LAKESIDE EFW

Ch 6

Air quality

6

6 Air quality

Introduction

6.1 Fichtner Consulting Engineers Ltd was appointed to undertake the assessment of the potential for effects on air quality, including as a result of construction dust, road traffic movements during construction, and the emission of flue gases from the stacks. The findings of the assessment are summarised in this chapter and the full report is included as technical appendix D. The data sources and references used in the assessment are shown in table 6.1. The potential for effects on human health as a result of inhalation and ingestion of pollutants that accumulate in the environment is assessed in chapter 7 of the ES.

APIS website: www.apis.ac.uk
Defra, 2019, Clean Air Strategy 2019
Defra, 2018, Local Air Quality Management – Technical Guidance (TG)16
Defra, 2018, National Atmospheric Emissions Inventory: Air Pollution Inventories for England, Scotland, Wales and Northern Ireland: 1990-2016
Defra, 2018, Nitrogen dioxide fall off with distance calculator v4.2
Defra, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland
Environment Agency, 2016, Air Emissions Risk Assessment for your Environmental Permit
Environment Agency, 2016, Guidance on assessing group 3 metals stack emissions from incinerators – V.4
Environment Agency, 2013, AQTAG 17 – Guidance on in combination assessments for aerial emissions from Environmental Permitting Regulations (EPR) permits
Environment Agency, 2012, Operational Instruction 67_12: Detailed assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation
Environment Agency, 2012, Operational Instruction 66_12: Simple assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation
Environment Agency, 2003, Horizontal Guidance Note IPPC H1 Integrated Pollution Prevention and Control (IPPC) Environmental Assessment and Appraisal of BAT
Environmental Protection UK (EPUK) and Institute of Air Quality Management, 2017, Land-Use Planning & Development Control: Planning for Air Quality
Expert Panel on Air Quality Standards (EPAQS), 2006, Guidelines for Halogens and Hydrogen Halides in Ambient Air for Protecting Human Health against Acute Irritancy Effects
Institute of Air Quality Management, 2016, Guidance on the Assessment of Dust from Demolition and Construction v1.1
Table 6.1: References and data sources

Legislation and policy

Legislation

6.2 Part IV of the Environment Act 1995 introduced a system of local air quality management (LAQM). This requires local authorities to review and assess air quality within their boundaries against a series of objectives. The *Air Quality Strategy* (2007) established the policy framework for ambient air quality management and assessment in the UK and set out national air quality objectives. Where these are unlikely to be met, a local authority must designate an air quality management area (AQMA) and draw up an air quality action plan. The government published its *Clean Air Strategy* in January 2019. This set out the methods by which air pollution from all sectors will be reduced, but did not introduce any new air quality objectives.

6.3 The Air Quality Standards Regulations 2010 (as amended) implement the EC's Directive 2008/50/EC on ambient air quality and cleaner air for Europe and Directive 2004/107/EC. The regulations set out a series of mandatory limit values assigned to individual pollutants, based on an assessment of the effects of each pollutant on public health. These limit values are the same as the national air quality objectives, but differ in terms of compliance dates, locations where they apply and the legal responsibility for ensuring they are complied with.

6.4 The Industrial Emissions Directive (2010/75/EU) covers almost all regulation of industrial processes within the EU. It requires the European Commission to develop Best Available Techniques (BAT) reference documents (referred to as BREFs). The final draft Waste Incineration BREF was published in December 2018 and is likely to be formally adopted in the third quarter of 2019. Atmospheric emissions from industrial processes are controlled in the UK through the Environmental Permitting (England and Wales) Regulations 2010 and subsequent amendments. When the BREF is implemented, the Environment Agency will have to review and implement conditions within all environmental permits requiring operators to comply with emissions limits set out in the BREF. These are more stringent than those currently set out in the Industrial Emissions Directive.

6.5 In addition to the air quality objectives and limit values described above, the Environment Agency sets out environmental assessment levels for other pollutants in its (2016) *Air Emissions Risk Assessment for your Environmental Permit.* Standards and objectives for the protection of sensitive ecosystems and habitats are also contained within this guidance, as well as in the online Air Pollution Information System (APIS).

6.6 For the purposes of this assessment, the various limit values, objectives and environmental assessment levels are collectively referred to as air quality assessment levels (AQALs). Tables 6.2, 6.3 and 6.4 summarise the AQALs used in the assessment and full details of the sources of these can be found in technical appendix D.

Pollutant	Limit value (μg/m[3])	Averaging period	Frequency of exceedances
Nitrogen dioxide (NO_2)	200	1 hour	18 times per year
	40	Annual	N/A
Sulphur dioxide (SO_2)	266	15 minutes	35 times per year
	350	1 hour	24 times per year
	125	24 hours	3 times per year
Particulate matter (PM_{10})	50	24 hours	35 times per year
	40	Annual	N/A
Particulate matter ($PM_{2.5}$)	25	Annual	N/A
Carbon monoxide (CO)	10,000	8 hours, running	N/A
	30,000	1 hour	N/A
Hydrogen chloride	750	1 hour	N/A
Hydrogen fluoride	160	1 hour	N/A
	16	Annual	N/A
Ammonia	2,500	1 hour	N/A
	180	Annual	N/A
Lead	0.25	Annual	N/A
Benzene	5	Annual	N/A
	195	1 hour	N/A
1,3-butadiene	2.25	Annual, running	N/A
Polychlorinated biphenyls (PCBs)	6	1 hour	N/A
	0.2	Annual	N/A
Polycyclic aromatic hydrocarbons (PAHs)	0.00025	Annual	N/A

Table 6.2: AQALs

Metal	Directive target level (μg/m[3])	Environmental assessment level (μg/m[3])	
		Long term	Short term
Arsenic	0.006	0.003	-
Antimony	-	5	150
Cadmium	0.005	0.005	-
Chromium (II and III)	-	5	150
Chromium (VI)	-	0.0002	-
Cobalt	-	-	-
Copper	-	10	200
Lead	-	0.25	-
Manganese	-	0.15	1,500
Mercury	-	0.25	7.5
Nickel	0.020	0.020	-
Thallium	-	-	-
Vanadium	-	5	1

Table 6.3: Environmental assessment levels for metals

Pollutant	Concentration ($\mu g/m^3$)	Measured as
Nitrogen oxides (NO_x) (as NO_2)	75	Daily mean
	30	Annual mean
SO_2	10	Annual mean for sensitive lichen communities and bryophytes, and ecosystems where lichens and bryophytes are an important part of the ecosystem's integrity
	20	Annual mean for all higher plants
Hydrogen fluoride	5	Daily mean
	0.5	Weekly mean
Ammonia	1	Annual mean for sensitive lichen communities and bryophytes, and ecosystems where lichens and bryophytes are an important part of the ecosystem's integrity
	3	Annual mean for all higher plants

Table 6.4: Critical levels for the protection of vegetation and ecosystems

Planning policy

6.7 The National Planning Policy Framework (NPPF; 2019) sets out the government's planning policies for England and how they are expected to be applied. In relation to air pollution, paragraph 181 of the NPPF states that:

> *"Planning policies and decisions should sustain and contribute towards compliance with relevant 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 from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

6.8 Core policy 8 of Slough Borough Council's (2008) adopted Slough Local Development Framework Core Strategy 2006-2026 states that developments must not give rise to unacceptable levels of pollution, including air pollution or dust.

Methodology

Baseline

6.9 Information on existing air quality in the vicinity of the site was obtained by collating the results of automatic monitoring carried out on behalf of Defra and monitoring undertaken by Slough Borough Council, South Bucks District Council and the London Borough of Hillingdon. The closest monitoring points to the site are continuous analysers at Slough Lakeside 1 and Slough Lakeside 2, approximately 0.8 km and 0.7 km south of the site respectively, and diffusion tubes at Iver Old Slade Lane, Lakeside Road and Colnbrook Bypass, approximately 0.60 km, 0.78 km and 0.74 km from the site respectively.

6.10 Background concentrations of air pollutants were obtained from a number of sources, including Defra, the National Environment Research Council Centre for Ecology and Hydrology, *Guidelines for Halogens and Hydrogen Halides in Ambient Air for Protecting Human Health against Acute Irritancy Effects* (EPAQS, 2006), the UK Eutrophying and Acidifying Atmospheric Pollutants project, the Rural Metals and UK Urban / Industrial Networks, the Toxic Organic Micro Pollutants Network and the PAH Network. The references and data sources used in the study are set out in table 6.1.

Impact assessment

Effects during construction

6.11 A qualitative assessment of the potential effects from the generation and dispersion of dust and PM_{10} during construction was undertaken in accordance with guidance produced by the Institute of Air Quality Management (IAQM, 2016). The sensitivity of the study area to construction dust impacts was defined based on the criteria identified in the guidance, which are summarised in figure 6.1 and reproduced in full in technical appendix D. The magnitude of dust emissions was defined using the criteria in figure 6.2, taking into account the general activity descriptors on site. The risk of dust impacts was then determined using the matrix in figure 6.3 to combine the measures of area sensitivity and dust emissions magnitude.

6.12 A quantitative assessment of the potential effects of emissions from construction traffic was undertaken using the ADMS-Roads 4.1 model. Background concentrations of NO_2 for the assessment were taken from the Defra-mapped background concentrations for the grid square of each receptor. Appropriate emissions factors were used from the Defra emissions factor toolkit version 9.0. Model verification was carried out in accordance with Defra's (2018) *Local Air Quality Management – Technical Guidance (TG)16.* Full details of the assumptions used in the modelling are provided in technical appendix D. The assessment of the effects of construction traffic emissions was undertaken using the matrix in figure 6.4, which is discussed in more detail in paragraph 6.14 below.

Effects post-construction

Process emissions assessment

6.13 Detailed dispersion modelling was undertaken using the ADMS 5.2 model. It was assumed that emissions from the replacement facilities will comply with the BAT associated emission limits set out in the draft final BREF, as discussed in paragraph 6.4, or relevant emissions limits from the Industrial Emissions Directive where BAT associated emission limits are not applicable. Lower emission limits are proposed for NO_x because of the sensitivity of the local area and a lower short term emission limit is proposed for SO_2. The impacts of the existing EfW / HTI were also modelled so that these could be subtracted from the impact of the proposed facilities to give the net change in permitted impacts. Full details of the modelling inputs are provided in technical appendix D. The assessment considered effects during both commissioning and full operation. The other assessment scenarios discussed in chapter 5 were not examined because they would not alter the findings of the assessment.

6.14 The significance of post-construction effects was assessed using the criteria produced by EPUK and the IAQM in 2017. These criteria define impact descriptors based on the percentage change relative to the AQAL as a result of the replacement facilities (the 'process contribution') and the long term average concentration at a receptor in relation to the AQAL (figure 6.4). The overall significance of effects is determined, in accordance with the guidance, using professional judgement and taking account of the impact descriptors. Only effects that are moderate or above (including slight to moderate) are considered to be significant in EIA terms.

6.15 The matrix in figure 6.4 is only designed to be used in relation to annual mean concentrations. For short term concentrations (those averaged over a period of an hour or less), the following descriptors of change have been used to assess the impact:

- <10% – negligible
- 10-20% – slight
- 20-50% – moderate
- >50% – substantial

6.16 The assessment of short term impacts has been carried out in accordance with the EPUK and IAQM guidance. It does not take background concentrations into account, as these are less important in determining the severity of impact for short term concentrations. The guidance does not provide any descriptors for averaging periods between one hour and a year. Therefore, for these periods, the Environment Agency's (2016) criteria have been used (see paragraph 6.18).

6.17 Where an impact could not be screened out as insignificant based on the outputs of the initial screening and modelling, the significance of the effect was determined based on professional scientific judgement of the likelihood of emissions causing an exceedance of an AQAL. This is a standard approach that allows the risk and likelihood of the exceedance to be investigated and assessed in detail.

6.18 In addition, the Environment Agency's (2016) *Guidance on assessing group 3 metals stack emissions from incinerators – V.4* was used to assess the impacts of emissions of metals relative to their respective AQAL. These state that process contributions can be considered insignificant if:

- The long term process contribution is <1% of the long term environmental standard; and
- The short term process contribution is <10% of the short term environmental standard

6.19 Where these standards are exceeded, the predicted environmental concentration (PEC) should be compared to the environmental standard. If the PEC is less than the environmental standard, it can be concluded that there is no risk of exceeding the AQAL and, as such, the effect is considered negligible and not significant.

6.20 For those substances with the potential to accumulate in the environment, tolerable daily intakes (TDI; the amount of contaminant that can be ingested daily over a lifetime without appreciable health risks) and index doses (a level of exposure that is associated with a negligible risk to human health) are defined. Where the impact of process emissions is within these levels, a negligible impact on human health is predicted.

6.21 The EPUK and IAQM guidance is not designed for the assessment of impacts at ecological sites, so these have been assessed using the Environment Agency's (2012) guidance. This sets out the screening criteria shown in table 6.5.

Threshold	European sites	Sites of special scientific interest	National nature reserves, locally designated sites, ancient woodland
Y (% threshold long term)	1	1	100
Y (% threshold short term)	10	10	100
Z (% threshold)	70	70	100

Table 6.5: Ecological screening criteria
Y = long term process contribution calculated as a percentage of the relevant critical level or load
Z = long term PEC calculated as a percentage of the relevant critical level or load

6.22 The guidance states that:

- If the process contribution is less than Y% critical level and load then emissions from the application are not significant, and
- If the PEC is less than Z% critical level and load it can be concluded there will be no likely significant effects, either alone or in combination

Plume visibility

6.23 There is the potential for the EfW / HTI's plumes to be visible under certain circumstances, caused by water vapour in the exhaust gases condensing as the gases cool. The water vapour in the gases mixes with the ambient air as the plume disperses, so that it ceases to be visible once the vapour content is low enough. If the gases are hot and dry, or weather conditions promote rapid dispersion and slow cooling, the plume may not be visible at all.

6.24 ADMS 5.2 includes a plume visibility module, which models the dispersion and cooling of water vapour and predicts whether the plume will be visible, based on its liquid water content. This module has been used to quantify the number of visible plumes likely to occur during the operation of the replacement EfW / HTI. A previous version of the Environment Agency's guidance note H1 (July 2003) set out a methodology to quantify the potential impact from visible plumes. This has not been included in the latest version of the guidance but, in the absence of any other appropriate methodology, it has been used in the assessment (table 6.6).

Impact	Qualitative description
Zero	No visible impacts resulting from the operation
Insignificant	Plume length exceeds boundary <5% of the daylight hours per year. No local sensitive receptors
Low	Plume length exceeds boundary <5% of the daylight hours per year. Sensitive local receptors
Medium	Plume length exceeds boundary >5% of the daylight hours per year. Sensitive local receptors
High	Plume length exceeds boundary >25% of the daylight hours per year with obscuration. Sensitive local receptors

Table 6.6: Summary of qualitative plume visibility assessment criteria

Limitations and uncertainties

6.25 The following conservative assumptions have been used in the assessment:

- The replacement facilities will continually operate at the emissions limit values, except for volatile organic compounds, cadmium and chromium, for which typical speciation[(1)] and emissions from existing EfW facilities have been used
- The worst case assumption for the conversion of NO_x to NO_2 has been applied
- The replacement facilities will operate at the short term emissions limit values during worst case meteorological conditions for dispersion
- The impacts presented are based on the maximum concentrations from five years of weather data

Baseline

6.26 As discussed above, baseline local and national monitoring data and national modelled background concentrations were obtained for a range of pollutants. Table 6.7 summarises the values for the annual baseline concentrations that have been used to evaluate the effects of the replacement facilities. Full details of all the monitoring and modelling results and the rationale behind the selection of the chosen data are provided in technical appendix D.

[1] The disaggregation of a group of compounds (such as volatile organic compounds or polycyclic aromatic hydrocarbons) into individual compounds.

Pollutant	Annual mean concentration	Unit	Source
NO_2	27.5	$\mu g/m^3$	Maximum monitored concentration, Old Slade Lane Iver diffusion tube
SO_2	33.0	$\mu g/m^3$	Maximum mapped background concentration from across the modelling domain, Defra 2001 dataset
PM_{10}	15.0	$\mu g/m^3$	Maximum monitored concentration, Slough Lakeside 2 continuous monitoring station
$PM_{2.5}$	7.3	$\mu g/m^3$	Maximum monitored concentration, Slough Lakeside 2 continuous monitoring station
CO	506	$\mu g/m^3$	Maximum mapped background concentration from across the modelling domain, Defra 2001 dataset
Benzene	1.0	$\mu g/m^3$	Maximum mapped background concentration from across the modelling domain, Defra 2001 dataset
1,3-butadiene	0.6	$\mu g/m^3$	Maximum mapped background concentration from across the modelling domain, Defra 2001 dataset
Ammonia	1.7	$\mu g/m^3$	Maximum mapped background concentration from across the modelling domain, Defra (CEH) 2014
Hydrogen chloride	0.7	$\mu g/m^3$	Maximum monitored concentration across the UK, 2011-2015
Hydrogen fluoride	2.3	$\mu g/m^3$	Maximum measured concentration from EPAQS report
Mercury	3.7	ng/m^3	Maximum average annual monitored concentration across all UK urban background sites, 2013-2017
Cadmium	0.26	ng/m^3	
Dioxins and furans	33.0	fg/m^3	Maximum monitored across the UK, 2012-2016
Dioxin-like PCBs	127.5	pg/m^3	
PAHs	0.49	ng/m^3	Maximum of the UK average concentrations
Arsenic	0.79	ng/m^3	Maximum monitored concentration at all urban background sites across the UK, 2013-2017
Antimony	-	ng/m^3	
Chromium	13.16	ng/m^3	
Cobalt	0.25	ng/m^3	
Copper	11.10	ng/m^3	
Lead	10.35	ng/m^3	
Manganese	10.90	ng/m^3	
Nickel	6.61	ng/m^3	
Vanadium	1.55	ng/m^3	

Table 6.7: Summary of baseline concentrations

6.27 Six AQMAs have been declared within 5 km of the site, three by Slough Borough Council, one by South Bucks District Council, one by London Borough of Hillingdon and one by Spelthorne Borough Council, as follows:

- Slough AQMA No. 1 was declared for exceedances of the annual mean NO_2 objective and is 1.5 km to the west of the proposed stack location
- Slough AQMA No.2 was declared for exceedances of the annual mean NO_2 objective and is 1.5 km south west of the proposed stack location
- Slough AQMA No.4 was declared for exceedances of the annual mean NO_2 objective and is 4.7 km north west of the proposed stack location
- South Bucks District Council AQMA No.2 was declared for exceedances of the annual mean NO_2 objective and is 0.1 km north of the proposed stack location
- Hillingdon AQMA was declared for exceedances of the annual mean NO_2 objective and is 1.0 km east of the proposed stack location
- Spelthorne AQMA was declared for exceedances of the annual mean NO_2 objective and is 2.4 km south of the proposed stack location

Effects during construction

Construction dust

6.28 The risk of dust emissions from a construction site causing loss of amenity and / or health or ecological effects is related to the following:

- The activities being undertaken (number of vehicles and plant etc)
- The duration of these activities
- The size of the site
- The meteorological conditions (wind speed, direction and rainfall)
- The proximity of receptors to the activity
- The adequacy of the mitigation measures applied to reduce or eliminate dust
- The sensitivity of the receptors to dust

6.29 Construction works give rise to the risk of dust impacts during demolition (not applicable at this site), earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. The assessment considers the potential for impacts within 350 m of the site boundary and within 50 m of roads to be used by construction vehicles (up to 500 m from the site entrance), in accordance with the IAQM guidance.

6.30 No high sensitivity receptors (residential dwellings, hospitals or schools) have been identified within the given distances, although there are two medium sensitivity receptors within 350 m of the site boundary and one within 100 m. These comprise places of work and a golf course. In accordance with figure 6.1, the area surrounding the site is considered to be of low sensitivity to dust soiling from earthworks and construction activities. In addition, there are eight medium sensitivity receptors within 50 m of the site access route and four within 20 m. As a result, the area is of medium sensitivity to dust soiling due to trackout.

6.31 In relation to human health effects from PM_{10} emissions during construction, baseline PM_{10} levels in the area must be considered. The baseline level set out in table 6.4 is considered to be representative of concentrations near the site. Using the matrix in figure 6.1, the area surrounding the site is considered to be of low sensitivity to human health effects. No potentially dust-sensitive ecological receptors have been identified within 50 m of the site, meaning that the area is not sensitive to ecological effects.

6.32 There will be no demolition activities associated with the replacement facilities, so there is no potential for impacts from this source. The total area of the site is greater than 10,000 m^2 and there will be substantial earthworks involved in the creation of the development platform. With reference to the guidance in figure 6.2, the dust emissions magnitude for earthworks is predicted to be large.

6.33 The total building volume will be greater than 100,000 m^3 and construction works will involve potentially dusty activities. As a result, the magnitude of dust emissions for construction is predicted to be large. The transport assessment has identified that the peak HGV construction traffic movements will be approximately 340 per day. The magnitude of dust emissions for trackout is therefore considered to be large.

6.34 The dust emission magnitude and area sensitivity have been combined to determine the risk of dust generation with no mitigation, which is as follows for each construction stage:

- Earthworks: low risk of dust soiling, low risk to human health and negligible risk of ecological effects
- Construction: low risk of dust soiling, low risk to human health and negligible risk of ecological effects
- Trackout: medium risk of dust soiling, low risk to human health and negligible risk of ecological effects

Construction traffic

6.35 The potential for significant effects from construction traffic emissions has been assessed at 10 sensitive receptors along the A4 (figure 6.5). The results of the modelling are shown in tables 6.8 to 6.10.

Receptor	2021 baseline PEC		2021 with development PEC		Impact	
	μg/m³	% of AQAL	μg/m³	% of AQAL	μg/m³	% of AQAL
RR1	35.92	89.80%	36.08	90.20%	0.16	0.40%
RR2	36.10	90.25%	36.27	90.68%	0.17	0.42%
RR3	36.24	90.60%	36.42	91.05%	0.18	0.45%
RR4	36.16	90.40%	36.33	90.83%	0.17	0.43%
RR5	31.12	77.80%	31.18	77.95%	0.06	0.15%
RR6	36.99	92.48%	37.39	93.48%	0.40	1.00%
RR7	31.94	79.85%	32.18	80.45%	0.24	0.60%
RR8	35.56	88.90%	35.85	89.63%	0.29	0.72%
RR9	31.82	79.55%	32.02	80.05%	0.20	0.50%
RR10	34.88	87.20%	35.17	87.93%	0.29	0.72%

Table 6.8: Construction phase annual mean NO_2 impact at roadside receptors

Receptor	2021 baseline PEC		2021 with development PEC		Impact	
	μg/m³	% of AQAL	μg/m³	% of AQAL	μg/m³	% of AQAL
RR1	17.85	44.63%	17.89	44.74%	0.041	0.10%
RR2	17.89	44.73%	17.93	44.84%	0.042	0.11%
RR3	17.92	44.80%	17.96	44.91%	0.043	0.11%
RR4	17.91	44.78%	17.95	44.89%	0.043	0.11%
RR5	17.14	42.86%	17.16	42.91%	0.018	0.04%
RR6	18.86	47.16%	18.91	47.27%	0.046	0.12%
RR7	18.36	45.90%	18.39	45.97%	0.029	0.07%
RR8	19.32	48.30%	19.37	48.44%	0.053	0.13%
RR9	18.59	46.49%	18.63	46.57%	0.032	0.08%
RR10	19.08	47.69%	19.12	47.81%	0.046	0.11%

Table 6.9: Construction phase annual mean PM_{10} impact at roadside receptors

Receptor	2021 baseline PEC		2021 with development PEC		Impact	
	$\mu g/m^3$	% of AQAL	$\mu g/m^3$	% of AQAL	$\mu g/m^3$	% of AQAL
RR1	12.21	48.86%	12.24	48.95%	0.023	0.09%
RR2	12.24	48.95%	12.26	49.04%	0.024	0.10%
RR3	12.25	49.01%	12.28	49.11%	0.025	0.10%
RR4	12.25	48.99%	12.27	49.09%	0.025	0.10%
RR5	11.80	47.19%	11.81	47.23%	0.010	0.04%
RR6	12.96	51.84%	12.99	51.95%	0.028	0.11%
RR7	12.64	50.58%	12.66	50.65%	0.017	0.07%
RR8	13.20	52.81%	13.23	52.93%	0.030	0.12%
RR9	12.77	51.10%	12.79	51.17%	0.019	0.08%
RR10	13.07	52.26%	13.09	52.37%	0.027	0.11%

Table 6.10: Construction phase annual mean $PM_{2.5}$ impact at roadside receptors

6.36 As shown in table 6.8, the impact of construction vehicle emissions of NO_2 at receptors RR1 to RR5 is less than 0.5% of the AQAL and the effect can be screened out as negligible and not significant, regardless of the total concentration. At the other five receptor locations, the impact rounds to 1% of the AQAL and the PEC is less than 94.5% of the AQAL. As a result, with reference to figure 6.4, the effect will be negligible and not significant.

6.37 Tables 6.9 and 6.10 show that the impact of construction vehicle emissions of PM_{10} and $PM_{2.5}$ will be less than 0.5% of the AQAL at all of the roadside receptors. The effect will therefore be negligible and not significant.

Effects post-construction

Process emissions assessment – sensitive human receptors

Introduction

6.38 The assessment evaluated the highest predicted process contributions to ground level concentrations during the operation of the replacement facilities over five modelled years for each pollutant, known as the point of maximum impact. These are set out in full in technical appendix D. The results were compared to the relevant AQALs, as set out in the methodology section above. Where effects could not be screened out as insignificant in accordance with the Environment Agency's (2016) guidance, or where impacts could not be described as negligible irrespective of the total concentration in accordance with the EPUK and IAQM guidance (2017), further analysis was undertaken of the potential for effects at sensitive human receptors. The locations of the sensitive receptors are shown on figure 6.6.

6.39 A second assessment was also undertaken to model the predicted process contributions during commissioning of the EfW / HTI, when one line of the existing plant at Lakeside Road will be shut down while one line of the new replacement facilities is commissioned. The operations then switch over, so the second line of the existing plant is shut down and the second line of the new replacement facility is commissioned. Only two lines (out of the total four) will be running simultaneously. As set out in technical appendix D, the impacts during the commissioning phase are predicted to be lower than the existing baseline levels at the point of maximum impact. While the change in impact at some of the sensitive receptors close to the existing EfW is predicted to be higher than in the fully operational scenario, the decommissioning of one line at the existing

EfW means that the impacts at these receptors during commissioning will be less than the impacts with the currently permitted facility in operation. The results of the commissioning scenario modelling are provided in technical appendix D.

6.40 Following the initial modelling, the long term and short term impacts of the following pollutants were screened out as insignificant and / or negligible and no further modelling was required:

- Long term SO_2
- Short term PM_{10}
- CO
- Hydrogen chloride
- Hydrogen fluoride
- Ammonia
- Short term volatile organic compounds (VOCs) as benzene
- Mercury
- Dioxins and furans
- PCBs

6.41 Full details of the initial modelling results for the above pollutants are set out in technical appendix D, but no significant adverse effects are predicted as a result of emissions of these substances.

Annual mean NO_2

6.42 Table 6.11 shows the maximum predicted annual mean NO_2 concentrations over the five modelled years at the point of maximum impact and the sensitive receptor locations, in addition to the contribution from background sources. As discussed in the methodology section, the impact of the existing Lakeside facilities has been subtracted to give the net change in impacts. This is because the emission limit for the replacement EfW plant is half the emission limit for the existing plant and therefore there is a benefit from the change.

6.43 Impacts that do not screen out as insignificant in accordance with the Environment Agency's guidance are shown in italics. Impacts that cannot be described as negligible irrespective of the total concentration in accordance with the EPUK and IAQM criteria are shown in bold.

Receptor	Process contribution		PEC	
	Conc. (μg/m³)	% of AQAL	Conc. (μg/m³)	% of AQAL
Point of maximum impact	3.45	***8.6%***	30.95	77.4%
R1: Old Slade Lane 1, Richings Park	2.69	***6.7%***	30.19	75.5%
R2: Old Slade Lane 2, Richings Park	1.33	***3.3%***	28.83	72.1%
R3: Old Slade Lane 3, Richings Park	0.76	***1.9%***	28.26	70.7%
R4: Main Drive, Richings Park	0.40	***1.0%***	27.90	69.8%
R5: North Park, Richings Park	0.24	**0.6%**	27.74	69.4%
R6: Sutton Lane 1, Langley	0.06	0.2%	27.56	68.9%
R7: Sutton Lane 2, Langley	0.07	0.2%	27.57	68.9%
R8: London Road, Colnbrook	0.08	0.2%	27.58	69.0%
R9: Vicarage Way, Colnbrook	0.26	**0.6%**	27.76	69.4%
R10: The Hawthorns, Colnbrook	0.05	0.1%	27.55	68.9%
R11: The Island, Longford	-0.12	-0.3%	27.38	68.5%
R12: Verbena Close, West Drayton	0.01	<0.1%	27.51	68.8%
R13: Lily Drive, West Drayton	-0.03	-0.1%	27.47	68.7%
R14: The Common, West Drayton	-0.01	<0.1%	27.49	68.7%
R15: Mayfield Park, West Drayton	-0.08	-0.2%	27.42	68.5%
R16: Thorney Mill Road, Thorney	0.07	0.2%	27.57	68.9%
R17: Richings Way, Richings Park	0.36	**0.9%**	27.86	69.7%
R18: Parlaunt Park Primary Academy	0.03	<0.1%	27.53	68.8%
R19: Foxborough Primary School	0.06	0.1%	27.56	68.9%
R20: Colnbrook CoE School	0.15	0.4%	27.65	69.1%
R21: Harmondsworth Primary School	-0.28	-0.7%	27.22	68.1%
R22: Laurel Lane Primary School	-0.01	<0.1%	27.49	68.7%
R23: St Catharine Catholic Primary School	-0.07	-0.2%	27.43	68.6%

Table 6.11: Annual mean NO_2
Note: PEC includes contribution of 27.50 μg/m³, which is the maximum monitored at the SB1 diffusion tube. Assumes 70% conversion of NO_x to NO_2

6.44 Table 6.11 shows that the annual mean net process contribution at the point of maximum impact cannot be screened out as negligible or insignificant. Using the IAQM guidance, the change can be described as moderate adverse, as the annual mean net process contribution is 5.5-10% of the AQAL and the PEC is less than 94.5% of the AQAL. This impact occurs in a small area within the South Bucks District Council AQMA No.2, declared for exceedances of the annual mean NO_2 objective. However, a review of local air quality monitoring data shows that baseline concentrations in the AQMA where the impact is predicted to occur are likely to be no more than 27.5 μg/m³, which is the average monitored concentration at Old Slade Lane. Detailed modelling in technical appendix D shows that the area of impact that cannot be screened out extends across a small area of Old Slade Lane, where the AQAL applies. To assess the impact at areas of relevant exposure, the impacts on sensitive receptors have therefore been assessed.

6.45 Table 6.11 shows that the impacts at all but seven of the sensitive receptors are less than 0.5% of the AQAL, so can be described as negligible irrespective of the total concentrations. There is no potential for significant adverse effects at these receptors.

6.46 Receptors R1, R2, R3 and R4 are all in close proximity to each other in Richings Park. The relevant background concentration for these receptors is 27.50 μg/m³, measured at Old Slade Lane. When this is applied, the impact of the replacement facilities at R2, R3 and R4 is assessed as negligible, as the annual mean process contribution is less than 5.5% of the AQAL and the PEC is less than 75.5% of the AQAL. The impact at R1 is assessed as slight, as the annual mean process contribution is 5.5-10.5% of the AQAL and the PEC is less than 75.5% of the AQAL. No significant effects are predicted at these receptors.

6.47 Receptor R5 is located close to R4 but along North Road, which is fairly busy. There is a diffusion tube close to this receptor, but it is a kerbside tube only 1.6 m from the kerb. The houses along North Road are set back at least 4 m from the kerb. The adjusted background concentration at this distance is 36.7 $\mu g/m^3$. Applying this as the baseline concentration at R5, as a conservative measure, means that the PEC is predicted to be 36.9 $\mu g/m^3$, or 92.3% of the AQAL. Therefore, the impact of the replacement facilities will be negligible, as the annual mean process contribution is less than 1.5% of the AQAL and the PEC is less than 94.5% of the AQAL.

6.48 Receptor R9 is located in Colnbrook. Measured concentrations in Colnbrook away from the main roads are up to 29 $\mu g/m^3$. When this background concentration is applied, the PEC is predicted to be 29.26 $\mu g/m^3$, or 73.15% of the AQAL. Therefore, the impact of the replacement facilities at R9 will be negligible, as the annual mean process contribution is less than 1.5% of the AQAL and the PEC is less than 75.5% of the AQAL.

6.49 Receptor R17 lies between Richings Way and Thorney Lane South in Richings Park and is not near any busy roads. A review of local air quality monitoring data shows that baseline concentrations close to this receptor are likely to be no more than 37.3 $\mu g/m^3$ (the average maximum monitored at a roadside location at Tower Arms, Thorney Lane, near the receptor). Applying this as the baseline concentration at R17, as a conservative measure, means that the PEC is predicted to be 37.5 $\mu g/m^3$, or 93.9% of the AQAL. Therefore, the impact of the replacement facilities will be negligible, as the annual mean process contribution is less than 1.5% of the AQAL and the PEC is less than 94.5% of the AQAL.

Hourly mean NO_2

6.50 Table 6.12 shows the maximum predicted NO_2 99.79th percentile[2] of hourly mean concentrations over the five modelled years at the point of maximum impact and the sensitive receptor locations, in addition to the contribution from background sources. The analysis conservatively assumes that the EfW facility operates at the half-hourly emission limit of 200 mg/Nm^3. In reality, the facility will mainly run below the daily emission limit of 100 mg/Nm^3.

[2] The value below which a given percentage of observations in a group of observations falls. For example, for the 99.79th percentile of hourly mean nitrogen dioxide concentrations, 99.79% of the observations are below the given figure.

Receptor	Process contribution		PEC	
	Conc. (μg/m³)	% of AQAL	Conc. (μg/m³)	% of AQAL
Point of maximum impact	38.97	***19.5%***	93.97	47.0%
R1: Old Slade Lane 1, Richings Park	25.11	***12.6%***	80.11	40.1%
R2: Old Slade Lane 2, Richings Park	19.44	9.7%	74.44	37.2%
R3: Old Slade Lane 3, Richings Park	16.66	8.3%	71.66	35.8%
R4: Main Drive, Richings Park	11.86	5.9%	66.86	33.4%
R5: North Park, Richings Park	10.62	5.3%	65.62	32.8%
R6: Sutton Lane 1, Langley	7.53	3.8%	62.53	31.3%
R7: Sutton Lane 2, Langley	9.62	4.8%	64.62	32.3%
R8: London Road, Colnbrook	6.61	3.3%	61.61	30.8%
R9: Vicarage Way, Colnbrook	10.66	5.3%	65.66	32.8%
R10: The Hawthorns, Colnbrook	8.31	4.2%	63.31	31.7%
R11: The Island, Longford	5.73	2.9%	60.73	30.4%
R12: Verbena Close, West Drayton	4.73	2.4%	59.73	29.9%
R13: Lily Drive, West Drayton	4.48	2.2%	59.48	29.7%
R14: The Common, West Drayton	5.82	2.9%	60.82	30.4%
R15: Mayfield Park, West Drayton	5.13	2.6%	60.13	30.1%
R16: Thorney Mill Road, Thorney	5.67	2.8%	60.67	30.3%
R17: Richings Way, Richings Park	7.27	3.6%	62.27	31.1%
R18: Parlaunt Park Primary Academy	5.34	2.7%	60.34	30.2%
R19: Foxborough Primary School	4.96	2.5%	59.96	30.0%
R20: Colnbrook CoE School	8.59	4.3%	63.59	31.8%
R21: Harmondsworth Primary School	4.86	2.4%	59.86	29.9%
R22: Laurel Lane Primary School	4.18	2.1%	59.18	29.6%
R23: St Catharine Catholic Primary School	4.23	2.1%	59.23	29.6%

Table 6.12: Hourly mean NO_2

6.51 Using the IAQM guidance, the change at the point of maximum impact can be described as slight, as the annual mean process contribution is more than 10% of the short term AQAL. The impact at all but one sensitive receptor is less than 10% of the AQAL, so can be assessed as negligible irrespective of the total concentration. There is no potential for significant adverse effects at these receptors.

6.52 At R1, the process contribution is predicted to be 25.1 μg/m³, which is 12.6% of the short term AQAL. This is therefore a slight adverse effect that will not be significant.

Annual mean PM_{10}

6.53 Table 6.13 shows the maximum predicted annual mean PM_{10} concentrations over the five modelled years at the point of maximum impact and the sensitive receptor locations, in addition to the contribution from background sources. The analysis conservatively assumes that the entire particulate matter is released at the emissions limit value for total dust and the entire emissions consist only of PM_{10}.

Receptor	Process contribution		PEC	
	Conc. (μg/m³)	% of AQAL	Conc. (μg/m³)	% of AQAL
Point of maximum impact	0.26	**0.7%**	15.26	38.16%
R1: Old Slade Lane 1, Richings Park	0.21	**0.5%**	15.21	38.0%
R2: Old Slade Lane 2, Richings Park	0.11	0.3%	15.11	37.8%
R3: Old Slade Lane 3, Richings Park	0.08	0.2%	15.08	37.7%
R4: Main Drive, Richings Park	0.05	0.1%	15.05	37.6%
R5: North Park, Richings Park	0.03	0.1%	15.03	37.6%
R6: Sutton Lane 1, Langley	0.01	<0.1%	15.01	37.5%
R7: Sutton Lane 2, Langley	0.01	<0.1%	15.01	37.5%
R8: London Road, Colnbrook	0.01	<0.1%	15.01	37.5%
R9: Vicarage Way, Colnbrook	0.03	0.1%	15.03	37.6%
R10: The Hawthorns, Colnbrook	0.01	<0.1%	15.01	37.5%
R11: The Island, Longford	0.02	<0.1%	15.02	37.5%
R12: Verbena Close, West Drayton	0.03	0.1%	15.03	37.6%
R13: Lily Drive, West Drayton	0.03	0.1%	15.03	37.6%
R14: The Common, West Drayton	0.04	0.1%	15.04	37.6%
R15: Mayfield Park, West Drayton	0.02	0.1%	15.02	37.6%
R16: Thorney Mill Road, Thorney	0.03	0.1%	15.03	37.6%
R17: Richings Way, Richings Park	0.04	0.1%	15.04	37.6%
R18: Parlaunt Park Primary Academy	0.01	<0.1%	15.01	37.5%
R19: Foxborough Primary School	0.01	<0.1%	15.01	37.5%
R20: Colnbrook CoE School	0.03	0.1%	15.03	37.6%
R21: Harmondsworth Primary School	0.02	<0.1%	15.02	37.5%
R22: Laurel Lane Primary School	0.02	<0.1%	15.02	37.6%
R23: St Catharine Catholic Primary School	0.02	<0.1%	15.02	37.5%

Table 6.13: Annual mean PM_{10}

Note: PEC includes contribution of 15.00 μg/m³, which is the maximum monitored at the Slough Lakeside 2 continuous monitor

6.54 Table 6.13 shows that the impacts at all but one of the sensitive receptors (R1) can be screened out as being both insignificant and negligible and there is no potential for significant adverse effects at these receptors.

6.55 At R1, the impact is assessed as negligible because the annual mean process contribution is 0.5% of the AQAL (and therefore well below the 5.5% threshold) and the PEC is 38.0% of the AQAL (well below the 75.5% threshold). No significant adverse effects are therefore predicted at this receptor.

Annual mean $PM_{2.5}$

6.56 Table 6.14 shows the maximum predicted annual mean $PM_{2.5}$ concentrations over the five modelled years at the point of maximum impact and the sensitive receptor locations, in addition to the contribution from background sources. The analysis conservatively assumes that the entire particulate matter is released at the emissions limit value for total dust and the entire emissions consist only of $PM_{2.5}$.

Receptor	Process contribution		PEC	
	Conc. (μg/m³)	**% of AQAL**	**Conc. (μg/m³)**	**% of AQAL**
Point of maximum impact	0.26	***1.0%***	7.56	30.3%
R1: Old Slade Lane 1, Richings Park	0.21	**0.9%**	7.51	30.1%
R2: Old Slade Lane 2, Richings Park	0.11	0.4%	7.41	29.6%
R3: Old Slade Lane 3, Richings Park	0.08	0.3%	7.38	29.5%
R4: Main Drive, Richings Park	0.05	0.2%	7.35	29.4%
R5: North Park, Richings Park	0.03	0.1%	7.33	29.3%
R6: Sutton Lane 1, Langley	0.01	0.1%	7.31	29.3%
R7: Sutton Lane 2, Langley	0.01	0.1%	7.31	29.3%
R8: London Road, Colnbrook	0.01	0.1%	7.31	29.3%
R9: Vicarage Way, Colnbrook	0.03	0.1%	7.33	29.3%
R10: The Hawthorns, Colnbrook	0.01	<0.1%	7.31	29.2%
R11: The Island, Longford	0.02	0.1%	7.32	29.3%
R12: Verbena Close, West Drayton	0.03	0.1%	7.33	29.3%
R13: Lily Drive, West Drayton	0.03	0.1%	7.33	29.3%
R14: The Common, West Drayton	0.04	0.2%	7.34	29.4%
R15: Mayfield Park, West Drayton	0.02	0.1%	7.32	29.3%
R16: Thorney Mill Road, Thorney	0.03	0.1%	7.33	29.3%
R17: Richings Way, Richings Park	0.04	0.2%	7.34	29.4%
R18: Parlaunt Park Primary Academy	0.01	<0.1%	7.31	29.2%
R19: Foxborough Primary School	0.01	<0.1%	7.31	29.2%
R20: Colnbrook CoE School	0.03	0.1%	7.33	29.3%
R21: Harmondsworth Primary School	0.02	0.1%	7.32	29.3%
R22: Laurel Lane Primary School	0.02	0.1%	7.32	29.3%
R23: St Catharine Catholic Primary School	0.02	0.1%	7.32	29.3%

Table 6.14: Annual mean $PM_{2.5}$
Note: PEC includes contribution of 7.30 μg/m³, which is the maximum monitored at the Slough Lakeside 2 continuous monitor

6.57 Detailed modelling in technical appendix D found that the point of maximum impact is uninhabited, so there is no potential for a significant adverse effect on sensitive receptors at this location. Table 6.14 shows that the impacts at all but one of the sensitive receptors (R1) can be screened out as being both insignificant and negligible and there is no potential for significant adverse effects at these receptors.

6.58 At R1, the impact is assessed as negligible because the annual mean process contribution is 0.9% of the AQAL (and therefore well below the 5.5% threshold) and the PEC is 30.1% of the AQAL (well below the 75.5% threshold). No significant adverse effects are therefore predicted at this receptor.

Annual mean VOCs as benzene

6.59 Table 6.15 shows the maximum predicted annual mean VOC concentrations (as benzene) over the five modelled years at the point of maximum impact and the sensitive receptor locations, in addition to the contribution from background sources. The analysis conservatively assumes that all the VOC released from the replacement facilities consists only of benzene.

Receptor	Process contribution		PEC	
	Conc. (μg/m³)	% of AQAL	Conc. (μg/m³)	% of AQAL
Point of maximum impact	0.53	***10.5%***	1.53	30.5%
R1: Old Slade Lane 1, Richings Park	0.43	***8.6%***	1.43	28.6%
R2: Old Slade Lane 2, Richings Park	0.22	***4.5%***	1.22	24.5%
R3: Old Slade Lane 3, Richings Park	0.15	***3.1%***	1.15	23.1%
R4: Main Drive, Richings Park	0.10	***1.9%***	1.10	21.9%
R5: North Park, Richings Park	0.06	***1.3%***	1.06	21.3%
R6: Sutton Lane 1, Langley	0.03	**0.5%**	1.03	20.5%
R7: Sutton Lane 2, Langley	0.03	**0.6%**	1.03	20.6%
R8: London Road, Colnbrook	0.03	**0.6%**	1.03	20.6%
R9: Vicarage Way, Colnbrook	0.06	***1.3%***	1.06	21.3%
R10: The Hawthorns, Colnbrook	0.02	**0.5%**	1.02	20.5%
R11: The Island, Longford	0.03	**0.6%**	1.03	20.6%
R12: Verbena Close, West Drayton	0.06	***1.2%***	1.06	21.2%
R13: Lily Drive, West Drayton	0.05	***1.0%***	1.05	21.0%
R14: The Common, West Drayton	0.08	***1.5%***	1.08	21.5%
R15: Mayfield Park, West Drayton	0.05	***1.0%***	1.05	21.0%
R16: Thorney Mill Road, Thorney	0.07	***1.4%***	1.07	21.4%
R17: Richings Way, Richings Park	0.08	***1.7%***	1.08	21.7%
R18: Parlaunt Park Primary Academy	0.02	0.4%	1.02	20.4%
R19: Foxborough Primary School	0.02	0.4%	1.02	20.4%
R20: Colnbrook CoE School	0.05	***1.0%***	1.05	21.0%
R21: Harmondsworth Primary School	0.03	**0.6%**	1.03	20.6%
R22: Laurel Lane Primary School	0.04	**0.9%**	1.04	20.9%
R23: St Catharine Catholic Primary School	0.03	**0.7%**	1.03	20.7%

Table 6.15: Annual mean VOCs as benzene

Note: PEC includes contribution of 1.0 μg/m³, which is the maximum mapped background concentration over the modelling domain

6.60 Detailed modelling in technical appendix D found that the point of maximum impact is uninhabited, so there is no potential for a significant adverse effect on sensitive receptors at this location. Table 6.15 shows that the impacts can only be screened out as being both insignificant and negligible at two of the sensitive receptors (R18 and R19). There is no potential for significant adverse effects at these receptors.

6.61 As discussed above, in accordance with the EPUK and IAQM guidance, impacts can be assessed as negligible when the annual mean process contribution is less than 5.5% of the AQAL and the PEC is less than 75.5% of the AQAL. This is the case for all the remaining receptors except R1. No significant adverse effects are therefore predicted at these receptors. At R1, the process contribution is predicted to be 8.6% of the AQAL and the PEC is 28.6% of the AQAL. Therefore, the effect is assessed as being slight. This is a highly conservative assessment, as it assumes that all the VOC released from the replacement facilities consists solely of benzene. In reality, this will not be the case. No significant adverse effects are predicted at this receptor.

Annual mean VOCs as 1,3-butadiene

6.62 Table 6.16 shows the maximum predicted annual mean VOC concentrations (as 1,3-butadiene) over the five modelled years at the point of maximum impact and the sensitive receptor locations, in addition to the contribution from background sources. The analysis conservatively assumes that all the VOC released from the replacement facilities consists only of 1,3-butadiene.

Receptor	Process contribution		PEC	
	Conc. (μg/m³)	% of AQAL	Conc. (μg/m³)	% of AQAL
Point of maximum impact	0.53	***23.4%***	1.13	50.0%
R1: Old Slade Lane 1, Richings Park	0.43	***19.1%***	1.03	45.8%
R2: Old Slade Lane 2, Richings Park	0.22	***9.9%***	0.82	36.6%
R3: Old Slade Lane 3, Richings Park	0.15	***6.8%***	0.75	33.5%
R4: Main Drive, Richings Park	0.10	***4.2%***	0.70	30.9%
R5: North Park, Richings Park	0.06	***2.9%***	0.66	29.5%
R6: Sutton Lane 1, Langley	0.03	***1.2%***	0.63	27.9%
R7: Sutton Lane 2, Langley	0.03	***1.3%***	0.63	27.9%
R8: London Road, Colnbrook	0.03	***1.3%***	0.63	28.0%
R9: Vicarage Way, Colnbrook	0.06	***2.8%***	0.66	29.5%
R10: The Hawthorns, Colnbrook	0.02	***1.1%***	0.62	27.8%
R11: The Island, Longford	0.03	***1.4%***	0.63	28.0%
R12: Verbena Close, West Drayton	0.06	***2.7%***	0.66	29.4%
R13: Lily Drive, West Drayton	0.05	***2.2%***	0.65	28.9%
R14: The Common, West Drayton	0.08	***3.4%***	0.68	30.0%
R15: Mayfield Park, West Drayton	0.05	***2.2%***	0.65	28.9%
R16: Thorney Mill Road, Thorney	0.07	***3.0%***	0.67	29.7%
R17: Richings Way, Richings Park	0.08	***3.8%***	0.68	30.4%
R18: Parlaunt Park Primary Academy	0.02	**0.8%**	0.62	27.5%
R19: Foxborough Primary School	0.02	**0.8%**	0.62	27.5%
R20: Colnbrook CoE School	0.05	***2.3%***	0.65	29.0%
R21: Harmondsworth Primary School	0.03	***1.4%***	0.63	28.1%
R22: Laurel Lane Primary School	0.04	***1.9%***	0.64	28.6%
R23: St Catharine Catholic Primary School	0.03	***1.5%***	0.63	28.1%

Table 6.16: Annual mean VOCs as 1,3-butadiene

Note: PEC includes contribution of 0.60 μg/m³, which is the maximum mapped background concentration over the modelling domain

6.63 Detailed modelling in technical appendix D found that the point of maximum impact is uninhabited, so there is no potential for a significant adverse effect on sensitive receptors at this location. Table 6.16 shows that the impacts cannot be screened out as being insignificant and negligible at any of the sensitive receptors. However, at all but three of the receptors, the annual mean process contribution is less than 5.5% of the AQAL and the PEC is less than 75.5% of the AQAL. The impact is therefore classified as negligible at most of the receptors and no significant effects are predicted.

6.64 At R2 and R3, the impact will be slight adverse and not significant, as the annual mean process contribution will be between 5.5% and 10.5% of the AQAL and the PEC is less than 75.5% of the AQAL. At R1, the annual mean process contribution is more than 10.5% of the AQAL, while the PEC is less than 75.5% of the AQAL. The impact at this receptor is therefore predicted to be moderate. However, this is a highly conservative assessment, as it assumes that all the VOC released from the replacement facilities consists solely of 1,3-butadiene. In reality, 1,3-butadiene makes up less than 10% of VOC emissions and EfW plants operate with VOC concentrations below 20% of the emission limit. This means that the actual process contribution will be less than 0.5% of the AQAL and no significant adverse effects are predicted.

Annual mean cadmium

6.65 The assessment was initially undertaken using a conservative screening assumption that cadmium is released from the replacement facilities at the combined emission limit for cadmium and thallium. However, monitoring from EfWs indicates that concentrations of cadmium are typically approximately 35%

of the limit. Therefore, the assessment has considered the impact of cadmium under the following scenarios:

- Screening – assumes cadmium is released at 100% of the combined emission limit value
- Worst case – assumes cadmium is released at 50% of the combined emission limit value
- Typical – assumes cadmium is released at 35% of the combined emission limit value

6.66 Table 6.17 shows the maximum predicted annual mean cadmium concentrations over the five modelled years at the point of maximum impact and the sensitive receptor locations. The figures for the receptors are shown for the typical scenario.

Receptor	Process contribution		PEC	
	Conc. (ng/m^3)	% of AQAL	Conc. (ng/m^3)	% of AQAL
Point of maximum impact – screening	1.05	***21.0%***	1.31	26.2%
Point of maximum impact – worst case	0.53	***10.5%***	0.79	15.7%
Point of maximum impact – typical	0.37	***7.4%***	0.63	12.6%
R1: Old Slade Lane 1, Richings Park	0.86	***6.0%***	1.12	22.4%
R2: Old Slade Lane 2, Richings Park	0.45	***3.1%***	0.71	14.1%
R3: Old Slade Lane 3, Richings Park	0.31	***2.1%***	0.57	11.3%
R4: Main Drive, Richings Park	0.19	***1.3%***	0.45	9.0%
R5: North Park, Richings Park	0.13	**0.9%**	0.39	7.8%
R6: Sutton Lane 1, Langley	0.05	0.4%	0.31	6.3%
R7: Sutton Lane 2, Langley	0.06	0.4%	0.32	6.3%
R8: London Road, Colnbrook	0.06	0.4%	0.32	6.4%
R9: Vicarage Way, Colnbrook	0.13	**0.9%**	0.39	7.7%
R10: The Hawthorns, Colnbrook	0.05	0.3%	0.31	6.2%
R11: The Island, Longford	0.06	0.4%	0.32	6.4%
R12: Verbena Close, West Drayton	0.12	**0.9%**	0.38	7.7%
R13: Lily Drive, West Drayton	0.10	**0.7%**	0.36	7.2%
R14: The Common, West Drayton	0.15	***1.1%***	0.41	8.2%
R15: Mayfield Park, West Drayton	0.10	**0.7%**	0.36	7.2%
R16: Thorney Mill Road, Thorney	0.14	***1.0%***	0.40	7.9%
R17: Richings Way, Richings Park	0.17	***1.2%***	0.43	8.6%
R18: Parlaunt Park Primary Academy	0.04	0.3%	0.30	6.0%
R19: Foxborough Primary School	0.04	0.3%	0.30	5.9%
R20: Colnbrook CoE School	0.10	**0.7%**	0.36	7.3%
R21: Harmondsworth Primary School	0.06	0.4%	0.32	6.5%
R22: Laurel Lane Primary School	0.09	**0.6%**	0.35	6.9%
R23: St Catharine Catholic Primary School	0.07	**0.5%**	0.33	6.5%

Table 6.17: Annual mean cadmium
Note: PEC includes contribution of 0.26 ng/m^3, which is the maximum annual average monitored concentration from UK urban background sites (2013-2017)

6.67 Table 6.17 shows that the change associated with process emissions from the replacement facilities at the point of maximum impact is assessed as moderate using the IAQM guidance, as the annual mean process contribution will be more than 10% of the AQAL and the PEC is less than 75.5% of the AQAL. However, this is an extremely conservative assessment, as monitoring data from facilities processing a similar fuel have indicated that concentrations of cadmium are usually about 35% of the limit. To assess the impact at areas of relevant exposure, the impact at sensitive receptors has been considered using the 'typical' scenario.

6.68 Table 6.17 shows that the impacts can be screened out as being both insignificant and negligible at eight of the sensitive receptors (R6, R7, R8, R10, R11, R18, R19 and R21). There is no potential for significant adverse effects at these receptors.

6.69 As discussed above, in accordance with the EPUK and IAQM guidance, impacts can be assessed as negligible when the annual mean process contribution is less than 5.5% of the AQAL and the PEC is less than 75.5% of the AQAL. This is the case for all the remaining receptors except R1. No significant adverse effects are therefore predicted at these receptors. At R1, the process contribution is predicted to be 5.5-9.9% of the AQAL and the PEC is predicted to be less than 75.5% of the AQAL. Therefore, the impact is assessed as slight adverse and not significant.

Annual mean PAHs

6.70 Table 6.18 shows the maximum predicted annual mean PAHs over the five modelled years at the point of maximum impact and at each identified receptor location, in addition to the contribution from background sources.

Receptor	**Process contribution**		**PEC**	
	Conc. (μg/m³)	**% of AQAL**	**Conc. (μg/m³)**	**% of AQAL**
Point of maximum impact	2.10	**0.8%**	492.10	196.8%
R1: Old Slade Lane 1, Richings Park	1.72	**0.7%**	491.72	196.7%
R2: Old Slade Lane 2, Richings Park	0.89	0.4%	490.89	196.4%
R3: Old Slade Lane 3, Richings Park	0.61	0.2%	490.61	196.2%
R4: Main Drive, Richings Park	0.38	0.2%	490.38	196.2%
R5: North Park, Richings Park	0.26	0.1%	490.26	196.1%
R6: Sutton Lane 1, Langley	0.11	<0.1%	490.11	196.0%
R7: Sutton Lane 2, Langley	0.11	<0.1%	490.11	196.0%
R8: London Road, Colnbrook	0.12	<0.1%	490.12	196.0%
R9: Vicarage Way, Colnbrook	0.25	0.1%	490.25	196.1%
R10: The Hawthorns, Colnbrook	0.10	<0.1%	490.10	196.0%
R11: The Island, Longford	0.12	<0.1%	490.12	196.0%
R12: Verbena Close, West Drayton	0.25	0.1%	490.25	196.1%
R13: Lily Drive, West Drayton	0.20	0.1%	490.20	196.1%
R14: The Common, West Drayton	0.30	0.1%	490.30	196.1%
R15: Mayfield Park, West Drayton	0.20	0.1%	490.20	196.1%
R16: Thorney Mill Road, Thorney	0.27	0.1%	490.27	196.1%
R17: Richings Way, Richings Park	0.34	0.1%	490.34	196.1%
R18: Parlaunt Park Primary Academy	0.08	<0.1%	490.08	196.0%
R19: Foxborough Primary School	0.07	<0.1%	490.07	196.0%
R20: Colnbrook CoE School	0.21	0.1%	490.21	196.1%
R21: Harmondsworth Primary School	0.13	0.1%	490.13	196.1%
R22: Laurel Lane Primary School	0.17	0.1%	490.17	196.1%
R23: St Catharine Catholic Primary School	0.13	0.1%	490.13	196.1%

Table 6.18: Annual mean PAHs
Note: PEC includes contribution of 490.0 μg/m³, which is the maximum of the UK average concentrations

6.71 Table 6.18 shows that the change associated with process emissions from the replacement facilities at the point of maximum impact is assessed as moderate using the IAQM guidance, as the annual mean process contribution will be less than 1.5% of the AQAL and the PEC is greater than 110% of the AQAL. However, baseline concentrations in the vicinity of the replacement facilities are already high at 196.0% of the AQAL and the process contribution is very small

(0.8% of the AQAL). Therefore, emissions from the replacement facilities represent a very small proportion of the long term average concentration.

6.72 Table 6.18 shows that the impacts can be screened out as being both insignificant and negligible at all but one of the sensitive receptors, so there is no potential for significant adverse effects at these receptors. At R1, the annual mean process contribution is 0.7% of the AQAL and the PEC is 196.7% of the AQAL, so the impact is described as moderate adverse using the IAQM guidance. However, without the process contribution, the PEC is still predicted to be 196.0% of the AQAL. Therefore, emissions from the replacement facilities represent a very small proportion of the long term average concentration at R1 (0.7% of the AQAL) and no significant adverse effects are predicted.

Hourly mean SO_2

6.73 Table 6.19 shows the maximum predicted 99.73rd percentile of hourly mean SO_2 concentrations over the five modelled years at the point of maximum impact and at each identified receptor location, in addition to the contribution from background sources.

Receptor	Process contribution		PEC	
	Conc. ($\mu g/m^3$)	% of AQAL	Conc. ($\mu g/m^3$)	% of AQAL
Point of maximum impact	49.48	***14.1%***	115.48	33.0%
R1: Old Slade Lane 1, Richings Park	32.15	9.2%	98.15	28.0%
R2: Old Slade Lane 2, Richings Park	24.68	7.1%	90.68	25.9%
R3: Old Slade Lane 3, Richings Park	21.36	6.1%	87.36	25.0%
R4: Main Drive, Richings Park	14.97	4.3%	80.97	23.1%
R5: North Park, Richings Park	13.48	3.9%	79.48	22.7%
R6: Sutton Lane 1, Langley	9.60	2.7%	75.60	21.6%
R7: Sutton Lane 2, Langley	11.90	3.4%	77.90	22.3%
R8: London Road, Colnbrook	8.22	2.3%	74.22	21.2%
R9: Vicarage Way, Colnbrook	13.44	3.8%	79.44	22.7%
R10: The Hawthorns, Colnbrook	10.43	3.0%	76.43	21.8%
R11: The Island, Longford	7.07	2.0%	73.07	20.9%
R12: Verbena Close, West Drayton	5.95	1.7%	71.95	20.6%
R13: Lily Drive, West Drayton	5.64	1.6%	71.64	20.5%
R14: The Common, West Drayton	7.35	2.1%	73.35	21.0%
R15: Mayfield Park, West Drayton	6.51	1.9%	72.51	20.7%
R16: Thorney Mill Road, Thorney	7.26	2.1%	73.26	20.9%
R17: Richings Way, Richings Park	9.22	2.6%	75.22	21.5%
R18: Parlaunt Park Primary Academy	6.60	1.9%	72.60	20.7%
R19: Foxborough Primary School	6.19	1.8%	72.19	20.6%
R20: Colnbrook CoE School	10.80	3.1%	76.80	21.9%
R21: Harmondsworth Primary School	6.09	1.7%	72.09	20.6%
R22: Laurel Lane Primary School	5.11	1.5%	71.11	20.3%
R23: St Catharine Catholic Primary School	5.11	1.5%	71.11	20.3%

Table 6.19: Hourly mean SO_2

6.74 Table 6.19 shows that the change associated with process emissions from the replacement facilities at the point of maximum impact is assessed as slight using the IAQM guidance, as the annual mean process contribution will be more than 10% of the AQAL. Detailed modelling in technical appendix D shows that the process contribution is predicted to exceed 10% of the AQAL in a small area along Old Slade Lane and the neighbouring golf course. However, there is a very low likelihood of emissions at the half-hour emission limit value coinciding with worst case weather conditions for dispersal. To assess the impact at areas of relevant exposure, the impact at sensitive receptors has therefore been considered.

6.75 Table 6.19 shows that the impacts can be screened out as being both insignificant and negligible at all of the sensitive receptors, so there is no potential for significant adverse effects.

15-minute mean SO_2

6.76 Table 6.20 shows the maximum predicted 99.9th percentile of 15-minute mean SO_2 concentrations over the five modelled years at the point of maximum impact and at each identified receptor location, in addition to the contribution from background sources.

Receptor	Process contribution		PEC	
	Conc. ($\mu g/m^3$)	% of AQAL	Conc. ($\mu g/m^3$)	% of AQAL
Point of maximum impact	52.80	***19.9%***	118.80	44.7%
R1: Old Slade Lane 1, Richings Park	35.29	***13.3%***	101.29	38.1%
R2: Old Slade Lane 2, Richings Park	27.75	***10.4%***	93.75	35.2%
R3: Old Slade Lane 3, Richings Park	24.00	9.0%	90.00	33.8%
R4: Main Drive, Richings Park	18.55	7.0%	84.55	31.8%
R5: North Park, Richings Park	16.63	6.3%	82.63	31.1%
R6: Sutton Lane 1, Langley	11.95	4.5%	77.95	29.3%
R7: Sutton Lane 2, Langley	14.57	5.5%	80.57	30.3%
R8: London Road, Colnbrook	10.97	4.1%	76.97	28.9%
R9: Vicarage Way, Colnbrook	16.55	6.2%	82.55	31.0%
R10: The Hawthorns, Colnbrook	13.14	4.9%	79.14	29.8%
R11: The Island, Longford	10.16	3.8%	76.16	28.6%
R12: Verbena Close, West Drayton	10.33	3.9%	76.33	28.7%
R13: Lily Drive, West Drayton	10.14	3.8%	76.14	28.6%
R14: The Common, West Drayton	11.88	4.5%	77.88	29.3%
R15: Mayfield Park, West Drayton	9.59	3.6%	75.59	28.4%
R16: Thorney Mill Road, Thorney	9.95	3.7%	75.95	28.6%
R17: Richings Way, Richings Park	11.72	4.4%	77.72	29.2%
R18: Parlaunt Park Primary Academy	9.64	3.6%	75.64	28.4%
R19: Foxborough Primary School	9.03	3.4%	75.03	28.2%
R20: Colnbrook CoE School	13.49	5.1%	79.49	29.9%
R21: Harmondsworth Primary School	10.57	4.0%	76.57	28.8%
R22: Laurel Lane Primary School	8.56	3.2%	74.56	28.0%
R23: St Catharine Catholic Primary School	8.44	3.2%	74.44	28.0%

Table 6.20: 15-minute mean SO_2

6.77 Table 6.20 shows that the change associated with process emissions from the replacement facilities at the point of maximum impact is assessed as slight using the IAQM guidance, as the annual mean process contribution will be more than 10% of the AQAL. To assess the impact at areas of relevant exposure, the impact at sensitive receptors has therefore been considered.

6.78 Table 6.20 shows that the impacts can be screened out as being both insignificant and negligible at all but two of the sensitive receptors, so there is no potential for significant adverse effects at these receptors. At R1 and R2, the process contribution is predicted to be more than 10% of the short term AQAL. The impact of the replacement facilities at these receptors is therefore assessed as being slight and not significant.

Metals

6.79 The Environment Agency's (2016) guidance sets out the following two stage process for detailed modelling of group 3 metals:

- Firstly it should be assumed that each metal is released at 100% of the total metal emission limit value (i.e. 0.5 mg/Nm^3)
- If the impact cannot be screened out under the first stage, it should be assumed that each metal is released at the maximum concentration monitored at an existing facility

6.80 The guidance also states that where the process contribution for any metal exceeds 1% of the long term environmental standard, or 10% of the AQAL, there is the potential for significant pollution. Where the process contribution exceeds these criteria, the PEC should be compared to the AQAL. The impact can be screened out as not significant where the PEC is less than 100% of the environmental standard. The long term and short term modelling results are set out in tables 6.21 and 6.22 respectively.

Metal	**AQAL (ng/m^3)**	**Background conc. (ng/m^3)**	**Stage 1 assessment(1)**				**Stage 2 assessment(2)**				
			PC		**PEC**		**Metal as % of total ELV**	**PC**		**PEC**	
			ng/m^3	**% AQAL**	**ng/m^3**	**% AQAL**		**ng/m^3**	**% AQAL**	**ng/m^3**	**% AQAL**
Arsenic	3	0.79	15.77	*525.75%*	16.56	*522.08%*	8.3%	1.31	*43.81%*	2.10	70.15%
Antimony	5,000	-	15.77	0.32%	-	-	3.8%	0.60	0.01%	-	-
Chromium	5,000	13.16	15.77	0.32%	28.93	0.58%	30.7%	4.84	0.10%	18.00	0.36%
Chromium (VI)	0.2	2.63	15.77	*7,866.25 %*	18.40	*9,202.25 %*	0.012%	0.0018	*0.92%*	2.63	*1,316.92 %*
Cobalt	-	0.25	15.77	-	16.02	-	1.9%	0.29	-	0.54	-
Copper	10,000	11.10	15.77	0.16%	26.87	0.27%	9.7%	1.52	0.02%	12.62	0.13%
Lead	250	10.35	15.77	*6.31%*	26.12	10.45%	16.8%	2.64	*1.06%*	12.99	5.20%
Manganese	150	10.90	15.77	*10.52%*	26.67	17.78%	20.0%	3.15	*2.10%*	14.05	9.37%
Nickel	20	6.61	15.77	*78.86%*	22.38	*111.91%*	73.3%	11.57	*57.83%*	18.18	90.88%
Vanadium	5,000	1.55	15.77	0.32%	17.32	0.35%	2.0%	0.32	0.01%	1.87	0.04%

Table 6.21: Long term metals results for the replacement facilities – point of maximum impact

(1) Assumes that each metal is released at 100% of the total metal ELV (i.e. 0.5 mg/Nm^3)
(2) Assumes that each metal is released at the maximum concentration monitored at an existing facility, as presented in appendix A of the Environment Agency (2016) guidance
(3) There is no monitoring of the separate species of chromium in the UK. This assessment assumes that background concentrations of chromium (VI) equate to 20% of the total chromium concentration, as required by the guidance

Metal	AQAL (ng/m³)	Baseline conc. (ng/m³)	Assuming each metal emitted at 100% of the group ELV		Metal (as % of ELV)	Assuming each metal emitted as per Environment Agency maximum monitored	
			PC as % of AQAL	PEC as % of AQAL		PC as % of AQAL	PEC as % of AQAL
Arsenic	-	1.58	-	-	8.3%	-	-
Antimony	150,000	-	0.14%	-	3.8%	0.01%	-
Chromium	150,000	26.32	0.14%	0.16%	30.7%	0.04%	0.06%
Chromium (VI)	-	5.26	-	-	0.04%	-	-
Cobalt	-	0.50	-	-	1.9%	-	-
Copper	200,000	22.20	0.11%	0.12%	9.7%	0.01%	0.02%
Lead	-	20.70	-	-	16.8%	-	-
Manganese	1,500,000	21.80	0.01%	0.02%	20.0%	0.003%	0.004%
Nickel	-	13.22	-	-	73.3%	-	-
Vanadium	1,000	3.10	*21.03%*	21.34%	2.0%	0.42%	0.73%

Table 6.22: Short term metals results for the replacement facilities – point of maximum impact

6.81 Table 6.21 shows that, if it is assumed that the entire emissions of metals consists of only one type of metal, the annual process contributions of arsenic, chromium (VI), cobalt, lead, manganese and nickel are predicted to be greater than 1% of the long term AQAL at the point of maximum impact. However, only the PECs for arsenic, chromium (VI) and nickel are predicted to be greater than 100% of the AQAL under this worst case screening assumption.

6.82 If it is assumed that the replacement facilities will perform no worse than a currently permitted facility, the predicted process contribution is below 1% of the AQAL for all pollutants except arsenic, chromium (VI), lead, manganese and nickel. However, the PECs for arsenic, manganese, lead and nickel are well below 100% of the AQAL, so the impacts can be screened out. Using the Environment Agency's guidance criteria, it can be concluded that there is no risk of exceeding the long term AQAL for all metals except chromium (VI) and there is no potential for significant pollution.

6.83 The predicted process contribution for chromium (VI) exceeds 1% of the AQAL and the PEC exceeds 100% of the AQAL. However, this assumes that each metal is released at the maximum concentration monitored at an existing facility. The average concentration monitored at an existing facility is 0.001 ng/m³. Using this as the emission concentration for the replacement facilities, the impact is predicted to be 0.92% of the AQAL. The effect can therefore be screened out and there is no potential for significant pollution.

6.84 Table 6.22 shows that, even if it is assumed that each metal is released from the replacement facilities at the total metal emission limit value, the maximum 1-hour process contribution at the point of maximum impact is predicted to be less than 10% of the short term AQAL for all metals except vanadium. However, the PEC for vanadium is well below 100% of the AQAL, so the impacts can be screened out. There is therefore no potential for significant pollution from any metals.

Process emissions assessment – ecological receptors

6.85 The impact of emissions from the replacement facilities has been compared to the critical levels set out in table 6.5 to determine whether further assessment is required. As shown in table 6.23, the process contribution at the locally designated sites will be less than 100% of the critical level for all pollutants considered. At all the European and nationally designated sites the process contribution is predicted to be less than 1% of the long term and less than 10% of the short term critical levels for all pollutants. This means that the impacts can be screened out as insignificant and no further assessment is required.

Site	NO_x		SO_2	Hydrogen fluoride		Ammonia
	Annual mean	Daily mean	Annual mean	Weekly mean	Daily mean	Annual mean
European designated sites (within 10 km) and nationally designated sites (within 2 km)						
South-West London Waterbodies	0.7%	4.7%	0.3%	2.9%	0.7%	0.7%
Windsor Forest and Great Park	0.3%	1.4%	0.3%	0.9%	0.2%	0.9%
Locally designated sites (within 2 km)						
Old Wood	3.4%	26.9%	2.9%	12.9%	4.0%	9.7%
Old Slade Lake	10.8%	39.2%	9.5%	30.2%	5.9%	31.5%
Opposite Iver Station	1.6%	5.5%	1.4%	3.2%	0.8%	4.7%
Lower Colne	3.2%	7.3%	2.8%	5.7%	1.1%	9.5%
Queen Mother Reservoir	0.8%	6.7%	0.7%	4.9%	1.0%	2.4%

Table 6.23: Impact of emissions at ecological sites as percentage of critical level

6.86 In addition, the impact of the replacement facilities has been examined against critical loads at each of the identified statutory designated ecological receptors. The full results of the modelling are included in technical appendix D. At all locally designated sites, the process contribution is predicted to be less than 100% of the relevant critical loads. At all the European and nationally designated sites, the process contribution is predicted to be less than 1% of the relevant critical loads. This means that the impact of the replacement facilities can be screened out as insignificant and no further assessment is required.

Plume visibility

6.87 The modelling showed that a visible plume is predicted to extend beyond the site boundary for less than 5% of daylight hours. In accordance with the Environment Agency's assessment criteria in table 6.6, as the plume length exceeds the distance to the site boundary for less than 5% of the year and there are local sensitive receptors, the visual impact of the plume is considered to be low.

6.88 In addition, although visible plumes are predicted to extend over the M4 motorway occasionally, the results of the modelling show that there will be no occasions when a visible plume reaches the ground. There is therefore no risk of a visible plume causing obscured vision for drivers on the M4 or any other road. Full details of the modelling outcomes are provided in technical appendix D, but no significant adverse effects are predicted.

Mitigation and monitoring

6.89 A range of measures to reduce dust generation during construction will be put in place through the framework construction environmental management plan, as set out in technical appendix C. Appropriate measures for a site of this size and nature include the following:

- Displaying the name and contact details of person(s) accountable for dust issues on the site boundary. This may be the environment manager / engineer or the site manager
- Displaying the head or regional office contact information
- Recording all dust and air quality complaints, identifying the cause(s), taking appropriate measures to reduce emissions in a timely manner and recording the measures taken
- Making the complaints log available to Slough Borough Council when asked
- Recording any exceptional incidents that cause dust and / or air emissions, either on or off site, and the action taken to resolve the situation in the logbook
- Planning the site layout so that machinery and dust-causing activities are located away from receptors, as far as possible
- Keeping site fencing, barriers and scaffolding clean using wet methods
- Removing materials that have the potential to produce dust from site as soon as possible, unless these are being re-used on site. If they are being re-used on site, covering, seeding or fencing stockpiles to prevent wind whipping
- Ensuring all vehicles switch off engines when stationary and there are no idling vehicles
- Only using cutting, grinding or sawing equipment fitted, or in conjunction, with suitable dust suppression techniques, such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems
- Ensuring an adequate water supply on the site for effective dust / particulate matter suppression / mitigation, using non-potable water where possible and appropriate
- Ensuring equipment is readily available on site to clean any dry spillages and cleaning up spillages as soon as reasonably practicable after the event using wet cleaning methods
- Prohibiting bonfires and burning of waste materials
- Ensuring sand and other aggregates are stored in designated areas and are not allowed to dry out, unless this is required for a particular process, in which case ensuring that appropriate additional control measures are in place
- Ensuring vehicles entering and leaving the site are covered to prevent escape of materials during transport
- Implementing a wheel wash system
- Ensuring there is an adequate area of hard surfaced road between the wheel wash facility and the site exit

6.90 With these measures in place, no significant effects are predicted as a result of dust generation during construction.

6.91 No additional operational mitigation or monitoring is required beyond that embedded into the design and required by legislation, which will be regulated by the Environment Agency under the environmental permit.

Residual effects

6.92 No significant residual air quality effects are predicted.

Cumulative effects

6.93 As set out in chapter 5, the potential for cumulative effects with other consented developments in the area has been examined. The North Park, CEMEX project has the potential to generate dust from minerals activities, but it is 1 km from the application site and so is too far away for there to be any potential for significant adverse cumulative effects on dust levels.

6.94 None of the consented projects in the area will generate process emissions, so there is no potential for significant cumulative air quality effects post-construction.

Construction dust – sensitivity of the study area

Receptor sensitivity	No. receptors	Distance from source (m)			
		<20	<50	<100	<350
Dust soiling effects on people and property					
High (e.g. dwellings, museums, long and medium stay car parks)	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium (e.g. parks and places of work)	>1	Medium	Low	Low	Low
Low (e.g. playing fields, farmland, short term car parks)	>1	Low	Low	Low	Low
Human health impacts					
High (e.g. dwellings, schools, care homes) and annual mean PM_{10} concentration >32 µg/m³	>100	High	High	High	Low
	10-100	High	High	Medium	Low
	1-10	High	Medium	Low	Low
High and annual mean PM_{10} concentration 28-32 µg/m³	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	High	Medium	Low	Low
High and annual mean PM_{10} concentration 24-28 µg/m³	>100	High	Medium	Low	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
High and annual mean PM_{10} concentration <24 µg/m³	>100	Medium	Low	Low	Low
	10-100	Low	Low	Low	Low
	1-10	Low	Low	Low	Low
Medium (e.g. office and shop workers) and annual mean PM_{10} concentration >32 µg/m³	>10	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium and annual mean PM_{10} concentration 28-32 µg/m³	>10	Medium	Low	Low	Low
	1-10	Low	Low	Low	Low
Medium and annual mean PM_{10} concentration <28 µg/m³	>1	Low	Low	Low	Low
Low (e.g. parks, playing fields, public footpaths)	>1	Low	Low	Low	Low
Ecological impacts					
High (e.g. internationally designated site with dust-sensitive features)	N/A	High	Medium	Not sensitive	
Medium (e.g. SSSI with dust-sensitive features)	N/A	Medium	Low	Not sensitive	
Low (e.g. locally designated site with dust-sensitive features)	N/A	Low	Low	Not sensitive	

From: Institute of Air Quality Management, 2016, Guidance on the assessment of dust from demolition and construction

Construction dust – dust emission magnitude

Dust emission magnitude	Activity
Large	Demolition: >50,000 m^3 building demolished; potentially dusty construction material (e.g. concrete); on site crushing and screening; demolition activities >20 m above ground level. Earthworks: Total site area >10,000 m^2; potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size); >10 heavy earth moving vehicles active at any one time; formation of bunds >8 m in height; total material moved >100,000 tonnes. Construction: Total building volume >100,000 m^3; on site concrete batching; sandblasting. Trackout: >50 HDV outward movements in any one day; potentially dusty surface material (e.g. high clay content); unpaved road length >100 m.
Medium	Demolition: Total building volume 20,000-50,000 m^3; potentially dusty construction material; demolition activities 10-20 m above ground level. Earthworks: Total site area 2,500-10,000 m^2; moderately dusty soil type (e.g. silt); 5-10 heavy earth moving vehicles active at any one time; formation of bunds 4-8 m in height; total material moved 20,000-100,000 tonnes. Construction: Total building volume 25,000-100,000 m^3; potentially dusty construction material (e.g. concrete); on site concrete batching. Trackout: 10-50 HDV outward movements in any one day; moderately dusty surface material (e.g. high clay content); unpaved road length 50-100 m.
Small	Demolition: Total building volume <20,000 m^3; construction material with low potential for dust release (e.g. metal cladding or timber); demolition activities <10 m above ground level; demolition during wetter months. Earthworks: Total site area <2,500 m^2; soil type with large grain size (e.g. sand); <5 heavy earth moving vehicles active at any one time; formation of bunds <4 m in height; total material moved <20,000 tonnes; earthworks during wetter months. Construction: Total building volume <25,000 m^3; construction material with low potential for dust release (e.g. metal cladding or timber). Trackout: <10 HDV outward movements in any one day; surface material with low potential for dust release; unpaved road length <50 m.

From: Institute of Air Quality Management, 2016, Guidance on the assessment of dust from demolition and construction.

Construction dust – risk of dust effects without mitigation

Area sensitivity	Dust emission magnitude: Large	Medium	Small
High	High	Medium	Low (medium for demolition)
Medium	Medium (high for demolition)	Medium (low for trackout)	Low (negligible for trackout)
Low	Low (medium for demolition)	Low	Negligible

From: Institute of Air Quality Management, 2016, Guidance on the assessment of dust from demolition and construction.

Air quality – impact descriptors for individual receptors

Long term average concentration at receptor in assessment year	Change in concentration relative to air quality assessment level (AQAL)			
	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Note: The table is intended to be used by rounding the change in the percentage pollutant concentration to whole numbers, which then makes it clear which cell the impact falls within. Changes of 0% (i.e. less than 0.5%) will be described as negligible.

From: Environmental Protection UK and the Institute of Air Quality Management, 2017, Land-Use Planning & Development Control: Planning for Air Quality.

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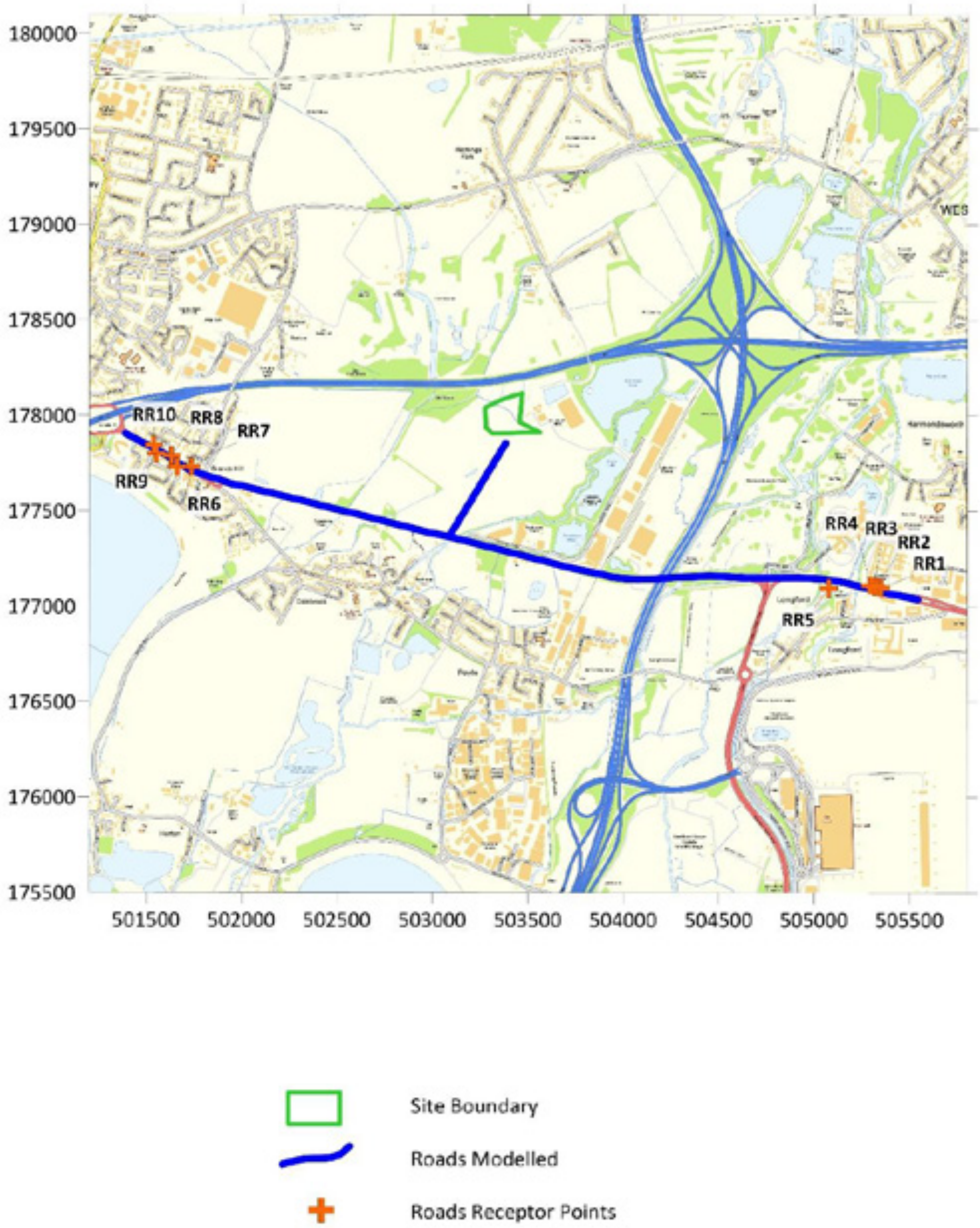

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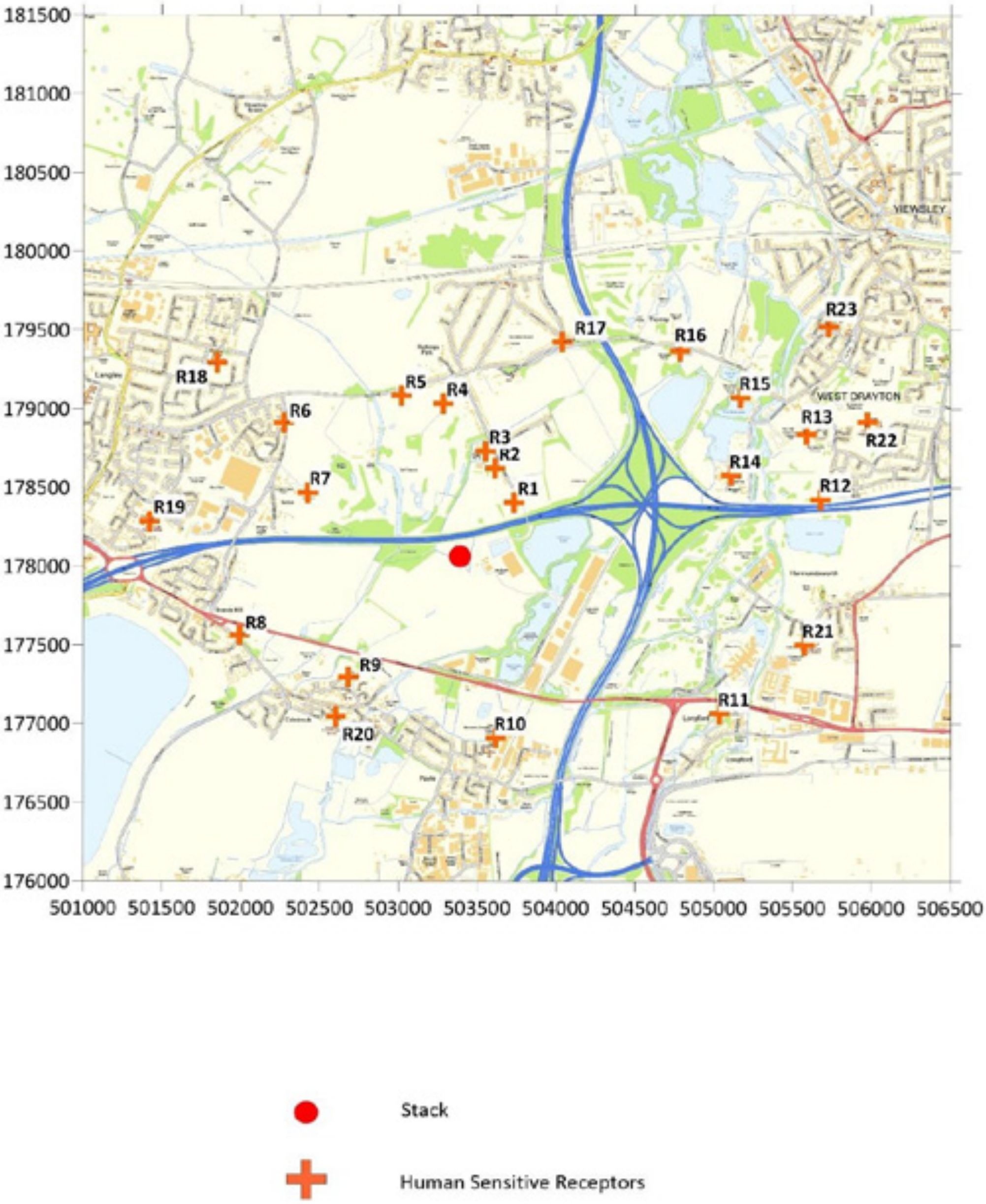

Figure 6.6 Locations of air quality sensitive receptors