Introduction

5.1 This chapter presents an assessment of the potential impacts of the proposed Ardley Energy from Waste (EfW) facility and the associated amendments to the existing landfill and HWRC, on air quality with particular regard to the following:

During the construction phase:

- fugitive dust from traffic movements and construction; and
- combustion pollutants (PM_{10}, $NO_{x,}$ etc) from construction traffic.

During the site operational phase:

- combustion pollutants (PM_{10}, $NO_{x,}$ etc) from traffic;
- combustion pollutants (WID pollutants) from the stack;
- fugitive dust and litter from waste handling operations; and
- fugitive odours and bioaerosols from waste handling operations.

5.2 The significance and resultant impacts of emissions to air from the proposed development are dependent upon the relationship between the:

- magnitude of the emissions;
- prevailing meteorological conditions for that location; and
- proximity of sensitive locations to the emission sources.

5.3 The potential for emissions to air to cause nuisance and health impacts has been assessed. Further assessment of health impacts has been undertaken as part of the Human Health Assessment (Appendix 11).

5.4 Where development proposals are described, or where this assessment touches on other technical specialisms covered in greater detail elsewhere within this Environmental Statement (such as highways), descriptions will refer to those aspects critical to the aerial environment only.

Assessment Methodology

Scope

5.5 In order to enable effective design and operation of the EfW, associated changes will be required to existing infrastructure (landfill and HWRC). These changes are described earlier in the Environmental Statement, and include:

- re-modelling of the landfill to accommodate the EfW development in the south eastern corner of the site. There will be approximately 2.06 million tonnes of non inert void space, resulting in the loss of an estimated 600,000 tonnes of void space as result of the EfW development;

- Based on an EfW development not becoming operational until late 2013 it assumed that landfilling at existing rates will continue up to 2012/3. Thereafter it is assumed that landfill inputs will decrease to in the order of 200,000 tpa and would be a mix of industrial and commercial waste and inerts. This gives the proposed landfill an estimated completion date of 2019.

- As a result of the space to be created by re-locating the landfill offices and weighbridge to the new proposed southern access it is proposed to extend the HWRC to provide a further four skip bays and six additional public parking spaces.

5.6 The air quality impact of the revised landfilling operations will be comparable to the operations for which there is existing permission (and PPC Permit). Furthermore, any specific additional risk (although there is likely to be less risk given that the filling tonnages are reduced) would be covered in the landfill gas risk assessment (LFGRA) supporting the PPC variation application for the site.

General

5.7 The assessment is based upon a comparison of the baseline (current and projected without the development proposals) situation against the air quality impacts resulting from the development proposal scenario.

5.8 A staged approach has been adopted as the basis of all air quality assessments. This ensures that the approach taken for the assessment of risk is proportional to the risk of an unacceptable impact being caused. As such, where a simple review of the situation shows that risk is negligible, this will be sufficient. In cases where the risk of a health or nuisance impact cannot be regarded as insignificant, a more detailed assessment may be required (such as a simple quantitative screening assessment or an advanced dispersion modelling exercise as appropriate).

5.9 Each of the activities associated with the proposal have been assessed for potential air quality impacts. The assessment includes fugitive emissions of dust, odours and litter; pollutants in stack emissions for which the Waste Incineration Directive (WID) sets limits, and other pollutants that may be present in stack emissions for which air quality standards have been set. The methodology used in each assessment is presented below.

Assessment of Dust and Litter

5.10 Given the construction activities and handling of waste materials during the operational phase, there is a potential risk for the generation of dust and, in respect of waste handling, for fugitive release of litter to occur. This is of relevance to both the EfW, HWRC and existing landfill operations.

5.11 For such operations the common concern regarding dust emissions and fugitive litter is their potential 'nuisance' effect. The potential nuisance effects of dust emissions are related to emissions of large particles, generally larger than 30µm in diameter. Deposition of these particles onto surfaces, such as windows and cars, causes soiling that, if sufficiently great, will sometimes be considered to be a 'nuisance'.

5.12 A qualitative assessment of the dust and litter generation potential of the operations has been carried out. An assessment of finer particulates, i.e. particles of 10µm in diameter (PM_{10}) and smaller, has been carried out as part of the stack dispersion modelling.

Odour and Bioaerosols Assessment Methodology

5.13 Given the nature of the material being handled (i.e. waste) there is the potential for the generation of odour and bioaerosols during the operational stage. A qualitative assessment of the odour and bioaerosol generation potential of the EfW operations has been carried out.

Traffic Impact Assessment Methodology

5.14 The assessment of impact of traffic has been carried out using the UK Design Manual for Roads and Bridges (DMRB) methodology (2007)[1.] The DMRB methodology facilitates the prediction of pollutant concentrations near to roads, as a result of vehicle emissions. Predicted concentrations at receptors are made using an empirical relationship using different emission factors for different vehicle types. These emission factors change from year to year as the technology in the vehicle fleet improves.

5.15 The criterion for assessment of air quality contained within the latest DMRB guidance (207/07) focuses on roads with relatively high changes in flows or high proportion of HDV traffic. 'Affected roads' are defined as those that meet any of the following criteria:

- Road alignment will change by 5 m or more; or
- Daily traffic flows will change by 1,000 AADT or more; or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
- Daily average speed will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more.

Only properties and Designated Sites within 200m of roads affected by the project need be considered.

[1] Design Manual for Roads and Bridges Vol. 11 Environmental Assessment (Consolidated Edition), Section 3, Part 1 Air Quality (May 2007)

5.16 If none of the roads in the network meet any of the traffic/alignment criteria or there are no properties or relevant Designated Sites near (within 200m) the affected roads, then the impact of the scheme can be considered to be neutral in terms of local air quality and no further air quality assessment is required.

5.17 Owing to improvements in vehicle technology as required by European Directives (amendments to the 1970 Directive 70/220/EEC), the DMRB assumes that emissions will fall with time. The vehicle improvements include progressive refinements in engine performance, the introduction of three-way catalytic converters and particle traps for diesel vehicles. As a consequence of these reductions in emission rates, predicted future pollutant levels will be lower than present day levels close to roads where traffic flows do not change significantly.

5.18 The assessed road links are described below. The receptors are considered to represent varying distances from the road edge (1m, 5m and 10m from road edge) and this will allow for comparison of impacts with potential receptors which are located at these distances from the affected road links.

Table 1
Road Links used in DMRB Assessment

Road Link	Assessed Receptor Location
Link 1	Northern section of B340
Link 2	Central 1 section of B340
Link 3	Central 2 section of B340
Link 4	Southern section of B340

Detailed Dispersion Modelling Methodology

5.19 Detailed atmospheric dispersion modelling has been undertaken in relation to emissions from the stack serving the thermal waste treatment process as detailed in Appendix 5-1 with due consideration to relevant guidance[2, 3]; the modelling approach is based upon the following stages:

- identification of sensitive receptors;
- review of emissions from other existing and proposed local industrial sources;
- review of process design proposals and emission sources;
- compilation of the existing air quality baseline with due regard to Review and Assessment of local air quality;

[2] Air Dispersion modelling report requirements (for detailed air dispersion modelling). AQMAU, Environment Agency (not dated).
[3] Guidelines for the Preparation of Dispersion Modelling Assessment for Compliance with Regulatory Requirements – an update to the 1995 Royal Meteorological Society guidance. UK Atmospheric Dispersion Modelling Committee (ADMLC), Version 1.4, 2004.

- calculation of process contribution to ground level concentrations and deposition of pollutants emitted from the process;
- evaluation of effects on ecological receptors;
- consideration of cumulative effects; and
- sensitivity analyses of model input data.

5.20 A number of commercially available dispersion models are able to predict ground level concentrations arising from emissions to atmosphere from elevated point sources such as the proposed Ardley EfW facility. For this assessment the AERMOD (PRIME) model has been applied, although consideration has been given to the ADMS model in the assessment of model sensitivity.

5.21 The AERMOD dispersion modelling program is widely used and accepted by the Environment Agency in the UK for undertaking such assessments and its predictions have been validated for dispersion from tall stacks against real-time monitoring data by the USEPA[4]. It is therefore considered a suitable model for this assessment.

5.22 The issues of model sensitivity have been considered in detail in Appendix 5-1. Additional information on current concentrations of Nitrogen Dioxide at Ardley is presented in Appendix 5-2.

Assessment of Human Health Effects

5.23 The potential effects on human health have been assessed within the detailed dispersion modelling assessment by comparison of predicted impacts against health based air quality objectives. In addition, deposition rates of dioxins and metals have been determined as part of a more detailed health impact assessment (Appendix 13)

Assessment of Impacts on Vegetation and Ecosystems

5.24 The potential impacts on ecosystems have been assessed by reference to critical levels and critical loads. Both are set with respect to values below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

5.25 Critical levels are a quantitative estimate of exposure to one or more airborne pollutants in gaseous form. Critical levels for the protection of vegetation and ecosystems are specified within relevant European air quality directives and corresponding UK air quality regulations.

5.26 Critical loads are a quantitative estimate of exposure to deposition of one or more pollutants. Critical loads are set for the deposition of various substances to sensitive ecosystems.

[4] AERMOD: Latest Features and Evaluation Results. USEPA Report: EPA-454/R-03-003 June 2003, (http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod)

5.27 For all European sites, SSSIs and other protected ecological sites in the study area (defined as 10km radius from the proposed development), process contributions and predicted environmental concentrations of NOx SO_2, NH_3 and HCl have been calculated for comparison against relevant critical level and critical load thresholds.

5.28 Deposition rates were calculated using dispersion modelling results processed by following empirical methods recommended by the Environment Agency in AQTAG06[5] as summarised in Appendix 5-1.

Significance Criteria

5.29 Guidance issued by the National Society for Clean Air (NSCA)[6] (now Environmental Protection UK), relating to air quality considerations within the planning process for use by local planning authorities and developers alike was updated in November 2006. In order to ensure that the descriptions of the significance of predicted impacts used within this report are clear and consistent and in accordance with recent guidance, the following criteria have been used based on the NSCA guidance.

5.30 The magnitude of change has been measured by reference to the applied criteria, namely Air Quality Standards (AQS) where these exist, or Environmental Assessment Levels (EALs) where AQS are absent, referred to collectively as Standards in Table 2 below.

Table 2:
Descriptors for Changes

Magnitude of Change	Change as % of applied Standard
Very large	increase/decrease >25%
Large	increase/decrease 15-25%
Medium	increase/decrease 10-15%
Small	increase/decrease 5-10%
Very small	increase/decrease 1-5%
Extremely small	increase/decrease <1%

[5] AQTAG06 – Technical Guidance on detailed modelling approach for an appropriate assessment for emissions to air. Environment Agency, working Draft version 9, 12/05/06.
[6] Development Control: Planning for Air Quality. NSCA, 2006.

Table 3
Descriptors for Impact Significance

Magnitude of Change	Extremely Small	Very Small	Small	Medium	Large	Very Large
Above Standard without scheme	Slight adverse	Slight adverse	Substantial adverse	Substantial adverse	Very Substantial adverse	Very Substantial adverse
Below Standard without scheme. Above with scheme	Slight adverse	Moderate adverse	Substantial adverse	Substantial adverse	Very Substantial adverse	Very Substantial adverse
Below Standard with scheme, but not well below	Negligible	Slight adverse	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
Well below standard with scheme	Negligible	Negligible	Slight adverse	Slight adverse	Slight adverse	Moderate adverse

Baseline Conditions

Relevant Legislation and Guidance

Waste Incineration Regulations

5.31 The Waste Incineration (England and Wales) Regulations 2002 (SI 2002 No, 2980) came into force on 28 December 2002 and transpose the Waste Incineration Directive, 2000/76/EC (WID). The Directive applies to incineration and co-incineration plants (which accept waste and other fuels such as biomass) which treat waste as defined in the Waste Framework Directive. Such wastes include municipal waste, clinical waste, hazardous waste, general waste and waste derived fuels. The Waste Incineration Regulations would apply to the proposed operations.

5.32 The WID sets out emission limit values for emission to air as detailed in Appendix 5-1, these emission limits would be set as permit conditions by the Environment Agency as part of the permitting process.

Ambient Air Quality

(National) Air Quality Strategy

5.33 The 'Air Quality Strategy for England, Scotland, Wales and Northern Ireland' (UKAQS), first published in 2000 and updated and re-released by Defra in July 2007, contains air quality objectives based on the protection of both human health and vegetation (ecosystems). These objectives have been set taking into account the Air Quality Standards (AQS) defined in the Air Quality Standards Regulations 2007. A summary of the current air quality standards for the pollutants detailed in the UKAQS 2007 for the purpose of Local Air Quality Management is provided in Appendix 5-1.

5.34 The UKAQS actually includes more exacting objectives for some pollutants than required by EC legislation. This assessment refers only to UK air quality standards, as compliance with these standards will ensure that the less demanding European Air Quality limit values also being met.

Standards Relating to Odour Nuisance

5.35 Currently, in the UK there are no statutory standards for assessing odour nuisance. Even outside the UK, few standards exist owing to the difficulty in defining odour nuisance and problems associated with the measurement of odour and assessing compliance with any odour nuisance standards that may be applied.

Standards Relating to Bio-aerosols

5.36 Currently, in the UK there are no statutory standards relating to bio-aerosols.

Standards and Guidelines Relating to Dust

5.37 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.

The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance

5.38 The guidance recommends three criteria to access the potential impact of a construction activity. These criteria take into account of;

- the area taken up by the development;
- the number of properties being developed; and
- the potential impact of the development on sensitive receptors close to the development, for example schools, housing and hospitals

5.39 These criteria can then be used to assess whether a development represents a low, medium or high risk by following the guidelines illustrated in Table 4 below.

Table 4
Classification of Development Site in relation to Dust Impact[7]

Risk	Characteristic of Site
Low	Development of up to 1000 sq metres of land and; Development of one property and up to a maximum of ten and; Potential for emissions and dust to have an infrequent impact on sensitive receptors
Medium	Development of between 1,000 and 15,000 sq metres of land and Development of between ten to 150 properties and; Potential for emissions and dust to have an intermittent or likely impact on sensitive receptors
High	Development of over 15,000 sq metres of land, or; Development of over 150 properties or; Major development referred to the major and/or the London Development Agency or; Major development referred to by the London borough or; Potential for emissions and dust to have significant impact on sensitive receptors

5.40 The guidance recommends mitigation measures for low, medium and high risk developments and best practise measures are recommended for site planning, construction traffic, demolition works and site activities.

Planning Policy Context

Waste Strategy (2007)

5.41 The government published Waste Strategy 2007 for England on 24 May 2007. It sets out the government's vision for sustainable waste management. The strategy provides an excellent overview of the waste situation across the UK.

5.42 Useful selections of studies within Waste Strategy (2007) have been undertaken that highlight the problems with waste disposal across the country.

5.43 Management of municipal waste within the UK showed that the majority of our waste is disposed through Landfill with a small proportion incinerated. In comparison with other countries throughout Europe the UK ranks as one of the highest places where municipal waste is sent to landfill with only Greece and Ireland ranking higher.

[7] Mayor of London. Best Practice Guidance (2006) The control of dust and emissions from construction and demolition

5.44 Defra have identified the following trend in Municipal waste management in England 2006/07.

5.45 The guidance recommends three criteria to access the potential impact of a construction activity. These criteria take into account of;

- 57.9% of waste is landfilled;
- 11.1% of waste is incinerated with EfW;
- 30.6% of waste is recycled/composted; and
- 0.4% other waste disposal techniques.

5.46 Defra have also identified the South East as being one of the highest areas within the country where waste is sent to Landfill consequently raising concerns over the future of this disposal method.

5.47 Waste Strategy 2007 recognises that the Landfill Tax Escalator and the introduction of the Landfill Allowance Trading Scheme (LATS) have created sharp incentives to direct waste form landfill.

5.48 A variety of Objectives and Targets are set out within Waste Strategy 2007 which confirm the acceptability of the principle of development for the proposed EfW at Ardley. In particular the following key objectives and targets have been recognised as pertinent to the application:

Key Objectives

- meet and exceed the landfill directive targets diversion targets for biodegradable municipal waste in 2010, 2013 and 2020;

- increase diversion from landfill of non-municipal waste and secure better integration for treatment of municipal and non municipal waste.

Key Targets

- reduce the amount of household waste not re-used, recycled or composted from over 22.2 million tonnes in 2000by 29% to 15.8 million tonnes in 2010 with an aspiration to reduce it to 12.2 million tonnes in 2020 – a reduction of 45%

- recovery of Municipal Waste – 53% by 2010, 67% by 2015 and 75% by 2020.

5.49 Waste Strategy 2007 recognises that recovering Energy from Waste (EfW) is an essential component of well balanced energy policy. Energy from Waste is expected to account for 25% of municipal waste by 2020 compared to 10% today.

Baseline Environment

Meteorology

5.50 The most important meteorological parameters governing the atmospheric dispersion of pollutants are wind speed, wind direction, and atmospheric stability:

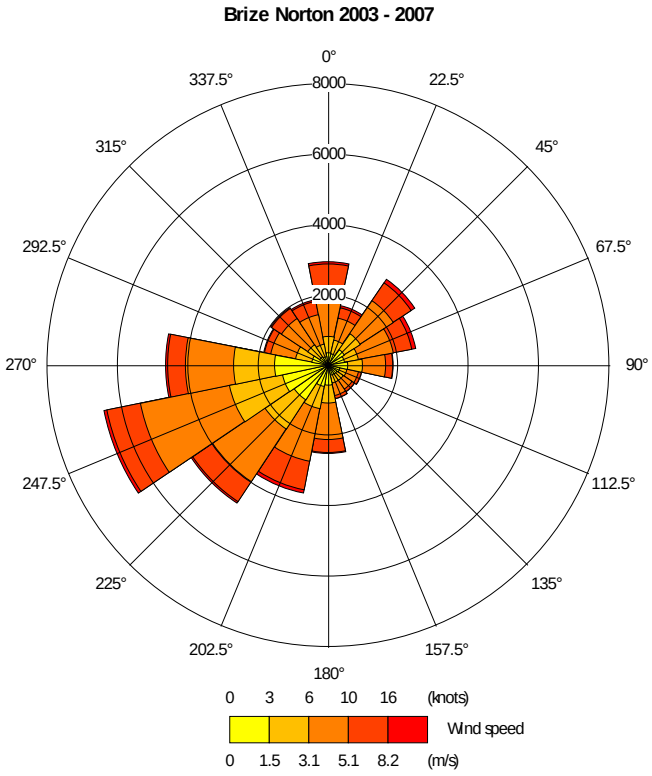
- wind direction determines the direction of travel of the plume;
- wind speed affects dispersion by increasing the initial dilution of pollutants and inhibiting plume rise for elevated sources; and.
- atmospheric stability is a measure of the turbulence of the air, which will effect the degree of dilution in the atmosphere or dispersion.

Local Wind Speed and Direction Data

5.51 Following consultation with the meteorological data provider, it was concluded that Brize Norton, located approximately 31km southwest of the application site would provide the most complete and representative dataset for purposes of this assessment. Meteorological data is also available from Little Rissington, an observation station located approximately 35km west of the application site but not used due to having no cloud cover data. Meteorological data used in this assessment was for the period 1st January 2003 to 31st December 2007 (inclusive).

5.52 A windrose for Brize Norton meteorological data for the period 2003 to 2007 (inclusive), providing the frequency of wind speed and direction, is presented in Figure 1

Figure 1:
Windrose for Brize Norton Observing Station (2003 – 2007)



5.53 As is apparent from this windrose, the predominant wind direction is from the south and south western quarter for all the years of data. Similarly, wind directions from the north occur relatively infrequently for all the years of data.

Topography

5.54 The topography of the surrounding area covered by the larger modelling grid (within 8.5km in each direction) is variable lying between 58m AoD in the region to the south east to 154m AoD to the north and east. Elevations have been included within the dispersion model.

Existing Air Quality

5.55 Whilst there is no specific background monitoring for WID pollutants, from a combination of government (central and local), appropriate background concentrations for majority of the pollutants have been established. model.

Dust, Odours and Aerosols

5.51 There are no measurements concentrations of dust, odours or bio-aerosols available around the location of the proposed development site. The EfW and HWRC are located immediately next to the operational Ardley landfill. The operators of this PPC Permitted landfill have a requirement to monitor for releases of landfill gas (odours and specific gaseous pollutants) and litter.

Sensitive Receptors

5.52 The term 'sensitive receptors' includes any persons, locations or systems that may be susceptible to changes as a consequence of the proposed development.

Human Receptors

5.53 According to the LAQM TG (03), air quality standards should only apply to all locations where members of the public may be reasonably likely to be exposed to air pollution for the duration of the relevant objective. Thus short term standards such as the 1 hour standard for NO_2 should apply to footpaths at site boundaries and other areas which may be frequented by the public even for a short period of time. Longer term standards such as the 24 hour for PM_{10}, or annual means, should apply at houses other locations which the public can be expected to occupy on a continuous basis. These standards do not apply to exposure at the workplace.

5.54 The proposed development is in proximity to isolated residences and settlements (potentially long term sensitive receptors). For the purposes of this assessment, a receptor grid has been applied to the surrounding area, with discrete receptors as listed in Appendix 5-1 and shown in Appendix 5 Drawing AQ1.

5.55 Whilst there are more than fifty sensitive receptors in the vicinity of the site, these discrete receptors are considered to be representative of sensitive locations around the site. Given that dispersion modelling has been completed using a receptor grid, impact concentration for assessing impacts may effectively be determined at any location surrounding the site.

Ecological Receptors

5.56 Horizontal Guidance Note: IPPC H1 states that receptors, such as Sites of Special Scientific Interest (SSSI) or European sites (e.g. Special Area of Conservation), within 10km of PPC Permitted processes, or 10km on ‘major emitters’ (i.e. power stations and steel refineries) should be considered when determining the impacts. A radius of 10km has been applied in this assessment as advised by the Agency.

5.57 The identified sites and features of ecological value within the zone of influence of the study area are detailed in Appendix 5-1 and shown on Appendix 5 Drawing AQ4.

Assessment of Impact, Mitigation and Residual Effects

Construction Effects

Construction Dust

Potential Sources of Construction Dust

5.58 Dust effects would primarily occur during phases involving ground works, however bare earth surface, storage mounds and the movement of vehicles over bare earth may also generate dust. The transfer of dust from the site onto the highway will also present a risk of dust impact. This is relevant to both construction of the EfW and, to a lesser extent (due to scale of construction) the HWRC.

Assessment of Construction Dust

5.59 Based on the Control of Construction Dust Guidance, the proposed development would be classified as of medium to high potential for dust impacts and therefore mitigation measures will be required.

5.60 The potential for unacceptable impacts resulting from the deposition of construction dust in relation to local air quality effects is primarily dependent on the duration of exposure (i.e. construction duration) and separation distance from the source to receptor. It is common practice (in mineral planning for example[8]) to use a distances of between 100-200m from major sources as the radius within which there is the potential for significant air quality impacts from deposition of dust.

5.61 There are no residential properties within several hundred meters of the proposed EfW development and therefore the potential for dust impacts at residential receptors from construction are considered to be negligible. Receptors are however located close to the HWRC and mitigation will be required during construction operations.

5.62 To prevent unacceptable impact from dust resuspended by construction vehicles mitigation measures will be employed. These will be selected with regard to best practice guidance[9], and may include as appropriate: damping down dusty surfaces; controlling the speed of mobile plant crossing un-surfaced areas; mechanical road sweeper on public road; covering HGV's carrying dusty materials. The residual impact at these locations is predicted to be low.

[8] Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Mineral Extraction in England, Annex 1: Dust. OPDM March 2005.

[9] Greater London Authority, Best Practice Guidance The control of dust and emissions from construction and demolition

5.63 No further mitigation is therefore required and the potential risk would cease once construction is complete.

Construction Traffic

5.64 Construction of the Facility is anticipated to occur over a 26 month programme commencing in April 2011 and ending in July 2013. Construction traffic will access the site over this period, with peak construction vehicle movements likely to occur in 2011. During construction of the Facility it is estimated that the Facility would generate 50 Heavy Goods Vehicles (HGV) movements per day, and 334 light vehicle (LV) movements per day on the Northern and Central sections of the B340, with no additional traffic on the Southern section of the B340.

5.65 The site is expected to be operational in late 2013. During operation it is estimated that the Facility would generate 114 movements per day, including 80 HGV and 34 light vehicle (LV) movements per day on the Northern and Central sections of the B340. On the Southern section of the B340 it is estimated the Facility would generate 44 vehicle movements per day, including 18 Heavy Goods Vehicles (HGV) movements per day, and 26 light vehicle (LV) movements per day.

5.66 The impact of construction traffic on air quality would be below the DMRB screening criteria (of 200 HGV movements per day). However, a DMRB screening has been undertaken in direct response to the scoping opinion issues by consultees.

5.67 The NO_2 process contribution (annual average) of traffic generated as a result of construction of the Facility at assessed receptors for 2011 is shown below in Table 5.

Table 5
Predicted NO_2 Concentrations in 2011

Road Link	Receptor (distance from road)	Predicted Environmental Concentration (annual mean) (µg/m^3)		Process Contribution (µg/m^3)	% Change
		2011 No Development	2011 With Development		
Link 1	1m	19.49	19.66	+0.18	+0.92
	5m	19.29	19.46	+0.17	+0.88
	10m	18.92	19.07	+0.15	+0.80
Link 2	1m	19.70	19.87	+0.18	+0.91
	5m	19.50	19.67	+0.17	+0.87
	10m	19.13	19.28	+0.15	+0.80
Link 3	1m	18.92	19.11	+0.19	+0.98
	5m	18.76	18.94	+0.18	+0.94
	10m	18.47	18.63	+0.16	+0.85
Link 4	1m	18.82	18.82	+0.00	+0.00

	Predicted Environmental Concentration (annual mean) (µg/m^3)			
5m	18.66	18.66	+0.00	+0.00
10m	18.36	18.36	+0.00	+0.00

5.68 In 2011 the maximum contribution of nitrogen dioxide as a result of construction of the Facility is modelled at the "1m from the road edge" receptor at Link 3, with a process contribution of 0.19µg/m^3 and a percentage increase in the 2011 annual mean concentration of 0.98%. The highest predicted environmental concentrations, taking into account background levels is 19.87µg/m^3, located at the "1m from the road edge" receptor at Link 2, which is well below the air quality objective of 40µg/m^3.

5.69 The additional NO_2 generated as a result of vehicles accessing the Facility during construction of the Facility therefore represents an "extremely small" change according to the air quality NSCA impact criteria. In accordance with the NSCA significance criteria, whereby the predicted environmental concentration is compared with the air quality objective, it is demonstrated that the Facility would result in a "negligible" impact at the assessed locations.

5.70 The PM_{10} (annual average) process contribution (annual average) of traffic generated as a result of construction of the Facility at assessed receptors for 2011 is shown below in Table 6.

Table 6
Predicted PM_{10} Concentrations in 2011

Road Link	Receptor (distance from road)	Predicted Environmental Concentration (annual mean) (µg/m^3)		Process Contribution (µg/m^3)	% Change
		2011 No Development	2011 With Development		
Link 1	1m	19.71	19.76	+0.05	+0.24
	5m	19.66	19.70	+0.04	+0.22
	10m	19.56	19.60	+0.04	+0.20
Link 2	1m	19.62	19.66	+0.05	+0.24
	5m	19.56	19.61	+0.04	+0.22
	10m	19.47	19.50	+0.04	+0.20
Link 3	1m	19.41	19.46	+0.05	+0.24
	5m	19.37	19.42	+0.04	+0.22
	10m	19.30	19.34	+0.04	+0.19
Link 4	1m	20.61	20.61	+0.00	+0.00
	5m	20.57	20.57	+0.00	+0.00
	10m	20.50	20.50	+0.00	+0.00

5.71 In 2011 the maximum contribution of PM_{10} as a result of operations at the Facility is modelled at the "1m from the road edge" receptor at Links 1, 2 and 3, with a process contribution of 0.05µg/m^3 and a percentage increase in the 2011 annual mean concentration of 0.24%. The highest predicted environmental concentrations, taking into account background levels is 20.61 µg/m^3, located at the "1m from the road edge" receptor at Link 4, which is below the air quality objective of 40 µg/m^3.

5.72 The additional PM_{10} generated as a result of vehicles accessing the Facility therefore represents an "extremely small" change according to the air quality NSCA impact criteria. In accordance with the NSCA significance criteria, whereby the predicted environmental concentration is compared with the air quality objective, it is demonstrated that the development would result in a "negligible" impact at the assessed locations.

5.73 The impact of traffic generated as a result of the construction of the Facility on the number of PM_{10} exceedences of the 24-hour mean objective for 2011 is shown below in Table 7.

Table 7
Predicted PM_{10} Daily Exceedences in 2011

Road Link	Receptor (distance from road)	Predicted No. days per year > 50 µg/m^3		Additional Predicted No. days per year > 50 µg/m^3	% Change
		2011 No Development	2011 With Development		
Link 1	1m	3.06	3.11	+0.05	+1.78
	5m	3.00	3.05	+0.05	+1.68
	10m	2.89	2.93	+0.04	+1.50
Link 2	1m	2.95	3.00	+0.05	+1.82
	5m	2.89	2.94	+0.05	+1.72
	10m	2.78	2.82	+0.04	+1.53
Link 3	1m	2.72	2.77	+0.05	+1.86
	5m	2.68	2.72	+0.05	+1.75
	10m	2.60	2.64	+0.04	+1.55
Link 4	1m	4.19	4.19	+0.00	+0.00
	5m	4.14	4.14	+0.00	+0.00
	10m	4.04	4.04	+0.00	+0.00

5.74 In 2011 the highest increase in the number of exceedence days for PM_{10} as a result of operations at the Facility was modelled at the "1m from the road edge" and "5m from the road edge" receptors at Links 1, 2 and 3, with an additional 0.05 days above 50 µg/m^3 as a result of the Facility and a maximum percentage increase in the days of exceedence per year in 2011 of 1.86%. The highest predicted number of days of exceedence, taking into account background levels is 4.19 days per year, located at the "1m from the road edge" receptor at Link 4, which is well below the air quality objective of 35 days of exceedence per year.

Operational Effects

Dust and Litter

Potential Sources of Dust and Litter

5.75 During operation of the proposed Ardley EfW facility the potential for dust and litter generation would arise from the handling and processing of waste.

5.76 The potential dust and litter impacts of the HWRC or PPC Permitted landfill would be no worse than for the existing situation. There have been no dust complaints associated with the existing site operations.

Designed in Mitigation Measures (EfW)

5.77 Waste would be brought to site in enclosed refuse collection vehicles and bulk loaders. Incoming waste vessels that are not enclosed would be sheeted (or netted) to ensure no escape of waste materials during transit. This would avoid the risk of dust or litter being caused by or associated with the operation. The waste would be unloaded directly into the waste bunker inside the waste reception building. Air from the waste reception area would be actively extracted as primary combustion air, thus maintaining a negative pressure in the waste reception, minimising the emission of dust from the building.

5.78 All vehicle movements would take place on hardstanding and all storage and handling of Air Pollution Control (APC) materials, both raw and used, would be undertaken within the building in enclosed vessels and silos.

5.79 The bottom ash from the incineration process would be quenched and transported to the storage area (2-3 days) before being exported from site.

Assessment of Dust and Litter Impacts

5.80 Given the high degree of designed mitigation in the form of containment of potential sources of dust and litter from the proposed operations, it is considered that the risk of dust and litter generation is insignificant. No further mitigation is therefore required.

Odour and Bioaerosol

Potential Sources of Odour and Bioaerosols

5.81 The storage and handling of waste represents a potential source for the generation of odour and bioaerosols.

5.82 The potential bioaerosol impacts of the HWRC or PPC Permitted landfill would be no worse than for the existing situation.

Designed in Mitigation Measures

5.83 The waste would be delivered in enclosed vessels prior to discharge in the reception area within the main Ardley EfW building. Air from the waste reception area would be actively extracted to serve as combustion air, thus maintaining a negative pressure in this part of the building and achieving a high degree of containment of any generated odours or bioaerosols within the reception area. Waste would be present at the facility for no more than a few days pending treatment, and therefore the potential for the formation of odour and bio-aerosols would be minimised.

Assessment of Odour and Bioaerosol Impact

5.84 The risk of generation of odour and bioaerosols from the waste material would be relatively low and the potential for emission would be mitigated by the enclosure of all operations and the extraction of air from the processing area.

5.85 Therefore, given the high degree of designed mitigation in the form of containment of potential sources of odour and bioaerosols from the proposed operations; it is considered that the risk of dust and litter generation is insignificant. No further mitigation is therefore required.

Traffic Emissions

Sources of Traffic Emissions

5.86 As described in the Transport Assessment is has been assumed that all waste would be brought to site by road. Additional road traffic generation would also arise from the export of bottom ash and APC residues, and the import of materials for flue gas treatment.

5.87 During operation it is estimated that the EfW Facility would generate 266 Heavy Goods Vehicles (HGV) movements per day, and 104 light vehicle (LV) movements per day on the Northern and Central sections of the B340, and 18 Heavy Goods Vehicles (HGV) movements per day, and 26 light vehicle (LV) movements per day on the Southern section of the B340.

5.88 According to the DMRB[10] guidance, further assessment is required when daily traffic flows are increased by 1000 AADT or more or HGV movements are increased by 200 or more. Therefore, in accordance with the criteria for a traffic assessment provided in the DMRB guidance it is considered that a Tier 2 assessment for traffic emissions using the DMRB methodology is required.

5.89 The vehicle movements associated with the redesigned HWRC and PPC Permitted landfill would be less than for the existing site (due to lower tonnage received). This would partially offset movements associated with the proposed EfW.

Assessment of Traffic Emissions

5.90 The DMRB methodology facilitates the prediction of pollutant concentrations near to roads, as a result of vehicle emissions. The DMRB localised air quality assessment has concentrated on the impact relating to nitrogen dioxide (NO_2) and fine particles (PM_{10}) as they key pollutants relating to traffic emissions.

5.91 The NO_2 process contribution (annual average) of traffic generated as a result of the ongoing operations at the application site at assessed receptors for 2013 is shown below in Table 8.

Table 8
Predicted NO_2 Concentrations in 2013

Road Link	Receptor (distance from road)	Predicted Environmental Concentration (annual mean) (µg/m^3)		Process Contribution (µg/m^3)	% Change
		2013 No Development	2013 With Development		
Link 1	1m	18.77	18.95	+0.17	+0.93
	5m	18.59	18.75	+0.16	+0.89
	10m	18.25	18.40	+0.15	+0.81
Link 2	1m	18.98	19.16	+0.17	+0.92
	5m	18.80	18.96	+0.17	+0.88
	10m	18.46	18.61	+0.15	+0.80
Link 3	1m	18.27	18.46	+0.19	+1.02
	5m	18.13	18.30	+0.18	+0.97
	10m	17.86	18.01	+0.16	+0.88
Link 4	1m	18.17	18.21	+0.05	+0.25
	5m	18.02	18.06	+0.04	+0.24
	10m	17.75	17.79	+0.04	+0.22

[10] Design Manual for Roads and Bridges. Volume 11 Section 3. Part 1 HA 207/07. Page 3/3. May 2007

5.92 In 2013 the maximum contribution of nitrogen dioxide as a result of operations at the Facility is modelled at the "1m from the road edge" receptor at Link 3, with a process contribution of 0.19µg/m^3 and a percentage increase in the 2013 annual mean concentration of 1.02%. The highest predicted environmental concentrations, taking into account background levels is 19.16 µg/m^3, located at the "1m from the road edge" receptor at Link 2, which is well below the air quality objective of 40 µg/m^3.

5.93 The additional NO_2 generated as a result of vehicles accessing the Facility therefore represents a "very small" change according to the air quality NSCA impact criteria. In accordance with the NSCA significance criteria, whereby the predicted environmental concentration is compared with the air quality objective, it is demonstrated that the development would result in a "negligible" impact at the assessed locations.

5.94 The PM_{10} (annual average) process contribution of traffic generated as a result of the ongoing operations at the application site at assessed receptors for 2013 is shown below in Table 9.

Table 9
Predicted PM_{10} Concentrations in 2013

Road Link	Receptor	Predicted Environmental Concentration (annual mean) (µg/m^3)		Process Contribution (µg/m^3)	% Change
		2013 No Development	2013 With Development		
Link 1	1m	19.31	19.34	+0.03	+0.16
	2m	19.26	19.29	+0.03	+0.15
	3m	19.18	19.20	+0.02	+0.13
Link 2	1m	19.11	19.14	+0.03	+0.16
	2m	19.07	19.10	+0.03	+0.15
	3m	18.98	19.01	+0.02	+0.13
Link 3	1m	18.94	18.97	+0.03	+0.16
	2m	18.90	18.93	+0.03	+0.15
	3m	18.84	18.86	+0.02	+0.13
Link 4	1m	20.23	20.24	+0.01	+0.04
	2m	20.20	20.21	+0.01	+0.03
	3m	20.14	20.14	+0.01	+0.03

5.95 In 2013 the maximum contribution of PM_{10} as a result of operations at the Facility is modelled at the "1m from the road edge" and "5m from the road edge" receptors at Links 1, 2 and 3, with a process contribution of 0.03µg/m^3 and a maximum percentage increase in the 2013 annual mean concentration of 0.16%. The highest predicted environmental concentrations, taking into account background levels is 20.24 µg/m^3, located at the "1m from the road edge" receptor at Link 4, which is below the air quality objective of 40 µg/m^3.

5.96 The additional PM_{10} generated as a result of vehicles accessing the Facility therefore represents an "extremely small" change according to the air quality NSCA impact criteria. In accordance with the NSCA significance criteria, whereby the predicted environmental concentration is compared with the air quality objective, it is demonstrated that the development would result in a "negligible" impact at the assessed locations.

5.97 The impact of traffic generated by ongoing operations at the Facility on the number of PM_{10} exceedences of the 24-hour mean objective for 2013 is shown below in Table 10.

Table 10
Predicted PM_{10} Daily Exceedences in 2013

Road Link	Receptor	Predicted No. days per year > 50 µg/m^3		Additional Predicted No. days per year > 50 µg/m^3	% Change
		2013 No Development	2013 With Development		
Link 1	1m	2.61	2.64	+0.03	+1.24
	2m	2.56	2.59	+0.03	+1.17
	3m	2.47	2.50	+0.03	+1.04
Link 2	1m	2.40	2.43	+0.03	+1.30
	2m	2.35	2.38	+0.03	+1.22
	3m	2.27	2.29	+0.02	+1.09
Link 3	1m	2.22	2.25	+0.03	+1.35
	2m	2.19	2.22	+0.03	+1.27
	3m	2.13	2.15	+0.02	+1.13
Link 4	1m	3.69	3.70	+0.01	+0.26
	2m	3.65	3.66	+0.01	+0.25
	3m	3.57	3.58	+0.01	+0.22

5.98 In 2013 the highest increase in the number of exceedence days for PM_{10} as a result of operations at the Facility was modelled at the "1m from the road edge" receptor at Link 3 with an additional 0.03 days above 50 µg/m^3 as a result of the Facility and a maximum percentage increase in the days of exceedence per year in 2013 of 1.35%. The highest predicted number of days of exceedence, taking into account background levels is 3.7 days per year, located at the "1m from the road edge" receptor at Link 4, which is well below the air quality objective of 35 days of exceedence per year.

Emissions from EfW Process Stack

5.99 The detailed assessment of impact from the Ardley EfW process stack is detailed in Appendix 5-1 and an overview is presented in the following section.

Sources

5.100 The stack serving the proposed Ardley EfW thermal waste treatment process would consist of two flues, within a single chimney, one for each process line. The process conditions used to determine the pollutant emission rates were calculated from design data provided by the manufacturer as detailed in Appendix 5-1.

5.101 The applied emission rates are were calculated from these process conditions and the appropriate WID emission limits as detailed in Appendix 5-1.

Predicted Impacts on Air Quality

5.102 The detailed results of modelling giving the process contribution (PC) and the predicted environmental concentrations (PEC) are given in Appendix 5-1.

5.103 The predicted short-term ground level PC from the Ardley EfW at the appropriate WID emission limits have been ranked as extremely small or very small (i.e. <5% of the applied standard) for all pollutants.

5.104 The significance of impacts of predicted short-term PEC for all pollutants have been classified as 'negligible'.

5.105 The predicted long-term ground level process contributions (PC) from the Ardley EfW at the appropriate WID emission limits have been classified as extremely small or very small (i.e. <5% of the applied standard) for all pollutants.

5.106 The significance of impacts of predicted long-term PEC for all pollutants have been classified as 'negligible'.

Predicted Impacts on Sensitive Ecosystems

5.107 The predicted PCs of both nitrogen oxides and sulphur dioxide at all of the identified sensitive ecological receptors have been classified as insignificant and no further assessment is required.

5.108 The predicted PC for acid deposition at each of the identified sensitive ecological receptors was less than 2% of the applicable critical load for the habitat type when typical emission rates and operating hours are considered.

5.109 The predicted process contribution to nitrogen deposition (as NOx and NH_3) at each of the identified sensitive ecological receptors was less than 1% of the applicable critical load for the habitat type when typical emission rates and operating hours are considered.

5.110 The existing background dominates the total deposition of all of these pollutants at each receptor.

Summary and Conclusions

5.111 An assessment of the air quality impacts associated with the proposed Ardley EfW development and associated landfill and HWRC amendments has been undertaken. The assessment has focussed on the principal emissions to air, including:

- Air Quality Strategy Pollutants from vehicles;
- Air Quality Strategy and WID Pollutants from point sources (EfW Stack);
- Dust and litter emissions during the construction and operational phases; and
- Odours and bioaerosols arising from the waste treatment process.

5.112 The changes to the layout of the landfill site are not predicted to lead to any additional risk of odour, dust or bioaerosol impact. The reduction in received tonnage will result in a benefit in terms of traffic movements associated with the landfill (which will be offset by additional movements due to the EfW).

5.113 The assessments of dust, litter, odour and bioaerosols have been undertaken qualitatively and have found that the risk of significant generation of emissions during operational phase of the EfW is low.

5.114 The greatest risk of dust impacts from the EfW will occur at the nearby properties during the construction stage. Similarly, the greatest risk of dust impacts from the HWRC will occur at the nearby residences during the construction stage. Effective mitigation would prevent unacceptable impacts occurring.

5.115 The findings of the screening assessment of traffic emissions relating to both the construction and operational traffic have found that impacts on air quality may be classified as negligible.

5.116 The findings of the assessment of emissions from the proposed Ardley EfW stack has found that for a majority of substances the predicted long-term and short term impacts would be negligible even if the plant operated at the WID emission limits for the entire year.

5.117 The impact of emissions from the Ardley EfW stack on sensitive ecosystems is predicted to be ‘insignificant’ for all receptors when typical emission rates and operating hours are considered.

5.118 The impact of emissions from the Ardley EfW would not therefore give rise to significant adverse air quality effects for both human and ecological receptors in either the short-term or the long-term.