	1.80	1.08	0.00375	0.180	**0.00000375**	0.000000000299	0.0000000143	0.000000000150
HSR11	Large car park off Tees Dock Road	0.0706	1.56	0.934	0.00706	0.156	**0.00000706**	0.000000000564	0.0000000124	0.000000000283
HSR12	Saint Peter's Catholic College	0.0245	1.49	0.893	0.00245	0.149	0.00000245	0.000000000196	0.0000000119	0.0000000000982
HSR13	Tesco Extra store entrance	0.0234	1.56	0.936	0.00234	0.156	0.00000234	0.000000000187	0.0000000125	0.0000000000936
HSR14	Industrial activity off Tees Dock Road	0.0344	1.38	0.825	0.00344	0.138	**0.00000344**	0.000000000274	0.0000000110	0.000000000138
HSR15	Industrial activity ENE of Site	0.0465	1.17	0.702	0.00465	0.117	**0.00000465**	0.000000000371	0.00000000935	0.000000000186
HSR16	Allotments South Garden	0.0174	1.17	0.700	0.00174	0.117	0.00000174	0.000000000139	0.00000000932	0.0000000000696

Notes to Table 22

(a) Refer to Section 3.6., for further details on the background sources utilised.

5. ASSESSMENT OF AIR QUALITY IMPACTS - IMPACT ON HABITAT SITES – CRITICAL LEVELS

5.1. Model Setup

5.1.1. This assessment considered the effect of emissions from the Installation on critical levels for the habitat sites identified in Table 2. Modelling was undertaken with the following settings:

- buildings effects were included;
- complex terrain was included (Terrain File One (which was used for all receptors bar NYM1) and Terrain File Two (which was used for NYM1 only) – see Section 2.17.);
- emission rates for pollutants were as outlined in Table 10a of Section 2.11.;
- stack heights of 90m were used;
- a surface roughness of 0.5m was used for the dispersion site and 0.3m for the met measurement site (a value of 0.5m was used for the dispersion site and met measurement site when using the 2020 NWP met data); and
- 5 years of hourly sequential meteorological data from Loftus recording station for the period 2016 – 2020 (inclusive) and 2020 NWP data was used.

5.2. Comparison of Maximum Predicted Pollutant Ground Level Concentrations with Critical Levels for the Protection of Vegetation and Ecosystems - Oxides of Nitrogen

5.2.1. A summary of maximum predicted GLCs of oxides of nitrogen at the identified sensitive habitat sites is presented in Table 23. In accordance with the H1 guidance, the significance of the impacts has been determined using the 1% and 10% criteria for long and short-term predictions, respectively, for SPAs, SACs, Ramsars and SSSIs (see Section 2.22. of this document). Any significant impacts are highlighted in bold.

Table 23: Comparison of Maximum Predicted Oxides of Nitrogen Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites – SPAs, SACs, Ramsars and SSSIs

		Pollutant	NO_x (annual mean)	NO_x (24-hour mean)
		Critical Level	30	75
		Maximum PC (µg/m³)	**0.393**	3.85
		Max PC as % of Critical Level	**1.31%**	5.14%
NYM1	North York Moors - SAC / SPA		0.0316	0.392
TCC1	Teesmouth and Cleveland Coast - SPA / SSSI		0.188	3.85
TCC2			**0.393 (1.31%)**	3.35
TCC3			0.247	2.98
TCC4			0.109	2.28
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar		0.178	3.82
TCC6			0.188	2.78

Table 23: Comparison of Maximum Predicted Oxides of Nitrogen Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites – SPAs, SACs, Ramsars and SSSIs (cont.)

	Pollutant	NO_X (annual mean)	NO_X (24-hour mean)
	Critical Level	30	75
	Maximum PC (µg/m³)	**0.393**	3.85
	Max PC as % of Critical Level	**1.31%**	5.14%
TCC7	Teesmouth and Cleveland Coast - SPA / Ramsar	0.101	2.01
TCC8		0.173	2.05
TCC9		**0.312 (1.04%)**	1.75
TCC10		0.100	1.37
TCC11		0.0878	1.11
TCC12		0.0602	1.05
TCC13		0.205	1.22
TCC14	Teesmouth and Cleveland Coast - SSSI	0.0849	1.11

5.2.2. It can be seen from the data in Table 23 that the daily mean oxides of nitrogen PCs are all less 10% of the respective critical level and therefore, are not significant at all SACs, SPAs, SSSIs and Ramsar sites considered.

5.2.3. For the annual mean oxides of nitrogen PCs, the impact is potentially significant (i.e., greater than 1% of the long-term critical level) at TCC2 and TCC9. Consequently, PECs will need to be calculated for these receptors.

5.2.4. Making use of the relevant background NO_X concentrations, as outlined in Table 6 of Section 2.8., the PECs for TCC2 and TCC9 are 36.17 µg/m³ and 28.24 µg/m³, respectively. The PECs as a percentage of the annual critical level would therefore be 121% (TCC2) and 94% (TCC9).

5.2.5. In accordance with Section 2.22., whilst it can be assumed for TCC9 that there will be no adverse effect (i.e., the PEC is less than 100% of the critical level), the PEC for TCC2 is potentially significant.

5.2.6. The data shows that the ambient background level at TCC2 already exceeds the long-term critical level in the absence of the development (i.e., a concentration that is 119% of the critical level).

5.2.7. This issue was considered further in BSG Ecology's ("BSG") shadow Habitat Regulations Assessment ("sHRA") and their assessment of air quality impacts on Teesmouth and Cleveland Coast SSSSI. The reports are included as Appendix 2 of this report for ease of reference.

5.2.8. In summary, the sHRA concludes:

The habitats at the various modelling points are either intertidal mudflat or are permanently inundated with sea water. Mudflat is not considered to be sensitive to elevated NO_X levels of the magnitude predicted for the proposed development due to the effects of inundation, dilution, tidal mixing and dispersal.

It is also understood that parts of the estuary are subject to dredging in order to maintain a navigable channel. The removal of sediment will by default result in the removal of nutrients contained within those sediments.

Examination of the evidence base for the Teesmouth and Cleveland Coast SPA / Ramsar extension indicates that, whilst some tern species may feed within the estuary (and potentially in the vicinity of the areas where small-scale exceedance of NO_X are predicted), most of the qualifying species are associated with more distant areas. Terns are mainly piscivorous and it is concluded that the predicted air quality changes are not likely to affect prey availability and hence the conservation status of these species.

5.3. Comparison of Maximum Predicted Pollutant Ground Level Concentrations with Critical Levels for the Protection of Vegetation and Ecosystems - Sulphur Dioxide

5.3.1. A summary of maximum predicted GLCs of sulphur dioxide at the identified sensitive habitat sites are presented in Table 24. In accordance with the H1 guidance, the significance of the impacts has been determined using the 1% criteria for long-term predictions, for SPAs, SACs, Ramsars and SSSIs (see Section 2.22. of this document). In Table 24, any significant impacts are highlighted in bold.

Table 24: Comparison of Maximum Predicted Sulphur Dioxide Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites

		Pollutant	SO_2 (annual mean)
		Critical Level (µg/m³)	20 [(a)]
		Maximum PC (µg/m³)	0.120
		Max PC as % of Critical Level	0.60%
NYM1	North York Moors - SAC / SPA		0.0101
TCC1	Teesmouth and Cleveland Coast - SPA / SSSI		0.0574
TCC2			0.120
TCC3			0.0755
TCC4			0.0333
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar		0.0545
TCC6			0.0573
TCC7			0.0307
TCC8			0.0536
TCC9			0.0962
TCC10			0.0262
TCC11			0.0226
TCC12			0.0153
TCC13			0.0518
TCC14	Teesmouth and Cleveland Coast - SSSI		0.0216

Notes to Table 24

(a) From a review of the citations for each particular ecological designation, of the range of features noted, lichens and bryophytes are not included. It has therefore been considered that lichens and bryophytes are not important components of the ecological habitat sites modelled, with the critical level of 20 µg/m³ therefore used.

5.3.2. It can be seen from the data in Table 24 that the annual mean sulphur dioxide PCs are all less than 1% of the critical level and therefore are not significant at all SACs, SPAs, SSSIs and Ramsar sites considered.

5.4. Comparison of Maximum Predicted Pollutant Ground Level Concentrations with Critical Levels for the Protection of Vegetation and Ecosystems - Ammonia

5.4.1. A summary of maximum predicted GLCs of ammonia at the identified sensitive habitat sites are presented in Table in Table 25. In accordance with the H1 guidance, the significance of the impacts has been determined using the 1% criteria for long-term predictions, for SPAs, SACs, Ramsars and SSSIs (see Section 2.22. of this document). Any significant impacts are highlighted in bold.

Table 25: Comparison of Maximum Predicted Ammonia Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites

		Pollutant	NH_3 (annual mean) - Other Vegetation
		Critical Level (µg/m³)	3 [(a)]
		Maximum PC (µg/m³)	**0.0398**
		Max PC as % of Critical Level	**1.33%**
NYM1	North York Moors – SAC / SPA		0.00337
TCC1	Teesmouth and Cleveland Coast – SPA / SSSI		0.0191
TCC2			**0.0398 (1.33%)**
TCC3			0.0251
TCC4			0.0111
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar		0.0181
TCC6			0.0190
TCC7			0.0102
TCC8			0.0178
TCC9			**0.0320 (1.07%)**
TCC10			0.00812
TCC11			0.00701
TCC12			0.00471
TCC13			0.0159
TCC14	Teesmouth and Cleveland Coast - SSSI		0.00666

Notes to Table 25

(a) From a review of the citations for each particular ecological designation, of the range of features noted, lichens and bryophytes are not included. It has therefore been considered that lichens and bryophytes are not important components of the ecological habitat sites modelled, with the critical level of 3 µg/m³ therefore used.

5.4.2. It can be seen from the data in Table 25 that the annual mean ammonia PCs are all less than 1% of the critical level at the majority of the ecological sites assessed. The impact is potentially significant (i.e., greater than 1% of the long-term critical level) at TCC2 and TCC9. Consequently, PECs will need to be calculated for these receptors.

5.4.3. The relevant background NH_3 concentrations, See Table 6 of Section 2.8.), for TCC2 and TCC9 are 1.64 µg/m³ and 1.45 µg/m³, respectively. The PECs as a percentage of the annual critical level would therefore be 55% (TCC2) and 48% (TCC9). In accordance with Section 2.22., it can therefore be assumed that there will be no adverse effect on the ecological sites assessed (i.e., the PECs are less than 100% of the critical level).

5.5. Comparison of Maximum Predicted Pollutant Ground Level Concentrations with Critical Levels for the Protection of Vegetation and Ecosystems - Hydrogen Fluoride

5.5.1. A summary of maximum predicted GLCs of hydrogen fluoride at the identified sensitive habitat sites are presented in Table 26. In accordance with the H1 guidance, the significance of the impacts has been determined using the 1% and 10% criteria for long and short-term predictions, respectively, for SPAs, SACs, Ramsars and SSSIs (see Section 2.22. of this document). Any significant impacts are highlighted in bold.

Table 26: Comparison of Maximum Predicted Hydrogen Fluoride Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites

		Pollutant	HF (weekly mean)	HF (daily mean)
		Critical Level (µg/m³)	0.5	5
		Maximum PC (µg/m³)	**0.0187**	0.0389
		Max PC as % of Critical Level	**3.74%**	0.78%
NYM1	North York Moors - SAC / SPA		0.00238	0.00442
TCC1	Teesmouth and Cleveland Coast - SPA / SSSI		**0.0146 (2.92%)**	0.0389
TCC2			**0.0187 (3.74%)**	0.0337
TCC3			**0.0120 (2.40%)**	0.0300
TCC4			**0.0118 (2.37%)**	0.0229
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar		**0.0149 (2.98%)**	0.0386
TCC6			**0.0145 (2.90%)**	0.0280
TCC7			**0.0104 (2.07%)**	0.0203
TCC8			**0.00864 (1.73%)**	0.0209
TCC9			**0.00808 (1.62%)**	0.0177
TCC10			**0.00651 (1.30%)**	0.0140
TCC11			0.00452	0.0115
TCC12			**0.00514 (1.03%)**	0.0106
TCC13			**0.00533 (1.07%)**	0.0126
TCC14	Teesmouth and Cleveland Coast - SSSI		0.00436	0.0119

5.5.2. It can be seen from the data in Table 26 that the daily mean HF PCs are all less than 10% of the critical levels and therefore are not significant at all SACs, SPAs, SSSIs and Ramsar sites considered.

5.5.3. For the weekly mean HF PCs, a conservative approach has been taken and the significance of impacts have been assessed against the 1% criterion for long-term predictions. Consequently, the weekly average HF PCs are greater than 1% of the critical level for TCC1-TCC10 (inclusive) and TCC12 and TCC13 - and are therefore potentially significant. NYM1, TCC11 and TCC14 are less than 1% of the critical level therefore no further assessment is required.

5.5.4. For the ecological receptors with PCs that are potentially significant PECs will need to be calculated. Monitoring of ambient levels of HF is not currently carried out in the UK. A modelling study has suggested a natural background concentration of 0.0005 µg/m^3 with an elevated background of 0.003 µg/m^3 where there are local anthropogenic emission sources [31]. In the interest of being conservative, the higher background concentration (i.e., 0.003 µg/m^3) will be used for the purposes of calculating the PECs.

5.5.5. The maximum weekly HF PC occurs at TCC2 and therefore the worst-case PEC would be 0.0217 µg/m^3 (or 4.34% of the weekly critical level). In accordance with Section 2.22., it can therefore be assumed that there will be no adverse effect (i.e., the PECs are all well below 100% of the critical level). Consequently, the same can be concluded for all other locations considered.

(31) EPAQS (February 2006), Guidelines for Halogen and Hydrogen Halides in Ambient Air for Protecting Human Health Against Acute Irritancy Effects

6. ASSESSMENT OF AIR QUALITY IMPACTS - IMPACT ON HABITAT SITES - DEPOSITION

6.1. Model Setup

6.1.1. This assessment considered the effect of emissions from the Installation on critical loads for the habitat sites identified in Table 2. Modelling was undertaken with the following settings:

- buildings effects were included;
- complex terrain was included (Terrain File One (which was used for all receptors bar NYM1) and Terrain File Two (which was used for NYM1 only) – see Section 2.17);
- emission rates for pollutants were as outlined in Table 10a of Section 2.11.;
- the proposed stack heights of 90m were considered;
- a surface roughness of 0.5m was used for the dispersion site and 0.3m for the met measurement site (a value of 0.5m was used for the dispersion site and met measurement site when using the 2020 NWP met data);
- 5 years of hourly sequential meteorological data from Loftus recording station for the period 2016 – 2020 (inclusive) and 2020 NWP data was used; and
- the deposition velocities for grassland (see Table 8 of Section 2.9.) were utilised for all ecological sites assessed.

6.2. Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads – European Sites and SSSIs

6.2.1. A summary of maximum predicted nutrient nitrogen deposition rates at the identified European Sites and SSSIs are presented in Table 27. It should be noted that the initial approach was to assess the habitat with the lowest lower and upper critical load. However, further to feedback from Natural England ("NE") via their Discretionary Advice Service ("DAS") on the 13th of January 2022 (a copy of which may be found as Appendix V), it has been advised that a critical load range of 10-15 kgN/ha/yr (reflective of *Coastal stable dune grasslands (calcareous type)*) is more appropriate for TCC1 – TCC14 due to the absence of *Coastal stable dune grasslands (acid type)* at any of the modelled ecological receptors. Habitat Interests considered are as specified in Table 5 in Section 2.7.

6.2.2. It should be noted that, as APIS does not provide data for Ramsar sites, as the Ramsar site (i.e., TCC5 – TCC13) is noted for the same bird species as the SPA, it is reasonable to assume that the site should be treated in the same way. Consequently, the habitat interest and feature selected for the SPA has also been selected for the Ramsar site considered.

6.2.3. In Table 27, any PCs greater than 1% of the critical load and PECs greater than 100% (i.e., the level beyond which it cannot be assumed that there will be no adverse effect on European Sites and SSSI's) of the critical load are highlighted in bold.

Table 27: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [a] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
NYM1	North York Moors – SAC (Blanket Bogs – Raised and blanket bogs)	5	10	0.0153	0.31%	0.15%	n/a	n/a	n/a	n/a
	North York Moors – SPA (European Golden Plover – Reproducing – Montane habitats)	5	10	0.0153	0.31%	0.15%	n/a	n/a	n/a	n/a
TCC1	Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type)	10	15	0.106	**1.06%**	0.71%	8.96	9.07	91%	60%
TCC2				0.202	**2.02%**	**1.35%**		9.16	92%	61%
TCC3				0.138	**1.38%**	0.92%		9.10	91%	61%
TCC4				0.0631	0.63%	0.42%	n/a	n/a	n/a	n/a

Table 27: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs (cont.)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [(a)] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
TCC5	Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type)	10	15	0.0995	0.99%	0.66%	n/a	n/a	n/a	n/a
TCC6				0.107	**1.07%**	0.71%	8.96	9.07	91%	60%
TCC7				0.0578	0.58%	0.39%	n/a	n/a	n/a	n/a
TCC8				0.0945	0.95%	0.63%	n/a	n/a	n/a	n/a
TCC9				0.168	**1.68%**	**1.12%**	8.4	8.57	86%	57%
TCC10				0.0522	0.52%	0.35%	n/a	n/a	n/a	n/a
TCC11				0.0453	0.45%	0.30%	n/a	n/a	n/a	n/a
TCC12				0.0306	0.31%	0.20%	n/a	n/a	n/a	n/a
TCC13				0.103	**1.03%**	0.69%	9.1	9.20	92%	61%

Table 27: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs (cont.)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [(a)] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
TCC14	Coastal stable dune grasslands (calcareous type)	10	15	0.0432	0.43%	0.29%	n/a	n/a	n/a	n/a

Notes to Table 27

(a) Total PC to nutrient nitrogen deposition is derived from the sum of the contribution from Nitrogen and Ammonia (dry deposition only).

6.2.4. It can be seen from the data in Table 27 that, following the calculation of PECs, there are no predicted exceedances for nitrogen deposition at any of the modelled points. Consequently, no further assessment is required.

6.2.5. **Further to discussions with NE, via their DAS, additional modelling and assessment has been undertaken for nutrient nitrogen deposition. Please see Section 10 of this report.**

6.3. Comparison of Maximum Predicted Acid Deposition Rates with Critical Loads – European Sites and SSSIs

6.3.1. A summary of maximum predicted acid deposition rates at the identified European Sites and SSSIs are presented in Table 28. Habitat Interests considered are as specified in Table 5 of Section 2.7., with the deposition velocities for grassland (as outlined in Table 8 of Section 2.9.) utilised for all ecological sites assessed.

6.3.2. In Table 28, any PCs greater than 1% of the critical load, and PECs greater than 100% (i.e., the level beyond which it cannot be assumed that there will be no adverse effect on European Sites and SSSI's) of the critical load are highlighted in bold.

Table 28: Comparison of Maximum Predicted Acid Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs

ADMS Ref.	Site Details	PC N (keq/Ha/yr)	BG N (keq/ha/yr)	PC S (keq/Ha/yr)	BG S (keq/ha/yr)	CL MinN (keq/ha/yr)	CLMaxN (keq/ha/yr)	CLMaxS (keq/ha/yr)	PEC N (keq/ha/yr)	PEC S (keq/ha/yr)	PC as % of CL	Total PEC (keq/ha/yr)	PEC as % of CL
NYM1	North York Moors – SAC (Blanket Bogs – Raised and blanket bogs)	0.00109	1.36	0.00119	0.18	0.321	0.504	0.183	1.36	0.181	0.45%	n/a	n/a
	North York Moors – SPA (European Golden Plover – Reproducing – Montane habitats)	0.00109	1.36	0.00119	0.18	0.178	0.471	0.150	1.36	0.181	0.48%	n/a	n/a
TCC1	Teesmouth and Cleveland Coast – SPA (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	0.00754	1.03	0.00833	0.20	0.856	4.856	4.00	1.04	0.208	0.33%	n/a	n/a
TCC2		0.0157	1.03	0.0173	0.20	0.856	4.856	4.00	1.05	0.217	0.68%	n/a	n/a
TCC3		0.00984	1.03	0.0109	0.20	0.856	4.856	4.00	1.04	0.211	0.43%	n/a	n/a
TCC4		0.00449	1.03	0.00495	0.20	0.856	4.856	4.00	1.03	0.205	0.19%	n/a	n/a

Table 28: Comparison of Maximum Predicted Acid Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs (cont.)

ADMS Ref.	Site Details	PC N (keq/Ha/yr)	BG N (keq/ha/yr)	PC S (keq/Ha/yr)	BG S (keq/ha/yr)	CL MinN (keq/ha/yr)	CL MaxN (keq/ha/yr)	CL MaxS (keq/ha/yr)	PEC N (keq/ha/yr)	PEC S (keq/ha/yr)	PC as % of CL	Total PEC (keq/ha/yr)	PEC as % of CL
TCC1 – TCC4 & TCC14	Teesmouth and Cleveland Coast - SSSI	No information currently held / accessible via APIS' portal											
TCC5	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	0.00708	1.03	0.00783	0.20	0.856	4.856	4.00	1.04	0.208	0.31%	n/a	n/a
TCC6		0.00759	1.03	0.00838	0.20	0.856	4.856	4.00	1.04	0.208	0.33%	n/a	n/a
TCC7		0.00411	1.03	0.00453	0.20	0.856	4.856	4.00	1.03	0.205	0.18%	n/a	n/a
TCC8		0.00673	1.03	0.00742	0.20	0.856	4.856	4.00	1.04	0.207	0.29%	n/a	n/a
TCC9		0.0120	1.01	0.0132	0.23	0.856	4.856	4.00	1.02	0.243	0.52%	n/a	n/a
TCC10		0.00372	1.03	0.00411	0.20	0.856	4.856	4.00	1.03	0.204	0.16%	n/a	n/a
TCC11		0.00322	1.07	0.00354	0.28	0.856	4.856	4.00	1.07	0.284	0.14%	n/a	n/a
TCC12		0.00218	1.07	0.00239	0.28	0.856	4.856	4.00	1.07	0.282	0.09%	n/a	n/a
TCC13		0.00734	0.75	0.00808	0.25	0.856	4.856	4.00	0.757	0.258	0.20%	n/a	n/a

Notes to Table 28
PC N = Process contribution from Nitrogen and Ammonia (dry deposition only)
PC S = Process contribution from Sulphur (dry deposition) and Hydrogen Chloride (wet and dry deposition)
PEC = Predicted environmental concentration
BG = Background concentration
CL = Critical Load

6.3.3. It can be seen from the data in Table 28 that the maximum acid deposition rates due to process contributions are less than 1% of the critical load at all the modelled points. Consequently, no further assessment is required.

7. ASSESSMENT OF AIR QUALITY IMPACTS - PLUME VISIBILITY

7.1. Forecast Visible Plumes

7.1.1. This section of the report describes the potential visible plume impacts from the Installation's A1 and A2 stack. A plume will become visible when water vapour in the plume condenses to form small particles in the form of water droplets. A plume is defined as "visible" if the liquid water content of the plume at the centreline exceeds 0.000015 kg/kg and is defined to have grounded if the vertical spread of the plume is larger than the plume centreline height.

7.1.2. In addition to the input parameters for the model used thus far, the initial mixing ration of the plume in kg/kg (i.e., the mass of water vapour per unit mass of dry release at the source) is also required. This value was provided by HZI and is 0.131 kg/kg.

7.1.3. Plume visibility for the main stack was assessed for the 5 years of observed met data and the one year of NWP met data. All met files include the relative humidity and temperature required for plume visibility calculation.

7.1.4. The modelled lengths of visible vapour plumes are provided in Table 29 for all hours – daytime and night time. No visible groundings were observed for any of the met years.

Table 29: Predicted Visible Plumes

	2016	2017	2018	2019	2020	NWP 2020
Number of Met Lines Used	8480	8681	8637	8660	8686	8615
Number of Visible Plumes	2807	2868	3004	2884	3046	1318
Percentage of Visible Plumes	33%	33%	35%	33%	35%	15%
Average length of visible plumes (m)	73.83	78.77	80.82	73.64	70.11	36.40
Max Length of visible plume (m)	405.46	447.61	499.83	412.44	370.35	297.71

7.1.5. The results of the plume visibility assessment concluded that visible plumes will only occur for a maximum of 35% of the hours in a year. The maximum length of a visible plume from the Installation is 499.83m. However, for the worst-case met year, average visible plumes would be 80.82m in length. It should be noted that this assessment includes night-time hours.

7.1.6. It is also important to consider how often the plumes of varying length will be present for. Table 30 provides the 10-100th Percentile plume lengths for each met year considered. All figures are in meters.

Table 30: 10-100th Percentile Plume Lengths

Percentile	2016	2017	2018	2019	2020	NWP 2020
10th Percentile Plume Length	0	0	0	0	0	0
20th Percentile Plume Length	0	0	0	0	0	0
30th Percentile Plume Length	0	0	0	0	0	0
40th Percentile Plume Length	0	0	0	0	0	0
50th Percentile Plume Length	0	0	0	0	0	0
60th Percentile Plume Length	0	0	0	0	0	0
70th Percentile Plume Length	9	9	16	10	14	0
80th Percentile Plume Length	39	47	54	42	43	0
85th Percentile Plume Length	59	67	73	61	62	0
90th Percentile Plume Length	89	90	98	87	87	19
95th Percentile Plume Length	141	139	144	137	135	42
98th Percentile Plume Length	202	216	215	202	195	68
99th Percentile Plume Length	251	266	267	241	238	92
100th Percentile Plume Length	405	448	500	412	370	298

7.1.7. The results in Table 30 show that for 60% of all hours, no visible plume is forecast to occur. When visible, the plume length is predicted to be short, with a maximum plume length of around 16m for the 70th Percentile of hours as shown in Table 30.

7.1.8. The plume is forecast to extend to a length of up to 144m for the 95th Percentile and, when taking the predominant south-westerly wind direction into consideration (see Section 2.12.) the visible plume would remain within the Installation's boundary for the majority of the time. The eastern and north-eastern Installation boundaries are circa 175m – 185m from the stack locations, respectively.

7.1.9. It should be noted that, as the approximate closest point of the Installation's boundary is circa 90m to the north of the A1 and A2 emission points, the maximum visible plume, regardless of plume direction, would remain within the Installation's boundary 85% of the time.

7.1.10. The nearest potentially sensitive human receptor considered in the assessment would be HSR1 – Industrial activity off John Boyle Road, at a distance of 422m from the Installation's stacks. Consequently, as demonstrated by the 99th Percentile in Table 30, the plume would only visibility extend to the closest potentially sensitive human receptor for up to 1% of the time.

7.1.11. In the absence of EA specific guidance on plume visibility, SEPA's H1 guidance[32], has been used to assess the impact of plume visibility. The screening criteria used is provided in Table 31.

Table 31: Screening Criteria for Plume Visibility

Impact	Quantitative Description
Zero	• No visible impacts resulting from operation of process
Insignificant	• Regular small impact from operation of process • Plume length exceeds boundary less than 5% of daylight hours per year • No sensitive local receptors
Low	• Regular small impact from operation of process • Plume length exceeds boundary less than 5% of daylight hours per year • Sensitive local receptors
Medium	• Regular large impact from operation of process • Plume length exceeds boundary for more than 5% of daylight hours per year • Sensitive local receptors
High	• Continuous large impact from operation of process • Plume length exceeds boundary more than 25% of daylight hours per year • Local sensitive receptors

7.1.12. As the SEPA criteria references daylight hours, the model was re-run excluding hours from 10pm to 4am.

7.1.13. Following the assessment of daylight hours only, the results were similar to those displayed in Tables 29 and 30. For 60% of daylight hours, no visible plume is forecast to occur. When visible, the plume length is predicted to be short, with a maximum plume length of around 16m for the 70th Percentile of hours.

7.1.14. For daylight hours, the plume is forecast to extend to a length of up to 152m for the 95th Percentile and, when taking the predominant south-westerly wind direction into consideration (see Section 2.12.) the visible plume would remain within the Installation's boundary for the majority of the time (the eastern and north-eastern Installation boundaries are circa 175m – 185m from the stack locations, respectively).

7.1.15. The maximum visible plume, regardless of plume direction, would remain within the Installation's boundary 85% of the time, with a visible plume length of 77m for the 85th Percentile of hours.

7.1.16. At the nearest potentially sensitive human receptor considered in the assessment (i.e., HSR1) the 99th Percentile visible plume length for daylight hours would only extend to this receptor for up to 1% of the time.

7.1.17. Consequently, based on the SEPA criteria, the impact of the visible plume for daylight hours would be classed as 'medium' for the following reasons:

- the plume is visible 34% of the time;

[32] IPPC Environmental Assessment and Appraisal of BAT, V6, July 2003

- the plume length exceeds the nearest point of the site boundary distance for more than 5% of hours per year (i.e., for the 90th Percentile, with a value of 103m); and
- there are sensitive local receptors considered.

7.1.18. It should be noted that the area to the north of the Installation's boundary (i.e., the point of the boundary approximately closest to the A1 and A2 emission points) is occupied by industrial land use. Visible plumes would not extend to the vast majority of the human receptor locations assessed and only very seldom would plumes be visible at HSR1.

7.1.19. Consequently, it is likely that the impact of visible plumes could be considered insignificant.

8. ASSESSMENT OF AIR QUALITY IMPACTS - ABNORMAL EMISSIONS

8.1. Scenarios Considered

8.1.1. In order to assess the impact of the plant under abnormal operating conditions, two scenarios have been considered:

- with emissions at the half-hourly emission limits prescribed in Annex VI of the IED,
- and to take account of short-term abnormal conditions permitted under Article 46(6) of the IED.

8.2. Emissions at Half-hourly Emission Limit Values

8.2.1. The dispersion modelling results presented below are based on the Installation operating for all hours in the year with the pollutant concentrations at the daily ELVs prescribed by Annex VI of the IED. This is an extreme assumption, especially for long term predictions since the Installation could never operate with release rates as high as this in practice. Annex VI of the IED also prescribes short-term ELVs for some pollutants based on half hourly average concentrations. However, the frequency with which these limits can be applied are very limited (i.e., for the majority of pollutants with half hourly limits the daily limit value must be complied with for 97% of the time).

8.2.2. Half-hourly limit values apply to total dust (30mg/Nm^3), volatile organic compounds (as benzene) (20mg/Nm^3), hydrogen chloride (60mg/Nm^3), hydrogen fluoride (4mg/Nm^3), sulphur dioxide (200mg/Nm^3) and oxides of nitrogen (as nitrogen dioxide) (400mg/Nm^3). The emission rates for the Installation operating at these half-hourly limits are as displayed in Table 10b of Section 2.11.

8.2.3. Short-term peak concentrations may arise if the Installation emits some pollutants that are at concentrations within the half hourly limit values prescribed in Annex VI of the IED but greater than the daily limit values used for the dispersion modelling. The probability of such occasions occurring at the same time as the meteorological conditions that produce the highest one-hour mean GLCs is remote. However, in the event that this does occur, then the maximum one-hour mean GLCs for these pollutants would be as provided in Table 32, with any potentially significant PCs shown in bold.

Table 32: Maximum Predicted One-hour Concentrations (PCs) for Emissions at the Half- hourly IED Emission Limit Values

Pollutant	Maximum Predicted Hourly Mean GLC (PC) (µg/m³) [(b)]	Short-term AQS (µg/m³)	PC as a %age of Short-term AQS
Particulate Matter (as PM_{10})	7.69	No hourly standard	n/a
VOCs (as Benzene)	5.11	No hourly standard	n/a
Hydrogen Chloride	15.32	750	2.04%
Hydrogen Fluoride	1.02	160	0.64%
Sulphur Dioxide	**51.11**	350	**14.60%**
Nitrogen Dioxide [(a)]	**35.82**	200	**17.91%**

Notes to Table 32
(a) Assuming 35% of NO_x is oxidised to NO_2 (see Section 2.24. of this document).
(b) Maximum predicted hourly concentration for all hours of the meteorological data set.

8.2.4. With the exception of SO_2 and NO_2, predicted PCs under these worst-case conditions are all less than 10% of their respective AQSs and, in accordance with the short-term significance criterion detailed in Section 2.21. of this document, would be assessed as being not significant.

8.2.5. For SO_2 and NO_2, the maximum predicted short term concentrations are approximately 15% and 18%, respectively. This represents the very worst-case conditions (i.e., these are the highest PCs predicted assuming the Installation emits at the half-hourly average for the entire year and therefore, combines the maximum emission with the worst-case hour of meteorological data). Furthermore, these are the maximum concentrations predicted at any location within the model area. Accordingly, it is considered that, in practice, releases of short-term SO_2 and NO_2 will not be significant. However, even at these concentrations, using the IAQM methodology (as outlined in Section 2.21.), the severity of the impact would be described as 'small' (i.e., the predicted PCs for SO_2 and NO_2 are both between 11-20% of their respective AQSs).

8.2.6. Predicted concentrations at the sensitive human receptors will be substantially lower than this, and, accordingly, will not be significant.

8.3. Emissions Under Abnormal Operating Conditions

8.3.1. Article 46(6) of the IED allows abnormal operation, where the ELVs can be exceeded for certain periods, without being in contravention of the Environmental Permit for the plant. This part of the assessment quantifies the impacts on air quality as a result of changes in emissions during abnormal events.

8.3.2. In the event of any process disruption or mechanical failure, the operator would assess the situation to determine if these abnormal conditions can be remedied without resulting in elevated emissions; this would avoid shutting down the process unnecessarily. Where this

is not the case, the operator would reduce/cease fuel loading and commence a controlled shutdown of the combustion plant.

8.3.3. The dispersion modelling assessment for abnormal emissions has been adapted to consider short-term impacts during periods of abnormal operation, assuming abatement plant failure. Article 46(6) of the IED specifies that abatement plant or monitoring failure may not occur for longer than four hours whilst the plant is operating. Therefore, if it is likely that the problem cannot be rectified within four hours then a controlled shut down would be implemented as soon as possible. In addition, the total allowable period in a year for abnormal releases must not exceed sixty hours.

8.3.4. Accordingly, the maximum time period for which a failure can occur is four hours. For carbon monoxide and total organic carbon - VOCs (pollutant indicators of poor combustion conditions) are not allowed to exceed their respective ELVs. Therefore, a four-hour exceedance of the ELVs only applies to total dust (maximum concentration of 150mg/Nm^3, expressed as a half-hourly average), hydrogen chloride, hydrogen fluoride, sulphur dioxide and oxides of nitrogen.

8.3.5. For assessing short-term air quality impacts resulting from abnormal operation, it has been assumed that the plant operates for four hours continuously at the maximum emission concentration (i.e., half-hourly limit or abnormal emission limit). Abnormal emission limits apply to carbon monoxide (100mg/Nm^3) and to total dust (150mg/Nm^3).

8.3.6. For assessing long-term impacts - annual mean GLCs - it has been assumed that the plant operates at sixty hours per year at the maximum permissible emission 3% of the time at the half hour limit where these apply and the remainder at the daily emission limit. On this basis an annual average emission limit has been derived to determine annual average concentrations (refer to Table 10c of Section 2.11., for details).

8.3.7. Emission concentrations for the assessment of abnormal emissions on short-term and long-term predicted concentrations are presented in Table 33. Predicted maximum GLCs are compared to the relevant AQSs in Table 34.

Table 33: Short-term and Long-term Emission Concentrations for Abnormal Releases

Pollutant	Half Hour Limit (mg/Nm^3)	Normal Emission Concentration (mg/Nm^3)	Maximum Emission Concentration (mg/Nm^3)	Assumed Short-term Abnormal Emission Concentration (mg/Nm^3)	Assumed Long-term Abnormal Emission Concentration (mg/Nm^3)
Particulate Matter, as PM_{10}	30	5	150	29.2 [(a)]	5.99 [(b)]
Hydrogen Chloride	60	6	-	60	No Long-term AQS
Hydrogen Fluoride	4	1	-	4	1.02 [(c)]

Table 33: Short-term and Long-term Emission Concentrations for Abnormal Releases (cont.)

Pollutant	Half Hour Limit (mg/Nm^3)	Normal Emission Concentration (mg/Nm^3)	Maximum Emission Concentration (mg/Nm^3)	Assumed Short-term Abnormal Emission Concentration (mg/Nm^3)	Assumed Long-term Abnormal Emission Concentration (mg/Nm^3)
Sulphur Dioxide	200	30	-	200	No Long-term AQS
Nitrogen Dioxide	400	100	-	400	102.05 (c)
Carbon Monoxide	100	50	150 (d)	100	No Long-term AQS

Notes to Table 33

(a) 4 hours at 150mg/Nm^3 and 20 hours at the normal emissions concentration (5mg/Nm^3) for comparison with daily mean AQS.

(b) 60 hours at 150mg/Nm^3 and the remainder of hours at the normal emission concentration of 5mg/Nm^3.

(c) 60 hours at half hour limit and the remainder at the normal emissions concentration.

(d) Ten-minute average.

Table 34: Comparison of Maximum Predicted Pollutant Ground Level Concentrations (PCs) with Air Quality Standards for Abnormal Emissions

Pollutant	Averaging Period	Maximum Predicted GLC (PC) ($\mu g/m^3$)	AQS ($\mu g/m^3$)	PC as a %age of AQS
Particulate Matter, as PM_{10}	annual	0.0516	40	0.13%
	24-hour	0.211	50	0.42%
Hydrogen Chloride	1-hour	0.516	750	0.07%
Hydrogen Fluoride	annual	0.00879	16	0.05%
	1-hour	1.02	160	0.64%
Sulphur Dioxide	24-hour	**17.1**	125	**13.71%**
	1-hour	29.0	350	8.28%
	15-minute	**33.6**	266	**12.63%**
Nitrogen Dioxide	annual	**0.615**	40	**1.54%**
	1-hour	**20.9**	200	**10.44%**
Carbon Monoxide	8-hour	14.3	10,000	0.14%

8.3.8. It is evident from the data in Table 34, that PCs of PM_{10}, HCl, HF, 1-hour SO_2 and CO can be considered to be not significant as long term GLCs are less than 1% of the long-term AQS and short term GLCs are less than 10% of the short-term AQS.

8.3.9. For annual NO_2, the maximum predicted annual mean GLC is in excess of 1% of the long-term AQS. For 24-hour and 15-minute SO_2 and 1-hour NO_2 and the short-term PCs are in excess of 10% of the short-term AQSs. Stage 2 screening has, therefore, also been undertaken for these pollutants.

8.3.10. The PEC for annual NO_2 (when using DT R27 (2019 data) as the background air quality source – refer to Table 17 in Section 3.4., for details) would be 25.42µg/m^3 (or 64% of the AQS). Under the IAQM methodology the impact of the maximum predicted annual NO_2 PC, under abnormal operating conditions, would therefore be described as 'negligible'.

8.3.11. The potentially significant short-term concentrations (i.e., for 24-hour and 15-minute SO_2 and 1-hour NO_2), are all within 11% - 20% of their AQSs and therefore the severity of the impact would be described as 'small' in accordance with the IAQM methodology.

8.3.12. For SO_2 and NO_2, the potentially significant impacts are all only just above the significance criterion and represent the very worst-case conditions. Furthermore, these are the maximum concentrations predicted at any location within the model area. Accordingly, it is considered that, in practice, releases of SO_2 and NO_2 will not be significant.

9. IN-COMBINATION ASSESSMENT

9.1. Cumulative Impacts

9.1.1. In addition to the effect of the proposed Installation, there are several other developments in the surrounding area which may have an effect on both human and ecological health when considered in combination. Existing emissions within the area are considered to already be accounted for in background air quality data.

9.1.2. The developments that ECL are aware of (at time of writing), but have been excluded from the assessment are as follows:

- Potential new Energy from Waste ("EfW") site opening in 2026 at the former SSI steelworks site – situated approximately 1.6 km east-northeast from the proposed FCC Installation – this information was obtained from pre-release statements only, no further data is available, consequently this development will not be considered;
- Dockside Road (1) and Dockside Road (2) – Teeside Renewable Energy Centre, operated by PD Ports, is expected to be operational within the next few years. Situated approximately 1.7 km to the west of the proposed Installation, again this information was obtained from pre-release statements only, no further data is available, consequently this development will not be considered.
- Wilton 11 EfW, operated by Suez / Sembcorp. Situated approximately 2.1 km east from the proposed Installation. Despite being operational since around 2018, no data is publicly available in relation to the input data required to model the site within either the HHRA or the ADM. An information request has been sent to the EA however, at time of writing no suitable data is available;
- Haverton Hill household waste recycling centre and North East Energy Recovery Centre, both operated by Suez. Both sites are located approximately 6.5 km to the west from the proposed Installation. It is considered, given their considerable distance from the proposed Installation it will not be necessary to include them in the cumulative assessment; and
- Tees Eco Energy – currently proposed (planning and permitting granted). Situated approximately 6.7 km to the west from the proposed Installation. It is considered, given the considerable distance of Tees Eco Energy from the proposed Installation, it will not be necessary to be included in the cumulative assessment.

9.1.3. The development to be included in the assessment is the Redcar Energy Centre ("REC"). The REC will be situated at land formerly occupied by Redcar Bulk Terminal (approximately 4.8km to the north of the Installation) and is due to be commissioned circa 2024 to 2025. Consequently, the emissions arising from the two stacks associated with its two process lines will be incorporated into the cumulative impact assessment undertaken as part of this study. This will be carried out making use of the emissions data disclosed in the air quality chapter submitted as part of the planning application documentation for REC[33].

[33] Planning Application Reference Number: R/2020/0411/FFM. Available online via: https://planning.redcar-cleveland.gov.uk/Planning/Display?applicationNumber=R%2F2020%2F0411%2FFFM

9.2. Model Setup

9.2.1. This assessment considered the effect of any cumulative emissions arising from the proposed Installation and REC at the maximum point of impact and at potentially sensitive human receptor and ecological locations. Modelling was undertaken with the following settings:

- buildings effects were included. For the REC, the buildings included within the model were those detailed in Table 11.8 of the RPS report: *Chapter 11 Air Quality* – which was submitted as part of the planning application for the REC;
- the modelled grid was as specified in Section 2.19.4;
- complex terrain was included (refer to Terrain File Three of Section 2.17., for further details);
- emission rates for pollutants were as outlined in Table 10a of Section 2.11. for the Installation and as calculated from the stack and emission characteristics detailed in the RPS report for the REC (i.e., Tables 11.9 and 11.10 of the *Chapter 11 Air Quality* report submitted as part of the planning application for the REC);
- stack heights of 90m were considered for the Installation, with stack heights of 80m for REC's two emission points;
- a surface roughness of 0.5m was used for the dispersion site and 0.3m for the met measurement site (a value of 0.5m was used for the dispersion site and met measurement site when using the 2020 NWP met data); and
- 5 years of hourly sequential meteorological data from Loftus recording station for the period 2016 – 2020 (inclusive) and 2020 NWP data was used.

9.3. Comparison of Maximum Predicted Pollutant Ground Level Concentrations with Air Quality Standards

9.3.1. The predicted PCs for each of the pollutants considered in the assessment at the maximum point of impact have been extracted and are presented in Table 35. The data is based on the worst case met data year. It should be noted that the location of the maximum impact may not be in an area where there is a relevant public exposure.

9.3.2. Maximum concentrations are considered potentially significant if the long-term prediction is greater than 1% of the long-term AQS. For short-term predictions, a potentially significant concentration would be greater than 10% of the short-term AQS. In Table 35, any PCs that are above these significance criteria are indicated in bold type.

Table 35: Comparison of Predicted Maximum GLCs with AQSs - Cumulative

Pollutant	Worst Case Met Year	Maximum PC (µg/m³)	AQS (µg/m³)	PC as a % of AQS
NO_2 (annual mean)	NWP 2020	**2.57**	40	**6.41%**
NO_2 (1 hour, 99.79th percentile)	NWP 2020	10.5	200	5.25%
SO_2 (24 hour, 99.18th percentile)	NWP 2020	5.26	125	4.20%
SO_2 (1 hour, (99.73rd percentile)	NWP 2020	7.46	350	2.13%
SO_2 (15min, 99.90th Percentile)	NWP 2020	8.17	266	3.07%
PM_{10} (annual mean)	NWP 2020	0.154	40	0.39%
PM_{10} (24 hour, 90.41st Percentile)	NWP 2020	0.471	50	0.94%
$PM_{2.5}$ (annual mean)	NWP 2020	0.154	20	0.77%
CO (8 hour, 100th percentile)	2019	12.1	10,000	0.12%
VOC (annual mean)	NWP 2020	**0.308**	5	**6.16%**
NH_3 (annual mean)	NWP 2020	0.308	180	0.17%
NH_3 (1-hour)	2017	3.65	2,500	0.15%
HCl (1-hour)	2017	2.19	750	0.29%
HF (annual mean)	NWP 2020	0.0306	16	0.19%
HF (1-hour)	2017	0.363	160	0.23%
Sb (annual mean)	NWP 2020	0.00944	5	0.19%
Sb (1-hour)	2017	0.112	150	0.07%
As (annual mean)	NWP 2020	**0.00944**	0.003	**314.78%**
Cd (annual mean)	NWP 2020	**0.000559**	0.005	**11.19%**
Cr (annual mean)	NWP 2020	0.00944	5	0.19%
Cr (1-hour)	2017	0.112	150	0.07%
Cr(VI) (annual mean)	NWP 2020	**0.00944**	0.0002	**4721.75%**
Co (annual mean)	NWP 2020	**0.00944**	0.2	**4.72%**
Co (1-hour)	2017	0.112	6	1.86%
Cu (annual mean)	NWP 2020	0.00944	10	0.09%
Cu (1-hour)	2017	0.112	200	0.06%
Pb (annual mean)	NWP 2020	**0.00944**	0.25	**3.78%**

Table 35: Comparison of Predicted Maximum GLCs with AQSs – Cumulative (cont.)

Pollutant	Worst Case Met Year	Maximum PC (µg/m³)	AQS (µg/m³)	PC as a % of AQS
Mn (annual mean)	NWP 2020	0.00944	1	0.94%
Mn (1-hour)	2017	0.112	1,500	0.01%
Hg (annual mean)	NWP 2020	0.000559	0.25	0.22%
Hg (1-hour)	2017	0.00668	7.5	0.09%
Ni (annual mean)	NWP 2020	**0.00944**	0.02	**47.22%**
Tl (annual mean)	NWP 2020	0.000559	1	0.06%
Tl (1-hour)	2017	0.00668	30	0.02%
V (annual mean)	NWP 2020	0.00944	5	0.19%
V (24-hour)	NWP 2020	0.0620	1	6.20%
PAH (as B[a]P) (annual mean)	NWP 2020	**0.0000890**	0.00025	**35.61%**
PCBs (annual mean)	NWP 2020	0.00000000188	0.2	0.0000009%
PCBs (1-hour)	2018	0.0000000232	6	0.0000004%
Dioxins and Furans	NWP 2020	0.00000000123	No Standard Applies	

9.3.3. It can be seen from the data in Table 35, that the cumulative impact varies depending on the pollutant considered. The potentially significant impacts are for long-term (annual):

- NO_2,
- VOC (as benzene),
- As,
- Cd,
- Cr(VI),
- Co,
- Pb,
- Ni, and
- PAH (as B[a]P)

9.3.4. It is important to note that the metals, at this step of the assessment, have each been modelled at their respective ELVs (see Table 10a of Section 2.11., of this report for the Installation and Table 11.10. of the RPS report for REC[34]).

9.3.5. However, it would not be reasonable to assume that each Group 3 metal emits at the maximum ELV for the group. In this regard, the EA has provided guidance on the steps required for assessing the impact of metals emissions (see Section 2.23., of this report). If any of the Group 3 metals exceed 1% of a long-term standard, then the PEC should be compared against the AQS. If the PEC is greater than 100% of the AQS then case specific screening is required. Consequently, background concentrations for As, Cr(VI), Co, Pb and Ni are required. Cd will also be considered with the Group 3 metals.

[34] Refer to Chapter 11, Air Quality of Planning Application Reference Number: R/2020/0411/FFM. Available online via: https://planning.redcar-cleveland.gov.uk/Planning/Display?applicationNumber=R%2F2020%2F0411%2FFFM

9.4. Step 1 and 2 Screening of Group 2 and 3 Metals

9.4.1. Using the background concentrations detailed in Table 14 of Section 3.4., and a background concentration of 0.000647 µg/m^3 for Cd (as also acquired from Scunthorpe Low Santon urban industrial monitoring site (2019 data)), PECs for the potentially significant Group 2 and 3 metals are provided in Table 36. Any PECs greater than 100% of the AQS are highlighted in bold.

Table 36: PECs of Group 3 Metals – Step 1 Screening - Cumulative

Pollutant	Worst Case Met Year	Maximum PC (µg/m³)	AQS (µg/m³)	PC as a % of AQS	Background Concentration (µg/m³)	Maximum PEC (µg/m³)	PEC as a % of AQS
As (annual mean)	NWP 2020	**0.00944**	0.003	**314.78%**	0.000788	**0.0102**	**341%**
Cd (annual mean)	NWP 2020	**0.000559**	0.005	**11.19%**	0.000647	0.00121	24%
Cr(VI) (annual mean)	NWP 2020	**0.00944**	0.0002	**4721.75%**	0.000749	**0.0102**	**5096%**
Co (annual mean)	NWP 2020	**0.00944**	0.2	**4.72%**	0.000177	0.00962	5%
Pb (annual mean)	NWP 2020	**0.00944**	0.25	**3.78%**	0.0154	0.0248	10%
Ni (annual mean)	NWP 2020	**0.00944**	0.02	**47.22%**	0.00124	0.0107	53%

9.4.2. The data in Table 36 indicates that, although for the majority of pollutants the PECs can be screened out, further screening is required for long-term As and Cr(VI).

9.4.3. Step 2 screening indicates that where the PC exceeds 1% of the long standard, the maximum emissions data in Appendix A of the EA's Group 3 metals assessment guidance can be used to revise the predictions, and the PEC then compared against the AQS. The guidance states that As comprises 5% of the Group 3 metals, and Cr(VI) 0.03%. Consequently, the emission rates for each have been recalculated based on these percentages. The results of the assessment may be found in Table 37.

Table 37: PECs of Group 3 Metals – Step 2 Screening - Cumulative

Pollutant	Met Year	Maximum PC (µg/m³)	AQS (µg/m³)	PC as a % of AQS	Background Concentration (µg/m³)	Maximum PEC (µg/m³)	PEC as a % of AQS
As (annual mean)	NWP 2020	**0.000462**	0.003	**15%**	0.000788	0.00125	42%
Cr(VI) (annual mean)	NWP 2020	**0.00000277**	0.0002	**1.4%**	0.000749	**0.000751**	**376%**

9.4.4. The data in Table 37 indicates that, following further screening, the PECs for As can now be screened out.

9.4.5. The PCs for Cr(VI) (as shown in Table 37), whilst significantly lower than the results presented in Table 36 for the Step 1 screening, are still potentially significant, at 1.4% of the AQS.

9.4.6. The maximum predicted annual GLC for Cr(VI), for the cumulative emissions, occurs in an area approximately 500m north of REC (456185 (X), 526429 (Y)) and is therefore, in the context of this modelling study, more likely to be associated with the predicted PCs for REC's two emission points. This was further explored by running the model in groups to be able to differentiate between the predicted PCs associated with the Installation and the predicted PCs associated with REC. For the worst-case met year (i.e., NWP 2020) the annual GLC for Cr(VI) for REC was 0.00000263 µg/m^3 (or 1.31% of the AQS) at 456185 (X), 526429 (Y).

9.4.7. Furthermore, the predicted location of the maximum GLC is not necessarily representative of permanent human exposure as the location is that of grassland and sand dune and lies just outside the boundary of the Teesmouth and Cleveland Coast habitat site. In addition, the worst-case met year is the site-specific NWP data for the Installation and therefore may not be reflective of this very coastal location.

9.4.8. As discussed in Section 2.12., the wind rose for the NWP data, compared to the observed data from Loftus recording station, appears to demonstrate a more significant and focused south-westerly wind. Any differences in the prevailing wind direction, as well as other meteorological effects accounted for, will have a significant impact on the predicted PCs.

9.4.9. Consequently, for Cr(VI), the Step 2 screening results for the five years of met data from Loftus recording station have also been provided for comparison with the NWP 2020 data. These results are presented as Table 38.

Table 38: PECs of As – Step 2 Screening – All Met Years - Cumulative

Pollutant	Met Year	Maximum PC (µg/m³)	AQS (µg/m³)	PC as a % of AQS	Background Concentration (µg/m³)	Maximum PEC (µg/m³)	PEC as a % of AQS
Cr(VI) (annual mean)	2016	0.00000151	0.0002	0.76%	0.000749	**0.000750**	**375%**
	2017	0.00000159		0.80%		**0.000750**	**375%**
	2018	0.00000156		0.78%		**0.000750**	**375%**
	2019	0.00000190		0.95%		**0.000750**	**375%**
	2020	**0.00000210**		**1.05%**		**0.000751**	**375%**
	NWP 2020	**0.00000277**		**1.39%**		**0.000751**	**376%**

9.4.10. It can be seen from the data in Table 38, that for met years 2016 – 2019 (inclusive), the predicted Cr(VI) PCs, following Step 2 screening, would be considered not significant (i.e., the PCs are less than 1% of the AQS).

9.4.11. It should be noted that, whilst the impact of the PCs associated with met years 2020 and NWP 2020 are potentially significant – they only just exceed the AQS when both the Installation and REC (i.e., four emission points in total) have been modelled on a worst-case scenario basis of emitting at the calculated ELV, 24-hours a day, 365 of the year.

9.4.12. In accordance with the IAQM guidance, the severity of impact for the Step 2 screening Cr(IV) PCs for met years 2020 and NWP 2020 would be regarded as 'moderate'. In reality however, the overall emissions arising from the cumulative scenario considered are likely to be much lower during normal operation. Furthermore, the potentially significant PCs only account for a very small percentage of the PEC when being added to a background concentration which is already highly elevated (i.e., 374% of the Cr(IV) AQS).

9.4.13. Consequently, taking the above assessment into consideration, no further assessments are considered necessary for the metals.

9.5. Step 2 Screening of Remaining Pollutants

9.5.1. The long-term impacts of NO_2, VOC and PAH, as displayed in Table 35, also require further assessment. The next stage of the Step 2 impact significance screening process is to compare the long-term pollutant PECs with the criteria outlined in Section 2.21. of this report.

9.5.2. Using the relevant background data discussed in section 3.6., the PEC assessment for annual NO_2, VOC and PAH is shown in Table 39, with any potentially significant PCs indicated in bold.

Table 39: Long-term impacts of NO_2, VOC and PAH – Step 2 Screening - Cumulative

Pollutant	Worst Case Met Year	Maximum PC (µg/m³)	AQS (µg/m³)	PC as a % of AQS	Background Concentration (µg/m³)	Maximum PEC (µg/m³)	PEC as a % of AQS	Impact Descriptor
NO_2 (annual mean)	NWP 2020	**2.57**	40	**6%**	24.8	27.37	68%	Slight
VOC (annual mean)	NWP 2020	**0.308**	5	**6%**	0.355	0.663	13%	Slight
PAH (as B[a]P) (annual mean)	NWP 2020	**0.0000890**	0.00025	**36%**	0.000206	0.000295	118%	Substantial

9.5.3. The data in Table 39 indicates that for annual NO_2 and VOC the impact on the environment can be classed as 'slight', in accordance with the IAQM guidance. When using the EA online guidance for screening assessments for emissions to air, further detailed modelling is not required if PECs are less than 70% of the long-term AQS. Although not directly applicable to the detailed modelling stage, the PECs of annual NO_2 and VOC would be considered not significant based on the screening criteria.

9.5.4. For PAH (as B[a]P) the impact on the environment can be classed as 'substantial', in accordance with the IAQM guidance. It is worth noting that, as the maximum predicted annual GLC for PAH (as B[a]P) occurs in an area approximately 500m north of REC (456185 (X), 526429 (Y)) it is suspected, in the context of this modelling study, that the maximum GLC is more likely to be associated with the emissions arising from the REC. This was further explored by running the model in groups to be able to differentiate between the predicted PCs associated with the Installation and the predicted PCs associated with REC. For the worst-case met year (i.e., NWP 2020) the annual GLC for PAH (as B[a]P) for REC was 0.0000874 µg/m^3 (or 35% of the AQS) at 456185 (X), 526429 (Y).

9.5.5. Furthermore, the predicted location of the maximum GLC is not necessarily representative of permanent human exposure as the location is that of grassland and sand dune and lies just outside the boundary of the Teesmouth and Cleveland Coast habitat site. In addition, the worst-case met year is the site-specific NWP data for the Installation and therefore may not be reflective of this very coastal location.

9.5.6. As discussed in Section 2.12., the wind rose for the NWP data, compared to the observed data from Loftus recording station, appears to demonstrate a more significant and focused south-westerly wind. Any differences in the prevailing wind direction, as well as other meteorological effects accounted for, will have a significant impact on the predicted PCs.

9.5.7. In reality, the overall emissions arising from the cumulative scenario considered are likely to be much lower during normal operation. Furthermore, the potentially significant annual PAH PCs, arising from four stacks modelled on a worst-case scenario basis (i.e., emitting at the maximum ELV 24-hours a day, 365 days of the year), are being added to a background concentration which is already elevated (i.e., 83% of the AQS).

9.5.8. Consequently, taking the above assessment into consideration, no further assessments are considered necessary for annual NO_2, VOC or PAH.

9.6. Assessment of Air Quality Impacts – Potentially Sensitive Human Receptor Locations – Cumulative Impacts

9.6.1. This assessment considered the effect of cumulative emissions from the Installation and REC on the potentially sensitive human receptors identified in Table 1.

9.7. Results – Group 1, 2 and 3 Metals

9.7.1. Due to the number of potentially sensitive human receptors, and the varying screening methodology, the results have been split into two sections. This section focuses on Group 1, 2 and 3 metals only, the remaining pollutants are discussed in Section 9.8.

9.7.2. Based on Stage 1 screening (i.e., long-term PCs greater than 1% of their AQS are potentially significant and short-term PCs greater than 10% of their AQS are potentially significant), all metals with short-term averaging periods screened out. The metals with potentially significant impacts were As, Cd, Cr(VI), Co, Pb and Ni (all annual mean). Consequently, PECs were considered for these metals.

9.7.3. Following calculation of the PECs, all metals with the exception of As and Cr(VI) screened out (i.e., the PECs were all less than 100% of their respective AQSs). Step 2 screening indicates that where the PC exceeds 1% of the long standard, the maximum emissions data in Appendix A of the EA's Group 3 metals assessment guidance can be used to revise the predictions, and the PEC then compared against the AQS. The guidance states that As comprises 5% of the Group 3 metals, and Cr(VI) 0.03%. Consequently, the emission rates for each have been recalculated based on these percentages.

9.7.4. Following Step 2 screening for As and Cr(VI), all Group 1, 2 and 3 metals screen out as being not significant at all potentially sensitive human receptors when assessing the cumulative impacts.

9.7.5. The results of the screening assessments for Group 1, 2 and 3 metals may be found in Table 40, with any potentially significant impacts highlighted in bold.

Table 40: Predicted Maximum GLCs at Potentially Sensitive Human Receptors for Group 1, 2 and 3 Metals – Cumulative Impacts

	Pollutant	Sb (annual)	Sb (1-hour)	As (annual) [a]	Cd (annual)	Cr (annual)	Cr (1-hour)	Cr VI (annual) [a]	Co (annual)	Co (1-hour)	Cu (annual)	Cu (1-hour)
	AQS (µg/m³)	5	150	0.003	0.005	5	150	0.0002	0.2	6	10	200
	Maximum PC (µg/m³)	0.00253	0.0769	**0.000126**	**0.000166**	0.00253	0.0769	0.000000756	**0.00253**	0.0769	0.00253	0.0769
	Max PC as % of AQS	0.05%	0.05%	**4.19%**	**3.31%**	0.05%	0.05%	0.38%	**1.27%**	1.28%	0.03%	0.04%
	Background Concentration (µg/m³)	n/a	n/a	0.000788 [b]	0.000647 [b]	n/a	n/a	n/a	0.000177 [b]	n/a	n/a	n/a
	Max PEC as % of AQS	n/a	n/a	30%	16%	n/a	n/a	n/a	1.35%	n/a	n/a	n/a
HSR1	Industrial activity off John Boyle Road	0.000521	0.0561	0.0000257	0.0000326	0.000521	0.0561	0.000000154	0.000521	0.0561	0.000521	0.0561
HSR2	Industrial activity off Stapylton Street	0.00172	0.0659	**0.0000854**	**0.000113**	0.00172	0.0659	0.000000512	0.00172	0.0659	0.00172	0.0659
HSR3	Industrial activity off Eston Road	0.00116	0.0769	**0.0000575**	**0.0000752**	0.00116	0.0769	0.000000345	0.00116	0.0769	0.00116	0.0769
HSR4	Residential properties off Cheetham Street	0.00155	0.0584	**0.0000769**	**0.000101**	0.00155	0.0584	0.000000462	0.00155	0.0584	0.00155	0.0584
HSR5	Residential properties off Elgin Avenue	0.00143	0.0503	**0.0000713**	**0.0000941**	0.00143	0.0503	0.000000428	0.00143	0.0503	0.00143	0.0503
HSR6	Residential properties off Passfield Crescent	0.00108	0.0592	**0.0000534**	**0.0000698**	0.00108	0.0592	0.000000321	0.00108	0.0592	0.00108	0.0592
HSR7	Golden Boy Green Community Centre	0.000980	0.0508	**0.0000486**	**0.0000634**	0.000980	0.0508	0.000000292	0.000980	0.0508	0.000980	0.0508
HSR8	Residential properties off Lawson Close	0.00108	0.0672	**0.0000538**	**0.0000703**	0.00108	0.0672	0.000000323	0.00108	0.0672	0.00108	0.0672
HSR9	Industrial activity NNW of Site	0.00109	0.0539	**0.0000542**	**0.0000710**	0.00109	0.0539	0.000000325	0.00109	0.0539	0.00109	0.0539
HSR10	Grangetown Primary School	0.00130	0.0589	**0.0000647**	**0.0000853**	0.00130	0.0589	0.000000389	0.00130	0.0589	0.00130	0.0589
HSR11	Large car park off Tees Dock Road	0.00253	0.0478	**0.000126**	**0.000166**	0.00253	0.0478	0.000000756	**0.00253**	0.0478	0.00253	0.0478
HSR12	Saint Peter's Catholic College	0.000965	0.0640	**0.0000479**	**0.0000625**	0.000965	0.0640	0.000000288	0.000965	0.0640	0.000965	0.0640
HSR13	Tesco Extra store entrance	0.000904	0.0616	**0.0000449**	**0.0000585**	0.000904	0.0616	0.000000269	0.000904	0.0616	0.000904	0.0616
HSR14	Industrial activity off Tees Dock Road	0.00135	0.0418	**0.0000669**	**0.0000864**	0.00135	0.0418	0.000000402	0.00135	0.0418	0.00135	0.0418
HSR15	Industrial activity ENE of Site	0.00152	0.0368	**0.0000758**	**0.000100**	0.00152	0.0368	0.000000455	0.00152	0.0368	0.00152	0.0368
HSR16	Allotments South Garden	0.000738	0.0376	**0.0000366**	0.0000475	0.000738	0.0376	0.000000220	0.000738	0.0376	0.000738	0.0376

Table 40: Predicted Maximum GLCs at Potentially Sensitive Human Receptors for Group 1, 2 and 3 Metals – Cumulative Impacts (cont.)

	Pollutant	Pb (annual)	Mn (annual)	Mn (1-hour)	Hg (annual)	Hg (1-hour)	Ni (annual)	Tl (annual)	Tl (1-hour)	V (annual)	V (24-hour)
	AQS (µg/m³)	0.25	1	1,500	0.25	7.5	0.02	1	30	5	1
	Maximum PC (µg/m³)	**0.00253**	0.00253	0.0769	0.000166	0.00503	**0.00253**	0.000166	0.00503	0.00253	0.0249
	Max PC as % of AQS	**1.01%**	0.25%	0.01%	0.07%	0.07%	**13%**	0.017%	0.02%	0.05%	2.49%
	Background Concentration (µg/m³)	0.0154 [(b)]	n/a	n/a	n/a	n/a	0.00124 [(b)]	n/a	n/a	n/a	n/a
	Max PEC as % of AQS	7.15%	n/a	n/a	n/a	n/a	19%	n/a	n/a	n/a	n/a
HSR1	Industrial activity off John Boyle Road	0.000521	0.000521	0.0561	0.0000326	0.00373	**0.000521**	0.0000326	0.00373	0.000521	0.00936
HSR2	Industrial activity off Stapylton Street	0.00172	0.00172	0.0659	0.000113	0.00438	**0.00172**	0.000113	0.00438	0.00172	0.0203
HSR3	Industrial activity off Eston Road	0.00116	0.00116	0.0769	0.0000752	0.00503	**0.00116**	0.0000752	0.00503	0.00116	0.0249
HSR4	Residential properties off Cheetham Street	0.00155	0.00155	0.0584	0.000101	0.00388	**0.00155**	0.000101	0.00388	0.00155	0.0188
HSR5	Residential properties off Elgin Avenue	0.00143	0.00143	0.0503	0.0000941	0.00333	**0.00143**	0.0000941	0.00333	0.00143	0.0232
HSR6	Residential properties off Passfield Crescent	0.00108	0.00108	0.0592	0.0000698	0.00382	**0.00108**	0.0000698	0.00382	0.00108	0.0126
HSR7	Golden Boy Green Community Centre	0.000980	0.000980	0.0508	0.0000634	0.00338	**0.000980**	0.0000634	0.00338	0.000980	0.0128
HSR8	Residential properties off Lawson Close	0.00108	0.00108	0.0672	0.0000703	0.00435	**0.00108**	0.0000703	0.00435	0.00108	0.0156
HSR9	Industrial activity NNW of Site	0.00109	0.00109	0.0539	0.0000710	0.00358	**0.00109**	0.0000710	0.00358	0.00109	0.0191
HSR10	Grangetown Primary School	0.00130	0.00130	0.0589	0.0000853	0.00392	**0.00130**	0.0000853	0.00392	0.00130	0.0199
HSR11	Large car park off Tees Dock Road	**0.00253**	0.00253	0.0478	0.000166	0.00318	**0.00253**	0.000166	0.00318	0.00253	0.0124
HSR12	Saint Peter's Catholic College	0.000965	0.000965	0.0640	0.0000625	0.00414	**0.000965**	0.0000625	0.00414	0.000965	0.0141
HSR13	Tesco Extra store entrance	0.000904	0.000904	0.0616	0.0000585	0.00400	**0.000904**	0.0000585	0.00400	0.000904	0.0166
HSR14	Industrial activity off Tees Dock Road	0.00135	0.00135	0.0418	0.0000864	0.00278	**0.00135**	0.0000864	0.00278	0.00135	0.0124
HSR15	Industrial activity ENE of Site	0.00152	0.00152	0.0368	0.000100	0.00244	**0.00152**	0.000100	0.00244	0.00152	0.00953
HSR16	Allotments South Garden	0.000738	0.000738	0.0376	0.0000475	0.00249	**0.000738**	0.0000475	0.00249	0.000738	0.00951

Notes to Table 40

(a) Modelled in accordance with the Step 2 screening guidance (refer to Section 9.7.3., for details).

(b) Background concentrations taken from the urban industrial site at Scunthorpe Low Santon, 2019 data (refer to Section 3.4., for further details on this monitoring station).

9.8. Results – Remaining Pollutants

9.8.1. This section focuses on all pollutants excluding the Group 1, 2 and 3 Metals which are discussed in Section 9.7.

9.8.2. Based on Stage 1 screening (i.e., long-term PCs greater than 1% of their AQS are potentially significant and short-term PCs greater than 10% of their AQS are potentially significant), all pollutants with short-term averaging periods screened out all locations. Potentially significant impacts were observed at two locations for long term impacts of NO_2, four locations for VOC (as benzene) and all sixteen locations for PAH (as B[a]P). Consequently, PECs were considered for these pollutants.

9.8.3. Following the calculation of the PECs, impacts of NO_2 and VOC at the potentially sensitive human receptor locations were classed as 'negligible'. For PAH (as B[a]P), the human receptor location with the highest potentially significant PC could be categorised a 'slight'. Consequently, no further assessments are required.

9.8.4. The results of this assessment may be found in Table 41, with any potentially significant impacts highlighted in bold.

Table 41: Predicted Maximum GLCs at Potentially Sensitive Human Receptors for All Remaining Pollutants – Cumulative Impacts

	Pollutant	NO_2 (annual mean)	NO_2 (99.79th %ile)	SO_2 (99.18th %ile)	SO_2 (99.73rd %ile)	SO_2 (99.90th %ile)	PM_{10} (annual)	PM_{10} (90.41st %ile)	$PM_{2.5}$ (annual)	CO (8-hour)	VOC (annual)
	AQS (µg/m³)	40	200	125	350	266	40	50	20	10,000	5
	Maximum PC (µg/m³)	**0.604**	4.86	1.86	4.05	4.94	0.0419	0.103	0.0419	6.06	**0.0839**
	Max PC as % of AQS	**1.51%**	2.43%	1.49%	1.16%	1.86%	0.10%	0.21%	0.21%	0.06%	**1.68%**
	Background Concentration (µg/m³)	24.8 [(a)]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.358 [(a)]
	Max PEC as % of AQS	64%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9%
	IAQM Impact Descriptor	Negligible	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Negligible
HSR1	Industrial activity off John Boyle Road	0.132	2.59	0.537	2.05	3.10	0.00858	0.0354	0.00858	3.82	0.0172
HSR2	Industrial activity off Stapylton Street	**0.406**	4.85	1.81	3.95	4.82	0.0285	0.103	0.0285	6.06	**0.0569**
HSR3	Industrial activity off Eston Road	0.279	4.86	1.86	4.05	4.94	0.0192	0.0658	0.0192	5.82	0.0384
HSR4	Residential properties off Cheetham Street	0.367	3.91	1.62	3.33	3.81	0.0256	0.0871	0.0256	5.09	**0.0513**
HSR5	Residential properties off Elgin Avenue	0.340	3.62	1.67	3.07	3.56	0.0238	0.0821	0.0238	4.86	0.0475
HSR6	Residential properties off Passfield Crescent	0.260	3.77	0.997	3.10	3.58	0.0178	0.0821	0.0178	5.27	0.0356
HSR7	Golden Boy Green Community Centre	0.237	3.07	0.841	2.53	3.03	0.0162	0.0685	0.0162	4.74	0.0324
HSR8	Residential properties off Lawson Close	0.261	3.44	1.16	2.81	3.55	0.0179	0.0730	0.0179	4.02	0.0359
HSR9	Industrial activity NNW of Site	0.262	2.83	1.41	2.40	3.08	0.0181	0.0502	0.0181	4.51	0.0361
HSR10	Grangetown Primary School	0.310	2.80	1.27	2.38	2.92	0.0216	0.0769	0.0216	3.62	0.0432
HSR11	Large car park off Tees Dock Road	**0.604**	2.93	1.13	2.21	3.70	0.0419	0.103	0.0419	3.26	**0.0839**
HSR12	Saint Peter's Catholic College	0.233	3.11	1.02	2.51	3.88	0.0160	0.0661	0.0160	3.54	0.0319
HSR13	Tesco Extra store entrance	0.218	2.91	1.36	2.42	3.00	0.0150	0.0585	0.0150	3.77	0.0299
HSR14	Industrial activity off Tees Dock Road	0.333	2.44	0.837	1.91	2.72	0.0223	0.0700	0.0223	2.71	0.0446
HSR15	Industrial activity ENE of Site	0.360	1.98	0.813	1.64	2.68	0.0253	0.0683	0.0253	2.25	**0.0506**
HSR16	Allotments South Garden	0.180	2.18	0.696	1.75	2.52	0.0122	0.0521	0.0122	3.07	0.0244

Table 41: Predicted Maximum GLCs at Potentially Sensitive Human Receptors for All Remaining Pollutants – Cumulative Impacts (cont.)

	Pollutant	NH_3 (annual)	NH_3 (1-hour)	HCl (1 hour)	HF (annual)	HF (1-hour)	PAH (as B[a]P) (annual)	PCB (annual)	PCB (1-hour)	Dioxins & Furans (annual)
	AQS (µg/m³)	180	2,500	750	16	160	0.00025	0.2	6	n/a
	Maximum PC (µg/m³)	0.0839	2.55	1.53	0.00838	0.255	**0.0000107**	0.000000000647	0.0000000196	0.000000000336
	Max PC as % of AQS	0.05%	0.10%	0.20%	0.05%	0.16%	**4.29%**	0.00000032%	0.00000033%	n/a
	Background Concentration (µg/m³)	n/a	n/a	n/a	n/a	n/a	0.000206 [(a)]	n/a	n/a	n/a
	Max PEC as % of AQS	n/a	n/a	n/a	n/a	n/a	87%	n/a	n/a	n/a
	IAQM Impact Descriptor	n/a	n/a	n/a	n/a	n/a	Slight	n/a	n/a	n/a
HSR1	Industrial activity off John Boyle Road	0.0172	1.86	1.12	0.00171	0.186	**0.00000344**	0.000000000120	0.0000000149	0.0000000000687
HSR2	Industrial activity off Stapylton Street	0.0569	2.19	1.31	0.00569	0.219	**0.00000684**	0.000000000443	0.0000000175	0.000000000228
HSR3	Industrial activity off Eston Road	0.0384	2.55	1.53	0.00383	0.255	**0.00000538**	0.000000000291	0.0000000196	0.000000000154
HSR4	Residential properties off Cheetham Street	0.0513	1.94	1.16	0.00512	0.194	**0.00000628**	0.000000000398	0.0000000155	0.000000000205
HSR5	Residential properties off Elgin Avenue	0.0475	1.67	1.00	0.00475	0.154	**0.00000579**	0.000000000369	0.0000000132	0.000000000190
HSR6	Residential properties off Passfield Crescent	0.0356	1.96	1.17	0.00356	0.170	**0.00000507**	0.000000000270	0.0000000146	0.000000000143
HSR7	Golden Boy Green Community Centre	0.0324	1.69	1.01	0.00324	0.169	**0.00000474**	0.000000000244	0.0000000135	0.000000000130
HSR8	Residential properties off Lawson Close	0.0359	2.22	1.33	0.00358	0.155	**0.00000501**	0.000000000272	0.0000000168	0.000000000144
HSR9	Industrial activity NNW of Site	0.0361	1.79	1.07	0.00361	0.179	**0.00000492**	0.000000000276	0.0000000143	0.000000000145
HSR10	Grangetown Primary School	0.0432	1.96	1.17	0.00431	0.196	**0.00000537**	0.000000000334	0.0000000156	0.000000000173
HSR11	Large car park off Tees Dock Road	0.0839	1.59	0.952	0.00838	0.159	**0.0000107**	0.000000000647	0.0000000127	0.000000000336
HSR12	Saint Peter's Catholic College	0.0319	2.12	1.27	0.00319	0.165	**0.00000455**	0.000000000242	0.0000000159	0.000000000128
HSR13	Tesco Extra store entrance	0.0299	2.04	1.22	0.00299	0.204	**0.00000429**	0.000000000226	0.0000000155	0.000000000120
HSR14	Industrial activity off Tees Dock Road	0.0446	1.39	0.833	0.00445	0.139	**0.00000735**	0.000000000331	0.0000000111	0.000000000179
HSR15	Industrial activity ENE of Site	0.0506	1.22	0.732	0.00505	0.122	**0.00000597**	0.000000000395	0.00000000975	0.000000000202
HSR16	Allotments South Garden	0.0244	1.25	0.749	0.00243	0.121	**0.00000376**	0.000000000182	0.00000000989	0.0000000000977

Notes to Table 41

(a) Refer to Section 3.6., for further details on the background sources utilised.

9.9. Assessment of Air Quality Impacts – Impact on Habitat Sites – Critical Levels

9.9.1. This assessment considered the effect of cumulative emissions from the Installation and REC on critical levels for the habitat sites identified in Table 2.

9.10. Comparison of Maximum Predicted Pollutant Ground Level Concentrations with Critical Levels for the Protection of Vegetation and Ecosystems - Oxides of Nitrogen

9.10.1. A summary of maximum predicted GLCs of oxides of nitrogen at the identified sensitive habitat sites is presented in Table 42. In accordance with the H1 guidance, the significance of the impacts has been determined using the 1% and 10% criteria for long and short-term predictions, respectively, for SPAs, SACs, Ramsars and SSSIs (see Section 2.22. of this document). Any significant impacts are highlighted in bold.

Table 42: Comparison of Maximum Predicted Oxides of Nitrogen Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites

	Pollutant	NO_X (annual mean)	NO_X (24-hour mean)
	Critical Level (µg/m³)	30	75
	Maximum PC (µg/m³)	**0.827**	5.99
	Max PC as % of Critical Level	**2.76%**	7.98%
NYM1	North York Moors - SAC / SPA	0.0549	0.572
TCC1	Teesmouth and Cleveland Coast - SPA / SSSI	0.252	3.88
TCC2		**0.573**	3.37
TCC3		**0.383**	2.99
TCC4		0.157	2.27
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar	0.235	3.83
TCC6		0.236	2.79
TCC7		0.147	2.01
TCC8		**0.357**	3.33
TCC9		**0.598**	5.99
TCC10		0.133	1.39
TCC11		0.230	4.26
TCC12		0.127	1.99
TCC13		**0.827**	5.14
TCC14	Teesmouth and Cleveland Coast – SSSI	**0.300**	3.63

9.10.2. It can be seen from the data in Table 42 that the daily mean oxides of nitrogen PCs are all less than 10% of the respective critical level and therefore, are not significant at all SACs, SPAs, SSSIs and Ramsar sites considered.

9.10.3. For the annual mean oxides of nitrogen PCs, the impact is potentially significant (i.e., greater than 1% of the long-term critical level) at TCC2, TCC3, TCC8, TCC9, TCC13 and TCC14. Consequently, PECs will need to be calculated for these receptors.

9.10.4. Using the background NO_X concentrations, provided in Table 6 of Section 2.8., the PEC assessment for TCC2, TCC3, TCC8, TCC9, TCC13 and TCC14 is shown in Table 43.

Table 43: Comparison of Maximum Predicted Oxides of Nitrogen PECs with Critical Levels at Sensitive Habitat Sites

ADMS Ref. [(a)]	Annual NO_X PC ($\mu g/m^3$)	CL ($\mu g/m^3$)	Annual NO_X PC as %age of CL	Background ($\mu g/m^3$)	PEC ($\mu g/m^3$)	PEC as %age of CL
TCC2	**0.573**	30	**1.91%**	35.78	36.35	**121%**
TCC3	**0.383**		**1.28%**	35.78	36.16	**121%**
TCC8	**0.357**		**1.19%**	49.10	49.46	**165%**
TCC9	**0.598**		**1.99%**	27.93	28.53	95%
TCC13	**0.827**		**2.76%**	21.52	22.35	74%
TCC14	**0.300**		**1.00%**	24.14	24.44	81%

Notes to Table 43
(a) Refer to Section 2.4., for further details regarding the receptor name and designation.
CL = Critical Level.

9.10.5. It can be seen from the results in Table 43, and in accordance with Section 2.22., that whilst it can be assumed for TCC9, TCC13 and TCC14 that there will be no adverse effect (i.e., the PECs are less than 100% of the critical level), the PECs for TCC2, TCC3 and TCC8 are potentially significant.

9.10.6. The data shows that the ambient background levels at TCC2, TCC3 and TCC8 already exceed the long-term critical level in the absence of the development (i.e., a concentration that is 119% of the critical level at TCC2 and TCC3 and a concentration that is 164% of the critical at TCC8).

9.10.7. As discussed in Section 5.2., BSG have provided the following assessment, (see BSG's reports in Appendix 2):

The habitats at the various modelling points are either intertidal mudflat or are permanently inundated with sea water. Mudflat is not considered to be sensitive to elevated NO_X levels of the magnitude predicted for the proposed development due to the effects of inundation, dilution, tidal mixing and dispersal.

It is also understood that parts of the estuary are subject to dredging in order to maintain a navigable channel. The removal of sediment will by default result in the removal of nutrients contained within those sediments.

Examination of the evidence base for the Teesmouth and Cleveland Coast SPA / Ramsar extension indicates that, whilst some tern species may feed within the estuary (and potentially in the vicinity of the areas where small-scale exceedance of NO_X are predicted), most of the qualifying species are associated with more distant areas. Terns are mainly piscivorous and it is concluded that the predicted air quality changes are not likely to affect prey availability and hence the conservation status of these species.

9.11. Comparison of Maximum Predicted Pollutant Ground Level Concentrations with Critical Levels for the Protection of Vegetation and Ecosystems - Sulphur Dioxide

9.11.1. A summary of maximum predicted GLCs of sulphur dioxide at the identified sensitive habitat sites are presented in Table 44. In accordance with the H1 guidance, the significance of the impacts has been determined using the 1% criteria for long-term predictions, for SPAs, SACs, Ramsars and SSSIs (see Section 2.22. of this document). Any significant impacts are highlighted in bold.

Table 44: Comparison of Maximum Predicted Sulphur Dioxide Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites

		Pollutant	SO_2 (annual mean)
		Critical Level (µg/m³)	20 [(a)]
		Maximum PC (µg/m³)	**0.215**
		Max PC as % of Critical Level	**1.08%**
NYM1	North York Moors - SAC / SPA		0.0164
TCC1	Teesmouth and Cleveland Coast - SPA / SSSI		0.0739
TCC2			0.166
TCC3			0.109
TCC4			0.0460
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar		0.0691
TCC6			0.0699
TCC7			0.0430
TCC8			0.0991
TCC9			0.169
TCC10			0.0399
TCC11			0.0634
TCC12			0.0362
TCC13			**0.215**
TCC14	Teesmouth and Cleveland Coast – SSSI		0.0728

Notes to Table 44

(a) From a review of the citations for each particular ecological designation, of the range of features noted, lichens and bryophytes are not included. It has therefore been considered that lichens and bryophytes are not important components of the ecological habitat sites modelled, with the critical level of 20 µg/m³ therefore used.

9.11.2. It can be seen from the data in Table 44 that, with the exception of TCC13, the annual mean sulphur dioxide PCs are all less than 1% of the critical levels and therefore are not significant at all SACs, SPAs, SSSIs and Ramsar sites considered.

9.11.3. For the annual mean sulphur dioxide PCs, the impact is potentially significant (i.e., greater than 1% of the long-term critical level) at TCC13. It should be noted that the latest background SO_2 concentration at TCC13, as reported by APIS (refer to Table 6 of Section 2.8., for details), is 0 µg/m^3. However, it is suspected this value is erroneous and in the interest of being conservative the SO_2 value from TCC11 (i.e., the receptor closest in distance to TCC13) of 2.38 µg/m^3 will be used for calculating the SO_2 PECs for TCC13.

9.11.4. Consequently, with a PEC of 2.60 µg/m^3 (or 13% of the critical level) at TCC13, it can be assumed there will be no adverse effect (i.e., the PEC is less than 100% of the critical level).

9.12. Comparison of Maximum Predicted Pollutant Ground Level Concentrations with Critical Levels for the Protection of Vegetation and Ecosystems - Ammonia

9.12.1. A summary of maximum predicted GLCs of ammonia at the identified sensitive habitat sites are presented in Table in Table 45. In accordance with the H1 guidance, the significance of the impacts has been determined using the 1% criteria for long-term predictions, for SPAs, SACs, Ramsars and SSSIs (see Section 2.22. of this document). Any significant impacts are highlighted in bold.

Table 45: Comparison of Maximum Predicted Ammonia Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites

		Pollutant	**NH_3 (annual mean) - Other Vegetation**
		Critical Level (µg/m^3)	3 [(a)]
		Maximum PC (µg/m^3)	**0.0717**
		Max PC as % of Critical Level	**2.39%**
NYM1	North York Moors – SAC / SPA		0.00545
TCC1	Teesmouth and Cleveland Coast – SPA / SSSI		0.0246
TCC2			**0.0552**
TCC3			**0.0361**
TCC4			0.0153
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar		0.0230
TCC6			0.0232
TCC7			0.0143
TCC8			**0.0330**
TCC9			**0.0561**
TCC10			0.0133
TCC11			0.0211
TCC12			0.0121

Table 45: Comparison of Maximum Predicted Ammonia Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites (cont.)

		Pollutant	NH_3 (annual mean) - Other Vegetation
		Critical Level (µg/m³)	3 [(a)]
		Maximum PC (µg/m³)	**0.0717**
		Max PC as % of Critical Level	**2.39%**
TCC13	Teesmouth and Cleveland Coast - SPA / Ramsar		**0.0717**
TCC14	Teesmouth and Cleveland Coast – SSSI		0.0223

Notes to Table 45

(a) From a review of the citations for each particular ecological designation, of the range of features noted, lichens and bryophytes are not included. It has therefore been considered that lichens and bryophytes are not important components of the ecological habitat sites modelled, with the critical level of 3 µg/m³ therefore used.

9.12.2. It can be seen from the data in Table 45 that the annual mean ammonia PCs are all less than 1% of the critical level at the majority of the ecological sites assessed. The impact is potentially significant (i.e., greater than 1% of the long-term critical level) at TCC2, TCC3, TCC8, TCC9 and TCC13. Consequently, PECs will need to be calculated for these receptors.

9.12.3. Using the relevant background NH_3 concentrations, provided in Table 6 of Section 2.8., the PEC assessment for TCC2, TCC3, TCC8, TCC9 and TCC13 is shown in Table 46.

Table 46: Comparison of Maximum Predicted NH_3 PECs with Critical Levels at Sensitive Habitat Sites

ADMS Ref. [(a)]	Annual NH_3 PC (µg/m³)	CL (µg/m³)	Annual NH_3 PC as %age of CL	Background (µg/m³)	PEC (µg/m³)	PEC as %age of CL
TCC2	**0.0552**	3	**1.84%**	1.60	1.66	55%
TCC3	**0.0361**		**1.20%**	1.60	1.64	55%
TCC8	**0.0330**		**1.10%**	1.60	1.63	54%
TCC9	**0.0561**		**1.87%**	1.42	1.48	49%
TCC13	**0.0717**		**2.39%**	0.89	0.962	32%

Notes to Table 46

(b) Refer to Section 2.4., for further details regarding the receptor name and designation.

CL = Critical Level.

9.12.4. As displayed by the results in Table 46, and in accordance with Section 2.22., it can be assumed that there will be no adverse effect on the ecological sites assessed (i.e., the PECs are all less than 100% of the critical level).

9.13. Comparison of Maximum Predicted Pollutant Ground Level Concentrations with Critical Levels for the Protection of Vegetation and Ecosystems - Hydrogen Fluoride

9.13.1. A summary of maximum predicted GLCs of hydrogen fluoride at the identified sensitive habitat sites are presented in Table 47. In accordance with the H1 guidance, the significance of the impacts has been determined using the 1% and 10% criteria for long and short-term predictions, respectively, for SPAs, SACs, Ramsars and SSSIs (see Section 2.22. of this document). Any significant impacts are highlighted in bold.

Table 47: Comparison of Maximum Predicted Hydrogen Fluoride Ground Level Concentrations (PCs) with Critical Levels at Sensitive Habitat Sites

	Pollutant	HF (weekly mean)	HF (daily mean)
	Critical Level (µg/m³)	0.5	5
	Maximum PC (µg/m³)	**0.0190**	0.0500
	Max PC as % of Critical Level	**3.81%**	1.00%
NYM1	North York Moors - SAC / SPA	0.00383	0.00579
TCC1	Teesmouth and Cleveland Coast - SPA / SSSI	**0.0146**	0.0390
TCC2		**0.0186**	0.0339
TCC3		**0.0121**	0.0301
TCC4		**0.0120**	0.0229
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar	**0.0150**	0.0387
TCC6		**0.0148**	0.0281
TCC7		**0.0107**	0.0203
TCC8		**0.0133**	0.0277
TCC9		**0.0177**	0.0500
TCC10		**0.00656**	0.0141
TCC11		**0.0135**	0.0355
TCC12		**0.00769**	0.0166
TCC13		**0.0177**	0.0428
TCC14	Teesmouth and Cleveland Coast – SSSI	**0.0190**	0.0302

9.13.2. It can be seen from the data in Table 47 that the daily mean HF PCs are all less than 10% of the critical levels and therefore are not significant at all SACs, SPAs, SSSIs and Ramsar sites considered.

9.13.3. For the weekly mean HF PCs, a conservative approach has been taken and the significance of impacts have been assessed against the 1% criterion for long-term predictions. Consequently, the weekly average HF PCs are greater than 1% of the critical level for TCC1- TCC14, inclusive, and are therefore potentially significant. For NYM1 the long-term significance criteria has not been exceeded (being less than 1% of the critical level).

9.13.4. For the ecological receptors with PCs that are potentially significant PECs will need to be calculated. Monitoring of ambient levels of HF is not currently carried out in the UK. A modelling study has suggested a natural background concentration of 0.0005 µg/m^3 with an elevated background of 0.003 µg/m^3 where there are local anthropogenic emission sources [(35)]. In the interest of being conservative, the higher background concentration (i.e., 0.003 µg/m^3) will be used for the purposes of calculating the PECs.

9.13.5. The maximum weekly HF PC occurs at TCC14 and therefore the worst-case PEC would be 0.0220 µg/m^3 (or 4.41% of the weekly critical level). In accordance with Section 2.22., it can therefore be assumed that there will be no adverse effect (i.e., the PECs are all well below 100% of the critical level).

9.14. Assessment of Air Quality Impacts – Impacts on Habitat Sites – Deposition

9.14.1. Sections 9.15. and 9.16. considered the effect of cumulative emissions from the Installation and REC on critical loads for the habitat sites identified in Table 2. The deposition velocities for grassland (as outlined in Table 8 of Section 2.9.) were utilised for all ecological sites assessed.

9.15. Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads – European Sites and SSSIs

9.15.1. A summary of maximum predicted nutrient nitrogen deposition rates at the identified European Sites and SSSIs are presented in Table 48. Refer to Section 6.2.1., for an explanation as to the Critical Load ranges selected in the assessment. Habitat Interests considered are as specified in Table 5 of Section 2.7.

9.15.2. It should be noted that, as APIS does not provide data for Ramsar sites, as the Ramsar site (i.e., TCC5 – TCC13) is noted for the same bird species as the SPA, it is reasonable to assume that the site should be treated in the same way. Consequently, the habitat interest and feature selected for the SPA has also been selected for the Ramsar site considered.

9.15.3. In Table 48, any PCs greater than 1% of the critical load and PECs greater than 100% (i.e., the level beyond which it cannot be assumed that there will be no adverse effect on European Sites and SSSI's) of the critical load are highlighted in bold.

(35) EPAQS (February 2006), Guidelines for Halogen and Hydrogen Halides in Ambient Air for Protecting Human Health Against Acute Irritancy Effects

Table 48: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [a] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
NYM1	North York Moors – SAC (Blanket Bogs – Raised and blanket bogs)	5	10	0.0248	0.50%	0.25%	n/a	n/a	n/a	n/a
	North York Moors – SPA (European Golden Plover – Reproducing – Montane habitats)	5	10	0.0248	0.50%	0.25%	n/a	n/a	n/a	n/a
TCC1	Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type)	10	15	0.135	**1.35%**	0.90%	8.96	9.09	91%	n/a
TCC2				0.280	**2.80%**	**1.86%**		9.24	92%	62%
TCC3				0.197	**1.97%**	**1.31%**		9.16	92%	61%
TCC4				0.0835	0.83%	0.56%	n/a	n/a	n/a	n/a

Table 48: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs (cont.)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [a] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
TCC5	Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type)	10	15	0.125	**1.25%**	0.83%	8.96	9.09	91%	61%
TCC6				0.128	**1.28%**	0.85%		9.09	91%	61%
TCC7				0.0776	0.78%	0.52%	n/a	n/a	n/a	n/a
TCC8				0.180	**1.80%**	**1.20%**	8.96	9.14	91%	61%
TCC9				0.308	**3.08%**	**2.05%**	8.4	8.71	87%	58%
TCC10				0.0668	0.67%	0.45%	n/a	n/a	n/a	n/a
TCC11				0.117	**1.17%**	0.78%	10.78	10.90	**109%**	73%
TCC12				0.0618	0.62%	0.41%	n/a	n/a	n/a	n/a
TCC13				0.418	**4.18%**	**2.79%**	9.1	9.52	95%	63%

Table 48: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs (cont.)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [(a)] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
TCC14	Coastal stable dune grasslands (calcareous type)	10	15	0.151	**1.51%**	**1.01%**	10.78	10.93	**109%**	73%

Notes to Table 48

(a) Total PC to nutrient nitrogen deposition is derived from the sum of the contribution from Nitrogen and Ammonia (dry deposition only).

9.15.4. It can be seen from the data in Table 48 that, following the calculations of the PECs, there are predicted exceedances for nitrogen deposition at modelling points TCC11 and TCC14, with the remaining sites screening out as insignificant.

9.15.5. It is worth noting that the background levels are already elevated and exceed the lower critical load for both TCC11 and TCC14 in the absence of the predicted process contributions from the Installation and REC. This point is further raised by NE in their DAS (see Appendix V for a copy of the full DAS):

Given that the predicted exceedance is small and should be taken in the context with the elevated background concentrations, Natural England does not require further information at this stage.

9.15.6. **Further to discussions with NE, via their DAS, additional modelling and assessment has been undertaken for nutrient nitrogen deposition. Please see Section 10 of this report.**

9.16. Comparison of Maximum Predicted Acid Deposition Rates with Critical Loads – European Sites and SSSIs

9.16.1. A summary of maximum predicted acid deposition rates at the identified European Sites and SSSIs are presented in Table 49. Habitat Interests considered are as specified in Table 5 of Section 2.7., with the deposition velocities for grassland (as outlined in Table 8 of Section 2.9.) utilised for all ecological sites assessed.

9.16.2. In Table 49, any PCs greater than 1% of the critical load, and PECs greater than 100% (i.e., the level beyond which it cannot be assumed that there will be no adverse effect on European Sites and SSSI's) of the critical load are highlighted in bold.

Table 49: Comparison of Maximum Predicted Acid Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs

ADMS Ref.	Site Details	PC N (keq/Ha/yr)	BG N (keq/ha/yr)	PC S (keq/Ha/yr)	BG S (keq/ha/yr)	CL MinN (keq/ha/yr)	CL MaxN (keq/ha/yr)	CL MaxS (keq/ha/yr)	PEC N (keq/ha/yr)	PEC S (keq/ha/yr)	PC as % of CL	Total PEC (keq/ha/yr)	PEC as % of CL
NYM1	North York Moors – SAC (Blanket Bogs – Raised and blanket bogs)	0.00176	1.36	0.00190	0.18	0.321	0.504	0.183	1.36	0.182	0.73%	n/a	n/a
	North York Moors – SPA (European Golden Plover – Reproducing – Montane habitats)	0.00176	1.36	0.00190	0.18	0.178	0.47	0.150	1.36	0.182	0.78%	n/a	n/a
TCC1	Teesmouth and Cleveland Coast – SPA	0.00961	1.03	0.0105	0.20	0.856	4.856	4.00	1.04	0.211	0.41%	n/a	n/a
TCC2	Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type)	0.0217	1.03	0.0237	0.20	0.856	4.856	4.00	1.05	0.224	0.93%	n/a	n/a
TCC3		0.0140	1.03	0.0152	0.20	0.856	4.856	4.00	1.04	0.215	0.60%	n/a	n/a
TCC4		0.00594	1.03	0.00648	0.20	0.856	4.856	4.00	1.04	0.206	0.26%	n/a	n/a

Table 49: Comparison of Maximum Predicted Acid Deposition Rates with Critical Loads at Sensitive Habitat Sites – European Sites and SSSIs (cont.)

ADMS Ref.	Site Details	PC N (keq/Ha/yr)	BG N (keq/ha/yr)	PC S (keq/Ha/yr)	BG S (keq/ha/yr)	CL MinN (keq/ha/yr)	CL MaxN (keq/ha/yr)	CL MaxS (keq/ha/yr)	PEC N (keq/ha/yr)	PEC S (keq/ha/yr)	PC as % of CL	Total PEC (keq/ha/yr)	PEC as % of CL
TCC1 – TCC4 & TCC14	Teesmouth and Cleveland Coast - SSSI	No information currently held / accessible via APIS' portal											
TCC5	Teesmouth and Cleveland Coast – SPA / Ramsar Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type)	0.00891	1.03	0.00977	0.20	0.856	4.856	4.00	1.04	0.210	0.38%	n/a	n/a
TCC6		0.00912	1.03	0.0100	0.20	0.856	4.856	4.00	1.04	0.210	0.39%	n/a	n/a
TCC7		0.00553	1.03	0.00602	0.20	0.856	4.856	4.00	1.04	0.206	0.24%	n/a	n/a
TCC8		0.0128	1.03	0.0139	0.20	0.856	4.856	4.00	1.04	0.214	0.55%	n/a	n/a
TCC9		0.0219	1.01	0.0238	0.23	0.856	4.856	4.00	1.03	0.254	0.94%	n/a	n/a
TCC10		0.00476	1.03	0.00520	0.20	0.856	4.856	4.00	1.03	0.205	0.21%	n/a	n/a
TCC11		0.00829	1.07	0.00894	0.28	0.856	4.856	4.00	1.08	0.289	0.35%	n/a	n/a
TCC12		0.00440	1.07	0.00475	0.28	0.856	4.856	4.00	1.07	0.285	0.19%	n/a	n/a
TCC13		0.0298	0.75	0.0318	0.25	0.856	4.856	4.00	0.780	0.282	0.79%	n/a	n/a

Notes to Table 49
PC N = Process contribution from Nitrogen and Ammonia (dry deposition only)
PC S = Process contribution from Sulphur (dry deposition) and Hydrogen Chloride (wet and dry deposition)
PEC = Predicted environmental concentration
BG = Background concentration
CL = Critical Load

9.16.1. It can be seen from the data in Table 28 that the maximum acid deposition rates due to process contributions are less than 1% of the critical load at all the modelled points. Consequently, no further assessment is required.

10. NATURAL ENGLAND – DISCRETIONARY ADVICE SERVICE

10.1. Meeting Summary

10.1.1. As discussed in Sections 6 and 9 of this report, there have been predicted exceedances of long-term NO_X and nutrient nitrogen deposition on the Teesmouth and Cleveland Coast habitat site. Consequently, a meeting was held with NE's DAS, on the 24th of November 2021 (refer to Appendix III for the meeting minutes) to discuss this in further detail.

10.1.2. During the meeting ECL discussed the nutrient nitrogen deposition results (see Sections 6.2. and 9.15.) and drew reference to the fact that the NH_3 contributions, making up the majority of the combined PCs, were likely being dramatically overestimated. Further to Table 27 of Section 6.2., Table 50 displays the breakdown of the predicted PCs on nutrient nitrogen deposition, for the ecological sites with potentially significant impacts.

Table 50: Nutrient Nitrogen Deposition Breakdown for Sites with Potentially Significant Impacts – Installation Only (BAT-AELs)

ADMS Ref.	NO_2 PC (kgN/Ha/Yr)	NH_3 PC (kgN/Ha/Yr)	Total PC (kgN/Ha/Yr)	% Contribution from NO_2	% Contribution from NH_3
TCC1	0.0189	0.0870	0.106	18%	82%
TCC2	0.0395	0.162	0.202	20%	80%
TCC3	0.0248	0.113	0.138	18%	82%
TCC5	0.0179	0.0815	0.0995	18%	82%
TCC6	0.0189	0.0877	0.107	18%	82%
TCC8	0.0174	0.0771	0.0945	18%	82%
TCC9	0.0314	0.137	0.168	19%	81%
TCC13	0.0206	0.0825	0.103	20%	80%

10.1.3. It can be seen from the data in Table 50 that, when using emission rates for NO_X and NH_3 calculated from the BAT-AELs (as displayed in Table 10a of Section 2.11.), the predicted NH_3 concentration on nutrient nitrogen deposition is significantly higher than that from NO_2.

10.1.4. ECL therefore suggested undertaking additional modelling for emissions of NO_X and NH_3, using emission rates calculated from monitored data (as opposed to the BAT-AELs), as based on previous experience, actual NH_3 emissions are significantly lower than the BAT-AEL.

10.1.5. It was considered that this approach would be more reflective of the ERF's normal operating regime and therefore a more realistic predicted nutrient nitrogen deposition rate. NE agreed this would be helpful in their assessment of impact for the modelled ecological sites with predicted exceedances. Consequently, further assessment was undertaken.

10.2. Revised Emissions Data

10.2.1. Further to discussion with the technology provider, HZI, emissions data was provided based on monitoring undertaken for a similar FCC/HZI plant in Edinburgh, the Millerhill Resource and Energy Recovery Centre (a copy of which may be found as Appendix IV).

10.2.2. It should be noted that the current ELV for NO_X for Millerhill is 200mg/Nm^3, however tests have been undertaken with the 1-hour NO_X concentration being reduced to 130 mg/Nm^3 (dry, 11% O_2). At this concentration, the 1-hour NH_3 concentration was 1.5 mg/Nm^3 (dry, 11% O_2). Based on this testing, and in the interest of providing a conservative assessment, HZI would expect that, with the plant operating at the lower NO_X ELV of 100mg/Nm^3, NH_3 concentrations would be in the order of 3.5mg/Nm^3.

10.2.3. Consequently, the emission rate for NH_3 has been calculated as 0.148 g/s for both the A1 and A2 emission points (See Section 2.11 for all stack emissions characteristics).

10.3. Additional Scenarios – Nutrient Nitrogen Deposition

10.3.1. Additional modelled runs were performed to expand on the results displayed in both Section 6.2. (i.e., the Installation only scenario) and Section 9.15. (i.e., the in-combination assessment of the Installation's and REC's emissions).

10.3.2. The only specified points considered for this assessment were the specified points for the Teesmouth and Cleveland Coast habitat site (i.e., TCC1 – TCC14, inclusive) for emissions of annual NO_X and NH_3 (i.e., to calculate the revised predicted nutrient nitrogen deposition rates).

10.3.3. A revised output grid (see Section 10.4.) was also modelled to provide additional isopleths to assist with the ecological assessment of impact.

10.4. Model Setup

10.4.1. The additional modelling was undertaken with the following settings:

- buildings effects were included. Refer to Section 2.16., for the Installation. For the REC, the buildings included within the model were those detailed in Table 11.8 of the RPS report: *Chapter 11 Air Quality* – which was submitted as part of the planning application for the REC;
- the revised modelled grid sizing was 7km by 7km (in order to capture the predicted pollutant GLCs arising from both the Installation in isolation and the in-combination scenario (i.e., with REC included)). The grid coordinates were X = 450325 to 457325 and Y = 519912 to 526912, with 701 nodes along each axis (i.e., a grid spacing of 10m);
- complex terrain was included. Further to Section 2.17., a fourth terrain file was created. To capture the output grid as detailed above, and the specified points for Teesmouth and Cleveland Coast habitat site within this area (i.e., TCC1 – TCC14), terrain data was used for an area of 8km by 8km (with an ADMS grid resolution of 64 x 64);
- emission rates for NO_X, for the Installation, were as outlined in Table 10a of Section 2.11. For NH_3, the emissions rates for the Installation were as outlined in Section 10.2.3. For the REC the emission characteristics were as detailed in the RPS report (i.e., Tables

11.9 and 11.10 of the *Chapter 11 Air Quality* report submitted as part of the planning application for the REC);

- stack heights of 90m were considered for the Installation, with stack heights of 80m for REC's two emission points;
- a surface roughness of 0.5m was used for the dispersion site and 0.3m for the met measurement site (a value of 0.5m was used for the dispersion site and met measurement site when using the 2020 NWP met data); and
- 5 years of hourly sequential meteorological data from Loftus recording station for the period 2016 – 2020 (inclusive) and 2020 NWP data was used.

10.5. Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads – TCC1 – TCC14 (Installation Only - Revised NH_3 Data)

10.5.1. A summary of maximum predicted nutrient nitrogen deposition rates, based on the revised NH_3 concentrations, at modelled points TCC1 – TCC14 (inclusive), are presented in Table 51. Refer to Section 6.2.1., for an explanation as to the Critical Load ranges selected in the assessment. Habitat Interests considered are as specified in Table 5 in Section 2.7. This section considers the FCC Installation in isolation.

10.5.2. It should be noted, as APIS does not provide data for Ramsar sites, as the Ramsar site (i.e., TCC5 – TCC14) is noted for the same bird species as the SPA, it is reasonable to assume that the site should be treated in the same way. Consequently, the habitat interest and feature selected for the SPA has also been selected for the Ramsar site considered.

10.5.3. In Table 51, any PCs greater than 1% of the critical load and PECs greater than 100% (i.e., the level beyond which it cannot be assumed that there will be no adverse effect on European Sites and SSSI's) of the critical load are highlighted in bold.

Table 51: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – TCC1 – TCC14 (Installation Only)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [a] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)
TCC1	Teesmouth and Cleveland Coast – SPA & SSSI (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	10	15	0.0524	0.524%	0.349%	n/a	n/a
TCC2				0.0964	0.964%	0.643%	n/a	n/a
TCC3				0.0637	0.637%	0.425%	n/a	n/a
TCC4				0.0285	0.285%	0.190%	n/a	n/a
TCC5	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	10	15	0.0482	0.482%	0.321%	n/a	n/a
TCC6				0.0469	0.469%	0.313%	n/a	n/a
TCC7				0.0260	0.260%	0.173%	n/a	n/a
TCC8				0.0437	0.437%	0.291%	n/a	n/a
TCC9				0.0786	0.786%	0.524%	n/a	n/a

Table 51: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – TCC1 – TCC14 (Installation Only) (cont.)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [(a)] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)
TCC10	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	10	15	0.0239	0.239%	0.159%	n/a	n/a
TCC11				0.0216	0.216%	0.144%	n/a	n/a
TCC12				0.0164	0.164%	0.109%	n/a	n/a
TCC13				0.0492	0.492%	0.328%	n/a	n/a
TCC14	Teesmouth and Cleveland Coast (SSSI Coastal stable dune grasslands (calcareous type))	10	15	0.0204	0.204%	0.136%	n/a	n/a

Notes to Table 51

(a) Total PC to nutrient nitrogen deposition is derived from the sum of the contribution from Nitrogen and Ammonia (dry deposition only).

10.5.1. It can be seen from the data in Table 51 that the maximum nutrient nitrogen deposition rates due to the Installation's PCs, with the revised NH_3 emission rates, are now less than 1% of the critical load at all the modelled points.

10.5.2. To assist with the ecological assessment of impact, additional isopleths have been created based on the revised output grid (as detailed in Section 10.4.). Figure 33 provides the nutrient nitrogen deposition rates in the area surrounding the modelled points for Teesmouth and Cleveland Coast habitat site.

10.5.3. In addition, Figure 34 has been included to allow for comparison to be made between the NH_3 emissions at the revised concentration and the NH_3 emissions at the BAT-AELs (i.e., as per Section 6.2.). Please note that, for consistency with Figure 33, the grid extent and terrain file for the emissions at the BAT-AELs modelled runs are as specified in Section 10.4.1 (with the emission rates as per Table 10a of Section 2.11.).

10.5.4. In Figures 33 and 34, the specified ecological receptors are represented by the pink annotated pins and the Installation as the red annotated circle.

Figure 33: Nutrient Nitrogen Deposition (N + NH_3 (dry)) – Installation Only (Revised NH_3 Emission Rate) – Met Year 2020

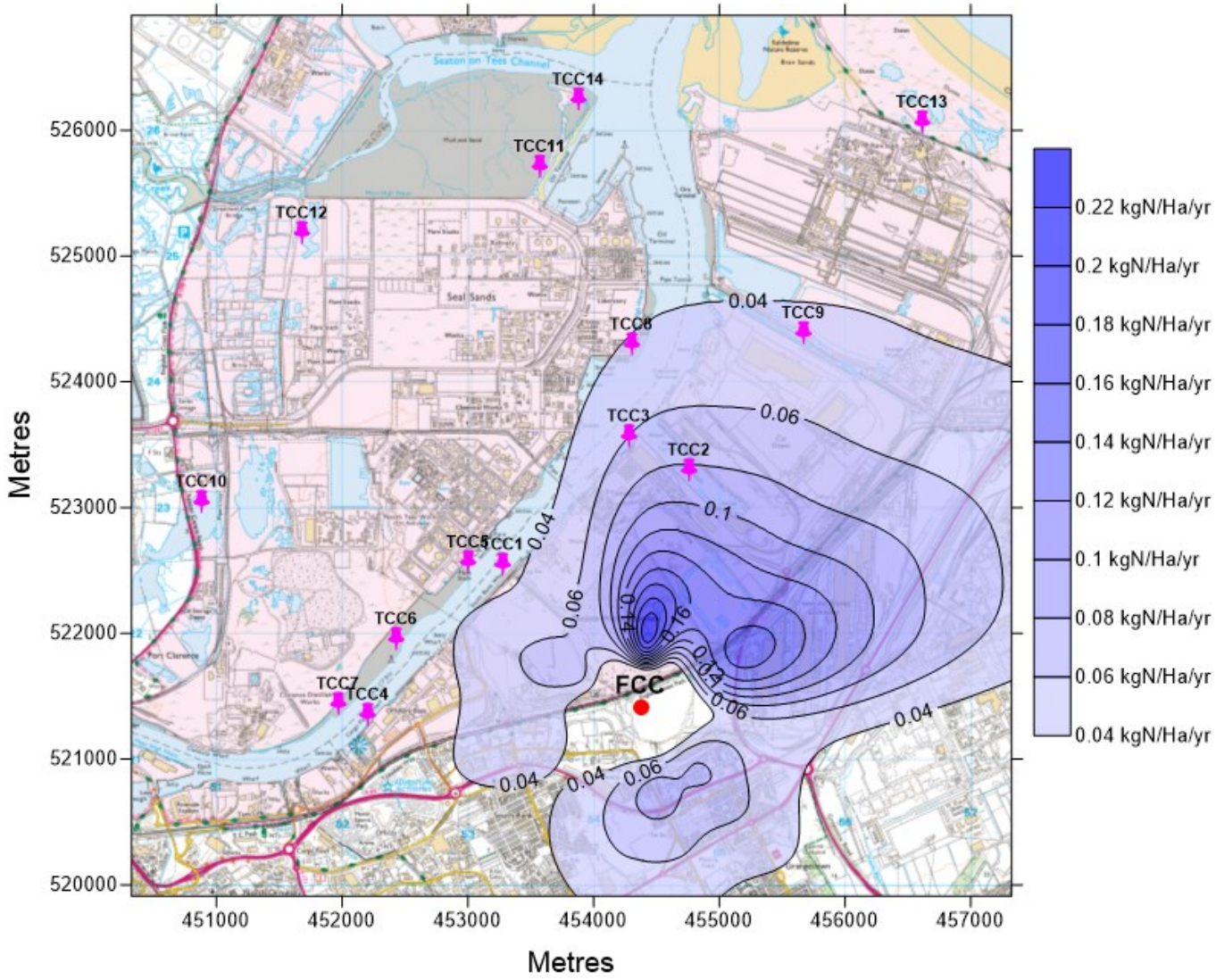
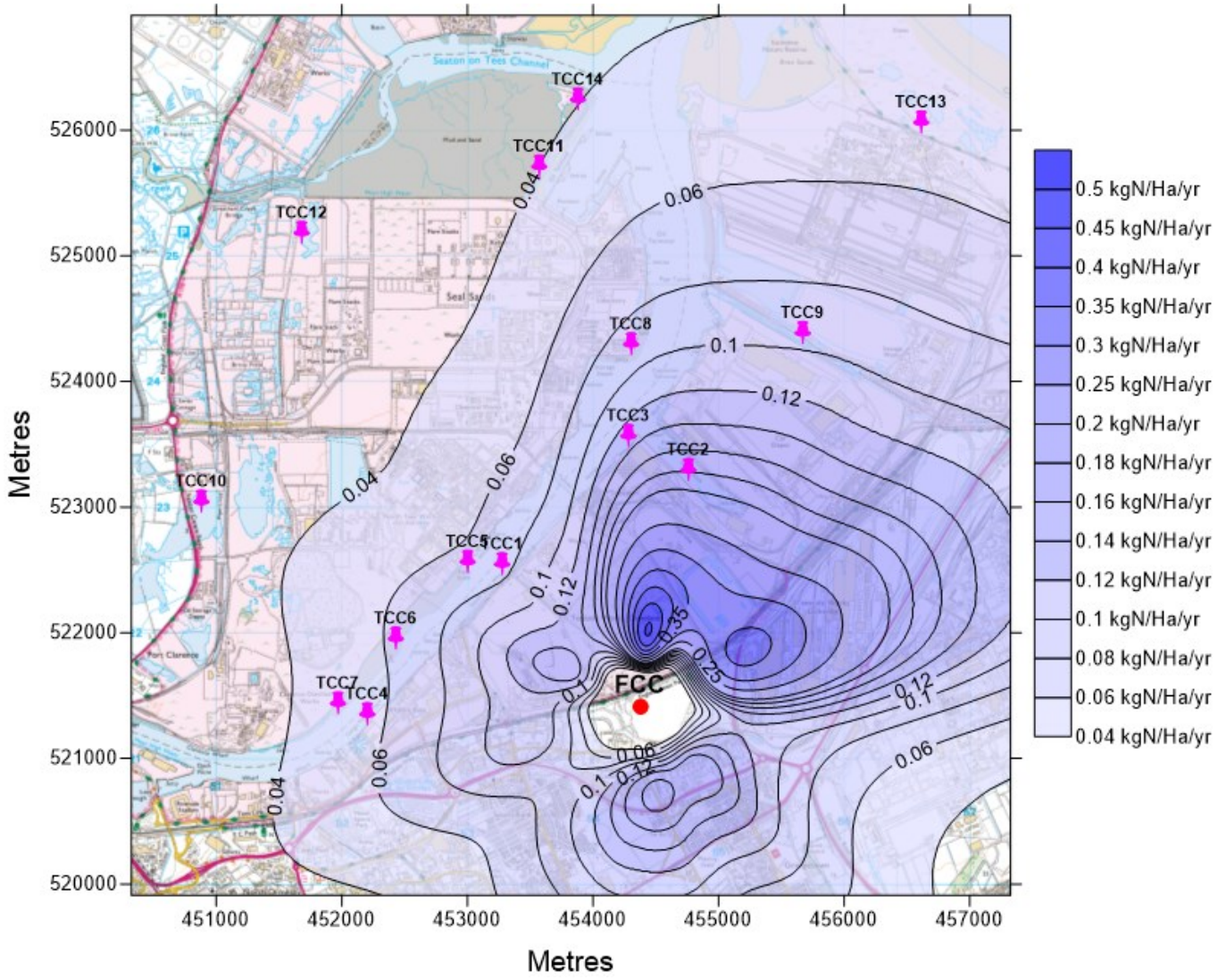


Figure 34: Nutrient Nitrogen Deposition (N + NH_3 (dry)) – Installation Only (NO_X & NH_3 at BAT-AELs) – Met Year 2020



10.6. Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads – TCC1 – TCC14 (Installation (Revised NH_3 Data) + REC)

10.6.1. A summary of maximum predicted nutrient nitrogen deposition rates, based on the revised NH_3 concentrations for the Installation, at modelled points TCC1 – TCC14 (inclusive), are presented in Table 52. This section considers the FCC Installation together with the REC operating at the ELVs as detailed in Tables 11.9 and 11.10 of the *Chapter 11 Air Quality* report submitted as part of the planning application for the REC. Refer to Section 6.2.1., for an explanation as to the Critical Load ranges selected in the assessment. Habitat Interests considered are as specified in Table 5 in Section 2.7. As previously mentioned, the habitat interest and feature selected for the SPA has also been selected for the Ramsar site considered.

10.6.2. In Table 52, any PCs greater than 1% of the critical load and PECs greater than 100% (i.e., the level beyond which it cannot be assumed that there will be no adverse effect on European Sites and SSSI's) of the critical load are highlighted in bold.

Table 52: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – TCC1 – TCC14 (Installation + REC)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [(a)] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
TCC1	Teesmouth and Cleveland Coast – SPA & SSSI (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	10	15	0.0810	0.81%	0.540%	n/a	n/a	n/a	n/a
TCC2				0.176	**1.76%**	**1.18%**	8.96	9.14	91%	61%
TCC3				0.138	**1.38%**	0.92%		9.10	91%	n/a
TCC4				0.0522	0.522%	0.348%	n/a	n/a	n/a	n/a
TCC5	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	10	15	0.0741	0.741%	0.494%	n/a	n/a	n/a	n/a
TCC6				0.0679	0.679%	0.453%	n/a	n/a	n/a	n/a
TCC7				0.0478	0.478%	0.319%	n/a	n/a	n/a	n/a
TCC8				0.137	**1.37%**	0.91%	8.96	9.10	91%	n/a
TCC9				0.223	**2.23%**	**1.48%**	8.4	8.62	86%	57%

Table 52: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – TCC1 – TCC14 (Installation + REC) (cont.)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [(a)] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
TCC10	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	10	15	0.0397	0.397%	0.264%	n/a	n/a	n/a	n/a
TCC11				0.0919	0.92%	0.613%	n/a	n/a	n/a	n/a
TCC12				0.0475	0.475%	0.316%	n/a	n/a	n/a	n/a
TCC13				0.382	**3.82%**	**2.54%**	9.1	9.48	95%	63%
TCC14	Teesmouth and Cleveland Coast (SSSI Coastal stable dune grasslands (calcareous type))	10	15	0.125	**1.25%**	0.83%	10.78	10.91	**109%**	n/a

Notes to Table 52

(a) Total PC to nutrient nitrogen deposition is derived from the sum of the contribution from Nitrogen and Ammonia (dry deposition only).

10.6.3. It can be seen from the data in Table 52 that, following the calculation of PECs, there is only one predicted exceedance for nitrogen deposition at modelling point TCC14, with the remaining sites screening out as insignificant.

10.6.4. It is worth noting that the background levels are already elevated and exceed the lower critical load for TCC14 in the absence of the predicted process contributions from the Installation and REC (i.e., the background concentration alone is 108% of the lower critical load). This point is further raised by NE in their DAS (see Appendix V for a copy of the full DAS):

Given that the predicted exceedance is small and should be taken in the context with the elevated background concentrations, Natural England does not require further information at this stage.

10.6.5. It is interesting to note that the Installation operating in isolation does not lead to a breach of the relevant nutrient nitrogen critical loads for any of the modelled points assessed - with the cumulative impact of both installations operating simultaneously resulting in the vast majority of the exceedances displayed. Consequently, REC's emissions were modelled in isolation to ascertain the predicted nutrient nitrogen deposition rates.

10.6.6. Table 53 demonstrates the predicted nutrient nitrogen deposition rates associated with the three distinct scenarios modelled (i.e., the Installation in isolation, REC in isolation and the cumulative scenario of the Installation's and REC's emissions).

Table 53: Predicted Nutrient Nitrogen Deposition Rates at Sensitive Habitat Sites (TCC1 – TCC14) For Three Distinct Scenarios

ADMS Ref.	Site Details	Nutrient Nitrogen Deposition Rate [a] [b] (kgN/ha/yr)		
		Installation Only	REC Only	Installation + REC
TCC1	Teesmouth and Cleveland Coast – SPA & SSSI (Sandwich Tern – Concentration – Supralittoral sediment – Coastal stable dune grassland (acid type))	0.0524	0.0501	0.0810
TCC2		0.0964	0.0799	0.176
TCC3		0.0637	0.0838	0.138
TCC4		0.0285	0.0333	0.0522
TCC5	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern – Supralittoral sediment (acidic type))	0.0482	0.0465	0.0741
TCC6		0.0469	0.0375	0.0679
TCC7		0.0260	0.0321	0.0478
TCC8		0.0437	0.0986	0.137

Table 53: Comparison of Maximum Predicted Nutrient Nitrogen Deposition Rates with Critical Loads at Sensitive Habitat Sites – TCC1 – TCC14 - Three Scenarios (cont.)

ADMS Ref.	Site Details	Nutrient Nitrogen Deposition Rate [(a) (b)] (kgN/ha/yr)		
		Installation Only	REC Only	Installation + REC
TCC9	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern – Supralittoral sediment (acidic type))	0.0786	0.144	0.223
TCC10		0.0239	0.0310	0.0397
TCC11		0.0216	0.0714	0.0919
TCC12		0.0164	0.0356	0.0475
TCC13		0.0492	0.356	0.382
TCC14	Teesmouth and Cleveland Coast – SSSI (Sandwich Tern / Little Tern / Common Tern – Supralittoral sediment (acidic type))	0.0204	0.105	0.125

Notes to Table 53

(a) Total PC to nutrient nitrogen deposition is derived from the sum of the contribution from Nitrogen and Ammonia (dry deposition only).

(b) The NO_X and NH_3 emission rates for both the Installation and REC are as discussed in Section 10.4.1.

10.6.7. It can be seen from the results in Table 53 that, overall, the predicted nutrient nitrogen deposition rates for the REC are greater than those for the Installation. For example, for TCC8, the nutrient nitrogen deposition rate is 0.0437 kgN/ha/yr for the Installation and 0.0986 kgN/ha/yr REC only (or 0.44% and 0.99% of the lower critical load).

10.6.8. It is anticipated that the greater predicted deposition rate associated with the REC scenario is largely due to REC's closer proximity to a number of the specified ecological points (TCC9, TCC11, TCC13 and TCC14, in particular). In addition, the emission rates for REC are based on the BAT-AELs (as detailed in Tables 11.9 and 11.10 of the *Chapter 11 Air Quality* report submitted as part of the planning application for REC). When accounting for normal day to day operation, it is anticipated that the actual emission rates for REC, particularly in regard to NH_3, are likely to be lower, as is the case with the FCC Installation.

10.6.9. Consequently, if measured concentrations of NO_X and NH_3 for the REC were also known – a more representative cumulative scenario could be considered. It is likely that the predicted cumulative nutrient nitrogen deposition rates, would be lower and potentially could be considered not significant.

10.6.10. To assist with ecological assessment of impact, Figure 35 provides the isopleth for nutrient nitrogen deposition rates.

10.6.11. In addition, Figure 36 has been included to allow for comparisons to be made between the cumulative emissions with the Installation's actual NH_3 concentration, compared to the BAT-AELs (i.e., as per Section 9.15.). Please note that, for consistency with Figure 35, the grid extent and terrain file for the emissions at the BAT-AELs modelled runs are as specified in Section 10.4.1 (with the emission rates as per Table 10a of Section 2.11. for the Installation and as detailed in Tables 11.9 and 11.10 of the *Chapter 11 Air Quality* report submitted as part of the planning application for REC).

10.6.12. In Figures 35 and 36, the specified ecological receptors are represented by the pink annotated pins and the Installation and REC as the red annotated circles.

Figure 35: Nutrient Nitrogen Deposition (N + NH_3 (dry)) – Installation (with revised NH_3) + REC – NWP 2020

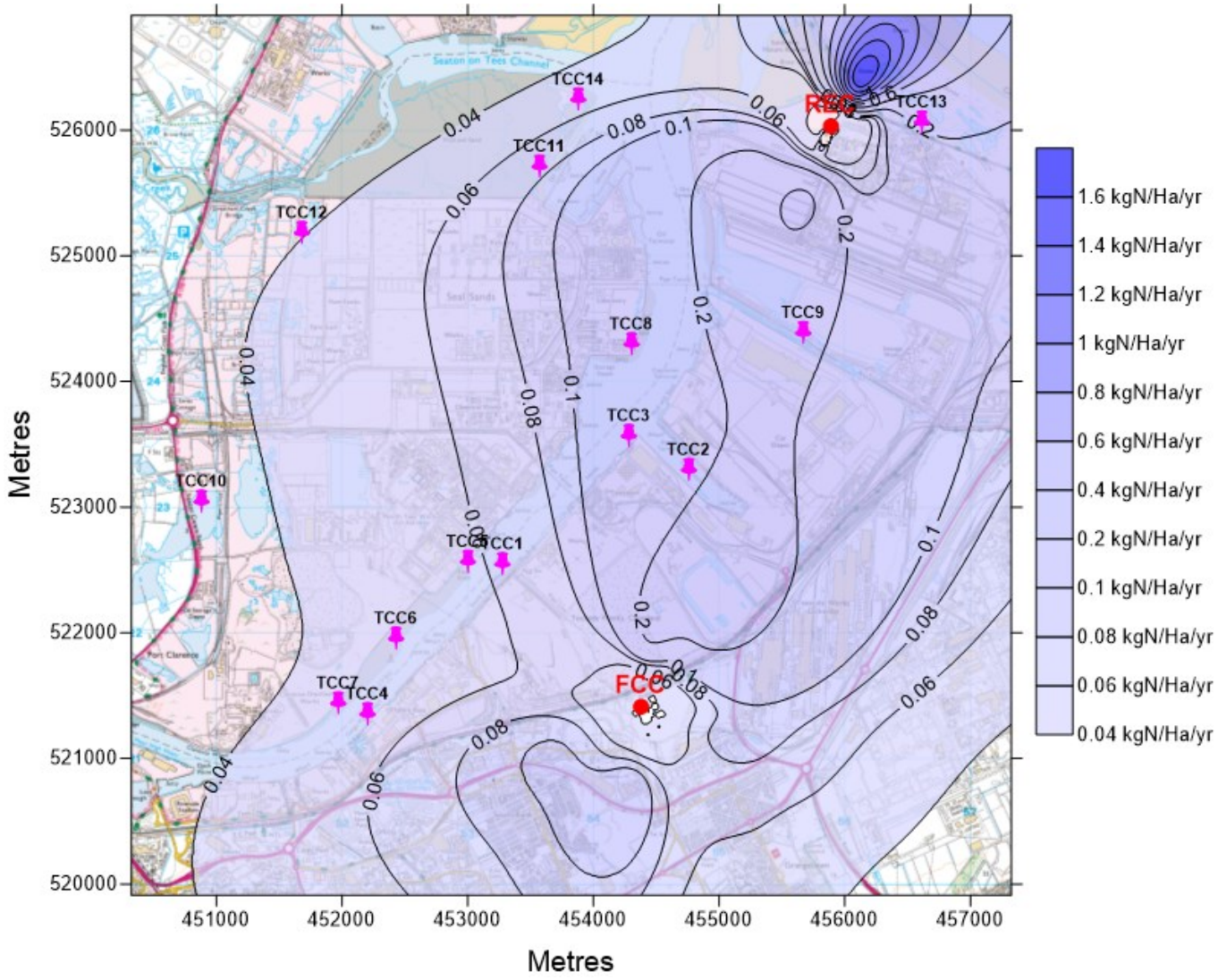
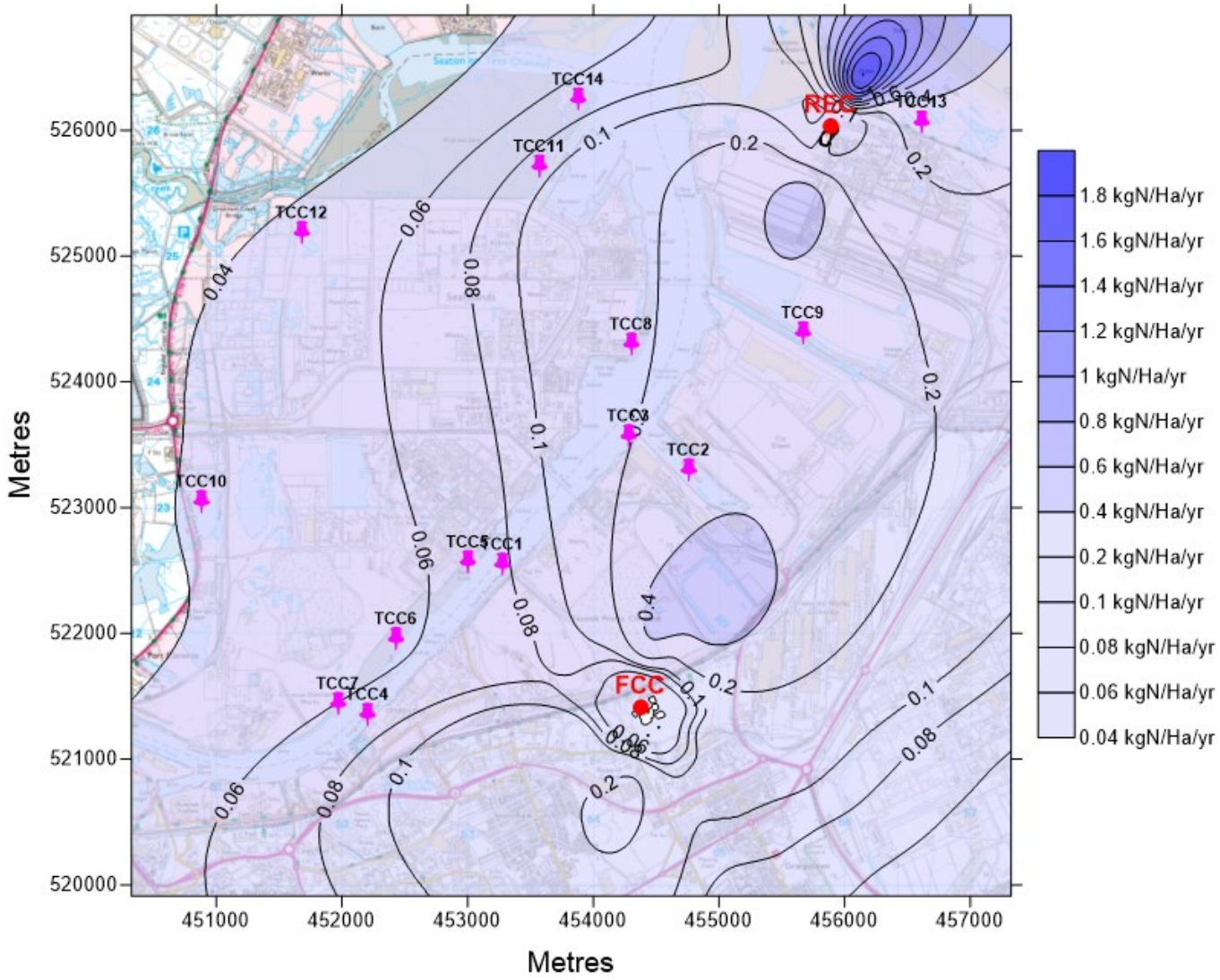


Figure 36: Nutrient Nitrogen Deposition (N + NH_3 (dry)) – Installation + REC (BAT-AELs) – NWP 2020



11. CONCLUSIONS

11.1.1. An assessment has been carried out to determine the local air quality impacts associated with the emissions from the proposed ERF at Tees Valley.

11.1.2. Detailed air quality modelling using the ADMS dispersion model has been undertaken to predict the impacts associated with stack emissions from the Installation. As a worst-case, emissions from the Installation's A1 and A2 stacks have been assumed to be released at the maximum ELVs twenty-four hours a day, 365 days of the year. This represents a conservative assessment of the impact since the actual emissions from the site are likely to be significantly lower during normal operation.

11.1.3. A detailed screening assessment has been carried out to determine the optimum discharge stack heights for the Installation's A1 and A2 emission points. Stack heights of 90m were considered appropriate.

11.1.4. Predicted maximum GLCs ("PCs") are within the long-term and short-term air quality objectives and are assessed as not significant for most pollutants assessed. For pollutants with potentially significant impacts, further screening has demonstrated that it is unlikely that any AQSs will be exceeded as a result of emissions from the proposed Installation at the maximum point of GLC or at any of the potentially significant human receptors.

11.1.5. For the sensitive habitat sites assessed, it has been demonstrated that the impact from the proposed Installation is unlikely to have a detrimental effect on these sites. For the critical levels of oxides of nitrogen, further screening demonstrated an exceedance of the significance criteria at one ecological point. However, further ecological assessment concluded that the predicted PCs are very small compared to elevated background levels. Emissions arising from the Installation are therefore considered unlikely to have an adverse effect on the conservation status of any qualifying species and hence the integrity of the Teesmouth and Cleveland Coast SPA / SSSI / Ramsar habitat site.

11.1.6. Following a meeting with NE, the additional assessments undertaken for nutrient nitrogen deposition (with the Installation's NH_3 emission rates revised to be more akin to normal operation) demonstrated that the Installation operating in isolation would not lead to an exceedance of the significance criteria for any of the modelled points for Teesmouth and Cleveland Coast habitat site.

11.1.7. An assessment of plume visibility was also undertaken which included daytime and night time hours. When daylight hours only were considered, visible plumes would only occur for 40% of the time and for 85% of the time would remain within the site boundary.

11.1.8. An assessment was also made of the impact of the proposed plant when operating under the abnormal conditions permitted under Article 46(6) of the IED. The results of the assessment indicated that it would be unlikely that any AQSs would be exceeded under such abnormal operating conditions.

11.1.9. For the in-combination assessment, predicted maximum GLCs are within the long-term and short-term air quality objectives and are assessed as not significant for most pollutants assessed. For the pollutants with potentially significant impacts, further screening has

demonstrated that it is unlikely the predicted GLCs will be detrimental to human health. For the sensitive habitat sites assessed, it has been demonstrated that the impact from the cumulative scenario is unlikely to have a detrimental effect on these sites. For the critical levels of oxides of nitrogen and for nutrient nitrogen deposition, further screening demonstrated an exceedance of the significance criteria. Additional assessments demonstrated that, whilst there were still predicted exceedances of the significance criteria at a select few modelled points for Teesmouth and Cleveland Coast habitat site, these were fewer in number, the overall significance less and are still likely to be an over-estimation of impact.

11.1.10. In summary, therefore, it can be concluded that the proposed ERF at Tees Valley will not have a detrimental impact on local air quality, human health or sensitive habitat sites.