5 AIR QUALITY

5.1 INTRODUCTION

5.1.1 This chapter describes the potential impacts of the construction and operation of the proposed facility on air quality. It considers the potential impacts on both human health and ecosystems.

5.1.2 The proposal has the potential to affect air quality as a result of:

- emissions during construction including:
  - dust and particulate matter from construction activities; and
  - exhaust emissions from plant, and construction vehicle movements on and off site.
- emissions during operation of the facility, including:
  - stack emissions;
  - dust and odours during waste handling; and
  - exhaust emissions from waste delivery and staff vehicles.

5.1.3 The assessment has been undertaken with reference to the methodologies and guidance set out in:

- *Environment Agency – Air emissions risk assessment for your environmental permit (2016)*
- *Institute of Air Quality Management and Environmental Protection UK – Land Use Planning & Development Control: Planning for Air Quality (2015)*
- *Institute of Air Quality Management – Guidance on the assessment of dust from demolition and construction (2014)*
- *Department of Environment, Farming and Rural Affairs - Local Air Quality Management Technical Guidance TG(16) (2016)*

5.1.4 Jersey has developed an *Air Quality Strategy*[1] with the aim of ensuring that

"*Everyone in Jersey should have access to outdoor air without significant risk to their health and that there should be minimal impacts from air pollutants on the environment of Jersey or our neighbours*"

5.1.5 This chapter provides an assessment of the proposed facility in relation to the aims and objectives of the Jersey Air Quality Strategy.

5.1.6 This chapter should be read in conjunction with chapters two and three of this EIS, which contain a description of the site and the proposed development, the general methodology, as well as the plans submitted with the planning application.

[1] Jersey Air Quality Strategy, 2013, http://www.gov.je/md/MDAttachments/Health%20and%20Social%20Services/Decisions%20in%202013/mdhss20130019rpt.pdf

5.2 POLICY AND LEGISLATION

AMBIENT AIR QUALITY STANDARDS

5.2.1 States of Jersey (SoJ) have not developed any air pollution legislation but the Air Quality Strategy[1] is in place and States of Jersey has agreed to work towards meeting the air quality standards for the protection of human health, as set out in the European Union Ambient Air Quality Directive[2] (EU Directive).

5.2.2 The EU Directive provides air quality limit values that should not be exceeded. If there is a risk of exceedance, an action plan is required to ensure limit values are met in the shortest possible time.

[2] Directive of the European Parliament and of the Council on ambient air and cleaner air for Europe, 2008/50/EC

5.2.3 **Table** 5-1 sets out the EU limit values relevant to this assessment. The limit values for nitrogen dioxide (NO_2), Benzene and Particulate Matter are explicitly included in the Air Quality Strategy.

5.2.4 The EU Directive brought together an earlier Framework Directive and subsequent daughter directives into a single legislative unit. The target values set out for cadmium, nickel and arsenic in the 4th daughter directive were not included in the over-arching Directive since further experience on its implementation was gathered. The target values remain in EU legislation and are reproduced in

5.2.5 **Table** 5-1. Within the EU, limit values are mandatory whereas target values are policy targets.

5.2.6 Not all of the pollutants that are of interest to the assessment of the impacts of the facility are included in EU directives. For these pollutants, the assessment levels are taken from UK Environment Agency's risk assessment guidance. These are set out in

5.2.8 Table 5-2**.**

5.2.9 **Table 5-3** sets out the relevant assessment levels for the protection of sites designated for nature conservation.

5.2.10 There are no air quality guidelines for dioxins and furans set out in legislation or policy, primarily because direct inhalation exposure constitutes only a small fraction of total exposure in the population. The potential for air borne emissions to contribute indirectly to the total intake of these compounds through deposition and uptake in the food chain is assessed with reference to an oral tolerable daily intake (TDI).

5.2.11 The Environment Agency recommend that a tolerable daily intake of 2 pg TEQ/kg bw per day is established[3,4,5]. A TDI of 2 pg TEQ/kg bw per day is considered by the EA to be adequate to protect against health effects and this value was used as the basis for assessing the potential risk to health resulting from exposure to dioxins in the emissions to atmosphere from the proposed facility.

[3] 1 picogram (pg) is 1 million millionth of a gram i.e. 0.000000000001 grams; kg-bw = kilogrammes bodyweight
[4] Environment Agency, Contaminants in soil: updated collation of toxicological data and intake values for dioxins, furans and dioxin-like PCBs, Science report SC050021/TOX 12, September 2009
[5] TEQ = toxic equivalency; allows the toxicity of a mixture of dioxins and dioxin-like compounds to be expressed as a single number, It is based on the relative toxicity of individual dioxins to the most toxic 2,3,7,8 TCDD.

Table 5-1 EU Limit Values and Target Values for the protection of human health

POLLUTANT	LIMIT/TARGET VALUE	MEASURED AS	SOURCE
Nitrogen Dioxide	40µg/m^3	Annual Mean	AAQD, JAQS
	200µg/m^3	Hourly Mean, 18 exceedances per annum permitted	AAQD, JAQS
Sulphur Dioxide	125µg/m^3	Daily Mean, 3 exceedances per annum permitted	AAQD
	350µg/m^3	Hourly Mean, 24 exceedances per annum permitted	AAQD
Carbon Monoxide	10,000µg/m^3	8 Hourly Mean	AAQD
Particulate Matter PM_{10}	40µg/m^3	Annual Mean	AAQD, JAQS
	50µg/m^3	Daily Mean, 35 exceedances per annum permitted	AAQD, JAQS
Particulate Matter $PM_{2.5}$	25µg/m^3	Annual Mean	AAQD, JAQS (by 2015)
	20µg/m^3	Annual Mean	AAQD (by 2020)
Benzene	5µg/m^3	Annual Mean	AAQD, JAQS
Lead	0.5µg/m^3	Annual Mean	AAQD
Arsenic	6ng/m^3	Annual Mean	4th Daughter Directive
Cadmium	5ng/m^3	Annual Mean	4th Daughter Directive
Nickel	20ng/m^3	Annual Mean	4th Daughter Directive

AAQD – EU Directive 2008/50/EC; JAQS – Jersey Air Quality Strategy

Table 5-2 Environmental Assessment Levels (EALs)

POLLUTANT	EAL	MEASURED AS
Hydrogen Chloride	750µg/m^3	Hourly Mean
Hydrogen Fluoride	16µg/m^3	Monthly Mean
	160µg/m^3	Hourly Mean
Mercury	0.25µg/m^3	Annual Mean
	7.5µg/m^3	Hourly Mean
Antimony	55µg/m^3	Annual Mean
	150µg/m^3	Hourly Mean
Chromium III & compounds	5µg/m^3	Annual Mean
	150µg/m^3	Hourly Mean
Chromium VI	0.2ng/m^3	Annual Mean
Copper	10µg/m^3	Annual Mean
	200µg/m^3	Hourly Mean
Manganese	0.15µg/m^3	Annual Mean
	1500µg/m^3	Hourly Mean
Vanadium	5µg/m^3	Annual Mean
	1µg/m^3	Hourly Mean

Table 5-3 EU Limit Values and EALs for protected conservation areas

POLLUTANT	EAL	MEASURED AS	SOURCE

POLLUTANT	EAL	MEASURED AS	SOURCE
Sulphur Dioxide	20µg/m^3	Annual Mean	AAQD, EARAG
	10µg/m^3	Annual Mean (if lichen/bryophytes present)	EARAG
Nitrogen Oxides	30µg/m^3	Annual Mean	AAQD, EARAG
	75µg/m^3	Daily Mean	EARAG
Hydrogen Fluoride	0.5µg/m^3	Weekly Mean	EARAG
	5µg/m^3	Daily Mean	EARAG

AAQD – EU Directive 2008/50/EC; EARAG – Environment Agency Risk Assessment Guidance

JERSEY AIR QUALITY STRATEGY POLICY

5.2.12 *Policy P4* of the Jersey Air Quality Strategy requires air quality monitoring to be undertaken, including in the vicinity of industrial sources. Where environmental risks are identified, then mitigation strategies must be identified.

> P4: The Minister for Planning and Environment will work with the Minister for Health and Social Services to ensure that the ambient air quality monitoring systems, strategies employed and measured concentrations meet the reporting requirements of protocols to which Jersey is a signatory (see policy 11)
>
> a) The upgrading of monitoring equipment will be reviewed if either pollution levels approach limits or existing equipment becomes obsolete;
>
> b) Assess the monitoring requirements with regard to industrial emissions and ensure that where risk is identified adequate mitigation strategies are put in place to minimise harm to human health and the environment;
>
> c) Review the current monitoring programme to ensure it is adequate and fit for purpose in order to identify any potential health or environmental risks and to take action accordingly;
>
> d) Continue to provide annual reports on ambient air quality monitoring results and to make these available to the public through an improved website (see JAQS policy 10)

5.2.13 *Policy P6* requires that emissions arising from waste operations are controlled in line with EU and UK best practice. For the facility, this is taken to imply that the emissions from the stack should comply with the limits set out in the EU Industrial Emissions Directive (IED)[6] for waste incineration (**Table 5-4**), although the control measures required to meet these emission limits are not specified. The policy also imposes a requirement to assess impacts against the standards for ambient air quality set out in the Strategy (

[6] Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control)

5.2.14 **Table** 5-1**).**

P6: The Minister for Planning and Environment will work with the Minister for Health and Social Services to ensure that negative impacts of emissions from industrial processes are minimised by;

a) Developing a register of point source emissions which will be constructed and maintained by the Health Protection Service. Where risk is identified, work will take place with the operator to put in place appropriate mitigation strategies based on EU and UK best practice guidance notes.

b) Ensuring that, where applicable, all emissions arising from waste operations are controlled through Waste Management (Jersey) Law, waste licences, in line with EU and UK best practice

c) Ensuring that adequate controls on new industrial developments are put in place through the planning permit process, including requirements for environmental impact assessments and strategic environmental assessments where relevant; using air quality limit values as set out in the JAQS.

d) Establishing the position with regard to emissions of mercury from the crematorium, and if risk is identified, work with the operator to put in place appropriate and proportionate mitigation strategies.

Table 5-4 IED emission limit values for waste incineration plants (mg/m^3 unless otherwise stated)

POLLUTANT	DAILY AVERAGE LIMIT	HALF-HOURLY EMISSION LIMIT	SAMPLING PERIOD AVERAGE
Total Dust	10	30	-
Gaseous/Vaporous total organic carbon (TOC)	10	20	-
Hydrogen Chloride	10	60	-
Hydrogen Fluoride	1	4	-
Sulphur Dioxide	50	200	-
Nitrogen Oxides	200	400	-
CARBON MONOXIDE	**50**	**100**	**-**
Cadmium	-	-	Total: 0.05
Thallium	-	-	
Mercury	-	-	0.05

POLLUTANT	DAILY AVERAGE LIMIT	HALF-HOURLY EMISSION LIMIT	SAMPLING PERIOD AVERAGE
Antimony	-	-	
Arsenic	-	-	
Lead	-	-	
Chromium	-	-	
Cobalt	-	-	Total: 0.5
Copper	-	-	
Manganese	-	-	
Nickel	-	-	
Vanadium	-	-	
Dioxins and Furans	-	-	0.1ngTEQ/m^3

All emission limit values calculated at 273.15K, 101.3kPa, 11%Oyxgen, dry; TEQ = Toxic Equivalent

5.3 SCOPE AND METHODOLOGY

SCOPE

5.3.1 The assessment of the air quality impacts of the construction and operation of the facility considers the following:

- → The existing air quality at sensitive receptors for air quality impacts in the vicinity of the development;
- → A qualitative assessment of risks from dust and particulate matter during construction of the facility, considering human health and amenity;
- → A quantitative assessment of the impact of emissions of pollutants from the exhaust stack during operation, considering human health and impacts on ecosystems; and
- → A qualitative assessment of risks from dust and odours during operation of the facility, primarily associated with the transport and storage of waste material, considering impacts on amenity.

5.3.2 The overall study area for the air quality assessment consists of the zone extending 10km in all directions from the facility. Within this area, impacts have been assessed on all potential human receptors and sites designated for nature conservation. Beyond this distance, any impacts from the facility will be imperceptible and effects would be **negligible**. Moreover, as set out in IAQM guidance on construction dust, impacts from construction dust and dust during operation are unlikely to extend more than 350m from the site and/or 50m from haulage/access roads up to 500m from the site boundary.

5.3.3 The facility is to be developed on the headland at La Collette. The proposed site is surrounded by industrial/public utility development. The principal receptors for air quality impacts are the residents of St Helier, to the north of the facility site at La Collette. There are also numerous settlements further afield including St Aubin to the west and Grouville and Le Hocq to the east, but impacts will decrease with distance from La Collette. The closest residential properties are over 750m to north and north-east on Mount Bingham, South Hill, Havre de Pas and Pier Road. In relation to ecological receptors, the South East Coast of Jersey Ramsar Site lies adjacent to the proposed site and comprises various habitats including intertidal reef. Further information on ecological receptors can be found in the Ecology assessment (Chapter 10).

5.3.4 The assessment of impacts during construction considers dust and particulate matter; the assessment of impacts during operation of the facility considers the impacts on all pollutants for which emission limits have been set in the IED plus dust and odours. In general, for waste incineration sources, the most significant emissions to air, in terms of local air quality impacts, are likely to be oxides of nitrogen (NOx), fine particulate matter (PM_{10}) and sulphur dioxide (SO_2). Pollutants such as heavy metals as well as dioxins and furans which are persistent in the environment and can accumulate in the food chain are also of concern.

5.4 CONSTRUCTION DUST AND PARTICULATE MATTER

5.4.1 Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust is therefore unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause ‘soiling’ and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

5.4.2 The smaller particles of dust (less than 10µm in aerodynamic diameter) are known as particulate matter (PM_{10}) and represent only a small proportion of total dust released; this includes a finer fraction, known as $PM_{2.5}$ (with an aerodynamic diameter less than 2.5µm). As these particles are at the smaller end of the size range of dust particles they remain suspended in the atmosphere for a longer period of time than the larger dust particles, and can therefore be transported by wind over a wider area. PM_{10} and $PM_{2.5}$ are small enough to be drawn into the lungs during breathing, which in sensitive members of the public could have a potential impact on health.

5.4.3 The qualitative assessment of likely significant impacts on local air quality and nearby receptors has followed the assessment methodology published by the IAQM and has taken into account details relating to the proposed development and professional judgement.

5.4.4 The IAQM methodology assesses the risk of potential dust and PM_{10} impacts from the following four sources: demolition; earthworks; general construction activities and track-out. It takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and particulate matter levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined.

5.4.5 **Figure 5.1** comprises a summary of the IAQM assessment criteria, aswell as a site specific assessment.

CONSTRUCTION VEHICLES AND PLANT

5.4.6 In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may also have an impact on local air quality adjacent to the access routes used by these vehicles and in the vicinity of the facility.

5.4.7 Detailed information relating to the number of construction vehicles and plant was not available at the time of writing. However, given the scale of the development and the nature of the required works, potential impacts from construction vehicles have been scoped out of the assessment.

5.5 OPERATION

DISPERSION MODELLING

5.5.1 The atmospheric dispersion model ADMS 5.1[7] has been used to quantify the impact of emissions from the proposed facility at existing receptors in the study area. ADMS 5.1 is an advanced dispersion model for calculating the concentrations of pollutants emitted from point, volume and area sources. The model uses algorithms that are able to take into account a range of parameters, including for example: the effects of buildings downwash; time varying emission rates and complex terrain etc, where appropriate.

5.5.2 The methodology used in the dispersion modelling follows the Environment Agency risk assessment methodology. An overview of the model input parameters is provided here. **Figure 5.2** comprises further detailed information**.**

→ The facility emissions are assumed to meet the emission limits set out in IED, at the daily average limit values for the assessment of annual mean, daily mean and 8-hourly concentrations, and at the half hourly average limit values for the assessment of hourly

[7] Model developed by Cambridge Environmental Research Consultants (CERC). Model version 5.1.2.0

means. All pollutants covered by IED are included in the assessment.

- The stack exit flow parameters were calculated using industry guidance[8] based on the waste throughput and are detailed in Error! Reference source not found.. Emission rates were calculated using the normalised flow rate and the IED emission limits. Impacts at 8 hours or less were assessed on the basis of the IED emission limits for half hourly emissions; impacts at daily periods or longer were assessed on the basis of the IED emission limits for daily emissions.
- The facility stack terminates 15m above ground level.
- The facility is assumed to operate for 8 hours per day (0800 to 1600), 5 days per week, with an average waste throughput of 100kg/hr which equates to ~180 tonnes/year. To ensure a conservative assessment, emissions at short periods (8hrs or less) were based on a maximum waste throughput of 200kg/hr.
- Impacts were considered on a grid of receptors centred on the facility. The resolution of the model grid was 15m within 0.75km of the stack and 50m elsewhere.
- Meteorological data were taken from Jersey Airport, 10km to the west-north-west of the site, for the years 2013 to 2015. The predominant wind direction is westerly/south-westerly in all years (**Figure 5.3)** with occasional winds from the north-east.
- Building downwash effects have been included in the modelling, with a single building used to represent the facility. For dispersion modelling purposes, the building is assumed to be 9m in height, and 30m x 21m footprint at an angle of 290º to north.
- Terrain effects have been included in the modelling. This ensures that the impact of the facility on elevated terrain in St Helier is appropriately modelled.
- To ensure a conservative assessment, all particulate matter emitted from the stack is assumed to be in the $PM_{2.5}$ size range (so it is assessed against both PM_{10} and $PM_{2.5}$ standards since $PM_{2.5}$ is a component of PM_{10}).
- Modelled impacts were assessed against the standards set out in
  -

[8] Validated methods for flue gas flow rate calculation with reference to EN 12952-15, Vattenfal, Kema & EoN for VBG Powertech, 2012.

- **Table** 5-1 **and**

- Table 5-2 for impacts on human health; *and*
- **Table 5-3** for impacts on ecological receptors.

5.5.3 The assessment of dust and odours during operation follows the same qualitative methodology as for dust during construction, with a focus on the identification of potential sources and receptors. The traffic generated by the facility, including waste delivery and staff vehicles, will be modest. It will not exceed the most stringent screening criteria set out in the IAQM guidance to trigger a requirement for assessing the impacts of road traffic e.g. a change in flow of 100 vehicles (as Annual Average Daily Traffic (AADT)) and/or 25 heavy goods vehicles (AADT). The impacts of operational traffic are, therefore, scoped out of the assessment.

Table 5-5 Emission Parameters for the Proposed Clinical Waste Facility

PARAMETER	CLINICAL WASTE FACILITY STACK	
Stack Height (above ground level) (m)	15	
Internal Stack diameter (m)	0.30	
Release Gas Temperature (ºC)	100	
Release Gas Velocity (m/s)	5	
Actual Volumetric Flow Rate (m^3/hr)	0.37	
Reference Flow Rate (Nm^3/hr)	0.27	
EMISSION RATES (G/S)	**LONG TERM (>8HR)**	**SHORT TERM (1HR)**
Total dust (assumed to be $PM_{2,5}$)	0.00272	0.0163
Nitrogen Oxides	0.0544	0.218
Sulphur Dioxide	0.0136	0.109
Carbon Monoxide	0.0272	-
Hydrogen Fluoride	0.000272	0.00218
Hydrogen Chloride	0.00272	0.0327
Group 1 metals (Cd,Tl)	0.000014	-
Group 2 metals (Hg)	0.00014	0.00027
Group 3 metals (Sb, As, Pb, Ni, Cr, Co, Cu, Mn, V)	0.00014	0.00027
Dioxins and Furans	0.0000003	-
Reference flow rate = 273.15K, 101,3kPa, 11% O2, dry;		

RESULTS PROCESSING

5.5.4 For nitrogen oxides, both the contribution to annual mean NO_x concentrations and the 99.79th percentile of the hourly mean concentrations (equivalent to 18th highest hour of the year, as per the air quality standards) were predicted. The predicted NO_x contributions were then converted to NO_2 following guidance provided by the Environment Agency[9], which assumes that for long-term concentrations 70% of the NO_x emissions will be NO_2 and for short-term concentrations 35% of emissions will be NO_2.

[9] Environment Agency's advice note for conversion ratios for NO_x and NO_2 published in 2005.

5.5.5 Chromium occurs in two principal forms in emissions – Chromium III and compounds, and Chromium VI. Of these, Chromium VI is the more toxic. Measurements of metals in the emissions of 10 waste incinerators in England and Wales were analysed by the UK Environment Agency and it was found that the proportion of Chromium VI to total chromium was a maximum of 2.1%[10]. This proportion was applied to the total predicted chromium impact for the assessment of Chromium VI.

HEALTH RISK ASSESSMENT

5.5.6 Dioxin and Furan exposure was modelled using a Health Risk Assessment developed for Her Majesty's Inspectorate of Pollution (HMIP)[11]. The assessment has been undertaken as a screening exercise and, as such, all receptors were assumed to reside at the most affected potential residential property (Territorial Army caretaker's flat). The assessment assumes continuous full load operation of the facility with dioxin emissions at the limit set out in WID.

SIGNIFICANCE CRITERIA

CONSTRUCTION

5.5.7 The IAQM assessment methodology recommends that significance is only assigned to the identified risk of dust impacts occurring from demolition/construction activities with appropriate mitigation measures in place. For almost all demolition/construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be **negligible**.

5.5.8 The significance of effects of exhaust emissions (NO_2 and Particulate Matter) arising from construction vehicles and on-site plant during the demolition/construction phase of the proposed development have been evaluated qualitatively using professional judgement.

OPERATION

5.5.9 The significance of the effects of the operation of the proposed facility has been assessed following the criteria outlined in the UK's Environment Agency Air Emissions Risk Assessment Guidance. These are intended for use in interpreting the results of an H1 screening assessment to determine whether further detailed modelling is required, but they provide a useful guide to the significance of an effect. The criteria make reference to the Process Contribution (PC) from the plant i.e. the contribution from the facility alone, and the Predicted Environmental Concentration (PEC) which is the process contribution plus the contribution from background/existing sources.

5.5.10 The EIS criteria state that the additional pollutant concentrations arising from the proposed facilitycan be considered to be insignificant if both of the following criteria are met:

- → The short-term PC is less than 10% of the short term AQS objective level / EAL; and
- → The long-term PC is less than 1% of the long-term AQS objective level / EAL.

5.5.11 If both the criteria aren't met, then the second stage screening criteria can be used, which are:

- → The short-term PC is less than 20% of the short term AQS objective level / EAL minus

[10] Environment Agency's advice note on Interim Guidance to Applicants on Metals Impact Assessment for Waste Incineration Plant.

[11] Risk Assessment of Dioxin Releases from Municipal Waste Incineration Process, HMIP 1996

twice the long term background concentration; *and*

→ The long-term PEC is less than 70% of the long-term AQS objective level / EAL.

CUMULATIVE IMPACTS

5.5.12 The impact of the operation of the facility is considered in isolation and, insofar as the impact of existing processes are implicitly included in the baseline, in combination with other potential local sources of pollution e.g. road traffic, power plant, energy from waste plant. However, as will be demonstrated, the impact of the proposed facility is imperceptible and, therefore, does not warrant a fully quantified cumulative assessment.

5.6 BASELINE AIR QUALITY

5.6.1 Baseline air quality was assessed with reference to the air quality monitoring carried out on the Jersey by Ricardo-AEA on behalf of States of Jersey Public Health Services and States of Jersey's own monitoring. The latest available data was reported in 2015 and relates to monitoring undertaken in 2014 (2012 for Particulate Matter). Monitoring has been undertaken since 1997.

5.6.2 The pollutants monitored were nitrogen dioxide (NO_2), particulate matter (as PM_{10}) and a range of hydrocarbon species including benzene. Nitrogen dioxide and particulate matter were monitored using automatic monitors, located in Halkett Place in the centre of St Helier. For NO_2, the monitoring was supplemented by passive diffusion tube monitoring throughout St Helier and across the island. Hydrocarbons were monitored using 'BTEX' diffusion tubes[12].

5.6.3 Figure 5.1 shows the location of monitoring in St Helier and Table 5-6 shows the results of the monitoring relevant to the assessment.

5.6.4 Air quality across Jersey is generally good, although some pockets of poorer air quality exist alongside busy roads and junctions in St Helier.

5.6.5 The principal source of nitrogen oxides on the island is road traffic and, consistent with this, the highest concentrations of NO_2 occur at kerbside sites, both in the centre of St Helier and alongside roads on the outskirts of the town (Georgetown) where exceedances of the EU limit value for annual mean NO_2 were monitored. At urban background sites, the concentrations of NO_2 were markedly lower and within the limit value.

5.6.6 The monitoring sites installed to monitor impacts from the existing industrial processes at La Collette (16, 17 and 18) were only operational for two months of 2015. Notwithstanding this, monitored concentrations of NO_2 at these sites were markedly lower than at both the kerbside and urban background monitoring sites in St Helier and were well below the limit value (<50% of the limit value of 40µg/m^3). The existing processes do not, therefore, contribute significantly to local concentrations of nitrogen dioxide.

5.6.7 Concentrations of benzene were well below the limit value (5µg/m^3) at all sites. The monitoring location at Faux Bie is close to a petrol station and influenced by fugitive emissions from fuel evaporation.

5.6.8 Monitored concentrations of particulate matter were within the limit values for annual mean and daily mean PM_{10} (40µg/m^3 as an annual mean, and 35 days less than 50µg/m^3).

[12] BTEX = Benzene, Toluene, Ethyl benzene and Xylenes

5.6.9 The principal sources of particulate matter are likely to be advection from the nearby continent and natural sources associated with St Helier's coastal location. However, there is also likely to be a contribution from vehicle movements within St Helier and on the local road network. Therefore, typical PM_{10} concentrations at residential properties away from road sources are likely to be lower than those monitored in the centre of St Helier with a low risk of exceedance of EU limit values.

5.6.10 Overall, monitored concentrations of NO_2 declined over time between 2000 and 2008, but then remained steady to 2013. Concentrations increased again in 2014, but at the time of writing it was not possible to state whether this trend will continue. Concentrations of hydrocarbons have decreased markedly over time.

5.6.11 Concentrations of particulate matter do not show any strong trends over time and interannual variability is likely to be dominated by meteorological conditions and prevailing winds rather than variations in emissions from local sources.

Table 5-6 States of Jersey air quality monitoring in St Helier

ID	Site Name	Description	2014 Annual Mean NO2 ug/m3	2014 Annual Mean Benzene ug/m3	2012 Annual Mean PM10 ug/m3 (Days >50ug/m3)
1	Les Bas Centre	Urban Background	24	0.5	
2	Halkett Place	Kerbside	33	0.7	28.8 (30)
3	Union Street	Kerbside	34	-	
4	New Street	Kerbside	21	-	
5	Broad Street	Urban Background	35	-	
6	Weighbridge	Kerbside	45	-	
7	Liberation Station	Kerbside	38	-	
8	The Parade	Roadside	27	-	
9	Faux Bie	Near Petrol Station	-	1.1	
10	Georgetown	Kerbside	44	-	
16	La Collette Gardens	Power Station	18	-	

ID	Site Name	Description	2014 Annual Mean NO2 ug/m3	2014 Annual Mean Benzene ug/m3	2012 Annual Mean PM10 ug/m3 (Days >50ug/m3)
17	South Hill Fort Regent	Power Station	18	-	
18	South Hill Park	Power Station	19	-	

Figure 5-1 States of Jersey air quality monitoring location in St Helier. Location of proposed facility shown with a green triangle. Not to scale.

5.7 ASSESSMENT OF IMPACTS

CONSTRUCTION

5.7.1 The risks of impacts from dust and particulate matter associated with the construction of the facility are **negligible** and no significant effects are anticipated. Figure 5.1 (**Appendix A)** sets out the criteria and results of the IAQM assessment of risks.

5.7.2 The risks from construction impacts are **negligible** due to a combination of the modest scale of the required works and the lack of sensitive receptors in proximity to the site.

5.7.3 As set out in IAQM guidance, impacts from construction dust are unlikely to extend more than 350m from the site and/or 50m from haulage roads up to 500m from the site boundary. There are no human receptors of high or medium sensitivity to dust impacts within 350m of the site boundary. The nearest residential properties or areas where a reasonable level of amenity would be expected, e.g. public gardens, are more than 500m north of the site. The nearest ecological receptors are over 100m from the site. The sensitivity of the area to dust impacts is, therefore, **low**.

5.7.4 No demolition is required onsite, although some earthworks and site preparation will be required which could result in emissions of dust from exposed and unconsolidated surfaces and/or stockpiles. Construction of the facility will involve laying concrete foundations, although no on-site batching would be required and the majority of the facility itself will be pre-fabricated. Overall, the scale of the required works is limited.

5.7.5 The access roads to the site are paved and the number of vehicles moving on site will be low. However, these access roads are likely to have a relatively high dust loading, due to the nature of the headland, existing processes and ongoing development of the area for light industrial/waste processing uses. There is, therefore, some potential for in-combination and/or cumulative impacts in relation to the trackout of dust from the site onto the public highway but the contribution from the construction works will be **minor**.

5.7.6 Taking into account the low dust emission potential of the construction activities and the low sensitivity of the area to dust and particulate matter impacts, the overall risk of impacts is **negligible**. No site-specific mitigation measures for dust mitigation are required but best practice, generic measures, as set out in Section 1.6, should be applied to ensure that the works do not contribute to the cumulative impacts of processes on the headland.

5.7.7 As stated previously, given the scale of the development and the nature of the required works, potential impacts from construction vehicles have been scoped out of the assessment due to the **negligible** level of risk.

OPERATION

HUMAN HEALTH

5.7.8 The maximum contributions of the emissions from the facility exhaust stack to ground level pollutant concentrations are shown in **Table 5.7** below for pollutants assessed against EU limit values, **Table 5.8** for halogens and **Table 5.9** for metals.

5.7.9 The maximum ground level impacts occur within 100m of the stack, primarily to the east (downwind of the stack on the prevailing wind direction) and to the south-east and north-west (influenced by building downwash). The maximum impacts therefore occur in an area where prolonged and/or repeated exposure of members of the public is unlikely. Furthermore, with respect to the maximum, modelled concentrations decrease by a factor of 2 within 200m of the stack and by a factor of 10 within 500m of the stack. At the closest residential receptors, the impacts of the facility are over 40 times lower than the maximum impacts.

5.7.10 For those pollutants for which there are EU limit values (**Table 5-7**) and for halogens (

5.7.11 **Table** 5-8), the maximum impact of the facility can be screened as being insignificant on the basis of the process contribution alone using the EIS criteria i.e. the contribution from the facility is less than 1% of the long term limit value and less than 10% of the short term limit value.

5.7.12 For example, for nitrogen dioxide, the maximum contribution of the facility to hourly mean concentrations anywhere within the study area is 17.47µg/m^3 or 8.7% of the limit value, for annual mean concentrations the maximum contribution is 0.24µg/m^3 or 0.6% of the limit value. At the closest residential properties/sensitive receptors, the maximum hourly mean and annual mean process contributions are less than 0.5µg/m^3 and 0.005µg/m^3 respectively, which equate to less than 0.25% and 0.015% of the limit values respectively. For particulate matter, the impacts are insignificant, irrespective of any assumptions relating to the size fraction of the particles.

5.7.13 The impacts of all metals can be immediately screened as being insignificant at the point of maximum impact with the exception of arsenic, cadmium, nickel and chromium VI (

5.7.15 Table 5-9). Whilst the contributions of these pollutants decrease markedly at sensitive receptor locations, it should be noted that the assessment of impacts is based on a highly conservative assumption. Namely, that each of the metals is emitted at their limit value (or the limit value for the group of metals),

5.7.16 **Table** 5-5**,** at all times when the facilityis operating.

5.7.17 The UK Environment Agency undertook a review of emissions of metals from incinerators in the UK and set out in a note[10] the maximum concentrations of certain metals in the exhaust gases. The emissions monitoring data showed that both the typical and maximum emission rates for certain key metals are well below the IED emission limits (

5.7.19 Table 5-10). If the impacts from the facility are assessed on the basis of the maximum monitored concentrations of these metals in exhaust gas streams then all except nickel can be screened as insignificant and, for nickel, the maximum impact is just 1.2% of the EU target value.

5.7.20 Overall, therefore, taking into consideration the limited potential for exposure of members of the public at the point of maximum impact of the emissions, the likely concentration of metals in the exhaust gases and the decrease in impact with distance from the source, it is concluded that impacts from all metals will be **insignificant**.

Table 5-7 Maximum modelled process contribution (PC) to ground level concentrations for pollutants with EU limit values. Results are shown as the maximum modelled over 3 years (2013 – 2015)

Pollutant	Averaging Period	Limit Value (ug/m3)	PC (ug/m3)	PC as % of Objective	Screened as Insignificant
Nitrogen Dioxide	Hourly Mean	200	17.47	8.7%	Yes
	Annual Mean	40	0.24	0.6%	Yes
Particulate Matter, PM_{10}	Daily Mean	50	0.078	0.2%	Yes
	Annual Mean	40	0.017	0.0%	Yes
Particulate Matter, $PM_{2.5}$	Annual Mean	20	0.017	0.1%	Yes
Sulphur Dioxide	Hourly Mean	350	23.65	6.8%	Yes
	Daily Mean	125	0.87	0.7%	Yes
Benzene	Annual Mean	5	0.0017	0.0%	Yes
Carbon Monoxide	8 Hourly Mean	10000	4.88	0.0%	Yes
Lead	Annual Mean	0.25	0.00087	0.3%	Yes

Table 5-8 Maximum modelled process contribution (PC) to ground level concentrations for halogens. Results are shown as the maximum modelled over 3 years (2013 – 2015)

Pollutant	Averaging Period	EALb (ug/m3)	PC (ug/m3)	PC as % of Objective	Screened as Insignificant
Hydrogen Chloride	Hourly Mean	750	18.77	2.5%	Yes

Pollutant	Averaging Period	EALb (ug/m3)	PC (ug/m3)	PC as % of Objective	Screened as Insignificant
Hydrogen Fluoride	Monthly Mean[a]	16	0.0017	0.0%	Yes
	Hourly Mean	160	1.25	0.8%	Yes

a. Assessed as twice the annual mean based on dispersion model testing; b EAL = Environmental Assessment Level

Table 5-9 Maximum modelled process contribution (PC) to ground level concentrations for metals. Results are shown as the maximum modelled over 3 years (2013 – 2015)

Pollutant	Averaging Period	Target Value / EAL (ug/m3)	PC (ug/m3)	PC as % of Objective	Screened as Insignificant
Arsenic	Annual Mean	0.006	0.00087	14.5%	No
Cadmium	Annual Mean	0.005	0.000087	1.7%	No
Nickel	Annual Mean	0.02	0.00087	4.4%	No
Mercury	Annual Mean	0.25	0.000087	0.0%	Yes
	Hourly Mean	7.5	0.016	0.2%	Yes
Antimony	Annual Mean	55	0.00087	0.0%	Yes
	Hourly Mean	150	0.16	0.1%	Yes
Chromium III & compounds	Annual Mean	5	0.00087	0.0%	Yes
	Hourly Mean	150	0.16	0.1%	Yes
Chromium VI	Annual Mean	0.0002	0.00087	435.7%	No
Copper	Annual Mean	10	0.00087	0.0%	Yes
	Hourly Mean	200	0.16	0.1%	Yes
Manganese	Annual Mean	0.15	0.00087	0.6%	Yes
	Hourly Mean	1500	0.16	0.0%	Yes
Vanadium	Annual Mean	5	0.00087	0.0%	Yes

Table 5-10 Comparison of IED emissions limits and monitored emissions of metals from incinerators in UK (from Environment Agency Interim Note) (mg/Nm^3)

Pollutant	IED Emission Limit	Min	Mean	Max	Ratio of IED to Max
Arsenic	0.5	0.0007	0.0016	0.003	167
Nickel	0.5	0.0006	0.0196	0.136	3.7
Chromium VI	0.5	0.0002	0.0076	0.033	15
Proportion of total chromium as Cr VI (%)	- (1 assumed for assessment)	0.03	0.7	2.1	48

INTERANNUAL VARIABILITY

5.7.21 The results presented in **Table 5-7** to

5.7.23 Table 5-9 represent the maximam taken across all three years of meteorological data used in the modelling. **Table 5-11** uses impacts on nitrogen dioxide to illustrate that the inter-annual variability in the maximum concentrations is not significant i.e. just +/-5% and +/-6% about the mean over the three years. Therefore, the results presented as the maximum over 2013 to 2015 are likely to be representative of the maximum likely concentrations in future years.

Table 5-11 Maximum modelled process contribution (PC) to ground level concentrations for Nitrogen Dioxide. Results are shown as a function of meteorological year

Year	Averaging Period	Limit Value (ug/m3)	PC (ug/m3)	PC as % of Objective	Mean Over 3 Years	Variation about Mean
2013	Hourly Mean	200	17.47	8.7%	16.66	+/- 5%
2014			16.33	8.2%		
2015			16.18	8.1%		
2013	Annual Mean	40	0.24	0.6%	0.23	+/- 6%
2014			0.22	0.5%		
2015			0.23	0.6%		

ECOLOGICAL IMPACTS

5.7.24 **Table 5-12** shows the maximum modelled concentrations of pollutants relevant to the protection of sites designated for nature conservation. The data are shown as the maximum modelled concentration, taken over three meteorological years and anywhere within the study area (irrespective of the presence of sensitive habitats). The modelled concentrations of sulphur dioxide can be screened as insignificant, even if the most sensitive habitats (lichen/bryophytes) are present. For nitrogen oxides and hydrogen fluoride, the maximum modelled concentrations marginally exceed the insignificance screening criteria i.e. 1.2% of the limit for annual mean nitrogen oxides and 1.4% of the limit for weekly mean hydrogen fluoride.

5.7.25 However, the closest ecological receptors (the South East coast Jersey Ramsar site) lie outside of the areas of maximum impact and the concentrations over the Ramsar site are less than half of the maximum concentrations. Impacts over the designated sites are, therefore, likely to be imperceptible (<1% of the long term standards, <10% of the short term standards).

Table 5-12 Maximum modelled process contribution (PC) to ground level concentrations for pollutants relevant to the protection of ecosystems. Results are shown as the maximum modelled over 3 years (2013 – 2015)

Pollutant	Averaging Period	Limit Value / EAL (ug/m3)	PC (ug/m3)	PC as % of Objective	Screened as Insignificant
Sulphur Dioxide	Annual Mean	20	0.087	0.4%	Yes

Pollutant	Averaging Period	Limit Value / EAL (ug/m3)	PC (ug/m3)	PC as % of Objective	Screened as Insignificant
	Annual Mean if lichen present	10	0.087	0.9%	Yes
Nitrogen Oxides	Annual Mean	30	0.35	1.2%	No
	Daily Mean	75	4.33	5.8%	Yes
HydrogenFluoride	Weekly Mean	0.5	0.0072	1.4%	No
	Daily Mean	5	0.022	0.4%	Yes

DUST AND ODOURS

5.7.26 The delivery to and handling of waste on the site during operation of the facility are potential sources of dust and odour. However, as during construction, since there are few sensitive receptors in the immediate vicinity of the facility, the principal risks associated with the operation of the site will relate to the transport of waste to the site.

DIOXIN INTAKE

5.7.27 The methodology outlined in the HMIP (Her Majesty's Inspectorate of Pollution) commissioned document on health risk from dioxins was used to calculate a total daily intake of dioxins for a range of human receptors; adult residents, child residents, infants, subsistence farmers and children of subsistence farmers via numerous exposure pathways e.g. via foodchain, inhalation, drinking water etc. The assessment was undertaken as a screening exercise and as a result, all receptors are assumed to reside at the point of maximum impact of the emissions from the proposed facility. This is an unrealistically conservative assumption, but is appropriate for a screening exercise.

5.7.28 Dioxins accumulate in fatty foods and over 90% of human background exposure to dioxins is estimated to come from the diet, with animal products being the dominant source. Direct inhalation and ingestion of soil, water and plants provide a relatively smaller contribution to total intake of dioxins. Although there are no surface drinking water supplies nearby and no subsistence fishermen living in the area, the fish and drinking water pathways were still included in the screening assessment to provide a worst case scenario.

5.7.29 The results of the screening exercise show that for the worst case exposure scenario of a subsistence farmer and child of subsistence farmer, the total intake of dioxins is well within the World Health Organization (WHO) recommended Tolerable Daily Intake (TDI) of 1-4 pg/kg-bw/day (**Table 5-13**). The total daily intake for an infant is expected to be 1-2 orders of magnitude greater than that of an adult, based on a 'per kilogramme of body weight' amount. This is, however, only sustained for a very short period of the individual's life.

Table 5-13 Modelled concentrations and resulting total daily intake of dioxins (Process Contribution) for receptors at the point of maximum impact of the Proposed Scheme. Intake provided as pg ITEQ/kg-bw/day

Receptor	Concentration (ug/m3 ITEQ)	Adult Intake	Child Intake	Infant Intake	Subsistence farmer intake	Child of Subsistence Farmer Intake

Receptor	Concentration (ug/m3 ITEQ)	Adult Intake	Child Intake	Infant Intake	Subsistence farmer intake	Child of Subsistence Farmer Intake
Location of Maximum Impact	$1.7x10^{-10}$	0.004	0.006	0.2	0.02	0.04

EMERGENCY RELIEF STACK

5.7.30 The facility may require an emergency relief stack for use during emergency conditions such as loss of electrical power or loss of system draught. Whilst emissions during such emergencies could result in a temporary increase in impacts from thefacility, the very low frequency of use and its limited duration will ensure that the impacts on receptors will be **negligible**.

ASSESSMENT OF EFFECTS

5.7.31 No significant effects are expected as a result of either the construction or operation of the waste facility.

DUST AND ODOURS

5.7.32 The assessment of potential impacts due to dust, during construction and operation, and odours, during operation, identified potential emission sources, albeit with limited magnitude. However, the assessment also identified that there were no sensitive receptors in proximity to the site.

5.7.33 Therefore, the potential for significant dust and odour nuisance, or impacts from increased particulate matter concentrations was classed as **negligible** for onsite works, and **negligible** to low for impacts from vehicles accessing the site from the public highway.

5.7.34 The potential effects of these would include temporary and/or intermittent soiling of surfaces and property outdoors, and odour annoyance in the local community. Mitigation measures will be put in place during construction and operation to minimise any effects, as set out in the following section, and no significant effects are anticipated.

OPERATION (HUMAN HEALTH)

5.7.35 The results of the detailed dispersion modelling study of the stack emissions demonstrated that the impacts of the facility on ambient pollutant concentrations will be insignificant. Using the UK Environment Agency criteria for screening impacts, the maximum impacts of the facility were readily screened as being insignificant for all pollutants except the metals arsenic, cadmium, nickel and hexavalent chromium.

5.7.36 For these metals, the initial assessment was based on the assumption that they were emitted at all times at their IED emission limit. Monitoring data from UK incinerators published by the UK Environment Agency demonstrated that this assumption was highly conservative, and that likely emission concentrations are substantially lower than the limit. As such, it was concluded that the likely impact from the metals will be **not be significant.**

5.7.37 Overall, therefore, with insignificant impacts from the stack emissions modelled for all pollutants, **no significant effects** on human health are expected. Furthermore, this applies whether the facility operates alone or in combination with other industrial processes on the La Collette headland.

5.7.38 The screening assessment of the potential dioxin intake via the foodchain resulting from the operation of the Proposed Scheme demonstrated that the maximum potential intake for a subsistence farmer, living at the point of maximum impact of the stack emissions, was more than an order of magnitude lower that the accepted tolerable daily intake. This scenario is highly conservative and actual dioxin intakes will be significantly lower and can be considered **negligible**.

OPERATION (ECOLOGICAL RECEPTORS)

5.7.39 The maximum process contributions to pollutant concentrations over the designated sites in Jersey are less than 1% of the limit values and environmental assessment levels for the protection of vegetation. It is, therefore, concluded that the impact of emissions from the facility on the designated sites will be **negligible**. This applies irrespective of existing pollution levels and irrespective of any cumulative impacts with other industrial processes.

OPERATION (CUMULATIVE)

5.7.40 Since the impacts from the facility are insignificant, they will not contribute to cumulative or in-combination effects with existing or future processes on the La Collette headland.

MITIGATION

CONSTRUCTION

5.7.41 The risk of impacts from dust and particulate matter during construction works is **negligible**, primarily due to the distance between works and sensitive receptors. Notwithstanding this, generic dust mitigation measures should be applied during the works to ensure that the construction of the facility does not contribute significantly to the cumulative impacts of dust from the La Collette headland industrial and waste processing sites, and in particular the track out of dust onto the public highway.

5.7.42 The final mitigation measures will be specified as part of the appointed contractor's construction environmental management plan. Indicative mitigation measures to be applied include but should not be limited to the following:

- sheeting of lorries/trucks delivering and/or leaving site with loose material;
- minimising material drop heights and rates as well as stockpile heights;
- preventing wind blown dust from stockpiled materials through compaction;
- damping down dry surfaces with water but avoiding the creation of silt run-off;
- provision of easily cleaned hard-standing area within the site for vehicles entering parking and leaving the site where appropriate;
- restricting vehicle speeds on site and on approach roads to site;
- keeping local residents informed on construction programme and activities; and
- visual inspections during works taking into account meteorological conditions and reviewing compliance with agreed mitigation measures.

OPERATION

STACK EMISSIONS

5.7.43 By design the facility will reduce emissions to air to minimal levels by incorporating an air pollution control (APC) system designed to ensure emissons meet IED emission limits and to minimise dioxin formation. Emissions will be monitored using a continuous emission monitoring system (CEMS).

5.7.44 The impact of the emissions on ambient air quality is limited by the use of a 15m stack height which is sufficient to disperse emissions to imperceptible levels at all sensitive receptors.

DUST AND ODOURS

5.7.45 The risk of odour and dust nuisance generation during operation of the facility is limited by both the distance to sensitive receptors and by the design and operating practices of the facility.

5.7.46 The principal sources of odour and dust in proximity to receptors are vehicles used in the delivery of waste and the removal of non-hazardous ash from the facility. Therefore, all waste will be delivered to the facility in covered containers. Once on site, all waste handling and storage operations will be undertaken in covered units and/or within the unit. Ash will be removed from the facility in covered skips.

5.7.47 No odours will escape from the facility, whether during routine or abnormal operations. A system of mitigating odour or fume from any part of the process including the waste loading hopper/ram will be included. During construction the Contractor shall consider all areas where odour can arise and include appropriate levels of abatement in order to reduce odour levels to a minimum.

5.7.48 The APC system will generate very small amounts of solid residue. This residue is hazardous but it will not be transported offsite and is not, therefore, a risk to human health. Rather it will be stored in sealed containers at La Collette along with the APC generated by the existing EfW plant.

5.7.49 The site will be subject to regular cleaning, including approach roads and subject to regular visual inspections to ensure that good management practices are being applied.

RESIDUAL EFFECTS

5.7.50 No significant residual air quality effects are anticipated as result of the construction or operation of the facility provided the design and mitigation measures are applied rigorously.

CONCLUSIONS

5.7.51 Air quality in Jersey is generally good. Areas of relatively poor air quality exist alongside busy roads and junctions in St Helier but these are limited in extent. Monitoring in the vicinity of the La Collette headland shows that air quality is good and that the existing industrial and waste management facilities do not adversely affect pollution levels.

5.7.52 The assessment of impacts from the construction and operation has been undertaken using a combined qualitative and quantitative approach. Risks from dust and odours have been assessed qualitatively; impacts from the stack have been assessed using detailed dispersion modelling. The modelling was undertaken using conservative assumptions including:

- Impacts assessment for the combustion of 180 tonnes of waste per year, at a maximum rate of 200kg/hr;
- Emissions at IED limits at all times or, for metals, at the maximum monitored concentrations at UK incinerators;
- Plume rise minimised due to the assumed low exhaust temperature and neglect of moisture effects;
- 70% conversion of NO_X to NO_2 for annual mean concentrations; 35% for hourly mean concentrations;
- All particulate matter emissions assumed to be in the $PM_{2.5}$ size fraction; and
- Impacts assessed as the maximum modelled concentrations over three meteorological

years.

5.7.53 **No significant** air quality effects are anticipated from either the construction or operation of the facility. This applies whether the facility is considered alone or in combination with other processes.

5.7.54 The facility is therefore compliant with the aims of the *Jersey Air Quality Strategy*. In particular:

- *Policy P4* requires air quality monitoring be undertaken, including in the vicinity of industrial sources. Emissions from the facility will be monitored in the stack to ensure compliance with IED emission limits;
- *Policy P4* requires that mitigation strategies are put in place to minimise harm to human health and the environment. The construction and operation of the facility will be subject to appropriate mitigation measures; *and*
- *Policy P6* requires that emissions arising from waste operations are controlled in line with EU and UK best practice. By design, emissions from the facilitywill meet IED emissions limits and their impacts will not affect Jersey's ability to comply with EU ambient air standards.

FIGURE 5.1 IAQM Assessment Criteria and Site Specific Assessment

Table B1.1 Dust emission magnitude determination criteria and assessment for demolition activities (without mitigation)

DEMOLITION CRITERIA	IAQM DUST EMISSION MAGNITUDE			SITE-SPECIFIC ASSESSMENT
	Small	**Medium**	**Large**	**Clinical waste facility**
Installation Volume	<20,000m^3	20,000m^3-50,000m^3	>50,000m^3	Site contains movable objects and non-permanent structures. There will be no demolition.
Material Dust Potential	Metal/timber cladding, demolition activity above <10m ground, during wetter months.	Potentially dusty demolition material, activities at 10-20m above ground.	Potentially dusty demolition material. Onsite crushing e.g. concrete and screening demolition activities >20m above ground level.	There will be no demolition.
Comments				There will be no demolition.
Overall Dust Emission Magnitude Rating				**Negligible/Not Applicable.**

Table B1.2 Dust emission magnitude determination criteria and assessment for earthworks activities (without mitigation)

EARTHWORKS CRITERIA	IAQM DUST EMISSION MAGNITUDE			SITE-SPECIFIC ASSESSMENT
	Small	**Medium**	**Large**	**Clinical waste facility**
Site Area	<2,500m^2	2,500 – 10,000m^2	>10,000m^2	The area of the Application site is approx 2,000m^2 and is small.
Soil/Material Type	Sand	Silt	Clay (dry)	The existing site is paved.
Earthmoving equipment	<5 veh at a time	5 – 10 veh at a time	>10 veh at a time	Due to the size of the site area and the overall size of the structure, it is unlikely that more than 5 earthmoving vehicles will be present at a time. Therefore a small dust emission potential.
Bunds / Stockpiles	<4m high	4 – 8m high	>8m high	Small-Medium. Due to site constraints, no bunds are anticipated. Temporary material stockpiles may be required/ created but these are expected to be no more than 4 metres in height.
Material Moved	<20,000 tonnes	20,000 -100,000 tonnes	>100,000 tonnes	Small - Medium. Total material to be excavated is not currently known but is expected to be less than 20,000 tonnes
Timing of Works	During wetter months	**Various conditions**	During drier months	Medium
Comments				
Overall Dust Emission Magnitude Rating				**Small**

Table B1.3 Dust emission magnitude determination criteria and assessment for construction activities (without mitigation)

Construction Criteria	IAQM Dust Emission Magnitude			Site-specific Assessment
	Small	**Medium**	**Large**	**Clinical waste facility**
Installation Volume	<25,000m^3	25,000m^3-100,000m^3	>100,000m^3	The total volume of the structure is expected to be less than 25,000m^2 and as such is considered to be small.
Dust Potential of Construction Activites	Use of materials with low potential for dust release (e.g. metal cladding or timber)	e.g. use of dusty material such as concrete/ballast; piling	e.g. on-site concrete batching, sandblasting	It is anticipated that the structure will use a mix of metal cladding and concrete, with significant pre-fabrication. As such, the dust emission magnitude is considered to be small-medium.
Comments				Due to the size of the structure and the amount of materials anticipated, the construction is expected to have a low potential for dust release.
Overall Dust Emission Magnitude Rating				**Small**

Table B1.4 Dust emission magnitude determination criteria and assessment for trackout activities (without mitigation)

Trackout Criteria	IAQM Dust Emission Magnitude			Site-specific Assessment
	Small	**Medium**	**Large**	**Clinical waste facility**
Number of HDV (>3.5t) per day	<10	10 – 50	>50	Due to the size of the site, it is anticipated that less than 10 HDVs will visit per day.
Extent of unconsolidated surfaces (i.e. unpaved road length)	<50m	50 – 100m	>100m	Small. The Application Site has an existing road network.
Surface material dust potential	Low	Moderately dusty i.e. some clay content	Potentially dusty i.e. high clay content	The existing site is paved. Travel to the local road network will be on surfaced roads.
Comments				Travel on, to and from the site is along paved service roads.
Overall Dust Emission Class Rating				**Small**

Table B1.5 Outcome of the assessment of potential dust emission magnitude from construction related activities

Activity	Dust Emission Magnitude
Demolition	N/A/Negligible
Earthworks	Small
Construction	Small
Trackout	Small

Table B1.6 Criteria for defining the sensitivity of receptors to construction dust related impacts

Sensitivity of the Area	Human Receptor – Dust Soiling Effects	Human Receptor – Human Health Effects of PM10	Ecological Receptor
High	→ Users can reasonably expect a enjoyment of a high level of amenity; or → The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected a to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. → Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	→ Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). → Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	→ Locations with an international or national designation and the designated features may be affected by dust soiling; or → Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. → Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	→ Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or → The appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. → Indicative examples include parks and places of work.	→ Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). → Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	→ Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or → Locations with a national designation where the features may be affected by dust deposition. → Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	→ The enjoyment of amenity would not reasonably be expected; or → Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or → There is transient exposure, where the people or	→ Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for	→ Locations with a local designation where the features may be affected by dust deposition. → Indicative example is a local Nature Reserve with dust sensitive features.

Sensitivity of the Area	Human Receptor – Dust Soiling Effects	Human Receptor – Human Health Effects of PM10	Ecological Receptor
	property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. → Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads. a People's expectations will vary depending on the existing	eight hours or more in a day). → Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	

Table B1.7 Criteria for the determination of the sensitivity of the area to dust soiling effects on people and property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table B1.8 Criteria for the determination of the sensitivity of the area to human health impacts

Receptor Sensitivity	PM10 background concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	10-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table B1.9 Criteria for the determination of the sensitivity of the area to ecological impacts

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

Table B1.10 Notes on sensitive receptors in the vicinity of the Application Site and defining the sensitivity of the area

Receptor Type	Description
Dust Soiling	The Application Site is located an existing industrial/brownfield area on a headland and is located over 750m away from the nearest residential receptor. It is located nearby some commercial units including a boatyard. The total number of high sensitivity receptors within 350m of the Application Site boundary is 0. The total number of medium sensitivity receptors within 20m is estimated to be 0. As such, the sensitivity of the area to dust soiling effects on people and property is considered to be low. For trackout, there are 0 high or medium sensitivity receptors within 50m from the edge of the trackout route. As such the dust soiling effects from trackout are considered to be low.
Human Health	Background concentrations of PM_{10} from local monitoring sites indicate that concentrations have ranged between 23.0 – 32.5µg/m^3 between the years 2009-2012. As there are no High or Medium sensitive receptors within 100m of the site it is considered that the sensitivity to PM10 impacts is low.
Ecological	There are two ecologically relevant internationally recognised sites located near to the Application Site. Neither site is located within the assessment distances defined within the IAQM guidance and further consideration of ecological receptors is not required. Furthermore, intertidal zones are not sensitive to dust deposition.

Table B1.11 Outcome of defining the sensitivity of the area

Potential Impact	Sensitivity of the surrounding area			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	Low	Low	Low	Low
Human Health	Low	Low	Low	Low

Table B1.12 Summary dust risk table to define site specific mitigation

Potential Impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible	Negligible	Negligible	Negligible
Human Health	Negligible	Negligible	Negligible	Negligible

FIGURE 5.2 MODEL INPUTS

Calculation of Exhaust Gas Flow Rate

Fuel Input 180 tonnes/year

Operation 5 days per week / 8 hours per day
260 days per year
1820 hrs per year
99kg/hr

Modelled

100 kg/hr on average
200 kg/hr as a maximum (assumed 2 x average rate)

Exhaust Gas

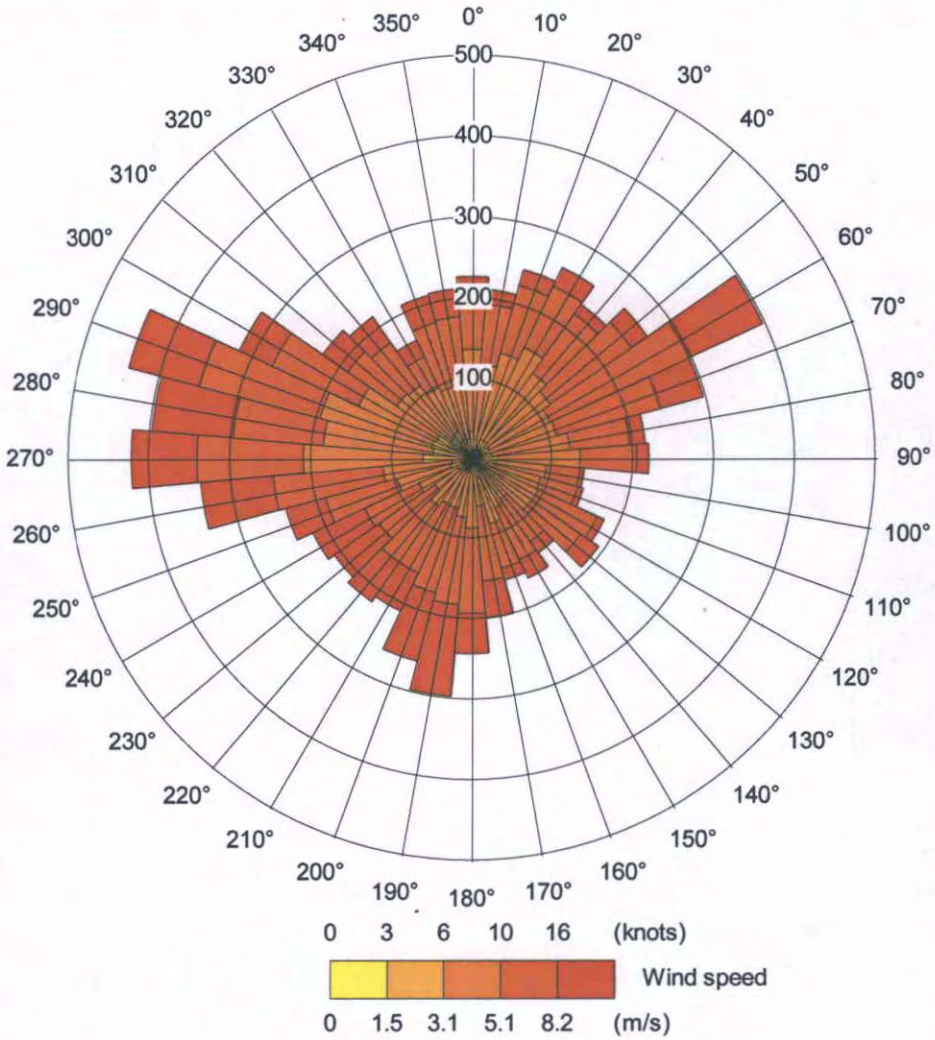
Fuel	100		200	kg/hr
Exhaust Gas	4.65		4.65	Nm3/kg (stoichiometric, dry), from Ref 8
Exhaust Gas	465		930	Nm3/hr (stoichiometric, dry)
Exhaust Gas	0.129		0.258	Nm3/s (stoichiometric, dry)
Exhaust Gas	0.272	0.544		Nm3/s (at 11% O2, dry) (used for emission rate calculation)
Exhaust Gas	0.372			m3/s (at 11%O2, dry, 100°C) (used for exit flow rate in modelling)

Model Parameters

PARAMETER	VALUE
Model	ADMS 5.1
Meteorological Data Set	Jersey Airport (2013, 2014, 2015) Hourly Sequential Data
Surface Roughness (Dispersion Site)	0.5m (Open Suburbia, to take account of industrial)
Monin-Obukhov Length (Dispersion Site)	30m Mixed Urban / Industrial
Site Latitude	49°
Receptors	Cartesian grid. 1.5x1.5km coverage with 15m resolution; 50m resolution to 5km x 5km

FIGURE 5.3 WIND ROSES

C:\BTJ\Projects\Jersey CWI\Model files\Air Quality\09 Model\Model Files\Jersey_13.met



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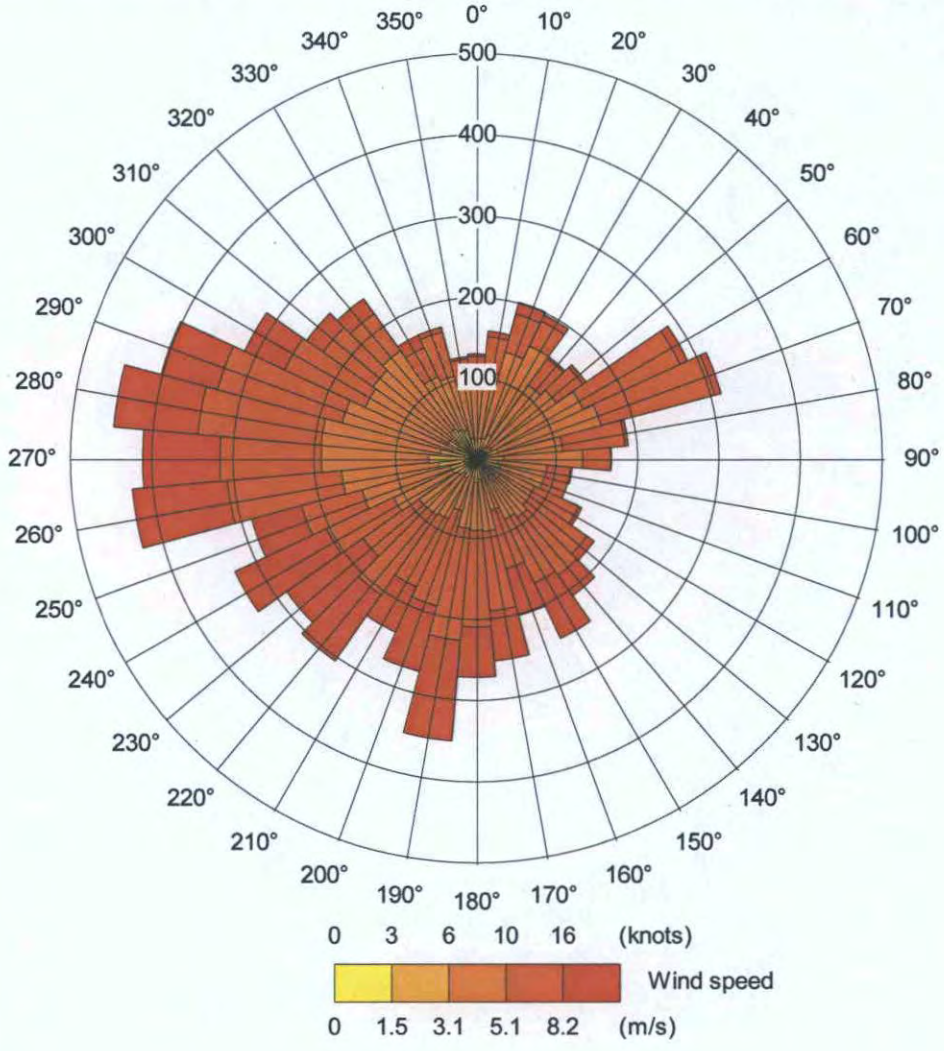

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