SEVERN ROAD RESOURCE RECOVERY CENTRE

CHAPTER 7- AIR QUALITY ASSESSMENT

Viridor

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CONTENTS

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AIR QUALITY 7

INTRODUCTION

7.1 This chapter considers the potential for the Proposed Severn Road Resource Recovery Centre (SRRRC) to impact upon air quality. The chapter describes the scope, relevant legislation, assessment methodology, the baseline conditions currently existing at the Application Site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

7.2 As part of the air quality assessment, detailed dispersion modelling of combustion emissions from the Energy from Waste (EfW) aspect of the SRRRC has been undertaken. This is provided as a technical report in Appendix 7-1.

SCOPE OF THE ASSESSMENT

7.3 The scope of the air quality assessment will address the following potential impacts:

- During the construction phase:
  - fugitive dust from traffic movements and construction; and
  - combustion pollutants (PM_{10}, NO_x) from construction traffic.
- During the site operational phase:
  - combustion pollutants (PM_{10}, NO_x, etc) from traffic;
  - combustion pollutants (specified in the Waste Incineration Directive) from the stack; and
  - fugitive odours and bioaerosols from waste handling operations.[1]

RELEVANT LEGISLATION, STANDARDS AND GUIDANCE

Waste Incineration Regulations

7.4 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.

[1] Reference required

7.5 The WID sets out limit values for emission to air as detailed in Appendix 7-1, these emission limits would be set as Permit conditions by the Environment Agency as part of the permitting process.

National Air Quality Strategy

7.6 The 'Air Quality Strategy for England, Scotland, Wales and Northern Ireland' (AQS), 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). The Air Quality Strategy sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK.

7.7 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 AQS 2007 for the purpose of Local Air Quality Management is provided in Appendix 7-1.

7.8 The AQS 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.

Environmental Permitting Regulations

7.9 Industrial process emissions to air, such as those from the EfW process are regulated under the Environmental Pollution (England and Wales) Regulations 2007 by the Environment Agency. Guidance Notes produced by DEFRA to provide a framework for regulation of installations and additional Technical Guidance Notes produced by the Environment Agency are used to provide the basis for permit conditions regards releases to air and mitigation measures. The Sector Guidance note relevant to this facility will be SG5.01[2].

7.10 Of particular relevance to the assessment of air quality impacts is the guidance document EPR H1 Environmental Risk Assessment[3]. The purpose of this guidance note is to provide supplementary information, relevant to all sectors, to assist applicants in responding to the requirements described in the EPR Sector and General Guidance Notes. The H1 assessment can be used to support an Environmental Assessment of the overall impact of the emissions resulting from the installation to confirm that the emissions are acceptable (i.e. do not cause significant pollution). The H1 guidance provides the assessor with Environmental Assessment Levels (EALs) for each pollutant against which impact may be assessed, therefore where pollutants are not regulated under the AQS, the H1 EALS have been applied.

[2] Environment Agency, Sector Guidance Note ¬IPPC S5.01: Guidance for the Incineration of Waste and Fuel Manufactured from or Including Waste (2001)
[3] EPR H1: Environmental Risk Assessment Part 2: Assessment of point source releases and cost-benefit analysis, version 080328. Environment Agency March 2008

Standards and Guidance Relating to Odour Nuisance

7.11 Currently, in the UK there are no statutory standards or levels against which to assess odour nuisance.

7.12 Draft guidance on odour[4] assessment and management has been released by the Environment Agency for consultation, but at the time of writing no final guidance has been issued. In general this draft guidance uses the normal source–pathway–receptor approach for identifying mitigation requirements and residual environmental impacts, therefore these general principals have been applied in this assessment.

Standards and Guidance Relating to Bio-aerosols

7.13 Currently, in the UK there are no statutory limits relating to bio-aerosols.

7.14 The Environment Agency has issued guidance in the form of a position statement[5] that is specific to composting sites and therefore not relevant to this Application. The recommended standoff distance of 250m for sensitive receptors is based upon studies that show that bioaerosols reduce to background levels at this distance from composting sources.

Standards and Guidance Relating to Dust

7.15 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.

7.16 Guidance for control of dust from construction has been produced by BRE[6] and Greater London Authority (GLA)[7]. The GLA guidance document provides site evaluation guidelines based upon the size in square metres or number of properties of the Proposed Development to rate the Application Site between a low risk to high risk. On the basis of the evaluation of risk the guidance prescribes a range of best practice mitigation measures to be applied at the Application Site.

Regulations and Guidance for Protection of Habitats

7.17 The Conservation (Natural Habitats &c) Regulations 1994 ('Habitats Regulations') transpose Council Directive 79/409/EEC on the conservation of wild birds ('Birds Directive') and Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ('Habitats

[4] Environment Agency Technical Guidance Note H4 – Odour management Consultation DRAFT (30th June 2009)

[5] Environment Agency, Our position on composting and potential health effects from bioaerosols, Policy number: 405_07 (2009)

[6] Building Research Establishment, Control of dust from construction and demolition activities (2003)

[7] London Councils and Greater London Authority, The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance (2006)

Directive') into national law (in conjunction with the Wildlife and Countryside Act) The Habitats Directive introduces the precautionary principle for protected areas, i.e. that projects can only be permitted to proceed, having ascertained that there will be no adverse effect on the integrity of the site. It requires an assessment to determine if significant effects are likely, followed by an 'appropriate assessment' by the competent authority if necessary.

7.18 In order to clarify the procedure for assessing the impact of Process Industries Regulation permissions under the Habitat Regulations; the Environment Agency has prepared Operational Instructions. These operational instructions form Appendix 7[8] of the Agency's guidance (the EU Habitats & Birds Directive Handbook) on how the Agency implement the Habitats Regulations when they consider new consents and review old consents. This procedure is based upon 'critical levels' (pollution concentrations in air) and 'critical loads' (a measure of nitrogen deposition and acidification), and provides guidance for 'assessing significance' and completing 'appropriate assessments'.

Planning Policy Context

7.19 National, regional and local planning policy documents have been reviewed for policies relevant to Air Quality and this Planning Application.

Planning Policy Statement 23

7.20 Policy guidance for local planning authorities regarding local air quality and new development is provided in PPS23, which states that the 'existing, and likely future, air quality in the area [of proposed development plans], including any Air Quality Management Areas (AQMA) or other areas where air quality is likely to be poor' should be considered in the preparation of development plan documents and may also be material in the consideration of individual planning applications where pollution considerations arise.

7.21 Appendix 1G of PPS23 re-iterates that the presence of an AQMA should not result in the sterilisation of a site from new development, or re-development of brownfield urban sites for new development.

Regional Planning Guidance 10 for the South West

7.22 Regional Planning Guidance 10 for the South West (RPG10)[9] contains Policy EN2: Air Quality that requires local authorities to '*ensure that air quality considerations are properly considered* along *with other material considerations in the planning process, particularly where any air quality management areas have been designated*'.

[8] Environment Agency, Appendix 7, Assessment of new PIR permissions under the Habitat Regulations, Operational Instruction., Version 2, 06/06/07

[9] Government Office for the South West, Regional Planning Guidance 10 for the South West (RPG10) (September 2001)

The Draft Regional Spatial Strategy (RSS) for the South West

7.23 The Draft Regional Spatial Strategy (RSS) for the South West[10] contains policy RE9: Air Quality that states '*The impacts of development proposals on air quality must be taken into account and local authorities should ensure, through LDDs, that new development will not exacerbate air quality problems in existing and potential AQMAs'*.

Draft Bristol Development Framework Core Strategy – Draft Development Principals

7.24 The draft development principals of the Core Strategy include Emerging Policy DP14 that's states 'Development *should be sited and designed in away as to avoid adversely impacting upon… air quality'.*

Bristol Local Plan 1997 (saved policies)

7.25 The Bristol Local Plan includes policy ME2 that's states '*Development, which has an unacceptable impact on the environmental amenity or wildlife of the surrounding area by reason of, fumes, odour, dust or other forms of air, land or water pollution will not be permitted*'.

Bristol City Council Air Quality and Land Use Planning Guide

7.26 BCC have produced the 'Air Quality and Land Use Planning Guide'. This document describes when an air quality assessment is required and appropriate approaches and tools largely drawn from EPUK guidance[11]. On the subject of assessing significance it states that BCC '*accepts that the National Air Quality Objectives provide the basis for assessing significance'*.

ASSESSMENT METHODOLOGY

General

7.27 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. The potential for cumulative effects from other planned or proposed industrial sources in the area has also been included.

7.28 A staged approach has been adopted, 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 of a health or nuisance impact is negligible, this will be sufficient. In cases where the risk cannot be regarded as insignificant, a more detailed

[10] South West Regional Assembly Draft Regional Spatial Strategy (RSS) for the South West 2006 -2026, (June 2006)
[11] NSCA, Development Control: Planning for Air Quality, 2006 Update (2006)

assessment may be required, such as a quantitative screening assessment or an advanced dispersion modelling exercise as appropriate.

7.29 Each of the activities associated with the proposal have been assessed for potential air quality impacts. The methodology used in each assessment is presented in the sections below.

Dust Assessment

7.30 Given the construction activities and handling of waste materials, there is a potential risk for the generation of dust. For such operations the common concern regarding dust emissions is their potential 'nuisance' effect. The potential nuisance effects of dust emissions are related to emissions of large and fine particles, generally larger than 30 microns in diameter. Deposition of these particles onto surfaces, such as windows and cars, can cause soiling that, if sufficiently great, will sometimes be considered to be a 'nuisance'.

7.31 A qualitative assessment of the dust generation potential of the operations has been carried out. This assessment takes account of:

- the potential magnitude of released dust ;
- buffer distances between sources and receptors; and
- local meteorological conditions.

7.32 An assessment of finer particulates that results from combustion sources, i.e. particles of 10 microns in diameter (PM_{10}s) and smaller, has been carried out as part of the stack dispersion modelling.

Odour and Bioaerosol Risk Assessment

7.33 A qualitative assessment of the potential for generation of odour and bioaerosols has been carried out on the basis of the proposed process. Where significant release of odours and bioaerosols is identified an assessment of impact has been undertaken on the basis of:

- the potential magnitude of released odour / bioaerosols;
- buffer distances between sources and receptors; and
- local meteorological conditions.

Traffic Exhaust Emissions Risk Assessment

7.34 The assessment of impact of traffic has been carried out using the UK Design Manual for Roads and Bridges (DMRB) methodology (2007)[12]. 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

[12] Design Manual for Roads and Bridges Vol. 11 Environmental Assessment (Consolidated Edition), Section 3, Part 1 Air Quality (May 2007, with revisions 2009)

factors for different vehicle types. These emission factors change from year to year as the technology in the vehicle fleet improves.

7.35 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.

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

7.37 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. For roads where the criteria are met the predicted environmental concentration at receptors within 200m will be predicted using the 'DMRB screening method v1.03c' and 'NO_2 from NO_x calculator'.

7.38 Owing to improvements in vehicle technology, the DMRB assumes that emissions per vehicle kilometre 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 can be lower than present day levels close to roads where traffic flows do not change significantly.

EfW Plant Combustion Emissions Risk Assessment

7.39 Detailed atmospheric dispersion modelling has been undertaken in relation to emissions from the stack serving the thermal waste treatment process as detailed in Appendix 7-1 with due consideration to relevant guidance[13, 14]; 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;

[13] Air Dispersion modelling report requirements (for detailed air dispersion modelling). AQMAU, Environment Agency (not dated).
[14] 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.

7.40 For this assessment the AERMOD model has been used. 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[15]. It is therefore considered a suitable model for this assessment.

7.41 The issues of model sensitivity have been considered in detail in Appendix 7-1.

7.42 Receptor locations for assessment against objectives or standards for protection of human health considered within the assessment includes all locations within a 10km radius of the site. According to the LAQM TG (09)[16], air quality standards should only apply to 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.

Assessment of Human Health Effects

7.43 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.

7.44 In addition, deposition rates of dioxins and metals have been determined as part of a more detailed Human Health Impact Assessment (Chapter 16).

Assessment of Impacts on Vegetation and Ecosystems

7.45 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.

7.46 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

[15] AERMOD: Latest Features and Evaluation Results. USEPA Report: EPA-454/R-03-003 June 2003, (http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod)
[16] DEFRA, Local Air Quality Management Technical Guidance LAQM.TG(09) (February 2009)

ecosystems are specified within relevant European air quality directives and corresponding UK air quality regulations.

7.47 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.

7.48 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 NO_x SO_2, NH_3 and HCl have been calculated for comparison against relevant critical level and critical load thresholds.

7.49 Deposition rates were calculated using dispersion modelling results processed by following empirical methods recommended by the Environment Agency in AQTAG06[17] as summarised in Appendix 7-1.

Significance Criteria

7.50 The Town and Country Planning (Environmental Impact Assessment) Regulations require '*a description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development*'. This has resulted in Environmental Statements using *descriptors* for the purposes of summarising impacts, typically negligible, minor beneficial or adverse, moderate beneficial or adverse, major beneficial or adverse. This air quality assessment uses these same descriptors, the rationale used to determine which descriptor is appropriate is described in the sections below:

7.51 Guidance issued by the National Society for Clean Air (NSCA), now Environmental Protection UK, proposes significance criteria relating to air quality assessment within the planning process. This guidance is widely used and accepted by Local Authorities across the UK. This report includes an example of descriptors for change and significance criteria in ambient concentrations of Nitrogen Dioxide and PM_{10}.

7.52 It is important to recognise that the NSCA descriptors only relate to PM_{10} and NO_2 and are intended primarily to identify impacts associated with pollutant impact from road vehicles against air quality strategy objectives. The NSCA example criteria are not considered applicable to other pollutants, as the concentrations of these PM_{10} and NO_2 are primarily driven by background concentrations rather that direct source contributions.

7.53 The Environment Agency's Environmental Permitting horizontal guidance note EPR H1[18] proposes criteria to identify significant emissions for an extensive list of pollutants for which

[17] AQTAG06 – Technical Guidance on detailed modelling approach for an appropriate assessment for emissions to air. Environment Agency, working Draft version 9, 12/05/06.

7.54 The significance criteria used in this assessment use the same rationale as the NSCA criteria and those described in the Environmental Permitting horizontal guidance, namely a descriptor of change and a separate descriptor for impact significance.

NO_2 and PM_{10} Descriptors

7.55 NO_2 and PM_{10} are the air pollutants of primary concern for purposes of regulation against air quality strategy objectives. The magnitude of change resulting from the process contribution against the background concentration is described using criteria derived from the NSCA as presented in Table 7-1.

Table 7-1
NSCA Magnitude of Change for PM_{10} and NO_2

Magnitude of Change	Annual Mean NO_2 / PM_{10}	Days PM_{10} > 50 µg/m^3
Very Large	+/- >25%	+/- >25 Days
Large	+/- 15-25%	+/- 15-25 Days
Medium	+/- 10-15%	+/- 10-15 Days
Small	+/- 5-10%	+/- 5-10 Days
Very Small	+/- 1-5%	+/- 1-5 Days
Extremely Small	+/- <1%	+/- <1 Days

7.56 The significance of impact is assessed by considering the magnitude of change and the predicted environmental concentration (PEC), in relation to the applied standard, as presented in Table 7-2.

Table 7-2
NSCA Significance Criteria for PM_{10} and NO_2

Magnitude of Change	Extremely Small	Very Small	Small	Medium	Large	Very Large
Increase with Scheme						
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	Negligible	Negligible	Slight	Slight	Slight	Moderate

[18] Environment Agency, Environmental Risk Assessment Part 2 Assessment of point source releases and cost-benefit analysis

standard with scheme	adverse	adverse	adverse	adverse

Table Note: In relation to impact as a percentage of a standard / EAL "well below" is defined as <75% of the standard.

Table 7-3
ES Significance Criteria for PM_{10} and NO_2

NSCA Significance Criteria	EIA Significance Descriptor
Negligible	Negligible
Slight Adverse	Minor
Moderate Adverse	Minor or Moderate (expert judgement)
Substantial Adverse	Moderate
Very Substantial Adverse	Moderate or Major (expert judgement)

Descriptors for all other pollutants

7.57 The significance criteria for all other pollutants in this study has been based on the EP H1 criteria.

7.58 The EP H1 guidance states that process contribution (PC) '*emissions can be seen as insignificant where*':

- $PC_{long\ term}$ *<= 1% of long term EAL/EQS*
- $PC_{short\ term}$ *<= 10% of short term EAL/EQS*

7.59 On this basis the PC is described as either 'insignificant' or 'not insignificant'. This criteria in combination with the resultant Predicted Environmental Concentration (PEC) has been used to determine the significance descriptors as described in Table 7-4.

Table 7-4
Significance Criteria for Other Pollutants

Significance Criteria	Descriptor of Significance
PC is insignificant and PEC below EAL PC is not insignificant but PEC below 75% of EAL	Negligible
PC is not insignificant and PEC >75% and <95% of EAL	Minor Adverse
PC is not insignificant and PEC >95% and <100% of EAL	Moderate Adverse
PC is not insignificant and PEC >100%	Major Adverse

BASELINE ENVIRONMENT

Baseline Air Quality

7.60 Baseline pollutant concentrations have been obtained from a range of sources. The derivation of these background concentrations is detailed in Appendix 7/1, and summarised in Table 7-5 below.

Table 7-5
Baseline Air Quality

Pollutant	Background Concentration (µg/m^3)		Data Source
	Short Term	Long Term	
PM_{10} µg/m^3	n/a	20.5 37.6 (24-hour mean)	Bristol St Paul AURN
$PM_{2.5}$ µg/m^3	n/a	13.2	Bristol St Paul AURN
NO_2 µg/m^3	149.0	32.5	Bristol St Paul AURN
CO µg/m^3	n/a	346.1 (8-hour mean)	Bristol St Paul AURN
SO_2 µg/m^3	19.0 24.0(15-minute mean)	8.8 (24-hour mean)	Bristol St Paul AURN
HCl µg/m^3	24.0	12.0	Maximum of SLR diffusion tube monitoring
HF µg/m^3	0.0 (<LOD)	0.0 (<LOD)	
Benzene µg/m^3	0.38	0.19	
Cadmium ηg/m^3	1.21	0.61	Heavy Metal Monitoring Network – Hallen and BZL Average (2008).
Mercury ηg/m^3	0.71	0.35	
Arsenic ηg/m^3	2.70	1.35	
Chromium ηg/m^3	11.32	5.66	
Copper ηg/m^3	10.11	5.06	
Lead ηg/m^3	3.61	1.81	
Manganese ηg/m^3	20.98	10.49	
Nickel ηg/m^3	7.45	3.72	
Vanadium ηg/m^3	0.11	0.06	
Dioxins fg(TEQ)/m^3	n/a	9.67	UK urban average
Ammonia	Various	Various	APIS database for specific Ecological site
BaP ηg/m^3	n/a	0.105	Cardiff Monitoring 3-

Sensitive Receptors

7.61 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

7.62 For assessment of combustion emissions from the EfW every human receptor location (short term and long term locations) has been assessed. The study area encompasses residential areas east as far as the centre of Bristol (covering predominantly the north western area of the city), south to Easton-in-Gordano and Portishead, and north to Ingst.

7.63 The assessment of emissions from vehicles is only required for properties and Designated Sites within 200m of roads affected by the project. In each area potentially affected by road traffic emissions, a 'worst case' receptor location has been considered, these are presented Appendix 7-2 and listed below:

- Severnwood Gardens, Severn Beach;
- Redwick Rd (North)/ Wick Road, Keens Grove and Redwick Rd (South)/ Severn Road Pilning; and
- McClaren Road / Cowley Way.

Ecological Habitats Designated Sites

7.64 The study area (10km from the Application Site) includes ecological habitats designated as SAC, SPA's and SSSI's as listed in the table below:

Table 7- 6
Ecological Habitat Designated Sites

Site	Dominant Habitat	Geographical Frame of Reference / Designation
Severn Estuary	Saltmarsh Shingle Shingle	International / SPA, SAC, Ramsar, SSSI
Avon Gorge Woodlands	Oak woodland Calcareous grassland Shingle, rocks and cliffs Skree	International / SAC
Severn Estuary	Saltmarsh Shingle	National / SSSI
Avon Gorge Woodlands	Oak woodland Calcareous grassland Shingle, rocks and cliffs Skree	
Pensylvannia Fields, Sedbury	Saltmarsh	
Ashton Court	Oak woodland Lowland pastures and parkland	
Horseshoe Bend, Shirehampton	Oak woodland Shingle, rocks and cliffs Saltmarsh	
Weston Big Wood	Oak woodland	

Meteorological Conditions

7.65 The most important meteorological parameters governing the atmospheric dispersion of pollutants are as follows:

- wind direction determines the broad transport of the emission and the sector of the compass into which the emission is dispersed;
- wind speed will affect ground level concentrations of emissions by increasing the initial dilution of pollutants in the emission; and
- Atmospheric stability; a measure of the turbulence, particularly of the vertical motions present.

7.66 Following consultation with the meteorological data provider, it was concluded that Filton Airport, located approximately 5km to the east of the application site, with missing cloud cover data taken from Bristol Lulsgate Meteorological Station, would provide the most complete and representative data set for purposes of this assessment. Meteorological data used in this assessment was for the period 1st January 2004 to 31st December 2008 (inclusive).

7.67 A windrose of the data from Filton Airport Meteorological Station is presented in Figure 7-1. As is apparent from this windrose, the predominant wind direction is from the west south west. Wind from the north west and south east occur relatively infrequently.

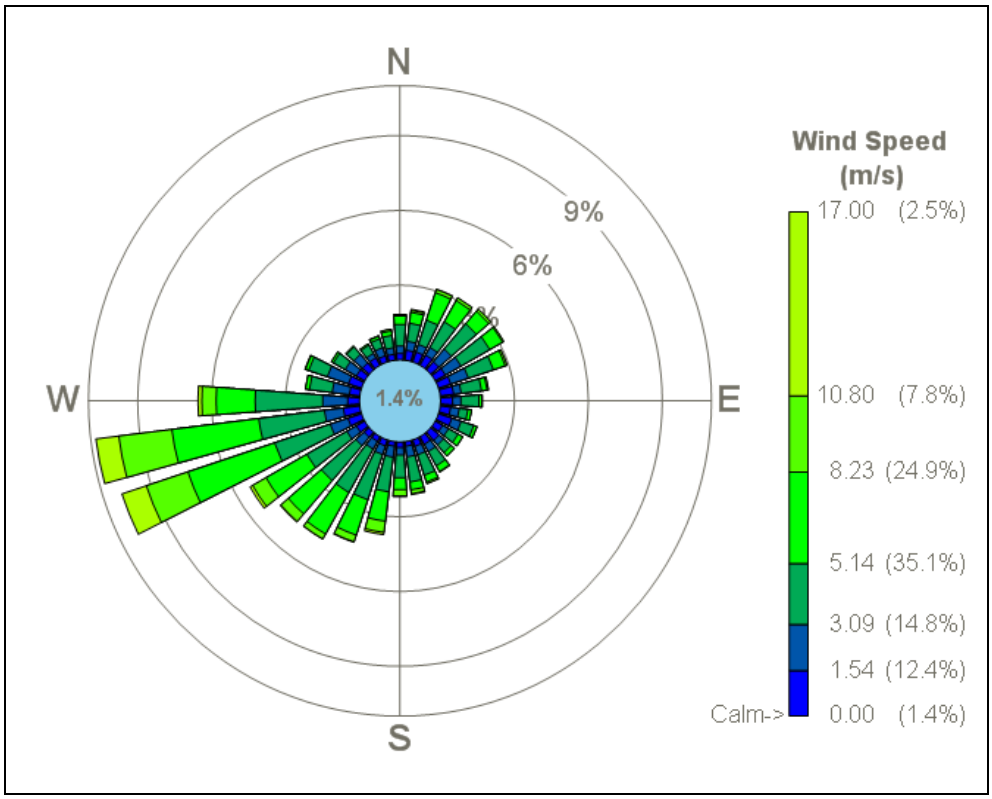

Figure 7-1
Windrose: Filton Meteorological Station 2004-2008

Topography

7.68 The presence of elevated terrain can significantly affect the dispersion of pollutants and the resulting ground level concentration in a number of ways. Elevated terrain reduces the distance between the plume centre line and the ground level, thereby increasing ground level concentrations. Elevated terrain can also increase turbulence and, hence, plume mixing with the effect of increasing concentrations near to a source and reducing concentrations further away.

7.69 The Application Site lies on a coastal flat that runs along the Severn Estuary north east to south west, consequently the immediate surroundings within approximately 5km of the site are relatively flat. To the south east of this coastal flat the land rises steadily to approximately 100m Above Ordnance Datum at approximately 10km from the Application Site. For this reason elevation data has been included in the model although the topographical features are considered unlikely to have a significant effect on the dispersion of emissions from the stack.

ASSESSMENT OF IMPACT, MITIGATION AND RESIDUAL EFFECTS

Construction Effects

Construction Dust

7.70 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

Potential Sources of Construction Dust

7.71 Based on the Control of Construction Dust Guidance, the Proposed Development would be classified as of medium to high potential for dust impacts on the basis of the area of the Application Site and therefore mitigation measures will be required.

7.72 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[19]) 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.

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

7.73 There are no residential properties within 1km of the Application Site and therefore the potential for dust impacts at residential receptors from construction are considered to be negligible.

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

Construction Traffic

7.75 The impact of construction traffic on air quality would be below the DMRB screening criteria (of 200 HGV movements per day) and would only be for a limited duration.

7.76 The potential effect on air quality due to the additional emissions from construction traffic is therefore considered as being negligible. No further mitigation is therefore required and effects would cease once construction is complete.

Operational Effects

Dust and Litter

Potential Sources of Dust and Litter

7.77 During operation of the proposed SRRRC, the potential for dust and litter generation would arise from the handling and processing of incoming waste, and export of recyclate and bottom ash.

Designed in Mitigation Measures

7.78 The following mitigation measures have been designed in to the Proposed Development:

- Materials (waste, recyclate, bottom ash) imported or exported from the Application Site would be transported in enclosed vehicles. Incoming waste vessels that are not enclosed would be sheeted (or netted) to ensure no escape of waste materials during transit;
- all waste reception, processing and storage activities in the MRF will be contained within the proposed building;
- incoming waste to the EfW plant would be unloaded directly into the waste bunker inside the waste reception building;
- all vehicle movements would take place on hardstanding and a programme of periodic road sweeping/cleaning would be in place;
- 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, and transported from site in enclosed containers; and
- the bottom ash from the incineration process would be quenched and directed by covered conveyor to a dedicated enclosed building for storage and processing (sorting, screening etc) for recycling into an aggregate product.

Assessment of Dust and Litter Impacts

7.79 Given the high degree of designed mitigation in the form of containment of potential sources of dust and litter from the proposed operations, there are no sources of dust or litter exposed to the ambient atmosphere, consequently the potential for fugitive release of dust or litter is low. On this basis the risk of dust and litter impact is negligible and no further mitigation is therefore required.

Odour and Bioaerosol

Potential Sources of Odour and Bioaerosols

7.80 The receipt, storage and handling of waste at the proposed EfW plant represents a potential source for the generation of odour and bioaerosols. The receipt, storage and handling of dry recyclables in the MRF does not present a significant risk of odour or bioaerosols.

Designed in Mitigation Measures

7.81 Measures that will mitigate the generation and fugitive release of odours and bioaerosols designed in to the Proposed Development are as follows:

- the waste would be delivered in enclosed vessels prior to discharge in the reception area within the main EfW building;
- waste would be present at the facility for no more than a few days pending treatment, and therefore the potential for the generation of odour and bio-aerosols due to biological activity would be minimised; and
- 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;

Assessment of Odour and Bioaerosol Impact

7.82 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.

7.83 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 fugitive release of odour and bioaerosol generation is low. Coupled with the significant buffer distance to residential receptor locations of >1km the risk of impact is considered to be negligible. No further mitigation is therefore required.

Traffic Emissions

Sources of Traffic Emissions

7.84 As described in the Transport Assessment all material imports and exports would be transported to the Application Site by road.

7.85 The Transport Assessment indicates that the proposed development would generate 514 Heavy Duty Vehicle (HDV) annual average daily trips (AADT). Traffic would join the A403 North / A403 South in a 48% / 52% split. Light vehicle trips are estimated to be an average additional 776 AADT as a result of the development. The existing AADT flow along north and south of the junction with Severn Road is approximately 5000 AADT.

7.86 The assessment of traffic emissions is required as predicted HDV flows increase by more than 200 AADT, meeting DMRB criteria for assessment, and total flow increases by more than 5% meeting BCC criteria for assessment.

Assessment of Traffic Emissions

7.87 The input parameters to the DMRB assessment and results are presented in full in Appendix 7-2.

7.88 The predicted change and significance of impact in relation to traffic emissions is presented in the tables below. The assessment predicts a 'very small' change in NO_2 concentrations and an 'extremely small' change in PM_{10} concentrations. This results in negligible impact at the receptor locations selected for the assessment, as these represent the locations of predicted highest impact it is predicted that the impact at all other receptor locations will also be negligible.

Table 7- 7
Assessment of Traffic Emissions: Nitrogen Dioxide

Receptor	NO_2 % increase	Predicted NO_2 Concentration (ug/m^3)	Impact Significance
R1	1.0%	28.62	Negligible
R2	1.4%	24.85	Negligible
R3	1.5%	26.35	Negligible

Table 7- 8
Assessment of Traffic Emissions: PM_{10}

Receptor	PM_{10} % increase	Increase in Days >50ug/m^3	Predicted PM_{10} Concentration (ug/m^3)	Impact Significance
R1	0.2%	0	18.87	Negligible
R2	0.2%	0	16.54	Negligible

R3	0.3%	0	17.30	Negligible

Emissions from EfW Process Stack

7.89 The detailed assessment of impact from the EfW process stack is detailed in Appendix 7-1 and an overview is presented in the following section.

Sources

7.90 The stack serving the proposed 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 7-1.

7.91 The applied emission rates were calculated from these process conditions and the appropriate WID emission limits (or typical emission rates where pollutants are not prescribed by the WID) as detailed in Appendix 7-1.

Predicted Impacts on Air Quality

7.92 The results of the atmospheric dispersion modelling are provided in the tables below, Table 7-9 and Table 7-10 present the maximum ground level predictions for short-term and long-term averages respectively. The process contribution (PC), predicted environmental concentration (PEC: PC + background concentration (BG)), magnitude of change and significance of impact are presented. Full results are presented in Appendix 7-1.

Table 7-9
Maximum Predicted Long-Term Concentrations

Pollutant	Applied Standard (Annual Mean)	PC Max (ug/m^3)	Magnitude of Change	PEC (ug/m^3)	% of EAL	Significance
PM_{10}	40	0.05	Extremely Small	20.6	51.4%	Negligible
NO_2	40	0.74	Very Small	33.2	83.1%	Minor Adverse
$PM_{2.5}$	25	0.05	Extremely Small	13.3	53.0%	Negligible
HCl	20	0.04	Insignificant	12.04	60.2%	Negligible
TOC	5	0.05	Potentially Significant	0.24	4.9%	Negligible
Cadmium	0.005	1.31E-04	Potentially Significant	7.41E-04	14.8%	Negligible
Thallium	1	1.31E-04	Insignificant	1.31E-04	0.0%	Negligible
Mercury	0.25	2.63E-04	Insignificant	6.13E-04	0.2%	Negligible
Antimony	5	2.92E-04	Insignificant	2.92E-04	0.0%	Negligible
Arsenic	0.003	2.92E-04	Potentially Significant	1.64E-03	54.7%	Negligible
Chromium (III)	5	2.92E-04	Insignificant	5.95E-03	0.1%	Negligible
Chromium (VI)	0.0002	2.92E-05	Potentially Significant	2.92E-05	14.6%	Negligible

Cobalt	0.2	2.63E-04	Insignificant	2.63E-04	0.1%	Negligible
Copper	2	2.92E-04	Insignificant	5.35E-03	0.3%	Negligible
Lead	0.5	2.92E-04	Insignificant	2.10E-03	0.4%	Negligible
Manganese	1	2.92E-04	Insignificant	1.08E-02	1.1%	Negligible
Nickel	0.02	2.92E-04	Potentially Significant	4.01E-03	20.1%	Negligible

Table 7- 10
Maximum Predicted Short-Term Concentrations

Pollutant	Applied Standard	PC Max (ug/m^3)	Magnitude of Change	PEC (ug/m^3)	% of EAL	Significance
PM_{10}	50	0.15	Extremely Small	37.7	75.5%	Negligible
NO_2	200	6.04	Very Small	155.0	77.5%	Minor Adverse
SO_2 (24-hr)	125	1.22	Insignificant	10.0	8.0%	Negligible
SO_2 (1-hr)	267	3.72	Insignificant	22.7	8.5%	Negligible
SO_2 (15-min)	266	4.99	Insignificant	29.0	10.9%	Negligible
CO	10000	3.06	Insignificant	349.16	3.5%	Negligible
HCl	800	1.63	Insignificant	25.63	3.2%	Negligible
HF	250	0.16	Insignificant	0.16	0.1%	Negligible
TOC	208	1.63	Insignificant	2.01	1.0%	Negligible
Cadmium	1.5	4.08E-03	Insignificant	5.29E-03	0.4%	Negligible
Thallium	30	4.08E-03	Insignificant	4.08E-03	<0.1%	Negligible
Mercury	7.5	8.16E-03	Insignificant	8.87E-03	0.1%	Negligible
Antimony	150	9.07E-03	Insignificant	9.07E-03	<0.1%	Negligible
Arsenic	15	9.07E-03	Insignificant	1.18E-02	0.1%	Negligible
Chromium (III)	150	9.07E-03	Insignificant	2.04E-02	<0.1%	Negligible
Chromium (IV)	3	9.07E-03	Insignificant	2.04E-02	0.7%	Negligible
Cobalt	6	9.07E-03	Insignificant	9.07E-03	0.2%	Negligible
Copper	60	9.07E-03	Insignificant	1.92E-02	<0.1%	Negligible
Manganese	1500	9.07E-03	Insignificant	3.00E-02	<0.1%	Negligible
Nickel	30	9.07E-03	Insignificant	1.65E-02	0.1%	Negligible
Vanadium	20	9.07E-03	Insignificant	9.18E-03	<0.1%	Negligible

7.93 The significance of impacts at the location of maximum ground level concentration for all pollutants is assessed as negligible with the exception of nitrogen dioxide concentrations that are assessed as minor adverse. As this represents the maximum ground level concentration the overall impact in the study area from combustion emissions emitted from the proposed EfW is considered to be negligible.

Predicted Impacts on Sensitive Ecosystems

7.94 The predicted environmental concentration of both nitrogen oxides and sulphur dioxide at all of the identified sensitive ecological receptors are

presented in Table 7-11 and Table 7-12 below. The predicted environmental concentration remains well below (<75%) of the critical levels.

Table 7- 11
Predicted Nitrogen Oxide Impacts on Sensitive Ecosystems (µg/m^3)

Designated Site	BG	PC	PEC	% of CL
Severn Estuary SPA	18.6	0.2	18.8	62.6%
Avon Gorge SSSI	13.1	0.1	13.2	43.9%
Ashton Court SSSI	12.4	0.1	12.5	41.7%
Horseshoe bend SSSI	13.1	0.1	13.2	43.9%

Table 7- 12
Predicted Sulphur Dioxide Impacts on Sensitive Ecosystems (µg/m^3)

Designated Site	BG	PC	PEC	% of CL
Severn Est SPA / SAC / SSSI	4.4	0.1	4.4	22.2%
Avon Gorge SPA / SAC SSSI	2.6	<0.1	2.6	12.9%
Ashton Court SSSI	2.3	<0.1	2.3	11.6%
Horseshoe bend SSSI	3.6	<0.1	3.6	17.9%

7.95 The predicted effects on ecological sites i terms of nitrogen and acid deposition is presented in Section 6 of Appendix 7-1 an not reproduced here.

7.96 In summary, the predicted PC to nitrogen deposition (as NO_x and NH_3) at each of the identified sensitive ecological receptors is less than 1% of the applicable critical load (CL) (i.e. the existing background dominates the total deposition of all of these pollutants) for the habitat type when typical emission rates and operating hours are considered, with the exception of Oak Woodlands at the Avon Gorge SAC at approximately 2% of the CL. The critical load for Oak Woodlands in Avon Gorge is already exceeded, however the process contribution from the proposed EfW is less than 1% of current levels.

7.97 Critical loads for acid deposition are only defined for the Avon Gorge SAC not the Severn Estuary. The PC to acid deposition at the Avon Gorge SAC from the proposed EfW is less than 2% of the current levels for sulphur and nitrogen acid deposition and the predicted total acid deposition is predicted to remain well within the defined Critical Loads.

SUMMARY AND CONCLUSIONS

7.98 An assessment of the air quality impacts associated with the proposed Severn Road Resource Recovery Centre 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.

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

7.100 The findings of the assessment of combustion emissions from the proposed EfW facility has found that for all pollutants the maximum predicted long-term and short term impacts would be negligible. The assessment takes a 'worst case' approach and has assumed emission at the WID limits and for 100% hours in the year. In reality the EfW will operate for less than 100% of hours in the year and is likely to emit at below WID limits.

7.101 The impact of emissions on sensitive ecosystems are not predicted to be significant as process contribution is a very small increase on current levels and neither critical levels nor critical loads are exceeded as a result of EfW combustion emissions.

7.102 The findings a DMRB assessment of the effects of the development traffic on air quality at the closest sensitive receptors to affected roads indicates that the significance of impacts would 'negligible'.

7.103 In summary the proposed Severn Road Resource Recovery Centre is not predicted to lead to exceedences of applicable standards for either human or ecological receptors.