8. AIR QUALITY AND ODOUR

8.1 Introduction

This chapter of the ES presents the findings of an assessment of local air quality impacts associated with the Proposed Development. The potential impacts of the Proposed Development on local air quality during both construction and operational phases have been assessed. For both phases, the type, source and significance of potential impacts are identified and the measures that should be employed to minimise these impacts are described.

The plant utilises two trains equipped with furnaces, boilers and abatement plant, burning RDF. The exhaust gases will be vented via two 75m stacks. The pollutants of interest for the Proposed Development are primarily those set out in the Industrial Emissions Directive (IED) (Ref 8.1) (See Section 8.4.4):

- particulate matter (as PM_{10} and $PM_{2.5}$);
- gaseous and vaporous organic substances, expressed as total organic carbon (VOC);
- hydrogen chloride (HCl);
- hydrogen fluoride (HF);
- sulphur dioxide (SO_2);
- oxides of nitrogen (NO_x), the sum of nitric oxide (NO) and nitrogen dioxide (NO_2), expressed as NO_2;
- twelve metals: arsenic (As), cadmium (Cd), cobalt (Co), chromium (Cr) (as CrIII and CrVI), copper (Cu), mercury (Hg), manganese (Mn), nickel (Ni), lead (Pb), antimony (Sb), thallium (Tl) and vanadium(V);
- polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans (collectively referred to as dioxins); and
- carbon monoxide (CO).

In addition, emissions of ammonia (NH_3) and polycyclic aromatic hydrocarbons (PAH) will also be considered, for the following reasons.

- NH_3 is of interest in relation to impacts on habitats, both directly and as a component of acid and nutrient nitrogen deposition.
- PAH, as benzo[a]pyrene, is subject to a statutory air quality standard

Consideration was given to the emissions of dust during construction and from handling of bottom ash; and odour during operation. In relation to impacts on sensitive ecology, the potential impacts associated with emissions of NH_3, NO_X, SO_2 and HCl have been assessed both through impacts on air quality and through deposition of acid and nutrient nitrogen. Predicted ground-level concentrations and derived deposition rates of these pollutants are compared with relevant air quality standards and guidelines for the protection of health and sensitive habitat sites.

8.2 Scope of Assessment

The 2016 ES concluded that the impact of stack emissions on air quality from the Consented Development would be negligible (for all pollutants studied); that there would be negligible risk of pollutant exceedances at critical habitats; and negligible odour impact. The different technology and stack height for the Proposed Development has the potential to give rise to different air quality impacts than presented in the 2016 ES. In accordance with the Scoping Report (**Appendix 3.1**), an updated assessment has been provided in relation to the following:

- detailed assessment of stack emissions. This includes a screening assessment for potential impacts on sensitive habitats (as there are nationally designated sites and Natura 2000 sites located within 15km of the site);
- long-term, operational traffic emissions;
- dust emissions from bottom ash and handling of air pollution control residues.

The construction dust and traffic assessments have been reviewed; however, since the construction method is very similar to that for the Consented Development, minor and non-material changes have been made. Also, the level of odour emissions and abatement is very similar between the Proposed Development and Consented Development, so there are no material changes to the 2016 assessment.

Air quality effects associated with the infrequent use back up engines have been scoped out from the assessment.

8.3 Assessment Methodology and Significance Criteria

8.3.1 Guidance

The air quality impact assessment (AQIA) has been undertaken with reference to applicable guidance documents. These include:

- Environment Agency (accessed December 2018) Air emissions risk assessment for your environmental permit (Ref 8.2);
- Environment Agency (2014) AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air (Ref 8.3);
- Environment Agency (undated) Conversion Ratios for NO_X and NO_2 (Ref 8.4);
- Environment Agency (2016) Releases from waste incinerators: Guidance on assessing group 3 metal stack emissions from incinerators (Ref 8.5);
- Institute of Air Quality Management (2017) Land-Use Planning & Development Control: Planning For Air Quality (Ref 8.6); and
- Defra (2016) Local Air Quality Management Technical Guidance (TG16) and associated Defra LAQM Guidance (Ref 8.7).

8.3.2 Construction Phase Methodology

8.3.2.1 Introduction

To assess the potential impacts associated with dust and PM_{10} releases during the construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the Institute of Air Quality Management[1] has been undertaken.

This approach divides construction activities into the following dust emission sources:

- demolition;
- earthworks;
- construction; and
- trackout.

The risk of dust effects (low, medium or high) is determined by the scale (magnitude) and nature of the works and the proximity of sensitive human and ecological receptors.

1 Guidance on the assessment of dust from demolition and construction, IAQM, February 2014

The IAQM guidance recommends that an assessment be undertaken where there are sensitive human receptors:

- within 350 m of the Site boundary; or
- within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).

An assessment should also be carried out where there are dust-sensitive ecological receptors:

- within 50 m of the Site boundary;
- or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).

The significance of the dust effects is based on professional judgement, taking into account the sensitivity of receptors and existing air quality.

8.3.2.2 Dust Emission Magnitude

The magnitude of the dust impacts for each source is classified as Small, Medium or Large depending on the scale of the proposed works. **Table 8.1** summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site-specific information and professional judgement.

Table 8.1 Dust Emission Magnitude Criteria

Source	Large	Medium	Small
Demolition	■ Total building volume >50,000m^3 ■ Potentially dusty Material (e.g. concrete) ■ Onsite crushing and Screening ■ Demolition activities >20m above ground level.	■ Total building volume 20,000-50,000m^3 ■ Potentially dusty material ■ Demolition activities 10-20m above ground level.	■ Total building volume <20,000m^3 ■ Construction material with low potential for dust release ■ Demolition activities <10m above ground level ■ Demolition during wetter months
Earthworks	■ Total site area >10,000m^2 ■ Potentially dusty soil type (e.g. clay) ■ >10 heavy earth moving vehicles active at any one time ■ Formation of bunds >8m in height ■ Total material moved >100,000 tonnes	■ Total site area 2,500-10,000m^2 ■ Moderately dusty soil type (e.g. silt) ■ 5 – 10 heavy earth moving vehicles active at any one time ■ Formation of bunds 4-8m in height ■ Total material moved 20,000-100,000 tonnes	■ Total site area <2,500m^2 ■ Soil type with large grain size (e.g. sand) ■ <5 heavy earth moving vehicles active at any one time ■ Formation of bunds <4m in height ■ Total matieral moved <20,000 tonnes ■ Earthworks during wetter months
Construction	■ Total building volume >100,000m^3 ■ On site concrete batching ■ Sandblasting	■ Total building volume 25,000 – 100,000m^3 ■ Potentially dusty construction material (e.g. concrete)	■ Total building volume <25,000m^3 ■ Material with low potential for dust release (e.g. metal cladding or timber)

Source	Large	Medium	Small
		■ On site concrete batching	
Trackout	■ >50 HGV movements in any one day [(a)] ■ Potenitally dusty surface material (e.g. high clay content) ■ Unpaved road length >100m	■ 10 – 50 HGV movements in any one day [(a)] ■ Moderately dusty surface material (e.g. silt) ■ Unpved road length 50 – 100m	■ < 10 HGV movements in any one day [(a)] ■ Surface material with low potential for dust release ■ Unpaved road length <50m

[(a)] HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes

8.3.2.3 Receptor Sensitivity

Factors defining the sensitivity of a receptor are presented in **Table 8.2**.

Table 8.2 Factors Defining the Sensitivity of a Receptor

Sensitivity	Human (Health)	Human (Dust soiling)	Ecological
High	■ Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} [(a)] ■ Examples include residential dwellings, hospitals, schools and residential care homes	■ Regular exposure ■ High level of amenity expected ■ Appearance, aesthetics or value of the property would be affected by dust soiling ■ Examples include residential dwellings, museums, medium and long-term car parks and car showrooms	■ Nationally or Internationally designated site with dust sensitive features [(b)] ■ Locations with vascular plant species [(c)]
Medium	■ Locations where workers are exposed over a time period relevant to the air quality objectives for PM_{10} [(a)] ■ Examples include office and shop workers [(d)]	■ Short term exposure ■ Moderate level of amenity expected ■ Possible diminished appearance or aesthetics of property due to dust soiling ■ Examples include parks and places of work	■ Nationally designated site with dust sensitive features [(b)] ■ Nationally designed sites with a particularly important plant species where dust sensitivity is unknown
Low	■ Transient human exposure ■ Examples include public footpaths, playing fields, parks and shopping streets	■ Transient exposure ■ Enjoyment of amenity not expected ■ Appearance and aesthetics of property unaffected	■ Locally designated site with dust sensitive features [(b)]

Sensitivity	Human (Health)	Human (Dust soiling)	Ecological
		■ Examples include playing fields, farmland [e], footpaths, short-term car parks and roads	

[a] In the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day.
[b] Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).
[c] Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.
[d] Does not include workers exposure to PM_{10} as protection is covered by Health and Safety at Work legislation.
[e] Except commercially sensitive horticulture

The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction sites, any pre-existing screening such as trees or buildings that would limit dust transport from a site and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

8.3.2.4 Area Sensitivity

The sensitivity of the area to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human health impacts are dependent on the existing PM_{10} concentrations in the area. **Table 8.3** and **Table 8.4** summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively.

Table 8.3 Sensitivity of the Area to Dust Soiling

Receptor Sensitivity	Number of Receptors	Distance from the source [a] <20m	<50m	<100m	<350m
High	**>100**	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	**>1**	Medium	Low	Low	Low
Low	**>1**	Low	Low	Low	Low

[a] For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

Table 8.4 Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} (ug/m^3)	Number of Receptors	Distance from the source [a] <20m	<50m	<100m	<200m	<350m
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} (ug/m^3)	Number of Receptors	Distance from the source [a] <20m	<50m	<100m	<200m	<350m
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

[a] For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

Table 8.5 Sensitivity of Area to Ecological Impact

Receptor Sensitivity	Distance from the Source <20m	<50m
High	High	Medium
Medium	Medium	Low
Low	Low	Low

For each dust emission source (demolition, construction, earthworks and trackout), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts.

8.3.2.5 Risk of Dust Impacts

The risk of dust impacts prior to mitigation for each emission source is presented in **Table 8.5** and **Table 8.6.**

Table 8.6 Risk of Dust Impacts – Demolition, Earthworks and Construction

Sensitivity of Area	Dust Emission Magnitude Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 8.7 Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Medium Risk	Low Risk	Negligible

8.3.2.6 Mitigation and Significance

The IAQM guidance provides a range of mitigation measures which are dependent on the level of dust risk attributed to the Site. Site specific mitigation measures are also included where appropriate.

The significance of the impacts following appropriate mitigation is determined by professional judgement.

8.3.2.7 Construction Traffic

Construction traffic will add to existing traffic levels on the surrounding road network. The greatest potential for impacts on air quality from traffic associated with this phase of the Proposed Development will be in the areas immediately adjacent to the principal means of access for construction traffic.

The Environmental Protection UK (EPUK)/ IAQM planning guidance (Ref 8.6) , states that for developments in areas where the existing air quality is good, a detailed assessment of traffic-related impacts is only required where:

- there is a change in the annual average daily traffic (AADT) flow of light goods vehicles (LGV) of more than 500 vehicles; and/or
- there is a change in the AADT flow of heavy goods vehicles (HGV) of more than 100 vehicles; and/or
- there is a change in the road re-alignment by more than 5m; and/or A new junction is introduced, which will significantly alter vehicle speeds.

It is anticipated that during the Site clearance, demolition and construction phases an average of 10 vehicle movements would be generated per hour (120 movements per day, assuming a 12-hour working day), of which 7 would be HGVs and 3 would be LGVs or vans (85 HGV movements and 35 LGV movements per day). The impact of the construction traffic emissions on local air quality is therefore expected to be *negligible*.

8.3.3 Operational Phase Methodology

8.3.3.1 Stack Emissions Assessment

Introduction

The scope of the impact assessment for stack emissions from the Proposed Development has been determined in the following way:

- consultation with the Environmental Health Department of Corby Borough Council (CBC);
- review of air quality data for the area surrounding the Site, including data from the DEFRA Air Quality Information Resource (UK-AIR) (Ref 8.8);
- desk study to confirm the location of nearby areas that may be sensitive to changes in local air quality; and
- review of emission parameters for the Proposed Development and dispersion modelling using the AERMOD dispersion model to predict ground-level concentrations of pollutants at sensitive human and habitat receptor locations.

Emissions

The input parameters used in the assessment are identified in **Table 8.8**.

Worst-case IED emission limits have been assumed for the purposes of the modelling assessment and the plant is assumed to be operating at full load of 260,000 tonnes/annum. The emissions are

assessed as occurring evenly throughout the year, as the annual mean impacts are the most sensitive and exact hours of operation are not known on an hour by hour basis.

For the Group III trace metal predictions, the Environment Agency guidance has been followed. This approach is based upon actual emissions data for UK Energy from Waste (EfW) plants as a fraction of the total permissible emission limit under IED. This guidance has also been used to derive specific emissions of CrVI. For PAHs, emissions have been derived from operational monitoring data obtained from an existing EfW facility elsewhere in UK.

Table 8.8 Emission Parameters (per stack)

Parameter	Unit	Value	
Number of stacks		2	2 stacks, approx. 3.3m apart
Number of flues per stack		1	
Stack height actual	m	75	
Flue diameter	m	1.660	
Emission velocity	m/s	15	
Volume flow rate Normalised	Nm^3/s	23.9	Calculated form Actual volume flow rate using Environment Agency Normalisation method
Volume flow rate Actual	Am^3/s	32.5	
Emission temperature (actual)	Celsius	140	
Oxygen (actual)	%	6.29	
Moisture (actual)	%	15.94	
Flue Easting	m	Stack 1: 490882	Stack 2: 290857
Flue Northing	m	Stack 1: 490880	Stack 2: 290854
Pollutant	**Species**	**Emission concentration (mg/Nm^3)**	**Emission load (g/s)**
Sulphur dioxide	SO_2	50	1.19
Nitrogen oxides	NO_x (as NO_2)	200	4.78
Carbon monoxide	CO	50	1.19
Particulate matter	PM_{10}	10	0.239
Particulate matter	$PM_{2.5}$	10	0.239
Hydrogen chloride	HCl	10	0.239
Hydrogen fluoride	HF	1	0.0239
Cadmium	Cd	0.05	0.00119
Thallium	Tl	0.05	0.00119
Mercury	Hg	0.5	0.0119
Antimony	Sb	0.0115 (a)	$2.75x10^{-4}$
Arsenic	As	0.025 (a)	$5.97x10^{-4}$
Chromium	total Cr	0.092 (a)	0.00220
Chromium	Cr^{VI+}	$1.30x10^{-4}$ (a)	$3.11x10^{-6}$

Parameter	Unit	Value	
Cobalt	Co	0.0056 [a]	$1.34x10^{-4}$
Copper	Cu	0.029 [a]	$6.93x10^{-4}$
Lead	Pb	0.0503 [a]	0.00120
Manganese	Mn	0.06 [a]	0.00143
Nickel	Ni	0.22 [a]	0.00526
Vanadium	V	0.006 [a]	$1.43x10^{-4}$
Polycyclic aromatic hydrocarbons	PAH (as benzo[a]pyrene)	$8.80x10^{-5}$	$2.10x10^{-6}$
Ammonium	NH_3	5 [b]	0.119
Total organic carbon	TOC (as benzene)	10	0.239
Polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans	Dioxins (i-TEQ)	$1.00x10^{-7}$	$2.39x10^{-9}$

[a] from Guidance on assessing group 3 metal stack emissions from incinerators (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/532474/LIT_7349.pdf)
[b] Defra (2011) WR 0608 Emissions from Waste Management Facilities. Average NH_3 emission concentration from EfW plants in UK in 2008 reported is 4.83 mg/Nm^3 (discounting atypical excessively high emissions)

Topography

The presence of elevated terrain can significantly affect the dispersion of pollutants by increasing turbulence and reducing the distance between the plume centre line and the ground level.

There are no sustained gradients of >1:10 in the vicinity of the facility, and therefore terrain was not included. There is a shallow valley to the north; however, this is not deemed sufficient to result in wind channelling effects.

Building Downwash / Entrainment

The presence of buildings close to emission sources can significantly affect the dispersion of pollutants by leading to a phenomenon called downwash. This occurs when a building distorts the wind flow, creating zones of increased turbulence. Increased turbulence causes the plume to come to ground earlier than otherwise would be the case and result in higher ground level concentrations closer to the stack.

Downwash effects are only significant where building heights are greater than one third of stack height. The downwash structures also need to be within five times the stack height to influence downwash.

The buildings associated with the Proposed Development are between 8.2 m and 39.5 m to the apex and some of these are therefore potentially significant compared with the proposed stack height of 75 m. The following buildings have been included in the dispersion model to account for potential downwash effects:

Table 8.9 Buildings included in dispersion model

Building name	Building height (m)
Main Boiler and FGT Building	39.5
Bunker	32.5
Air Cooled Condenser	25

Nitric Oxide to NO_2 Conversion

Oxides of nitrogen (NO_x) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, NO is oxidised to NO_2. The proportion of NO converted to NO_2 depends on a number of factors including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone (O_3).

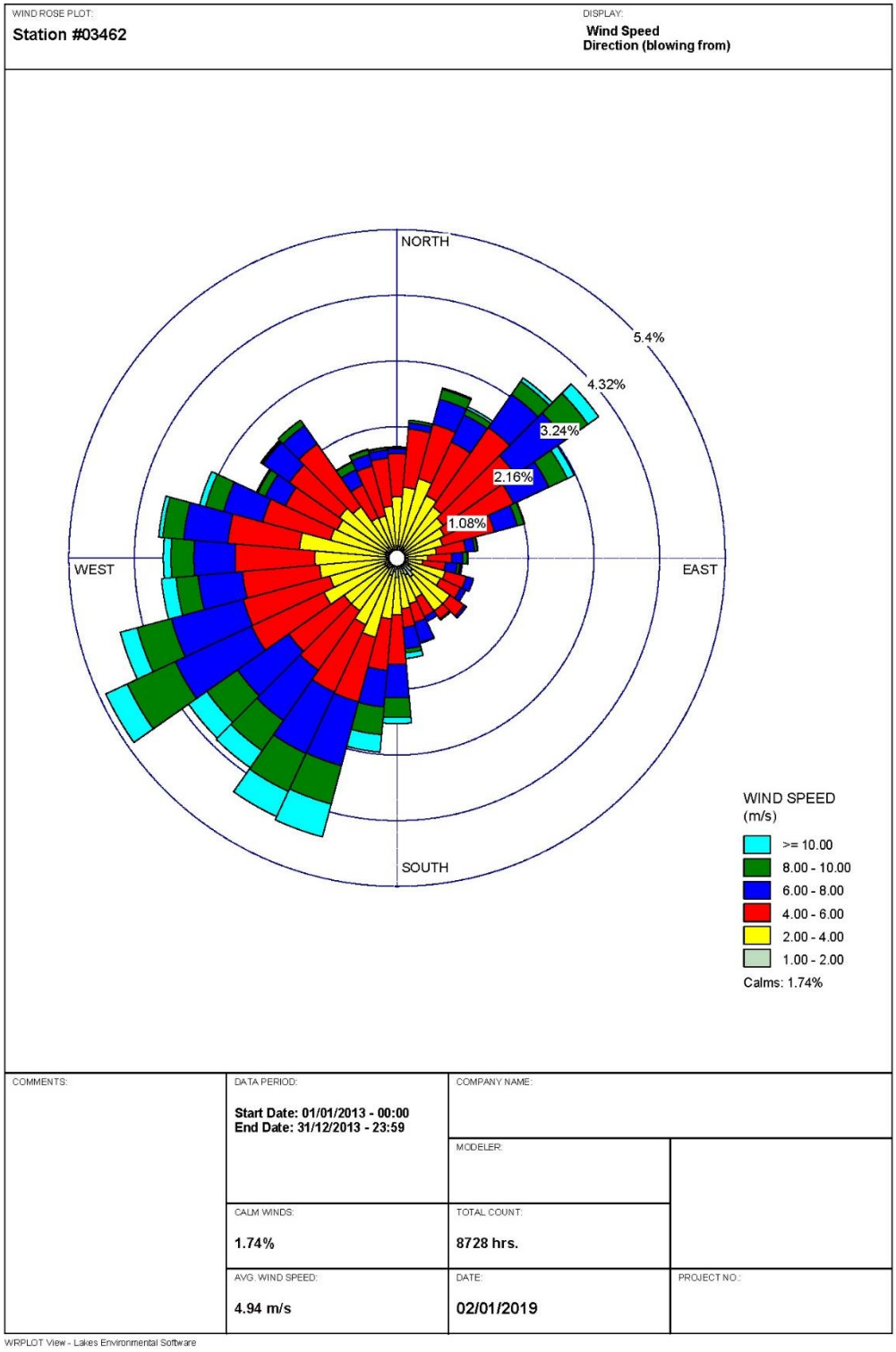
A conversion ratio of 70% NO_x:NO_2 has been assumed for comparison of predicted concentrations with the long-term objectives for NO_2. A conversion ratio of 35% has been utilised for the assessment of short-term impacts, as recommended by Environment Agency guidance.

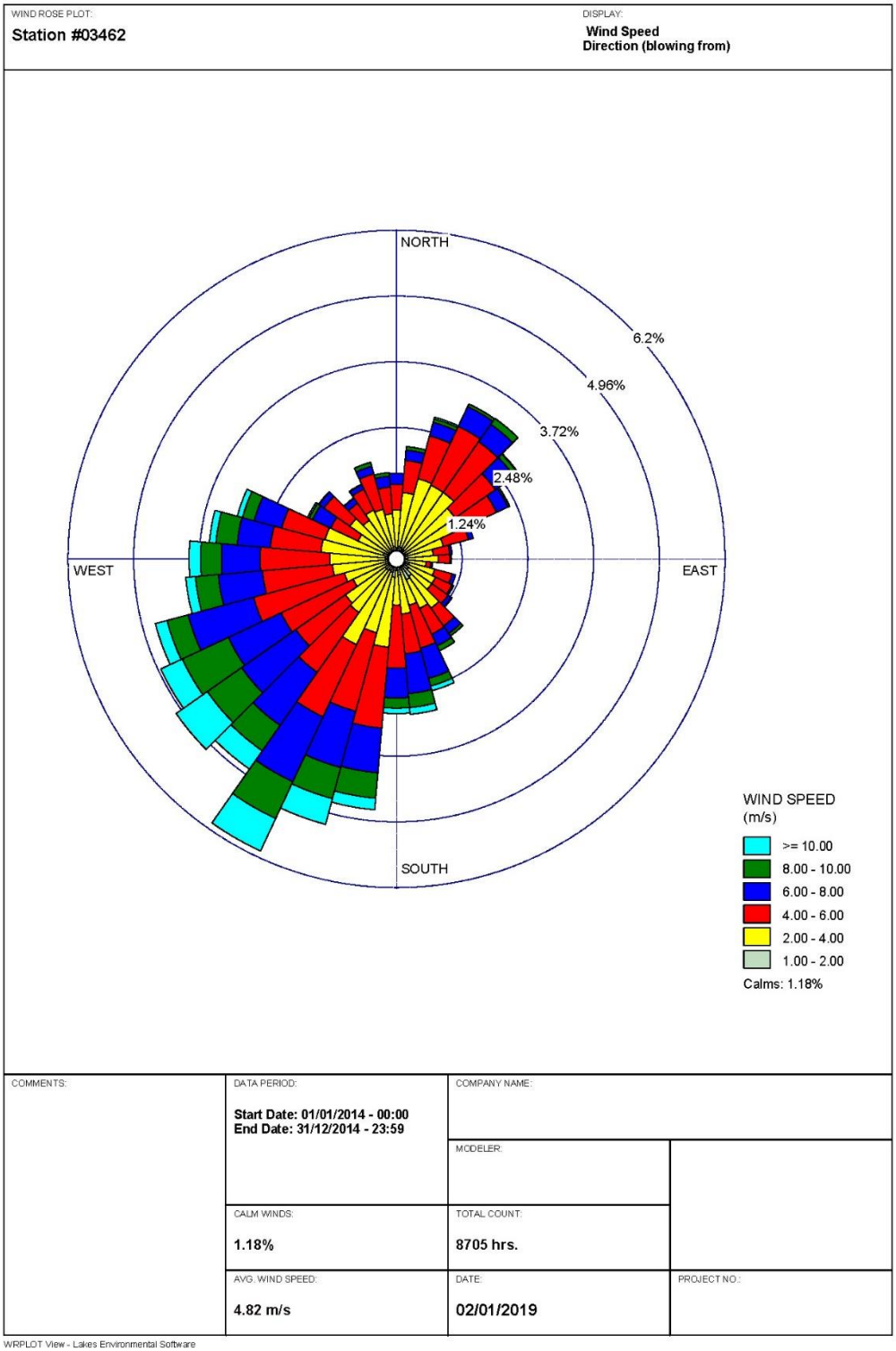
Local Meteorological Data

The dispersion modelling has been carried out using five years (2013-2017) of hourly sequential meteorological data in order to take account of inter-annual variability and reduce the effect of any atypical conditions. Data from a meteorological station at RAF Wittering (approximately 17 km northeast of the Site) has been used for the assessment, which is the most representative data currently available for the area.

Wind roses for each year of meteorological data are presented in **Figure 8.1**.

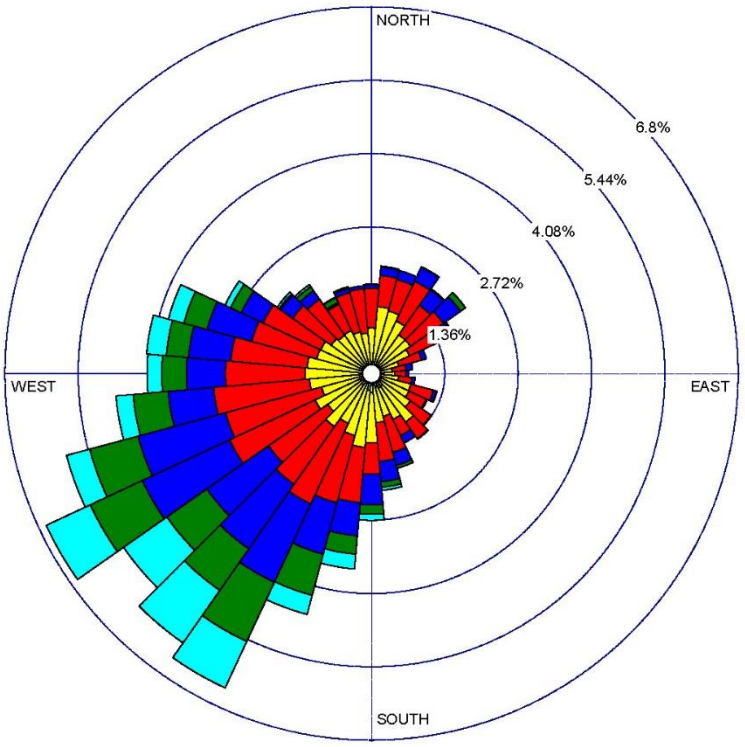
Figure 8.1 Wind Rose 2013 - 2017




WIND ROSE PLOT:
Station #03462
DISPLAY:
Wind Speed
Direction (blowing from)
NORTH
EAST
SOUTH
WEST
6.2%
4.96%
3.72%
2.48%
1.24%
WIND SPEED
(m/s)
>= 10.00
8.00 - 10.00
6.00 - 8.00
4.00 - 6.00
2.00 - 4.00
1.00 - 2.00
Calms: 1.18%
COMMENTS:
DATA PERIOD:
Start Date: 01/01/2014 - 00:00
End Date: 31/12/2014 - 23:59
COMPANY NAME:
MODELER:
CALM WINDS:
1.18%
TOTAL COUNT:
8705 hrs.
AVG. WIND SPEED:
4.82 m/s
DATE:
02/01/2019
PROJECT NO.:
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:
Station #03462

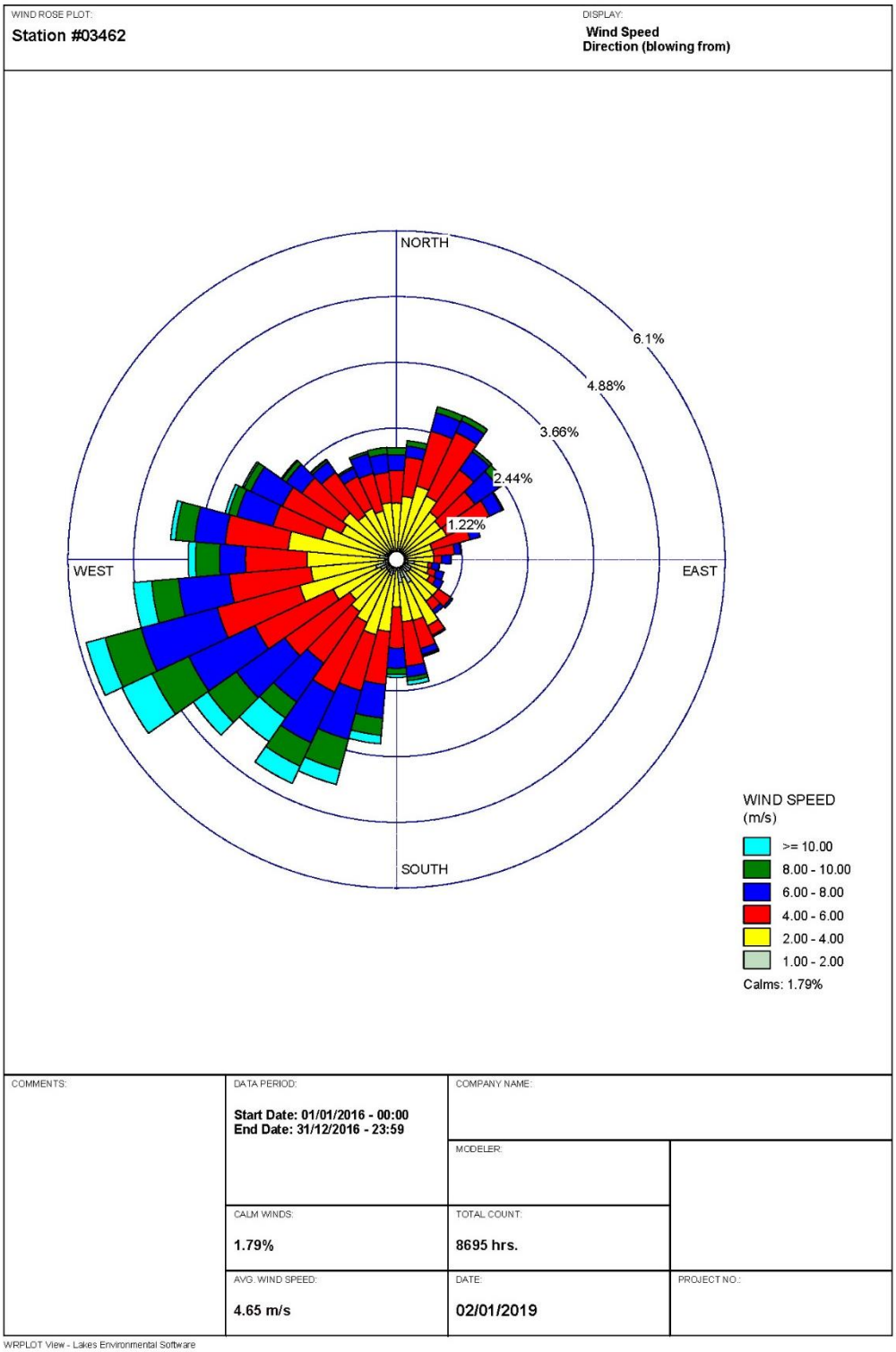
DISPLAY:
Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)
>= 10.00
8.00 - 10.00
6.00 - 8.00
4.00 - 6.00
2.00 - 4.00
1.00 - 2.00
Calms: 1.19%

COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 01/01/2015 - 00:00 **End Date: 31/12/2015 - 23:59**	MODELER:	
	CALM WINDS: **1.19%**	TOTAL COUNT: **8689 hrs.**	
	AVG. WIND SPEED: **5.26 m/s**	DATE: **02/01/2019**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software


WIND ROSE PLOT:
Station #03462
DISPLAY:
Wind Speed
Direction (blowing from)
NORTH
EAST
SOUTH
WEST
6.1%
4.88%
3.66%
2.44%
1.22%
WIND SPEED
(m/s)
>= 10.00
8.00 - 10.00
6.00 - 8.00
4.00 - 6.00
2.00 - 4.00
1.00 - 2.00
Calms: 1.79%
COMMENTS:
DATA PERIOD:
Start Date: 01/01/2016 - 00:00
End Date: 31/12/2016 - 23:59
COMPANY NAME:
MODELER:
CALM WINDS:
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TOTAL COUNT:
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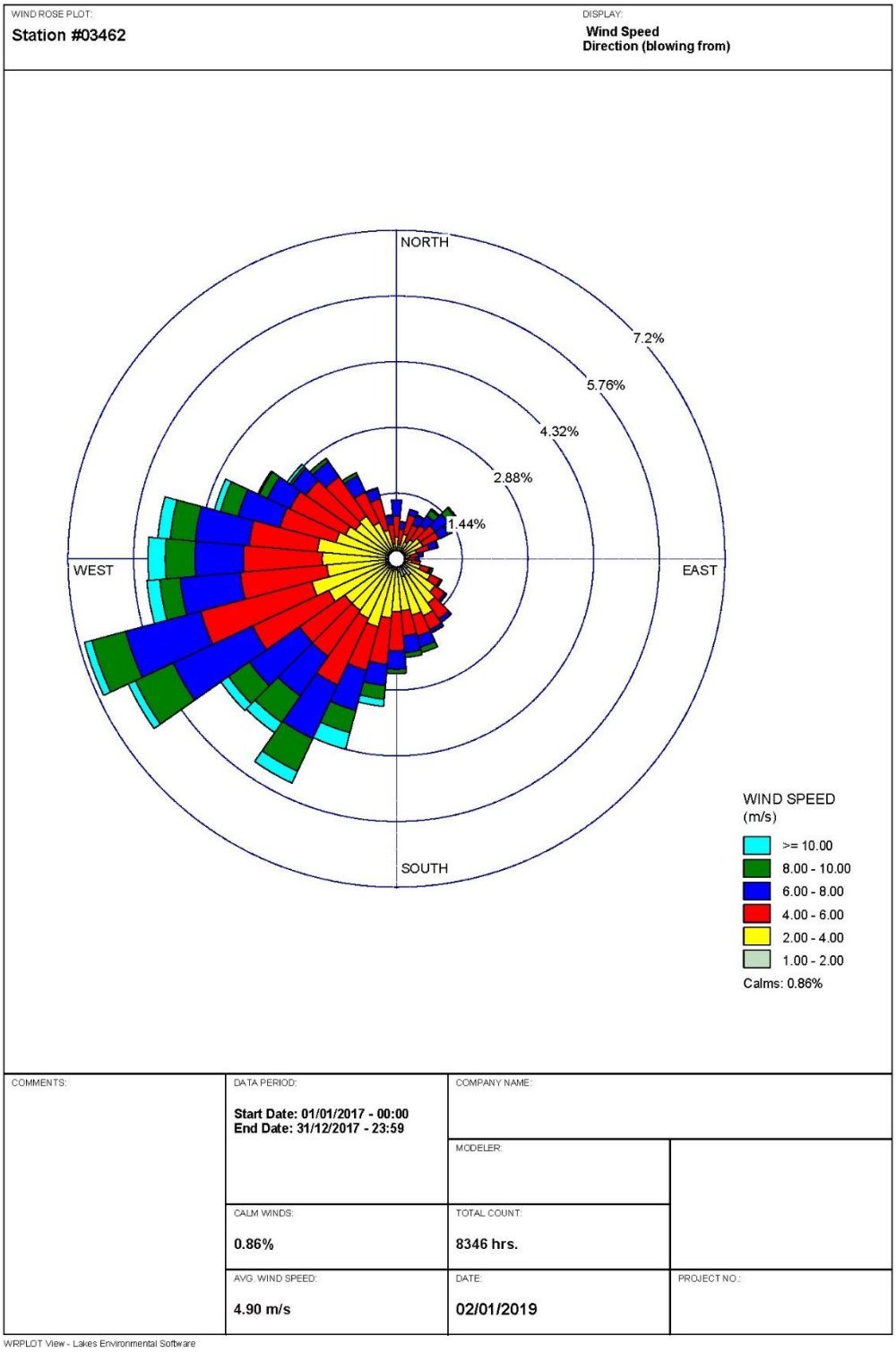
AVG. WIND SPEED:
4.65 m/s
DATE:
02/01/2019
PROJECT NO.:
WRPLOT View - Lakes Environmental Software



Sensitive Human Health Receptors

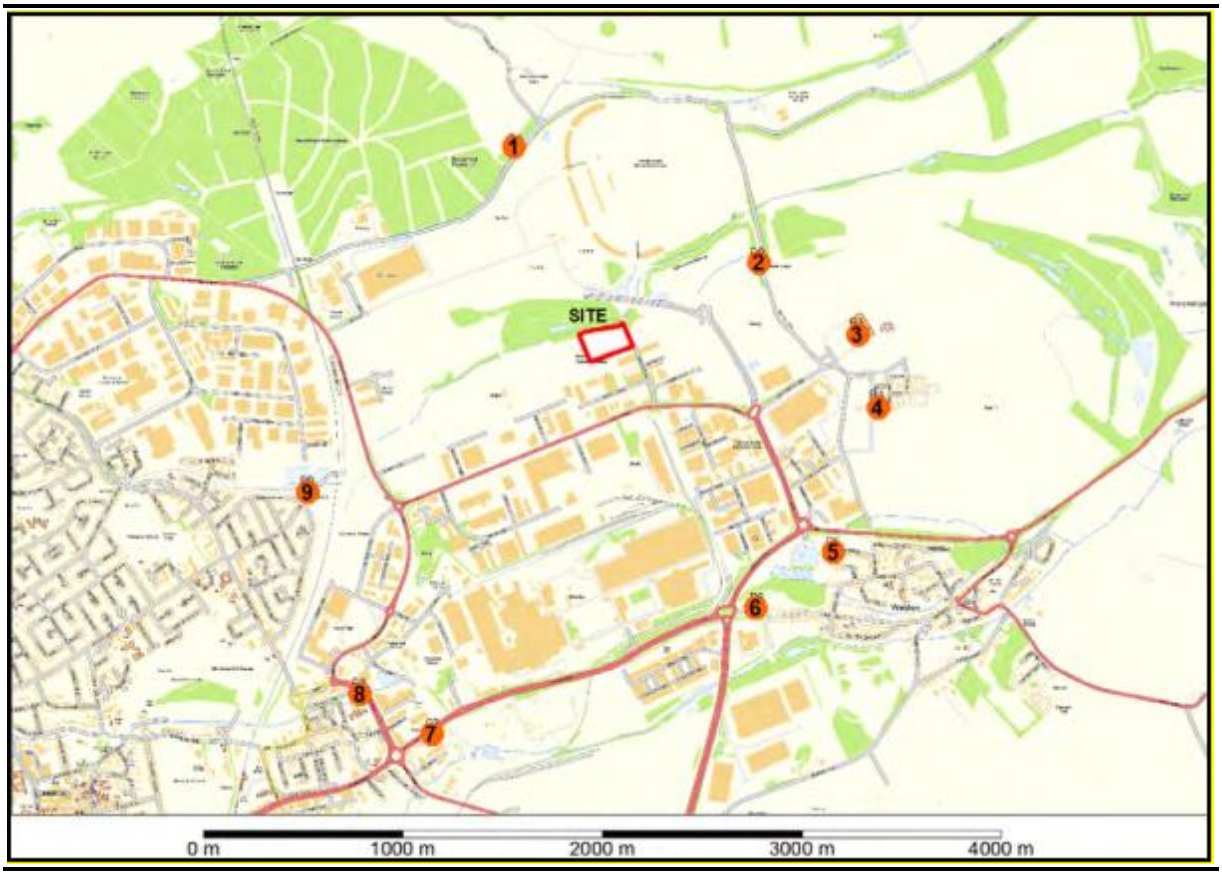
Pollutant concentrations have been predicted at both discrete receptor locations and using a Cartesian grid of 30 km x 30 km, of 100 m resolution, centered on the facility. Predicted ground level concentrations are compared with relevant air quality standards and guidelines for the protection of health.

Specific receptors have been identified where people are likely to be regularly exposed for prolonged periods of time (e.g. residential areas). The location of the discrete sensitive receptors is presented in **Table 8.10** and **Figure 8.2.**

Table 8.10 Location of Sensitive Receptors for Stack Emissions Assessment

ID	Receptor	Type	Easting	Northing
R1	Brookfield	Residential	490528	291829
R2	Weldon Lodge	Residential	491738	291528
R3	Priors Hall Development/ Corby Business Academy	Residential/School	492236	290908
R4	Barnwell Gardens	Residential	492336	290549
R5	4 Larratt Road	Residential	492117	289813
R6	143 Corby Road	Residential	491735	289534
R7	86 Weldon Road	Residential	490111	288904
R8	79 Turnwell Lane	Residential	489744	289108
R9	73 Pen Green Lane	Residential	489483	290118

Figure 8.2 Sensitive Receptor Locations for Stack Emission Assessment



Habitat Assessment

The Environment Agency's risk assessment guidance states that the impact of emissions to air on vegetation and ecosystems should be assessed for the following habitat sites within 15 km of the source:

- Special Areas of Conservation (SACs) and candidate SACs (cSACs) designated under the EC Habitats Directive (Ref 8.9);
- Special Protection Areas (SPAs) and potential SPAs designated under the EC Birds Directive (Ref 8.10); and
- Sites of Special Scientific Interest (SSSI) established by the 1981 Wildlife and Countryside Act (Ref 8.11).

Within 2 km of the source, local wildlife sites including the following (see Chapter 11 (Ecology and Nature Conservation) for complete list):

- National Nature Reserves (NNR);
- Local Nature Reserves (LNR);
- Local wildlife sites (LWS) and potential LWS (pLWS); and
- Ancient woodland (AWL).

Habitat receptor designations and locations relevant to the assessment are presented in **Table 8.11.**

Note that Ramsar Sites designated under the Convention on Wetlands of International Importance are not specifically considered in the assessment, as they are not subject to site specific Critical Loads.

Table 8.11 Location of Sensitive Habitat Receptors

ID	Receptor	Type	Approximate Location relative to Site
H1	Brookfield Plantation	LWS	800 m north-northwest
H2	Brookfield Plantation Cutting	LWS	1.5 km north-west
H3	Corby Old Quarry Gullet	LWS	1.0 km east
H4	Corby Old Quarry Ponds	LWS	1.7 km east
H5	Corby Tunnel Quarries	LWS	1.4 km north-west
H6	Potential Wildlife Site	pLWS	Adjacent to northern boundary
H7	Aldwincle Marsh	SSSI	13.8 km south-east
H8	Banhaw, Spring and Blackthorns Woods	SSSI	5km south-east
H9	Alder Wood and Meadow	SSSI	9.2 km south-west
H10	River Ise and Meadows	SSSI	8 km south
H11	Cowthick Quarry	SSSI	2.8 km south (geological only)
H12	Cranford St John	SSSI	14.1 km south
H13	Collyweston Great Wood and Easton Hornstocks	SSSI	13.4 km north-east
H14	Eye Brook Reservoir	SSSI	6.3 km north-west
H15	Eye Brook Valley Woods	SSSI	9 km north-west
H16	Wadenhoe Marsh and Achurch Meadow	SSSI	12.3 km south-east

ID	Receptor	Type	Approximate Location relative to Site
H17	Glapthorn Cow Pasture	SSSI	8.6 km east
H18	Geddington Chase	SSSI	3.6 km south
H19	Bulwick Meadows	SSSI	6 km north-east
H20	King's Cliffe Banks	SSSI	12 km north-east
H21	North Luffenham Quarry	SSSI	13.5 km north
H22	Pipewell Woods	SSSI	8 km south-west
H23	Wing Water Treatment Works	SSSI	11.7 km north
H24	Short Wood	SSSI	10 km east
H25	Stoke & Bowd Lane Woods	SSSI	10.8 km west
H26	Seaton Meadows	SSSI	6.8 km north
H27	Twywell Gullet	SSSI	13.3 km south
H28	Wakerley Spinney	SSSI	9.3 km north-east
H29	Luffenham Heath Golf Course	SSSI	11.7 km north
H30	Weldon Park	SSSI	3.2 km east
H31	Allexton Wood	SSSI	12 km north-west
H32	Sudborough Green Lodge Meadows	SSSI	8.7 km south-east
H33	Upper Nene Valley Gravel Pits	SSSI	13.7 km south-east
H34	Southfield Farm Marsh	SSSI	14.8 km south
H35	Rutland Water	SSSI	14.7 km north
H36	Upper Nene Valley Gravel Pits	SPA & Ramsar	13.7 km south-east
H37	Rutland Water	SPA & Ramsar	14.7 km north

The modelled ground level pollutant concentrations are used to predict deposition rates, using deposition velocities set out by the Environment Agency in the AQTAG(06) document (Ref 8.12). The dry deposition velocities for NO_2, SO_2, HCl and NH_3 are presented in **Table 8.12**.

Table 8.12 Dry Deposition Velocity (m/s)

Pollutant	Grassland	Woodland
Nitrogen Dioxide (NO_2)	0.0015	0.0030
Sulphur Dioxide (SO_2)	0.012	0.024
Hydrogen Chloride (HCl)	0.025	0.06
Ammonia (NH_3)	0.02	0.03

Following Environment Agency guidance[1], a long-term conversion rate of 70% for NO_x to NO_2 is applied to calculate nutrient nitrogen and acid deposition rates from NO_x.

[1] https://consult.environment-agency.gov.uk/psc/bn15-8tu-enviropower ltd/supporting_documents/Screening%20Habitats%20Assessment.pdf

Predicted ground level concentrations and acidification/ deposition rates are compared with relevant air quality standards, critical levels and critical loads for the protection of sensitive ecosystems and vegetation (see **Appendix 8.1**).

The impact assessment on ecological sites has been performed in a tiered fashion based on Environment Agency Guidance as presented in **Box 8.1**. This approach has been used to focus on the key ecological receptors, and eliminate from investigation those where it is clear that no likely significant effects will arise.

Some habitats of interest overlap, in which case the maximum extent of all designated areas has been assessed. In terms of the dispersion modelling, impacts on the receptors are captured using a grid of receptors defined throughout each habitat.

Box 8.1 Ecology Tiered Screening

Screening Step 1:

Are Process Contributions (PC)>1% of the most stringent (UK wide) Critical Levels (ambient concentrations of NO_x, SO_2, NH_3, HCl) or Critical Loads (nutrient nitrogen and acid deposition) anywhere on the Designated Site?

No — Screen Out for pollutants with PC<1%

Yes

Screening Step 2:

For those Designated Sites not screened out in Step 1, identify the single most sensitive features for each habitat and their associated Critical Loads/ Baseline

No — Screen Out for pollutants with PC<1%, or PC>1% and PC+baseline (PEC) <70%

Yes

Screening Step 3:

For those habitats not screened out in Step 2, gather site specific Critical Loads, Critical Levels and Baseline data for each habitat features present in the site.

No — Screen Out any habitat features for which PC>1% and PEC>70%

Yes

Screening Step 4:

For those remaining habitat features with PC>1% and PEC >70%, map these within the site(s) and identify the maximum impact within the geographical extent of the habitat site. Are there any habitat features with PC>1% and PEC>70%?

No — Screen Out for relevant pollutants

Yes

Assessment Step:

For the habitats that remain produce tabulated results for the habitats and sites that screen in. Produce contour plots showing extent of habitats where PC >1% and PEC>70%

Proceed to ecological assessment/HRA

8.3.3.2 Traffic Assessment

A summary of the 2023 and 2028 baseline and operational AADT flows for the Proposed Development is presented in **Table 8.13**.

Operational traffic associated with the Proposed Development is expected to increase flows on the local road network by a maximum of 197 vehicles per day on Shelton Road. However, Shelton Road is in an industrial estate where there is no long-term public exposure within 200 m of the road, and therefore impacts are considered to be negligible. The increase in traffic on all other road links is within the EPUK/IAQM screening criteria, therefore the potential impact of the operational traffic is considered to be *negligible*.

Table 8.13 Annual Average Daily Traffic Flows (2023 & 2028)

Link	2023 growth	2028 growth	2023 growth +Proposed Development	2028 growth +Proposed Development	%incr 2023 growth	%incr 2028 growth	Proposed Development AADT
Shelton Road	2620	2689	2816	2885	7.5%	7.3%	172
Steel Road (W)	9570	9818	9677	9925	1.1%	1.1%	94
Steel Road (E)	9570	9818	9659	9907	0.93%	0.91%	78
Phoenix Way (N)	14013	14375	14067	14429	0.39%	0.38%	48
Phoenix Way (S)	20443	20971	20485	21014	0.21%	0.20%	38
Steel Road (S)	12576	12902	12647	12973	0.56%	0.55%	62
A43 (E)	11167	11455	11190	11479	0.21%	0.21%	18
A43 Bangrave Road	15385	15783	15418	15816	0.21%	0.21%	44
A427 Weldon Road	11822	12128	11848	12153	0.21%	0.21%	26
A43 Bangrave Road (S)	10177	10440	10199	10462	0.21%	0.21%	18

8.3.3.3 Odour Assessment

A qualitative assessment of potential odour impacts has been carried out based on the following approach:

- detailed review of proposed technology and control measures;
- detailed discussions with the technology advisor;
- identification of sensitive receptors; and
- review of meteorological conditions for the area.

As this is a qualitative assessment of potential odour emissions from the Proposed Development, impacts have been identified and assessed taking account of the **F**requency, **I**ntensity (and therefore concentration), **D**uration, relative **O**ffensiveness (hedonic tone/character) and **L**ocation, "FIDOL" factors outlined in Section 8.4.5 and a review of the above information.

8.3.4 Significance Criteria

The impacts of the emissions from the facility are assessed taking into consideration the:

- Process Contribution (PC), this being the contribution from the facility only; and
- Predicted Environmental Concentration (PEC), this being the PC plus the baseline.

As the AQIA is being undertaken in support of a planning application, the significance criteria for sensitive human receptors are taken from IAQM. The significance criteria for sensitive ecological receptors are taken from the Environment Agency [(1)].

8.3.4.1 Sensitive Human Receptors

The EPUK / IAQM planning guidance sets out descriptors for evaluating the predicted impact at individual receptor locations; these criteria are presented in **Table 8.14**.

1 https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#screen-out-insignificant-pecs

Table 8.14 Impact Descriptions for Individual Receptors

Long-term average concentration at receptor in assessment year	% Change in Concentration relative to Air Quality Assessment Level (AQAL)			
Long Term PEC	**1%**	**2-5%**	**6-10%**	**>10%**
75% or less of AQAL	Negligible	Negligible	Minor	Moderate
76-94% of AQAL	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	Minor	Moderate	Moderate	Major
103-109% of AQAL	Moderate	Moderate	Major	Major
110% or more of AQAL	Moderate	Major	Major	Major
Short Term PC	**<10%**	**10-20%**	**20-50%**	**>50%**
(not dependent on baseline)	Negligible	Slight	Moderate	Substantial

The guidance states that percentage changes in concentration, relative to the air quality assessment level (AQAL), of less than 1%, but greater than or equal to 0.5%, should be rounded up to 1%. Changes of less than 0.5% are described as 'negligible'.

The overall significance of the effects of a proposed development is determined by professional judgement, taking into account the significance at individual receptors and other factors such as the number of people or properties that will be exposed to a change in air quality.

8.3.4.2 Sensitive Ecological Receptors

The Environment Agency criteria for identifying the significance of impacts at sensitive ecological receptors are set out in **Table 8.15**. In this case the percentage is not rounded, i.e. <1% is an insignificant contribution and would not lead to a significant effect.

Table 8.15 Significance for sensitive ecological receptors

Criterion	Assessment Actions
Long Term	
PC < 1% of AQCL/CL	Insignificant contribution and no further assessment required
PC > 1% of AQCL/CL and PEC < 70% of AQCL/CL	Unlikely to make a significant (1) contribution and no further assessment required
PC > 1% of AQCL/CL and PEC > 70% of AQCL/CL	Significant contribution and therefore detailed assessment required
Short Term	
PC < 10% of AQCL/CL	Insignificant contribution and no further assessment required
PC > 10% of AQCL/CL and PEC < 70% of AQCL/CL	Unlikely to make a significant contribution and no further assessment required
PC > 10% of AQCL/CL and PEC > 70% of AQCL/CL	Significant contribution and therefore detailed assessment required

Note 1: The term 'significant' is used here in the context of its meaning within the Environment Agency guidance (i.e. making a 'significant contribution') and not within the context of the EIA Regulations 2017 (i.e. not necessarily leading to a 'likely significant effect').

8.4 Legal Basis

8.4.1 Legislation, Planning Policy and Guidance

8.4.1.1 The European Directive on Ambient Air and Cleaner Air for Europe

European Directive 2008/50/EC (Ref 8.13) of the European Parliament and of the Council of 21st May 2008, sets legally-binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument.

The pollutants included relevant to this assessment are sulphur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter of less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}), particulate matter of less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$), lead (Pb), carbon monoxide (CO), benzene (C_6H_6), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

8.4.1.2 Air Quality Strategy for England, Scotland, Wales & Northern Ireland

The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) (Ref 8.14) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007, pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed. The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems.

8.4.1.3 Air Quality (England) Regulations

Many of the objectives in the AQS were made statutory in England with the *Air Quality (England) Regulations* (Ref 8.15) for the purpose of Local Air Quality Management (LAQM).

The Air Quality Standards Regulations 2015 have adopted into UK law the limit values required by EU Directive 2008/50/EC. These regulations prescribe the 'relevant period' (referred to in Part I2V of the Environment Act 1995) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the 'relevant period'.

The EALs, air quality standards and objectives for the pollutants considered in the assessment are presented in section 8.4.2**.**

8.4.1.4 Local Air Quality Management (LAQM)

Part IV of the Environment Act 1995 (Ref 9.16) also requires local authorities to periodically Review and Assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future

Whereas any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

The Department of Environment, Food and Rural Affairs (DEFRA) has published technical guidance for use by local authorities in their Review and Assessment work. This guidance, referred to in this chapter as LAQM.TG(16) (Ref 8.7), has been used where appropriate in the assessment.

8.4.1.5 Local Review and Assessment of Air Quality

Corby Borough Council has investigated air quality within its area as part of its responsibilities under the LAQM regime. Pollutant concentrations within the Borough are well within the air quality objectives and there has been no requirement to declare an AQMA.

8.4.1.6 National Planning Policy Framework 2018

Chapter 15 of the NPPF (2018) (Ref 8.17) notes that planning decisions should "*prevent new and existing developments from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of … air pollution ... Development should, wherever possible, help improve local environmental conditions such as air quality …"*

In dealing specifically with air quality the NPPF states that 'planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts on air quality from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified and so far as possible these opportunities should be considered at the plan-making stages.

1.1.1.1 North Northamptonshire Minerals & Waste Local Plan (2017)

Policy 18 of the Minerals and Waste Local Plan (Ref 8.18) requires that proposals for minerals and waste development demonstrate that air emissions (including dust) and odour must be avoided and minimised to an acceptable level.

1.1.1.2 Part 1 Local Plan: North Northamptonshire Joint Core Strategy (2016)

Policy 4 of the Part 1 Local Plan (Ref 8.19) requires that biodiversity and geodiversity assets be protected from adverse air quality effects and Policy 8 requires that both new and existing development avoid unacceptable levels of air pollution.

8.4.2 Air Quality Standards

8.4.2.1 Sensitive Human Receptors

The protection of sensitive human receptors is regulated through the following:

- Air Quality Standards imposed in UK law (Ref 8.20) transposed from EU standards (Ref 8.21); and
- Environmental Assessment Levels set out by the Environment Agency.

Collectively these are referred to as Air Quality standards (AQS).
The AQSs of relevance for this assessment are set out in **Table 8.16**.

Table 8.16 Air Quality Standards

Pollutant	Averaging period	Assessment Criterion (µg/m^3)
PM_{10}	Annual mean	40
PM_{10}	24 hour mean (not to be exceeded more than 35 times per year)	50
$PM_{2.5}$	Annual mean	20 (from 2020)
VOCs [1]	Annual Mean	5
VOCs [1]	1 hour mean	195
HCl	1 hour mean	750
HF	1 month mean	16
HF	1 hour mean	160
SO_2	24 hour mean (not to be exceeded more than 3 times per year)	125
SO_2	1 hour mean (not to be exceeded more than 24 times per year)	350
SO_2	15 minute mean (not to be exceeded more than 35 times per year)	266
NO_2	Annual mean	40
NO_2	1 hour mean (not to be exceeded more than 18 times per year)	200
As	Annual mean	0.006
Cd	Annual mean	0.005
Cr III	Annual mean	5
Cr III	1 hour mean	150
Cr VI [3]	Annual mean	0.0002
Cu	Annual mean	10
Cu	1 hour mean	200
Hg	Annual mean	0.25
Hg	1 hour mean	7.5
Mn	Annual mean	0.15
Mn	1 hour mean	1500
Ni	Annual mean	0.02
Pb	Annual mean	0.5
Sb	Annual mean	5
Sb	1 hour mean	150
V	Annual mean	5
V	1 hour mean	1
CO	8 hour running mean	10,000
NH_3	Annual mean	180
NH_3	1 hour mean	2500
PAH [2]	Annual mean	0.001

Note 1: Total VOCs assessed on the basis that all emissions arise as 100% benzene
Note 2: PAHs assessed on the basis that all emissions arise as 100% Benze[a]pyrene
Note 3: assessed as CrVI in PM_{10}
No AQS for Cobalt and Thallium
PCDD/F do not have an AQS as the total body burden is most critical and the large majority of exposure is via food.

8.4.2.2 Sensitive Ecological Receptors

The protection of sensitive ecological receptors is regulated through the following:

- Air Quality Standards imposed in UK law transposed from EU standards;
- Targets for protected conservation areas set out by the Environment Agency; and

Site specific Critical Loads set out on the Air Pollution Information Service (APIS [1]) website.

Those relating to ambient air are referred to as Critical Levels and those relating to deposition are referred to as Critical Loads.

The CLs of relevance for this assessment are set out in **Table 8.17**. As the Critical Loads are site specific, these are set out in the detailed results in **Appendix 8.1**.

Table 8.17 Critical Levels

Pollutant	Averaging period	Assessment Criterion (µg/m^3)
NH_3	Annual mean	1 (lichens and bryophytes) 3 (other species)
SO_2	Annual mean	10 (lichens and bryophytes) 20 (other species)
NO_x (as NO_2)	Annual mean	30
NO_x (as NO_2)	24 hour mean	75
HF	1 week mean	0.5
HF	24 hour mean	5

8.4.3 Control of Dust and Particulates Associated with Construction

Section 79 of the Environmental Protection Act (1990) states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Statutory nuisance is defined as:

- 'any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance', and
- 'any accumulation or deposit which is prejudicial to health or a nuisance'.

Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

In the context of the Proposed Development, the main potential for nuisance of this nature will arise during the construction phase; potential sources being the Site clearance, earthworks, construction and landscaping processes.

There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist; 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred. However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates.

8.4.4 Industrial Emissions Directive

The Industrial Emissions Directive (2010/75/EU) (Ref 8.1) came into force on the 6th January 2011, replacing the seven existing Directives, including the Waste Incineration Directive (WID) and Large Combustion Plant Directive (LDPD), implemented through the Environmental Permitting Regulations (EPR). The aim of the new Directive is to simplify the existing legislation and reduce administrative costs, whilst maintaining a high level of protection for the environment and human health. Permits will

1 www.apis.ac.uk

still be issued under EPR; however existing and new sites will be required to comply with the requirements of the IED, which places greater emphasis on new plant best available technology (BAT).

The IED has been transposed into UK law via the Environmental Permitting (England and Wales) (Amendment) Regulations 2013 (SI 2013 No, 390) (Ref 8.22), which came into force on 27 February 2013.

The design and operation of all new energy recovery facilities must ensure compliance with emission limit values (ELVs) set out in the IED; these ELVs are summarised in **Table 8.18.**

Table 8.18 IED Limit Values (mg/Nm^3)

Pollutant	ELV (Reference 11% O_2)
Daily Average	
Total dust	10
Total organic carbon (TOC)	10
Hydrogen chloride (HCl)	10
Hydrogen fluoride (HF)	1
Sulphur dioxide(SO_2)	50
Oxides of nitrogen (NO_x)	200
Carbon monoxide (CO)	50
Half-hourly Average	
Total dust	30
Total organic carbon (TOC)	20
Hydrogen chloride (HCl)	60
Hydrogen fluoride (HF)	4
Sulphur dioxide(SO_2)	200
Oxides of nitrogen (NO_x)	400
Carbon monoxide (CO)	100
Average over a sample period between 30 minutes and 8-hours	
Group 1 metals [(a)]	0.05
Group 2 metals [(b)]	0.05
Group 3 metals [(c)]	0.5
Average over a sample period between 6-hours and 8-hours	
Dioxins and Furans [(d)]	$1x10^{-7}$

(a) Cadmium (Cd) and thallium (Tl)
(b) Mercury (Hg)
(c) Antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni) and vanadium (V)
(d) i-TEQ (International Toxic Equivalent)

8.4.5 Odour

8.4.5.1 Conceptual Background

Odour is a mix of volatile chemical compounds or a single compound that triggers a reaction in the olfactory organ. The characteristics that are used to describe an odorous emission are as follows.

- Hedonic tone: this is a judgement of the relative pleasantness or unpleasantness of an odour made by assessors in an odour panel.
- Quality/Characteristics: this is a qualitative attribute which is expressed in terms of "descriptors", e.g. "fruity", "almond", "fishy". This can be of use when establishing an odour source from complainants descriptions.
- Concentration: the "amount" of odour present in a sample of air. It can be expressed in terms of parts per million, parts per billion or in mg/m^3 of air for a single odorous compound. More usually a mixture of compounds is present and the concentration of the mixture can be expressed in odour units per cubic metre (ouE/m^3).
- Intensity: is the magnitude (strength) of perception of an odour (from faint to strong).
- Intensity increases as concentration increases but the relationship is non-linear. Increases or decreases in concentration of an odour do not always produce a corresponding proportional change in the odour strength as perceived by the human nose.

The most commonly used attribute is concentration and this is measured in European Odour Units (ouE/m^3). The odour concentration at the detection threshold is defined to be 1 ouE/m^3. The odour unit is a Standard Unit in the same way as gram or milligram.

The assessment of an odour exposure (and therefore impact) may be undertaken with two differing approaches, by the use of indicator determinands, or total odour.

In the case where an emission is dominated by one particular odorous gas, the use of an indicator determinand may allow simple validation of an assessment through monitoring at source and receptor. For example, hydrogen sulphide in the case of emissions from sewage treatment works. However, more commonly an odour is the result of a complex mixture of chemicals. On this basis, a more appropriate approach in the case of this complex gas mixture is that of total odour.

Like air quality standards for individual pollutants, exposure to odour is given in terms of a percentile of averages over the course of a year. This prevents results being skewed by infrequent meteorological conditions. The exposure criteria most accepted in the UK at present is given in terms of (concentration) European Odour Units as a 98^{th} percentile of hourly averages. This allows 2% of the year when the impact may be above the limit criterion (175 hours).

8.4.5.2 Regulatory Standards and Guidelines

Currently, in the UK there are no numerical statutory standards for assessing the acceptability of predicted odour impacts from quantitative odour impact assessments. On this basis, odour impact criteria are typically based upon guideline documents (predominantly based on research from outside of the UK), case law and research.

The Environment Agency has published horizontal odour guidance note H4 – Odour Management [(1)], which is used to provide relevant guidance for all sectors regulated under the Environmental Permitting Regulations (EPR) [(2)]. The H4 guidance proposes the use of exposure criteria (benchmarks) for different types of process on the basis that not all odours are equally offensive, and not all receptors are equally sensitive. The conditions of an environmental permit will balance these installation-specific odour exposure criteria against what is realistically achievable in accordance with the concept of Best Available Techniques (BAT).

1 Environment Agency (March 2011), Horizontal Guidance Note H4, Odour Management

2 The Environmental Permitting Regulations 2010 – Statutory Instrument No. 675

The H4 guidance proposes indicative criteria of between C98,1 hour 1.5 ouE/m^3 and C98,1 hour 6.0 ouE/m^3 as a starting point before adjustments for local factors are made, dependent upon the relative offensiveness of the source and whether it is a new or existing installation /development.

The H4 Technical Guidance notes that 5 ouE/m^3 would be a "faint" odour whilst 10 ouE/m^3 would be considered a "distinct" odour. Generally, an average person would be able to recognise the source of an odour at about 3 ouE/m^3 although this can depend on the relative offensiveness of the odour.

The H4 Technical Guidance proposes a range of criteria based on the relative offensiveness of the odour. Thus the more unpleasant odours such as animal rendering, a criterion of 1.5 ouE/m^3 as a 98th percentile of annual hourly mean concentrations is used. Less unpleasant odours, for example from baking, have a less stringent standard of 6 ouE/m^3 as a 98th percentile of hourly means.

8.4.5.3 DEFRA Odour Guidance for Local Authorities

This Defra guidance [(1)] provides further general principles and factors that may be important in assessing when, or if, a specific odour source is likely to constitute a statutory nuisance.

The "FIDOL" factors within this guidance are defined as **F**requency, **I**ntensity (and therefore concentration), **D**uration, relative **O**ffensiveness (hedonic tone/character) and **L**ocation, along with any aggravating characteristics. **Table 8.19** below outlines the "FIDOL" factors that are useful in determining potential odour impact or offensiveness.

Table 8.19 Factors Relating Odour Impact to Statutory Nuisance

Factor	Factors determining Statutory Nuisance	Comments
Frequency	How often an individual is exposed to odour	Even a pleasant odour can be perceived as a nuisance if exposure is frequent. At low concentrations a rapidly fluctuating odour is more noticeable than a steady background odour, i.e. this is an aggravating factor
Intensity	Level of odour	Factors are equivalent
Duration	Duration of exposure	Factors are equivalent
Offensiveness	Type of odour	Some odours are universally considered offensive, such as decaying animal matter. Other odours may be offensive only to those who suffer unwanted exposure, e.g. coffee roasting
Location (the type of land use and nature of human activities in the vicinity of the odour source)	The characteristics of the neighborhood where the odour occurs	Factors are essentially equivalent
Tolerance and expectation of the receptor.	The sensitivity of the complainant	Statutory nuisance uses the concept of the response of the average reasonable person.

1 Defra (March 2010), Odour Guidance for Local Authorities, HMSO, London

8.5 Baseline Conditions (Updated Baseline)

8.5.1 Introduction

Baseline conditions have been updated from the 2016 ES, for those parameters for which more recent data is available. This is the case for:

- PM_{10}: Long term concentration has decreased, whereas short term concentration has increased when compared to 2016 ES;
- $PM_{2.5}$: Long term concentration has decreased when compared to 2016 ES;
- Benzene: Long term and short term concentrations have increased when compared to 2016 ES;
- HCl: Short term concentration has decreased when compared to 2016 ES;
- HF: Concentration has decreased when compared to 2016 ES;
- SO_2: 24 hour and 1 hour concentrations have increased, 15 minute concentration has decreased when compared to 2016 ES;
- NO_2: Concentrations have decreased when compared to 2016 ES;
- As: Long term concentration has increased when compared to 2016 ES;
- Cd: Long term concentration has increased when compared to 2016 ES;
- Cr III: Concentrations have increased when compared to 2016 ES;
- Cr VI: Concentrations have decreased when compared to 2016 ES;
- Cu: Concentrations have increased when compared to 2016 ES;
- Hg: Concentrations have decreased when compared to 2016 ES;
- Mn: Concentrations have decreased when compared to 2016 ES;
- Ni: Concentrations have decreased when compared to 2016 ES;
- Pb: Concentrations have increased when compared to 2016 ES;
- Sb: previously no data available;
- V: Concentrations have decreased when compared to 2016 ES;
- CO: Concentrations have increased when compared to 2016 ES;
- NH_3: Concentrations have increased when compared to 2016 ES;
- PCDD/F: Concentrations have decreased when compared to 2016 ES.

8.5.2 Sensitive Human Receptors

The baseline has been derived from publicly available sources to derive a representative local baseline. For some of the pollutants, little baseline data are available locally, and therefore data have been derived from representative non-local sources.

The available baseline information has been considered to derive a single value for each pollutant to be used in the assessment. There are no Air Quality Management Areas, and therefore there is no requirement to consider specifically elevated baseline in these areas.

For short-term averages, the long-term background has been multiplied by two, as per Environment Agency guidance. The following are noted.

- The Site is within the jurisdictions of Corby Borough Council and NCC. The boundary of East Northamptonshire District is close to the northern boundary of the facility.

- There are no national monitoring stations in Corby Borough or East Northamptonshire District, or at representative locations close by, including Automatic Urban and Rural Network Sites.
- Neither Corby Borough Council nor East Northamptonshire District undertaken automatic monitoring.
- Ambient air quality monitoring in Corby is limited to 14 NO_2 diffusion tube sites.
- East Northamptonshire District Council do not undertake NO_2 diffusion tube monitoring in or close to Corby.
- There are no national heavy metals, ammonia, PAH, hydrocarbon or automatic mercury monitoring sites close to Corby.

Regarding the non-local sites the following observations are made.

- Bilston Lane in Walsall was selected as it is an Urban Industrial site, and is considered to be more similar in character to the facility locale, when compared to a rural site.
- Sutton Bonnington is the closest HCl monitoring location to the facility.
- Monks Wood is the closest Sb and NH_3 monitoring location to the facility.
- Birmingham Ladywood is the closest PAH monitoring location to the facility.

The baseline used in the study is set out in **Table 8.20**.

Table 8.20 Baseline

Pollutant	Averaging period	AQS (µg/m^3)	Baseline (µg/m^3)	Source
PM_{10}	Annual mean	40	13.6	derived from Defra mapping for 2015
PM_{10}	24 hour mean (not to be exceeded more than 35 times per year)	50	27.1	long-term background multiplied by two, as per Environment Agency guidance
$PM_{2.5}$	Annual mean	20	9.40	derived from Defra mapping for 2015
VOCs (as benzene)	Annual Mean	5	0.342	Annual derived from Defra mapping for 2001
VOCs (as benzene)	1 hour mean	195	0.684	long-term background multiplied by two, as per Environment Agency guidance
HCl	1 hour mean	750	0.424	HCl 2015 annual mean is from Sutton Bonnington
HF	1 month mean	16	1.23	Page 27 of: EPAQS (2007) Guidelines for Halogens and Hydrogen Halides in Ambient Air for Protecting Human Health against Acute Irritancy Effects
HF	1 hour mean	160	2.46	long-term background multiplied by two, as per Environment Agency guidance

Pollutant	Averaging period	AQS ($\mu g/m^3$)	Baseline ($\mu g/m^3$)	Source
SO_2	24 hour mean (not to be exceeded more than 3 times per year)	125	4.32	Annual derived from Defra mapping for 2001, and multiplied by 2 as per Environment Agency guidance
SO_2	1 hour mean (not to be exceeded more than 24 times per year)	350	4.32	
SO_2	15 minute mean (not to be exceeded more than 35 times per year)	266	4.32	
NO_2	Annual mean	40	12.5	calculated from diffusion tube monitoring in Corby, taking the average of urban background sites
NO_2	1 hour mean (not to be exceeded more than 18 times per year)	200	25.1	long-term background multiplied by two, as per Environment Agency guidance
NO_x	Annual mean	30	21.4	derived from Defra mapping for 2015
NO_x	24 hour mean	75	42.8	long-term background multiplied by two, as per Environment Agency guidance
As	Annual mean	0.006	1.12×10^{-3}	derived from monitoring undertaken at Bilston Lane in Walsall, 2017
Cd	Annual mean	0.005	0.877×10^{-3}	derived from monitoring undertaken at Bilston Lane in Walsall, 2017
Cr III	Annual mean	5	3.92×10^{-3}	derived from monitoring undertaken at Bilston Lane in Walsall, 2017
Cr III	1 hour mean	150	7.85×10^{-3}	long-term background multiplied by two, as per Environment Agency guidance
Cr VI	Annual mean	0.0002	5.54×10^{-6}	derived on the basis of total Cr, factored by the Environment Agency guidance for CrVI emissions from EfW plants
Cu	Annual mean	10	2.23×10^{-2}	derived from monitoring undertaken at Bilston Lane in Walsall, 2017
Cu	1 hour mean	200	4.46×10^{-2}	long-term background multiplied by two, as per Environment Agency guidance
Hg	Annual mean	0.25	4.45×10^{-5}	derived from monitoring undertaken at Bilston Lane in Walsall, 2013

Pollutant	Averaging period	AQS (µg/m^3)	Baseline (µg/m^3)	Source
Hg	1 hour mean	7.5	8.90 x10^{-5}	long-term background multiplied by two, as per Environment Agency guidance
Mn	Annual mean	0.15	9.27 x10^{-3}	derived from monitoring undertaken at Bilston Lane in Walsall, 2017
Mn	1 hour mean	1500	1.85 x10^{-2}	long-term background multiplied by two, as per Environment Agency guidance
Ni	Annual mean	0.02	1.48 x10^{-3}	derived from monitoring undertaken at Bilston Lane in Walsall, 2017
Pb	Annual mean	0.5	2.00 x10^{-2}	derived from monitoring undertaken at Bilston Lane in Walsall, 2017
Sb	Annual mean	5	1.01 x10^{-3}	derived from Monks Wood, 2009
Sb	1 hour mean	150	2.02 x10^{-3}	long-term background multiplied by two, as per Environment Agency guidance
V	Annual mean	5	8.82 x10^{-4}	derived from monitoring undertaken at Bilston Lane in Walsall, 2017
V	1 hour mean	1	1.76 x10^{-3}	long-term background multiplied by two, as per Environment Agency guidance
CO	8 hour running mean	10,000	560	Annual derived from Defra mapping for 2001, and multiplied by 2 as per Environment Agency guidance
NH_3	Annual mean	180	2.01	NH_3 has been derived from Monks Wood, 2017
NH_3	1 hour mean	2500	4.03	long-term background multiplied by two, as per Environment Agency guidance
PAH	Annual mean	0.001	3.30 x10^{-5}	as Benzo[a]Pyrene from June 2018 from Birmingham Ladywood
PCDD/F	Annual mean	-	9.60 x10^{-9}	Urban monitoring sites for dioxins and furans are located in Manchester (Law Courts) and London (Nobel House), 2013-2017

8.5.3 Sensitive Ecological Receptors

For sensitive ecological receptors the baseline values for NH_3, SO_2, NO_x, acid deposition and nutrient nitrogen deposition are all set on a site-specific basis for each sensitive ecological receptor, as

presented on the APIS (Air Pollution Information System) website (Ref 8.23). The baseline used for each site is set out in **Appendix 8.1**, where the detailed results of the assessment are provided.

8.6 Identification and Evaluation of Key Effects

8.6.1 Construction Dust Impact (Non material change to 2016 ES)

The construction works will give rise to dust during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. The assessment of dust effects has followed the step by step methodology outlined in the 'Assessment Methodology and Significance Criteria' section of this chapter.

The precise behaviour of the dust, its residence time in the atmosphere, and the distance it can travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

Best practice measures will be adopted on the project as a matter of course, as set out in Section 8.8.1. There are no residential properties or any dust-sensitive installations (gas turbines, clean rooms, etc.) within 350 m of the boundary of the Site and/or within 100 m of the route to be used by construction vehicles on the public highway, up to 500 m from the site entrance. With the best practice measures, and the absence of sensitive receptors, the impacts of Site clearance, preparation and construction on nearby residential properties or dust-sensitive installations are therefore considered to be *negligible* and will not result in significant effects.

8.6.2 Operational Phase – Stack Emissions Impact (Updated Assessment)

8.6.2.1 Introduction

Predicted PCs are presented as the maximum arising off-site and at each of the discrete receptors identified in **Table 8.10**. The PC is the maximum arising for any of the five years of meteorological data used in the modelling.

The maximum PC is compared with the relevant air quality standard to determine the likely significance of the effect, in accordance with the Environment Agency risk assessment guidance. Where a potentially significant effect is identified, the predicted environmental concentration (process + background) is compared with the air quality standard to assess the likelihood of an exceedence.

8.6.2.2 Nitrogen Dioxide

The predicted annual mean and 99.8th percentile of 1-hour mean ground level NO_2 concentrations (PC) are presented in **Table 8.21**.

Table 8.21 Predicted NO_2 Concentrations (µg/m^3)

Receptor	Annual Mean	99.8th Percentile of 1-Hour Means
Maximum Off-Site	1.02	7.12
Brookfield	0.315	3.26
Weldon Lodge	0.772	3.61
Priors Hall Development/ Corby Business Academy	0.510	3.12
Barnwell Gardens	0.401	3.00
4 Larratt Road	0.233	2.74

Receptor	Annual Mean	99.8th Percentile of 1-Hour Means
143 Corby Road	0.174	2.70
86 Weldon Road	0.147	2.19
79 Tunwell Lane	0.159	2.26
73 Pen Green Lane	0.189	2.52
Maximum PC	**1.02**	**7.12**
AQS	**40**	**200**
Max PC (as a percentage of AQS)	**2.5%**	**3.6%**
Background	**12.5**	**25.1**
Maximum PEC	**13.5**	**32.2**
Max PEC (as a percentage of AQS)	**34%**	**16%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect on human health	**Not significant**	**Not significant**

There are no predicted exceedances of the long or short-term AQSs for NO_2 at any location off-site. In accordance with the EPUK/IAQM guidance, the air quality impact is *negligible* and will have no significant effects.

Predicted annual and 99.8th percentile of hourly mean NO_2 concentrations are presented as contour plots in **Figure 8.3** and **Figure 8.4** respectively.

Figure 8.3 Predicted Annual Mean NO_2 Concentration (µg/m^3)

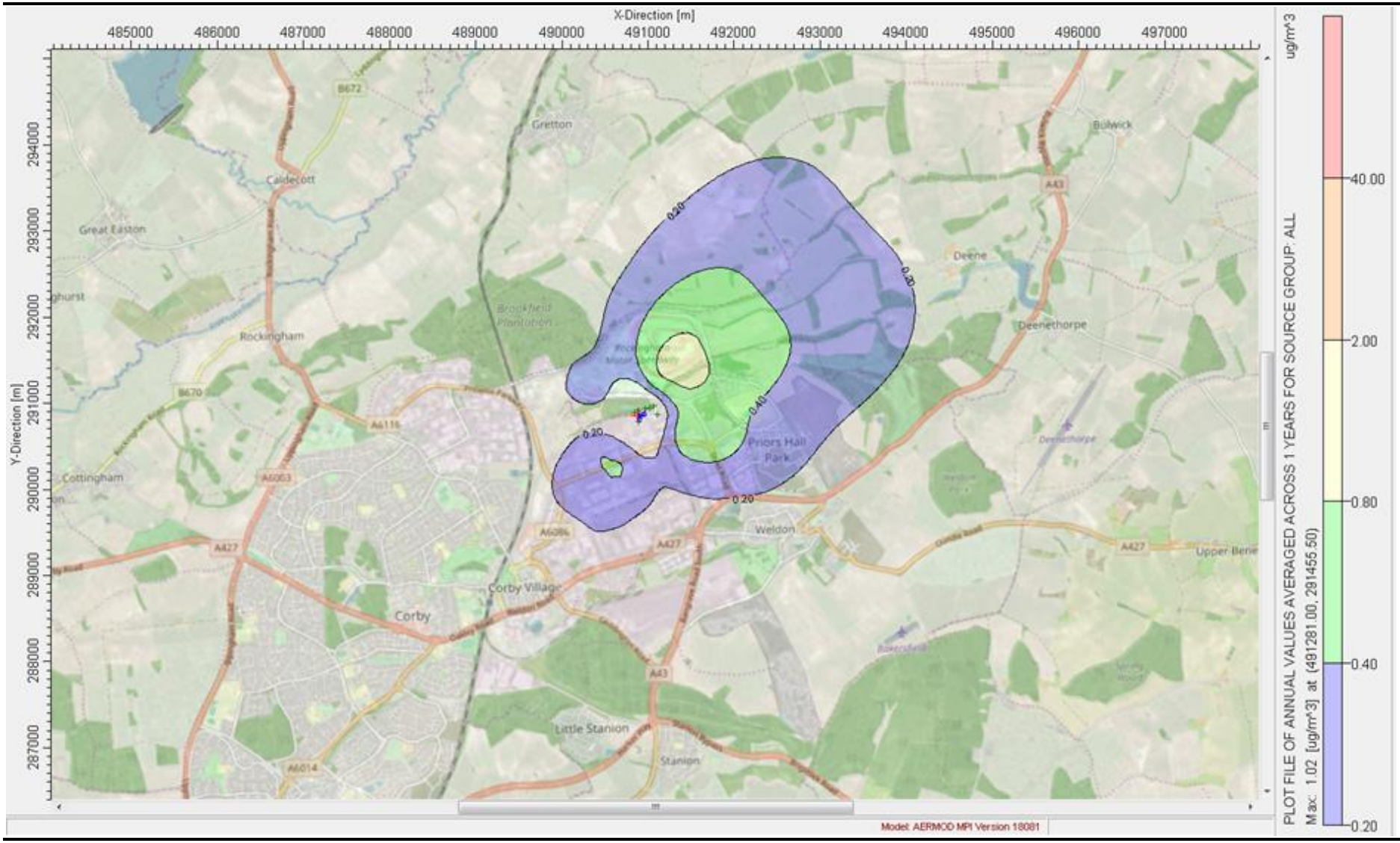
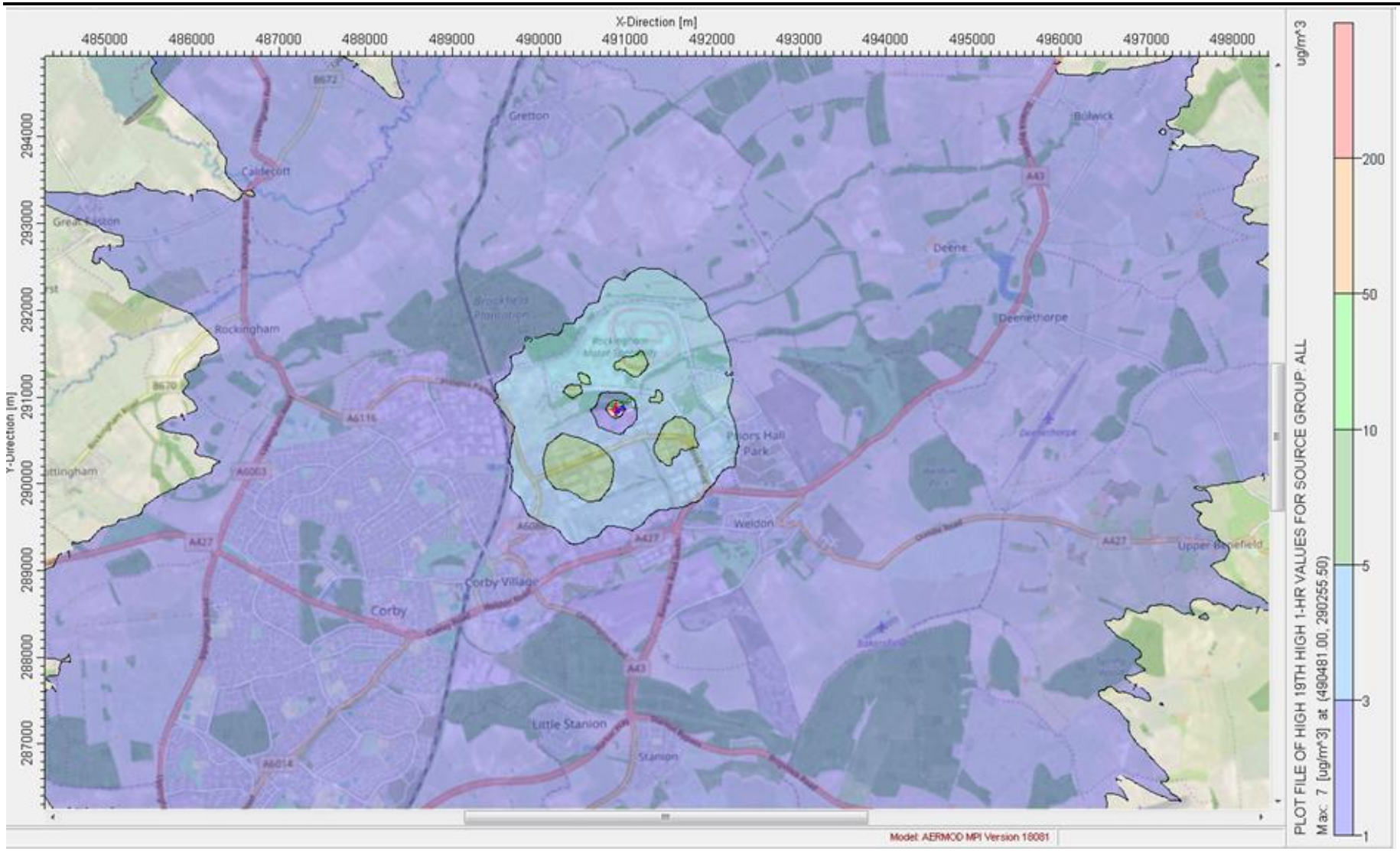


Figure 8.4 Predicted 99.8th Percentile of 1 Hour Mean NO_2 Concentrations (µg/m^3)



8.6.2.3 Carbon Monoxide (CO)

The predicted maximum 1-hour and 8-hour mean ground level CO process contributions are presented in **Table 8.22**.

Table 8.22 Predicted CO Concentrations (ug/m3)

Receptor	Maximum 8-hour mean	Maximum 1-hour mean
Maximum Off-Site	5.14	7.65
Brookfield	2.16	3.79
Weldon Lodge	2.36	4.30
Priors Hall Development/ Corby Business Academy	2.00	4.00
Barnwell Gardens	1.82	2.76
4 Larratt Road	1.53	4.40
143 Corby Road	1.71	3.47
86 Weldon Road	1.29	3.30
79 Tunwell Lane	1.35	2.76
73 Pen Green Lane	1.71	3.59
Maximum PC	**5.14**	**7.65**
AQS	**10000**	**30000**
Max PC (as a percentage of AQS)	**0.051%**	**0.025%**
Background	**560**	**560**
Maximum PEC	**565**	**568**
Max PEC (as a percentage of AQS)	**5.6%**	**1.9%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect on human health	**Not significant**	**Not significant**

The maximum predicted off-site 8-hour and 1-hour PCs are *negligible* and will have no significant effects on human health.

8.6.2.4 Sulphur Dioxide (SO_2)

Predicted SO_2 process contributions are presented in **Table 8.23**.

Table 8.23 Predicted SO_2 Concentrations ($\mu g/m^3$)

Receptor	99.2nd Percentile of 24-Hour Means	99.7th Percentile of 1-hour Means	99.9th Percentile of 15-Minute Means
Maximum Off-Site	2.20	5.01	6.29
Brookfield	0.846	2.26	2.88
Weldon Lodge	1.49	2.55	3.31
Priors Hall Development/ Corby Business Academy	1.02	2.21	2.81
Barnwell Gardens	0.834	2.08	2.67
4 Larratt Road	0.626	1.90	2.37
143 Corby Road	0.849	1.80	2.27
86 Weldon Road	0.550	1.45	1.81
79 Tunwell Lane	0.532	1.53	1.87
73 Pen Green Lane	0.613	1.75	2.18
Maximum PC	**2.20**	**5.01**	**6.29**
AQS	**125**	**350**	**266**
Max PC (as a percentage of AQS)	**1.8%**	**1.4%**	**2.4%**
Background	**4.32**	**4.32**	**4.32**
Maximum PEC	**6.52**	**9.33**	**10.6**
Max PEC (as a percentage of AQS)	**5.2%**	**2.7%**	**4.0%**
Impact on air quality	**Negligible**	**Negligible**	**Negligible**
Significance of effect on human health	**Not significant**	**Not significant**	**Not significant**

The maximum predicted ground level 99.2nd percentile of 24-hour mean, the predicted 99.7th percentile of 1-hour and the predicted 99.9th percentile of 15-minute mean concentrations are all *negligible* and will have no significant effects on human health.

8.6.2.5 Particulate Matter (as PM_{10})

Predicted annual mean and 90.4th percentile of 24-hour mean ground level PM_{10} process contributions are presented in **Table 8.24**. The predictions assume that 100% of the particulate matter emitted is PM_{10}.

Table 8.24 Predicted PM_{10} Concentrations ($\mu g/m^3$)

Receptor	Annual Mean	90.4th Percentile of 24-Hour Means
Maximum Off-Site	0.0727	0.232
Brookfield	0.0225	0.0803
Weldon Lodge	0.0551	0.154
Priors Hall Development/ Corby Business Academy	0.0364	0.0905
Barnwell Gardens	0.0286	0.0778
4 Larratt Road	0.0166	0.0558
143 Corby Road	0.0125	0.0391
86 Weldon Road	0.0105	0.0342
79 Tunwell Lane	0.0114	0.0388
73 Pen Green Lane	0.0135	0.0510
Maximum PC	**0.0727**	**0.232**
AQS	**40**	**50**
Max PC (as a percentage of AQS)	**0.18%**	**0.46%**
Background	**13.6**	**27.1**
Maximum PEC	**13.7**	**27.3**
Max PEC (as a percentage of AQS)	**34.2%**	**54.7%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect on human health	**Not significant**	**Not significant**

There are no predicted exceedances of the long or short-term AQOs for PM_{10} at any location off-site and impacts are *negligible* according to the EPUK/IAQM guidance and will have no significant effects on human health.

Predicted annual and 90.4th percentile of 24-hour mean PM_{10} concentrations are presented as contour plots in **Figure 8.5** and **Figure 8.6** respectively.

Figure 8.5 Predicted Annual Mean PM_{10} Concentration (µg/m^3)

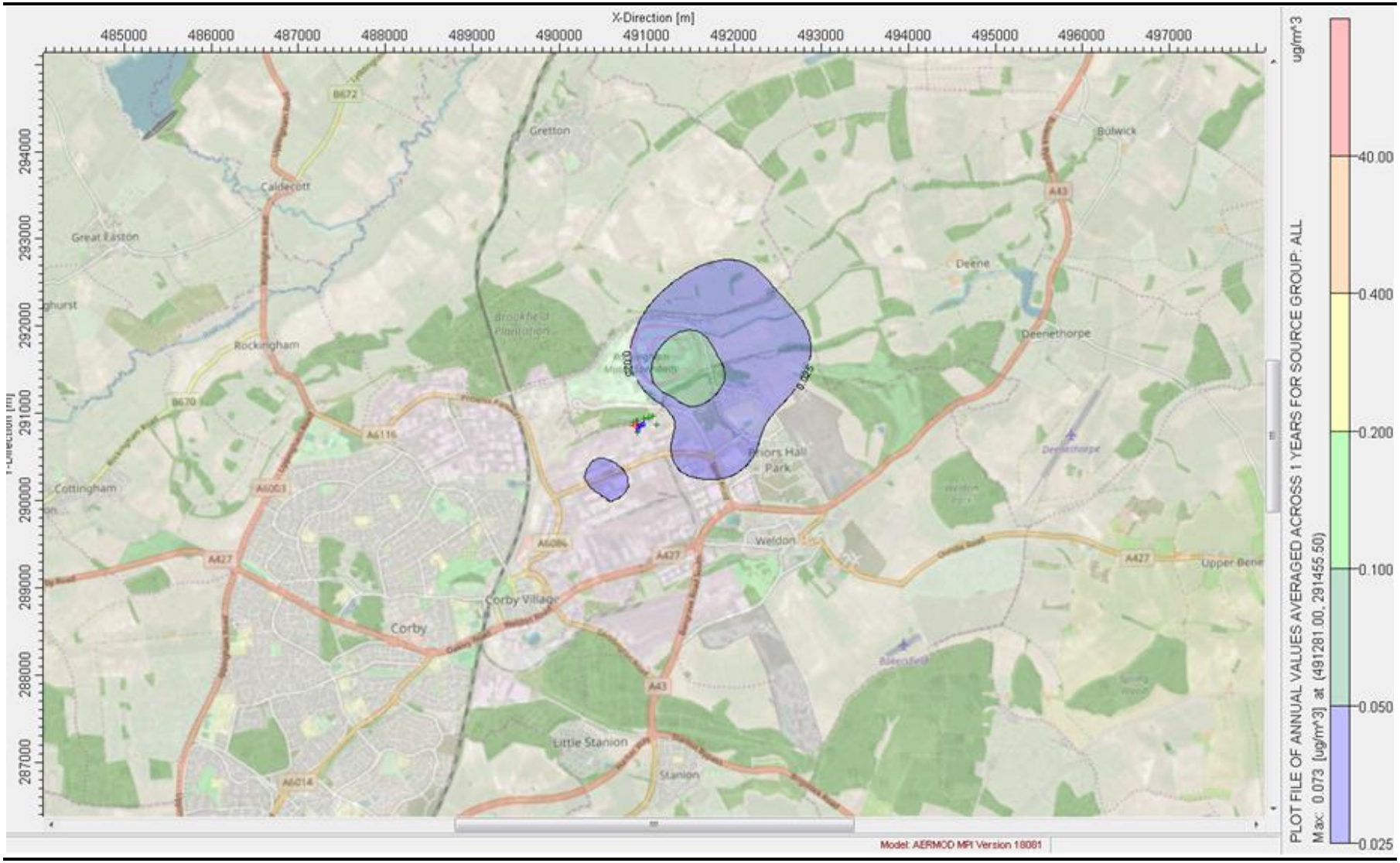
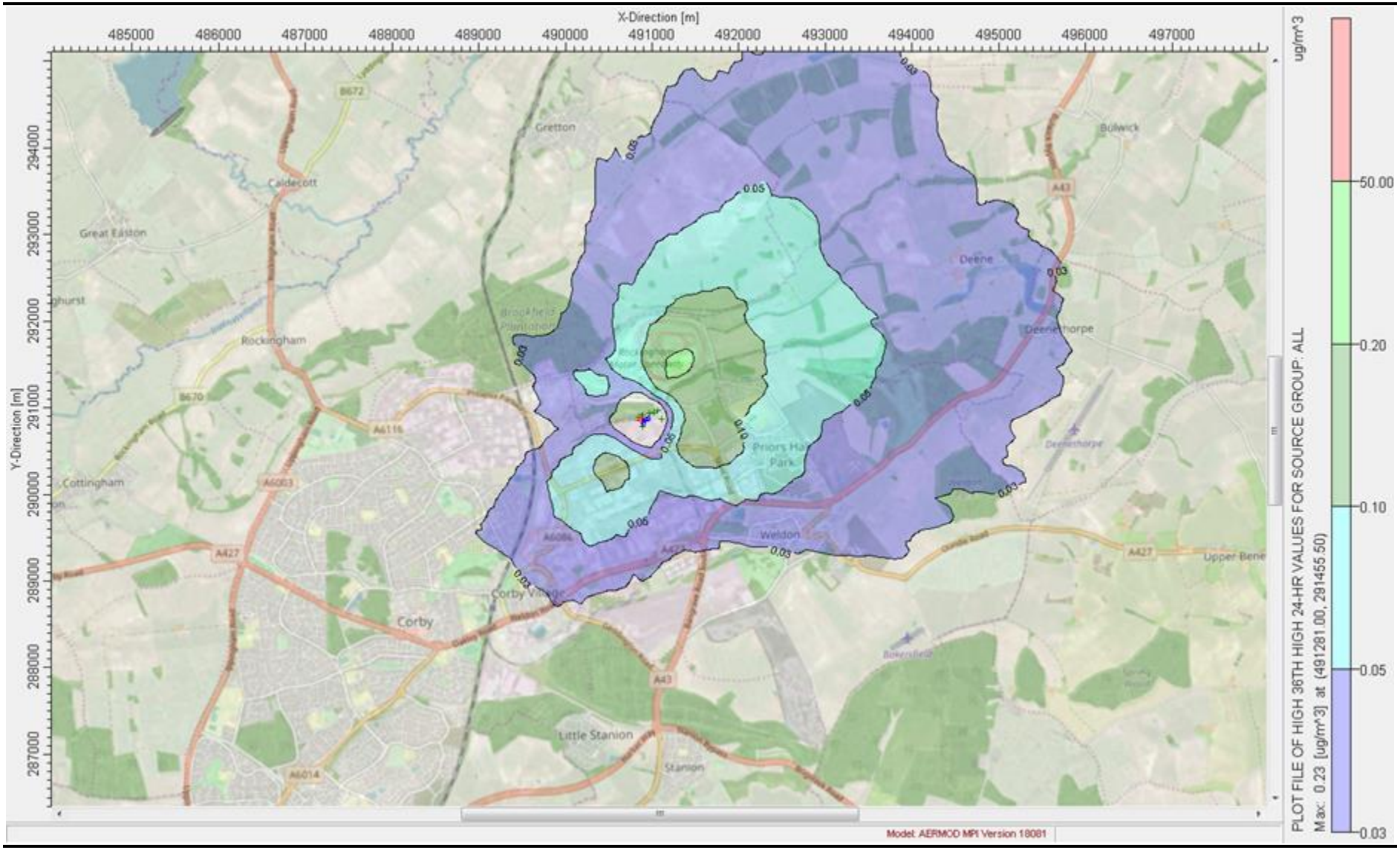


Figure 8.6 Predicted 90.4th Percentile of 24-Hour Mean PM_{10} Concentration (µg/m³)



8.6.2.6 Particulate Matter (as $PM_{2.5}$)

Predicted annual mean ground-level $PM_{2.5}$ process contributions are presented in **Table 8.25**. The predictions assume that 100% of the particulate matter emitted is $PM_{2.5}$.

Table 8.25 Predicted $PM_{2.5}$ Concentrations (µg/m^3)

Receptor	Annual Mean
Maximum Off-Site	0.0727
Brookfield	0.0225
Weldon Lodge	0.0551
Priors Hall Development/ Corby Business Academy	0.0364
Barnwell Gardens	0.0286
4 Larratt Road	0.0166
143 Corby Road	0.0125
86 Weldon Road	0.0105
79 Tunwell Lane	0.0114
73 Pen Green Lane	0.0135
Maximum PC	**0.0727**
AQS	**25**
Max PC (as a percentage of AQS)	**0.29%**
Background	**9.40**
Maximum PEC	**9.47**
Max PEC (as a percentage of AQS)	**37.9%**
Impact on air quality	**Negligible**
Significance of effect on human health	**Not significant**

Predicted maximum ground level $PM_{2.5}$ process contributions are well within the annual mean limit value and the impact is *negligible* and will have no significant effects.

8.6.2.7 Total Organic Carbon (as Benzene)

Predicted annual and 1-hour mean ground-level benzene concentrations (PC) are presented in **Table 8.26**.

Table 8.26 Predicted Benzene Concentration (µg/m^3)

Receptor	Annual Mean	1-Hour Means
Maximum Off-Site	0.0727	1.53
Brookfield	0.0225	0.758
Weldon Lodge	0.0551	0.860
Priors Hall Development/ Corby Business Academy	0.0364	0.800
Barnwell Gardens	0.0286	0.552
4 Larratt Road	0.0166	0.880
143 Corby Road	0.0125	0.695

Receptor	Annual Mean	1-Hour Means
86 Weldon Road	0.0105	0.659
79 Tunwell Lane	0.0114	0.552
73 Pen Green Lane	0.0135	0.718
Maximum PC	**0.0727%**	**1.53%**
AQS	**5**	**195**
Max PC (as a percentage of AQS)	**1.5%**	**0.78%**
Background	**0.342**	**0.684**
Maximum PEC	**0.415**	**2.21**
Max PEC (as a percentage of AQS)	**8.3%**	**1.1%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect on human health	**Not significant**	**Not significant**

Predicted maximum ground level benzene concentrations are well within the relevant air quality standards and the impact is *negligible* and will have no significant effects.

8.6.2.8 Hydrogen Chloride (HCl)

The maximum predicted 1-hour mean ground-level HCl process contributions are presented in **Table 8.27**.

Table 8.27 Predicted HCl Concentration (µg/m^3)

Receptor	1-Hour Mean
Maximum Off-Site	1.53
Brookfield	0.758
Weldon Lodge	0.860
Priors Hall Development/ Corby Business Academy	0.800
Barnwell Gardens	0.552
4 Larratt Road	0.880
143 Corby Road	0.695
86 Weldon Road	0.659
79 Tunwell Lane	0.552
73 Pen Green Lane	0.718
Maximum PC	**1.53**
AQS	**750**
Max PC (as a percentage of AQS)	**0.20%**
Background	**0.424**
Maximum PEC	**1.95**
Max PEC (as a percentage of AQS)	**0.26%**
Air quality impact	**Negligible**
Significance of effect on human health	**Not significant**

The predicted maximum HCl concentrations are well below the AQS and the impact is *negligible* and will have no significant effects.

8.6.2.9 Hydrogen Fluoride (HF)

The predicted maximum monthly and 1-hour mean ground-level HF process contributions are presented in **Table 8.28**.

Table 8.28 Predicted HF Concentrations (µg/m^3)

Receptor	1-Hour Mean	Monthly Means
Maximum Off-Site	0.153	0.0190
Brookfield	0.0758	0.00565
Weldon Lodge	0.0860	0.0110
Priors Hall Development/ Corby Business Academy	0.0800	0.00529
Barnwell Gardens	0.0552	0.00549
4 Larratt Road	0.0880	0.00344
143 Corby Road	0.0695	0.00271
86 Weldon Road	0.0659	0.00253
79 Tunwell Lane	0.0552	0.00289
73 Pen Green Lane	0.0718	0.00429
Maximum PC	**0.153**	**0.019**
AQS	**160**	**16**
Max PC (as a percentage of AQS)	**0.096%**	**0.12%**
Background	**2.46**	**1.23**
Maximum PEC	**2.61**	**1.25**
Max PEC (as a percentage of AQS)	**1.6%**	**7.8%**
Air quality impact	**Negligible**	**Negligible**
Significance of effect on human health	**Not significant**	**Not significant**

Maximum predicted ground level monthly mean and 1-hour mean hydrogen fluoride concentrations are less than 10% of the short-term EPAQS guideline values, therefore the impact is *negligible* and will have no significant effects.

8.6.2.10 Dioxins and Furans

The predicted annual mean ground-level dioxin and furan process contributions at identified sensitive receptor locations are presented in **Table 8.29**.

Table 8.29 Predicted Dioxin and Furan Concentrations (µg/m^3)

Receptor	Annual Mean
Maximum Off-Site	7.27×10^{-10}
Brookfield	2.25×10^{-10}
Weldon Lodge	5.51×10^{-10}
Priors Hall Development/ Corby Business Academy	3.64×10^{-10}

Receptor	Annual Mean
Barnwell Gardens	2.86 x10^{-10}
4 Larratt Road	1.66 x10^{-10}
143 Corby Road	1.25 x10^{-10}
86 Weldon Road	1.05 x10^{-10}
79 Tunwell Lane	1.14 x10^{-10}
73 Pen Green Lane	1.35 x10^{-10}
Maximum PC	**7.27 x10^{-10}**
AQS	-
Max PC (as a percentage of AQS)	-
Background	**9.60 x10^{-9}**
Maximum PEC	**1.03 x10^{-8}**
Max PEC (as a percentage of AQS)	-

There are no assessment criteria for dioxins and furans. The predicted maximum contribution from the Proposed Development is 5.7% of the average background concentration measured at urban monitoring sites in the UK (2013-2017).

8.6.2.11 PAH (as Benzo(a)Pyrene)

The annual mean ground-level B(a)P process contributions are presented in **Table 8.30**.

Table 8.30 Predicted B(a)P Concentrations (µg/m^3)

Receptor	Annual Mean
Maximum Off-Site	6.40 x10^{-7}
Brookfield	1.98 x10^{-7}
Weldon Lodge	4.85 x10^{-7}
Priors Hall Development/ Corby Business Academy	3.20 x10^{-7}
Barnwell Gardens	2.52 x10^{-7}
4 Larratt Road	1.46 x10^{-7}
143 Corby Road	1.10 x10^{-7}
86 Weldon Road	9.25 x10^{-8}
79 Tunwell Lane	1.00 x10^{-7}
73 Pen Green Lane	1.19 x10^{-7}
Maximum PC	**6.40 x10^{-7}**
AQS	**1.00 x10^{-3}**
Max PC (as a percentage of AQS)	**0.064%**
Background	**3.30 x10^{-5}**
Maximum PEC	**3.36 x10^{-5}**
Max PEC (as a percentage of AQS)	**3.4%**
Air quality impact	**Negligible**

Significance of effect on human health	**Not significant**

The maximum predicted off-site annual mean ground level B[a]P concentration is well below the AQS and the impact is *negligible* and will have no significant effects.

8.6.2.12 Ammonia (NH_3)

The predicted annual and maximum 1-hour mean ground-level ammonia concentrations (PC) are presented in **Table 8.31**.

Table 8.31 Predicted NH_3 Concentrations (µg/m^3)

Receptor	Annual Mean	1-Hour Means
Maximum Off-Site	0.0364	0.765
Brookfield	0.0113	0.379
Weldon Lodge	0.0276	0.430
Priors Hall Development/ Corby Business Academy	0.0182	0.400
Barnwell Gardens	0.0143	0.276
4 Larratt Road	0.00832	0.440
143 Corby Road	0.00623	0.347
86 Weldon Road	0.00526	0.330
79 Tunwell Lane	0.00570	0.276
73 Pen Green Lane	0.00676	0.359
Maximum PC	**0.0364**	**0.765**
AQS	**180**	**2500**
Max PC (as a percentage of AQS)	**0.02%**	**0.031%**
Background	**2.01**	**4.03**
Maximum PEC	**2.05**	**4.79**
Max PEC (as a percentage of AQS)	**1.1%**	**0.19%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect on human health	**Not significant**	**Not significant**

Maximum predicted ground level annual mean and 1-hour mean ammonia concentrations are less than 1% and 10% of the long and short-term EALs, therefore the impact is *negligible* and will have no significant effects.

8.6.2.13 Antimony (Sb)

The predicted annual and maximum 1-hour mean ground-level Sb concentrations (PC) are presented in **Table 8.32**.

Table 8.32 Predicted Sb Concentrations (µg/m^3)

Receptor	Annual Mean	1-Hour Means
Maximum Off-Site	8.36 x10^{-5}	1.76 x10^{-3}
Brookfield	2.59 x10^{-5}	8.71 x10^{-4}
Weldon Lodge	6.34 x10^{-5}	9.89 x10^{-4}
Priors Hall Development/ Corby Business Academy	4.19 x10^{-5}	9.20 x10^{-4}
Barnwell Gardens	3.29 x10^{-5}	6.35 x10^{-4}
4 Larratt Road	1.91 x10^{-5}	1.01 x10^{-3}
143 Corby Road	1.43 x10^{-5}	7.99 x10^{-4}
86 Weldon Road	1.21 x10^{-5}	7.58 x10^{-4}
79 Tunwell Lane	1.31 x10^{-5}	6.34 x10^{-4}
73 Pen Green Lane	1.55 x10^{-5}	8.25 x10^{-4}
Maximum PC	**8.36 x10^{-5}**	**1.76 x10^{-3}**
AQS	**5.00**	**150**
Max PC (as a percentage of AQS)	**0.0017%**	**0.0012%**
Background	**1.01 x10^{-3}**	**2.02 x10^{-3}**
Maximum PEC	**1.09 x10^{-3}**	**3.78 x10^{-3}**
Max PEC (as a percentage of AQS)	**0.022%**	**0.0025%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect	**Not significant**	**Not significant**

Maximum predicted ground level annual mean and 1-hour mean antimony are *negligible* and will have no significant effects.

8.6.2.14 Arsenic (As)

The predicted annual mean ground-level As concentrations (PC) are presented in **Table 8.33**. These impacts are based upon the maximum arsenic emissions as reported in the Environment Agency's metals guidance note.

Table 8.33 Predicted As Concentrations (µg/m^3)

Receptor	Annual Mean	Annual Mean
Maximum Off-Site	1.82x10^{-4}	1.82x10^{-4}
Brookfield	5.63x10^{-5}	5.63x10^{-5}
Weldon Lodge	1.38x10^{-4}	1.38x10^{-4}
Priors Hall Development/ Corby Business Academy	9.10x10^{-5}	9.10x10^{-5}
Barnwell Gardens	7.15x10^{-5}	7.15x10^{-5}
4 Larratt Road	4.16x10^{-5}	4.16x10^{-5}
143 Corby Road	3.11x10^{-5}	3.11x10^{-5}
86 Weldon Road	2.63x10^{-5}	2.63x10^{-5}
79 Tunwell Lane	2.85x10^{-5}	2.85x10^{-5}

Receptor	Annual Mean	Annual Mean
73 Pen Green Lane	$3.38x10^{-5}$	$3.38x10^{-5}$
Maximum PC	**$1.82x10^{-4}$**	**$1.82x10^{-4}$**
AQS	**0.006**	**0.003**
Max PC (as a percentage of AQS)	**3.0%**	**6.1%**
Background	**0.0012**	**0.0012**
Maximum PEC	**$1.4x10^{-3}$**	**$1.4x10^{-3}$**
Max PEC (as a percentage of AQS)	**23%**	**47%**
Impact on air quality	**Negligible**	**Minor**
Significance of effect	**Not significant**	**Not significant**

Maximum predicted ground level annual mean arsenic concentrations are predicted to be *minor*, based upon the maximum arsenic emissions at any EfW in the Environment Agency's metals guidance note. Table 8.34 illustrates the predicted impacts of arsenic emissions based upon the mean emissions from the EfWs studied in the Environment Agency metals note, showing that under typical operating conditions impacts would be Not Significant [1].

Table 8.34 Predicted As Concentrations (µg/m^3)

Receptor	Annual Mean	Annual Mean
Maximum Receptor PC	$5.51x10^{-6}$	$5.51x10^{-6}$
AQS	0.006	3.00E-03
Max Receptor PC (as a percentage of AQS)	0.092%	0.18%
Background	$1.22x10^{-3}$	$1.22x10^{-3}$
Maximum Receptor PEC	$1.23x10^{-3}$	$1.23x10^{-3}$
Max Receptor PEC (as a percentage of AQS)	20%	41%
Impact on air quality	Negligible	Negligible
Significance of effect	Not significant	Not significant

8.6.2.15 Cadmium (Cd)

The predicted annual mean ground-level Cd concentrations (PC) are presented in **Table 8.35**. These impacts are based upon the maximum cadmium emissions as reported in the Environment Agency's metals guidance note.

Table 8.35 Predicted Cd Concentrations (µg/m^3)

Receptor	Annual Mean
Maximum Off-Site	$3.64x10^{-4}$
Brookfield	$1.13x10^{-4}$
Weldon Lodge	$2.76x10^{-4}$
Priors Hall Development/ Corby Business Academy	$1.82x10^{-4}$
Barnwell Gardens	$1.43x10^{-4}$
4 Larratt Road	$8.32x10^{-5}$

[1] EA Metals Guidance: maximum arsenic emissions 0.025 mg/Nm^3, mean arsenic emissions 0.001 mg/Nm^3

143 Corby Road	$6.23x10^{-5}$
86 Weldon Road	$5.26x10^{-5}$
79 Tunwell Lane	$5.70x10^{-5}$
73 Pen Green Lane	$6.76x10^{-5}$
Maximum PC	**$3.64x10^{-4}$**
AQS	**0.005**
Max PC (as a percentage of AQS)	**7.3%**
Background	**0.000877**
Maximum PEC	**1.24x10-3**
Max PEC (as a percentage of AQS)	**24.8%**
Impact on air quality	**Minor**
Significance of effect	**Not significant**

Maximum predicted ground level annual mean cadmium concentrations are predicted to be *minor*, based upon the maximum emissions permissable under the Industrial Emissions Directive (noting that cadmium and thallium emissions are sumed). Table 8.36 illustrates the predicted impacts of cadmium emissions based upon the mean emissions from six currently operating EfWs, showing that under typical operating conditions impacts would be Negligible [1].

Table 8.36 Predicted Cd Concentrations (µg/m³)

Receptor	Annual Mean
Maximum Receptor PC	$1.26x10^{-5}$
AQS	0.005
Max Receptor PC (as a percentage of AQS)	0.25%
Background	$8.77x10^{-4}$
Maximum Receptor PEC	$8.90x10^{-4}$
Max Receptor PEC (as a percentage of AQS)	18%
Maximum Receptor PC	$1.26x10^{-5}$
Impact on air quality	Negligible
Significance of effect	Not significant

8.6.2.16 Copper (Cu)

The predicted annual and maximum 1-hour mean ground-level Cu concentrations (PC) are presented in **Table 8.37**.

[1] EfW emissions data information obtained from Environment Agency Environmental Permitting reporting:
MES Dudley EfW (2008) average Cd+Tl emissions: 0.00600mg/Nm^3
MES Wolverhampton (2008) average Cd+Tl emissions: 0.00288 mg/Nm^3
Veolia Marchwood (2008) average Cd+Tl emissions 0.00203 mg/Nm^3
Veolia Quartermaine (2008) average Cd+Tl emissions 0.00229 mg/Nm^3
Newlincs (2008) average Cd+Tl emissions 0.00123 mg/Nm^3
As Cd and Tl are reported together, as a worst case the total sum Cd+Tl velue is used in the calculation, therefore overestimating impacts. Average value used in assessment of typical emissions: 0.00228mg/Nm^3

Table 8.37 Predicted Cu Concentrations (µg/m^3)

Receptor	Annual Mean	1-Hour Means
Maximum Off-Site	$2.11x10^{-4}$	$4.44x10^{-3}$
Brookfield	$6.53x10^{-5}$	$2.20x10^{-3}$
Weldon Lodge	$1.60x10^{-4}$	$2.49x10^{-3}$
Priors Hall Development/ Corby Business Academy	$1.06x10^{-4}$	$2.32x10^{-3}$
Barnwell Gardens	$8.30x10^{-5}$	$1.60x10^{-3}$
4 Larratt Road	$4.82x10^{-5}$	$2.55x10^{-3}$
143 Corby Road	$3.61x10^{-5}$	$2.01x10^{-3}$
86 Weldon Road	$3.05x10^{-5}$	$1.91x10^{-3}$
79 Tunwell Lane	$3.30x10^{-5}$	$1.60x10^{-3}$
73 Pen Green Lane	$3.92x10^{-5}$	$2.08x10^{-3}$
Maximum PC	**$2.11x10^{-4}$**	**$4.44x10^{-3}$**
AQS	**10**	**200**
Max PC (as a percentage of AQS)	**0.0021%**	**0.0022%**
Background	**0.0223**	**0.0446**
Maximum PEC	**0.0225**	**0.0490**
Max PEC (as a percentage of AQS)	**0.23%**	**0.025%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect	**Not significant**	**Not significant**

Maximum predicted ground level annual mean and 1-hour mean copper concentrations are *negligible* and effects are not significant.

8.6.2.17 Total Chromium (CrIII)

The predicted annual and maximum 1-hour mean ground-level CrIII concentrations (PC) are presented in **Table 8.38**

Table 8.38 Predicted CrIII Concentrations (µg/m^3)

Receptor	Annual Mean	1-Hour Means
Maximum Off-Site	$6.69x10^{-4}$	$1.41x10^{-2}$
Brookfield	$2.07x10^{-4}$	$6.97x10^{-3}$
Weldon Lodge	$5.07x10^{-4}$	$7.91x10^{-3}$
Priors Hall Development/ Corby Business Academy	$3.35x10^{-4}$	$7.36x10^{-3}$
Barnwell Gardens	$2.63x10^{-4}$	$5.08x10^{-3}$
4 Larratt Road	$1.53x10^{-4}$	$8.10x10^{-3}$
143 Corby Road	$1.15x10^{-4}$	$6.39x10^{-3}$
86 Weldon Road	$9.67x10^{-5}$	$6.06x10^{-3}$
79 Tunwell Lane	$1.05x10^{-4}$	$5.08x10^{-3}$
73 Pen Green Lane	$1.24x10^{-4}$	$6.60x10^{-3}$
Maximum PC	**$6.69x10^{-4}$**	**0.0142**
AQS	**5**	**150**
Max PC (as a percentage of AQS)	**0.013%**	**0.0094%**
Background	**0.00392**	**0.00785**
Maximum PEC	**$4.95x10^{-3}$**	**0.0219**
Max PEC (as a percentage of AQS)	**0.092%**	**0.015%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect	**Not significant**	**Not significant**

Maximum predicted ground level annual mean and 1-hour mean CrIII concentrations are *negligible* and will have no significant effects.

8.6.2.18 Chromium VI (CrVI)

The predicted annual mean ground-level CrVI concentrations (PC) are presented in **Table 8.39.**

Table 8.39 Predicted CrVI Concentrations (µg/m^3)

Receptor	Annual Mean
Maximum Off-Site	9.45 $x10^{-7}$
Brookfield	2.93 $x10^{-7}$
Weldon Lodge	7.17 $x10^{-7}$
Priors Hall Development/ Corby Business Academy	4.73 $x10^{-7}$
Barnwell Gardens	3.72 $x10^{-7}$
4 Larratt Road	2.16 $x10^{-7}$
143 Corby Road	1.62 $x10^{-7}$
86 Weldon Road	1.37 $x10^{-7}$
79 Tunwell Lane	1.48 $x10^{-7}$

Receptor	Annual Mean
73 Pen Green Lane	1.76 x10^{-7}
Maximum PC	**9.45 x10^{-7}**
AQS	**2.00 x10^{-4}**
Max PC (as a percentage of AQS)	**0.47%**
Background	**5.54 x10^{-6}**
Maximum PEC	**6.49 x10^{-6}**
Max PEC (as a percentage of AQS)	**3.2%**
Impact on air quality	**Negligible**
Significance of effect	**Not significant**

Maximum predicted ground level annual mean CrVI concentrations are *negligible* and will have no significant effects.

8.6.2.19 Manganese (Mn)

The predicted annual and maximum 1-hour mean ground-level Mn concentrations (PC) are presented in **Table 8.40**.

Table 8.40 Predicted Mn Concentrations (µg/m^3)

Receptor	Annual Mean	1-Hour Means
Maximum Off-Site	4.36x10^{-4}	9.18x10^{-3}
Brookfield	1.35x10^{-4}	4.55x10^{-3}
Weldon Lodge	3.31x10^{-4}	5.16x10^{-3}
Priors Hall Development/ Corby Business Academy	2.18x10^{-4}	4.80x10^{-3}
Barnwell Gardens	1.72x10^{-4}	3.31x10^{-3}
4 Larratt Road	9.98x10^{-5}	5.28x10^{-3}
143 Corby Road	7.47x10^{-5}	4.17x10^{-3}
86 Weldon Road	6.31x10^{-5}	3.96x10^{-3}
79 Tunwell Lane	6.83x10^{-5}	3.31x10^{-3}
73 Pen Green Lane	8.11x10^{-5}	4.31x10^{-3}
Maximum Receptor PC	**4.36x10^{-4}**	**9.18x10^{-3}**
AQS	**0.15**	**1500**
Max PC (as a percentage of AQS)	**0.29%**	**0.00061%**
Background	**0.00927**	**0.0185**
Maximum PEC	**9.71x10-3**	**0.0277**
Max PEC (as a percentage of AQS)	**6.5%**	**0.0019%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect	**Not significant**	**Not significant**

Maximum predicted ground level annual mean and 1-hour mean Mn concentrations are *negligible* and will have no significant effects.

8.6.2.20 Mercury (Hg)

The predicted annual and maximum 1-hour mean ground-level Hg concentrations (PC) are presented in **Table 8.41**.

Table 8.41 Predicted Hg Concentrations (µg/m^3)

Receptor	Annual Mean	1-Hour Means
Maximum Off-Site	$3.64x10^{-4}$	$7.65x10^{-3}$
Brookfield	$1.13x10^{-4}$	$3.79x10^{-3}$
Weldon Lodge	$2.76x10^{-4}$	$4.30x10^{-3}$
Priors Hall Development/ Corby Business Academy	$1.82x10^{-4}$	$4.00x10^{-3}$
Barnwell Gardens	$1.43x10^{-4}$	$2.76x10^{-3}$
4 Larratt Road	$8.32x10^{-5}$	$4.40x10^{-3}$
143 Corby Road	$6.23x10^{-5}$	$3.47x10^{-3}$
86 Weldon Road	$5.26x10^{-5}$	$3.30x10^{-3}$
79 Tunwell Lane	$5.70x10^{-5}$	$2.76x10^{-3}$
73 Pen Green Lane	$6.76x10^{-5}$	$3.59x10^{-3}$
Maximum Receptor PC	**$3.64x10^{-4}$**	**$7.65x10^{-3}$**
AQS	**0.25**	**7.5**
Max PC (as a percentage of AQS)	**0.145%**	**0.102%**
Background	**0.0000445**	**0.0000890**
Maximum PEC	**$3.68x10^{-3}$**	**0.0766**
Max PEC (as a percentage of AQS)	**0.147%**	**0.102%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect	**Not significant**	**Not significant**

Maximum predicted ground level annual mean and 1 hour mercury concentrations are *negligible* and will have no significant effects.

8.6.2.21 Nickel (Ni)

The predicted annual mean ground-level Ni concentrations (PC) are presented in **Table 8.42** These impacts are based upon the maximum nickel emissions as reported in the Environment Agency's metals guidance note.

Table 8.42 Predicted Ni Concentrations (µg/m^3)

Receptor	Annual Mean
Maximum Off-Site	$1.60x10^{-3}$
Brookfield	$4.95x10^{-4}$
Weldon Lodge	$1.21x10^{-3}$
Priors Hall Development/ Corby Business Academy	$8.01x10^{-4}$
Barnwell Gardens	$6.30x10^{-4}$
4 Larratt Road	$3.66x10^{-4}$
143 Corby Road	$2.74x10^{-4}$
86 Weldon Road	$2.31x10^{-4}$
79 Tunwell Lane	$2.51x10^{-4}$
73 Pen Green Lane	$2.97x10^{-4}$
Maximum PC	**$1.63x10^{-3}$**
AQS	**0.02**
Max PC (as a percentage of AQS)	**8.0%**
Background	**0.00148**
Maximum PEC	**$3.08x10^{-3}$**
Max PEC (as a percentage of AQS)	**15%**
Impact on air quality	**Minor**
Significance of effect	**Not significant**

Maximum predicted ground level annual mean nickel concentrations are predicted to be *minor*, based upon the maximum nickel emissions at any EfW in the Environment Agency's metals guidance note. Table 8.43 illustrates the predicted impacts of nickel emissions based upon the mean emissions from the EfWs studied in the Environment Agency's metals note, showing that under typical operating conditions impacts would be Negligible.

Table 8.43 Predicted Ni Concentrations (µg/m^3)

Receptor	Annual Mean
Maximum Receptor PC	8.27x10-5
AQS	0.02
Max Receptor PC (as a percentage of AQS)	0.41%
Background	$1.48x10^{-3}$
Maximum Receptor PEC	$1.56x10^{-3}$
Max Receptor PEC (as a percentage of AQS)	7.8%
Maximum Receptor PC	$8.27x10^{-5}$
Impact on air quality	Negligible
Significance of effect	Not significant

8.6.2.22 Thallium (Tl)

The predicted annual and maximum 1-hour mean ground-level Tl concentrations (PC) are presented in **Table 8.44**

Table 8.44 Predicted Tl Concentrations (µg/m^3)

Receptor	Annual Mean	1-Hour Means
Maximum Off-Site	$3.64x10^{-4}$	$7.65x10^{-3}$
Brookfield	$1.13x10^{-4}$	$3.79x10^{-3}$
Weldon Lodge	$2.76x10^{-4}$	$4.30x10^{-3}$
Priors Hall Development/ Corby Business Academy	$1.82x10^{-4}$	$4.00x10^{-3}$
Barnwell Gardens	$1.43x10^{-4}$	$2.76x10^{-3}$
4 Larratt Road	$8.32x10^{-5}$	$4.40x10^{-3}$
143 Corby Road	$6.23x10^{-5}$	$3.47x10^{-3}$
86 Weldon Road	$5.26x10^{-5}$	$3.30x10^{-3}$
79 Tunwell Lane	$5.70x10^{-5}$	$2.76x10^{-3}$
73 Pen Green Lane	$6.76x10^{-5}$	$3.59x10^{-3}$
Maximum PC	**$3.64x10^{-4}$**	**$7.65x10^{-3}$**
AQS	**1**	**30**
Max PC (as a percentage of AQS)	**0.036%**	**0.025%**
Background	-	-
Maximum PEC	**$3.64x10^{-3}$**	**$7.65x10^{-3}$**
Max PEC (as a percentage of AQS)	**0.036%**	**0.025%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect	**Not significant**	**Not significant**

Maximum predicted ground level annual mean and 1-hour mean Tl concentrations *negligible* and the effects will be not significant.

8.6.2.23 Lead (Pb)

The predicted annual mean ground-level Pb concentrations (PC) are presented in **Table 8.45**

Table 8.45 Predicted Pb Concentrations (µg/m^3)

Receptor	Annual Mean
Maximum Off-Site	$3.66x10^{-4}$
Brookfield	$1.13x10^{-4}$
Weldon Lodge	$2.77x10^{-4}$
Priors Hall Development/ Corby Business Academy	$1.83x10^{-4}$
Barnwell Gardens	$1.44x10^{-4}$
4 Larratt Road	$8.37x10^{-5}$
143 Corby Road	$6.26x10^{-5}$

Receptor	Annual Mean
86 Weldon Road	$5.29x10^{-5}$
79 Tunwell Lane	$5.73x10^{-5}$
73 Pen Green Lane	$6.80x10^{-5}$
Maximum PC	**$3.66x10^{-4}$**
AQS	**1**
Max PC (as a percentage of AQS)	**0.073%**
Background	**0.0200**
Maximum PEC	**0.0204**
Max PEC (as a percentage of AQS)	**4.1%**
Impact on air quality	**Negligible**
Significance of effect	**Not significant**

Maximum predicted ground level annual mean lead concentrations are *negligible* and the effects will be not significant.

8.6.2.24 Vanadium (V)

The predicted annual and maximum 1-hour mean ground-level V concentrations (PC) are presented in **Table 8.46**

Table 8.46 Predicted V Concentrations (µg/m^3)

Receptor	Annual Mean	1-Hour Means
Maximum Off-Site	$4.36x10^{-5}$	$9.18x10^{-4}$
Brookfield	$1.35x10^{-5}$	$4.55x10^{-4}$
Weldon Lodge	$3.31x10^{-5}$	$5.16x10^{-4}$
Priors Hall Development/ Corby Business Academy	$2.18x10^{-5}$	$4.80x10^{-4}$
Barnwell Gardens	$1.72x10^{-5}$	$3.31x10^{-4}$
4 Larratt Road	$9.98x10^{-6}$	$5.28x10^{-4}$
143 Corby Road	$7.47x10^{-6}$	$4.17x10^{-4}$
86 Weldon Road	$6.31x10^{-6}$	$3.96x10^{-4}$
79 Tunwell Lane	$6.83x10^{-6}$	$3.31x10^{-4}$
73 Pen Green Lane	$8.11x10^{-6}$	$4.31x10^{-4}$
Maximum PC	**$4.36x10^{-5}$**	**$9.18x10^{-4}$**
AQS	**5**	**1**
Max PC (as a percentage of AQS)	**0.00087%**	**0.092%**
Background	**0.000882**	**0.00176**
Maximum PEC	**$9.26x10^{-4}$**	**$2.68x10^{-3}$**
Max PEC (as a percentage of AQS)	**0.019%**	**0.27%**
Impact on air quality	**Negligible**	**Negligible**
Significance of effect	**Not significant**	**Not significant**

Maximum predicted ground level annual mean and 1-hour mean V concentrations are *negligible* and the effects will be not significant.

8.6.2.25 Summary of Stack Emissions Impact

A summary of the significance of the predicted significance of the impact on pollutant concentrations at receptor locations is presented in **Table 8.47**

Table 8.47 Summary of Impact Significance for Stack Emissions

Pollutant	Significance
NO_2	Not significant
CO	Not significant
SO_2	Not significant
PM_{10}	Not significant
$PM_{2.5}$	Not significant
TOC (as benzene)	Not significant
HCl	Not significant
HF	Not significant
Dioxins and furans	Not applicable
PAH (as Benzo(a)Pyrene)	Not significant
NH_3	Not significant
Sb	Not significant
As	Not significant
Cd	Not significant
Cu	Not significant
Total chrome (CrIII)	Not significant
CrVI	Not significant
Mn	Not significant
Hg	Not significant
Ni	Not significant
Tl	Not significant
Pb	Not significant
V	Not significant

8.6.3 Habitat Impact (Updated Assessment)

The detailed results of the assessment steps are set out in **Appendix 8.1**. The screening steps identified that potential effects could arise only at Weldon Park SSSI, and only for acid deposition. This impact is discussed further in Chapter 11 (Ecology and Nature Conservation).

8.6.4 Odour Impact (No material change from 2016 ES)

Effective odour management and mitigation is a key requirement for this type of process and forms part of the primary design parameters.

The Proposed Development has been designed with a hierarchy of odour control and abatement measures to ensure that the potential for odour impacts is mitigated. An overview of the measures are provided in **Table 8.48**.

Table 8.48 Proposed Odour Control Measures

Tier	Reference	Description
1	Inventory Control	The Installation has been designed to be able to process approximately 260,000 tonnes per annum. The feedstock will be predominantly derived from RDF and mixed source waste with a low putrescible content. The Site has been designed with a Tipping Hall that will be managed in a manner that prevents wastes being accepted into the Site in the event that the Site is inoperable.
2	Sealed Building	The building that houses the tipping area has been designed to be operated under negative pressure. The building has been designed with internal extraction that will control the pressure at a nominal negative pressure of 50 Pascals. All door openings have been designed to be fast acting and will be operated with air curtains to maintain building pressure and odour control during the short time periods when the doors are opened. The building pressure will be maintained through the use of a fully automated building management system.

Taking account of the design measures and plant identified in Table 8.48, consideration of the potential off-site odour impacts has been assessed from each stage of the process in relation to the receptors near the Site, as identified in **Table 8.49**.

Table 8.49 Assessment of Odour Potential and Associated Mitigating Measures

Potential Source of Activity	Discussion and Mitigation	Odour Impact
Waste carrier arrives on-site. Odour emissions from waste vehicle.	Waste will be transported in covered and sealed vehicles, most wastes, particularly commercial and industrial sourced wastes will be transported in sealed bags and containers. The likelihood of delivery vehicles having to wait in the yard for prolonged periods is minimal, due to the rapid turnaround of vehicles	Negligible
Waste unloaded into tipping hall and sorted	This part of the process represents one of the greatest potential odour sources within the building. In the event that any waste falls outside of the specified criteria or if in the unlikely event that the plant is inoperative, this will be removed from site as soon as possible. The proposed abatement technology will be able to abate such odours to ensure negligible impacts beyond the Site boundary. Any spillages will be cleaned immediately.	Negligible
Vehicle exists building	Operating protocols and a physical barrier (ramp/hump) stopping vehicles from entering the unloading bay will prevent track-out of waste residues. A minimum daily wash-down of the	Negligible

Potential Source of Activity	Discussion and Mitigation	Odour Impact
	tipping halland unloading bay and disinfection will ensure track-out is highly unlikely to occur. Site operatives will be trained to visually inspect these areas during and after each delivery	
Combustion Process	Emissions to air from the combustion of waste to heat water and produce super-heated steam. Odours associated with this release point are considered to be negligible	Negligible
Power Generation	The final part of the process will comprise of power generation by a steam turbine and generator set. Odour emissions from this source is considered to be negligible.	Negligible
Fugitive odour emissions	As this is a new build facility which is designed to a very high standard employing the latest technology, the potential for fugitive emissions is considered to be negligible.	Negligible

8.7 Assessment of Cumulative Effects

A summary of cumulative schemes in the area is presented in Chapter 3 (EIA Methdology).

As identified earlier in this chapter, the Proposed Development will result in *negligible* effects on air quality, dust nuisance, human health, sensitive habitats and odour nuisance during the construction and operational phases for all pollutants and at all receptor locations, except for acid deposition at Weldon Park SSSI (which Chapter 11 Ecology and Nature Conservation confirms is not significant)..

Considering the above and the fact that the cumulative schemes:

- do not comprise any large combustion facilities;
- need to have appropriate mitigation in place themselves with regards to odour and dust nuisance and traffic increase; and
- impact other receptors (especially with regards to traffic increase and odour and dust nuisance) due to the different location of the cumulative schemes;

  cumulative impacts are not expected to be be significant.

8.8 Enhancement, Mitigation and Residual Effects

8.8.1 Construction Dust

It is recommended that the following 'best practice' measures be implemented, as appropriate during the construction phase:

- ensure effective site planning locating layout machinery and dust causing activities away from sensitive receptors;
- erect solid barriers around the Site boundary and ensure these are kept clean at all times;
- all vehicles should switch of engines when not in use i.e. no idling vehicles should occur on site;
- no site runoff of water or mud should be allowed so that trackout off-site is avoided;
- ensure stockpiles are kept for the shortest time possible and, if necessary, the use of sprinklers and hoses for dampening of exposed soil and materials should be employed;

- ensure an adequate supply of water on site if using sprinklers and hoses for dust suppression;
- where possible, enclosed chutes and covered skips should be used;
- observation of wind speed and direction prior to conducting dust-generating activities to determine the potential for dust nuisance to occur, avoiding potentially dustt generating activities during periods when wind direction may carry dust into sensitive areas and avoiding dust-generating operations during periods of high or gusty winds;
- stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of prevailing wind directions and seasonal variations in the prevailing wind;
- completed earthworks should be covered or vegetated as soon as is practicable;
- regular inspection of local highways and site boundaries to check for dust deposits (and removal if necessary);
- visual inspection of site perimeter to check for dust deposition (evident as soiling and marking) on vegetation, cars and other objects and taking remedial measures if necessary;
- ensure concrete batcher, where used, has a permit to operate and is operated in accordance with Process Guidance Note 3/1 (04);
- use of dust-suppressed tools for all operations;
- ensuring that all construction plant and equipment is maintained in good working order;
- ensure an adequate supply of equipment on site to clean any dry spillages;
- only use registered waste carriers to remove waste from site;
- no unauthorised burning of any material anywhere on site.
- construction vehicles should be kept clean and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

It is recommended that liaison with the Local Authority be maintained throughout the construction process, and any incidents which lead to excessive elevation of dust deposition and/or PM_{10} concentrations at neighbouring sensitive receptors are reported to the Environmental Health Department. If complaints are received from local residents, these will be documented in a diary or log held on site by the Site Manager. A nominated member of the construction team (e.g. Site Manager) will also act as a point of contact for residents who may be concerned about elevated deposition of dust.

The overall sensitivity of the Site is considered to be ‘medium’, based on the IAQM guidance. The overall significance of potential dust impacts based on this guidance and professional judgement are considered to be negligible following the implementation of appropriate and best practice mitigation measures as detailed above.

8.8.2 Stack Emissions

Air quality impacts associated with emissions from the Proposed Development are negligible in the large majority of cases for sensitive human receptors. Minor impacts are predicted to arise for a small number of metals when assuming that emissions arise at the highest concentrations observed in UK EfWs; however, these impacts are negligible when considering typicaly emissions which are considerably lower. In practice, all effects are expected to be not significant.

In terms of sensitive ecological receptors only one instance of Process Contribution exceeding a ‘significant contribution’ threshold has been identified. This is acid deposition at Weldon Park SSSI, and this is discussed further in Chapter 11 (Ecology and Nature Conservation.)

8.8.3 Odour

The proposed mitigation measures inherently designed into the process are considered adequate to control odour emissions from the proposed installation.

However, it is also recommended that an Odour Management Plan and Standard Operating Procedures are developed for the Site prior to its operation. This will form part of an application to the Environment Agency for an Environmental Permit for the Site. These procedures should be strictly followed and reviewed on an annual basis.

It is also recommended that spare parts for the key and more specialist plant are kept on site so that in the event of equipment failure, waste is not stored for prolonged periods of time.

8.9 Differences from the Consented Development

The main differences to the extant permission with regards to impacts on air quality are the stack height, which was 45m in 2016 as opposed to 75m with the updated plan, a different layout and different emissions.

With regards to odour impacts, impacts during construction, impacts from traffic emissions and impacts on human health, the mitigation requirements and residual effects are similar, if not the same as reported in the 2016 ES.

Some ecological receptors were not assessed in 2016 and are now included in this assessment or considered in more detail. This includes SSSIs within a 15km area from the Site, and identified the potential for a likely significant effect due to acid deposition at Weldon Park SSSI.

8.10 Summary

An assessment has been carried out to determine the local air quality impacts associated with the construction and operation of the Proposed Development.

A qualitative assessment of the impact of dust generating activities has been carried out in accordance with the Institute of Air Quality Management Guidance. Due to the distance of sensitive receptors from the Site boundary the risk of dust nuisance and human health or ecological impacts is considered to be negligible and no significant effects are predicted.

The numbers of vehicles associated with construction are not predicted to lead to significant effects in terms of total emissions or construction duration.

Detailed air quality modelling using the AERMOD dispersion model has been undertaken to predict the impacts associated with stack emissions at the Site. Emissions from the stacks have been assumed to be at IED limits for pollutants other than the metals, and based upon Environment Agency guidance for the metals. Actual emissions from the Site are anticipated to be within IED limits and impacts therefore lower.

The magnitude of the maximum predicted process contributions at nearby sensitive human receptors has been assessed as negligible in the large majority of cases. Where minor impacts are identified for metals, it is noted that these are based upon the maximum emissions taken from the Environment Agency guidance on assessment of Group 3 metals, and that in practice effects are likely to be not significant.

At the sensitive habitat sites, the predicted process contributions are insignificant compared with the relevant critical levels (airborne concentrations) and critical load functions (nutrient nitrogen and acid deposition), with the exception of acid deposition at Weldon Park SSSI.

The impact of operational traffic associated with the Proposed Development has been assessed as negligible.

Odour impacts associated with the Site will be effectively mitigated by the design of the installation and the implementation of an Odour Management Plan and will be not significant.

A summary of the air quality significance and residual effects for the Site is presented in **Table 8.50**.

Table 8.50 Air Quality Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Dust generated during demolition/ construction phases	Temporary	Not significant	Best practice mitigation measures	Not significant
Emissions from construction traffic	Temporary	Not significant	None	Not significant
Emissions from combustion facilities	Permanent	Not significant for human health Further assessment required of effect of acid deposition on Weldon Park SSSI	None To be identified through ecological assessment	Not significant To be identified through ecological assessment
Emissions from operational traffic	Permanent	Not significant	None	Not significant
Odour generated during operational phase	Permanent	Not significant	Process design and controls. Management Plan Implementation	Not significant

8.11 References

Ref 8.1 Industrial Emissions Directive (IED)

Ref 8.2 Environment Agency (accessed December 2018) Air emissions risk assessment for your environmental permit;

Ref 8.3. Environment Agency (2014) AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air;

Ref 8.4 Environment Agency (undated) Conversion Ratios for NOX and NO2;

Ref 8.5 Environment Agency (2016) Releases from waste incinerators: Guidance on assessing group 3 metal stack emissions from incinerators;

Ref 8.6. Institute of Air Quality Management (2017) Land-Use Planning & Development Control: Planning For Air Quality; and

Ref 8.7 Defra (2016) Local Air Quality Management Technical Guidance (TG16) and associated Defra LAQM Guidance

Ref 8.8 DEFRA Air Quality Information Resource (UK-AIR)

Ref 8.9 European Commission (1992) Habitats Directive (92/43/EEC)

Ref 8.10 European Commission (2009) Birds Directive (2009/147/EC)

Ref 8.11 DEFRA (1981) Wildlife and Countryside Act

Ref 8.12 Environment Agency AQTAG(06) document

Ref 8.13 The European Directive on Ambient Air and Cleaner Air for Europe

Ref 8.14 DEFRA (2011) Air Quality Strategy for England, Scotland, Wales & Northern Ireland

Ref 8.15 DEFRA (2000) Air Quality (England) Regulations

Ref 8.16 DEFRA (1995) Environmental Act

Ref 8.17 Ministry of Housing, Communities and Local Government (2018) National Planning Policy Framework.

Ref 8.18 Northamptonshire County Council (2017) Northamptonshire Minerals and Waste Local Plan

Ref 8.19 North Northamptonshire Joint Planning Unit (2016) North Northamptonshire Joint Core Strategy 2011 – 2031

Ref 8.20 The Air Quality Standards Regulations 2010 Statutory Instrument 2008/301, http://www.legislation.gov.uk/uksi/2010/1001/contents/made

Ref 8.21 European Union Air Quality Standards, http://ec.europa.eu/environment/air/quality/standards.htm

Ref 8.22 The Environmental Permitting (England and Wales) (Amendment) Regulations 2013

Ref 8.23 http://www.apis.ac.uk/