ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Panda

Starrus Eco Holdings Ltd
Cappagh Road
Finglas

O'Callaghan Moran & Associates
ENVIRONMENTAL MANAGEMENT FOR BUSINESS

March 2021

O'Callaghan Moran & Associates
Unit 15,
Melbourne Business Park,
Model Farm Road,
Cork.

021-4345366
info@ocallaghanmoran.com
www.ocallaghanmoran.com

Unit 15
Melbourne Business Park
Model Farm Road
Cork T12 WR89

T: 021 434 5366
E: admin@ocallaghanmoran.com
www.ocallaghanmoran.com

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

STARRUS ECO HOLDINGS LTD

MATERIALS RECOVERY FACILITY

CAPPAGH ROAD

FINGLAS

DUBLIN 11

Prepared For: -

Starrus Eco Holdings Ltd
Cappogue
Finglas
Dublin 11

Prepared By: -

O' Callaghan Moran & Associates
Unit 15
Melbourne Business Park
Model Farm Road
Cork
T12 WR89

March 2021

TABLE OF CONTENTS

APPENDICES

FIGURES & DRAWINGS

NON-TECHNICAL SUMMARY

1.0 Introduction

1.1 The Applicant

Starrus Eco Holdings Ltd trading as Panda Waste Management (Panda) is part of the Beauparc Group which is the largest waste management company in Ireland and also a utility provider. Panda operates a materials recovery facility on Cappagh Road under an Industrial Emissions licence granted by the Environmental Protection Agency (EPA).

1.2 Facility Overview

The site is on Cappagh Road and covers 2.5 hectares (ha). It has approval to accept 250, 000 tonnes/year of non-hazardous household, commercial, industrial and construction and demolition waste and these are processed in three waste handling buildings. The planning permission allow operations to be carried out 24 hours a day 7 days a week; however this expires in 2022 unless a further permission is granted.

1.3 Proposed Development

It is proposed to increase the annual waste intake to 450,000 tonnes and seek approval for permanent 24/7 operations. The existing buildings, plant and equipment have the capacity to accommodate the additional waste processing, there will be no alterations to the drainage systems and no material change to the nature and duration of any emissions.

2.0 Planning and Waste Management Policy

2.1 Planning Policy

The Fingal County Development Plan 2017-2023, sets out the development policies and objectives for the sustainable future growth of the county. Chapter 9 addresses waste management and states that the Council will implement the policies and recommendations of the Eastern Midlands Region Waste Management Plan 2015-2021.

2.2 Waste Management Policy

The foundation policy statement on waste management *"Changing Our Ways"* bases national policy on the EU Waste Management Hierarchy, which in descending order is:

- Prevention,
- Preparing for Reuse,
- Recycling,
- Other Recovery (including energy recovery); and
- Disposal.

The current policy "*Waste Action Plan for a Circular Economy"* is an action focused plan for Ireland to embrace the opportunities in becoming a circular economy and its objectives include ensuring that

measures support sustainable economic models (for example by supporting the use of recycled over virgin materials).

2.2.1 Waste Management Plan for the Eastern Midland Region

It is a policy of the Plan to aim to improve the regional and national self-sufficiency of waste management infrastructure for the reprocessing and recovery of particular waste streams in accordance with the proximity principle.

2.2.2 Circular Economy

The purpose of the European Commission's (Commission) Action Plan on the Circular Economy[1] is to transition the European Union (EU) to an economy where the value of products, materials and resources is maintained for as long as possible and the generation of waste minimised. To achieve this, materials at the end of their life cycle should be recovered through recycling and reintroduced to the product lifecycle.

2.2.3 Climate Change

The National Climate Change Strategy charts the way to achieve and maintain reductions in greenhouse gas emissions under the Kyoto Protocol. In 2009, the EU Commission agreed a package of proposals to deliver on the EU's commitments to fight climate change and promote renewable energy up to 2020 and beyond. The package seeks to achieve a 20% reduction in total EU greenhouse gas emissions by 2020 (relative to 1990 levels) and, at the same time, to increase to 20% the amount of renewables in energy consumption.

To meet the 2020 target greenhouse gases emissions must be reduced at a national level and the waste sector must contribute to this reduction. The diversion of biodegradable waste, for example food waste, from landfill to biological treatment (composting) reduces the emissions of methane, one of the most significant greenhouse gases. The use of non-recyclable wastes to manufacture fuels that replace fossil fuels also contributes to the reduction in greenhouse gas generation.

2.2.4 Compliance with Policy Objectives

The proposed development is consistent with objectives of the County Development Plan, Eastern Midlands Region Waste Management Plan and current national waste policy objectives. It involves the expansion of the recovery and recycling capacity an existing waste management facility to ensure that regional and national recycling and recovery targets are achieved.

2.3 Need for the Development

Efforts to decouple waste generation from economic growth have not yet been successful and the economic recovery since 2014 has resulted in an increase in the quantities of waste generated. To ensure that national and regional recovery and recycling targets are met, minimise the amount of waste disposed to landfill and to roll out circular economy initiatives there is a need to increase waste treatment capacity.

[1] https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF

3 Alternatives Examined

The facility already has an EPA licence and has the capacity to accommodate the proposed increased waste intake and is located in an area with excellent transport connections. The only alternative would be to acquire a new site, apply for planning permission and an EPA licence and provide the required infrastructure. This offers no environmental and economic benefits compared to the continued use of the existing facility.

4. Description of Existing Site and the Proposed Development

4.1 Site Location & Layout

The site is in an area that that has been extensively developed for industrial and commercial use and mineral extraction. Stadium Business Park is to the south and the Huntstown Quarry is to the east and north. The area to the west is undeveloped but is zoned for commercial use. There are ten residences to the south east, on the southern side of the Cappagh Road and these are the only private houses within 500m of the facility.

There facility consists of three waste handling buildings (Building A1 -2,030 m^2; Building A2 - 2,800 m^2 and Building B1 - 4,088 m^2) an electrical substation, two weighbridges and office and associated control rooms, staff amenity building (100 m2), fuel tanks and paved open yards.

4.2 Site Services

The site has connections to the main electricity supply and telecoms systems. Water for the staff toilets is obtained from an on-site well. There is no connection to the municipal foul sewer. Sanitary wastewater from the toilets is collected in an underground holding tank and sent off site for treatment. Rainwater run-off from the building roofs and paved yards is harvested for use as 'grey water' in the toilets, with the surplus discharged to the storm sewer serving the adjoining Stadium Business Park.

4.3 Waste Activities

The current licence and planning permission approve the acceptance of 250,000 tonnes of non-hazardous household, commercial, industrial and construction and demolition wastes.

The site operates 24 hours a day seven days a week. Wastes are delivered in Panda's waste collection trucks and those of other commercial waste companies and wastes are not accepted from members of the public. All deliveries are weighed in and the trucks then enter appropriate waste processing building where the wastes are off loaded, inspected and processed.

Mixed dry recyclables are sorted into the different types and these are then baled and stored before being sent for further treatment. Source separated wastes are baled and also stored before being sent off-site. Processed mixed solid wastes are accepted from other waste pre-treatment facilities and these are treated to remove recyclables, with the residues then further processed to produce a solid recovered fuel (SRF). The SRF is sent to cement kilns where it is used as a replacement for fossil fuels.

Food waste (brown bin) and mixed household waste (black bin) that contains odorous materials are accepted and stored in a section of one of the buildings that is fitted with an odour control system. It is then sent to other waste management facilities for further treatment.

Out of date packaged food from commercial operators is accepted and stored pending transfer to other treatment plants where the packaging is removed. This activity is authorised by the Department of Agriculture, Food and Marine under the Animal By-Products Regulations. Panda has received approval from the Department to set up a depackaging plant in the building fitted with the odour control system. This will allow Panda to send the depackaged materials directly to biological treatment plants (e.g. composting).

The increase in the annual waste intake to 450,000 tonnes and permanent 24/7 operations do not require the construction of any new buildings; changes to the surface water and foul water drainage systems and will not give rise to any new point or fugitive emission sources. The increased intake will result in additional traffic delivering and transferring the wastes, with associated increase in vehicle exhaust gases and diesel consumption and the additional processing will increase electricity consumption.

4.4 Emissions and Controls

Emissions include vehicle exhausts, dust, noise and odours and rainwater run-off. The EPA licence sets out the control measures that must be applied to ensure these emissions do not cause pollution. These include an odour control system that extracts the odorous air from inside the building where odorous wastes are accepted and passes it through a filter that reduces the odours to levels that do not cause an off-site nuisance.

Rainwater run-off is channelled through an oil interceptor to an underground tank from which there is a controlled flow to the storm sewer. The tank has a shut-off valve that can be closed in the event of an incident that has the potential to pollute the run-off.

The EPA licence also requires Panda to monitor odour, dust and noise emissions and the quality of the rainwater run-off.

4.5 Safety and Hazard Control

Panda has prepared and adopted an Accident Prevention Policy to minimise the risk of accidents occurring and an Emergency Response Procedure that specifies roles, responsibilities and actions required to deal quickly and efficiently with all foreseeable major incidents and to minimise environmental impacts.

4.6 Accidents & Emergencies

Panda has, in accordance with the retirements of the EPA licence, completed an Environmental Liability Risk Assessment (ELRA) that has identified the plausible accidents that could occur and evaluated the associated environmental effects. This has formed the basis for an Accident Impact Assessment that identifies and assesses the impacts of major accidents and natural disasters on humans, the environment and cultural heritage. Based on the types of waste that are and will be accepted and the activities carried out, the only accident that presents a significant risk of environmental pollution is a fire.

5 Climate

5.1 Receiving Environment

The climate in the area is mild and wet. The prevailing wind direction is from the south-west, with occasional winds from the east. The likelihood of a unique specific microclimate being present is very low.

5.2 Impacts

There is a link between greenhouse gas emissions and climate change. Direct emissions from waste management facilities are associated with on-site processing and off-site electricity power generation, while indirect emissions are linked to the vehicles transferring wastes to and from the site and staff transport.

5.3 Baseline Scenario

If the development does not proceed the current waste activities will continue with no changes to the potential for impact on climate.

5.4 Prevention & Mitigation Measures

Panda has completed an assessment of energy usage and potential measures to improve efficiency. Electricity is supplied by a renewables utility and Panda has planning permission to install roof mounted solar panels at the site.

5.5 Assessment of Impacts

All greenhouse gas emissions contribute to a cumulative negative climate change effect unless offset by mitigation or compensatory measures. The proposed development will result in additional greenhouse gas emissions associated with the increased diesel and electricity consumption. This will be somewhat off-set by increasing the diversion rate of biodegradable waste from land fill, the manufacture of solid recovered fuel that replaces fossil fuels and the installation of the roof mounted solar panels.

5.6 Residual Impacts

The proposed development will have an ongoing, imperceptible, negative impact on climate.

6 Traffic

6.1 Receiving Environment

Greenstar, a sister company of Panda's, operates a large scale waste management facility in Millennium Business Park, approximately 500m to the north of Panda. Traffic accessing the site was assessed in conjunction with this site. The site is accessed directly from the Cappagh Road.

An assessment of the traffic associated with the current operation was based on a 24 hour manual classified traffic count completed on 11th March 2020 at six junctions agreed in advance with Fingal County Council, which are:

Greenstar facility access road junction (1)

Millennium Business Park – Cappagh Road roundabout junction (2)

Huntstown Business Park – Cappagh Road roundabout junction (3)

Panda facility access road junction(4)

Cappagh Road – Mitchelstown Road roundabout junction (5)

Cappagh Road – Ballycoolin Road roundabout junction (6)

The peak morning traffic at the Greenstar facility access road junction is between 9am and 10am. At all other junction the peak occurred between 8am and 9am. The peak evening traffic occurs between 5pm and 6pm at all junctions.

At the Panda access junction the total traffic through the access junction over 24 hours was 8,129 passenger car units (PCU), with 678 PCU arriving at Panda MRF and 672 PCU departing. Peak hourly traffic occurred between 12am and 1pm.

6.2 Impacts

The proposed development will result in an 80% increase in the number of trucks accessing the facility. The majority of the access roads are and will continue to operate below capacity should the development proceed. The roundabout between the Cappagh Road and Mitchelstown Road to the north of the Panda facility is already under pressure from existing traffic flows, and will be above capacity in future regardless of the development.

6.3 Baseline Scenario

If the development does not go ahead, the junctions will continue to operate as currently and the roundabout at the Cappagh Road-Mitchelstown Road will remain under pressure and reach capacity in the near future.

6.4 Prevention & Mitigation Measures

As the proposed development will have no adverse impacts on the local road network, prevention and mitigation measures are not required.

6.5 Assessment of Impacts

The assessment took into consideration the proposed expansion of the annual waste acceptance rate at the nearby Greenstar waste management facility in Millennium Business Park, where it is proposed to increase the annual intake from 270,000 tonnes to 450,000 tonnes.

All six junctions were modelled. At the Panda facility access road the maximum capacity occurs at the midday peak in 2035. Junctions 1, 2, 3 and 6 will operate well below capacity for design years tested. Junction 5 is already under significant pressure and the proposed development will exceed its capacity; however even if the development does not proceed the junction will approach the recommended capacity by 2025 and reach full capacity by 2035.

6.6 Residual Impacts

The proposed development will have an on-going, slight negative impact on the local road network.

7. Land and Soil

7.1 Receiving Environment

The site, with the exception of a narrow landscape strip along the road frontage, is entirely covered with buildings and paving. The subsoils are between 1.3 and 8.45 m thick and comprise sandy gravelly boulder clays. The bedrock belongs to the Boston Hill Formation and comprises nodular and muddy limestones and shale.

7.2 Impacts

The development does not involve either any land take, or ground disturbance and will not result in any new emission to ground.

7.3 Baseline Scenario

If the proposed development does not proceed current operations will continue, with no change to the potential impact on land and geology.

7.4 Prevention & Mitigation Measures

The EPA licence specifies the prevention and mitigation measures that must be applied to avoid impact on land and geology, which include; the routine inspection and repair of paved areas, regular integrity tests of storage containment areas and drainage systems; the adoption of an emergency response procedure and staff training on appropriate spill response actions.

7.5 Assessment of Impacts

At present there are no direct or indirect emissions to ground and the proposed change will not give rise to any new emissions. The proposed increase in the annual waste intake will have no impact on land and soil.

7.6 Residual Impacts

The proposed development will have no impact on land and soil.

8. Water

8.1 Receiving Environment

The site is in the catchment of the Tolka River, which is approximately 2 kilometres to the south west and south. There are no streams or water courses either on site, or in the surrounding area. The Tolka River is part of the Liffey Water Management Unit, as designated by the Eastern River Basin District Management Plan. The overall status of the river is 'Moderate', and it is considered 'At Risk' of not achieving its restoration objective of at least 'Good' status by 2027.

The bedrock is a locally important (Lm) aquifer that is productive in local zones. The local direction of groundwater flow is to the south, but is likely to be greatly influenced by the large scale quarrying immediately to the east and north of the site (Huntstown Quarry). The aquifer vulnerability to pollution from the ground surface is Extreme. The aquifer is part of the Dublin Area Groundwater Body. This is categorised as being of 'Good' status, but is 'At Risk' of achieving its objective of protecting the existing status.

8.2 Impacts

The proposed development does not require any alteration to the existing surface water and foul water drainage systems. It will not result in any change to the volume and quality of the rainwater run-off. There are no current direct or indirect emissions to groundwater and the proposed development will not result in any new emissions.

8.3 Baseline Scenario

If the proposed development does not proceed current operations will continue, with no change to the potential impact on water.

8.4 Prevention & Mitigation Measures

The EPA licence specifies the prevention and mitigation measures that must be implemented to avoid impacts on waters which include; the provision of an oil interceptor on the surface water drains that collects run-off from areas where there is the potential for oil contamination to occur; provision of a flow attenuation tank that controls the flow rate to the storm sewer; provision of impermeable paving across all operational areas; routine inspection and repair of paved areas; regular integrity tests of storage containment areas and drainage systems; adoption of an emergency response procedure and staff training on appropriate spill response actions.

There is a shut off valve on the attenuation tank that can be closed in the event of an incident that has the potential to contaminate surface water retain the water inside the site boundary.

8.5 Assessment of Impacts

The proposed development will not result in any changes to the volume and quality of the rainwater run-off, will not give rise to any new emission to groundwater and will have no impact on surface water and groundwater.

8.6 Residual Impacts

The proposed development will have no impact on water.

9 Biodiversity

9.1 Receiving Environment

The site, with the exception of a narrow landscape strip at the road frontage, is entirely covered by buildings and paved yards. The habitat in the operational area is classified as 'BL3 Buildings and artificial surfaces'. This type of habitat is typically not species diverse and the likelihood of protected species

within the site boundary is very low. The site is not in a Special Area of Conservation (SAC), or a Special Protection Area (SPA) and the closest such sites are all approximately 10km from the site.

9.2 Impacts

The proposed development will not result in the loss of any habitats either inside, or outside the site boundary. It will not result in any new emissions to atmosphere, surface water or groundwater, or a change to the current operational hours.

9.3 Baseline Scenario

If the proposed development does not proceed the current activities will continue with no change to the risk presented to biodiversity.

9.4 Prevention & Mitigation Measures

As the development will not have any impact on biodiversity either inside, or outside the site boundary and will have no impact on any designated sites, specific prevention and mitigation measures are not required.

9.5 Assessment of Impacts

The proposed development will not result in the loss of or any damage to any habitats or disturbance of protected species either in, or outside the site boundary. The site is not in or adjacent to any Natura 2000 Sites and there are no viable pathways between the site and any Natura 2000 Sites.

9.6 Residual Impacts

The proposed development will have no residual impact on biodiversity.

10 AIR

10.1 Receiving Environment

The site is in an area that that has been extensively developed for industrial and commercial use and mineral extraction. The ambient air quality, based on the results of continuous monitoring conducted by the EPA in Finglas, is good.

10.2 Impacts

The potential emissions to air from the waste activities that are and will continue to be carried out include dust, vehicle exhausts and odours.

10.3 Baseline Scenario

If the proposed development does not proceed the facility will continue to operate as is, and there will be no change to the potential impacts on air quality.

10.4 Prevention & Mitigation Measures

Panda implements the control measures specified in the EPA licence that are designed to ensure waste activities do not give rise to negative impacts on air quality and these will continue to be applied.

All wastes are processed inside the buildings. The odour control system provided in the section of the building where odorous materials are handled has been proven to be effective in controlling odours and this system will continue to operate. The trucks that transport the wastes are fitted with nitrous oxides reduction systems and it is Panda policy not to allow engine idling.

10.5 Assessment of Impacts

The proposed development will not give rise to any new point emissions to air. There will be additional traffic movements which will result in an increase in the volume of vehicle exhausts.

10.6 Residual Impacts

The proposed development will have an ongoing imperceptible, negative impact on air quality, but will have no permanent impact.

11 Noise

11.1 Receiving Environment

The site is in an area that that has been extensively developed for industrial and commercial use and mineral extraction. There are ten residences approximately 450 m to the south-east. The EPA licence and planning permission requires Panda to carry out noise surveys to assess the impacts associated with its operations. Daytime, evening and night-time noise monitoring is carried out annually and this has established that the dominant source of noise in the locality is road traffic.

11.2 Impacts

The current noise sources include:

- Transport vehicles
- Fixed and mobile plant
- Odour Control Unit extraction fans

The facility is operational 24/7 and therefore the plant and fans are in constant use. The proposed development does not require the provision of any new sources of noise emissions or changes to the current operational hours.

11.3 Baseline Scenario

If the proposed development does not proceed the facility will continue to operate, with no change to the associated noise emissions.

11.4 Prevention & Mitigation Measures

Panda implements the noise control measures specified in the EPA licence that are designed to ensure operations do not give rise to emissions that are a cause of nuisance or impairment outside the facility boundary and these will continue to be applied.

11.5 Assessment of Impacts

The nearest noise sensitive locations are at least 450m from the site. The annual noise monitoring has confirmed that noise emissions from site activities do not exceed the daytime and night time limits set out in the EPA licence and planning permission and are not a cause of nuisance or impairment outside the site boundary. The proposed development will not result in any new sources of noise emissions.

11.6 Residual Impacts

The proposed development will have an on-going, imperceptible, neutral impact over its lifetime.

12 Landscape & Visual Impact

12.1 Receiving Environment

The facility is an area where the land cover use is industrial/commercial in an established and extensively developed industrial zone. It is not in an area designated as highly sensitive and is not overlooked by any designated views or prospect areas. The shape and mass of the existing buildings are similar to those of other commercial and industrial operators in the estate.

12.2 Impacts

The proposed development does not involve any change to either the appearance of the buildings, or the site layout.

12.3 Baseline Scenario

If the development does not proceed, the facility will continue to operate in its current layout, with no change to its external appearance.

12.4 Prevention & Mitigation Measures

As there will be no change to the external appearance of the site, prevention and mitigation measures are not required.

12.5 Assessment of Impacts

The proposed development will have no impact on the landscape.

12.6 Residual Impacts

The proposed development will have no residual impacts on the landscape.

13 Population & Human Health

13.1 Receiving Environment

Fingal's population is 296,214 persons, which equates to approximately 22% of the total population of Dublin. Fingal's share of the Dublin population has risen steadily since 1986, when it was just 14% and is projected to further increase.

13.2 Impacts

Traffic movements can, depending on the size, location and capacity of the local road network, be a cause of congestion that affects local residents. Vehicle exhaust gases can affect air quality with consequent implications for human health. While odours, noise and dusts do not present a direct risk to health, they can be a significant nuisance and cause of discomfort that indirectly affect human health.

The site is not in an area susceptible to natural disasters (earthquake, landslide, major flood events); however accidents with the potential to impact on the health of site staff and neighbours could occur. Panda has completed an accident impact assessment that identifies the plausible accidents that could occur and assesses the likely effects.

13.3 Baseline Scenario

If the development does not proceed, the facility will continue to operate in its current configuration with no change to the potential impacts on population and human health.

13.4 Prevention & Mitigation Measures

Panda implements the control measures specified in the EPA licence to ensure waste activities do not give rise to emissions that will be a cause of nuisance or impairment outside the facility boundary. The licence conditions also require the provision of mitigation measures, both infrastructural and procedural, that effectively minimise the risk of adverse impacts associated with major accidents.

13.5 Assessment of Impacts

The ambient air quality in the vicinity of the site is good and the routine monitoring carried out confirms dust, odours and noise emissions from the existing waste activities are not a cause of nuisance. The proposed development will not result in any new emissions with the exception of vehicle exhausts. The traffic associated with the additional waste intake will not will not contribute to increased traffic congestion in the vicinity of the installation.

13.6 Residual Impacts

The proposed development will have an on-going, imperceptible, negative impact on human beings.

14 Archaeology, Architecture & Cultural Heritage

14.1 Receiving Environment

There is no record of any archaeological or cultural heritage features within the site boundary and it is not in a designated Architectural Conservation Area.

14.2 Impacts

The proposed development will not involve any ground disturbance and therefore there is no risk of affecting any unidentified archaeological features.

14.3 Baseline Scenario

If the development does not proceed the facility will continue to operate and the potential for impacts on the cultural heritage will remain unchanged.

14.4 Prevention & Mitigation Measures

As the proposed development will not have any impact on any archaeological, architectural and cultural heritage feature, prevention and mitigation measures are not required.

14.5 Assessment of Impact

The development will have no impact on any known or unknown archaeological feature and no impact on any architectural, cultural heritage feature.

14.6 Residual Impacts

The development will no impact on any known/unknown cultural heritage feature.

15 Material Assets & Resource Consumption

15.1 Receiving Environment

The site is surrounded on all sites by commercial/industrial lots and an operational quarry. The local area does not have any significant amenity value for members of the general public.

15.2 Impacts

The development will not result in any impairment of amenity value and material assets. The development will contribute to sustaining employment levels at the facility and increasing waste recovery and recycling rates. It will result in an increase in electricity and diesel consumption.

15.3 Baseline Scenario

If the proposed development does not proceed, there will be no socio-economic benefit locally and no increase in natural resource consumption.

15.4 Prevention & Mitigation Measures

Panda implements the nuisance control measures specified in the EPA licence to prevent impacts on local amenities and also applies resource consumption control measures to minimise usage.

15.5 Impact Assessment

The current operations are not a source of adverse environmental nuisance and impairment of amenities outside the site boundary. They have not affected the progressive development of the area for commercial and industrial use. The proposed development will result in will be an increase in resource consumption (electricity and diesel), but will have a slight socio-economic benefit associated with maintaining local employment levels.

15.6 Residual Impacts

The development will have no impacts on amenity values and a slight socio-economic benefit in maintaining employment levels. It will have a slight negative impact in relation to resource consumption.

16 Interaction of the Foregoing

16.1 Population & Health/Air/Noise/Traffic

The proposed development has the potential to impact on human beings from noise, dust, odours and traffic. The proposed method of operation has taken account of these emissions and effective mitigation measures have been identified and are described in Chapters 4, 6, 10, 11 and 13.

16.2 Traffic/Climate/Materials Assets

The increase in traffic and electricity consumption associated with the proposed development will have will result in additional direct and indirect greenhouse gas emissions and the depletion of natural resources. The proposed method of operation has taken these changes into account and prevention and mitigation measures have been identified, as described in Chapters 4, 5, 6 and 15.

16.3 Cumulative Effects

The noise and ambient air quality surveys were conducted during typical operational hours and the assessments include the impacts of the emissions from the Panda facility and surrounding area and those associated with the proposed development. The traffic and transport assessment took into account the proposed expansion at the nearby Greenstar MRF in Millennium Business Park.

PREAMBLE

This Environmental Impact Assessment Report (EIAR) examines the potential impacts and significant effects on the environment of the proposal to increase the annual waste intake at the Starrus Eco Holdings Ltd (SEHL) materials recovery facility at Cappagh Road, Finglas, Dublin 11.

The information contained in the EIAR complies with the requirements of Article 5 (1)(a) to (e), Article 3(1)(a) to (e) and Annex IV of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive). The overall approach took into consideration the European Commission's *Guidance on the preparation of the Environmental Impact Assessment Report* and the Environmental Protection Agency's Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017).

The assessment of the effects on climate includes the implications for climate change. The biodiversity assessment incorporates an evaluation of the significance of effects on Natura 2000 Sites. The land and soils impact assessment addresses the implications for land take and land use requirements. The effects on population and human health, environment and cultural heritage takes into consideration the likely effects of major accidents and/or natural disasters.

The EIAR follows a grouped format structure, where each relevant topic is dealt with in a separate chapter that describes the baseline conditions (receiving environment), the direct and indirect significant impacts associated with the proposed activity, and the measures to avoid, prevent, reduce or, if possible, offset any identified significant adverse impacts, and assesses the effects and the residual impacts.

Chapter 4 is a detailed description of the proposed development. For the avoidance of repetition only those aspects of the development that are relevant to the particular topic are described in each Chapter. The methodologies applied in specialist surveys/assessments/ investigations are described in reports in the appendices and are not included in the main report.

Impacts were assessed in terms of the likely natural or physical changes to the environment resulting either directly, or indirectly from the proposed development taking into consideration a 'baseline'[2] scenario, cumulative effects and accidents. The assessment of cumulative effects took into consideration a planned future development of SEHL's waste management facility at Millennium Business Park, where it is proposed to increase the annual waste intake from 270,000 to 400,000 tonnes.

The significance of an impact was determined by a combination of objective (scientific) and subjective (social) concerns and the potential for the development to either have significant effect on an aspect of the environment that has been formally or systematically designated as being of importance, or to significantly alter the existing character of some aspects of the environment. The following objective criteria were used to determine significance:

- The magnitude and spatial extent of the impact;
- The nature of the impact;

[2] The was previously termed the 'do nothing' scenario

- The intensity and complexity of the impact;
- The probability of the impact;
- The expected onset, duration, frequency and reversibility of the impact;
- The accumulation of the impact, with those of other relevant existing and or/approved projects, and
- The possibility of effectively reducing the impact.

Impacts are, where possible, described in terms of quality, significance, probability, duration and type.

Quality: Positive, Neutral, Negative.

Significance: Imperceptible; Not Significant; Slight; Moderate; Significant; Very Significant, and Profound.

Extent & Context

Probability: Likely Effects; Unlikely Effects

Duration: Momentary seconds-minutes; Brief <1 day; Temporary <1 year; Short-term 1-7 years; Medium Term 7-15 years; Long Term 15-60 year; Permanent >60 years;

Type: Indirect; Cumulative; Do Nothing; Worst Case; Indeterminable; Irreversible; Residual and Synergistic.

The evaluation of the significance of an impact is based on current knowledge and the method of assessment.

Consultation

Starrus Eco Holdings Ltd held a pre-application consultation meeting with the Board on 25th January 2021 (Reference ABP-308740-20).

Project Team: Competent Experts

O'Callaghan Moran & Associates (OCM) were the prime consultants and, unless otherwise referenced, were responsible for the assessment of impacts. OCM has twenty three years' experience in the completion of environmental impact assessments for large scale waste management and industrial developments and has particular expertise geology, hydrogeology, hydrology, environmental risk assessment and waste management policy and regulation.

O'Callaghan Moran & Associates – Prime Consultants

Address: Unit 15
Melbourne Business Park
Model Farm Road
Cork T12 WR89
Telephone: 021 - 434 5366
E-mail: admin@ocallaghanmoran.com

McKenna & Associates – Site Layout Drawings & Elevations

Address: High Street
Trim
Co Meath
Telephone: 046 - 948 6788
E-mail: info@mckennaarchitecture.com

ORS – Traffic & Transport Assessment

Address: 2 Dublin Landings
North Wall Quay
North Dock
Dublin 1
D01 V4A3
Telephone: 01 -524 2060
Email: info@ors.ie

Noise & Vibrations Consultants Ltd-Noise Assessment

Address: Durhamstown
Bohermeen
Navan
Co. Meath
Telephone: 046-9073497
Email: boreilly1@eircom.net

Socotec- Air Emission Monitoring

Address: 2-4 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Scotland
Telephone: 01355-246730
Email: david.hay@socotec.com

Difficulties in Compiling the Required Information

OCM did not encounter any particular difficulties in compiling the required information.

1 INTRODUCTION

1.1 The Applicant

Starrus Eco Holdings Ltd (SEHL), trading as Panda, is part of the Beauparc Group which is the largest waste management company In Ireland and also a utility provider.

1.2 Site Overview

Panda opened the Cappagh Road facility in 2006 and it currently operates under planning permissions granted by Fingal County Council and an Industrial Emissions (IE) licence issued by the Environmental Protection Agency (EPA). These authorise the acceptance of 250,000 tonnes of non-hazardous municipal solid waste, commercial and industrial and construction and demolition waste.

The majority of the wastes are processed to recovery recyclable materials and to manufacture solid recovered fuel (SRF), while the remainder of the wastes is compacted/bulked up to facilitate transport to other authorised facilities for additional treatment.

The EPA licence specifies the infrastructural and operational controls that must implemented to ensue waste activities do not give rise to environmental pollution or nuisance/impairment of amenity outside the site boundary. A copy of the licence is in Appendix 1.

1.3 Proposed Development

It is proposed to increase the annual waste intake from 250,000 to 450,000 tonnes and to amend. permission FW19A/0145 to remove Condition 3b that limits the extended operational hours to 3 years from the final grant of permission. The development is required to accommodate the increasing amount of waste arising in the Eastern Midlands Waste Management Region and to allow Panda to increase its recycling and recovery capacity in support of circular economy initiatives it has already implemented and that are in the development stages.

The increased intake does not require either new buildings, or extensions to existing ones and does not involve any changes to the layout of external areas and drainage systems. The existing current staff complement and the existing plant and equipment have the capacity to process the additional wastes and additional staff numbers and processing equipment are not required. There development will not result in any material change to the emissions associated with the waste activities. A review of the IE licence is required.

2 PLANNING & WASTE MANAGEMENT POLICY

2.1 Introduction

This Chapter describes the site planning history, presents an overview of the relevant national and regional waste and planning policies and demonstrates how the proposed development is consistent with those policy objectives. It is based on the Fingal County Council Development Plan 2017-2023 (Development Plan); Fingal Local Economic Community Plan2106-2021 (LECP); National Waste Policy Statements and the Eastern Midlands Regional Waste Management Plan (2015-2021).

2.2 Planning History

Prior to development as a waste management facility the site had been used for agricultural purposes. In April 2006 permission (F05A/1156) was granted for Stage 1 - development of a building to process construction and demolition and commercial and industrial waste. The permission restricted the amount of wastes to 50,000 tonnes per annum because of the condition of the local road network.

In December 2007, permission (F07A/0954) was granted for Stage 2 - to construct a new building to process dry recyclable waste and increase the annual waste intake to 200,000 tonnes. In May 2014 permission (13A/0135) was granted for Stage 3 - construction of a new building to process municipal solid waste and increase the amount of waste accepted annually to 250,000 tonnes.

In June 2018, permission was granted (FW18A/0067) to extend the operational hours at the installation to 24 hours a day 7 days a week. The permission to extend operating hours was limited to 1 year from the date of grant of permission. In December 2019, permission was granted (FW19A/0145) to operate 24/7 for three years from date of grant of permission. In March 2021, permission was granted (FW20A/0037) to install roof mounted solar panels over two of the existing waste buildings.

2.3 Planning Policy & Land Use Zone

The site is in an area zoned 'GE' General Employment in the Development Plan and the objective is to provide opportunities for general enterprise and employment. The vision is to facilitate opportunities for compatible industry and general employment uses, logistics and warehousing activity in a good quality physical environment.

Waste disposal and recovery (excluding high impact) is a permitted use within a GE zoning and the relevant waste management policy objectives in the Development Plan are:

- WM 04. Facilitate the transition from a waste management economy to a green circular economy to enhance employment and increase the value recovery and recirculation of resources.

- WM 09: Promote increased recycling of waste in accordance with the Eastern Midlands Waste Management Plan 2015-2021, and

- WM 14: Promote the recovery (including recovery of energy) from waste in accordance with the Eastern Midlands Region Waste Management Plan 2015 – 2021

The Development Plan refers to Eastern Midlands Region Waste Management Plan 2015 -2021, whose overall vision is to rethink the approach taken towards managing waste and that waste should be seen as a valuable material resource. The Regional Plan also supports a move towards achieving a 'circular economy', which is essential if the region is to make better use of resources and become more resource efficient.

2.3.1 Fingal LECP

It is strategic policy (PIP5) to ensure, from environmental, business and public health needs, that waste management remains a priority for local authorities and waste management regions in continuing to invest in promoting and facilitating reuse and recycling by residential and commercial sources and that high standard options for treatment and final disposal of waste are available within the Greater Dublin Area.

2.4 Waste Management Policy

2.4.1 National Waste Management Policy

The foundation policy statement on waste management *"Changing Our Ways"* was published by the Department of the Environment and Local Government in September 1998. This statement firmly bases national policy on the EU Waste Management Hierarchy. In descending order, the current preference is: -

- Prevention;
- Preparing for Reuse;
- Recycling;
- Other Recovery (including energy recovery), and
- Disposal.

The 2002 policy statement *'Preventing and Recycling Waste - Delivering Change'* identified initiatives to achieve progress at the top of the Waste Hierarchy to prevent waste arising and increase recycling rates.

In '*Waste Management – Taking Stock and Moving Forward' 2004*, the significant improvement in recycling rates achieved since 1998 were recognised, but the need for further expansion was emphasised. The statement confirmed that Ireland's national policy approach remained *'grounded in the concept of integrated waste management, based on the internationally recognised waste hierarchy, designed to achieve, by 2013, the ambitious targets set out in Changing Our Ways'.*

In 2006, the National Biodegradable Waste Strategy was published. Its primary focus was to achieve the reduction targets set Landfill Directive (1999/31/EC) for the quantity of biodegradable municipal waste that can be landfilled. A key element is the collection and treatment of source separated household and commercial food waste, commonly referred to as "brown bin waste".

In 2008, the Government initiated a review of waste policy, to identify possible changes to policy at national level that would assist Ireland to move towards a sustainable resource and waste policy, including minimising the creation of waste and self-sufficiency in the reuse and recycling of materials. The review also addressed the application of alternative waste management technologies.

The EU Waste Framework Directive 2008/98/EC was introduced to co-ordinate waste management in Member States, with the objective of limiting the generation of waste and optimising the organisation of waste treatment and disposal. The Directive, which also established the first EU wide recycling targets, was transposed into Irish Law by the European Communities (Waste Directive) Regulations 2011 (S. I. No. 126 of 2011).

'A Resource Opportunity Waste Management Policy in Ireland', 2012, was also based on the EU Waste Management Hierarchy and encompassed a range of measures across all tiers namely, prevention and minimisation, reuse, recycling, recovery and disposal.

The Statement set out how the higher tiers of the Hierarchy can reduce Ireland's dependence on finite resources, virtually eliminate reliance on landfill and minimise the impact of waste management on the environment. It is a policy objective that when waste is generated the maximum value must be extracted from it by ensuring that it is reused, recycled or recovered.

In 2020, the government published its Waste Action Plan for a Circular Economy to inform and give direction to waste planning and management in Ireland over the coming years. It is an action focused for Ireland to embrace the opportunities in becoming a circular economy in the decade ahead.

While the thrust of the Plan is to prevent waste arising through reuse its objectives include ensuring that measures support sustainable economic models (for example by supporting the use of recycled over virgin materials.

The Plan promotes the development – for environmental and economic reasons – of adequate and appropriate treatment capacity at indigenous facilities to ensure that the full circularity and resource potential of materials is captured in Ireland.

Ireland has a number of targets under European waste legislation for specified waste types, including limiting the amount of municipal waste going to landfill to no more than 35% of amounts generated in 1995.

2.4.2 Waste Management Plan for the Eastern Midlands Region 2015-2021

The current Waste Management Plan for the Eastern Midlands Region 2015-2021 was published in May 2015 and remains in place until a new Regional Plan is made. It is policy to aim to improve regional and national self-sufficiency of waste management infrastructure for the reprocessing and recovery of particular waste streams in accordance with the proximity principle.

2.5 Circular Economy

The purpose of the European Commission's (Commission) Action Plan on the Circular Economy[3] is to transition the European Union (EU) to an economy where the value of products, materials and resources is maintained for as long as possible and the generation of waste minimised. This transition is essential to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy.

[3] https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF

The Commission recognises that recycling is a pre-condition for a circular economy, where resources and materials can be recycled, returned back to the economy and used again, meaning that what was once considered a waste can become a valuable resource.

To achieve this, materials at the end of their life cycle should be recovered through recycling and ideally reintroduced to the product lifecycle. These "secondary raw materials" can then be traded like primary raw materials.

2.6 Climate Change

In 2009, the EU Commission agreed a package of proposals to deliver on the EU's commitments to fight climate change and promote renewable energy up to 2020 and beyond. The package seeks to achieve a 20% reduction in total EU greenhouse gas emissions by 2020 (relative to 1990 levels) and, at the same time, to increase to 20% the amount of renewables in energy consumption.

The National Policy Position on Climate Action and Low Carbon Development (2014) recognised the threat that climate change poses for humanity and established a long-term national mitigation objective of low-carbon transition based on an aggregate reduction in carbon dioxide emissions of at least 80 % cent by 2050 compared with 1990 levels across the electricity generation, built environment and transport sectors.

The National Policy Position is the basis for the transition objective established in the Climate Action and Low Carbon Development Act 2015, which established the National Mitigation Plan (NMP) and the National Adaptation Framework (NAF) processes whose objectives are to address the causes and consequences of climate change in Ireland. The first NAF published in 2018 set out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts.

To meet the climate change objectives, it is essential that greenhouse gases emissions are reduced at a national level and the waste sector must contribute to this reduction. The diversion of biodegradable waste from landfill to composting reduces methane emissions, one of the most significant greenhouse gases. The use of combustible non-recyclable waste to manufacture SRF, which is an alternative to fossil fuel, also contributes to a reduction in greenhouse gas emissions as does the use of on-site renewable energy sources.

2.7 Compliance with Policy Objectives

The proposed development is consistent with current and proposed national and regional waste policy objectives, as it will increase the treatment capacity in the Eastern Midlands Region to get the maximum value from the waste and will contribute to the achievement and maintenance of national and regional recycling and recovery targets.

2.8 Need for the Development

Efforts to decouple waste generation from economic growth have not yet been successful and the economic recovery that started in 2014 has resulted in an increase in the quantities of waste arising.

The Eastern Midlands Regional Waste Management Plan estimates that the increase in municipal wastes (combined household and commercial) between 2012 and 2021 will be in the region of 2-3% annually. Growth at the higher rates presents a challenge to the region to ensure adequate collection and treatment capacity is required. Furthermore, the need to treat more of these wastes in the country in support of circular economy initiatives means that treatment capacity needs to increase above the projected rates, making the provision of capacity even more challenging.

To ensure that national and regional recovery and recycling targets are met, to minimise the amount of waste disposed to landfill and to roll out circular economy initiatives there is a need to increase indigenous waste treatment capacity.

Currently the national thermal waste treatment capacity cannot accommodate the volumes of refuse derived fuel (RDF) and SRF produced in the country and there is an on-going reliance on export to waste to energy recovery facilities in Europe. In the event of a disruption to either the national or overseas thermal treatment plants there is a need to provide temporary contingency storage for these fuels.

3 ALTERNATIVES EXAMINED

3.1 Introduction

This Chapter describes the reasonable alternatives to the proposed development that were considered, including site location, treatment technologies and configurations, and outlines the likely baseline scenario of the evolution of the current state of the environment without the implementation of the project.

3.2 Location

The facility location is well suited for the treatment of waste to maximise recovery and recycling rates for the following reasons:

- The waste recovery activities are compatible with the land zoning and the current land use in the surrounding area;
- The current planning permission and IE licence already authorise the acceptance and processing of wastes;
- The existing infrastructure can accommodate the proposed increase in the annual waste intake, and
- Existing ground conditions (soil type/geology/hydrology) and distances from sensitive environmental receptors minimise the risk of unexpected emissions giving rise to pollution.

The only alternative would be to acquire a new site, procure planning permission and an EPA licence and provide the required infrastructure. This offers no environmental and economic benefits compared to the continued operation of the existing facility.

3.3 Alternative Layout, Designs and Processes

The existing site layout and design comply with best practice and facilitate the implementation of effective mitigation measures.

3.4 Baseline (Do Nothing) Scenario

If the development does not proceed the existing facility will continue to operate in its current configuration, with no change to the associated emissions and environmental impacts.

4 FACILITY DESCRIPTION

4.1 Introduction

This Chapter describes the existing facility location, layout and method of operation and the proposed development. It discusses the emissions and details the control measures that are and will continue to be implemented. More information on the absorption capacity of the local environment, the emission control measures and an assessment of the impact of the emissions is presented in Chapters 5 to 15.

4.2 Site Location & Surrounding Land Use

The site is on Cappagh Road approximately 2.5km south-west of Dublin Airport (Figure 4.1). The surrounding land use is shown on Figure 4.2. The site is in an area that that has been extensively developed for industrial and commercial use and mineral extraction. Stadium Business Park is to the south, Rosemount Business Park to the south-west and to the north is Millennium Business Park.

The business parks are occupied by commercial activities including logistics companies, chemical distributors, light engineering, food distributors and cement manufacturers. The lands to the west are zoned for commercial use and Huntstown Quarry is to the east and north-east. The lot adjoining the northern site boundary is owned by Panda and is leased to a haulage company.

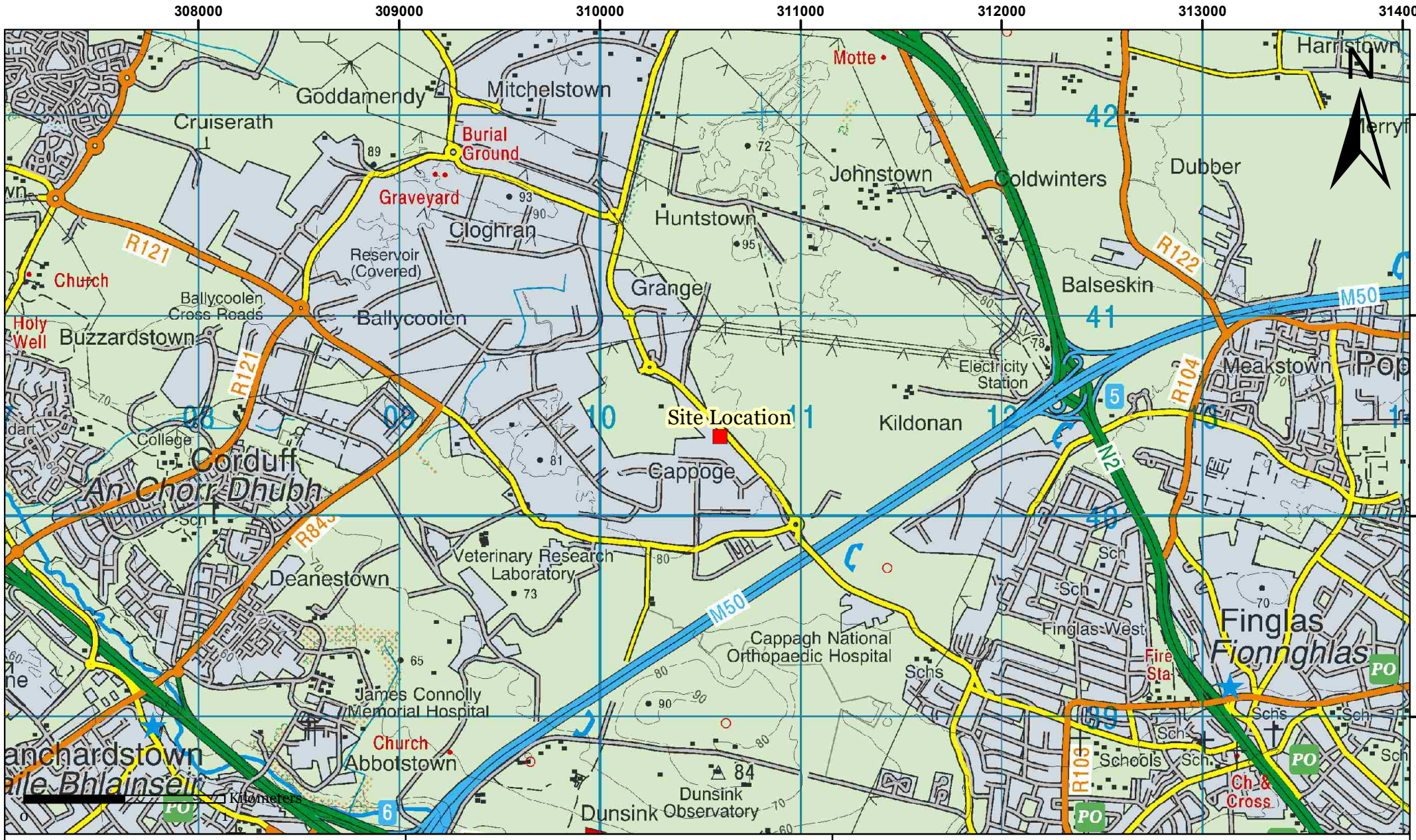
There is one vacant private residence located close to the facility, approximately 30m from the south-eastern boundary. This has been acquired by Panda and in March 2021 Fingal County Council made a decision to grant permission to redevelop the site as a public Civic Amenity Area (Ref FW20A/0096). There are ten residences (10 No) approximately 450 m to the south east, on the southern side of the Cappagh Road. These are the only private residences within 500m of the facility.

4.3 Site Layout

The site occupies 2.5 hectares (ha) and comprises three waste handling buildings (Building A1 -2,030 m^2; Building A2 - 2,800 m^2 and Building B1 - 4,088 m^2) an electrical substation, two weighbridges and office and associated control rooms, staff amenity building (100 m^2), fuel tanks and paved open yards.

4.4 Site Security

The site is surrounded by a wall and security fence. Access is via the front gate which is locked when the facility is closed. A CCTV surveillance system is provided and a static guard is on-site at night time, which means that there will be a rapid response to any emergency that occurs outside normal operational hours. The yard area lighting remains on throughout the hours of darkness.



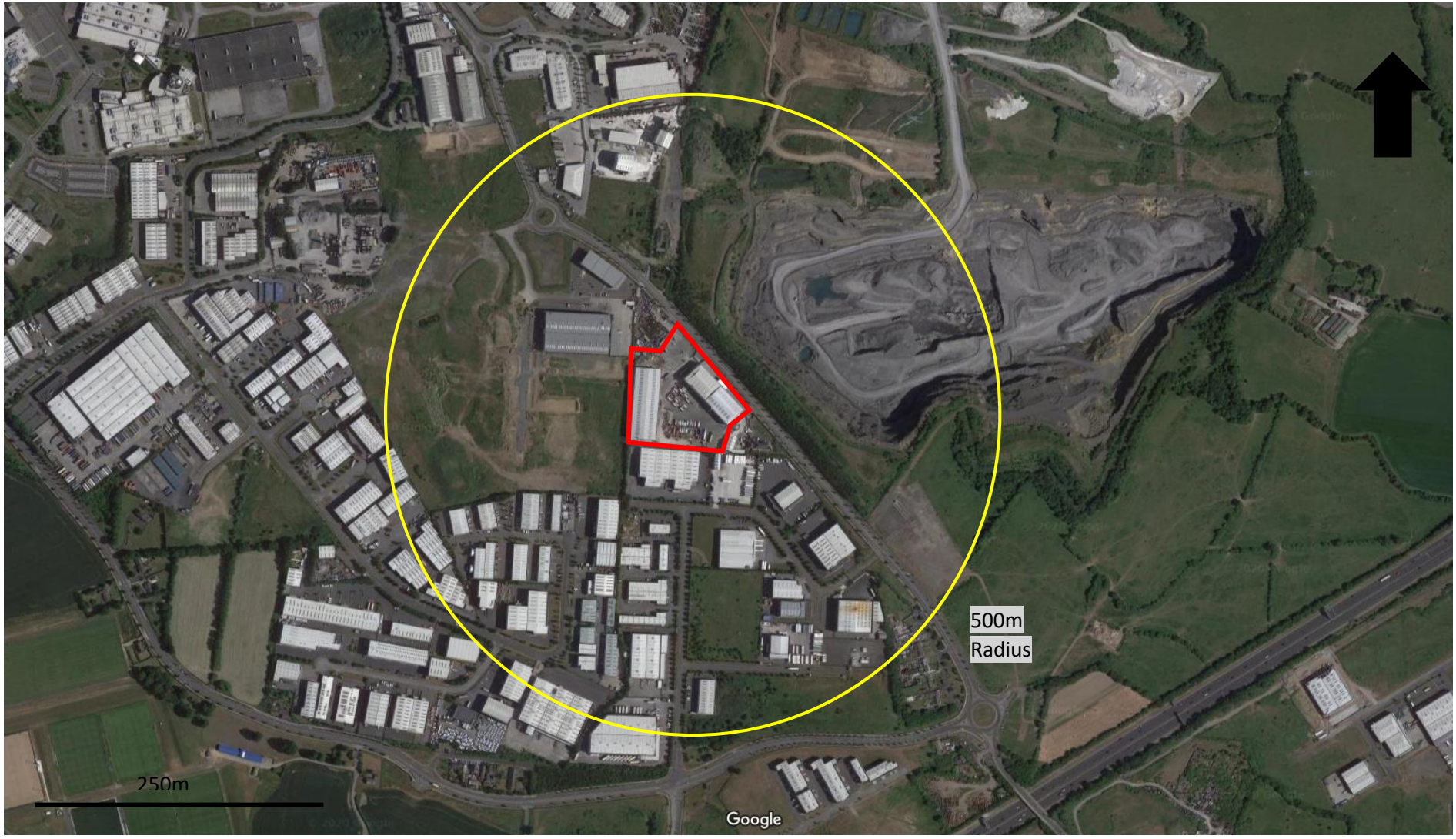
O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
email: info@ocallaghanmoran.com
Environmental Management for Business

CLIENT
Starrus Eco Holdings Ltd

TITLE
Site Location

Details:
Site Location

Figure 4.1



O'Callaghan Moran & Associates
environmental management for business
www.ocallaghanmoran.com

O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
Email: info@ocallaghanmoran.com

Title:

Figure 4.2 Surrounding Landuse

Legend

-Site Location

Client:

Starrus Eco Holdings Ltd.

4.5 Services

Electricity is supplied by a utility company and there is an electrical substation on-site. Water is obtained from an on-site well. Sanitary and sink wastewater is collected and stored in an underground tank (13.5m^3) outside the southern side of Building A1 pending removal off-site for treatment in a municipal wastewater treatment plant. Rainwater run-off from the buildings is collected and diverted to a rainwater harvesting system for use as 'grey water' in the welfare facilities and for dust suppression in the yards.

4.6 Drainage

4.6.1 Surface Water

Surplus rain water run-off from roofs and run-off from paved areas is collected in the surface water drainage system and directed to an attenuation tank in the south-east corner of the site. The tank has a capacity of 1,400m^3 and is connected to a Class 1 Full Retention Klargester Oil Interceptor.

The attenuation tank provides temporary storage of surface water and allows the discharge at a steady rate to the storm water sewer system serving the Stadium Business Park. The outflow from the tank is regulated by a hydrobrake, which has a maximum discharge rate of 6 litres/second (l/s).

The size of the attenuation tank is based on the run-off from an impermeable surface area (roof and paved yards) of 25,284 m^2 and the requirement to accommodate 1:100 year 6 hour rainfall event (60mm) that will generate 1,517.04m^3 of run-off. Assuming a continuous discharge rate of 6l/second, which equates to 129.6m^3 over the 6 hour period, the required storage capacity is 1387.44m^3.

4.6.2 Foul Water

The waste processing does not generate a wastewater. The floor of processing buildings are regularly cleaned by a road sweeper. There are two underground concrete holding tanks, each 13.5m^3 capacity, located at the entrances to Buildings A1 and A2 that collect any liquid seeps that occur inside the buildings. The contents are removed as required and sent to a municipal wastewater treatment plant.

4.7 Site Management

The Facility Manager, who has the appropriate training and experience as required under the IE Licence, is responsible for day-to-day facility operations. All facility personnel are provided with appropriate training and have the requisite qualifications and experience to complete their assigned tasks.

Panda implements an Integrated Management System (IMS) in accordance with the requirements of International Standard Organisation (ISO) 14001 Environmental Management System and Occupational Health and Safety Assessment Series (OHSAS) 18001:2007 and, at a site specific level has prepared and effectively implemented documented procedures and instructions in accordance with the requirements of both the OHSAS 18001:2007, ISO 14001 and the EPA licence.

4.8 Waste Types & Quantities

4.8.1 Existing

The EPA licence authorises the acceptance of non-hazardous domestic, commercial and industrial waste and construction and demolition waste. Currently Panda accepts source segregated cardboard, plastic and hangers, commercial and domestic dry mixed recyclables, residual mixed solid waste and biowaste (brown bin waste and expired packaged food waste). The actual amounts of each waste type accepted annual can vary once the total amount stays under 250,000 tonnes.

4.8.2 Proposed

The annual waste intake will increase to 450,000 tonnes; however there will be no change to the types of waste accepted.

4.9 Waste Acceptance Procedure

Panda has, in accordance with the EPA licence requirements, prepared documented waste acceptance procedures. Wastes are delivered by waste collectors that have up to date Waste Collection Permits and wastes are not accepted from members of the public. All deliveries arrive in fully covered containers/vehicles that are weighed in at the weighbridge and the accompanying documentation is checked. The driver is then directed to the waste intake areas in the appropriate building.

4.10 Waste Processes

Mixed dry recyclables are sorted into the different types and these are then baled and stored before being sent for further treatment. Source separated wastes are baled and also stored before being sent off-site. Processed mixed solid wastes are accepted from other waste pre-treatment facilities and these are treated to remove recyclables, with the residues then further processed to produce SRF. The SRF is sent to cement kilns where it is used as a replacement for fossil fuels.

Food waste (brown bin) and mixed household waste (black bin) that contains odorous materials are accepted and stored in a section of one of the buildings that is fitted with an odour control system. It is then sent to other waste management facilities for further treatment.

Out of date packaged food from commercial operators is accepted and stored pending transfer to other treatment plants where the packaging is removed. This activity is authorised by the Department of Agriculture, Food and Marine under the Animal By-Products Regulations. Panda is awaiting approval from the Department to set up a depackaging plant in the building fitted with the odour control system. This will allow Panda to send the depackaged materials directly to biological treatment plants (e.g. composting).

4.11 Plant & Equipment

The plant and equipment used at the installation include; balers, shredders, screeners, eddy current separators, magnets, optical sorter, density separators, forklifts, mechanical grabs and loading shovels.

4.12 Oil & Chemical Storage

Diesel and gas oil are stored in above ground steel tanks located in a steel bund adjacent to Building B1. Drums of engine and hydraulic oil are stored on bunded pallets.

4.13 Waste Generation

The welfare facilities and office generate small amounts of food waste, plastic and paper. These are collected and processed onsite.

4.14 Emissions

4.14.1 Surface Water

Surplus rainwater run-off from the building roofs and run-off from the yards discharges to the storm water sewer serving Stadium Business Park.

4.14.2 Foul Sewer

There is no discharge to foul sewer. Sanitary waste water is collected in an underground storage tank that is emptied regularly.

4.14.3 Noise

Vehicle movements in and out of the site are sources of noise; however these activities are part of the normal activities in the area and prevention and mitigation measures are not required. Panda has a policy of not allowing engine idling within the site.

4.14.4 Air

With the exception of the stack on the odour control system, there are no fixed point emission sources associated with operations. Potential fugitive emissions include dust, vehicle exhausts and odours.

The primary source of dust emissions is the waste processing, all of which is and will continue to be located inside the buildings. Secondary sources are vehicle movements on the paved yards during dry periods.

Vehicle exhausts contain a range of compounds that affect air quality, for example carbon monoxide, methane, carbon dioxide, and particulates. Odours are associated with the types of wastes accepted, the type of processing carried out and the time the wastes are retained on site. The only wastes accepted at the facility that are a significant source of malodours are the food waste and residual mixed waste.

4.14.5 Ground & Groundwater

There are no direct or indirect emissions to ground and groundwater.

4.15 Emission Controls

4.15.1 Surface Water

There is a shut off valve in the attenuation tank that can be closed in the event of an incident, for example a fire that has the potential to contaminate the rainwater run-off.

4.15.2 Noise

Panda implements the control measures specified in the licence that are designed to ensure waste activities do not give rise to noise emissions that will be a cause of nuisance or impairment outside the facility boundary.

4.15.3 Air

Waste processing is and will continue to be located inside the buildings. Panda cleans the yard and building floors regularly using a road sweeper and damps down the yard using hoses in dry periods.

The diesel fuelled heavy goods vehicles based at the facility are fitted with Selective Catalytic Reduction (SCR) systems. A diesel fuel additive (AdBlue) is used in the SCR to reduce the nitrous oxide levels in the exhaust gases.

The only wastes accepted at the facility that are a significant source of malodours are the mixed solid waste and brown bin waste, which are handled and stored in the section of Building A 2. The expired food depackaging unit will also be located in this area. This section of the building is fitted with an odour control unit (OCU) designed to maintain the section under negative pressure and collect and treat the air using an activated carbon filter. The detailed design of the OCU was agreed with the EPA before it is installed and commissioned.

Prior to the installation of the system the inside to the building was cleaned and a thick foam spray will be applied to all cladding joints and other parts of the building fabric that could be susceptible to air leaks. Rapid action doors were fitted to the vehicle access points. The objective was to achieve an air leakage rate of < $2m^3/m^2$/hour

Air is drawn from the building using one extraction fan and a system of roof mounted ducts provided with grills. The 75KW fan also has a flow capacity of 50,000m^3/hour, which achieves 2 No air changes per hour. The air passes through a through a jet pulse dust filter before entering the carbon unit. A damper is fitted to the inlet of the unit to allow the air flow to be balanced. The treated air vents to atmosphere via a single 14m high stack. The exhaust odour threshold concentration is less than 460 odour units (OuE/m^3).

4.16 Nuisance Control

Panda implements the nuisance control measures specified in the EPA licence to mitigate the impacts of noise, dust, litter and odours and minimise the risk of site activities being a source of nuisance to neighbours and members of the general public. Panda has prepared an Odour Management Plan (OMP) for waste handling operations that identifies the operational and control measures required to effectively manage and control for normal and abnormal conditions.

4.17 Environmental Monitoring

Environmental monitoring is carried out in accordance with Condition 6 and Schedule C of the EPA licence and includes the collection and analysis of the discharge to the storm sewer, dust deposition monitoring, a noise survey and monitoring of the emissions from the odour control system stack.

4.18 Safety and Hazard Control

Panda has adopted an Accident Prevention Policy and has prepared a Safety Statement for the site that makes provision for hazard identification and risk assessment. All personnel and visitors are obliged to comply with site guidelines regarding access to and from the facility and on-site traffic movement. All site personnel are provided with and are obliged to wear, personal protective equipment (PPE) appropriate for their particular functions. PPE includes facemasks, gloves, safety glasses, steel-toed footwear, overalls, reflective jackets and helmets.

4.19 Accidents and Emergencies

An emergency is an accident/incident that has the potential to result in harm to human health, damage to off-site assets and give rise to environmental pollution. The EPA licence requires Panda to prepare an Accident Prevention Policy and an Emergency Response Procedure (ERP) and ensure that all staff are made aware of their requirements.

The APP addresses all potential hazards, with particular reference to the prevention of accidents that may cause damage to the environment. The ERP identifies all potential hazards at the site that may cause damage to the environment and also specifies roles, responsibilities and actions required to deal quickly and efficiently with all foreseeable major incidents and to minimise environmental impacts.

Panda has documented procedure on the handling and storage of potentially polluting substances used at the facility, e.g. oils and the filling of tanks and mobile plant. The procedure describes how filling the fuel storage tanks and refuelling/servicing the mobile plant should be carried out to minimise the risk of accidental spills and ensure that if these occur there is a rapid and effective response.

Panda has completed a site specific fire risk assessment and prepared a Procedure on Fire Prevention and Detection that takes into consideration the Agency's Guidance Note on Fire Safety at Non Hazardous Waste Sites and the UK Environment Agency's Technical Guidance Note TGN7-01 Reducing Fire Risk at Sites Storing Combustible Materials.

Building B1, which presents the highest risk of fire, is provided with fire detection and protection system that identifies specific areas at risk and suppresses the risk of fire at the early stages of combustion. It include high resolution focus thermal imaging cameras combined with remote controlled foam suppression cannons.

A 150mm ring main has been installed and is connected to the Irish Water mains on the Cappagh Road. There are three hydrants and these have been tested by the Dublin Fire Service. A reel type fire hose is located at each door in the buildings and fire extinguishers are provided at strategic locations.

Recent amendments to Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive) requires an EIA of a proposed development to take into consideration the effects of a major accident and natural disasters.

Panda has, as required by the EPA licence, completed an environmental liability risk assessment (ELRA) that assesses the environmental effects, including impacts on humans, of foreseeable incidents and accidents. This forms the basis for the completion of an Accident Impact Assessment that identified the major accidents and natural disasters that could occur and assess the impacts on humans, the environment and cultural heritage. The Accident Impact Assessment Report is in Appendix 2.

5 CLIMATE

5.1 Introduction

This Chapter describes the climate at the site and the effects the proposed development will have on it, including a 'baseline' scenario. It identifies the prevention and mitigation measures that are and will be implemented to reduce the significance of the impacts and assesses the residual impacts.

5.2 Methodology

The assessment was based on Met Eireann data for monitoring station at Dublin Airport[4], which is approximately 2.5km to the north-east of the site, and took into consideration Ireland's Greenhouse Gas Emissions Projections 2018 -2040 published by the EPA (2019). The EPA is the responsible authority for reporting on climate change.

Greenhouse gas emission projections are a valuable analytical tool to inform how Ireland will comply with 2020 targets under the EU Effort Sharing Decision[5]. The EPA prepares the projections annually, in collaboration with relevant State and other bodies, to ensure consistency with economic forecasts and with projected activity in relevant sectors including energy, agriculture and industry.

5.3 Receiving Environment

An assessment of the climate of a region or site is based on records over long periods of time of meteorological variables including temperature, humidity, barometric pressure, wind and precipitation. Climates are typically described using averages of the different variables, most commonly temperature and precipitation.

The average rainfall, temperature, humidity and wind speed and direction for the Meteorological Station at Dublin Airport is presented in Table 5.1. The average annual rainfall is 733 mm and the mean daily temperature 9.6°C, so the climate at the site can be described as mild and wet.

A microclimate is a localised set of atmospheric conditions that differs from those in the surrounding areas, usually with a slight difference but occasionally with a substantial one. In urban areas the primary influencing factors are buildings and paving, but aspect and slope are also important. The site itself is in an urban area; however it is relative flat, so the likelihood of a unique specific microclimate is very low.

[4] "Contains Met Éireann Data licensed under a Creative Commons Attribution-ShareAlike 4.0 International licence"
[5] Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020

Table 5.1 Meteorological Data: Dublin Airport

Rainfall –	
Annual average	732.7 mm
Average maximum month (Dec)	75.6 mm
Average minimum month (July)	49.9 mm
Temperature	
Annual Average	9.6°C
Average maximum month (July)	18.9°C
Average minimum month(Feb)	2.5°C
Relative Humidity	
Mean at 0900UTC	82%
Mean at 1500UTC	72%
Wind (Knots)	
Frequency of calms	2.2%
Prevailing direction	South West
Prevailing sector	South West

5.4 Impacts

It is now internationally accepted there is a link between direct and indirect greenhouse gas emissions and climate change. Direct emissions from waste management facilities are associated with on-site processing and off-site electricity power generation, while indirect emissions are linked to the vehicles transferring wastes to and from the site and staff transport.

A development may have an influence on global climate where it represents "a significant proportion of the national contribution to greenhouse gases". Based on the nature and size of the proposed development, greenhouse gas emissions will not be significant in terms of the national emissions and Ireland's agreed limits under Kyoto Protocol. Thus the development will not affect the global climate.

Under the EU Effort Sharing Decision Ireland's 2020 target is to achieve a 20% reduction of non–Emissions Trading Scheme (ETS) sector emissions (i.e. agriculture, transport, residential, commercial, non-energy intensive industry and waste) compared to 2005 levels. Agriculture and transport dominate non-ETS sector emissions accounting for 75% and 80% of emissions in 2020 and 2030 respectively. The waste sector is a relatively minor source of greenhouse gases, estimated at 1.5% of Ireland's total greenhouse gases in 2017[6].

The EPA's Greenhouse Gas Emissions Projection Emissions 2019-2040 report provides an updated assessment of Ireland's total projected greenhouse gas emissions out to 2040 and includes an assessment of progress towards achieving its emission reduction targets out to 2020 and 2030 set under

[6] https://www.dccae.gov.ie/documents/Climate%20Action%20Plan%202019.pdf

the EU Effort Sharing Decision (Decision No 406/2009/EU) and Effort Sharing Regulation (Regulation (EU) 2018/842).

The EPA projects[7] that by 2020 non-ETS sector emissions will be 2% to 4% below 2005 levels under the With Existing Measures and With Additional Measures scenarios, respectively. Agriculture Transport and Energy dominate non-ETS sector emissions accounting for 32.6%, 19.8% and 18.7% respectively. In 2030, the contribution from Agriculture, Transport and Energy Industries is projected to change to 38.7%, 16.2% and 15% respectively.

Emissions from agriculture and transport are key determinants in meeting the targets and emissions from both sectors are projected to increase up to 2020. However, emissions from the waste sector are projected to decrease by 33.6% by 2030, primarily due to the reduction in the quantities of waste disposed to landfill.

5.5 Baseline Scenario

If the development does not proceed there will be no increase in direct and indirect greenhouse gas emissions from the additional electricity and diesel consumption associated with the increased waste processing and traffic.

5.6 Prevention & Mitigation Measures

Waste processing requires significant energy inputs and energy costs are a significant component of the business overheads. Condition 7 of the EPA licence requires Panda to carry out an energy audit to identify all practicable opportunities for energy use reduction and efficiency.

Panda is committed to complying with the requirements of the European Commission's Reference Document on Best Available Techniques (BAT) for Energy Efficiency, and takes the BAT conclusions on energy efficiency into account at the detailed design and procurement stage for new plant and equipment.

Panda is part of the Beauparc Group which includes Panda Power a renewable energy provider and who supplies the electricity to the facility. Panda has been granted planning permission to install roof mounted solar panels on two of the building roofs, which when installed will increase its use of renewable power sources.

Diesel fuelled plant engines are only turned on when wastes are being processed and Panda has a policy of not allowing engine idling. This also applies to waste transport vehicles serving the facility.

5.7 Assessment of Impacts

All greenhouse gas emissions, regardless of the source, contribute to a cumulative negative environmental effect unless offset by mitigation or compensatory measures.

[7] https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/2020-EPA-Greenhouse-Gas-Emissions-Projections_final.pdf

The proposed development will result in additional direct and indirect emissions associated with the increased electricity and diesel consumption. This will be somewhat off-site by increasing the diversion rate of biodegradable waste to landfill, expanding the production of SRF and the installation of the roof mounted solar panels.

5.8 Residual Impacts

The proposed development will have an on-going imperceptible, negative, impact on climate.

6 TRAFFIC & TRANSPORT

6.1 Introduction

This Chapter describes the existing road network and traffic conditions and the impacts of the proposed development, including a 'baseline' scenario. It identifies the prevention and mitigation measures that are and will be implemented to reduce the significance of the impacts and assesses the residual impacts.

6.2 Methodology

The assessment is based on a Traffic & Transport Assessment prepared by ORS, a copy of which is in Appendix 3. The ORS report provides details on the methodology applied in the assessment. The assessment took into consideration the proposed expansion of the annual waste acceptance rate at the nearby SEHL waste management facility in Millennium Business Park where it is proposed to increase the annual intake from 270,000 tonnes to 450,000 tonnes

6.3 Receiving Environment

6.3.1 Regional and Local Road Network

The site is accessed directly from the Cappagh Road.

6.3.2 Existing Traffic Generation

An assessment of the traffic generation characteristics of the existing operation was based on a 24 hour manual classified traffic count completed on 11th March 2020 at six junctions in the vicinity of the installation agreed in advance with the planning authority, which are:

Site 1 – Greenstar Facility access road junction
Site 2 – Millennium Business Park – Cappagh Road roundabout junction
Site 3 – Huntstown Business Park – Cappagh Road roundabout junction
Site 4 – Panda Facility access road junction
Site 5 – Cappagh Road – Mitchelstown Road roundabout junction
Site 6 – Cappagh Road – Ballycoolin Road roundabout junction.

The time periods assessed included the morning peak period (08.00 – 09.00), the evening peak period (17.00 – 18.00) and at the site access locations during the lunchtime period (12.00 – 13.00).

The Peak morning traffic at site 1 (Greenstar facility access road junction) occurs between 9am and 10am. At all other junctions, peak morning traffic occurs between 8am and 9am. The peak evening traffic occurs between 5pm and 6pm at all junctions.

At the Panda access junction (Site 4) the total traffic through the junction over 24 hours was 8,129 passenger car units (PCU), with 678 PCU arriving at the facility and 672 PCU departing. Peak hourly traffic occurred between 12am and 1pm, with 548 PCU recorded through the junction and 141 PCU

recorded travelling to and from the facility. However, traffic to and from the site between 8am and 9am was lower, at 63 PCU, while between 5pm and 6pm the number was 51 PCU.

6.4 Impacts

The proposed development will increase the annual waste intake from 250,000 to 450,000 tonnes per annum. This will result in an 80% increase in the number of heavy goods vehicles (HGV) accessing the facility. ORS concluded that the majority of the access roads currently operate below capacity and will continue to do so should the development proceed. The roundabout between the Cappagh Road and Mitchelstown Road (Site 5) (to the north of the site) is already under pressure from existing traffic flows, and will be above capacity in future regardless of the expansion.

6.5 Baseline Scenario

If the development does not go ahead, the junctions will continue to operate as currently and the roundabout at Site 5 will remain under pressure and reach capacity in the near future.

6.6 Prevention & Mitigation Measures

As the proposed development will have no significant adverse impacts on the road networks, prevention and mitigations measures are not required.

6.7 Assessment of Impacts

All six junctions were modelled using Junctions 9 software with existing traffic flows obtained from traffic counts and the predicted increase in traffic.

Site 4, Panda access road junction, was modelled using PICADY software for priority T-junctions for 3 time periods – AM peak, Mid-day peak and PM peak. The maximum capacity RFC value of 0.304 occurred at the midday peak in design year 2035, with all traffic, including expansion traffic, factored for growth using TII's Dublin Metropolitan Area High Sensitivity Factors for HGVs to obtain a conservative overview.

Sites 1, 2, 3, 5 and 6 were modelled using ARCADY software for roundabouts using growth factors for Dublin Metropolitan Area High Sensitivity Factor for HGV's to obtain a conservative overview for future design years. Sites 1, 2 and 3 will operate well below capacity for all future design years tested.

Sites 5 and 6 showed indications of capacity issues under the conservative assessment and therefore were modelled using the TII's Dublin Metropolitan Area Central Sensitivity Factors for cars and applying growth factors to existing traffic only. Site 6 shows a maximum RFC of 0.83 during the AM peak in design year 2035, indicating that the junction will continue to function below capacity for all future design years.

Site 5 modelling, however, indicates that the junction is already under significant pressure, with Arm B towards Kilshane operating at RFC of 0.96 at the AM peak under existing traffic flows. This will increase to 1.02 with traffic from the proposed expansions. Arm D Mitchelstown Road will also exceed recommended RFC of 0.85 by 2025.

The total traffic throughput at Site 5 was 1,535 PCU during the AM peak hour, with 649 PCU arriving at the junction from Arm B (Kilshane). Additional traffic arriving from Arm B due to expansions at the Panda and Greenstar sites at the AM peak amounts to just 21 PCU, an increase of 3.2%; while the total traffic through the junction at the AM peak from Panda and Greenstar expansions amounts to a total of 80 vehicles, an increase of 5.2%.

During the PM peak hour, Arm D (Mitchelstown Road) is currently operating at RFC of 0.72, rising to 0.76 with expansion traffic. However, future growth of existing traffic will approach the recommended RFC of 0.85 in 2025 without expansion traffic, and will approach full capacity RFC of 1.0 in 2035.

It is noteworthy that much of the traffic in the area should not be subject to growth factors and therefore future year modelling may overstate potential capacity issues – for example, existing Panda and Greenstar traffic has been factored for future growth, even though traffic will be limited by the authorised waste management capacity. Many facilities in the area operate under similar provisions.

6.8 Residual Impacts

The proposed development will, in conjunction with the development at the Greenstar facility, have an on-going, slight, negative impact on the local road network.

7 LAND & GEOLOGY

7.1 Introduction

This Chapter describes the land and geology at the facility and the impacts the proposed development will have on the land and geology within the development boundary, including a 'baseline' scenario. It identifies the prevention and mitigation measures that are and will be implemented to reduce the significance of the impacts and assesses the residual impacts.

7.2 Methodology

The assessment was based on information derived from an Environmental Impact Statement (EIS) prepared in 2013 (13A/0135); a desk study of databases maintained by the Geological Survey of Ireland (GSI), EPA and Teagasc, and the findings of a site investigation completed in 2005. It took into consideration the Institute of Geologists of Ireland (IGI) 'Guidelines for the Preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements' (2013) and the EPA guidelines described in the Introduction.

Given the available information on the ground conditions and, as the site has already been extensively developed and the proposed development does not involve either any land take outside the existing site boundary, or construction works/ground disturbance, a site investigation was not required.

7.3 Receiving Environment

7.3.1 Soils& Geology

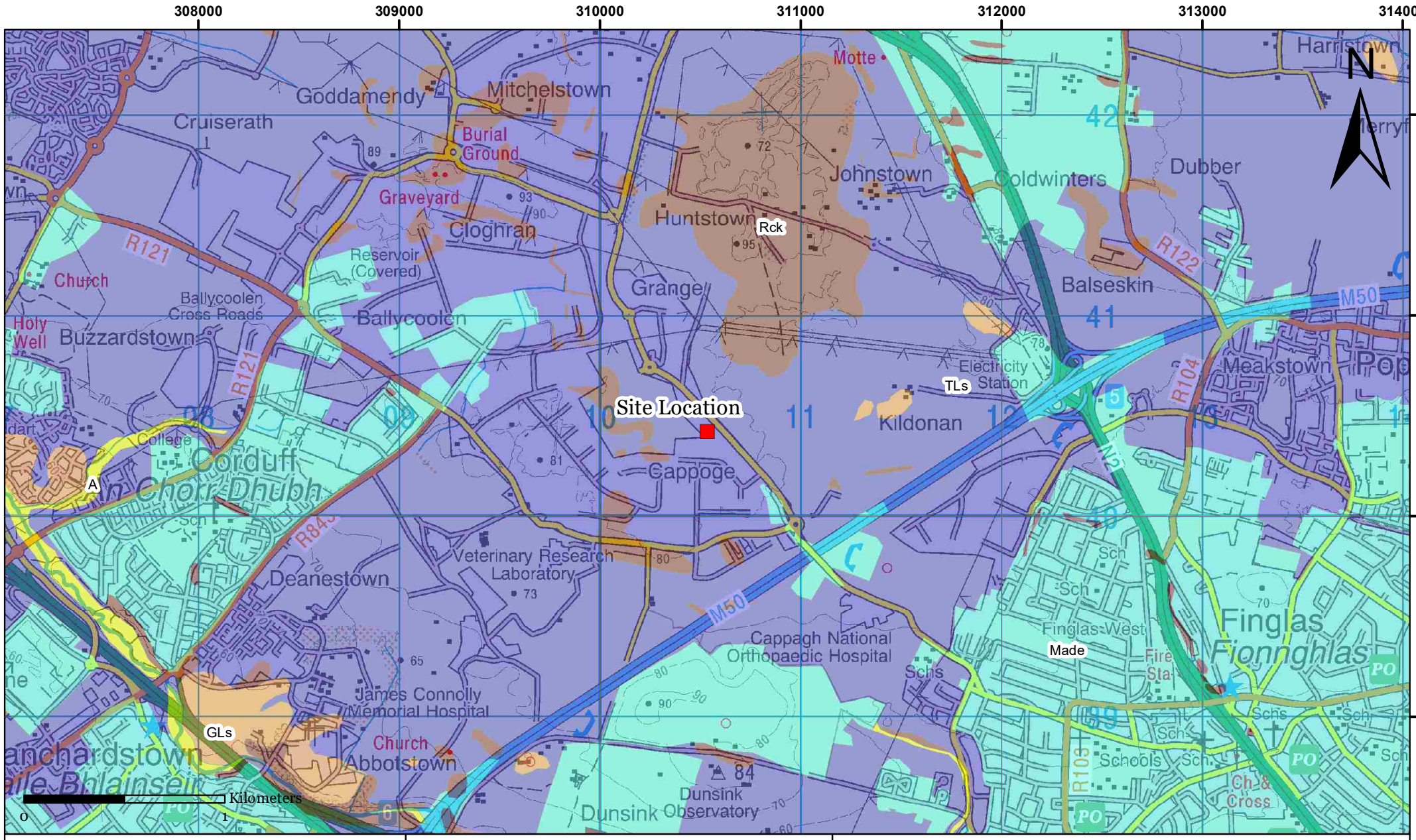
The soil distribution is shown on Figure 7.1. The site is mostly covered with buildings and paving. The subsoils beneath the site are between 1.3 and 8.45 m thick and comprise sandy gravelly boulder clays. The bedrock belongs to the Boston Hill Formation and comprises nodular and muddy limestones and shale (Figure 7.2).

7.3.2 Land Use

The site occupies 2.5 hectares (ha) and, with the exception of a narrow landscape at the road frontage is entirely covered by buildings and paved yards.

7.4 Impacts

There will be no direct or indirect emissions to ground, but there is the potential for accidental spills and oil leaks from the mobile plant to occur at the ground surface and for contaminated firewater run-off to infiltrate to ground in the event of a fire.



O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
email: info@ocallaghanmoran.com
Environmental Management for Business

CLIENT

Starrus Eco Holdings Ltd

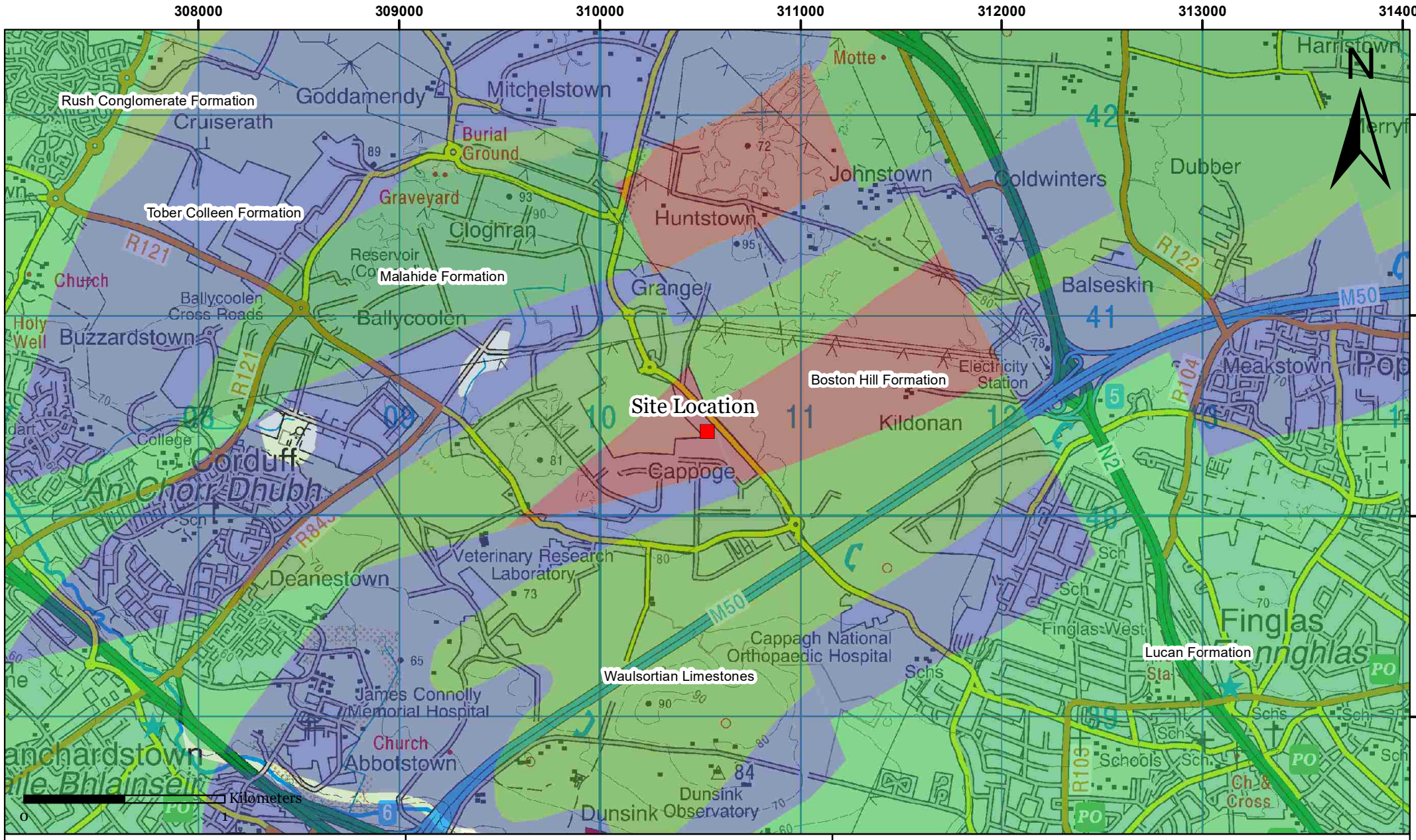
TITLE

Subsoils

Details:

- Site Location
- A - Alluvium undifferentiated
- GLs - Limestone sands and gravels (Carboniferous)
- Made - Made Ground
- Rck - Bedrock at surface
- TLs - Limestone till (Carboniferous)

Figure 7.1



O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
email: info@ocallaghanmoran.com
Environmental Management for Business

CLIENT

Starrus Eco Holdings Ltd

TITLE

Bedrock Geology

Details:

- Site Location
- Boston Hill Formation - Nodular & Muddy Limestone and Shale
- Lucan Formation - Dark Limestone and Shale
- Malahide Formation - Argillaceous, Bioclastic, Limestone, Shale
- Rush Conglomerate Formation - Conglomerate, Shale, Limestone
- Tober Colleen Formation - Calcareous Shale, Limestone Conglomerate
- Waulsortian Limestones - Massive, Unbedded Lime-Mudstone

Figure 7.2

7.5 Baseline Scenario

If the proposed development does not proceed current operations will continue, with no change to the potential impact on land and geology from the on-going operations.

7.6 Prevention & Mitigation Measures

The current EPA licence requires the regular inspection and repair as required of the paved areas; the routine inspection of all containment areas and underground pipes to ensure they continues to be fit for purpose and do not leak, the adoption of an emergency response procedure, and staff training on appropriate spill response actions.

7.7 Assessment of Impacts

The development will not result in any land take. At present there are no direct or indirect emissions to ground and the proposed change will not give rise to any new emissions. The proposed development will have no impact on land and geology.

7.8 Residual Impacts

The proposed development will have no impact on land and soil.

8 WATER

8.1 Introduction

This Chapter describes the surface water and the groundwater conditions at the site and the impacts that the proposed development will have on the receiving environment within and outside the site boundary, including a 'baseline' scenario. It identifies the prevention and mitigation measures that are and will continue to be implemented to reduce the significance of the impacts and assesses the residual impacts.

8.2 Methodology

The assessment was based on information on water derived from the 2013 EIS, a review of the Eastern Region River Basin District (ERBD) Management Plan and the results of surface water and groundwater monitoring carried out by Panda in compliance with the EPA licence conditions. It took into consideration the IGI guidance referred to in Section 7.2 and, as the proposed development will not involve any ground disturbance or any new emissions to ground or surface water, additional surveys were not required.

8.3 Receiving Environment

8.3.1 Hydrology

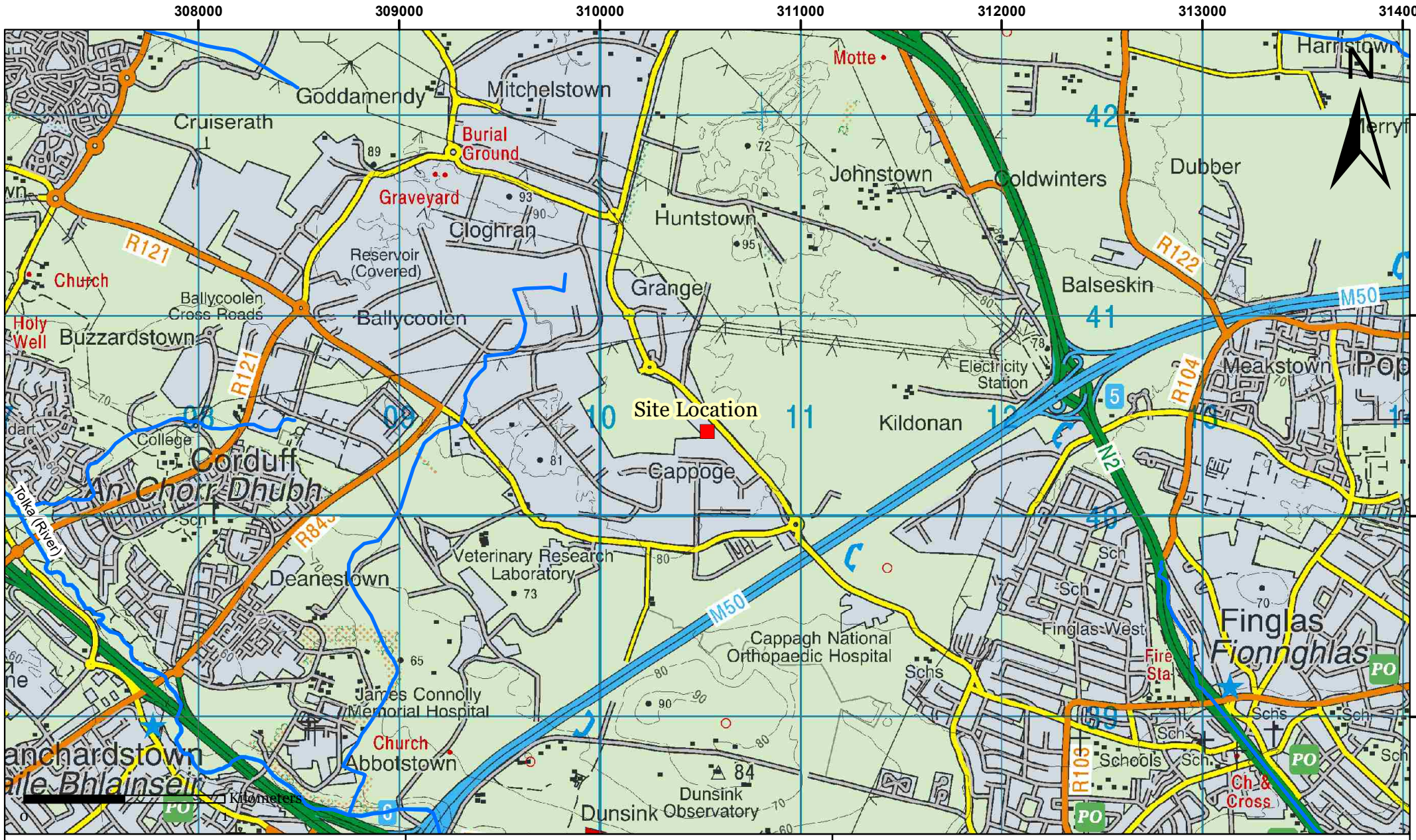
The regional drainage pattern is shown on Figure 8.1. The site lies within the catchment of the Tolka River, which is approximately 2.1 kilometres to the south-west and south of the site. There are no significant streams or water courses either at the site, or in the surrounding lands.

The Tolka River (IE_EA_09_109) is part of the IE_EA_Liffey Water Management Unit (WMU) designated in the ERBD Management Plan prepared under the EU Water Framework Directive (WFD). The WMU comprises various Water Bodies and the site is in the Tolka River Water Body.

Reports have been prepared on the 'Status' of each water body. Status means the condition of the water in a watercourse and is defined by its ecological and chemical status, whichever is worse. Water bodies are ranked in one of five classes, High, Good, Moderate, Poor and Bad. The WFD requires measures to ensure waters achieve at least 'Good Status' by 2015 and that their current status does not deteriorate. Where necessary, for example in heavily impacted or modified watercourses, extended deadlines (2021 and 2027) can be set for achieving the following objectives:

- Prevent Deterioration
- Restore Good Status
- Reduce Chemical Pollution
- Achieve Protected Areas Objectives

The objectives for particular watercourses are based on Pressure and Impact Assessments of human activity, including point and diffuse emissions, land use and morphological conditions on surface waters to identify those water bodies that are 'At Risk' of failing to meet the WFD objectives.



O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
email: info@ocallaghanmoran.com
Environmental Management for Business

CLIENT

Starrus Eco Holding Ltd

TITLE

Hydrology

Details:

Site Location

Rivers

Figure 8.1

The Tolka Water Body Status Report states that the overall status is 'Moderate', and is considered 'At Risk' of not achieving its restoration objective of at least 'Good' status by 2027.

8.3.1.1 Water Quality

There is one surface water discharge from the installation which is monitored weekly. There are no emission limit values set in the EPA Licence, but trigger levels have been set following the guidance set out in the Agency's Document 'Guidance for the Setting of Trigger Values for Stormwater Discharges to Off-Site Surface Waters at IPPC and Waste Licensed Facilities' (2012).

The purpose of the trigger levels is to identify a deterioration in water quality at an early stage so as to allow effective remedial actions to be taken. The results of the monitoring completed in 2019 and 2020 are in Appendix 4. The quality of the run-off is good and the trigger levels were not exceeded.

8.3.1.2 Flood Risk.

The National Preliminary Flood Risk Assessment (PFRA) was reviewed to determine the risk of flooding of the site. The flood extent maps were produced for various flood events of a given probability of occurrence. These are the 10%, 1% and 0.1% annual exceedance probability (AEP) events for fluvial flooding, which are equivalent to the 1 in 10, 1 in 100 and 1 in 1,000 year flood events respectively. The site is not located on or near a flood risk zone.

The site's storm water drainage system is designed to accommodate the run-off from a 1:100 return storm within the site and control the flow from the site to the Stadium Business Park storm sewer at 6 litres/second.

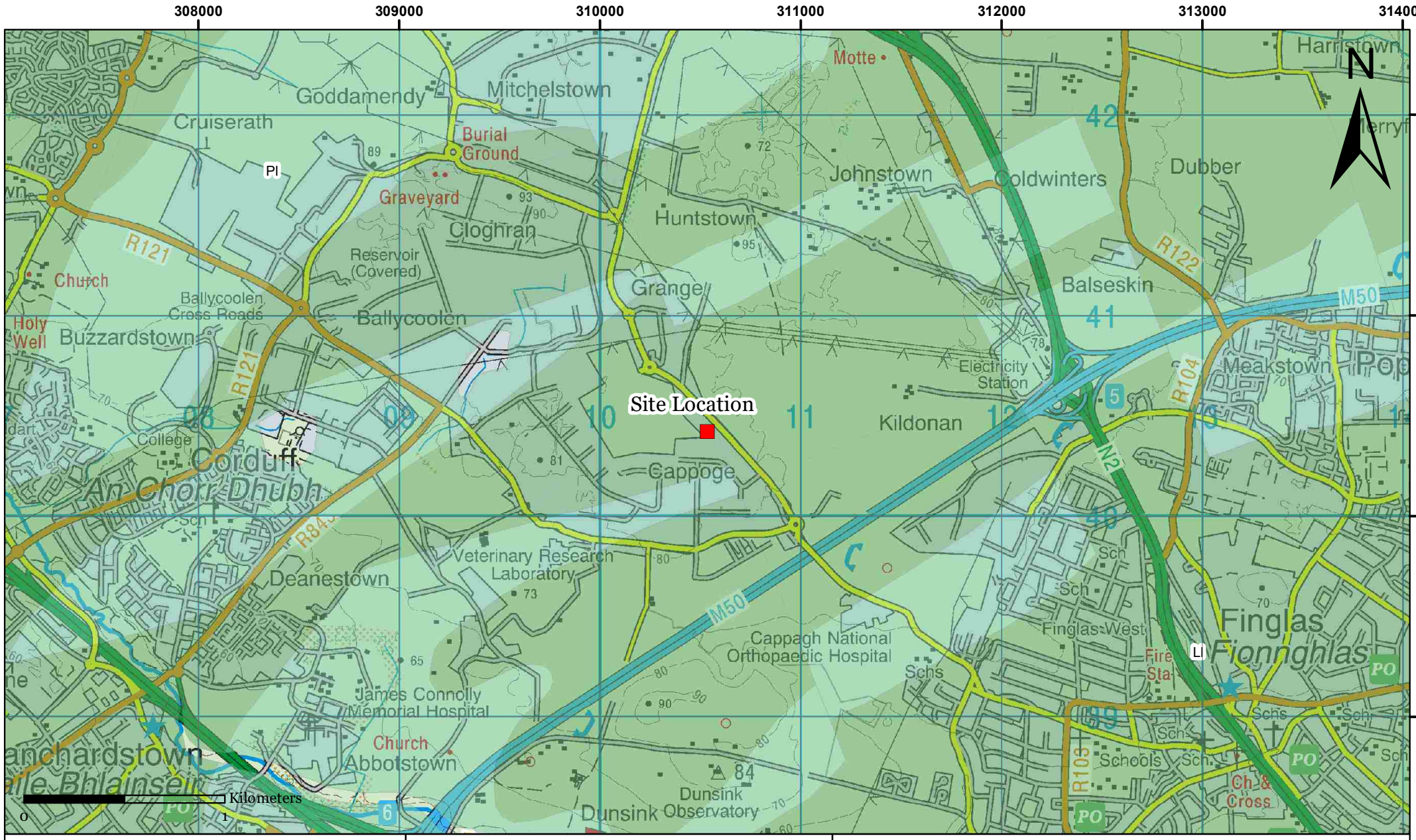
8.3.2 Hydrogeology

The bedrock belongs to the Boston Hill Formation and comprises nodular and muddy limestones and shale. Based on data obtained from the GSI the bedrock aquifer is a locally important (Lm) aquifer that is productive in local zones (Figure 8.2). There is one groundwater well used for abstraction approximately 1km to the south of the installation, however the well is in a different bedrock formation.

The aquifer vulnerability to pollution from the ground surface is Extreme, as shown on Figure 8.3. The local direction of groundwater flow is to the south, but is likely to be greatly influenced by the large scale quarrying immediately to the east and north of the site (Huntstown Quarry).

The aquifer is part of the Dublin Area Groundwater Body (IE_EA_G_005). The condition of a groundwater Water Body is defined by its chemical and quantitative status, whichever is worse, and groundwater quality is ranked in one of two status classes: Good or Poor. The Dublin Area Water Body is categorised as being of 'Good' status, but is 'At Risk' of achieving its objective of protecting the existing status.

There are is one on-site groundwater well which is monitored annually in accordance with the EPA licence requirements. The results of the monitoring completed in 2019 and 202 are in Table 8.1. There are no trigger levels set in the licence, but for comparative purposes Table 8.1 includes the EPA Interim Guideline Values (IGVs) on groundwater quality and the Groundwater Regulations Threshold Value (TGV) which were introduced in 2010 (S.I. 9 of 2010, as amended) on foot of requirements from the Water Framework Directive and have evolved from the IGVs.



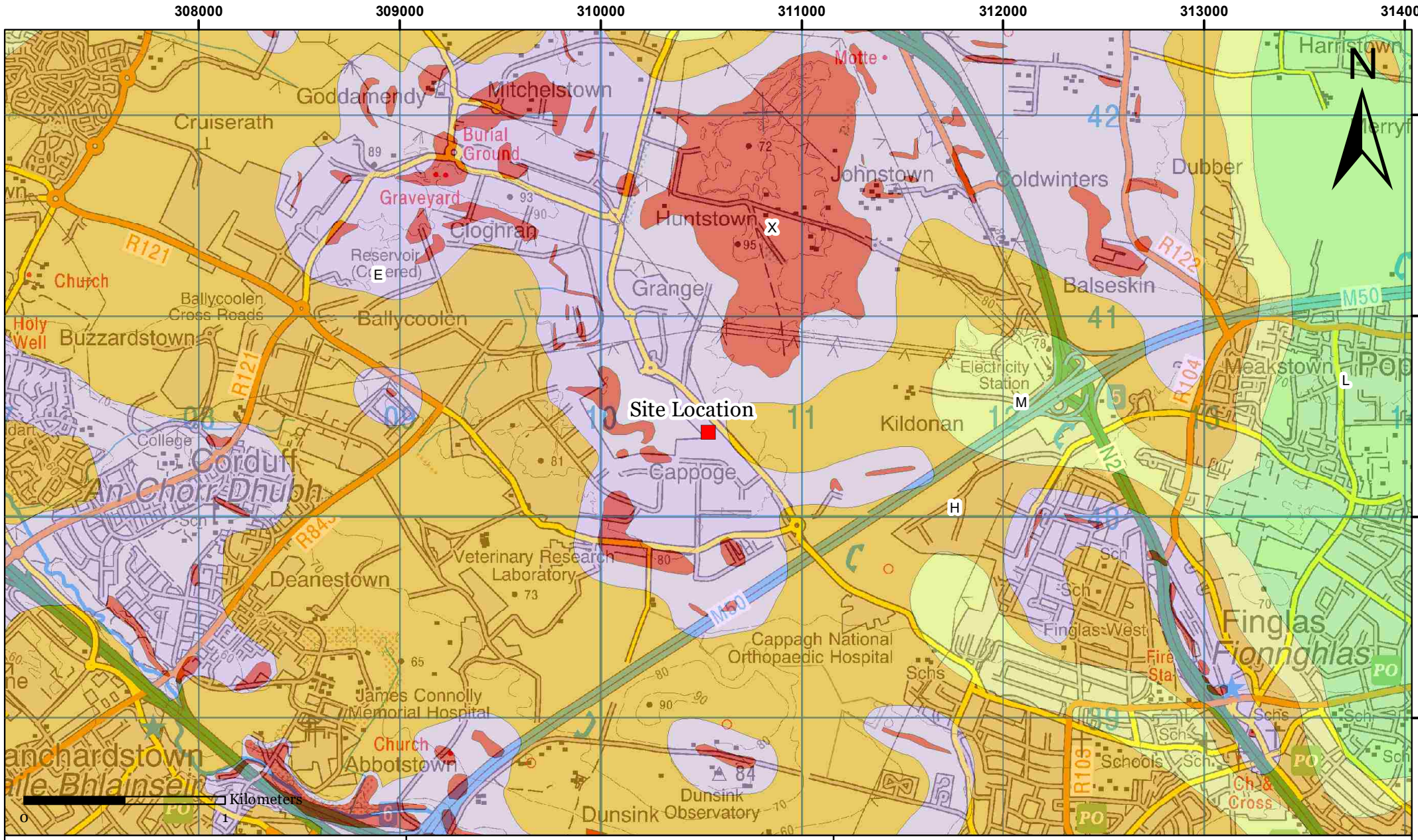
O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
email: info@ocallaghanmoran.com

CLIENT
Starrus Eco Holding

TITLE
Aquifer Classification

Details:
- Site Location
- LI - Locally Important Aquifer. Moderately Productive only in Local Zones
- PI - Poor Aquifer. Unproductive except for Local Zones

Figure 8.2



O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
email: info@ocallaghanmoran.com
Environmental Management for Business

CLIENT
Starrus Eco Holdings Ltd

TITLE
Groundwater Vulnerability

Details:
- Site Location
- X - Bedrock near Surface
- E - Extreme
- H - High
- M - Moderate
- L - Low

Figure 8.3

The IGV represent typical background or unpolluted conditions; however levels higher than the IGV can occur naturally depending on the local geological and hydrogeological conditions. While the TGV are more appropriate for large scale abstraction wells used for potable supply, they can be used to assess the significance of contamination where present in non-potable groundwater supplies. Because not all parameters monitored have been assigned a TV, the relevant IGV continue to be used for comparative purposes where applicable.

The results indicate that the quality of groundwater beneath the site is good, and has not been impacted by site activities.

Table 8.1 Groundwater Results 2019 & 2020

Parameter	Units	2019	2020	IGV	TGV
Ammonia	mg/l as N	0.03	<0.02	-	0.175
Biochemical Oxygen Demand	mg/l	<2	<2	-	-
Chloride	mg/l	39	90	-	187.5
Chemical Oxygen Demand	mg/l	7	7	-	-
Nitrate	mg/L as N	5.2	2.7	-	37.5
Total Petroleum Hydrocarbons	ug/l	<1	<1	10	-

8.4 Impacts

Sanitary wastewater is collected in an underground storage tank which is emptied regularly. AS there will be no change to staffing numbers there will be no increase in the volume of sanitary wastewater generated.

Rainwater run-off from the building roofs and paved open yards discharges to the storm sewer serving the Stadium Business Park.. The proposed development will not result in any change to the volume and quality of the rainwater run-off.

There are no current direct or indirect emissions to groundwater and the proposed development will not result in any new emissions.

8.5 Baseline Scenario

If the proposed development does not proceed current operations will continue, with no change to the potential impact on surface water and groundwater.

8.6 Prevention & Mitigation Measures

The current mitigation measures specified in the EPA licence include the provision of an oil interceptor on the storm water drains; impermeable paving across the operational areas; the inspection and repair of the paved areas; the routine inspection and survey of the drains; the adoption of an emergency response procedure, and staff training on appropriate spill response actions.

As referred to in Section 4.7.1, the surface water attenuation tank provides temporary storage of surface water and allows the discharge at a steady rate to the storm water sewer system serving the Stadium Business Park. The outflow from the tank is regulated by a flow restrictor (hydrobrake), which has a maximum discharge rate of 6 litres/second (l/s). There is a shut off valve located on the attenuation tank and in the event of a fire or accidental release of substances with the potential to contaminate water the valve can be shut to contain the firewater run off/ contaminated surface water inside the site.

8.7 Assessment of Impacts

The proposed development will not increase the volume of water run-off and will not will not affect the quality of the run-off to the storm sewer serving the Stadium Business Park. It will not present an increased risk of flooding either within, or outside the site boundary, will have no impact on the rainfall recharge to groundwater and, as there will be no new emissions to ground, there will be no impact on groundwater quality.

8.8 Residual Impacts

The proposed development will have no impact on water.

9 BIODIVERSITY

9.1 Introduction

This Chapter describes the biodiversity of the site and the impacts the proposed development will have on the receiving environment within and outside the site boundary, including a 'baseline' scenario. It assesses the need for prevention and mitigation measures to reduce the significance of the impacts and evaluates the residual impacts.

9.2 Methodology

The United Nations Convention on Biological Diversity (CBD) defines 'biological diversity' or biodiversity as 'the variability among living organisms from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems'. In this context, the assessment took into consideration ecosystems (habitats and organisms) inside and outside the facility boundary.

The site is almost completely covered by concrete paving and buildings and the existing biodiversity value is low. The current site condition and the nature of the proposed development, which involves no disturbance of on-site habitats and no disturbance of any off-site ecosystems, means that an ecological survey was not required.

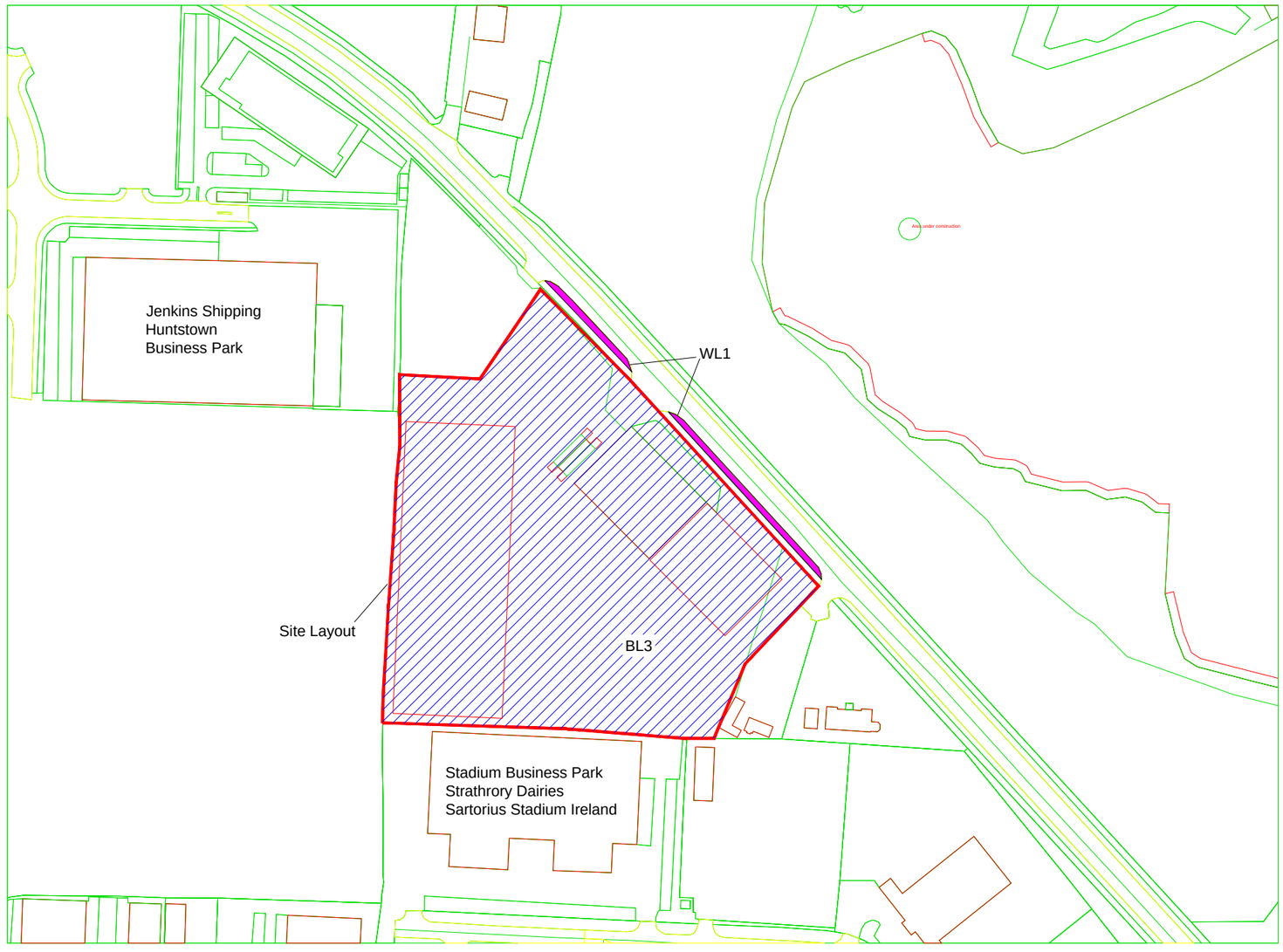
The assessment was based on information derived from the 2013 EIS and a site inspection. Habitats were classified using the descriptions and codes in the Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000) and 'Best Practice Guidance for Habitat Survey and Mapping' (2011).

OCM carried out a screening of the significance of the effects, if any, of the proposed changes on Natura 2000 sites within 10 km of the site to inform a decision on the need for an Appropriate Assessment. The screening concluded that the development would not have any likely significant effects on any Natura 2000 Site and therefore a Natura Impact Statement was not required. The report on the Screening is in Appendix 5.

9.3 Receiving Environment

9.3.1 Habitats

The habitats inside the site boundary are shown on Figure 9.1. With the exception of a narrow landscape strip (WL1) inside the boundary fence along the road frontage the site is entirely covered by paving and buildings. The operational area is classified as BL3 Buildings and artificial surfaces. BL3 includes all buildings (domestic, agricultural, industrial and community) other than derelict stone buildings and ruins. BL3 also includes areas of land that are covered with artificial surfaces (e.g. roads, car parks, pavements, runways, yards, and some tracks, paths, driveways and sports grounds. These habitats are typically not species diverse.



Legend:

WL1-Hedgerows

BL3-Buildings and Artificial Surfaces

O' Callaghan Moran & Associates.
Unit 15 Melbourne Business Park
Model Farm Road, Cork, Ireland.
Tel. (021) 4345366
email: info@ocallaghanmoran.com
environmental management for business

CLIENT

Starrus Eco Holdings Ltd

TITLE

Habitats

Details:

Ordnance Survey Ireland Limited
No. AR 0038719
Ordnace Survey Ireland/Government of Ireland

Date	FIGURE No.
06/04/2021	9.1
SCALE	REV.
1:2500	A

Before the facility was developed the land was used primarily for arable agriculture. Since then the site and surrounding lands have been extensively developed and the area is dominated by BL3 Buildings and artificial surfaces. The Huntstown Quarry (ED4) is to the east and north-east.

Given the layout of the existing facility and the surrounding land use the likelihood of the presence of protected species within the site is very low. There are no invasive species within the site boundaries.

9.3.2 Natura 2000 Sites

The European Union (EU) Habitats Directive (92/43/EC) and the EU Birds Directive (2009/147/EC) identify designated areas (Special Areas of Conservation (SAC) and Special Protection Areas (SPA) respectively) that are collectively known as Natura 2000 Sites. The site is not in either an SAC, or an SPA and the closest Site is least 8 km from the away (Table 9.1).

Table 9.1. Natura 2000 Sites within 15 km of the proposed Development

Site	Code	Distance (km)
South Dublin Bay & Tolka River Estuary SPA	004024	8.7 SE
Rye Water Valley/Carton SAC	001398	10.8 SW
South Dublin Bay SAC	000210	11.2 SE
Malahide Estuary SPA	004025	11.3 NE
Malahide Estuary SAC	000205	11.3 NE
North Dublin Bay SAC	00206	11.4 SE
North Bull Island SPA	004006	11.5 SE
Baldoyle Bay SAC	000199	13.0 E
Baldoyle Bay SPA	004016	13.2 E
Rogerstown Estuary SAC	000208	14.5 NE
Rogerstown Estuary SPA	004015	14.9 NE

9.4 Impacts

The proposed development will not result in the loss of any habitats either inside, or outside the site boundary. There will be no changes to the emissions associated with the waste operations and the current operational hours, and therefore no potential for disturbance of birds and mammals in the surrounding habitats. There is a surface water pathway between the development site and the Dublin Bay Tolka Estuary SPA.

9.5 Baseline Scenario

If the proposed development does not proceed the current activities will continue, with no change to the potential impact on biodiversity.

9.6 Prevention & Mitigation Measures

As the development will not have any impact on biodiversity either inside or outside the site boundaries and will have no impact on any designated sites, specific prevention and mitigation measures are not required.

9.7 Assessment of Impacts

The proposed development will not result in the loss of or damage to any habitats either in, or outside the site boundary. The site is not in, or adjacent to any Natura 2000 Sites. The only viable pathway between the development area and a Natura 2000 Site is surface water system that discharges to the River Tolka. The development will not result in any change to either the volume of quality of the storm water un-off and this in conjunction with the separation distance between the development area and the Dublin Bay Tolka Estuary SPA means the development will not have any significant impact on the SPA.

9.8 Residual Impacts

The proposed development will have no residual impact on biodiversity.

10 AIR

10.1 Introduction

This Chapter describes the ambient air quality and the impacts the proposed development will have on the receiving environment within and outside the site boundary, including a 'baseline' scenario. It identifies the prevention and mitigation measures that are and will be implemented to reduce the significance of the impacts and assesses the residual impacts.

10.2 Methodology

The assessment was based on information derived from ambient air quality databases maintained by the EPA and the dust deposition and OCU stack emission monitoring carried out by Panda in compliance with the EPA licence conditions.

10.3 Receiving Environment

The site is located in an area that that has been extensively developed for industrial and commercial use and mineral extraction.

10.3.1 Regional Ambient Air Quality

The EU Air Quality Framework Directive (96/62/EC) requires Member States to identify 'Zones' and 'Agglomerations' for air quality assessment purposes. In Ireland, four zones, A, B, C and D are defined in the Air Quality Standards (AQS) Regulations (S.I. No 180 of 2011).

- Zone A – Dublin Conurbation
- Zone B – Cork Conurbation
- Zone C – Large Towns with a Population > 15,000
- Zone D – Remaining Area of Ireland

Cappagh Road is in Zone A.

The Air Quality Standards (AQS) Regulations (2002 SI No. 271 of 2002) sets limit values for sulphur dioxide, nitrogen oxide, particulate matter and lead in ambient air. These regulations apply to ambient air quality in the local vicinity of land-use/development types including quarries and concrete/asphalt manufacturing facilities.

The AQS Regulations set ambient limits for 2.5 micron(µm) and 10 µm particulates (annual mean of 40µg/m^3 and 20µg/m^3 respectively) to protect human health, but do not set limits for dusts >10µm, which typically relate to nuisance effects rather than potential health effects.

In 2019, the EPA issued a report Urban Environmental Indicators: Nitrogen Dioxide Levels in Dublin[8], which detailed modelled concentrations of nitrogen dioxide beyond monitoring stations. The EPA found that based on a combination of air quality monitoring and modelling predictions many areas across Dublin, in particular those close to busy roads, were above the EU nitrogen dioxide (annual limit value of 40 µg/m^3. The predicted concentrations were highest around the M50, along certain city centre streets and around the entrance and exit of the Dublin Port Tunnel.

The EPA implements an air quality monitoring programme at a number of stations in Dublin, including one at Blanchardstown closed to the N3 M50 junction which is considered representative of air quality at the site. The station conducts continuous monitoring for nitrous dioxide and PM_{10}, and the results indicate the air quality is good[9].

The monitoring results for PM_{10} & $PM_{2.5}$ and nitrous oxide for the period 25th February to 11th March 2021 are shown on Figures 10.1 and 10.2[10]respectively. Figure 10.1 shows the latest available data for particulate matter over the 14 day period[11].

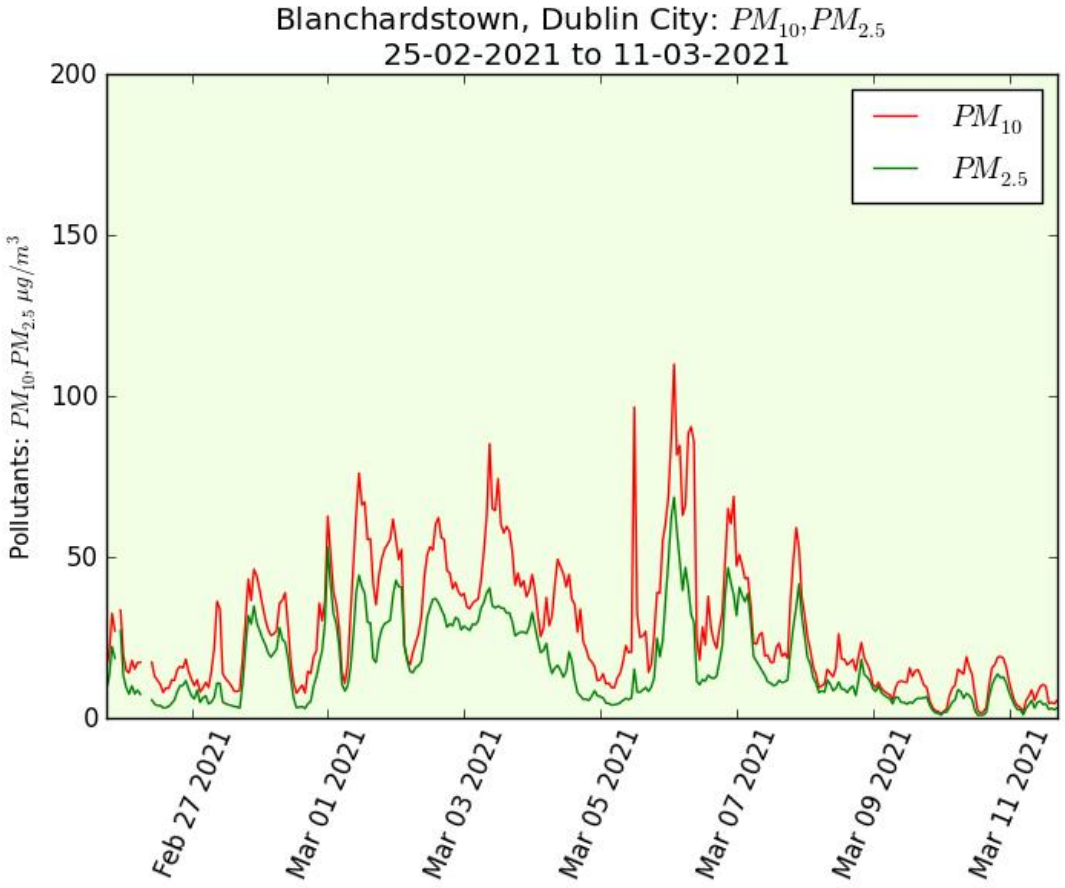


Figure 10.1 Particulate Matter Levels

[8] https://www.epa.ie/pubs/reports/air/quality/Urban_Environmental_Indicators_2019.pdf
[9] http://www.epa.ie/air/quality/data/blc/
[10] Derived from EPA Air Quality website
[11] This data has not yet been validated as it is received automatically from the site. .

The PM_{10} daily limit of 50 ug m^{-3} is deemed breached if more than 35 exceedances occur in a calendar year. The $PM_{2.5}$ annual limit value is 25 ug m^{-3} and there is no hourly or daily limit value.

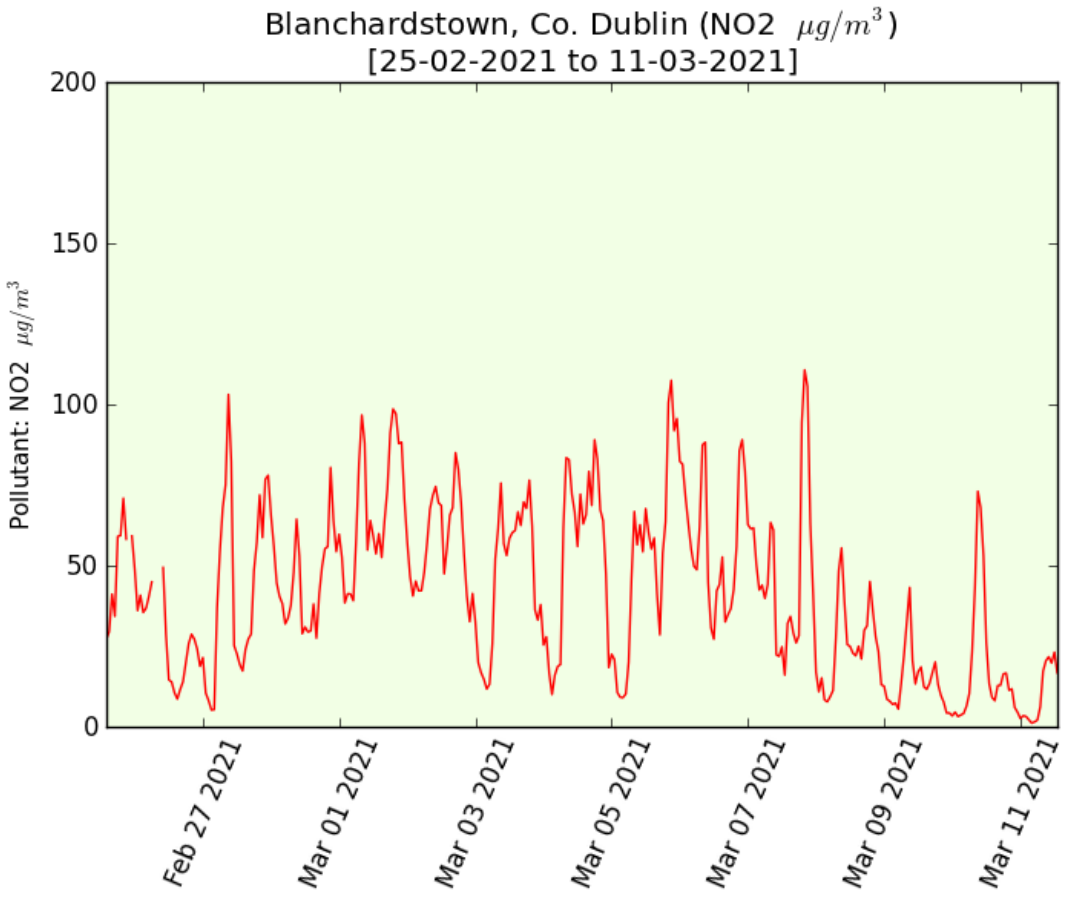


Figure 10.2 Nitrous Oxide Levels

The nitrous oxide hourly limit of 200 ug m^{-3} is deemed breached if more than 18 exceedances have occurred. There were no exceedances of the hourly limit.

The EPA's Air Quality Index for Health (AQIH) is a number from 1 to 10 indicating the air quality currently in a region and whether or not this might affect human health. 10 means the air quality is very poor and 1 to 3 inclusive means that the air quality is good. The AQIH is calculated every hour and as of March 2021 the ratings the closest stations to the site, which are in Blanchardstown (Station 29) and in Finglas (Station 46), was 1 (Good).

10.4 Impacts

The potential emissions to air from the waste activities that are and will be carried out include dust, vehicle exhausts and odours.

The primary source of dust emissions is and will continue to be the processing of the wastes. Secondary sources are vehicle movements on the paved yards during dry periods. Vehicle exhausts contain a range of compounds that affect air quality, for example nitrous oxide, carbon monoxide, methane, carbon dioxide, benzene and particulates.

Odours are associated with the types of wastes accepted, the type of processing carried out and the time the wastes are retained on site. The only wastes accepted at the facility that are a significant source of malodours are the mixed solid waste, brown bins waste. The depackaging of the expired food wastes is also a potential source of odours.

10.5 Baseline Scenario

If the proposed development does not proceed the facility will continue to operate as is, and there will be no change to the potential impacts on air quality.

10.6 Prevention & Mitigation Measures

Panda implements the control measures specified in the EPA licence that are designed to ensure waste activities do not give rise to negative impacts on air quality and these will continue to be applied.

The OCU (Ref Section 4.18.3) has proven to effectively mitigate odours from the section of Building A 2 where odorous wastes are and will continue to be handled. In addition Panda has prepared an Odour Management Plan (OMP), as required by the EPA licence for waste handling operations that will identify the operational and control measures to effectively manage and control odours and define odour management operational procedures for both normal and abnormal conditions.

The HGVs that transport the wastes are typically fitted with Selective Catalytic Reduction (SCR) systems. A diesel exhaust fuel additive (AdBlue) is used in the SCR to reduce the nitrous oxide levels in the exhaust gases and it is Panda's policy not to allow engine idling. It is an objective to ensure that odorous wastes are removed from the site on the day they are delivered and in all instances within 48 hours.

10.7 Assessment of Impacts

The EPA licence requires dust monitoring to be carried out on two occasions biannually. The results of the monitoring completed in March and May 2020 are in Table 10.1, which includes the deposition limit specified in the EPA licence. The results are all below the deposition limit.

Table 10.1 Dust Monitoring Results 2020

Location	March 2020	May 2020	Deposition Limit mg/m^2/day
DS1	70	129	350
DS2	76	145	350

The design of the OCU was based on numerical air dispersion modelling that identified the odour unit limits, which if adhered, to would ensure that the handling of odorous waste would not give rise to off-site nuisance. The EPA licence requires monitoring of the emissions from the OCU stack for particulates, odour units and volumetric flow. The reports on the monitoring completed in 2020 are in Appendix 6. The stack emissions complied with the emission limit values.

The proposed development will not give rise to any new point for fugitive emissions to air. There will be additional traffic movements and therefore an increase in vehicle exhaust gases.

10.8 Residual Impacts

The proposed development will have an ongoing slight, negative impact on air quality in the locality, but will have no permanent impact.

11 NOISE

11.1 Introduction

This Chapter describes the existing noise sources and the impacts the proposed development may have on the receiving environment within and outside the facility boundary, including a 'baseline' scenario. It identifies the prevention and mitigation measures that are and will be implemented to reduce the significance of the impacts and assesses the residual impacts.

11.2 Methodology

The assessment is based on the findings the annual noise monitoring surveys completed by Noise and Vibration Consultants Ltd, the most recent of which was completed in November. A copy of the report, which details the methodology applied, is in Appendix 7.

11.3 Receiving Environment

The site is in an area that that has been extensively developed for industrial and commercial use and mineral extraction. There is one vacant private residence located close to the facility, approximately 30m from the south eastern boundary. This has been acquired by Panda and it is intended to redevelop the site as a Civic Amenity Area. There are ten residences (10 No) approximately 450 m to the south-east, also on the southern side of the Cappagh Road. These are the only private residences within 500m of the facility.

11.4 Impacts

The current noise sources include:

- Transport vehicles
- Fixed and mobile plant
- Odour Control Unit extraction fans

The facility is operational 24/7 and therefore the plant and fans are in constant use. The proposed development does not require the provision of any new sources of noise emissions, or changes to the operational hours.

11.5 Baseline Scenario

If the proposed development does not proceed the facility will continue to operate, with no change to the associated noise emissions.

11.6 Prevention & Mitigation Measures

Panda implements the noise control measures specified in the EPA licence that are designed to ensure operations do not give rise to noise emissions that are a cause of nuisance or impairment outside the facility boundary and these will continue to be applied. These measures include processing all waste inside the buildings.

11.7 Assessment of Impacts

The EPA licence and planning permission (Ref FW19A/0145) requires PANDA to carry out noise surveys to assess the impacts associated with its operations. The EPA licence and the planning permission also specify noise limits that must be complied with, which are 55 dBA at noise sensitive locations (NSL) during daytime hours (07.00 to 19.00), 50 dBA during evening hours (19.00 to 23.00) and 45 dBA during night time hours (23.00 to 07.00).

Daytime, evening and night-time noise monitoring is carried out annually at the four approved noise monitoring locations, as shown on Figure 11.1.

Figure 11.1 Noise Monitoring Locations.

The results of the November 2020 survey, which is the most recent one available, are presented in Tables 11.1 to 11.4. At the time the survey was completed the site was fully operational. Site operations were not audible at any of the stations and were therefore lower than the limits specified in the EPA licence and the planning permission.

Table 11.1 Site Boundary Monitoring Location : AN1

Date	Time	LAeq	LAFmin	LAF10	LAF50	LAF90	Comment
06/11/2020	16:00	60.6	49.1	58.2	53.2	51.5	Vehicles close to monitor
06/11/2020	16:30	60.8	48.9	59.3	53.2	51.4	
06/11/2020	17:00	61.8	47.4	60.8	51.5	49.5	
	Mean	61.1	48.5	59.4	52.6	50.8	Site less than 55 dBA
06/11/2020	20:00	58.2	47.1	58.4	51.6	49.5	
06/11/2020	20:30	60.8	47.5	59.6	52.7	49.6	
	Mean	59.5	47.3	59.0	52.2	49.6	Site less than 50 dBA
07/11/2020	02:00	55.3	39.7	53.1	45.5	43.2	
07/11/2020	02:30	52.7	37.6	48.0	44.5	41.6	
	Mean	54.0	38.6	50.6	45.0	42.4	Site less than 45 dBA

Table 11.2 Site Boundary Monitoring Location AN2

Date	Time	LAeq	LAFmin	LAF10	LAF50	LAF90	Comment
Daytime							
06/11/2020	16:30	66.5	52.6	70.8	60.2	54.9	Vehicles close to monitor
06/11/2020	17:00	66.4	51.7	71.0	59.5	54.8	
06/11/2020	17:30	65.2	51.0	59.5	57.4	52.9	
	Mean	66.0	51.8	70.4	59.0	54.2	Site less than 55dBA
Evening							
06/11/2020	19:00	64.1	45.9	63.1	50.7	48.5	
06/11/2020	20:00	63.4	47.2	62.0	51.5	49.9	
	Mean	63.7	46.5	62.6	51.1	49.2	Site less than 50 dBA
Night							
07/11/2020	02:00	57.7	40.9	54.9	47.8	44.7	
07/11/2020	02:30	57.1	41.4	55.9	46.8	44.0	
	Mean	57.4	41.1	55.4	47.3	44.4	Site less than 45 dBA

Location close to very busy road traffic route

Table 11.3 Noise Sensitive Monitoring Location ANS1

Date	Time	LAeq	LAFmin	LAF10	LAF50	LAF90	Comment
Daytime							
06/11/2020	16:00	67.8	49.7	71.9	61.2	52.6	
06/11/2020	16:30	68.8	52.1	73.2	64.8	55.6	Mainly road traffic
06/11/2020	17:00	67.3	52.9	71.5	62.0	55.1	
	Mean	68.0	51.5	72.2	62.7	54.4	Site less than 55 dBA
Evening							
06/11/2020	20:00	62.8	47.2	65.8	51.5	48.8	Mainly road traffic
06/11/2020	20:30	62.2	46.6	64.7	51.4	49.4	
	Mean	62.5	46.9	65.3	51.5	49.1	Site less than 50 dBA
Night							
07/11/2020	02:00	61.4	43.1	55.7	46.5	44.9	
07/11/2020	02:30	55.4	42.3	50.2	46.6	44.8	
	Mean	58.4	42.7	53.0	46.6	44.9	Site less than 45 dBA

Location close to very busy road traffic route

Table 11.4 Noise Monitoring Location ANS2

Date	Time	LAeq	LAFmin	LAF10	LAF50	LAF90	Comment
Daytime							
06/11/2020	15:30	67.1	51.0	71.6	61.0	53.9	
06/11/2020	16:00	67.4	51.5	71.7	52.2	54.4	Mainly road traffic
06/11/2020	16:30	68.4	51.6	72.9	60.9	53.5	
	Mean	67.6	51.4	72.1	61.4	53.9	Site less than 55 dBA
Evening							
06/11/2020	20:30	65.5	47.4	66.0	52.3	49.7	Mainly road traffic
06/11/2020	21:00	63.8	47.2	62.9	51.9	49.4	
	Mean	64.7	47.3	64.5	52.1	49.6	Site less than 50 dBA
Night							
07/11/2020	01:30	55.4	42.6	50.5	46.5	44.8	
07/11/2020	02:00	57.4	41.2	48.0	44.7	43.0	
	Mean	56.4	41.9	49.3	45.6	43.9	Site less than 45 dBA

Location close to a very busy road traffic route

11.8 Residual Impacts

The proposed development will have an on-going, imperceptible, neutral impact over its lifetime.

12 LANDSCAPE & VISUAL IMPACT

12.1 Introduction

This Chapter provides an assessment of the impact of the proposed development on the landscape and visual amenity, which includes a 'baseline' scenario. It identifies the prevention and mitigation measures that are and will be implemented to reduce the significance of the impacts and assesses the residual impacts.

12.2 Methodology

The assessment was carried out in accordance with the guidelines in the document 'Landscape and Landscape Assessment, Consultation Draft of Guidelines for Planning Authorities' published by the Department of the Environment and Local Government (June 2000). It took into consideration the Landscape Character Assessment included in Fingal Development Plan 2017-2023.

The objective of the assessment was to determine the magnitude and significance of the proposed development to the landscape character and visual setting. Significance depends on the sensitivity of the affected landscape and visual receptor and the magnitude of change that is judged to have resulted from the proposed development. In considering magnitude and significance, the following were taken into account:

- The sensitivity of the view taking into account both the public accessibility of the land where views are possible and the likely sensitivity of that view given the distance, travelling speed (if relevant), intervening vegetation and land usage;
- The quality and value of the existing landscape;
- The degree to which the development will be visible within the surrounding area, and
- Any other changes in the existing landscape e.g. new road junctions.

12.3 Receiving Environment

The landscapes of North Dublin County comprise a dynamic mix of living elements that respond to history, culture, natural cycles, weather events, water, climatic and economic factors including those that relate to agriculture, industry, energy, transport, settlement and tourism. The Fingal Development Plan defines six Landscape Character Types in the area:

- High Lying Agriculture
- Low Lying Agriculture
- Estuary

- Coastal
- River Valleys and Canal

The site is in the low lying area, which is characterised by a mix of pasture and arable farming on low lying land with few protected views or prospects. At a site specific level the facility is an area where the land cover use is industrial/commercial in an established and extensively developed industrial zone. It is not in an area designated as highly sensitive and is not overlooked by any designated views or prospect areas. The shape and mass of the existing buildings are similar to those of other commercial and industrial operators in the estate.

12.4 Impacts

The site occupies 2.5 hectares (ha) and comprises three main processing buildings - Building A1 (2,030 m^2) and adjoining Building A2 (2,800 m2) and Building B1 (4,088 m^2). Ancillaries include an electrical substation, two weighbridges and office and associated control rooms and staff amenity building.

The proposed development does not involve any change to the appearance of the buildings or the site layout. The building elevations are shown on Drawing No 19-207-300-FL. The forms of the existing buildings and offices and the approach from the main road are shown on Photographs 12.1 to 12.6. The proposed development does not involve any change to the appearance of the buildings or the site layout.

Photograph 12.1 Buildings A1, A2 (Right) and B1 (Left) and yard (Foreground). .

Photograph 12.2 Weighbridges and offices

Photograph 12.3 Western Elevation of Building A1 and A2

Photograph 12.5 Building A1

Photograph 12.6 Approach from North

Photograph 12.7 Approach from South

12.5 Baseline Scenario

If the development does not proceed, there will be no change to the external appearance of the buildings and yards.

12.6 Prevention & Mitigation Measures

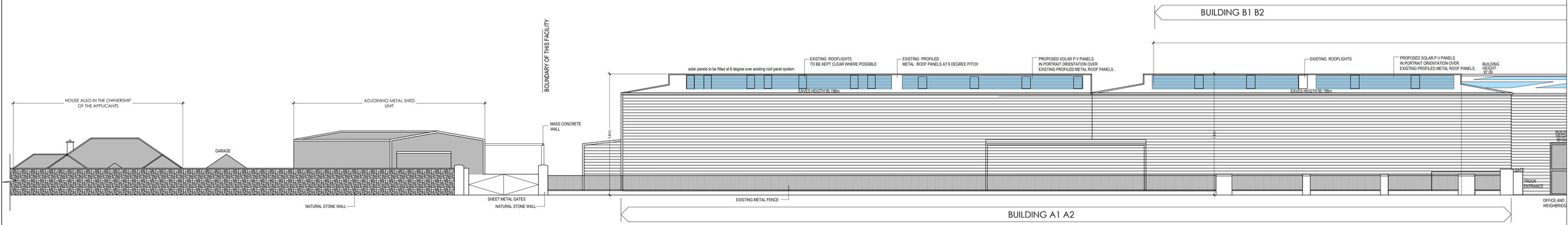
As there will be no change to the external appearance of the site prevention and mitigation measures are not required.

12.7 Assessment of Impacts

The proposed development will have no impact on the landscape.

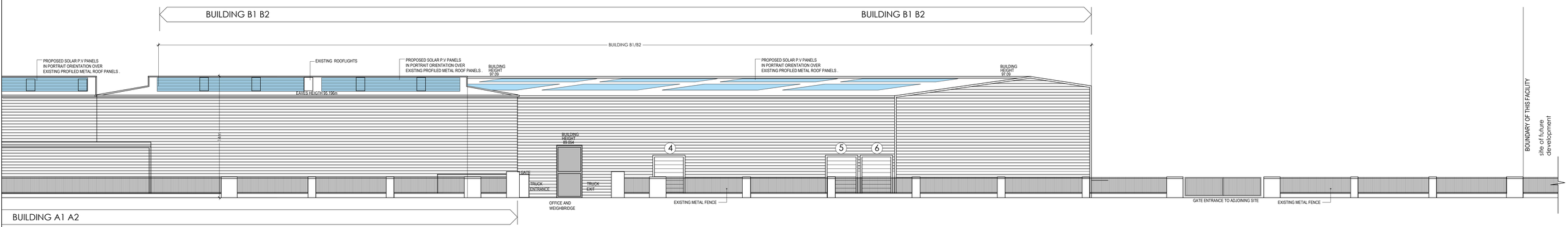
12.8 Residual Impacts

The proposed development will have no residual impacts.



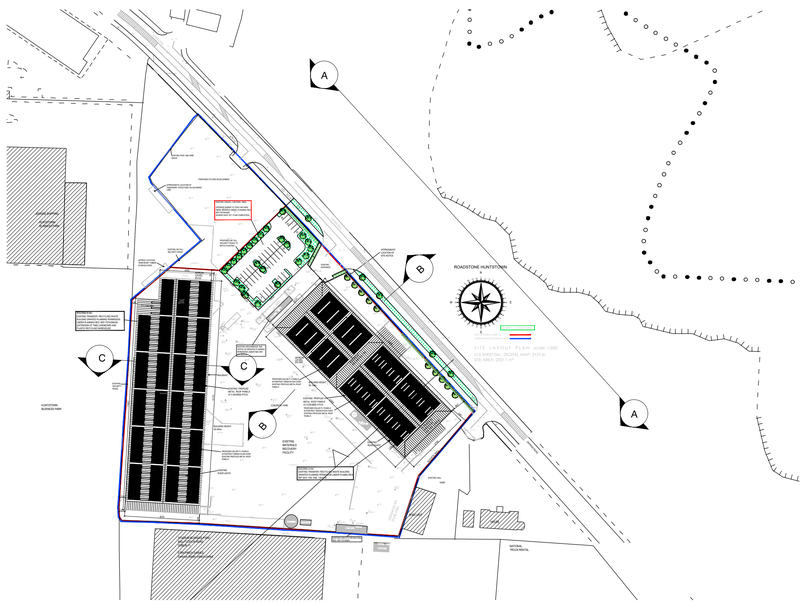
CONTIGUOUS ELEVATION A-A (FRONT ELEVATION) 1:200

PART 1 OF 2

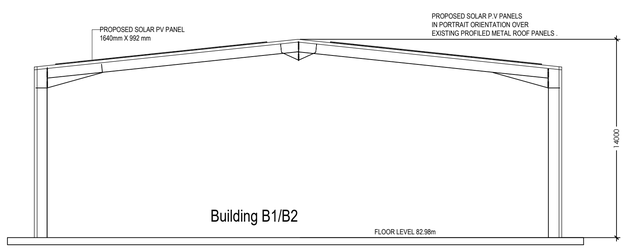


CONTIGUOUS ELEVATION A-A (FRONT ELEVATION) 1:200

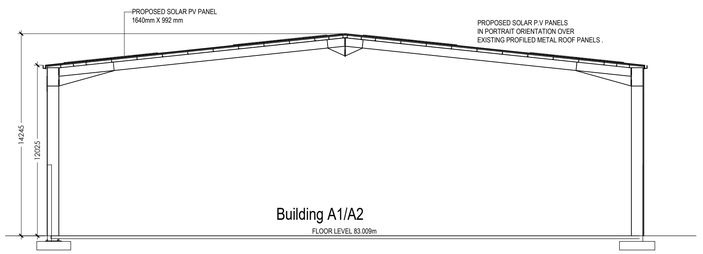
PART 2 OF 2



KEY PLAN NOT TO SCALE



SECTION B-B 1:200



SECTION C-C 1:200

mckenna + associates
high street, trim, co. meath.
phone / fax: +353 (0)46 948 6788
mobile: +353 (0)86 384 7470
email:info@mckennaarchitecture.com
web: www.mckennaarchitecture.com

Client
Starrus Eco Holdings Ltd

Project Title
PROPOSED INSTALLATION OF ROOF MOUNTED SOLAR PANELS OVER 2 NO. EXISTING TRANSFER/ RECYCLING WASTE BUILDINGS, AT PANDA MATERIALS RECYCLING FACILITY, CAPPAGH ROAD, CAPPOGE TD, FINGLAS, DUBLIN 11.

Drawing Title
CONTIGUOUS ELEVATIONS

Drawn By	Date	Scale
Stephen Hussey	17.01.2020	1:200, @ A1
Revision	**Drwg. Status**	**Drwg. No.**
	PLANNING	19-207-300-PL

13 POPULATION & HUMAN HEALTH

13.1 Introduction

This Chapter describes the population distribution in the vicinity of the proposed development and assesses the impacts of the proposed development on the population and human health. The assessment considered a 'baseline' scenario and identifies the prevention and mitigation measures that are and will be implemented to reduce the significance of the impacts and assesses the residual impacts.

13.2 Methodology

The assessment was based on the planning zoning status, the land use in the vicinity of the facility, population density and employment sectors. The information was derived from databases maintained by the Central Statistics Office (CSO) the County Development Plan and the Fingal LECP.

13.3 Receiving Environment

13.3.1 Fingal County

Fingal County covers 450 km^2, stretching from the River Liffey and the Dublin City boundary in the south to the Meath boundary north of Balbriggan, and from the coast in the east to the Meath and Kildare to the west. The County has major economic assets, including Dublin Airport, proximity to Dublin City & the Dublin Port Tunnel, road and rail infrastructure and a prime location on the Dublin-Belfast Economic corridor. Dublin Airport provides a significant economic hub for the County.

Fingal's population, derived from the in the 2016 Census is 296,214, which equates to approximately 22% of the total population of Dublin. Fingal's share of the Dublin population has risen steadily since 1986, when it was just 14% and is projected to further increase over the lifetime of the current County Development Plan.

Fingal hosts a wide range of commercial enterprises, including major multi-national companies and indigenous small and medium sized enterprises (SMEs) and small local business start-ups. The strength and diversity of the local economy is evident, as it includes all the key economic sectors identified within the national economy.

13.3.2 Local Area

The site is 2.5km south-west of Dublin Airport and surrounded to the north and south by commercial and industrial facilities and to the east and north-east by a large operational hard rock quarry. Stadium Business Park adjoins the southern site boundary and is occupied by commercial activities including logistics companies, chemical distributors, light engineering facility and food distributors. The lands to the west are currently undeveloped, but are zoned for general employment.

There are ten residences approximately 450 m to the south east and these are the nearest private dwellings. There are no schools, nursing homes or medical centres within 500 m of the site.

13.4 Impacts

Vehicle exhaust gases can affect air quality with a consequent implications for human health. While odours, noise and dusts do not present a direct risk to health, they can be a significant nuisance and cause of discomfort that can indirectly affect human health. Traffic movements to and from waste management facilities can, depending on the size, location and capacity of the local road network be a cause of congestion that affects local residents.

The site is not in an area susceptible to natural disasters (earthquake, landslide, major flood events). The current operations and the proposed activities do not come under the EC (Control of Major Accident Hazards involving Dangerous Substances) Regulations, 2006; however accidents with the potential to impact on the health of site staff and neighbours can occur at waste management facilities. Panda has completed an Accident Impact Assessment that identifies the plausible accidents that could occur and assesses the likely effects. A copy of the Impact Assessment is in Appendix 2.

The plausible accident risks identified at the site are presented in Table 13.1. These take into account the facility history, the controls and mitigating measures that are already in place as required by the EPA licence, with due regard for the potential failure of the controls.

Table 13.1 Accident Risks

Risk ID	Process	Potential Hazards/Risks
1	Oil Storage	Uncontrolled release from bulk storage tanks that escapes the bund and enters drains.
2		Escape to drains during filling/dispensing
3		Uncontrolled release from bulk storage tanks that escapes the bund and leaks to ground though damaged paving
4	Fire in Building	Smoke emissions
5		Firewater infiltration to ground-soil, groundwater and surface water contamination
6		Escape of firewater to drains.

The potential impacts are on human health via smoke and fumes and to the environment (surface water, groundwater and soils).

13.5 Baseline Scenario

If the development does not proceed, the facility will continue to operate in its current configuration with no change to the potential impacts on population and human health.

13.6 Prevention & Mitigation Measures

The prevention and mitigation measures that are and will be implemented to mitigate impacts associated with emissions to air (odours, vehicle exhaust gases and dusts) and noise emissions are described in Sections 10.6 and 11.6. Panda has engaged a specialist pest and vermin control contractor who visits the site regularly to ensure pests and vermin are properly controlled.

Panda has completed a Fire Risk Assessment that identifies all of the potential sources of fire and assesses the current prevention, detection and suppression controls. Panda has prepared an Emergency Response Procedure that describes the actions to be take in the event of a fire outbreak to ensure it is contained and extinguished as soon as is practical.

Panda has completed an Environmental Liability Risk Assessment (ELRA) as required by the EPA licence. This assesses the environmental damage associated with a large scale incident at the site, identifies the associated remedial actions and quantifies the costs. Panda has also prepared a Decommissioning Management Plan (DMP) that sets out the actions that will be taken in the event of the closure of the facility to ensure there are no long term environmental liabilities. Panda has agreed a financial provision[12] with the EPA that covers the costs of implementing both the ELRA and DMP.

13.7 Assessment of Impact

13.7.1 Human Health

The ambient air quality in the vicinity of the site is good and the routine monitoring carried out in accordance with the EPA licence confirms that emissions to air from the waste activities are not a cause of dust and odour nuisance. The exhaust gases from the additional traffic movements associated with the increase in the annual waste intake will contribute to a slight negative impact on air quality in the locality.

13.7.2 Environmental Nuisances

The control measures currently implemented by Panda ensure that birds, vermin and insects are not a source of nuisance and these control measures will continue to be applied.

13.7.3 Traffic

The proposed development will result in additional traffic movements to and from the facility and will increase the overall traffic in the local area. However, the traffic impact assessment has established that the development will not have any significant adverse impact on the local road network.

13.8 Residual Impacts

The proposed development will have an imperceptible, negative impact on population and human health associated with increased vehicle exhaust emissions, which will continue over its operational lifetime.

[12] Costs of remediating damage caused by a fire is covered by specialist environmental insurance cover, while a bond, which is immediately accessible by the EPA covers the closure cost.

14 ARCHAEOLOGY, ARCHITECTURE &CULTURAL HERITAGE

14.1 Introduction

This Chapter describes the archaeological, architectural and cultural heritage significance of the facility and its environs and assesses the impact of the proposed development including a 'baseline' scenario and the residual impacts.

14.2 Methodology

As the proposed development does not involve any ground disturbance the assessment was based on information in the 2013 EIS, which included a desk study of Records of Monuments and Places published by the Department of Arts, Heritage & Gaeltacht, and information contained in the County Development Plan.

14.3 Receiving Environment

14.3.1 Archaeological and Historical Background

The Sites and Monuments Records Map and the Registered Monuments Manual do not contain any record of any archaeological feature within the site and there are no listed monuments within 1 km of the site. There are two sites of interest within 500m, which are Cappogue Tower House to the south-east and a Fulacht Fiath to the north-west.

14.3.2 Architectural Heritage – Protected Structures

There is no record of any protected structure (e.g. medieval structure, church) within the site boundary.

14.3.3 Cultural Heritage

There is no record of any ritual and religious associations, riverine and estuarine sites, find spots of archaeological or heritage objects, designed landscapes, natural landscapes with cultural heritage associations, relic landscapes and folklore associations within the site boundary.

14.4 Impacts

The proposed development will not involve any ground disturbance and therefore there will be no risk of affecting unidentified archaeological features.

14.5 Do Nothing Scenario

If the development does not proceed the facility will continue to operate and the potential for impacts on the cultural heritage will remain unchanged.

14.6 Prevention and Mitigation Measures

As the proposed development will not have any impact on any archaeological, architectural and cultural heritage feature, prevention and mitigation measures are not required.

14.7 Assessment of Impact

The development will have no impact on any known or unknown archaeological feature and no impact on any architectural, cultural heritage feature.

14.8 Residual Impacts

The development will have no residual impact on any archaeological, architectural or cultural heritage features.

15 MATERIAL ASSETS/NATURAL RESOURCES

15.1 Introduction

This Chapter describes the material assets in the environs of the site. It identifies the potential impacts, describes the proposed prevention and mitigation measures and assesses the impacts, including residual impacts. It also addresses a 'baseline' scenario.

15.2 Methodology

The assessment was based on information derived from the current County Development Plan, Fingal LECP, CSO databases and Panda's records of natural resource consumption.

15.3 Receiving Environment

15.3.1 Surrounding Land Use and Amenity Value

The site is surrounded the north and south by commercial and industrial facilities and to the east and north east by a large operational hard rock quarry. The locality has been extensively developed and the overall the amenity value is low. Stadium Business Park adjoins the southern site boundary and is occupied by commercial activities including logistics companies, chemical distributors, light engineering facility and food distributors. The lands to the west are zoned for commercial and industrial use.

15.3.2 Infrastructure

The local and regional road network is described in Chapter 6.

15.3.3 Socio-Economic Activity

Panda is a significant local employer and its operations have not adversely affected the existing economic activities in the surrounding area. The facility accepts household, and commercial and construction and demolition waste material from Dublin City and environs. This benefits local economy, as it minimise waste management costs and benefits the community socially and environmentally by promoting sustainable development, reducing the need for landfills and preventing pollution.

15.3.4 Natural Resource

Current activities involve the use of diesel fuelled waste transport vehicles and mobile plant and electricity for lighting and heating of the buildings and yard lighting. Panda Power is a renewable energy provider supplies the electricity to the facility. Water is obtained from the on-site well to supply the staff welfare facilities. Table 15.1 lists the resources expected to be used annually on site.

Table 15.1 Annual Resource Consumption

Resources	Quantities
Green Diesel	132,202.7 litres
Electricity	7,216,477 units

15.4 Impacts

15.4.1 Infrastructure

The local and regional road networks have the capacity to accommodate the increased traffic associated with the proposed development.

15.4.2 Socio-Economic Activity

The proposed development will contribute to securing the long term commercial viability of the facility and maintaining local employment levels.

15.4.3 Resource Consumption

The development will result in increased electricity and diesel consumption.

15.5 Baseline Scenario

If the proposed development does not proceed the facility will continue to operate as is, with no change to the potential impacts on material assets.

15.6 Prevention & Mitigation Measures

Panda implements the nuisance control measures specified in the licence to prevent impacts on local amenities and also applies resource consumption control measures to minimise usage. Electricity is supplied by Panda Power, a renewable energy supplier and Panda has been granted planning permission for the installation of roof mounted solar panels on two of the processing buildings.

15.7 Assessment of Impacts

The current operations are not a source of adverse environmental nuisance or impairment of amenities outside the site boundary and have not adversely affected the existing economic activities in the surrounding area, nor have they reduced the potential for the future expansion of such activities. The proposed development will have a slight socio-economic benefit associated with maintaining local employment levels, but will result in an increase in natural resource consumption.

15.8 Residual Impact

The development will have no impacts on amenity values and a slight socio-economic benefit in maintaining employment levels. It will have a slight negative impact in relation to resource consumption.

16 INTERACTION OF THE FOREGOING

16.1 Introduction

Earlier Chapters describe the impacts associated with the proposed development and the proposed mitigation measures. This Chapter discusses the significance of the actual and potential direct, indirect and cumulative effects of the changes due to interaction between relevant receptors, which are Population & Health/Air/Noise/Traffic and Climate/Material Assets. It is based on the physical and environmental impacts of the existing facility and the proposed development on the receiving environment.

16.2 Population & Health/Air/Noise/Traffic

The proposed development has the potential to impact on human beings from noise, dust, odours and traffic. The proposed method of operation has taken account of these emissions and effective mitigation measures are already in place, as described in Chapters 4, 6, 10 and 11.

16.3 Traffic/Climate/Materials Assets

The increase in traffic and electricity consumption associated with the proposed development will result in additional direct and indirect greenhouse gas emissions and depletion of natural resources. The proposed method of operation has taken these changes into account and prevention and mitigation measures are already in place, as described in Chapters 4, 5, 6 and 15.

16.4 Cumulative Effects

The noise and air quality surveys were conducted during typical operational hours and the assessments include the impacts of both the emissions from the Panda facility, activities in the surrounding area and those associated with the proposed development. The traffic and transport assessment took into account the proposed expansion at the nearby SEHL facility in Millennium Business Park.

Table 16.1 Interaction of Impacts

	Climate	Traffic	Soils & Geology	Water	Ecology	Air	Noise	Landscape	Human Beings	Heritage	Material Assets
Climate		√									
Traffic						√					
Soils & Geology											
Water											
Ecology											
Air	√								√		
Noise									√		
Landscape											
Human Beings											
Heritage											
Material Assets											

APPENDIX 1

EPA LICENCE

LICENCE REG. NO W0261-02 HAS BEEN TRANSFERRED
Please note that Licence Reg. No. W0261-02 was transferred to Starrus Eco Holdings Limited on 22 June 2018. For further information on this please refer to the Transfer Notification on the Ageny's website.

This licence was amended on 22 January 2020 under Section 96(1)(c) of the Environmental Protection Agency Act 1992, as amended. The details of Amendment A must be read in conjunction with this licence. The amendment document is entitled "Technical Amendment A".

This licence was amended on 25 February 2020 under Section 96(1)(a) of the Environmental Protection Agency Act 1992, as amended. The details of Amendment B must be read in conjunction with this licence. The amendment document is entitled "Clerical Amendment B".

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Headquarters
P.O. Box 3000
Johnstown Castle Estate
County Wexford
Ireland

INDUSTRIAL EMISSIONS LICENCE

Licence Register Number:	**W0261-02**
Company Register Number:	**115425**
Licensee:	**Nurendale Limited**
Location of Installation:	**Cappagh Road Cappogue Finglas Dublin 11**

ENVIRONMENTAL PROTECTION AGENCY ACT 1992 AS AMENDED

INDUSTRIAL EMISSIONS LICENCE

Decision of Agency, under Section 90(2) of the Environmental Protection Agency Act 1992 as amended.

Reference number in Register of licences: W0261-02

Further to notice dated 31/12/2014 the Agency in exercise of the powers conferred on it by the Environmental Protection Agency Act 1992 as amended, for the reasons hereinafter set out, hereby grants a revised Industrial Emissions licence to Nurendale Limited, Rathdrinagh, Beauparc, Navan, County Meath, CRO number 115425,

to carry on the following activities

-: Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, (other than activities to which the Urban Waste Water Treatment Regulations 2001 (S.I. No. 254 of 2001) apply):
(ii) pre-treatment of waste for incineration or co-incineration;

and

:- The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised license under Part IV is in force or in respect of which licence under the said Part is or will be required.

at Cappagh Road, Cappogue, Finglas, Dublin 11 subject to the conditions as set out.

GIVEN under the Seal of the Agency this 11th day of February 2015

PRESENT when the seal of the Agency
was affixed hereto:

Mary Turner, Authorised Person

INTRODUCTION

This introduction is not part of the licence and does not purport to be a legal interpretation of the licence.

This licence authorises Nurendale Limited (CRO Number 115425) to operate a materials recovery facility that processes construction and demolition and non-hazardous commercial and industrial wastes, household and commercial dry recyclable wastes as well as clean paper and cardboard. In particular this licence review authorises the installation to increase the quantity of waste, to expand the type of wastes that can be accepted at the installation and to extend the hours of operation and waste acceptance. This licence authorises the acceptance of 250,000 tonnes per annum of non-hazardous waste. The changes introduce one new emission point to air associated with the odour abatement unit to be installed where residual, food and other odour-forming waste will be processed.

For the purposes of the EU Industrial Emissions Directive (2010/75/EU), this installation falls within the scope of the following Annex I categories:

Category 5.3 (b): Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, and excluding activities covered by Directive 91/271/EEC:
(ii) pre-treatment of waste for incineration or co-incineration.

The licence sets out in detail the conditions under which Nurendale Limited will operate and manage this installation.

Table of Contents

Page No

Glossary of Terms

All terms in this licence should be interpreted in accordance with the definitions in the Environmental Protection Agency Act 1992 as amended / Waste Management Act 1996 as amended, unless otherwise defined in the section.

Adequate lighting	20 lux measured at ground level.
AER	Annual Environmental Report.
Aerosol	A suspension of solid or liquid particles in a gaseous medium.
Agreement	Agreement in writing.
Annually	All or part of a period of twelve consecutive months.
Application	The application by the licensee for this licence.
Appropriate Facility	A waste management facility, duly authorised under relevant law and technically suitable.
Attachment	Any reference to Attachments in this licence refers to attachments submitted as part of this licence application.
Basic characterisation	A thorough determination, according to standardised analysis and behaviour testing methods, of the short and long-term leaching behaviour and/or characteristic properties of the waste.
BAT	Best Available Techniques.
BAT conclusions	A document containing the parts of a BAT reference document laying down the conclusions on best available techniques, their description, information to assess their applicability, the emission levels associated with the best available techniques, associated monitoring, associated consumption levels and, where appropriate, relevant site remediation measures.
BAT reference document	A document drawn up by the Commission of the European Union in accordance with Article 13 of the Industrial Emissions Directive, resulting from the exchange of information in accordance with that Article of that Directive and describing, in particular, applied techniques, present emissions and consumption levels, techniques considered for the determination of best available techniques as well as BAT conclusions and any emerging techniques.
Biannually	At approximately six – monthly intervals.
Biennially	Once every two years.
Biodegradable waste	Any waste that is capable of undergoing anaerobic or aerobic decomposition, such as food, garden waste, sewage sludge, paper and paperboard.

Biodegradable municipal waste (BMW)	The biodegradable component of municipal waste, typically composed of food and garden waste, wood, paper, cardboard and textiles.
Biowaste	Biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants.
BOD	5 day Biochemical Oxygen Demand (without nitrification suppression).
CEN	Comité Européen De Normalisation – European Committee for Standardisation.
COD	Chemical Oxygen Demand.
Commercial Waste	As defined in Section 5(1) of the Waste Management Act 1996, as amended.
Compliance Testing	This constitutes periodical testing to determine whether a waste complies with waste acceptance criteria. The tests focus on key variables and behaviour identified by basic characterisation.
Construction and demolition (C&D) waste	Wastes that arise from construction, renovation and demolition activities: Chapter 17 of the EWC or as otherwise may be agreed.
Containment boom	A boom that can contain spillages and prevent them from entering drains or watercourses or from further contaminating watercourses.
CRO Number	Company Register Number.
Daily	During all days of plant operation and, in the case of emissions, when emissions are taking place; with at least one measurement on any one day.
Day	Any 24 hour period.
Daytime	0700 hrs to 1900 hrs.
dB(A)	Decibels (A weighted).
DO	Dissolved oxygen.
Documentation	Any report, record, results, data, drawing, proposal, interpretation or other document in written or electronic form which is required by this licence.
Drawing	Any reference to a drawing or drawing number means a drawing or drawing number contained in the application, unless otherwise specified in this licence.
Emission limits	Those limits, including concentration limits and deposition rates, established in *Schedule B: Emission Limits,* of this licence.
EMP	Environmental Management Programme.

Environmental damage	As defined in Directive 2004/35/EC.
EPA	Environmental Protection Agency.
European Waste Catalogue (EWC)	A harmonised, non-exhaustive list of wastes drawn up by the European Commission and published as Commission Decision 2000/532/EC and any subsequent amendment published in the Official Journal of the European Community.
Evening Time	1900hrs to 2300hrs
Facility	Any site or premises used for the purpose of the recovery or disposal of waste.
Fortnightly	A minimum of 24 times per year, at approximately two week intervals.
Gas Oil	Gas Oil as defined in Council Directive 1999/32/EC and meeting the requirements of S.I. No. 119 of 2008.
GC/MS	Gas chromatography/mass spectroscopy.
Green Waste	Waste wood (excluding timber), plant matter such as grass cuttings, and other vegetation.
Groundwater	Has the meaning assigned to it by Regulation 3 of the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010).
ha	Hectare.
Heavy metals	This term is to be interpreted as set out in "Parameters of Water Quality, Interpretation and Standards" published by the Agency in 2001. ISBN 1-84095-015-3.
Hours of operation	The hours during which the installation is authorised to be operational.
Hours of waste acceptance	The hours during which the installation is authorised to accept waste.
ICP	Inductively coupled plasma spectroscopy.
IE	Industrial Emissions.

Incident	The following shall constitute as incident for the purposes of this licence: (i) an emergency; (ii) any emission which does not comply with the requirements of this licence; (iii) any exceedance of the daily duty capacity of the waste handling equipment; (iv) any trigger level specified in this licence which is attained or exceeded; and, (v) any indication that environmental pollution has, or may have, taken place.
Industrial Emissions Directive	Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast).
Industrial waste	As defined in Section 5(1) of the Waste Management Act 1996 as amended.
Inert waste	Waste that does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the ecotoxicity of the leachate must be insignificant, and in particular must not endanger the quality of surface water and/or groundwater.
Installation	A stationary technical unit or plant where the activity concerned referred to in the First Schedule of EPA Act 1992, as amended is or will be carried on, and shall be deemed to include any directly associated activity, which has a technical connection with the activity and is carried out on the site of the activity.
Irish Water	Irish Water, Colvill House, 24/26 Talbot Street, Dublin 1.
K	Kelvin.
kPa	Kilopascals.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).
Landfill Directive	Council Directive 1999/31/EC.
$L_{Ar,T}$	The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and/or impulsiveness of the sound.
Licensee	Nurendale Limited, Rathdrinagh, Beauparc, Navan, County Meath, CRO Number (115425).

Liquid waste	Any waste in liquid form and containing less than 2% dry matter.
List I	As listed in the EC Directives 2006/11/EC and 80/68/EEC and amendments.
List II	As listed in the EC Directives 2006/11/EC and 80/68/EEC and amendments.
Local Authority	Fingal County Council.
Maintain	Keep in a fit state, including such regular inspection, servicing, calibration and repair as may be necessary to perform its function adequately.
Mass flow limit	An emission limit value expressed as the maximum mass of a substance that can be emitted per unit time.
Mass flow threshold	A mass flow rate above which a concentration limit applies.
Mobile plant	Self-propelled machinery used for the emplacement of wastes or for the construction of specified engineering works.
Monthly	A minimum of 12 times per year, at intervals of approximately one month.
Municipal waste	As defined in Section 5(1) of the Waste Management Act 1996 to 2012.
Night-time	2300 hrs to 0700 hrs.
Noise-sensitive location (NSL)	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other installation or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
Oil separator	Device installed according to the International Standard I.S. EN 858-2:2003 (Separator system for light liquids, (e.g. oil and petrol) – Part 2: Selection of normal size, installation, operation and maintenance).
PRTR	Pollutant Release and Transfer Register.
Quarterly	All or part of a period of three consecutive months beginning on the first day of January, April, July or October.
Recyclable materials	Waste types, such as cardboard, batteries, gas cylinders etc, may be recycled.
Refuse Derived Fuel (RDF)	Fuel that has been produced in accordance with a technical standard from pre-treated non-hazardous municipal, commercial or industrial waste.
Residual Waste	The fraction of collected waste remaining after a treatment or diversion step, which generally requires further treatment or disposal, including mixed municipal waste.

Sample(s)	Unless the context of this licence indicates to the contrary, the term samples shall include measurements taken by electronic instruments.
Sanitary effluent	Wastewater from installation toilet, washroom and canteen facilities.
Separate Collection	The collection of bio-waste separately from other kinds of waste in such a way as to avoid the different waste fractions or waste components from waste being mixed, combined or contaminated with other potentially polluting wastes, products or materials.
Soil	The top layer of the Earth's crust situated between the bedrock and the surface. The soil is composed of mineral particles, organic matter, water, air and living organisms.
Solid recovered fuel (SRF)	Fuel that has been produced in accordance with a technical standard from pre-treated non-hazardous municipal, commercial or industrial waste.
SOP	Standard operating procedure.
Source segregated waste	Waste which is separated at source; meaning that the waste is sorted at the point of generation into a recyclable fraction(s) for separate collection (e.g., paper, metal, glass, plastic, bulk dry recyclables, biodegradables, etc.,) and a residual fraction. The expression 'separate at source' shall be construed accordingly.
Specified emissions	Those emissions listed in *Schedule B: Emission Limits,* of this licence.
Specified Engineering Works	Engineering works listed in *Schedule D: Specified Engineering Works,* of this licence.
Standard method	A National, European or internationally recognised procedure (e.g. I.S. EN, ISO, CEN, BS or equivalent); or an in-house documented procedure based on the above references; a procedure as detailed in the current edition of "Standard Methods for the Examination of Water and Wastewater" (prepared and published jointly by A.P.H.A., A.W.W.A. & W.E.F.), American Public Health Association, 1015 Fifteenth Street, N.W., Washington DC 20005, USA; or an alternative method as may be agreed by the Agency.
Storage	Includes holding of waste.
Storm water	Rain water run-off from roof and non-process areas.
Temporary storage	In relation to waste is a period of less than six months as defined in the Waste Management Act 1996, as amended.
The Agency	Environmental Protection Agency.
TOC	Total organic carbon.
Trade effluent	Trade effluent has the meaning given in the Water Services Act, 2007.

Treatment/Pre-treatment:	In relation to waste, any manual, thermal, physical, chemical or biological processes that change the characteristics of waste in order to reduce its volume or hazardous nature or facilitate its handling, disposal or recovery, including baling and wrapping of waste.
Trigger level	A parameter value, the achievement or exceedance of which requires certain actions to be taken by the licensee.
Waste	Any substance or object which the holder discards or intends or is required to discard.
Water Services Authority	Fingal County Council.
WEEE	As defined in S.I. No. 340 of 2005.
Weekly	During all weeks of plant operation and, in the case of emissions, when emissions are taking place; with at least one measurement in any one week.
WWTP	Waste water treatment plant.

Decision & Reasons for the Decision

The Environmental Protection Agency is satisfied, on the basis of the information available, that subject to compliance with the conditions of this licence, any emissions from the activity will comply with and will not contravene any of the requirements of Section 83(5) of the Environmental Protection Agency Act 1992, as amended.

In reaching this decision the Environmental Protection Agency has considered the documentation relating to the current licence, Register Number: W0261-01, and the review application Register Number: W0261-02. This includes supporting documentation received from the applicant, a submission received from a third party, the reports of the Licensing Inspector and the Environmental Impact Assessment (EIA) report contained therein.

It is considered that the Environmental Impact Assessment Report (as included in the Inspector's Report dated 20th November 2014) contains a fair and reasonable assessment of the likely significant effects of the licensed activity on the environment. The assessment as reported is adopted as the assessment of the Agency. Having regard to this assessment, it is considered that the proposed activity, if managed, operated and controlled in accordance with the licence will not result in the contravention of any relevant environmental quality standards or cause environmental pollution.

A screening for Appropriate Assessment was undertaken to assess, in view of best scientific knowledge and the conservation objectives of the site, if the proposed activity, individually or in combination with other plans or projects is likely to have a significant effect on a European Site(s). In this context, particular attention was paid to the following European sites:

- South Dublin Bay SAC (000210);
- North Dublin Bay SAC (000206);
- North Bull Island SPA (004006);
- South Dublin Bay and River Tolka Estuary SPA (004024);
- Baldoyle Bay SPA (004016);
- Baldoyle Bay SAC (000199).

The Agency considered, for the reasons set out below, that the proposed activity is not directly connected with or necessary to the management of those sites as European Sites and that it can be excluded, on the basis of objective information, that the proposed activity, individually or in combination with other plans or projects, will have a significant effect on a European site, and accordingly the Agency determined that an Appropriate Assessment of the proposed activity is not required.

It has been determined that this facility does not have the potential for significant effects on any European site due to the nature and scale of the operations, the absence of a process emission to water and the distance between the installation and the designated sites.

No objection having been received to the proposed determination, the licence is granted in accordance with the terms of the proposed determination.

Part I Schedule of Activities Licensed

In pursuance of the powers conferred on it by the Environmental Protection Agency Act 1992 as amended, the Agency hereby grants this Industrial Emissions licence to:

Nurendale Limited, Rathdrinagh, Beauparc, Navan, County Meath, and CRO Number (115425)

under Section 90(2) of the said Act to carry on the following activities:

> Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, (other than activities to which the Urban Waste Water Treatment Regulations 2001 (S.I. No. 254 of 2001) apply):
> (ii) pre-treatment of waste for incineration or co-incineration;

and

> The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised license under Part IV is in force or in respect of which licence under the said Part is or will be required.

at Cappagh Road, Cappogue, Finglas, Dublin 11 subject to the following twelve Conditions, with the reasons therefor and associated schedules attached thereto.

Part II Schedule of Activities Refused

None of the proposed activities as set out in the licence application have been refused.

Part III Conditions

Condition 1. Scope

1.1 Industrial Emissions Directive activities at this installation shall be restricted to those listed and described in *Part I Schedule of Activities Licensed*, and shall be as set out in the licence application or as modified under Condition 1.4 of this licence and subject to the conditions of this licence.

1.2 Activities at this installation shall be limited as set out in *Schedule A: Limitations*, of this licence.

1.3 For the purposes of this licence, the installation authorised by this licence is the area of land outlined in red on Drawing No. 6419 (A3), Site Location Map, of the application. Any reference in this licence to "installation" shall mean the area thus outlined in red. The licensed activities shall be carried on only within the area outlined.

1.4 No alteration to, or reconstruction in respect of, the activity, or any part thereof, that would, or is likely to, result in

(i) a material change or increase in:

- the nature or quantity of any emission;
- the abatement/treatment or recovery systems;
- the range of processes to be carried out;
- the fuels, raw materials, intermediates, products or wastes generated, or

(ii) any changes in:

- site management, infrastructure or control with adverse environmental significance;

shall be carried out or commenced without prior notice to, and without the agreement of, the Agency.

1.5 The installation shall be controlled, operated and maintained, and emissions shall take place as set out in the licence. All programmes required to be carried out under the terms of this licence become part of this licence.

1.6 This licence is for the purpose of Industrial Emissions licensing under the EPA Act 1992 as amended only and nothing in this licence shall be construed as negating the licensee's statutory obligations or requirements under any other enactments or regulations.

1.7 This licence shall have effect in lieu of the licence granted to the licensee on 31 August 2010 (Register No W0261-01).

Reason: ***To clarify the scope of this licence.***

Condition 2. Management of the Installation

2.1 Installation Management

2.1.1 The licensee shall employ a suitably qualified and experienced installation manager who shall be designated as the person in charge. The installation manager or a nominated, suitably qualified and experienced deputy shall be present on the installation at all times during its operation or as otherwise required by the Agency.

2.1.2 The licensee shall ensure that personnel performing specifically assigned tasks shall be qualified on the basis of appropriate education, training and experience as required and shall be aware of the requirements of this licence.

2.2 Environmental Management System (EMS)

2.2.1 The licensee shall maintain and implement an Environmental Management System (EMS), which shall incorporate energy efficiency management. The EMS shall be reviewed for suitability, adequacy and effectiveness and updated on an annual basis.

2.2.2 The EMS shall include, as a minimum, the following elements:

2.2.2.1 An environmental policy defined for the installation.

2.2.2.2 Management and Reporting Structure.

2.2.2.3 Schedule of Environmental Objectives and Targets.

The licensee shall maintain and implement a Schedule of Environmental Objectives and Targets. The schedule shall, as a minimum, provide for a review of all operations and processes, including an evaluation of practicable options, for energy and resource efficiency, the use of cleaner technology, cleaner production and the prevention, reduction and minimisation of waste and shall include waste reduction targets. The schedule shall include time frames for the achievement of set targets and shall address a five-year period as a minimum. In relation to waste recovery the schedule shall include an initial waste recovery target for waste accepted, as well as time frames for achieving higher recovery targets. The schedule shall, as a minimum, include specific objectives for the control and minimisation as well as an annual review of the dust, odour and noise nuisance potential of the site activities. The schedule shall be reviewed annually and amendments thereto notified to the Agency for agreement as part of the Annual Environmental Report (AER).

2.2.2.4 Environmental Management Programme (EMP)

The licensee shall maintain and implement an EMP, including a time schedule, for achieving the Environmental Objectives and Targets prepared under Condition 2.2.2.3. The EMP shall include:

- designation of responsibility for targets;
- the means by which they may be achieved;
- the time within which they may be achieved.

The EMP shall be reviewed annually and amendments thereto notified to the Agency for agreement as part of the Annual Environmental Report (AER).

A report on the programme, including the success in meeting agreed targets, shall be prepared and submitted to the Agency as part of the AER. Such reports shall be retained on-site for a period of not less than seven years and shall be available for inspection by authorised persons of the Agency.

2.2.2.5 Documentation

(i) The licensee shall maintain and implement an environmental management documentation system which shall be to the satisfaction of the Agency.

(ii) The licensee shall issue a copy of this licence to all relevant personnel whose duties relate to any condition of this licence.

2.2.2.6 Corrective and Preventative Action

(i) The licensee shall establish, maintain and implement procedures to ensure that corrective and preventative action is taken should the specified requirements of this licence not be fulfilled. The responsibility and authority for persons initiating further investigation and corrective and preventative action in the event of a reported non-conformity with this licence shall be defined.

(ii) Where a breach of one or more of the conditions of this licence occurs, the licensee shall without delay take measures to restore

compliance with the conditions of this licence in the shortest possible time and any feasible preventative actions to prevent recurrence of the breach.

(iii) All corrective and preventative actions shall be documented.

2.2.2.7 Internal Audits

The licensee shall establish, maintain and implement a programme for independent internal audits of the EMS. Such audits shall be carried out at least once every three years. The audit programme shall determine whether or not the EMS is being implemented and maintained properly, and in accordance with the requirements of the licence. Audit reports and records of resultant corrective and preventative actions shall be maintained as part of the EMS in accordance with condition 2.2.2.5.

2.2.2.8 Awareness and Training

The licensee shall maintain and implement procedures for identifying training needs, and for providing appropriate training, for all personnel whose work can have a significant effect upon the environment. Appropriate records of training shall be maintained.

2.2.2.9 Communications Programme

The licensee shall maintain and implement a Public Awareness and Communications Programme to ensure that members of the public can obtain information at the facility, at all reasonable times, concerning the environmental performance of the facility.

2.2.2.10 Maintenance Programme

The licensee shall maintain and implement a programme for maintenance of all plant and equipment based on the instructions issued by the manufacturer/supplier or installer of the equipment. Appropriate record keeping and diagnostic testing shall support this maintenance programme. The licensee shall clearly allocate responsibility for the planning, management and execution of all aspects of this programme to appropriate personnel (see Condition 2.1 above). The maintenance programme shall use appropriate techniques and measures to ensure the optimisation of energy efficiency in plant and equipment.

2.2.2.11 Efficient Process Control

The licensee shall maintain and implement a programme to ensure there is adequate control of processes under all modes of operation. The programme shall identify the key indicator parameters for process control performance, as well as identifying methods for measuring and controlling these parameters. Abnormal process operating conditions shall be documented, and analysed to identify any necessary corrective action.

Reason:	***To make provision for management of the activity on a planned basis having regard to the desirability of ongoing assessment, recording and reporting of matters affecting the environment.***

Condition 3. Infrastructure and Operation

3.1 The licensee shall establish and maintain, for each component of the installation, all infrastructure referred to in this licence in advance of the commencement of the licensed activities in that component, or as required by the conditions of this licence. Infrastructure specified in the application that relates to the environmental performance of the installation and is not specified in the licence, shall be installed in accordance with the schedule submitted in the application.

3.2 The licensee shall have regard to the following when choosing and/or designing any new plant or infrastructure:

(i) energy efficiency; and,
(ii) the environmental impact of eventual decommissioning.

3.3 Installation Notice Board

3.3.1 The licensee shall, within one month of the date of grant of this licence, provide an Installation Notice Board on the installation so that it is legible to persons outside the main entrance to the installation. The minimum dimensions of the board shall be 1200 mm by 750 mm. The notice board shall be maintained thereafter.

3.3.2 The board shall clearly show:

(i) the name and telephone number of the installation;
(ii) the normal hours of operation;
(iii) the name of the licence holder;
(iv) an emergency out of hours contact telephone number;
(v) the licence reference number; and
(vi) where environmental information relating to the installation can be obtained.

3.3.3 A plan of the installation clearly identifying the location of each storage and treatment area shall be displayed as close as is possible to the entrance to the installation. The plan shall be displayed on a durable material such that is legible at all times. The plan shall be replaced as material changes to the installation are made.

3.4 Installation Security

3.4.1 Security and stockproof fencing and gates shall be maintained at the installation. The base of the fencing shall be set in the ground. Subject to the implementation of the Decommissioning Management Plan (as required by Condition 10.2 of this licence) the requirement for such installation security may be removed.

3.4.2 The licensee shall install and maintain a CCTV monitoring system which records all waste vehicle movements into and out of the installation. The CCTV system shall be operated at all times with digital date stamping. Unless otherwise agreed by the Agency, copies of recordings shall be kept on site or stored electronically at a secure off-site location and made available to the Agency on request.

3.4.3 Gates shall be locked shut when the facility is unsupervised.

3.4.4 The licensee shall remedy any defect in the gates and/or fencing as follows:

(i) A temporary repair shall be made by the end of the working day; and

(ii) A repair to the standard of the original gates and/or fencing shall be undertaken within three working days.

3.5 Installation Roads and Site Surfaces

3.5.1 Effective site roads shall be provided and maintained to ensure the safe and nuisance-free movement of vehicles within the installation.

3.5.2 The licensee shall provide and maintain an impermeable concrete surface in the areas of the installation associated with the movement, processing, handling and storage of wastes. The surfaces shall be concreted and constructed to British Standard 8110 or

an alternative as agreed by the Agency. The licensee shall remedy any defect in concrete surfaces within five working days.

3.6 Facility Office

3.6.1 The licensee shall provide and maintain an office at the installation. The office shall be constructed and maintained in a manner suitable for the processing and storing of documentation.

3.6.2 The licensee shall provide and maintain a working telephone and a method for electronic transfer of information at the installation.

3.7 Waste Inspection and Quarantine Areas

3.7.1 A Waste Inspection Area and a Waste Quarantine Area shall be provided and maintained at the installation.

3.7.2 These areas shall be constructed and maintained in a manner suitable, and be of a size appropriate, for the inspection of waste and subsequent quarantine if required. The waste inspection area and the waste quarantine area shall be clearly identified and segregated from each other.

3.8 Weighbridge and Wheel Cleaners

3.8.1 The licensee shall provide and maintain a weighbridge and wheel cleaners at the installation.

3.8.2 The wheel cleaners shall be used by all vehicles leaving the facility as required to ensure that no trade effluent/storm water or waste is carried off-site. All water from the wheel cleaning area shall be directed to the waste water collection and storage system.

3.8.3 The wheel-wash shall be inspected on a daily basis and drained as required. Silt, stones and other accumulated material shall be removed as required from the wheel-wash and disposed of appropriately.

3.9 Waste handling, ventilation and processing plant

3.9.1 Items of plant deemed critical to the efficient and adequate processing of waste at the facility (including *inter alia* waste-loading vehicles and ejector trailers) shall be provided on the following basis:

(i) 100% duty capacity;

(ii) 20% standby capacity available on a routine basis; and

(iii) Provision of contingency arrangements and/or backup and spares in the case of breakdown of critical equipment.

3.9.2 Within three months from the date of grant of this licence, the licensee shall maintain an inventory detailing the duty and standby capacity in tonnes per day, of all waste handling and processing equipment to be used at the facility. These capacities shall be based on the licensed waste intake, as per *Schedule A: Limitations*, of this licence.

3.9.3 The quantity of waste to be accepted at the facility on a daily basis shall not exceed the duty capacity of the equipment at the facility. Any exceedance of this intake shall be treated as an incident.

3.10 Waste Water Management

3.10.1 The licensee shall maintain a waste water collection and storage system as outlined in section 5.10 of the 'Project Description' document of licence application Reg. No. W0261-01.

3.10.2 All waste water (including sanitary effluent from the site offices, floor washdown water and drainage from waste storage and quarantine areas) shall be collected and stored in the on-site waste water storage tanks prior to disposal off-site.

3.10.3 Waste water stored in the on-site storage tanks shall be tankered off-site in fully enclosed road tankers to a Wastewater Treatment Plant that is satisfactory to the Agency.

3.10.4 The licensee shall monitor the available storage capacity in the underground waste water storage tanks on a weekly basis. A log of such inspections shall be maintained.

3.11 Construction and Demolition Waste Recovery Area

3.11.1 The licensee shall provide and maintain a construction and demolition waste recovery area. This infrastructure shall at a minimum comprise the following:

(i) an impermeable concrete slab;
(ii) collection and disposal infrastructure for all run-off;
(iii) appropriate bunding to provide visual and noise screening; and
(iv) all stockpiles shall be adequately contained to minimise dust generation.

3.11.2 Only construction and demolition waste shall be accepted at this area. Wastes that are capable of being recovered shall be separated and shall be stored temporarily in this area in advance of being subjected to other recovery activities at the facility or transport off the facility.

3.12 Dust/Odour Control

3.12.1 The licensee shall install and provide adequate measures for the control of odours and dust emissions, including fugitive dust emissions, from the facility.

3.12.2 An odour management system shall be provided before any residual or food waste is accepted at the installation. Installation of an odour-management system shall at a minimum include the following:

(i) Dust curtains (or equivalent approved by the Agency) shall be maintained on the entry/exit points from the waste transfer building; all other doors in this building shall be kept closed when not in use.

(ii) Unless otherwise agreed by the Agency, all buildings for the storage or treatment of residual, food and other odour-forming waste shall be maintained at negative air pressure with ventilated gases being subject to treatment as necessary or as may be specified by the Agency.

(iii) The licensee shall maintain a programme to demonstrate negative pressure and building envelope integrity throughout all buildings where residual, food and other odour-forming waste is deposited, stored or treated to ensure that there is no significant escape of odours. The programme shall also maintain all criteria for the operation and control of negative pressure. This programme shall be reviewed at least annually.

3.13 Operational Controls

The licensee shall provide and use adequate lighting during the operation of the facility in hours of darkness.

3.14 The licensee shall install on all emission points such sampling points or equipment, including any data-logging or other electronic communication equipment, as may be required by the Agency. All such equipment shall be consistent with the safe operation of all sampling and monitoring systems.

3.15 The licensee shall clearly label and provide safe and permanent access to all on-site sampling and monitoring points and to off-site points as required by the Agency. The requirement with regard to off-site points is subject to the prior agreement of the landowner(s) concerned.

3.16 Tank, Container and Drum Storage Areas

3.16.1 All tank, container and drum storage areas shall be rendered impervious to the materials stored therein. Bunds shall be designed having regard to Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (2004).

3.16.2 All tank and drum storage areas shall, as a minimum, be bunded, either locally or remotely, to a volume not less than the greater of the following:

(i) 110% of the capacity of the largest tank or drum within the bunded area; or

(ii) 25% of the total volume of substance that could be stored within the bunded area.

3.16.3 All drainage from bunded areas shall be treated as contaminated unless it can be demonstrated to be otherwise. All drainage from bunded areas shall be diverted for collection and safe disposal, unless it can be deemed uncontaminated and does not exceed the trigger levels set for storm water emissions under 6.11.

3.16.4 All inlets, outlets, vent pipes, valves and gauges must be within the bunded area.

3.16.5 All tanks, containers, drums and pipework shall be labelled to clearly indicate their:

(i) contents;
(ii) capacity; and
(iii) flow direction.

3.17 The licensee shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage at the installation. Once used, the absorbent material shall be disposed of at an appropriate facility.

3.18 Silt Traps and Oil Separators

The licensee shall maintain silt traps and oil separators at the installation:

(i) Silt traps to ensure that all storm water discharges, other than from roofs, from the installation pass through a silt trap in advance of discharge;

(ii) An oil separator on the storm water discharge from yard areas. The separator shall be a Class I full retention separator.

The silt traps and separator shall be in accordance with I.S. EN-858-2: 2003 (separator systems for light liquids).

3.19 Fire-water Retention

3.19.1 The licensee shall, prior to the acceptance of residual, food and other odour-forming waste at the installation and in any event within six months of date of grant of licence, undertake an updated risk assessment on the need for fire water retention having regard to the Environmental Protection Agency Draft Guidance Note to Industry on the Requirements for Fire-Water Retention Facilities. The licensee shall implement any mitigation measures identified by the risk assessment.

3.19.2 The licensee shall ensure permanent access is maintained at all times to the shut-off valve for surface water run-off in the event of a fire and that the valve is clearly labelled.

3.20 All pump sumps, storage tanks or other treatment plant chambers from which spillage of environmentally significant materials might occur in such quantities as are likely to breach local or remote containment or separators, shall be fitted with high liquid level alarms (or oil detectors as appropriate).

3.21 The provision of a catchment system to collect any leaks from flanges and valves of all over-ground pipes used to transport material other than water shall be examined. This shall be incorporated into a Schedule of Environmental Objectives and Targets set out in Condition 2 of this licence for the reduction in fugitive emissions.

3.22 The licensee shall maintain in a prominent location on the site a wind sock, or other wind direction indicator, which shall be visible from the public roadway outside the site.

3.23 Specified Engineering Works

3.23.1 The licensee shall submit proposals for all Specified Engineering Works, as defined in *Schedule D: Specified Engineering Works*, of this licence, to the Agency for its agreement at least two months in advance of the intended date of commencement of any such works. No such works shall be carried out without the prior agreement of the Agency.

3.23.2 All specified engineering works shall be supervised by a competent person(s) and that person, or persons, shall be present at all times during which relevant works are being undertaken.

3.23.3 Following the completion of all specified engineering works, the licensee shall complete a construction quality assurance validation. The validation report shall be made available to the Agency on request. The report shall, as appropriate, include the following information:

(i) A description of the works;

(ii) As-built drawings of the works;

(iii) Any other information requested in writing by the Agency.

3.24 Waste Acceptance Hours and Hours of Operation

3.24.1 Waste shall be accepted at or dispatched from the installation only between the hours of 6:00 and 23:00 Monday to Saturday inclusive, unless otherwise agreed by the Agency.

3.24.2 The installation shall be operated only during the hours of 7:00 to 21:00 Monday to Saturday inclusive.

3.24.3 The installation shall not operate or accept/dispatch waste on Sundays or on Public Holidays without the agreement of the Agency.

Reason: ***To provide for appropriate operation of the installation to ensure protection of the environment.***

Condition 4. Interpretation

4.1 Emission limit values for emissions to atmosphere in this licence shall be interpreted in the following way:

4.1.1 Continuous Monitoring

(i) No 24 hour mean value shall exceed the emission limit value.

(ii) 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value.

(iii) No 30 minute mean value shall exceed twice the emission limit value.

4.1.2 Non-Continuous Monitoring

(i) For any parameter where, due to sampling/analytical limitations, a 30 minute sample is inappropriate, a suitable sampling period should be employed and the value obtained therein shall not exceed the emission limit value.

(ii) For flow, no hourly or daily mean value, calculated on the basis of appropriate spot readings, shall exceed the relevant limit value.

(iii) For all other parameters, no 30 minute mean value shall exceed the emission limit value.

4.2 The concentration and volume flow limits for emissions to atmosphere specified in this licence shall be achieved without the introduction of dilution air and shall be based on gas volumes under standard conditions of:

4.2.1 From non-combustion sources:

Temperature 273K, Pressure 101.3 kPa (no correction for oxygen or water content).

4.2.2 From combustion sources:

Temperature 273K, Pressure 101.3 kPa, dry gas; 3% oxygen for liquid and gas fuels, 6% oxygen for solid fuels.

4.3 Where the ability to measure a parameter is affected by mixing before emission, then, with agreement from the Agency, the parameter may be assessed before mixing takes place.

4.4 Noise

Noise from the installation shall not give rise to sound pressure levels ($L_{Aeq,\ T}$) measured at NSLs of the installation which exceed the limit value(s).

4.5 Dust and Particulate Matter

Dust and particulate matters from the activity shall not give rise to deposition levels which exceed the limit value(s).

Reason: ***To clarify the interpretation of limit values fixed under the licence.***

Condition 5. Emissions

5.1 No specified emission from the installation shall exceed the emission limit values set out in *Schedule B: Emission Limits,* of this licence. There shall be no other emissions of environmental significance.

5.2 No emissions, including odours, from the activities carried on at the site shall result in an impairment of, or an interference with amenities or the environment beyond the installation boundary or any other legitimate uses of the environment beyond the installation boundary.

5.3 No substance shall be discharged in a manner, or at a concentration, that, following initial dilution, causes tainting of fish or shellfish.

5.4 The licensee shall ensure that all or any of the following:

- Vermin
- Birds
- Flies
- Mud
- Dust
- Litter

associated with the activity do not result in an impairment of, or an interference with, amenities or the environment at the installation or beyond the installation boundary or any other legitimate uses of the environment beyond the installation boundary. Any method used by the licensee to control or prevent any such impairment/interference shall not cause environmental pollution.

5.5 No trade effluent, firewater, leachate and/or contaminated storm water shall be discharged to surface water drains.

5.6 There shall be no direct emissions to ground or groundwater.

5.7 The road network in the vicinity of the facility shall be kept free from any debris caused by vehicles entering or leaving the facility. Any such debris or deposited materials shall be removed without delay.

Reason: ***To provide for the protection of the environment by way of control and limitation of emissions.***

Condition 6. Control and Monitoring

6.1 Test Programme

6.1.1 The licensee shall prepare to the satisfaction of the Agency, a test programme for abatement equipment installed to abate emissions to atmosphere at A2-1 (odour control unit). This programme shall be submitted to the Agency in advance of implementation.

6.1.2 The programme, following agreement with the Agency, shall be completed within three months of the commencement of operation of the abatement equipment.

6.1.3 The criteria for the operation of the abatement equipment as determined by the test programme, shall be incorporated into the standard operating procedures.

6.1.4 The test programme shall as a minimum:

(i) establish all criteria for operation, control and management of the abatement equipment to ensure compliance with the emission limit values specified in this licence; and

(ii) assess the performance of any monitors on the abatement system and establish a maintenance and calibration programme for each monitor.

6.1.5 A report on the test programme shall be submitted to the Agency within one month of completion.

6.2 The licensee shall carry out such sampling, analyses, measurements, examinations, maintenance and calibrations as set out below and as in accordance with *Schedule C: Control & Monitoring,* of this licence.

6.2.1 Analyses shall be undertaken by competent staff in accordance with documented operating procedures.

6.2.2 Such procedures shall be assessed for their suitability for the test matrix and performance characteristics shall be determined.

6.2.3 Such procedures shall be subject to a programme of Analytical Quality Control using control standards with evaluation of test responses.

6.2.4 Where any analysis is sub-contracted it shall be to a competent laboratory.

6.3 The licensee shall ensure that:

(i) sampling and analysis for all parameters listed in the Schedules to this licence; and

(ii) any reference measurements for the calibration of automated measurement systems;

shall be carried out in accordance with CEN-standards. If CEN standards are not available, ISO, national or international standards that will ensure the provision of data of an equivalent scientific quality shall apply.

6.4 All automatic monitors and samplers shall be functioning at all times (except during maintenance and calibration) when the activity is being carried on unless alternative sampling or monitoring has been agreed in writing by the Agency for a limited period. In the event of the malfunction of any continuous monitor, the licensee shall contact the Agency as soon as practicable, and alternative sampling and monitoring facilities shall be put in place. The use of alternative equipment, other than in emergency situations, shall be as agreed by the Agency.

6.5 Monitoring and analysis equipment shall be operated and maintained as necessary so that monitoring accurately reflects the emission/discharge (or ambient conditions where that is the monitoring objective).

6.6 All treatment/abatement and emission control equipment shall be calibrated and maintained in accordance with the instructions issued by the manufacturer/supplier or installer.

6.7 The frequency, methods and scope of monitoring, sampling and analyses, as set out in this licence, may be amended with the agreement of the Agency following evaluation of test results.

6.8 The licensee shall prepare a programme, to the satisfaction of the Agency, for the identification and reduction of fugitive emissions using an appropriate combination of best available techniques. This programme shall be included in the Environmental Management Programme.

6.9 The integrity and water tightness of all underground pipes, tanks, bunding structures and containers and their resistance to penetration by water or other materials carried or stored therein shall be tested and demonstrated by the licensee. This testing shall be carried out by the licensee at least once every three years and reported to the Agency on each occasion. This testing shall be carried out in accordance with any guidance published by the Agency. A written record of all integrity tests and any maintenance or remedial work arising from them shall be maintained by the licensee.

6.10 The drainage system (i.e., gullies, manholes, any visible drainage conduits and such other aspects as may be agreed) shall be visually inspected weekly and desludged as necessary. All sludge and drainage from these operations shall be collected for safe disposal. The drainage system, bunds, silt traps and oil interceptors shall be properly maintained at all times. The licensee shall maintain a drainage map on site. The drainage map shall be reviewed annually and updated as necessary.

6.11 Storm Water

6.11.1 A visual examination of the storm water discharges shall be carried out daily. A log of such inspections shall be maintained.

6.11.2 A licensee shall, within six months of date of grant of licence, establish suitable trigger levels for pH, conductivity, suspended solids, total petroleum hydrocarbons and mineral oil in storm water discharges, such that storm waters exceeding these levels will be diverted for retention and suitable disposal. The licensee shall have regard to the Environmental Protection Agency "Guidance on the setting of trigger values for storm water discharges to off-site surface waters at EPA IPPC and Waste licensed facilities" when establishing the suitable trigger levels.

6.12 Noise

The licensee shall carry out a noise survey of the site operations annually. The survey programme shall be undertaken in accordance with the methodology specified in the 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)' as published by the Agency.

6.13 Pollutant Release and Transfer Register (PRTR)

The licensee shall prepare and report a PRTR for the site. The substance and/or wastes to be included in the PRTR shall be determined by reference to EC Regulations No. 166/2006 concerning the establishment of the European Pollutant Release and Transfer Register. The PRTR shall be prepared in accordance with any relevant guidelines issued by the Agency and shall be submitted electronically in specified format and as part of the AER.

6.14 The licensee shall, within six months of the date of grant of this licence, develop and establish a Data Management System for collation, archiving, assessing and graphically presenting the monitoring data generated as a result of this licence.

6.15 Litter Control

6.15.1 All loose litter or other waste, placed on or in the vicinity of the facility, other than in accordance with the requirements of this licence, shall be removed, subject to the agreement of the landowners, immediately and in any event by 10.00 am of the next working day after such waste is discovered.

6.15.2 The licensee shall ensure that all vehicles delivering waste to and removing waste and materials from the facility are appropriately covered.

6.16 Dust/Odour Control

6.16.1 All residual, food and other odour-forming waste, other than baled and wrapped waste, shall be removed from the facility within 48 hours of its arrival or generation on site, except at Public Holiday weekends. At Public Holiday weekends, this waste shall be removed within 72 hours of its arrival or generation on site.

6.16.2 In dry weather, site roads and any other areas used by vehicles shall be sprayed with water as and when required to minimise airborne dust nuisance.

6.16.3 The licensee shall undertake, as required by the Agency, an odour assessment which shall include as a minimum the identification and quantification of all significant odour sources and an assessment of the suitability and adequacy of the odour abatement systems installed to deal with these emissions. Any recommendations arising from the odour assessment shall be implemented to the satisfaction of the Agency.

6.17 Operational Controls

6.17.1 The floor of the waste transfer buildings shall be cleaned on a weekly basis and on a daily basis where residual, food and other odour-forming waste is handled. The floor of the storage bays for recovered wastes shall be washed down and cleaned on each occasion such bays are emptied, or as a minimum on a weekly basis. The licensee shall maintain a record of cleaning of the waste transfer buildings and storage bays at the installation.

6.17.2 Scavenging shall not be permitted at the facility.

6.17.3 There shall be no unauthorised public access to the facility.

6.18 Monitoring Locations

Within three months of the date of grant of this licence, the licensee shall submit to the Agency an appropriately scaled drawing or drawings showing all the monitoring locations that are stipulated in this licence including any noise-sensitive locations and private wells to be monitored. The drawing shall include the eight-digit national grid reference of each monitoring point.

6.19 Nuisance Monitoring

The licensee shall, at a minimum of daily intervals, inspect the facility and its immediate surrounds for nuisances caused by litter, vermin, birds, flies, mud, dust and odours. The licensee shall maintain a record of all nuisance inspections.

6.20 Soil Monitoring

The licensee shall carry out soil monitoring at the site of the installation within ten years of date of grant of licence and at least once every ten years thereafter. The sampling and monitoring shall be carried out in accordance with any guidance or procedure as may be specified by the Agency.

6.21 Vermin and Flies

In advance of the acceptance of residual, food and other odour-forming waste, the licensee shall maintain and implement a programme for the control and eradication of vermin and fly infestations at the facility. The programme shall include as a minimum, operator training, details on the rodenticide(s) and insecticide(s) to be used, mode and frequency of application and measures to contain sprays within the installation boundary.

6.22 An inspection system for the detection of leaks on all flanges and valves on over-ground pipes used to transport materials other than water shall be developed and maintained within six months of the date of grant of licence.

Reason: ***To provide for the protection of the environment by way of treatment and monitoring of emissions.***

Condition 7. Resource Use and Energy Efficiency

7.1 The licensee shall carry out an audit of the energy efficiency of the site within one year of the date of grant of this licence. The audit shall be carried out in accordance with the guidance published by the Agency, "Guidance Note on Energy Efficiency Auditing". The energy efficiency audit shall be repeated at intervals as required by the Agency.

7.2 The audit shall identify all practicable opportunities for energy use reduction and efficiency and the recommendations of the audit will be incorporated into the Schedule of Environmental Objectives and Targets under Condition 2 above.

7.3 The licensee shall identify opportunities for reduction in the quantity of water used on site including recycling and reuse initiatives, wherever possible. Reductions in water usage shall be incorporated into Schedule of Environmental Objectives and Targets.

7.4 The licensee shall undertake an assessment of the efficiency of use of raw materials in all processes, having particular regard to the reduction in waste generated. The assessment should take account of best international practice for this type of activity. Where improvements are identified, these shall be incorporated into the Schedule of Environmental Objectives and Targets.

Reason: ***To provide for the efficient use of resources and energy in all site operations.***

Condition 8. Materials Handling

8.1 All waste treatment shall be carried out inside buildings.

8.2 Waste Storage

8.2.1 Unless otherwise agreed by the Agency, all waste storage areas shall be inside buildings.

8.2.2 Unless otherwise agreed by the Agency, all outdoor storage areas shall be covered. This condition shall apply to all storage areas used for waste and other material that has the potential to contaminate rain water and surface water run-off.

8.3 Waste Storage Plan

8.3.1 The licensee shall, prior to the acceptance of residual, food and other odour-forming waste at the installation and in any event within three months of date of grant of licence, establish, maintain and implement a Waste Storage Plan for all waste stored and held at the installation.

8.3.2 The Waste Storage Plan shall include:

- a limit on the volume of waste to be stored or held in designated storage areas;
- maximum stockpile sizes in designated storage areas;
- a limit on the maximum storage or holding period for waste in designated storage areas; and
- any other requirements arising from recommendations of the Fire Risk Assessment required by Condition 9.4 of this licence.

8.3.3 Waste storage and holding practices at the facility shall comply at all times with the Waste Storage Plan.

8.3.4 Waste accepted or generated at the facility shall be stored or held only in designated areas that have been identified in the Waste Storage Plan.

8.3.5 All designated areas for storage or holding of waste shall be:

- clearly labelled;
- appropriately segregated; and
- visibly or physically delineated by walls, dividers, painted lines or marks on the ground or other methods acceptable to the Agency.

8.4 Wrapping of baled municipal waste

8.4.1 The wrapping of baled municipal waste, RDF, SRF and other waste shall be carried out in such a manner that:

- the waste is fully contained,
- the emission of odour from the wrapped bales is prevented,
- access by vermin is prevented, and
- the discharge of contaminated run-off from the wrapped bales is prevented.

8.4.2 Each bale shall be labelled with:

- its date of production,
- its content and EWC code and
- the name of the facility and its licence register number (W0261-02).

8.4.3 The licensee shall maintain and implement operating procedures for the baling and wrapping of waste.

8.4.4 The integrity of each wrapped bale shall be checked fortnightly and prior to its dispatch from the installation. Any damaged bales shall be repaired within 24 hours of damage being detected. No damaged bales shall be dispatched from the installation. Records of these checks and repairs shall be maintained at the installation.

8.5 Waste Acceptance and Characterisation Procedures

8.5.1 Waste shall only be accepted at the facility from Local Authority waste collection or transport vehicles or holders of waste permits, unless exempted or excluded, issued under the Waste Management Act 1996, as amended. Copies of these waste collection permits must be maintained at the facility.

8.5.2 Waste shall be accepted at the installation only from known waste producers or new waste producers subject to initial waste profiling and waste characterisation off-site. The written records of this off-site waste profiling and characterisation shall be retained by the licensee for all active waste producers and for a two year period following termination of licensee/waste producer agreements.

8.5.3 Waste arriving at the facility shall have its documentation checked at the point of entry to the facility and subject to this verification, weighed, documented and directed to an appropriate storage or treatment building or area. Each load of waste shall be inspected upon tipping at the installation. Only after such inspections shall the waste be treated for disposal or recovery.

8.5.4 Any waste deemed unsuitable for processing at the facility and/or in contravention of this licence shall be immediately separated and removed from the facility at the earliest possible time. Temporary storage of such wastes shall be in a designated Waste Quarantine Area. Waste shall be stored under appropriate conditions in the quarantine area to avoid putrefaction, odour generation, the attraction of vermin and any other nuisance or objectionable condition.

8.5.5 The licensee shall, prior to the acceptance of residual, food and other odour-forming waste at the installation and in any event within three months, develop and maintain and implement detailed written procedures and criteria for:
(i) characterisation, compliance testing, acceptance, on-site verification and handling of all wastes arriving at the installation;
(ii) rejection of unacceptable incoming waste; and
(iii) ensuring adequate storage capacity exists in advance of waste acceptance.

8.6 The licensee shall ensure that waste generated in the carrying on of the activity shall be prepared for re-use, recycling or recovery or, where that is not technically or economically possible, disposed of in a manner which will prevent or minimise any impact on the environment.

8.7 Disposal or recovery of waste on-site shall only take place in accordance with the conditions of this licence and in accordance with the appropriate National and European legislation and protocols.

8.8 Waste sent off-site for recovery or disposal shall be transported only by an authorised waste contractor. The waste shall be transported from the site of the activity to the site of recovery/disposal only in a manner that will not adversely affect the environment and in accordance with the appropriate National and European legislation and protocols.

8.9 The licensee shall ensure that, in advance of transfer to another person, waste shall be classified, packaged and labelled in accordance with National, European and any other standards which are in force in relation to such labelling.

8.10 The loading and unloading of materials shall be carried out in designated areas protected against spillage, leachate run-off and fugitive emissions.

8.11 Waste shall be stored in designated areas, protected as may be appropriate against spillage and leachate run-off.

8.12 No waste classified as green list waste in accordance with the EU Shipment of Waste Regulations (Council Regulation EEC No. 1013/2006, as may be amended) shall be consigned for recovery without the agreement of the Agency.

8.13 Waste for disposal/recovery off-site shall be analysed in accordance with *Schedule C: Control & Monitoring,* of this licence.

8.14 Unless approved in writing, in advance, by the Agency the licensee is prohibited from mixing a hazardous waste of one category with a hazardous waste of another category or with any other non-hazardous waste.

8.15 The licensee shall neither import waste into the State nor export waste out of the State except in accordance with the relevant provisions of Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14th June 2006 on shipments of waste and associated national regulations.

8.16 Standards Regarding the Supply of Refuse Derived Fuel (RDF) or Solid Recovered Fuel (SRF)

8.16.1 Refuse derived fuel or solid recovered fuel produced at the facility shall be classified and specified in accordance with *I.S. EN 15359:2011 Solid recovered fuels - Specifications and classes* unless otherwise agreed by the Agency.

8.16.2 No refuse derived fuel or solid recovered fuel shall be supplied to a person or organisation for combustion except where there is in place a technical specification. The technical specification shall be prepared, unless otherwise agreed by the Agency, in accordance with *I.S. EN 15359:2011 Solid recovered fuels - Specifications and classes* and shall be agreed between the licensee and the recipient person or organisation.

8.16.3 No solid recovered fuel classified as waste shall be supplied for combustion in any facility or installation that has not been granted a licence or permit under the Waste Incineration Directive or Industrial Emissions Directive.

8.16.4 The technical specification referred to in Condition 8.16.1 shall set out the criteria to be met in order that combustion of the refuse derived fuel or solid recovered fuel will not lead to failure to comply with the conditions of a licence or permit as may be applicable at the destination incineration or co-incineration facility.

8.16.5 The licensee shall annually, or at a greater frequency if so instructed by the Agency and unless otherwise agreed by the Agency, demonstrate, using a method agreed or specified by the Agency, that the treatment process for the manufacture of refuse derived fuel or solid recovered fuel results in a materially significant net increase in calorific value over the mixed waste introduced to the treatment process.

8.16.6 Bulky metallic and non-metallic parts shall be removed prior to processing waste into RDF/SRF.

8.17 Only waste that has been subject to treatment may be dispatched for disposal at a landfill facility. Treatment shall reflect published EPA guidance as set out in *Municipal Solid Waste - Pre-treatment and Residuals Management,* EPA, 2009. With the agreement of the Agency, this condition shall not apply to:

(i) Inert waste for which treatment is not technically feasible; and
(ii) Other waste for which such treatment does not contribute to the objectives of the Landfill Directive as set out in Article 1 of the Directive by reducing the quality of the waste or the hazards to human health or the environment.

8.18 Each load of waste dispatched to landfill shall be accompanied by documentation verifying the type of treatment carried out on the waste and, in the case of municipal waste or treated municipal waste, its biodegradable content.

Reason: ***To provide for the appropriate handling of material and the protection of the environment.***

Condition 9. Accident Prevention and Emergency Response

9.1 The licensee shall ensure that a documented Accident Prevention Procedure is in place that addresses the hazards on-site, particularly in relation to the prevention of accidents with a possible impact on the environment. This procedure shall be reviewed annually and updated as necessary.

9.2 The licensee shall, ensure that a documented Emergency Response Procedure is in place, that addresses any emergency situation which may originate on-site. This procedure shall include provision for minimising the effects of any emergency on the environment. This procedure shall be reviewed annually and updated as necessary.

9.3 Incidents

9.3.1 In the event of an incident the licensee shall immediately:

(i) carry out an investigation to identify the nature, source and cause of the incident and any emission arising therefrom;
(ii) isolate the source of any such emission;
(iii) evaluate the environmental pollution, if any, caused by the incident;
(iv) identify and execute measures to minimise the emissions/malfunction and the effects thereof;
(v) identify the date, time and place of the incident;
(vi) notify the Agency and other relevant authorities.

9.3.2 Where an incident or accident that significantly affects the environment occurs, the licensee shall, without delay take measures to limit the environmental consequences of the incident or accident and to prevent further incident or accident.

9.4 The licensee shall arrange, within three months of the date of grant of this licence and every three years thereafter, for the completion, by an independent and appropriately qualified consultant, of a fire risk assessment for the facility. The assessment shall examine all relevant factors on site that impinge on fire risk and prevention. The assessment shall have regard to the EPA Guidance Note: *Fire Safety at Non-Hazardous Waste Transfer Stations, 2013.* A report on the fire risk assessment shall be prepared within six months of the date of grant of this licence. Any recommendations in the fire risk assessment shall be implemented by the licensee.

Reason: ***To provide for the protection of the environment.***

Condition 10. Decommissioning & Residuals Management

10.1 Following termination, or planned cessation for a period greater than six months, of use or involvement of all or part of the site in the licensed activity, the licensee shall, to the satisfaction of the Agency, decommission, render safe or remove for disposal/recovery any soil, subsoil, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution.

10.2 Decommissioning Management Plan (DMP)

10.2.1 The licensee shall prepare, to the satisfaction of the Agency, a fully detailed and costed plan for the decommissioning or closure of the site or part thereof. This plan shall replace the existing Decommissioning Plan and shall be submitted to the Agency within six months of date of grant of this licence.

10.2.2 The plan shall be reviewed annually and proposed amendments thereto notified to the Agency for agreement as part of the AER. No amendments may be implemented without the agreement of the Agency.

10.2.3 The licensee shall have regard to the Environmental Protection Agency's Guidance on Assessing and Costing Environmental Liabilities (2014) and, as appropriate, Guidance on Environmental Liability Risk Assessment, Residuals Management Plans, and Financial Provision (2006) and the baseline report, when implementing Condition 10.2.1 above.

10.3 The Decommissioning Management Plan shall include, as a minimum, the following:

(i) a scope statement for the plan;

(ii) the criteria that define the successful decommissioning of the activity or part thereof, which ensures minimum impact on the environment;

(iii) a programme to achieve the stated criteria;

(iv) where relevant, a test programme to demonstrate the successful implementation of the decommissioning plan; and

(v) details of the costings for the plan and the financial provisions to underwrite those costs.

10.4 A final validation report to include a certificate of completion for the Decommissioning Management Plan, for all or part of the site as necessary, shall be submitted to the Agency within three months of execution of the plan. The licensee shall carry out such tests, investigations or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment.

Reason: ***To make provision for the proper closure of the activity ensuring protection of the environment.***

Condition 11. Notification, Records and Reports

11.1 The licensee shall notify the Agency, in a format as may be specified by the Agency, one month in advance of the intended date of commencement of acceptance of residual and/or food waste.

11.2 The licencee shall notify the Agency by both telephone and either email or webform, to the Agency's headquarters in Wexford, or to such other Agency office as may be specified by the Agency, as soon as practicable after the occurrence of any of the following:

(i) an incident or accident that significantly affects the environment;

(ii) any release of environmental significance to atmosphere from any potential emissions point including bypasses;

(iii) any breach of one or more of the conditions attached to this licence;

(iv) any malfunction or breakdown of key control equipment or monitoring equipment set out in *Schedule C: Control and Monitoring,* of this licence which is likely to lead to loss of control of the abatement system; and

(v) any incident with the potential for environmental contamination of surface water or groundwater, or posing an environment threat to air or land, or requiring an emergency response by the Local Authority.

The licensee shall include as part of the notification, date and time of the incident, summary details of the occurrence, and where available, the steps taken to minimise any emissions.

11.3 The following shall be notified, as soon as practicable after the occurrence of any incident which relates to a discharge to water:

(i) Inland Fisheries Ireland in the case of discharges to receiving waters.

11.4 The licensee shall make a record of any incident. This record shall include details of the nature, extent, and impact of, and circumstances giving rise to, the incident or accident. The record shall include all corrective actions taken to manage the incident or accident, minimise wastes generated and the effect on the environment, and avoid recurrence. In the case of a breach of a condition, measures to restore compliance. The licensee shall, as soon as practicable following notification, submit to the Agency the record.

11.5 The licensee shall record all complaints of an environmental nature related to the operation of the activity. Each such record shall give details of the date and time of the complaint, the name of the complainant (if provided), and give details of the nature of the complaint. A record shall also be kept of the response made in the case of each complaint.

11.6 The licensee shall record all sampling, analyses, measurements, examinations, calibrations and maintenance carried out in accordance with the requirements of this licence and all other such monitoring which relates to the environmental performance of the installation.

11.7 The licensee shall as a minimum ensure that the following documents are accessible at the site:

(i) the licences relating to the installation;

(ii) the current EMS for the installation, including all associated procedures, reports, records and other documents;

(iii) the previous year's AER for the installation;

(iv) records of all sampling, analyses, measurements, examinations, calibrations and maintenance carried out in accordance with the requirements of this licence and all other such monitoring which relates to the environmental performance of the installation;

(v) relevant correspondence with the Agency;

(vi) up-to-date site drawings/plans showing the location of key process and environmental infrastructure, including monitoring locations and emission points;

(vii) up-to-date Standard Operational Procedures for all processes, plant and equipment necessary to give effect to this licence or otherwise to ensure that standard operation of such processes, plant or equipment does not result in unauthorised emissions to the environment;

(viii) any elements of the licence application or EIS documentation referenced in this licence; and

(ix) all records of audits.

This documentation shall be available to the Agency for inspection at all reasonable times.

11.8 The licensee shall maintain a computer based record for each load of waste arriving at and departing from the facility. The licensee shall record the following:

(i) the date and time;

(ii) the name of the carrier (including if appropriate, the waste carrier registration details);

(iii) the vehicle registration number;

(iv) the trailer, skip or other container unique identification number (where relevant);

(v) the name of the producer of the waste as appropriate;

(vi) the name of the waste facility (if appropriate) from which the load originated including the waste licence or waste permit register number;

(vii) a description of the waste including the associated EWC/HWL codes;

(viii) the quantity of the waste, recorded in tonnes;

(ix) details of the treatment(s) to which the waste has been subjected, if any;

(x) the classification and coding of the waste, including whether MSW or otherwise;

(xi) whether the waste is for disposal or recovery and if recovery for what purpose;

(xii) the name of the person checking the load; and where loads or wastes are removed or rejected, details of the date of occurrence, the types of waste and the facility to which they were removed.

11.9 The licensee shall submit to the Agency, by the 31st March of each year, an AER covering the previous calendar year. This report, which shall be to the satisfaction of the Agency, shall include as a minimum the information specified in *Schedule E: Annual Environmental Report,* of this licence and shall be prepared in accordance with any relevant guidelines issued by the Agency.

11.10 A full record, which shall be open to inspection by authorised persons of the Agency at all times, shall be kept by the licensee on matters relating to the waste management operations and practices at this site. This record shall be maintained on a monthly basis and shall as a minimum contain details of the following:

(i) the tonnages and EWC Code for the waste materials imported and/or sent off-site for disposal/recovery;

(ii) the names of the agent and carrier of the waste, and their waste collection permit details, if required (to include issuing authority and vehicle registration number);

(iii) details of the ultimate disposal/recovery destination facility for the waste and its appropriateness to accept the consigned waste stream, to include its permit/licence details and issuing authority, if required;

(iv) written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site;

(v) details of all waste consigned abroad for Recovery and classified as 'Green' in accordance with the EU Shipment of Waste Regulations (Council Regulation EEC No. 1013/2006, as may be amended). The rationale for the classification must form part of the record;

(vi) details of any rejected consignments;

(vii) details of any approved waste mixing;

(viii) the results of any waste analyses required under *Schedule C: Control & Monitoring,* of this licence; and

(ix) the tonnage and EWC Code for the waste materials recovered/disposed on-site.

11.11 The licensee shall submit report(s) as required by the conditions of this licence to the Agency's Headquarters in Wexford, or to such other Agency office as may be specified by the Agency.

11.12 All reports shall be certified accurate and representative by the installation manager or a nominated, suitably qualified and experienced deputy.

Reason: ***To provide for the collection and reporting of adequate information on the activity.***

Condition 12. Financial Charges and Provisions

12.1 Agency Charges

12.1.1 The licensee shall pay to the Agency an annual contribution of €5,869, or such sum as the Agency from time to time determines, having regard to variations in the extent of reporting, auditing, inspection, sampling and analysis or other functions carried out by the Agency, towards the cost of monitoring the activity as the Agency considers necessary for the performance of its functions under the Environmental Protection Agency Act 1992, as amended. The first payment shall be a pro-rata amount for the period from the date of grant of this licence to the 31st day of December, and shall be paid to the Agency within one month from the date of grant of the licence. In subsequent years the licensee shall pay to the Agency such revised annual contribution as the Agency shall from time to time consider necessary to enable performance by the Agency of its relevant functions under the Environmental Protection Agency Act 1992, as amended and all such payments shall be made within one month of the date upon which demanded by the Agency.

12.1.2 In the event that the frequency or extent of monitoring or other functions carried out by the Agency needs to be increased, the licensee shall contribute such sums as determined by the Agency to defray its costs in regard to items not covered by the said annual contribution.

12.2 Environmental Liabilities

12.2.1 The licensee shall as part of the AER, provide an annual statement as to the measures taken or adopted at the site in relation to the prevention of environmental damage, and the financial provisions in place in relation to the underwriting of costs for remedial actions following anticipated events (including closure) or accidents/incidents, as may be associated with the carrying on of the activity.

12.2.2 The licensee shall arrange for the completion, by an independent and appropriately qualified consultant, of a comprehensive and fully costed Environmental Liabilities Risk Assessment (ELRA) which addresses the liabilities from past and present activities. The assessment shall include those liabilities and costs identified in Condition 10 for execution of the DMP. A report on this assessment shall be submitted to the Agency for agreement prior to the acceptance of residual, food and other odour-forming waste at the installation and in any event within three months. The ELRA shall be reviewed as necessary to reflect any significant change on site, and in any case every three years following initial agreement. Review results are to be notified as part of the AER.

12.2.3 The licensee shall, to the satisfaction of the Agency and prior to the acceptance of residual, food and other odour-forming waste at the installation and in any event within six months, make financial provision to cover any liabilities associated with the operation (including closure). The amount of indemnity held shall be reviewed and revised as necessary, but at least annually. Proof of renewal or revision of such financial indemnity shall be included in the annual 'Statement of Measures' report identified in Condition 12.2.1.

12.2.4 The licensee shall revise the cost of closure annually and any adjustments shall be reflected in the financial provision made under Condition 12.2.3.

12.2.5 The licensee shall have regard to the Environmental Protection Agency Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision when implementing Conditions 12.2.2 and 12.2.3 above.

Reason:	***To provide for adequate financing for monitoring and financial provisions for measures to protect the environment.***

SCHEDULE A: Limitations

A.1

The following waste related processes are authorised:

Recovery of wastes listed in Schedule A.2
Baling and wrapping of waste
Storage of waste

No additions to these processes are permitted unless agreed in advance by the Agency.

A.2 Waste Acceptance

Table A.1 Waste Categories and Quantities

Waste Type		Maximum Note2 (Tonnes Per Annum)
Non-Hazardous Wastes Note 1	Dry Mixed Recyclables (EWC 20 03 01)	60,000
	Mixed Municipal Waste (EWC 20 03 01)	30,000
	Biodegradable kitchen and canteen Waste (EWC 20 01 08)	20,000
	Paper and Cardboard packaging (EWC 15 01 01)	25,000
	Plastic Packaging (EWC 15 01 02)	10,000
	Wooden Packaging (EWC 15 01 03)	1,000
	Metallic Packaging (EWC 15 01 04)	100
	Mixed Packaging (EWC 15 01 06)	3,000
	Glass Packaging (EWC 15 01 07)	1,000
	End of Life Tyres (EWC 16 01 03)	100
	Mixture of concrete, bricks, tiles and ceramics (EWC 17 01 07)	5,000
	Plastic Waste (EWC 20 01 39)	10,000
	Metals (EWC 20 01 40)	1,000
	Bulky waste (EWC 20 03 07)	1,000
	Soil and Stones (EWC 17 05 04)	10,000
	Gypsum-based construction materials (EWC 17 08 02)	1,000
	Mixed construction and demolition waste (EWC 17 09 04)	35,000
	Combustible waste (EWC 19 12 12)	1,000
	Other wastes (including mixtures of materials) from mechanical treatment of wastes (EWC 19 12 12)	4,000
	Paper and cardboard (EWC 20 01 01)	30,000
	Glass (EWC 20 01 02)	1,000
Non-Hazardous Waste Total		**250,000**
Total		**250,000**

Note 1: Any proposals to accept other compatible non-hazardous waste types must be agreed in advance by the Agency.
Note 2: The limitation on individual non-hazardous waste types may be varied with the agreement of the Agency subject to the total limit for non-hazardous waste staying the same.

SCHEDULE B: Emission Limits

B.1 Emissions to Air

Emission Point Reference No:	A2-1	
Location:	Building A1	
Volume to be emitted:	Maximum rate per hour:	45,936 m^3
Minimum discharges height:	14 m above ground	

B.2 Emissions to Water

There shall be no emissions to water of environmental significance.

B.3 Emissions to Sewer

There shall be no process effluent emissions to sewer.

B.4 Noise Emissions

Daytime dB $L_{Ar,T}$ (30 minutes)	Evening time dB $L_{Ar,T}$ (30 minutes)	Night-time dB $L_{Aeq,T}$ (15-30 minutes)
55	50	45[Note 1]

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise-sensitive location.

SCHEDULE C: Control & Monitoring

C.1.1. Control of Emissions to Air

Emission Point Reference No: A2-1
Description of Treatment: Odour control unit including dust filter, scrubber and activated carbon treatment unit

Control Parameter	Monitoring	Key Equipment Note 1
Static pressure across the filter	Continuous	Pressure sensors
Odour character	Daily	Sniff Ports
Note 2	Note 2	Note 2

Note 1: The licensee shall maintain appropriate access to standby and/or spares to ensure the operation of the abatement system.
Note 2: Other parameters to be determined through test programme under Condition 6.1.

C.1.2. Monitoring of Emissions to Air

Emission Point Reference No: A2-1

Parameter	Monitoring Frequency	Analysis Method/Technique
Particulates	Biannually	Standard Method

C.2.1. Control of Emissions to Water

There shall be no emissions to water of environmental significance.

C.2.2. Monitoring of Emissions to Water

There shall be no emissions to water of environmental significance.

C.2.3. Monitoring of Storm Water Emissions

Emission Point Reference No: SW-1

Parameter	Monitoring Frequency	Analysis Method/Technique
pH	Weekly	Standard method
Conductivity	Weekly	Standard method
Suspended solids	Weekly	Standard method
Total petroleum hydrocarbons	Quarterly	Standard method
Mineral oil	Quarterly	Standard method
Visual Inspection	Daily	Sample and examine for colour and odour.

C.3.1. Control of Emissions to Sewer

There shall be no process effluent emissions to sewer.

C.3.2. Monitoring of Emissions to Sewer

There shall be no process effluent emissions to Sewer.

C.4 Waste Monitoring

Waste Class	Frequency Note1	Parameter Note1	Method
Municipal waste dispatched to landfill **Other** Note 2	As may be specified by the Agency	BMW content	Waste characterisation of other methods as may be specified

Note 1: Parameters and frequency for compliance testing to be agreed under Condition 8.5.
Note 2: Analytical requirements to be determined on a case by case basis.

C.5 Noise Monitoring

No additional noise monitoring is required in this schedule.

C.6 Ambient Monitoring

C.6.1 Air Monitoring

Location: AD-1 and AD-2, as per Drawing No. 138-01 (Emissions and Sampling_Locations), or as may be amended under Condition 6.7.

Parameter	Monitoring Frequency	Analysis Method/Technique
Dust deposition	Bi-annually Note 1	Bergerhoff Note 2

Note 1: Once during the period May to September, or as otherwise specified in writing by the Agency.
Note 2: Standard Method VD12119 (Measurement of Dustfall, Determination of Dustfall using Bergerhoff Instrument (Standard Method) German Engineering Institute).

C.6.2 Groundwater Monitoring

Location: To be agreed by the Agency within six months of date of grant of licence.

Parameter	Monitoring Frequency	Analysis Method/Techniques
Hazardous Compounds Note1	Annually	Standard Method

Note 1: The relevant hazardous substances for monitoring in groundwater shall be as per the 'Baseline Report' submitted with the application. Monitoring for the identified hazardous substances shall be carried out at least annually, unless a case for less frequent monitoring is agreed by the Agency.

C.6.3 Soil Monitoring

Location: **As per the 'Baseline report' [Note 1].**

Parameter	Monitoring Frequency	Analysis Method/Techniques
Relevant hazardous substances [Note 2]	Every ten years	Standard Method

Note 1: As per the 'Baseline Report', submitted with the licence application. Additional or alternative locations may be agreed by the Agency.

Note 2: The relevant hazardous substances for monitoring in soil shall be as per the 'baseline report' submitted with the application, or otherwise agreed by the Agency.

SCHEDULE D: Specified Engineering Works

Specified Engineering Works
Upgrade of building fabric for building A1.
Installation of odour control unit.
Any other works notified in writing by the Agency.

SCHEDULE E: Annual Environmental Report

Annual Environmental Report Content [Note 1]
Waste recovery report.
Emissions from the installation.
Waste management record, including summary of rejected waste loads.
Resource consumption summary.
Complaints summary.
Schedule of Environmental Objectives and Targets.
Environmental management programme – report for previous year.
Environmental management programme – proposal for current year.
Pollutant Release and Transfer Register – report for previous year.
Pollutant Release and Transfer Register – proposal for current year.
Noise monitoring report summary.
Ambient monitoring summary.
Tank and pipeline testing and inspection report.
Reported incidents summary.
Energy efficiency audit report summary.
Report on the assessment of the efficiency of use of raw materials in processes and the reduction in waste generated.
Report on progress made and proposals being developed to minimise water demand and the volume of trade effluent discharges.
Development/Infrastructural works summary (completed in previous year or prepared for current year).
Reports on financial provision made under this licence, management and staffing structure of the installation, and a programme for public information.
Review of decommissioning management plan.
Statement of measures in relation to prevention of environmental damage and remedial actions (Environmental Liabilities).
Environmental Liabilities Risk Assessment Review (every three years or more frequently as dictated by relevant on-site change including financial provisions.
Waste activities carried out at the facility.
Quantity and composition of waste recovered, received and disposed of during the reporting period and each previous year (relevant EWC codes to be used).
Full title and a written summary of any procedures developed by the licensee in the year which relates to the facility operation.
Review of nuisance controls.
Volume of trade effluent/leachate and/or contaminated stormwater produced and volume transported off-site.
Any other items specified by the Agency.

Note 1: Content may be revised subject to the agreement of the Agency.

Sealed by the seal of the Agency on this the 11th day of February 2015.

PRESENT when the seal of the Agency
Was affixed hereto:

Mary Turner, Authorised Person

APPENDIX 2

ACCIDENT IMPACT ASSESSMENT REPORT

Unit 15
Melbourne Business Park
Model Farm Road
Cork T12 WR89

T: 021 434 5366
E:admin@ocallaghanmoran.com
www.ocallaghanmoran.com

ACCIDENT IMPACT ASSESSMENT

STARRUS ECO HOLDINGS LTD T/A Panda

CAPPAGH ROAD

FINGLAS

DUBLIN 11

Prepared For: -

Starrus Eco Holdings Ltd
Cappogue
Finglas
Dublin 11

Prepared By: -

O' Callaghan Moran & Associates
Unit 15
Melbourne Business Park
Model Farm Road
Cork. T12 WR89

March 2021

Project	Accident Impact Assessment: Cappagh Road			
Client	SEHL			
Report No	Date	Status	Prepared By	Reviewed By
	20/04/2020	Draft	Martina Gleeson PhD	Jim O'Callaghan MSc, CEnv, MCIWM, IEMA
	31/03/2021	Final		

TABLE OF CONTENTS

PAGE

1. INTRODUCTION

Starrus Eco Holdings Ltd (SEHL) trading Panda is part of the Beauparc Group Ireland's leading integrated waste management company. It operates its waste management facility on the Cappagh Road, Finglas, Dublin 11, under an Industrial Emissions licence granted by the Environmental Protection Agency (EPA) and planning permissions granted by Fingal County Council.

The facility currently accepts and process mixed and source separated non-hazardous solid household, commercial, industrial and construction & demolition waste. The EPA licence and the planning permission authorise the acceptance of 250,000 tonnes of waste per annum. Panda intends to apply for planning permission and a revised EPA licence to increase the annual waste intake rate to 450,000 tonnes and this requires the completion of an Environmental Impact Assessment (EIA).

Recent amendments to Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive) requires an EIA of a proposed development to take into consideration the effects of a major accident. Panda commissioned O'Callaghan Moran & Associates (OCM) to carry out an assessment of the likely effects of major accidents.

1.1 Methodology

The assessment had regard to the Environmental Liability Risk Assessment that was prepared in accordance with EPA's Guidance Document 'Guidance on Assessing and Costing Environmental Liabilities 2014'.

The assessment included:

- A review of the current and proposed operations, including materials and waste handling, processing and storage practices; emission control and management (infrastructural and procedural); accident prevention policy and emergency response procedures.
- Determining the environmental setting and the identification of any particular sensitive receptors that could be impacted by a major accident, and
- Identifying the plausible accidents that could occur, and
- Evaluating the likely impact on the sensitive receptors, including human health, cultural heritage and the environment.

1.2 Limitations

While the EIA Directive is clear that a major accident and/or natural disaster assessment should be mainly applied to facilities that are subject to the Control of Major Accident Hazards Directive (2012/18/EU) and nuclear installations. However, this assessment is carried out for completeness

The assessment focused on larger scale accidents i.e. incidents that have the potential for significant and long term adverse impacts. Minor incidents, for example small oil spills (<200 litres) whose potential for negative impacts is limited were not assessed.

2. RISK IDENTIFICATION

2.1 Site Location & Layout

The site is on Cappagh Road and covers 2.5 hectares (ha). The layout is shown on Drawing No. 18-139-200. There are three waste handling buildings (Building A1 -2,030 m^2; Building A2 - 2,800 m^2 and Building B1 - 4,088 m^2) an electrical substation, two weighbridges and office and associated control rooms, staff amenity building (100 m^2), fuel tanks and paved open yards.

2.2 Waste Activities

The site operates 24 hours a day seven days a week. Wastes are delivered in Panda's waste collection trucks and those of other commercial waste companies and wastes are not accepted from members of the public. All deliveries are weighed in and the trucks then enter appropriate waste processing building where the wastes are off loaded, inspected and processed.

Mixed dry recyclables are sorted into the different types and these are then baled and stored before being sent for further treatment. Source separated wastes are baled and also stored before being sent off-site. Processed mixed solid wastes are accepted from other waste pre-treatment facilities and these are treated to remove recyclables, with the residues then further processed to produce a solid recovered fuel (SRF). The SRF is sent to cement kilns where it is used as a replacement for fossil fuels.

Food waste (brown bin) and mixed household waste (black bin) that contains odorous materials are accepted and stored in a section of one of the buildings that is fitted with an odour control system. It is then sent to other waste management facilities for further treatment.

Out of date packaged food from commercial operators is accepted processed and stored pending transfer to other treatment plants where the packaging is removed. This activity is authorised by the Department of Agriculture, Food and Marine under the Animal By-Products Regulations.

2.3 Plant & Equipment

The plant and equipment used at the installation include; balers, shredders, screeners, eddy current separators, magnets, optical sorter, density separators, forklifts, mechanical grabs and loading shovels. The plant items are subject to a preventative maintenance programme and critical spares are kept at the site.

2.4 Site Security

The site is surrounded by a wall and security fence. Access is via the front gate which is locked when the facility is closed. The yard area lighting remains on throughout the hours of darkness. A CCTV surveillance system is provided and a static guard is on-site at night time, which means that there will be a rapid response to any emergency that occurs outside normal operational hours.

JENKINS SHIPPING

HUNTSTOWN
BUSINESS PARK

SITE BOUNDARY

HUNTSTOWN
BUSINESS PARK

EXISTING POST AND WIRE FENCE

APPROXIMATE LOCATION OF TEMPORARY STRUCTURE ON ADJOINING LAND

PROPOSED FUTURE DEVELOPMENT

PROPOSED SEMI-MATURE LIME TREES Tilda cordata 'greenspire'18 / 20 (Lime) within Tree pits

PROPOSED REVISED STAFF CAR PARKING LAYOUT FROM THAT PREVIOUSLY APPROVED UNDER PLANNING REG. REF. 13A/0135

PROPOSED 2M TALL SECURITY FENCE TO MATCH EXISTING

EXISTING 2M TALL SECURITY FENCE

APPROX LOCATION TEMPORARY TIMBER STORAGE SHED

PROPOSED 2M TALL TWIN WIRE MESH FENCE TO SEPARATE PARKING FROM MATERIALS RECYCLING AREA

SITE NOTICE APPROXIMATE LOCATION

EXISTING ENTRANCE

CAPPAGH ROAD

ROADSTONE HUNTSTOWN

F.F.L=82.98m

F.F.L=83.00m

BUILDING A1
REG. REF 05/A.1158

EXISTING WEIGHBRIDGE AND OFFICE AS GRANTED PLANNING PERMISSION UNDER REG REF FW13A/0135

PROPOSED DEFINED WALKWAY

PROPOSED DEFINED WALKWAY

EXISTING SECURITY FENCE

CONCRETE YARD

BUILDING A2
WAREHOUSE
REG. REF/ 13A/0135

EXISTING MATERIALS RECOVERY FACILITY

EXISTING STORM WATER ATTENUATION SYSTEM

UNDERGROUND ATTENUATION TANK

EXISTING WALL

YARD

ACOUSTIC WALL

DESIGNATED BIN STORE AREA

SHED UNIT

HOUSE

BUILDING B1/B2
REG. REF/ F07A/0954/EL
(EXTENSION OF TIME)
CARDBOARD AND PLASTIC
RECYCLING WAREHOUSE

EXISTING SUB-STATION BUILDING
REG. REF F07A/0954

STADIUM BUSINESS PARK
BALLYCOOLIN ROAD
DUBLIN 11

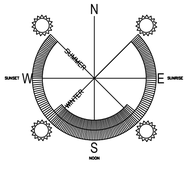
STRATHROY DAIRIES
Sartorius Stedim Ireland Limited

NATIONAL
TRUCK RENTAL

PROPOSED SEMI-MATURE LIME TREES
Tilda cordata 'greenspire'18 / 20 (Lime) within Tree pits

WORKS YET TO BE COMPLETED AS PER LANDSCAPING PLAN APPROVED UNDER PLANNING REG. REF. FW13A/0135

EXISTING PLANTING INSIDE FRONT BOUNDARY



EXISTING SITE LAYOUT PLAN 1:500
SITE BOUNDED IN RED
SITE AREA= 2.5 Hectares

mckenna + associates
high street, trim, co. meath.

phone / fax: +353 (0)46 948 6788
mobile: +353 (0)86 384 7470
email:info@mckennaarchitecture.com
web: www.mckennaarchitecture.com

Client	Starrus Eco Holdings Ltd
Project Title	
Drawing Title	SITE LAYOUT PLAN

Drawn By	Date	Scale
Stephen Hussey	05.11.2018	1:500@ A1
Revision	**Drwg. Status**	**Drwg. No.**
	PLANNING	18139-200

2.5 Site Services

The site has connections to the main electricity supply and telecoms systems. Water for the staff toilets is obtained from an on-site well. There is no connection to the municipal foul sewer and sanitary wastewater from the toilets is collected in an underground holding tank and sent off site for treatment.

Rainwater run-off from the building roofs is harvested for use as 'grey water' in the toilets, with the surplus along with the run-off from the paved yards discharged to the storm sewer serving the adjoining Stadium Business Park via an attenuation tank. There is a shut off valve on the attenuation tank that can be closed in the event of an incident that has the potential to contaminate surface water retain the water inside the site boundary.

2.6 Safety and Hazard Control

Panda has prepared and adopted an Accident Prevention Policy to minimise the risk of accidents occurring. Panda has also prepared documented procedures that address the on-site hazards, particularly in relation to the prevention of accidents that have a possible impact on the environment.

All facility personnel and visitors are obliged to comply with Panda's safety guidelines regarding access to and from the facility and on-site traffic movement. All site personnel are provided with and are obliged to wear, personal protective equipment (PPE) appropriate for their particular functions. PPE includes facemasks, gloves, safety glasses, steel-toed footwear, overalls, reflective jackets and helmets.

2.7 Inventory of Wastes & Raw Materials

The type and amount of waste on site at any one time is determined by the Waste Storage Plan approved by the EPA. This is a dynamic document that is subject to regular update depending on market conditions. The Plan designates the storage area for specific waste type and specifies the maximum dimensions of the storage areas and stockpiles. It also specifies the minimum separation distance between the storage areas to minimise the risk of fire spread.

2.7.1 Oils and Chemicals

Diesel and gas oil are stored in above ground steel tanks located in a steel bund adjacent to Building B1. Drums of engine and hydraulic oil are stored on bunded pallets.

2.8 Emergency Response

An emergency is an accident/incident that has the potential to result in environmental pollution and harm to human health & safety. Panda has prepared an Emergency Response Procedure that specifies roles, responsibilities and actions required to deal quickly and efficiently with all foreseeable major incidents and to minimise environmental impacts.

2.9 Environmental Sensitivity

2.9.1 Surrounding Land Use

The site is located in an area that that has been extensively developed for industrial and commercial use and mineral extraction. Stadium Business Park is to the south, Rosemount Business Park to the south-west and to the north is Millennium Business Park. The business parks are occupied by commercial activities including logistics companies, chemical distributors, light engineering, food distributors and cement manufacturers. The lands to the west are zoned for commercial use and Hunstown Quarry is to the east and north-east. The lot adjoining the northern site boundary is owned by Panda and is leased to a haulage company.

There is one vacant private residence located close to the facility, approximately 30m from the south-eastern boundary. This has been acquired by Panda and it is intended to redevelop the site as a public Civic Amenity Area. There are ten residences (10 No) approximately 450 m to the south east, also on the southern side of the Cappagh Road. These are the only private residences within 500m of the facility.

2.9.2 Hydrology

The site is in the catchment of the Tolka River, which is approximately 2 kilometres to the south west and south. There are no streams or water courses either on site, or in the surrounding area. The Tolka River is part of the Liffey Water Management Unit, as designated by the Eastern River Basin District Management Plan. The overall status of the river is 'Moderate', and it is considered 'At Risk' of not achieving its restoration objective of at least 'Good' status by 2027.

2.9.3 Geology & Hydrogeology.

The subsoils beneath the site are between 1.3 and 8.45 m thick and comprise sandy gravelly boulder clays. The bedrock belongs to the Boston Hill Formation and comprises nodular and muddy limestones and shale. The bedrock is a locally important (Lm) aquifer that is productive in local zones. The local direction of groundwater flow is to the south, but is likely to be greatly influenced by the large scale quarrying immediately to the east and north of the site (Huntstown Quarry). The aquifer vulnerability to pollution from the ground surface is Extreme.

2.9.4 Designated Sites

There are no habitats of ecological importance within the site boundary and the site is not in or close to a Special Area of Conservation (SAC), Special Protected Areas (SPA) or National Heritage Areas (NHA).

3. RISK ANALYSIS

3.1 Facility Design and Operation

The EPA Licence conditions require the provision of mitigation measures, both infrastructural and procedural, that effectively minimise the risk of environmental effects associated with accidents. Such measures, which are subject to regular review by Panda include:

- Provision of an appropriately experienced Facility Management Team and implementation of appropriate staff training programmes;
- Implementation of a site specific Environmental Management System (EMS), including an Environmental Management Programme (EMP);
- Adoption of site specific Accident Prevention Policy and Emergency Response Procedures (ERPs), which are reviewed annually;
- Provision of impermeable concrete surfaces in areas where wastes are stored and handled;
- Provision and maintenance of appropriate spill response and clean-up equipment in areas where there is a risk of spills occurring;
- Completion of a Fire Risk Assessment and the provision of appropriate fire prevention, detection and suppression controls;
- Completion of Fire Water Retention Assessment and provision of required retention capacity, and
- Regular site inspections.

3.2 Natural Disasters

The site is not in an area of geological instability or susceptible to earthquakes. It is not in a flood zone and there are no records that the site and adjoining lands have been flooded in the past.

3.3 Risk Identification

Environmental liabilities arise from contamination or damage to environmental media (air, surface water, soils and groundwater), which can act as pathways to sensitive receptors (human beings and cultural features). This assessment took into consideration those accidents that are likely to occur such as fires, explosions, spills and leaks.

The receptors that are potentially susceptible to adverse impacts associated with such incidents include, air, soils, groundwater, surface water and the occupants of nearby commercial activities and residences. There are no cultural heritage receptors.

3.4 Major Accident Scenarios

The assessment focused on major accidents i.e. incidents that have the potential for significant long term adverse impacts. Minor incidents such as liquid seeps from the vehicles delivering the non-wastes, oil drips from waste transport vehicles and the mobile plant, oil spills during refuelling of the mobile plant and failure of the odour control system were not considered.

The plausible risks of major accidents at the site are listed in Table 3.1. These take into account the controls and mitigating measures that are already in place, with due regard for the potential failure of the controls.

Table 3.1 Major Accidents

Risk ID	Process	Potential Hazards/Risks
1	Diesel/Oil Storage	Accidental release of diesel from bulk storage tanks-surface water contamination
2		Accidental release of diesel during deliveries and dispensing-surface water contamination.
3		Accidental release of diesel and oils- soil and groundwater and surface water contamination.
4	Fire in Recycling Buildings/ External Waste Storage Areas	Smoke emissions to air.
5		Firewater run-off to surface water drains-surface water contamination.
6		Firewater infiltration to ground-soil, groundwater and surface water contamination

4. IMPACT ASSESSMENT

4.1 Diesel Release

Diesel and oil are stored in a fully bunded area. There is a documented procedure on refuelling/dispensing and staff are fully trained in spill prevention and clean-up. All drainage from the yards passes through an oil interceptor to a holding tank. All operational areas are paved with concrete, which is routinely inspection and damaged paved areas repaired. Routine integrity testing of the drains is also carried out. The severity of any impact would be minor.

4.2 Fire

The only areas where there is the potential for a fire to occur is inside the buildings, where combustible materials are handled and stored and the external waste storage areas.

The buildings are large open steel portal warehouse type buildings with mass concrete walls to 4.5m and insulated wall cladding from 4.5m to 13m approximately. The roof material comprises metal insulated cladding.

Depending on the size and duration of a fire the emergency services co-coordinator may order the evacuation of the occupants of the nearby commercial units and private residences.

Panda has completed a Firewater Retention Assessment for the installation to estimate the volume of firewater run-off that would be generated in the response to a fire and the available capacity to retain this firewater inside the buildings and prevent it from entering the surface water drainage system.

A fire in the main processing building could generate a maximum 1.739m^3 of firewater. However if this was to occur during a rainfall event, as specified in the EPA Guidance, the volume generated would be 2,494m^3.

The overall retention capacity of the building, attenuation tank and surrounding yard is 1,300m^3. The shut off valve on the surface water system will be closed to prevent discharge of potentially contaminated firewater to the municipal storm water system.

There is potential for contaminated firewater to infiltrate to ground in areas where the concrete floors are damaged; however given the regular inspection and repair of the floors the likelihood of significant damage is very low and therefore the risk to soil and groundwater is low.

5. CONCLUSIONS

A fire has the potential to impact on human beings and result in surface water, soil and groundwater contamination. The Environmental Liability Risk Assessment completed by Panda in accordance with the EPA licence conditions has identified the likely scale of the impacts and quantified the cost of the remedial works. Panda has put in place a financial provision agreed with the EPA to meet the costs of the remedial works.

APPENDIX 3

TRAFFIC ASSESSMENT REPORT

Tel: +353 1 524 2060 | Email: info@ors.ie

Traffic and Transport Assessment

Proposed Waste Management Capacity Expansion, Panda Waste, Ballycoolin, Dublin 11

April 27th, 2020

Traffic and Transport Assessment

Proposed Waste Management Capacity Expansion, Panda Waste, Ballycoolin, Dublin 11

Document Control Sheet

Client:	Beauparc Utilities Ltd.
Document No:	191_424-ORS-XX-XX-RP-TR-7d-002

Revision	Status	Author	Reviewed By	Approved By	Issue Date
P01	S2	ASG	AP	DMC	05/05/2020

Index

Executive Summary

This Traffic and Transport Assessment Report [TTA] examines existing and proposed traffic conditions and transport activity to determine the effects on the local road network attributable to the proposed waste management capacity expansion at Panda Waste recycling facility in Ballycoolin, Dublin 11.

Following consultation with Fingal County Council, it was agreed that this study should assess the cumulative impacts of this development and of a neighbouring similar proposed expansion at Greenstar Materials recycling facility in Millennium Business Park.

The expansions involve increases to the quantity of waste processed annually at the Panda and Greenstar facilities, which will increase traffic to and from the facilities but will not require any construction works or site expansion at either facility.

Existing traffic data has been used to enable accurate assessments of the current conditions and predicted future conditions. Traffic counts were carried out at six no. junctions in the vicinity and traffic entering and exiting the two existing facilities was assessed to allow for future growth projections and to analyse the split of this traffic through the six junctions in the vicinity.

Our analysis indicates that four of the six junctions will continue to function significantly below capacity in design year 2035, 15 years after expansion, based on conservative growth factors. The roundabout junction between Cappagh Road and Ballycoolin Road will approach recommended maximum RFC of 0.85 in 2035. The roundabout junction between Cappagh Road and Mitchelstown Road is currently operating at close to full capacity at the morning peak time, with an RFC of 0.96 noted on one arm.

1 Introduction

The purpose of this report is to address the traffic and transport related issues that may arise in relation to a proposal by Beauparc Utilities to increase the annual waste handling throughput at two recycling facilities in Ballycoolin, Dublin 11. The proposal includes increasing the waste handled at their Panda facility on Cappagh Road from 250,000 tonnes to 450,000 tonnes per annum, and increasing the waste handled at their Greenstar facility in Millennium Business Park from 270,000 tonnes to 450,000 tonnes per annum.

This report therefore will assess the impact these proposed expansions, and the associated increased traffic flows, will have on the public road network in the vicinity of these two neighbouring facilities.

1.1 Objectives of this TTA

The objective of this report is to assess the impact that the proposed developments will have on the existing surrounding road network, with the assessment focusing primarily on the existing local Cappagh Road.

The objectives of this report are to assess (a) the prevailing traffic conditions on the local road network in the vicinity of the proposed developments, and (b) the effect of the anticipated volume of traffic generated by the proposed development on the local road network.

Following consultation with Fingal County Council, the following 6 junctions, shown in Figure 1.1 below, were selected for inclusion in this assessment:

- Site 1 – Greenstar facility access road junction
- Site 2 – Millennium Business Park – Cappagh Road roundabout junction
- Site 3 – Huntstown Business Park – Cappagh Road roundabout junction
- Site 4 – Panda facility access road junction
- Site 5 – Cappagh Road – Mitchelstown Road roundabout junction
- Site 6 – Cappagh Road – Ballycoolin Road roundabout junction.

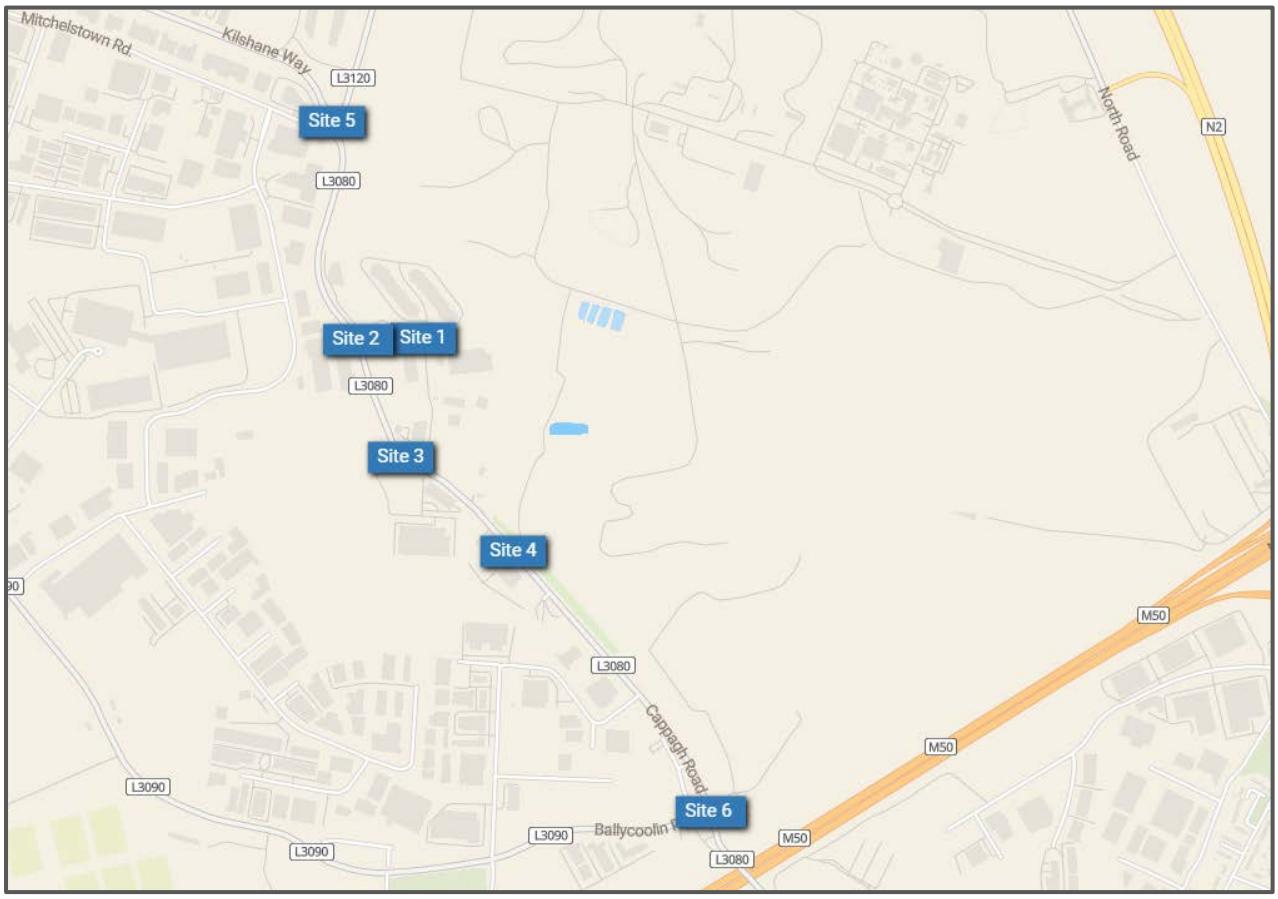


Figure 1.1 – Map indicating traffic count site locations (Source: IDASO Ltd.)

1.2 Methodology

The methodology that will be used for this assessment are as follows:

- Automated traffic counts were taken over a 24-hour period at the six selected junctions in the vicinity of the proposed expansions on Wednesday 11th of March 2020.
- The traffic count data was used to establish existing peak traffic flows to be used as the baseline for the analysis.
- The traffic distribution splits at the subject junctions were calculated from the traffic counts and applied to the anticipated future generated traffic as a result of the proposed waste management capacity expansion.
- The predicted traffic to be generated by the proposed developments was obtained by multiplying existing arrival and departure figures at each facility by the appropriate factors.
- All junctions were modelled using Junctions 9 software for future design years using High Sensitivity growth factors for HGV's on all traffic flows to produce a conservative result.
- Four of the six junctions will function significantly below capacity in design year 2035 with conservative growth factors applied to all traffic flows.
- Two of the six junctions showed capacity issues under preliminary conservative analysis and were therefore modelled using Central Sensitivity growth factors for cars.

2 The Proposed Developments

2.1 Greenstar Site Location

The Greenstar site is located in Millennium Business Park in Ballycoolin, Finglas and is bounded by other existing commercial units and by the internal Business Park roadway to the west and south, and by Huntstown Quarry east and north. The site is accessed via Cappagh Road and the internal Business Park roadway.

The site location is shown in Figure 2.1 below.

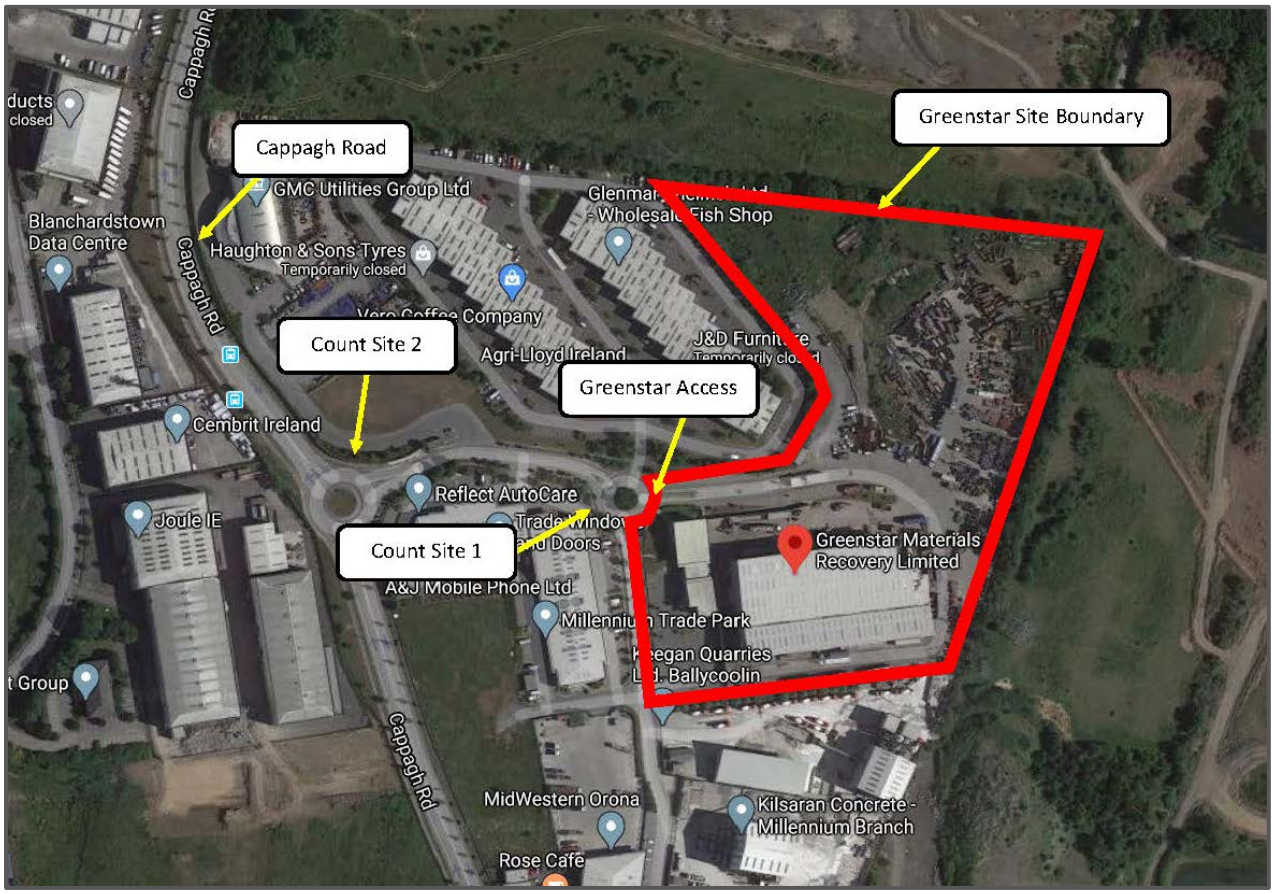


Figure 2.1 – Site location map indicating Greenstar site boundary (Source: Google Maps)

2.2 Panda Site Location

The Panda site is located along Cappagh Road to the south of Huntstown Business Park in Ballycoolin, Finglas and is bounded by other existing commercial units to the west and south and by the internal Business Park roadway to the east and north. The site is accessed directly from Cappagh Road.

The site location is shown in Figure 2.2 below.

Figure 2.2 – Site location map indicating Panda site boundary (Source: Google Maps)

2.3 Description of the Proposed Development

The proposed developments comprise an increase in material handling at both plants, with Greenstar increasing handling from 270,000 tonnes per annum to 450,000 tonnes per annum, and Panda increasing handing from 250,000 tonnes per annum to 450,000 tonnes per annum.

Both sites are equipped to manage this increase without additional construction works; therefore, the main impact from the proposed development will be the increase in traffic associated with transporting the additional materials to and from the existing facilities along the local road network.

3 Existing Traffic Conditions

3.1 Existing Traffic Flows

As part of the Traffic and Transport Assessment, traffic flows have been collected to ascertain current traffic conditions and to define representative traffic levels for a base year scenario. This base year provides the basis for all subsequent assessment and operational testing of the relevant junctions.

Manual classified traffic counts were undertaken by IDASO Data Analysis Services over 24 hours from 0:00am on the 11th of March 2020 at six junctions in the vicinity of the proposed developments. The traffic counts encompass all traffic movements at the junctions. Traffic entering and exiting the existing facilities were assessed and additional traffic likely to be generated by the proposed increased throughput were calculated.

Traffic counts provided throughput figures for a variety of vehicle types ranging from pedestrians to motorcycles to passenger cars to heavy good vehicles (HGVs). These figures were then multiplied by the appropriate vehicle weighting factors, as specified in TII Publication PE-PAG 02016, to obtain total PCU (Passenger Car Unit) values for all traffic flows. The factor applied for HGVs is 2.3; 1 HGV is counted as 2.3 PCU in the figures used in modelling analyses.

3.2 Existing Road Network

The critical junctions to be assessed as part of this TTA have been agreed between the design team and the Local Authority.

All roads and junctions included in this assessment are existing roads already in active usage and are part of a wider industrial park management area; as such, their condition and suitability for purpose are not subject to assessment as part of this report.

For visual detail of the junctions tested as part of this assessment, please refer to Figure 3.1 to 3.6 below.

Figure 3.1 – Site 1: Roundabout access to Greenstar facility (Source: Google Maps)

Figure 3.2 – Site 2: Millennium Business Park – Cappagh Road roundabout (Source: Google Maps)

Figure 3.3 – Site 3: Huntstown Business Park – Cappagh Road roundabout (Source: Google Maps)

Figure 3.4 – Site 4: Cappagh Road access to Panda facility (Source: Google Maps)

Figure 3.5 – Site 5: Mitchelstown Road – Cappagh Road roundabout (Source: Google Maps)

Figure 3.6 – Site 6: Cappagh Road – Ballycoolin Road roundabout (Source: Google Maps)

3.3 Traffic Collision Data in Vicinity of the Site

Data on road collisions near the existing Greenstar and Panda facilities was obtained from the Road Safety Authority website. As indicated in Figure 3.7 below, no incidents of any kind have been recorded in the vicinity.

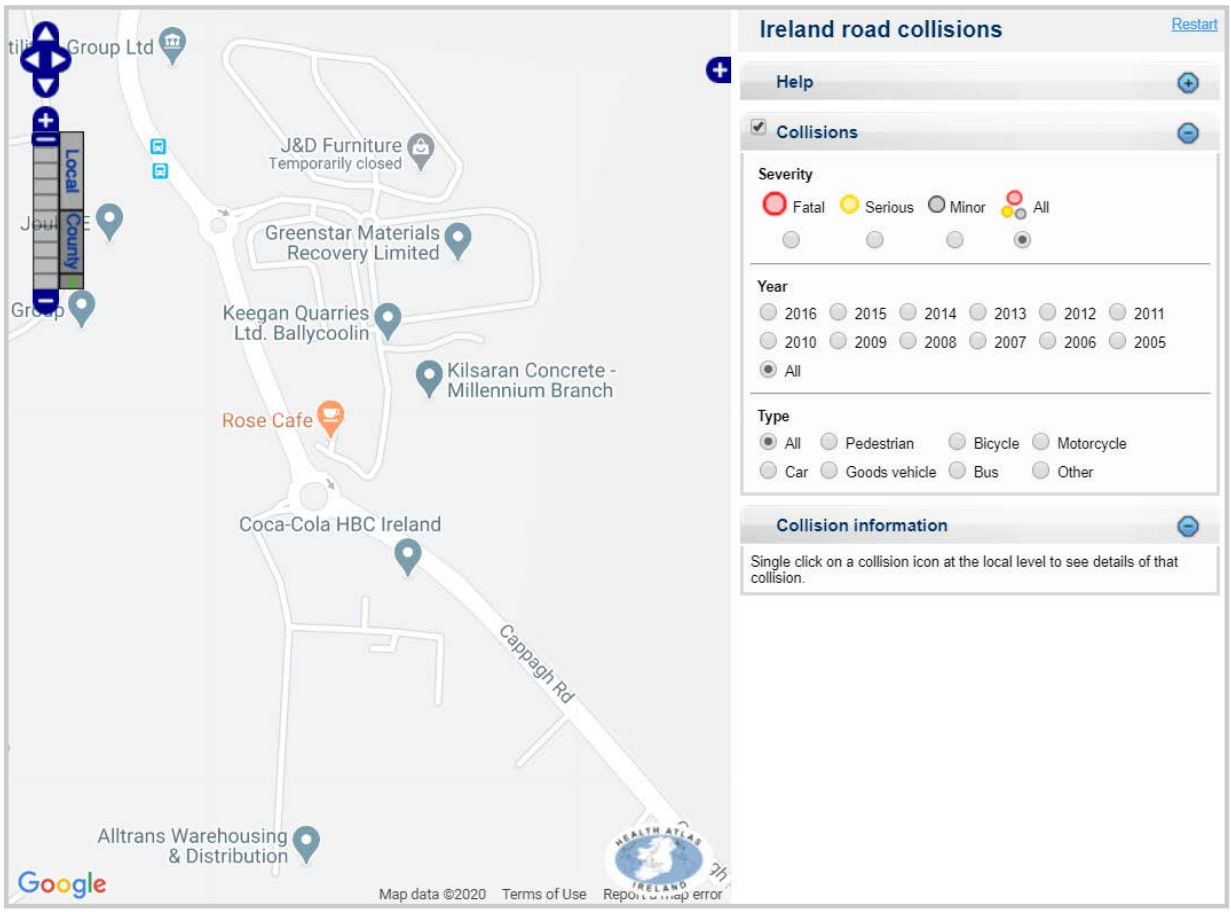


Figure 3.7 – Road Collision Data in the vicinity of Greenstar and Panda facilities

4 Impact of Proposed Development on Existing Road Network

4.1 Traffic Generation and Distribution Splits

In order to obtain a trip rate for the proposed developments following expansion, the existing traffic entering and departing each premises was assessed based on the traffic counts obtained in March 2020, and additional traffic was calculated based on comparison of expanded waste volumes versus current waste volumes.

4.2 Traffic Generation

To determine the worst-case scenario for traffic generation for each site expansion, existing traffic counts were reviewed, and hourly traffic peaks identified. Evening peak throughput at all junctions occurred between 5pm and 6pm. At site 1, peak junction throughput occurred between 9am and 10am. At all other junction sites, peak morning traffic occurred between 8am and 9am.

At Greenstar, the total traffic through the access roundabout over 24 hours was 3371 PCU, with 587 PCU arriving at Greenstar and 603 PCU departing. Peak hourly traffic occurred between 12 and 1pm, with 323 PCU recorded through the roundabout and 121 PCU recorded travelling to and from Greenstar. However, traffic to and from Greenstar between 8am and 9am was lower, at 95 PCU, while between 5pm and 6pm this figure fell to 46 PCU.

Site 1 roundabout was therefore modelled for 3 time periods: 8am-9am; 12noon-1pm; and 5pm-6pm.

Additional traffic due to the expansion was calculated based on existing traffic figures multiplied by 0.67, since this facility will be expanded from 270,000 tonnes to 450,000 tonnes per annum, an increase of 67%. This traffic was split through other sites 2, 3, 5 and 6 as per existing traffic splits at these junctions. It is assumed that any additional traffic generated at site 4, Panda facility, by Greenstar facility, will be adequately accounted for in factoring up existing Panda facility figures.

At Panda, the total traffic through the access junction over 24 hours was 8129 PCU, with 678 PCU arriving at Panda and 672 PCU departing. Peak hourly traffic occurred between 12 and 1pm, with 548 PCU recorded through the junction and 141 PCU recorded travelling to and from Panda. However, traffic to and from Panda between 8am and 9am was lower, at 63 PCU, while between 5pm and 6pm this figure fell to 51 PCU.

Site 4 priority T-junction was therefore modelled for three time periods: 8am-9am; 12noon-1pm; and 5pm-6pm.

Additional traffic due to the expansion was calculated based on existing traffic figures multiplied by 0.8, since this facility will be expanded from 250,000 tonnes to 450,000 tonnes per annum, an increase of 80%. This traffic was split through other sites 2, 3, 5 and 6 as per existing traffic splits at these junctions. It is assumed that any additional traffic generated at site 1, Greenstar facility, by Panda facility, will be adequately accounted for in factoring up existing Greenstar facility figures.

SITE 1	Existing Traffic				Expansion Traffic		
	Junction	Greenstar			Greenstar		
Time Range	Total PCU	Departures	Arrivals	Total PCU	Departures	Arrivals	Total PCU
00:00-01:00	1.5	0	0	0	0	0	0
01:00-02:00	1.5	0	1.5	1.5	0	1	1
02:00-03:00	19	8	6	14	5.4	4	9.4
03:00-04:00	12.1	5.3	4.8	10.1	3.6	3.2	6.8
04:00-05:00	34.8	9.1	4.8	13.9	6.1	3.2	9.3
05:00-06:00	79	18.8	17.8	36.6	12.6	11.9	24.5
06:00-07:00	204.5	38.2	41.5	79.7	25.6	27.8	53.4
07:00-08:00	204.7	46.6	30.9	77.5	31.2	20.7	51.9
08:00-09:00	286	36	59.1	95.1	24.1	39.6	63.7
09:00-10:00	301.2	48	39.1	87.1	32.2	26.2	58.4
10:00-11:00	320	59.5	60.4	119.9	39.9	40.5	80.3
11:00-12:00	291.7	47.9	52.1	100	32.1	34.9	67
12:00-13:00	323	48.4	72.9	121.3	32.4	48.8	81.3
13:00-14:00	265.4	64.8	30.5	95.3	43.4	20.4	63.9
14:00-15:00	268.4	62.2	57.9	120.1	41.7	38.8	80.5
15:00-16:00	250	31.8	42.8	74.6	21.3	28.7	50
16:00-17:00	202.4	33.4	34.2	67.6	22.4	22.9	45.3
17:00-18:00	164.6	26.1	19.5	45.6	17.5	13.1	30.6
18:00-19:00	70.6	8.6	9.5	18.1	5.8	6.4	12.1
19:00-20:00	42.5	6.9	4.6	11.5	4.6	3.1	7.7
20:00-21:00	10.2	2	3	5	1.3	2	3.4
21:00-22:00	4.5	1	0	1	0.7	0	0.7
22:00-23:00	6.3	0	0	0	0	0	0
23:00-24:00	6.9	0	0	0	0	0	0
TOTAL	3370.8	602.6	592.9	1195.5	403.7	397.2	801

Table 4.1 – Existing & Expansion Traffic figures for Site 1 Greenstar access roundabout

SITE 4	Existing Traffic				Expansion Traffic		
	Junction	Panda			Panda		
Time Range	Total PCU	Departures	Arrivals	Total PCU	Departures	Arrivals	Total PCU
00:00-01:00	32.9	3.3	2.3	5.6	2.6	1.8	4.5
01:00-02:00	35.6	1	1.5	2.5	0.8	1.2	2
02:00-03:00	43.1	3	3	6	2.4	2.4	4.8
03:00-04:00	25.6	3.8	2.5	6.3	3	2	5
04:00-05:00	61.3	10.5	23.2	33.7	8.4	18.6	27
05:00-06:00	166.9	30.8	29.4	60.2	24.6	23.5	48.2
06:00-07:00	397	69.3	70.8	140.1	55.4	56.6	112.1
07:00-08:00	587.3	50.7	38.2	88.9	40.6	30.6	71.1
08:00-09:00	651.4	22.1	41.2	63.3	17.7	33	50.6
09:00-10:00	588.6	39.5	31.8	71.3	31.6	25.4	57
10:00-11:00	458	35.5	51.3	86.8	28.4	41	69.4
11:00-12:00	479.2	53.1	52.1	105.2	42.5	41.7	84.2
12:00-13:00	548.1	75	65.6	140.6	60	52.5	112.5
13:00-14:00	566.8	56.3	58.9	115.2	45	47.1	92.2
14:00-15:00	576.7	64.3	58.6	122.9	51.4	46.9	98.3
15:00-16:00	534.8	55.5	49.4	104.9	44.4	39.5	83.9
16:00-17:00	637	37.6	36.3	73.9	30.1	29	59.1
17:00-18:00	762.9	25.7	25	50.7	20.6	20	40.6
18:00-19:00	418.8	9.8	15.6	25.4	7.8	12.5	20.3
19:00-20:00	206.8	7.3	1.5	8.8	5.8	1.2	7
20:00-21:00	96.1	5.3	5.3	10.6	4.2	4.2	8.5
21:00-22:00	93.7	2.3	3.3	5.6	1.8	2.6	4.5
22:00-23:00	88.3	5.6	10.4	16	4.5	8.3	12.8
23:00-24:00	71.8	4.8	1	5.8	3.8	0.8	4.6

Table 4.2 – Existing & Expansion Traffic figures for Site 4 Panda access T-junction

4.3 Generated traffic splits through neighbouring junctions

Based on the traffic counts obtained and the direction of travel of vehicles arriving at and departing from the two facilities, the following profiles of expansion traffic were established:

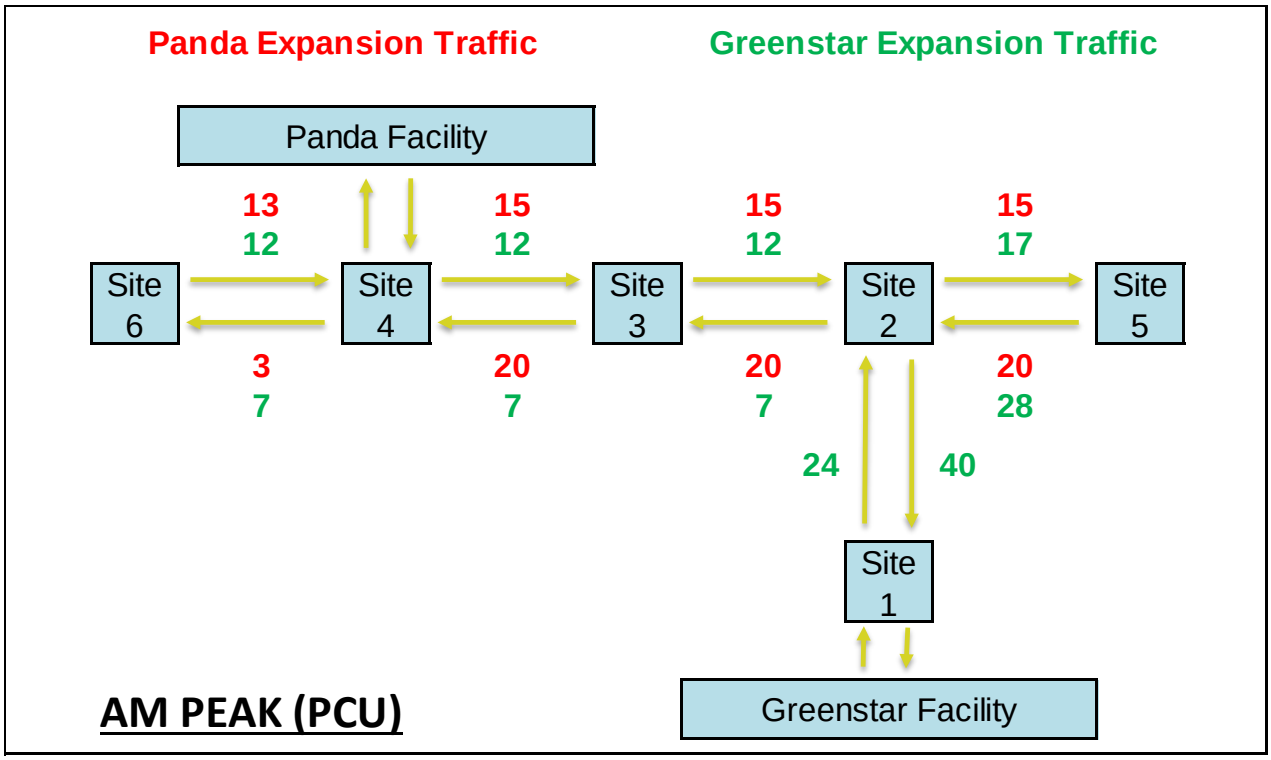


Figure 4.1 – AM peak traffic flow splits for expansion traffic at Panda and Greenstar facilities

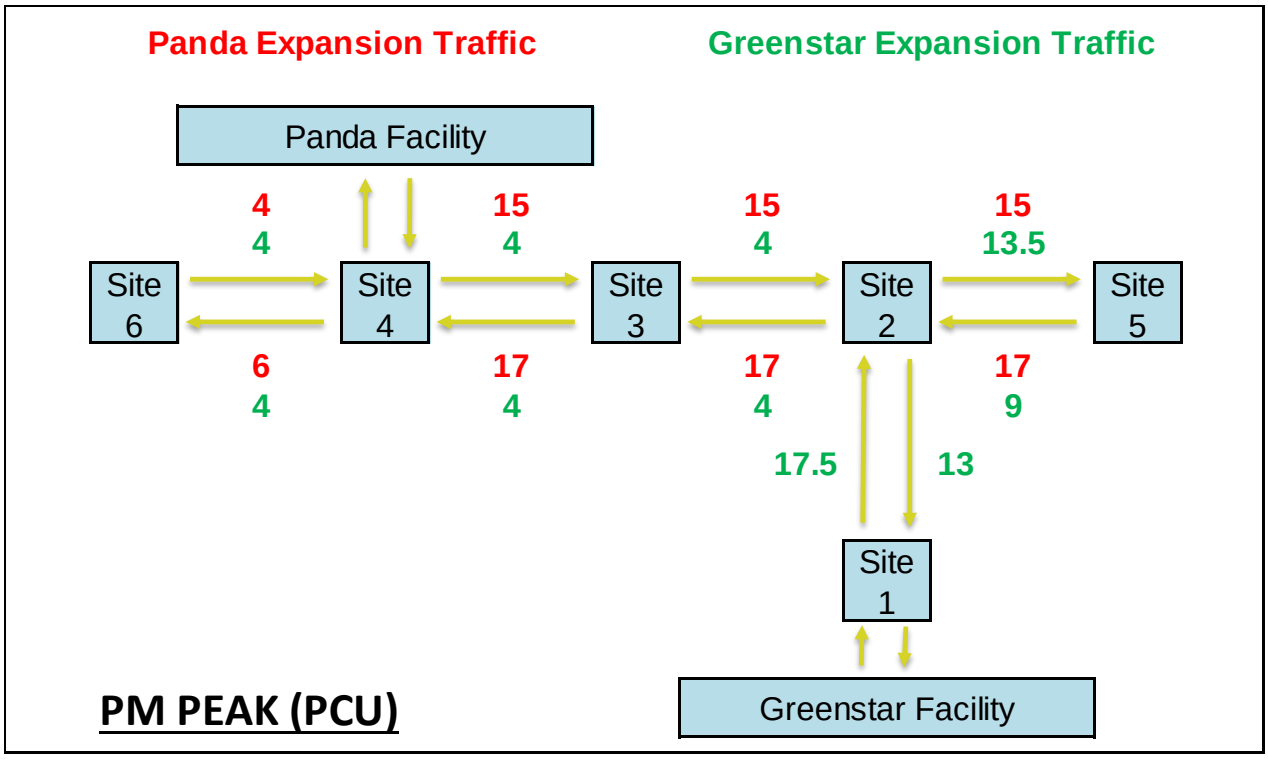


Figure 4.2 – PM peak traffic flow splits for expansion traffic at Panda and Greenstar facilities

4.4 Traffic Impacts of proposed development on local road network

All six junctions were modelled using Junctions 9 software with existing traffic flows obtained from traffic counts and expansion traffic obtained as shown in Figures 4.1 and 4.2 above.

Site 4, Panda access road junction, was modelled using *PICADY* software for priority T-junctions for three time periods – AM peak, Mid-day peak and PM peak. Maximum capacity RFC value of 0.304 occurred at the midday peak in design year 2035, with all traffic, including expansion traffic, factored for growth using TII's Dublin Metropolitan Area High Sensitivity Factors for HGV's to obtain a conservative overview.

Sites 1, 2, 3, 5 and 6 were modelled using *ARCADY* software for roundabouts, with all traffic, including expansion traffic, factored for growth using growth factors for Dublin Metropolitan Area High Sensitivity Factor for HGV's to obtain a conservative overview for future design years.

Sites 1, 2 and 3 will operate well below capacity for all future design years tested. Results of the conservative overview assessment for Sites 1, 2 and 3 are presented below in Tables 4.3, 4.4 and 4.5 below.

	AM					NOON					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2020 base level														
Arm A	D1	0.0	5.12	0.04	A	D2	0.1	5.31	0.07	A	D3	0.1	4.98	0.07	A
Arm B		0.1	5.08	0.05	A		0.1	5.21	0.07	A		0.0	4.90	0.03	A
Arm C		0.1	4.77	0.07	A		0.1	5.08	0.11	A		0.1	4.94	0.09	A
Arm D		0.4	6.69	0.26	A		0.4	6.67	0.26	A		0.1	5.42	0.09	A
	expansion traffic														
Arm A	D4	0.0	0.00	0.00	A	D5	0.0	0.00	0.00	A	D6	0.0	0.00	0.00	A
Arm B		0.1	4.72	0.05	A		0.1	4.80	0.06	A		0.0	4.66	0.03	A
Arm C		0.0	0.00	0.00	A		0.0	0.00	0.00	A		0.0	0.00	0.00	A
Arm D		0.1	5.39	0.08	A		0.1	5.50	0.10	A		0.0	5.09	0.03	A
	2020 with expansion														
Arm A	D7	0.0	5.34	0.04	A	D8	0.1	5.60	0.07	A	D9	0.1	5.04	0.07	A
Arm B		0.1	5.35	0.10	A		0.2	5.60	0.13	A		0.1	5.08	0.07	A
Arm C		0.1	4.88	0.07	A		0.1	5.27	0.11	A		0.1	5.04	0.10	A
Arm D		0.6	7.52	0.34	A		0.6	7.71	0.36	A		0.1	5.59	0.11	A
	2035 with expansion														
Arm A	D10	0.1	5.86	0.06	A	D11	0.1	6.33	0.12	A	D12	0.1	5.35	0.11	A
Arm B		0.2	5.88	0.15	A		0.3	6.35	0.20	A		0.1	5.42	0.10	A
Arm C		0.1	5.25	0.11	A		0.2	5.94	0.17	A		0.2	5.52	0.15	A
Arm D		1.1	10.01	0.50	B		1.2	10.53	0.53	B		0.2	5.95	0.17	A

Table 4.3 – *ARCADY* results for Site 1 using conservative future growth calculation

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2020 base level									
Arm A	D1	0.6	4.50	0.37	A	D2	0.4	3.70	0.25	A
Arm B		0.3	7.03	0.22	A		0.6	8.08	0.35	A
Arm C		0.3	3.64	0.24	A		0.7	4.71	0.39	A
	expansion traffic									
Arm A	D3	0.1	2.91	0.05	A	D4	0.0	2.83	0.02	A
Arm B		0.1	4.70	0.04	A		0.0	4.63	0.03	A
Arm C		0.0	2.75	0.02	A		0.0	2.71	0.02	A
	2020 with expansion									
Arm A	D5	0.8	4.94	0.42	A	D6	0.4	3.84	0.27	A
Arm B		0.4	7.72	0.28	A		0.7	8.75	0.39	A
Arm C		0.4	3.83	0.27	A		0.8	4.93	0.41	A
	2035 with expansion									
Arm A	D7	1.9	8.00	0.63	A	D8	0.7	4.74	0.41	A
Arm B		1.0	12.00	0.47	B		1.9	16.41	0.64	C
Arm C		0.8	4.88	0.41	A		1.9	8.41	0.64	A

Table 4.4 – *ARCADY* results for Site 2 using conservative future growth calculation

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2020 base level									
Arm A	D1	0.1	3.89	0.05	A	D2	0.1	4.44	0.08	A
Arm B		0.6	5.04	0.34	A		0.4	4.71	0.29	A
Arm C		0.4	4.78	0.29	A		0.8	5.79	0.42	A
	expansion traffic									
Arm A	D3	0.0	3.26	0.03	A	D4	0.0	3.24	0.02	A
Arm B		0.0	3.40	0.03	A		0.0	3.37	0.02	A
Arm C		0.0	0.00	0.00	A		0.0	0.00	0.00	A
	2020 with expansion									
Arm A	D5	0.1	4.02	0.08	A	D6	0.1	4.57	0.11	A
Arm B		0.6	5.28	0.37	A		0.5	4.84	0.31	A
Arm C		0.5	4.90	0.29	A		0.8	5.90	0.42	A
	2035 with expansion									
Arm A	D7	0.2	4.62	0.13	A	D8	0.2	5.80	0.19	A
Arm B		1.3	7.43	0.55	A		0.9	6.25	0.46	A
Arm C		0.9	6.39	0.45	A		1.9	9.49	0.64	A

Table 4.5 – *ARCADY* results for Site 3 using conservative future growth calculation

Sites 5 and 6 showed indications of capacity issues under the conservative assessment and therefore were modelled using the more accurate approach, using TII's Dublin Metropolitan Area Central Sensitivity Factors for cars and applying growth factors to existing traffic only. Results of ARCADY analysis for Sites 5 and 6 are presented in Tables 4.6 and 4.7 below.

Site 6 shows a maximum RFC of 0.83 dring the am peak in future design year 2035, indicating that the junction will continue to function below capacity for all future design years.

Site 5 modelling, however, indicates that the junction is already under significant pressure, with Arm B to/from Kilshane operating at RFC of 0.96 at the AM peak under existing traffic flows. This will increase to 1.02 with traffic from the proposed expansions. Arm D Mitchelstown Road will also exceed recommended RFC of 0.85 by 2025.

The total traffic throughput at Site 5 was counted at 1535 PCU during the AM peak hour, with 649 PCU arriving at the junction from Arm B (Kilshane). Additional traffic arriving from Arm B due to expansions at Greenstar and Panda at the AM peak amounts to just 17 PCU, an increase of 2.6%; while the total traffic through the junction at the AM peak from Panda and Greenstar expansions amounts to a total of 80 vehicles, an increase of 5.2%.

During the PM peak hour, Arm D (Mitchelstown Road) is currently operating at RFC of 0.72, rising to 0.76 with expansion traffic. However, future growth of existing traffic will approach recommended RFC of 0.85 in 2025 without expansion traffic, and will approach full capacity RFC of 1.0 in 2035.

It is noteworthy however that much of the traffic in the area should not be subject to growth factors and therefore future year modelling may overstate potential capacity issues – for example, existing Panda and Greenstar traffic has been factored for future growth, even though traffic will be limited by waste management capacity. Many facilities in the area operate under similar provisions.

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
2020 base level										
Arm A	D1	0.5	4.84	0.33	A	D2	0.5	5.25	0.29	A
Arm B		13.2	70.44	0.96	F		1.2	10.33	0.51	B
Arm C		0.6	5.84	0.36	A		1.6	8.30	0.60	A
Arm D		0.4	7.02	0.25	A		2.7	25.14	0.72	D
expansion traffic										
Arm A	D3	0.0	2.99	0.03	A	D4	0.0	2.94	0.01	A
Arm B		0.0	4.52	0.03	A		0.0	4.41	0.01	A
Arm C		0.0	2.98	0.03	A		0.0	2.97	0.03	A
Arm D		0.0	4.47	0.01	A		0.0	4.48	0.01	A
2020 with expansion										
Arm A	D5	0.6	5.14	0.36	A	D6	0.5	5.43	0.31	A
Arm B		23.6	114.26	1.02	F		1.3	10.95	0.54	B
Arm C		0.7	6.17	0.40	A		1.9	9.02	0.63	A
Arm D		0.4	7.30	0.27	A		3.3	29.64	0.76	D
2025 without expansion										
Arm A	D7	0.6	5.14	0.36	A	D8	0.5	5.64	0.32	A
Arm B		34.3	152.49	1.06	F		1.4	11.69	0.57	B
Arm C		0.7	6.22	0.39	A		2.1	9.84	0.66	A
Arm D		0.4	7.36	0.28	A		4.6	40.44	0.83	E
2025 with expansion										
Arm A	D9	0.7	5.47	0.40	A	D10	0.6	5.84	0.34	A
Arm B		53.8	227.66	1.12	F		1.5	12.49	0.59	B
Arm C		0.8	6.51	0.43	A		2.4	10.88	0.69	B
Arm D		0.5	7.65	0.29	A		6.0	51.78	0.87	F
2035 without expansion										
Arm A	D11	0.7	5.57	0.41	A	D12	0.6	6.16	0.36	A
Arm B		79.3	356.74	1.19	F		1.8	13.99	0.63	B
Arm C		0.8	6.61	0.43	A		3.0	12.89	0.73	B
Arm D		0.5	7.82	0.31	A		13.0	101.43	0.98	F
2035 with expansion										
Arm A	D13	0.9	5.95	0.44	A	D14	0.7	6.35	0.38	A
Arm B		104.0	503.72	1.26	F		2.0	15.05	0.65	C
Arm C		0.9	6.92	0.46	A		3.5	14.71	0.77	B
Arm D		0.5	8.14	0.33	A		19.2	140.13	1.03	F

Table 4.6 – *ARCADY* results for Site 5 using central future growth calculation

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2020 base level									
Arm A	D1	0.5	4.92	0.30	A	D2	0.5	5.09	0.29	A
Arm B		0.0	0.00	0.00	A		0.0	0.00	0.00	A
Arm C		2.3	9.41	0.68	A		1.9	8.11	0.63	A
Arm D		0.6	4.17	0.34	A		0.9	5.12	0.44	A
	expansion traffic									
Arm A	D3	0.0	2.92	0.01	A	D4	0.0	2.91	0.01	A
Arm B		0.0	0.00	0.00	A		0.0	0.00	0.00	A
Arm C		0.0	2.95	0.02	A		0.0	2.91	0.01	A
Arm D		0.0	2.52	0.01	A		0.0	0.00	0.00	A
	2020 with expansion									
Arm A	D5	0.5	5.02	0.32	A	D6	0.5	5.18	0.31	A
Arm B		0.0	0.00	0.00	A		0.0	0.00	0.00	A
Arm C		2.5	10.06	0.70	B		1.9	8.27	0.64	A
Arm D		0.6	4.27	0.36	A		0.9	5.18	0.45	A
	2035 without expansion									
Arm A	D7	0.7	5.69	0.37	A	D8	0.6	5.96	0.37	A
Arm B		0.0	0.00	0.00	A		0.0	0.00	0.00	A
Arm C		4.6	16.40	0.81	C		3.4	12.36	0.76	B
Arm D		0.8	4.79	0.42	A		1.3	6.43	0.54	A
	2035 with expansion									
Arm A	D9	0.7	5.82	0.39	A	D10	0.7	6.08	0.38	A
Arm B		0.0	0.00	0.00	A		0.0	0.00	0.00	A
Arm C		5.2	18.41	0.83	C		3.5	12.73	0.77	B
Arm D		0.8	4.93	0.43	A		1.3	6.52	0.55	A

Table 4.7 – *ARCADY* results for Site 6 using central future growth calculation

5 Conclusion

The main conclusions of this study are summarised as follows:

- The key junctions identified by ORS in consultation with Fingal County Council were subjected to capacity analysis to examine the potential traffic levels generated from the proposed Greenstar and Panda expansions and the existing road network.

- These junctions were examined for AM and PM peak conditions and it was found that Sites 1, 2, 3, 4 and 6 will operate below capacity in all future design years following expansions.

- Site 5 roundabout between Cappagh Road and Mitchelstown Road is already under pressure from existing traffic flows, with the arm from Kilshane already operating at 96% of capacity at the AM peak period. The proposed expansions will increase 2020 traffic on this road by 2.6% and will increase the total traffic through the junction by 5.2%.

- In transportation engineering terms, the proposed expansions put forward by the design team will not be a significant traffic generator and will not adversely impact on the operation on the regional road to which they connect. Any capacity issues identified are pre-existing and require attention irrespective of the proposed expansions, which will have minimal impact.

Appendix A – Traffic Count Data

Traffic count data available on request

Appendix B – Junctions 9 Modelling Data

Modelling data available on request

APPENDIX 4

SURFACE WATER MONITORING REPORTS

Surface Water Results 2019 & 2020

	Conductivity	pH	TSS	Mineral Oil	TPH
	µS/cm	pH Units	mg/l	µg/l	µg/l
Warning Level	**819**	**7.73**	**30.62**	**731**	**1285**
Action Level	**977**	**7.96**	**40.13**	**1013**	**1758**
07/01/2019	355	6.56	8		
16/01/2019	483	7.07	10		
24/01/2019	529	7.23	<2	<2.5	<1
31/01/2019	515	7.30	5		
08/02/2019	436	6.81	10		
14/02/2019	537	7.12	8		
20/02/2019	507	7.05	25		
27/02/2019	545	7.06	11		
06/03/2019	331	7.09	3		
13/03/2019	507	7.34	2		
21/03/2019	481	7.07	12		
27/03/2019	564	6.95	7		
05/04/2019	243	7.13	10	610	871
12/04/2019	571	6.90	10		
17/04/2019	461	6.97	13		
24/04/2019	566	6.98	9		
08/05/2019	514	7.11	11		
17/05/2019	568	6.95	23		
22/05/2019	510	7.53	<2		
07/06/2019	445	7.10	7		
11/06/2019	556	7.02	11		
20/06/2019	493	6.98	13		
26/06/2019	494	7.43	10		
02/07/2019	566	7.11	5		
26/07/2019	526	6.90	7	<2.5	<1
02/08/2019	398	7.26	<2		
09/08/2019	328	7.31	<2		
16/08/2019	371	6.92	7		
23/08/2019	392	7.17	9		
30/08/2019	493	7.22	10		
13/09/2019	494	7.18	5		
20/09/2019	547	7.01	7		
27/09/2019	475	7.02	14		
04/10/2019	445	7.18	29		
11/10/2019	513	7.37	16		
18/10/2019	465	7.01	10		
24/10/2019	357	7.12	<2		
08/11/2019	370	7.17	5	252	428
15/11/2019	262	6.95	26		
26/11/2019	349	7.19	6		
29/11/2019	379	7.00	20		
06/12/2019	402	7.19	2		
20/12/2019	674	7.58	<2		
17/01/2020	468	7.12	35		
07/02/2020	593	7.09	12		
14/02/2020	622	7.17	5		
21/02/2020	613	7.08	5		
28/02/2020	516	7.06	<2		
06/03/2020	397	6.93	5		
20/03/2020	425	7.03	16		
27/03/2020	411	7.00	8		
03/04/2020	512	7.06	13		

	Conductivity	pH	TSS	Mineral Oil	TPH
	µS/cm	pH Units	mg/l	µg/l	µg/l
Warning Level	**819**	**7.73**	**30.62**	**731**	**1285**
Action Level	**977**	**7.96**	**40.13**	**1013**	**1758**
08/05/2020	713	7.22	10		
15/05/2020	597	7.25	8		
22/05/2020	786	7.01	24		
29/05/2020	789	7.10	20		
05/06/2020	606	7.09	13		
12/06/2020	618	7.21	8	263	877
19/06/2020	164	7.02	22		
26/06/2020	355	7.24	13		
03/07/2020	333	7.30	6		
10/07/2020	350	7.19	21		
17/07/2020	324	7.20	10		
24/07/2020	409	7.30	6		
31/07/2020	282	7.15	12		
14/08/2020	676	7.09	17	<2.5	<1
21/08/2020	374	7.23	19		
28/08/2020	300	7.32	7		
04/09/2020	343	7.35	4		
11/09/2020	368	7.28	15		
25/09/2020	483	7.17	20		
02/10/2020	499	7.09	12		
09/10/2020	197.2	6.88	3		
16/10/2020	483	7.11	16		
23/10/2020	387	6.95	<2	<2.5	<1
30/10/2020	530	7.17	18		
06/11/2020	295	6.82	12		
11/12/2020	487	6.98	9		
22/12/2020	712	7.30	12		

08/10/2020

Aluminium	Ammonia	Antimony	Arsenic	Barium	Beryllium	BOD	Boron	Cadmium	Cesium	Chromium
ug/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
31	0.09	<3	1	74	<1	<2	25	<1	<2	<1

Cobalt	Conductivity	Copper	Gallium	Iron	Lead	Lithium	Manganese	Nickel	Rubidium	Selenium
ug/L	µscm	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
<1	1503	132	<1	279	2	6	186	6	<24	1

Silver	TSS	Strontium	Sulphate	Thallium	Tin	TOC	Uranium	Vanadium	Zinc
ug/L	mg/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	ug/L	ug/L
<0.42	<2	373	168	<1	<1	316	<1	<1	286

APPENDIX 5

APPROPRIATE ASSESSMENT SCREENING REPORT

Unit 15
Melbourne Business Park
Model Farm Road
Cork T12 WR89

T: 021 434 5366
E: admin@ocallaghanmoran.com
www.ocallaghanmoran.com

O'Callaghan Moran & Associates
ENVIRONMENTAL MANAGEMENT FOR BUSINESS

APPROPRIATE ASSESSMENT

STAGE 1 SCREENING

STARRUS ECO HOLDINGS LTD

CAPPAGH ROAD

FINGLAS

DUBLIN 11

Prepared For: -

Starrus Eco Holdings Ltd
Cappogue
Finglas
Dublin 11

Prepared By: -

O'Callaghan Moran & Associates
Unit 15
Melbourne Business Park
Model Farm Road
Cork T12 WR89

March 2021

Project	Appropriate Assessment Screening Report			
Client	Starrus Eco Holdings Limited			
Report No.	Date	Status	Prepared By	Reviewed By
201380202	15/02/2020	Draft	Austin Hynes MSc	Jim O'Callaghan MSc
	10/04/2020	Rev A		
	07/07/2020	Rev B		
	31/03//2021	Final		

TABLE OF CONTENTS

PAGE

1. INTRODUCTION

Panda commissioned O'Callaghan Moran & Associates (OCM) to carry out an Appropriate Assessment Screening of a proposed development at its waste recovery and transfer facility at Cappagh Road, Finglas, Dublin 11. The assessment is required to support a planning application to increase the annual waste intake to 450,000 tonnes per annum.

The Habitats Directive, which is implemented under the European Communities Birds and Natural Habitats) Regulations 2011 (S.I. No 477 of 2011), requires an "appropriate assessment" of the potential impacts any proposed development that may have an impact on the conservation objectives of any Natura 2000 site.

Article 6(3) of the Directive stipulates that *any plan or project not directly connected with or necessary to the management of a Natura 2000 Site, but likely to have a significant effect thereon…shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.*

Guidance documents issued by Department of Environment, Heritage and Local Government (DEHLG) and the National Parks and Wildlife Services (NPWS) recommend that the assessment be completed in a series of Stages, which comprise:

Stage 1: Screening

The purpose of this Stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone and in combination with other plans or projects, could have significant effects on a Natura 2000 Site in respect of the site's conservation objectives.

Stage 2: Appropriate Assessment

This Stage is required if the Stage 1 Screening exercise identifies that the project is likely to have a significant impact on a Natura 2000 Site.

Stage 3: Assessment of Alternative Solutions.

If Stage 2 determines that the project will have an adverse impact upon the integrity of a Natura 2000 Site, despite the implementation of mitigation measures, it must be objectively concluded that no alternative solutions exist before the plan can proceed.

Stage 4: Compensatory Measures:

Where no alternative solutions are feasible and where adverse impacts remain but imperative reasons of overriding public interest require the implementation of a project an assessment of compensatory measures that will effectively offset the damage to the Natura Site 2000 is required.

1.1 Methodology

The Screening Assessment was based on a site inspection and the nature and scale of the proposed development. It comprised a Source-Pathway-Receptor risk evaluation. This starts with the source i.e. the hazard, which can include air emissions, noise, surface water run-off, wastewater and raw materials and wastes handling and storage. The next step is to identify how a hazard can travel through the environment i.e. the pathway. The final step is to determine the receptors that could be affected by the hazard.

The assessment followed the guidance presented in the DEHLG (2009, revised February 2010) Appropriate Assessment of Plans and Projects in Ireland and the NPWS (2010) Circular NPW 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. The information sources included;

- National Parks & Wildlife Service (NPWS) - www.npws.ie
- Environmental Protection Agency (EPA) – www.epa.ie
- National Biodiversity Data Centre – www.biodiversityireland.ie
- Fingal County Council Development Plan 2017-2023.

2. DESCRIPTION OF PROJECT

2.1 Site Location & Layout

The site is on Cappagh Road and covers 2.5 hectares (ha). The layout is shown on Drawing No.18139-200. There are three waste handling buildings (Building A1 -2,030 m^2; Building A2 - 2,800 m^2 and Building B1 - 4,088 m^2) an electrical substation, two weighbridges and office and associated control rooms, staff amenity building (100 m2), fuel tanks and paved open yards.

2.2 Site Operations

The site operates 24 hours a day seven days a week. Wastes are delivered in Panda's waste collection trucks and those of other commercial waste companies and wastes are not accepted from members of the public. All deliveries are weighed in and the trucks then enter appropriate waste processing building where the wastes are off loaded, inspected and processed.

Mixed dry recyclables are sorted into the different types and these are then baled and stored before being sent for further treatment. Source separated wastes are baled and also stored before being sent off-site. Processed mixed solid wastes are accepted from other waste pre-treatment facilities and these are treated to remove recyclables, with the residues then further processed to produce a solid recovered fuel (SRF). The SRF is sent to cement kilns where it is used as a replacement for fossil fuels.

Food waste (brown bin) and mixed household waste (black bin) that contains odorous materials are accepted and stored in a section of one of the buildings that is fitted with an odour control system. It is then sent to other waste management facilities for further treatment.

Out of date packaged food from commercial operators is accepted and stored pending transfer to other treatment plants where the packaging is removed. This activity is authorised by the Department of Agriculture, Food and Marine under the Animal By-Products Regulations.

2.3 Services

The site has connections to the main electricity supply and telecoms systems. Water for the staff toilets is obtained from an on-site well. There is no connection to the municipal foul sewer. Sanitary wastewater from the toilets is collected in an underground holding tank and sent off site for treatment.

Rainwater run-off from the building roofs is harvested for use as 'grey water' in the toilets, with the surplus along with the run-off from the paved yards discharged to the storm sewer serving the adjoining Stadium Business Park via an attenuation tank. There is a shut off valve on the attenuation tank that can be closed in the event of an incident that has the potential to contaminate surface water retain the water inside the site boundary.

2.4 Hydrology

The site is in the catchment of the Tolka River, which is approximately 2 kilometres to the south west and south. There are no streams or water courses either on site, or in the surrounding area.

2.5 Geology and Hydrogeology

The subsoils beneath the site are between 1.3 and 8.45 m thick and comprise sandy gravelly boulder clays. The bedrock belongs to the Boston Hill Formation and comprises nodular and muddy limestones and shale.

The bedrock is a locally important (Lm) aquifer that is productive in local zones. The local direction of groundwater flow is to the south, but is likely to be greatly influenced by the large scale quarrying immediately to the east and north of the site (Huntstown Quarry). The aquifer vulnerability to pollution from the ground surface is Extreme.

2.6 Proposed Development

It is proposed to increase the annual waste intake from 250,000 tonnes to 450,000 tonnes and operate on a 24/7 basis permanently. The changes do not require the construction of any new buildings, alterations to the foul and surface water drainage system and will not result in any new point or fugitive emissions to air, surface water, ground and groundwater and will not be a new or additional source of noise and light emissions. Therefore control measures to mitigate the impacts of the proposed development on Natura 2002 Sites are not required.

3. NATURA 2000 SITES

SACs are selected for the conservation and protection of habitats listed on Annex I and species (other than birds) listed on Annex II of the Habitats Directive, and their habitats. The habitats on Annex I require special conservation measures. SPAs are selected for the conservation and protection of bird species listed on Annex I of the Birds Directive and regularly occurring migratory species, and their habitats, particularly wetlands. The selected habitats and species are termed Qualifying Interests.

A statement of Conservation Objectives is prepared for each designated site which identifies the qualifying interests or conservation features. The Conservation Objectives are intended to ensure that the relevant habitats and species present on a site are maintained, and where necessary restored, at a Favourable Conservation Status.

Favourable Conservation Status of a habitat, as defined in 2011 Birds and Natural Habitats Regulations, is when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable

Conservation Status of a species is when:

- the Favourable population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats,
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

3.1 Natura 2000 Sites Potentially Affected by the Project

The site is not in either an SAC, or an SPA. There are eleven Natura 2000 sites within 15 km of the site, as listed in Table 3.1 and shown on Figure 3.1.

Table 3.1. Natura 2000 Sites within 15 km of the proposed Development

Site	Code	Distance (km)
South Dublin Bay & Tolka River Estuary SPA	004024	8.7 SE
Rye Water Valley/Carton SAC	001398	10.8 SW
South Dublin Bay SAC	000210	11.2 SE
Malahide Estuary SPA	004025	11.3 NE
Malahide Estuary SAC	000205	11.3 NE
North Dublin Bay SAC	00206	11.4 SE
North Bull Island SPA	004006	11.5 SE
Baldoyle Bay SAC	000199	13.0 E
Baldoyle Bay SPA	004016	13.2 E
Rogerstown Estuary SAC	000208	14.5 NE
Rogerstown Estuary SPA	004015	14.9 NE

3.2 SPAs

Dublin Bay and River Tolka Estuary SPA

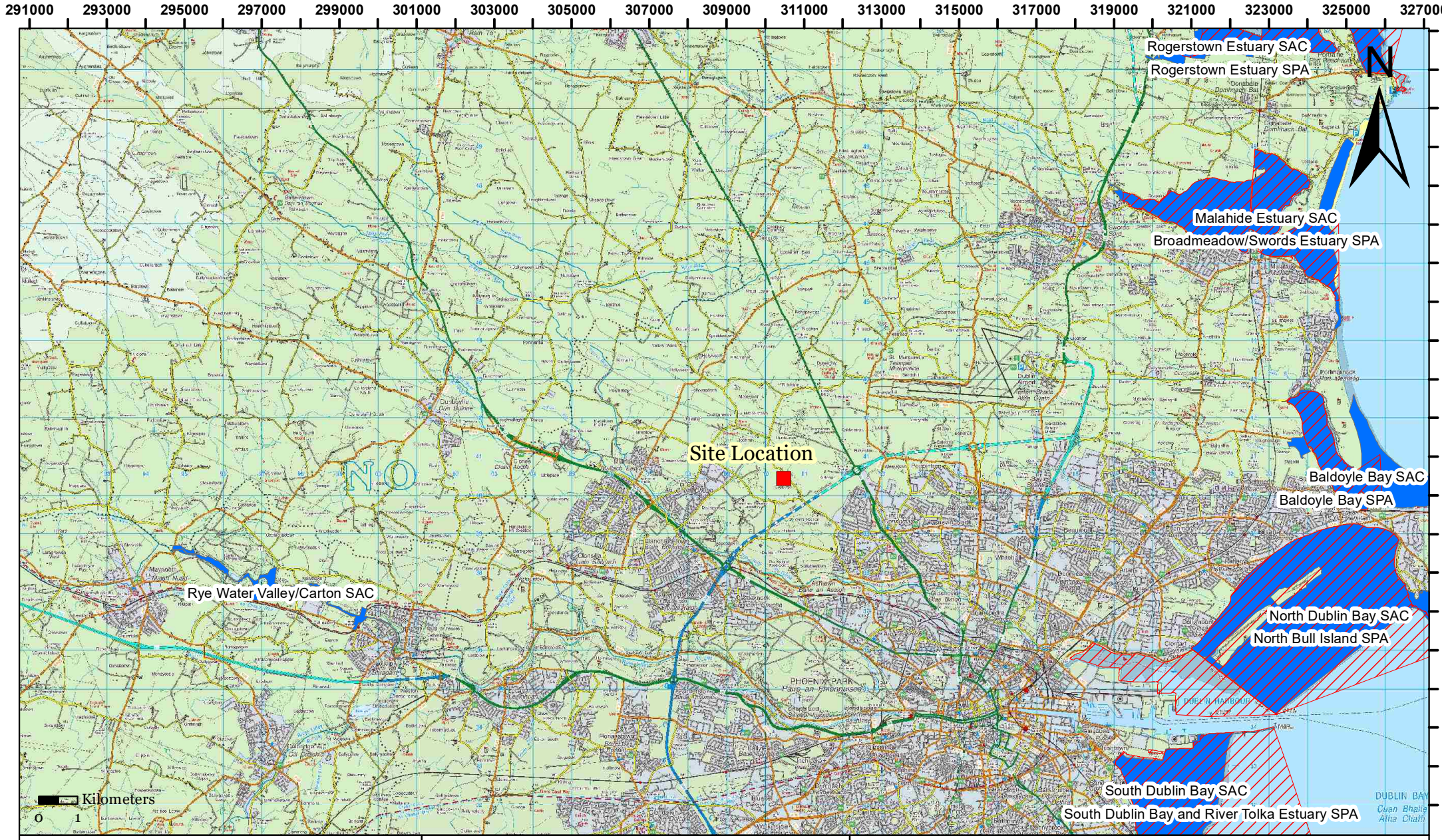
The South Dublin Bay and River Tolka Estuary SPA comprises a substantial part of Dublin Bay. It includes the intertidal area between the River Liffey and Dun Laoghaire, and the estuary of the River Tolka to the north of the River Liffey, as well as Booterstown Marsh. A portion of the shallow marine waters of the bay is also included.

The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/spa/004024 and the information is summarised below.

Qualifying Interests

The site is special conservation interest for the following species:

- Light-bellied Brent Goose [A046]
- Oystercatcher [A130]
- Ringed Plover [A137]
- Grey Plover [A141]
- Knot [A143]
- Sanderling [A144]
- Dunlin [A149]
- Bar-tailed Godwit [A157]
- Redshank [A162]
- Black-headed Gull [A179]
- Roseate Tern [A192]
- Common Tern [A193]
- Arctic Tern [A194]
- Wetlands [A999]



O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
email: info@ocallaghanmoran.com
Environmental Management for Business

CLIENT
Starrus Eco Holdings Ltd

TITLE
Natura 2000 Sites

Details:
- Site Location ING
- SPAs
- SACs

Figure 3.1

The Birds Directive pays particular attention to wetlands, and as these form part of the SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is an important site for wintering waterfowl, being an integral part of the internationally important Dublin Bay complex – all counts for wintering waterbirds are five year mean peaks for the period 1995/96 to 1999/2000. Although birds regularly commute between the south bay and the north bay, recent studies have shown that certain populations which occur in the south bay spend most of their time there. An internationally important population of Light-bellied Brent Goose (368) occurs regularly and newly arrived birds in the autumn feed on the Eelgrass bed at Merrion.

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SPA has been selected.

Malahide Estuary SPA

Malahide Estuary is situated in north County. Dublin, between the towns of Malahide and Swords. The site encompasses the estuary, saltmarsh habitats and shallow subtidal areas at the mouth of the estuary. The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/spa/004025 and the information is summarised below.

Qualifying Interests

The site is of special conservation interest for the following species:

- Great Crested Grebe (Podiceps cristatus) [A005]
- Light-bellied Brent Goose (Branta bernicla hrota) [A046]
- Shelduck (Tadorna tadorna) [A048]
- Pintail (Anas acuta) [A054]
- Goldeneye (Bucephala clangula) [A067]
- Red-breasted Merganser (Mergus serrator) [A069]
- Oystercatcher (Haematopus ostralegus) [A130]
- Golden Plover (Pluvialis apricaria) [A140]
- Grey Plover (Pluvialis squatarola) [A141]
- Knot (Calidris canutus) [A143]
- Dunlin (Calidris alpina) [A149]
- Black-tailed Godwit (Limosa limosa) [A156]
- Bar-tailed Godwit (Limosa lapponica) [A157]
- Redshank (Tringa totanus) [A162]
- Wetland and Waterbirds [A999]

The Birds Directive pays particular attention to wetlands, and as these form part of the SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SPA has been selected.

North Bull Island SPA

This site covers all of the inner part of north Dublin Bay, with the seaward boundary extending from the Bull Wall lighthouse across to Drumleck Point at Howth Head. The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/spa/004006 and the information is summarised below.

Qualifying Interests

The site is of special conservation interest for the following species:

- Light-bellied Brent Goose (Branta bernicla hrota) [A046]
- Shelduck (Tadorna tadorna) [A048]
- Teal (Anas crecca) [A052]
- Pintail (Anas acuta) [A054]
- Shoveler (Anas clypeata) [A056]
- Oystercatcher (Haematopus ostralegus) [A130]
- Golden Plover (Pluvialis apricaria) [A140]
- Grey Plover (Pluvialis squatarola) [A141]
- Knot (Calidris canutus) [A143]
- Sanderling (Calidris alba) [A144]
- Dunlin (Calidris alpina) [A149]
- Black-tailed Godwit (Limosa limosa) [A156]
- Bar-tailed Godwit (Limosa lapponica) [A157]
- Curlew (Numenius arquata) [A160]
- Redshank (Tringa totanus) [A162]
- Turnstone (Arenaria interpres) [A169]
- Black-headed Gull (Chroicocephalus ridibundus) [A179]
- Wetland and Waterbirds [A999]

The Birds Directive pays particular attention to wetlands, and as these form part of the SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SPA has been selected.

Rogerstown Estuary SPA

Rogerstown Estuary is situated about 2 km north of Donabate in north County Dublin. It is a relatively small, funnel shaped estuary separated from the sea by a sand and shingle peninsula; the site extends eastwards to include an area of shallow marine water. The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/spa/004015 and the information is summarised below.

Qualifying Interests

The site is of special conservation interest for the following species:

- Greylag Goose (Anser anser) [A043]
- Light-bellied Brent Goose (Branta bernicla hrota) [A046]
- Shelduck (Tadorna tadorna) [A048]
- Shoveler (Anas clypeata) [A056]
- Oystercatcher (Haematopus ostralegus) [A130]
- Ringed Plover (Charadrius hiaticula) [A137]
- Grey Plover (Pluvialis squatarola) [A141]
- Knot (Calidris canutus) [A143]
- Dunlin (Calidris alpina) [A149]
- Black-tailed Godwit (Limosa limosa) [A156]
- Redshank (Tringa totanus) [A162]
- Wetland and Waterbirds [A999]

The Birds Directive pays particular attention to wetlands, and as these form part of the SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SPA has been selected.

3.3 SACs

South Dublin Bay SAC

This site lies south of the River Liffey in Co. Dublin, and extends from the South Wall to the west pier at Dun Laoghaire. It is an intertidal site with extensive areas of sand and mudflats. The sediments are predominantly sands but grade to sandy muds near the shore at Merrion Gates. The main channel which drains the area is Cockle Lake.

The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/sac/000210 and the information is summarised below.

Qualifying Interests

The site is selected for the following habitats and/or species listed on Annex I/II of the Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- Mudflats and sandflats not covered by seawater at low tide [1140]
- Annual vegetation of drift lines [1210]
- Salicornia and other annuals colonising mud and sand [1310]
- Embryonic shifting dunes [2110]

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Rye Water Valley/Carton SAC

Rye Water Valley/Carton SAC is located between Leixlip and Maynooth, in Counties Meath and Kildare, and extends along the Rye Water, a tributary of the River Liffey.

The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/sac/001398 and the information is summarised below.

Qualifying Interests

The site is selected for the following habitats and/or species listed on Annex I/II of the Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- Petrifying springs with tufa formation (Cratoneurion) [7220]
- Vertigo angustior (Narrow-mouthed Whorl Snail) [1014]
- Vertigo moulinsiana (Desmoulin's Whorl Snail) [1016]

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Malahide Estuary SAC

Malahide Estuary is situated immediately north of Malahide and east of Swords in Co. Dublin. It is the estuary of the River Broadmeadow. The site is divided by a railway viaduct which was built in the 1800s.

The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/sac/000205 and the information is summarised below.

Qualifying Interests

The site is selected for the following habitats and/or species listed on Annex I/II of the Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- Mudflats and sandflats not covered by seawater at low tide [1140]
- Salicornia and other annuals colonising mud and sand [1310]
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]
- Mediterranean salt meadows (Juncetalia maritimi) [1410]
- Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]
- Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

North Dublin Bay SAC

This site covers the inner part of north Dublin Bay, the seaward boundary extending from the Bull Wall lighthouse across to the Martello Tower at Howth Head. The North Bull Island is the focal point of this site.

The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/sac/000206 and the information is summarised below.

Qualifying Interests

The site is selected for the following habitats and/or species listed on Annex I/II of the Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- Mudflats and sandflats not covered by seawater at low tide [1140]
- Annual vegetation of drift lines [1210]

- Salicornia and other annuals colonising mud and sand [1310]
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]
- Mediterranean salt meadows (Juncetalia maritimi) [1410]
- Embryonic shifting dunes [2110]
- Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]
- Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
- Humid dune slacks [2190]
- Petalophyllum ralfsii (Petalwort) [1395]

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Baldoyle Bay SAC

Baldoyle Bay SAC extends from just below Portmarnock village to the west pier at Howth in Co. Dublin. It is a tidal estuarine bay protected from the open sea by a large sand-dune system. Two small rivers, the Mayne and the Sluice, flow into the bay.

The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/sac/000199 and the information is summarised below.

Qualifying Interests

The site is selected for the following habitats and/or species listed on Annex I / II of the Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- Mudflats and sandflats not covered by seawater at low tide [1140]
- Salicornia and other annuals colonising mud and sand [1310]
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]
- Mediterranean salt meadows (Juncetalia maritimi) [1410]

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Rogerstown Estuary SAC

Rogerstown Estuary is situated about 2 km north of Donabate in Co. Dublin. It is a relatively small, narrow estuary separated from the sea by a sand and shingle bar. The estuary is divided by a causeway and narrow bridge, built in the 1840s to carry the Dublin-Belfast railway line.

The Site Synopsis, which lists the full Qualifying Interests, and the Conservation Objectives are accessible at https://www.npws.ie/protected-sites/sac/000208 and the information is summarised below.

Qualifying Interests

The site is selected for the following habitats and/or species listed on Annex I/II of the Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- Estuaries [1130]
- Mudflats and sandflats not covered by seawater at low tide [1140]
- Salicornia and other annuals colonising mud and sand [1310]
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]
- Mediterranean salt meadows (Juncetalia maritimi) [1410]
- Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]
- Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]

Conservation Objectives

The conservation objectives are to maintain or restore the favorable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

3.4 Source-Pathway-Receptor Linkages

Given the distances between the development site and the Natura 2000 Sites there is no potential for noise, light, air emissions and groundwater movement to adversely impact the qualifying interests and conservation objectives of any of the Sites.

The only potential direct connection between the installation and a Natura 2000 site is the surface water run-off to the storm drainage system. This ultimately enters the River Tolka, whose estuary is part of the Dublin Bay and River Tolka Estuary SPA, which is 8.7 km to the south-east.

4. LIKELY EFFECTS

4.1 Plan or Project

The proposed development does not require any construction works and will not result in any loss of habitats either within, or outside the site boundary. It will not result in any new or additional emissions to surface water, air, ground and groundwater, or any new noise and light emissions.

4.2 Direct Impacts

The installation is not located within or adjoining to a Natura 2000 Site and the proposed development will not result in any direct habitat loss or fragmentation of any SPA or SAC. There is a surface water pathway between the facility and the South Dublin and River Tolka Estuary SPA and this is the only pathway between the facility and a Natura 2000 Site.

The proposed development will not result in any changes to either the volume or quality of the surface water run-off from the facility, which the routine testing has confirmed to be good. This, in conjunction with the distance to the River Tolka Estuary mean that the potential for any adverse impact on the South Dublin and River Tolka Estuary SPA is not significant.

4.3 Indirect Impacts

The proposed development will not result in any new processes, there will be no changes to the existing emissions and it will not give rise to any new direct or indirect emission to air, surface water, ground, groundwater or the foul sewer and no new or addition noise and light emission. There will be no change to the currently authorised operational hours. Given the separation distances between the facility and the Natura 2000 Sites the proposed development presents no risk of indirect impacts.

4.4 Cumulative Effects

As the proposed development will not result in any changes to the current emissions it will not contribute to the cumulative effects on the South Dublin and River Tolka SPA.

5. SCREENING CONCLUSION & STATEMENT

5.1 Conclusion

The proposed changes will not have any direct or indirect effects on a Natura 2002 Site.

5.2 Statement

The proposed development does not present a risk of significant effects on the Qualifying Interests and Conservation Objectives of any Natura 2000 Sites.

APPENDIX 6

ODOUR/DUST MONITORING
REPORTS

STACK EMISSIONS MONITORING REPORT

2-4 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel: 01355 246 730
Fax: 01355 249 669

Your contact at SOCOTEC LTD
David Hay Business Manager - North Tel: 01355 246 730 Email: david.hay@socotec.com

Operator & Address:
Starrus Eco Holdings Limited (Panda Waste) Cappagh Rd. Cappogue Finglas Dublin 11

Permit Reference:
IE Licence: W0261-02

Release Point:
A2-1 (Odour Abatement)

Sampling Date(s):
09 March 2020

SOCOTEC Job Number:	LEK 12125
Report Date:	16-Apr-20
Version:	1
Report By: MCERTS Number: MCERTS Level: Technical Endorsements:	Cameron Russell MM 18 1481 MCERTS Level 1 Technician
Report Approved By: MCERTS Number: Business Title: Technical Endorsements: Signature:	Enda Flood MM 12 1170 MCERTS Level 2 - Team Leader 1, 2, 3 & 4

1015

CONTENTS

EXECUTIVE SUMMARY

MONITORING OBJECTIVES

Starrus Eco Holdings Limited (Panda Waste) operates a odour abatement process process at Finglas which is subject to IE Licence W0261-02, under the EPA Act 1992.

SOCOTEC LTD were commissioned by Q.E.D. Engineering Limited to carry out stack emissions monitoring to determine the release of prescribed pollutants from the following Plant under normal operating conditions.

The results of these tests shall be used to demonstrate compliance with a set of emission limit values for prescribed pollutants as specified in the Plant's IE Licence, W0261-02.

Plant

A2-1 (Odour Abatement)

Operator

Starrus Eco Holdings Limited (Panda Waste)
Cappagh Rd.
Cappogue
Finglas
Dublin 11

IE Licence: W0261-02

Stack Emissions Monitoring Test House

SOCOTEC - East Kilbride Laboratory
2-4 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
UKAS and MCERTS Accreditation Number: 1015

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
MCERTS accredited results will only be claimed where both the sampling and analytical stages are UKAS accredited.

EXECUTIVE SUMMARY

EMISSIONS SUMMARY					
Parameter	**Units**	**Result**	**Calculated Uncertainty +/-**	**Emission Limit Value (ELV)**	**MCERTS accredited result**
Total Particulate Matter	mg/m³	2.2	0.46	-	✓
Particulate Emission Rate	g/hr	59	12.1	-	
Odour	ouE/m³	101.00	-	-	✗
Odour Emission Rate	ouE/s	903.64	-	-	
Moisture	%	0.08	0.04	-	✓
Stack Gas Temperature	°C	12	-	-	✓
Stack Gas Velocity	m/s	7.7	0.16	-	
Gas Volumetric Flow Rate (Actual)	m³/hr	34079	1705	-	
Gas Volumetric Flow Rate (STP, Wet)	m³/hr	32234	1613	-	
Gas Volumetric Flow Rate (STP, Dry)	m³/hr	32209	1611	-	
Gas Volumetric Flow Rate at Reference Conditions	m³/hr	32209	1611	45936	

ND = None Detected,

Results at or below the limit of detection are highlighted by bold italic text.

The above volumetric flow rate is calculated using data from the preliminary survey. Mass emissions for non isokinetic tests are calculated using these values. For all isokinetic testing the mass emission is calculated using test specific flow data and not the above values.

Reference conditions are 273K, 101.3kPa, dry gas .

EXECUTIVE SUMMARY

MONITORING TIMES			
Parameter	**Sampling Date(s)**	**Sampling Times**	**Sampling Duration**
Total Particulate Matter Run 1	09 March 2020	11:40 - 12:40	60 minutes
Odour Run 1	09 March 2020	12:44 - 12:54	60 minutes
Odour Run 2	09 March 2020	12;55 - 13:05	60 minutes
Odour Run 3	09 March 2020	13:06 - 13:15	60 minutes
Preliminary Stack Traverse	09 March 2020	1124-11:33	-

EXECUTIVE SUMMARY

PROCESS DETAILS

Parameter	Process Details
Description of process	Odour abatement process
Continuous or batch	Continuous
Product Details	N/A
Part of batch to be monitored (if applicable)	N/A
Normal load, throughput or continuous rating	Normal
Fuel used during monitoring	N/A
Abatement	Activated charcoal
Plume Appearance	None visible

EXECUTIVE SUMMARY

Monitoring Methods

The selection of standard reference / alternative methods employed by SOCOTEC is determined, wherever possible by the hierarchy of method selection outlined in Environmental Protection Agency Technical Guidance Note (Monitoring) AG2.

MONITORING METHODS							
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Limit of Detection (LOD)**	**Calculated MU +/- % Result**	**Calculated MU +/- % ELV**
Total Particulate Matter	SRM - EN 13284-1	AE 104	1015	Yes	0.23 mg/m³	20.5%	N/A - No ELV
Odour	EN 13725	AE 142	1015	No	-	-	N/A - No ELV
Moisture	SRM - EN 14790	AE 105	1015	Yes	0.02%	46.27%	N/A - No ELV
Velocity	SRM - EN ISO 16911-1	AE 154	1015	Yes	5 Pa	2.1%	N/A - No ELV
Volumetric Flow Rate	SRM - EN ISO 16911-1	AE 154	1015	Yes	-	5.0%	350.78%

EXECUTIVE SUMMARY

Analytical Methods

The following tables list the analytical methods employed together with the custody details. Unless otherwise stated the samples are archived at the analysis lab location.

SAMPLING METHODS WITH SUBSEQUENT ANALYSIS							
Species	**Analytical Technique**	**Analytical Procedure**	**UKAS Lab Number**	**UKAS Accredited Lab Analysis**	**Analysis Lab**	**Analysis Report number**	**Archive Period**
Total Particulate Matter	Gravimetric	AE 106	1015	Yes	SOCOTEC (East Kilbride)	N/A	8 Weeks
Odour	olfactometry	0	0609	No	Odournet	090320 SOCOTEC LEK 12125/A2-1	8 Weeks

ON-SITE TESTING							
Species	**Analytical Technique**	**Analytical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Analysis**	**Laboratory**	**Data Archive Location**	**Archive Period**
Moisture	Gravimetric	AE 105	1015	Yes	SOCOTEC (East Kilbride)	-	-

EXECUTIVE SUMMARY

SAMPLING LOCATION					
Sampling Plane Validation Criteria	**Value**	**Units**	**Requirement**	**Compliant**	**Method**
Lowest Differential Pressure	27	Pa	>= 5 Pa	Yes	EN 15259
Lowest Gas Velocity	6.8	m/s	-	-	-
Highest Gas Velocity	8.5	m/s	-	-	-
Ratio of Gas Velocities	1.2	: 1	< 3 : 1	Yes	EN 15259
Mean Velocity	7.7	m/s	-	-	-
Maximum angle of flow with regard to duct axis	<15	°	< 15°	Yes	EN 15259
No local negative flow	Yes	-	-	Yes	EN 15259

DUCT CHARACTERISTICS		
	Value	**Units**
Shape	Circular	-
Depth	1.25	m
Width	-	m
Area	1.23	m^2
Port Depth	125	mm

SAMPLING LINES & POINTS		
	Isokinetic	**Non-Iso & Gases**
Sample port size	4"BSP	4"BSP
Number of lines used	2	1
Number of points / line	8	1
Duct orientation	horizontal	horizontal
Filtration	in stack	-
Filtration for TPM	in stack	-

SAMPLING PLATFORM	
General Platform Information	
Permanent / Temporary Platform / Ground level / Floor Level / Roof	Permanent
Inside / Outside	Outside

AG1 Platform requirements	
Is there a sufficient working area so work can be performed in a compliant manner	Yes
Platform has 2 levels of handrails (approximately 0.5 m & 1.0 m high)	Yes
Platform has vertical base boards (approximately 0.25 m high)	Yes
Platform has removable chains / self closing gates at the top of ladders	No
Handrail / obstructions do not hamper insertion of sampling equipment	Yes
Depth of Platform = >Stack depth / diameter + wall and port thickness + 1.5m	Yes

Sampling Platform Improvement Recommendations (if applicable)

The sampling location meets all the requirements as specified in EPA Guidance Note AG1.

EXECUTIVE SUMMARY

Sampling & Analytical Method Deviations

In this instance there were no deviations from the sampling and analytical methods employed.

APPENDICES

CONTENTS

APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

MONITORING SCHEDULE					
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Number of Samples**
Total Particulate Matter	SRM - EN 13284-1	AE 104	1015	Yes	1
Odour	EN 13725	AE 142	1015	No	3
Moisture	SRM - EN 14790	AE 105	1015	Yes	1
Velocity	SRM - EN ISO 16911-1	AE 154	1015	Yes	1

APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

CALIBRATEABLE EQUIPMENT CHECKLIST

Extractive Sampling		Instrumental Analyser/s		Miscellaneous	
Equipment	**Equipment I.D.**	**Equipment**	**Equipment I.D.**	**Equipment**	**Equipment I.D.**
Control Box DGM	LEK 9.30	Horiba PG-250 Analyser	-	Laboratory Balance	-
Box Thermocouples	LEK 9.31	FT-IR Gasmet	-	Tape Measure	LEK 20.2
Meter In Thermocouple	LEK 9.31	FT-IR Oven Box	-	Stopwatch	-
Meter Out Thermocouple	LEK 9.31	Bernath 3006 FID	-	Protractor	-
Control Box Timer	LEK 17.17	Signal 3030 FID	-	Barometer	LEK 16.9
Oven Box	-	Servomex	-	Digital Micromanometer	LEK 1.20
Probe	LEK 6.43	JCT Heated Head Filter	-	Digital Temperature Meter	LEK 2.16
Probe Thermocouple	-	Thermo FID	-	Stack Thermocouple	-
Probe	-	Stackmaster	-	Mass Flow Controller	-
Probe Thermocouple	-	FTIR Heater Box for Heated Line	-	MFC Display module	-
S-Pitot	LEK 6.43	Anemometer	-	1m Heated Line (1)	-
L-Pitot	-	Ecophysics NOx Analyser	-	1m Heated Line (2)	-
Site Balance	LEK 23.20	Chiller (JCT/MAK 10)	-	1m Heated Line (3)	-
Last Impinger Arm	-	Heated Line Controller (1)	-	5m Heated Line (1)	-
Dioxins Cond. Thermocouple	-	Heated Line Controller (2)	-	10m Heated Line (1)	-
Callipers	LEK 15.1r	Site temperature Logger	-	10m Heated Line (2)	-
Small DGM	-		-	15m Heated Line (1)	-
Heater Controller	-		-	20m Heated Line (1)	-
Inclinometer (Swirl Device)	LEK 24.7		-	20m Heated Line (2)	-

NOTE: If the equipment I.D is represented by a dash (-), then this piece of equipment has not been used for this test.

CALIBRATION GASES

Gas (traceable to ISO 17025)	Cylinder I.D Number	Supplier	ppm	%	Analytical Tolerance +/- %
-	-	-	-	-	-

STACK EMISSIONS MONITORING TEAM

MONITORING TEAM								
Personnel	**MCERTS Number**	**MCERTS**		**TE / H&S Qualifications and Expiry Date**				
		Level	**Expiry**	**TE1**	**TE2**	**TE3**	**TE4**	**H&S**
Enda Flood	MM 12 1170	MCERTS Level 2	Apr-23	Mar-24	Mar-24	Jun-23	Nov-23	Apr-23
Daniel Scully	MM 19 1563	MCERTS Trainee	Oct-24	-	-	-	-	Oct-24

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

TOTAL PARTICULATE MATTER SUMMARY					
Parameter	Sampling Times	Concentration mg/m³	Uncertainty mg/m³	ELV mg/m³	Emission Rate g/hr
Run 1	11:40 - 12:40 09 March 2020	2.2	0.46	-	59
Blank	-	0.59	-	-	-

Reference conditions are 273K, 101.3kPa, dry gas .

Acetone Blank Value mg/l	Acceptable Value mg/l
0.3	10

FILTER INFORMATION

SAMPLES								
Test	Filter & Probe Rinse Number	Filter Start Weight g	Filter End Weight g	Mass Gained on Filter g	Probe Rinse Start Weight g	Probe Rinse End Weight g	Mass Gained on Probe g	Combined Total Mass Gained g
Run 1	AC0841	0.10125	0.10162	0.00037	161.14270	161.14410	0.00140	0.00177

If total mass gained is less than the LOD then the LOD is reported

BLANKS								
Test	Filter & Probe Number	Filter Start Weight g	Filter End Weight g	Mass Gained Filter g	Probe Start Weight g	Probe End Weight g	Mass Gained Probe g	Combined Total Mass Gained g
Run 1	AC0840	0.10045	0.10032	-0.00013	177.35320	177.35380	0.00060	0.00047

If total mass gained is less than the LOD then the LOD is reported

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

ISOKINETIC SAMPLING EQUATIONS - RUN 1 — TPM

Absolute pressure of stack gas, P_s		
Barometric pressure, P_b	Kpa	100
Stack static pressure, P_{static}	pa	9
$P_s = P_b + P_{static}$	Kpa	100.0
Vol. of water vapour collected, V_{wstd}		
Moisture trap weight increase,Vlc	g	0.5
$V_{wstd} = (0.001246)(V_{lc})$	m^3	0.000623
Volume of gas metered dry, V_{mstd}		
Volume of gas sample through gas meter, V_m		0.875
Gas meter correction factor, Y_d		0.944
Mean dry gas meter temperature, T_m		280
Mean pressure drop across orifice, DH	mmH_2O	23.557
$V_{mstd} = \frac{(0.3592)(V_m)(P_b+(DH/13.6))(Y_d)}{T_m}$	m^3	0.797
Volume of gas metered wet, V_{mstw}		
$V_{mstw} = V_{mstd} + V_{wstd}$	m^3	0.7972
Vol. of gas metered at O_2 Ref. Cond., $V_{mstd@X\%O2}$		
Is the process burning hazardous waste? *(If yes, no favourable oxygen correction)*		No
% oxygen measured in gas stream, act%O_2		21.0
% oxygen reference condition		21
O_2 Reference Factor O_2 Ref $= \frac{21.0 - act\%O_2}{21.0 - ref\%O_2}$		No O2 Ref
$V_{mstd@X\%oxygen} = (V_{mstd})(O_{2\,Ref})$	m^3	No O2 Ref
Moisture content, B_{wo}		
$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$		0.0008
	%	0.08
Moisture by FTIR	%	-
Velocity of stack gas, V_s		
Velocity pressure coefficient, C_p		0.84
Mean of velocity heads, DP_{avg}	Pa	34.95
Mean stack gas temperature, T_s	K	285
Gas density (wet, ambient), p		
p=(Ms*Ps)/(8.314*Ts)	kg/m^3	1.217
Stack Velocity, Vs $V_s = Cp\sqrt{\frac{\Delta DPavg}{p}}$	m/s	6.35

Molecular weight of dry gas, M_d		
CO_2	%	0.00
O_2	%	20.95
Total	%	20.95
N_2 (100 -Total)	%	79.05
$M_d = 0.44(\%CO_2)+0.32(\%O_2)+0.28(\%N_2)$		28.84
Molecular weight of wet gas, M_s		
$M_s = M_d(1 - B_{wo}) + 18(B_{wo})$	g/gmol	28.83
Actual flow of stack gas, Q_a		
Area of stack, A_s	m^2	1.23
$Q_a = (60)(A_s)(V_s)$	m^3/min	467.7
Total flow of stack gas, Q		
Conversion factor (K/mm.Hg)		0.3592
$Q_{std} = \frac{(Q_a)P_s(0.3592)(1-B_{wo})}{(T_s)}$	Dry	441.8
$Q_{stdO2} = \frac{(Q_a)P_s(0.3592)(1-B_{wo})(O_2REF)}{(T_s)}$	@O_2ref	No O2 Ref
$Q_{stw} = \frac{(Q_a)P_s(0.3592)}{(T_s)}$	Wet	442.19
Percent isokinetic, %I		
Nozzle diameter, D_n	mm	6.91
Nozzle area, A_n	mm^2	37.51
Total sampling time, q	min	60
$\%I = \frac{(4.6398E6)(T_s)(V_{mstd})}{(P_s)(V_s)(A_n)(q)(1-B_{wo})}$	%	98.3
Acceptable isokinetic range 95% to 115%		Yes
Particulate Concentration, C		
Mass collected on filter, M_f	g	0.00037
Mass collected in probe, M_p	g	0.00140
Total mass collected, M_n	g	0.00177
$C_{wet} = \frac{M_n}{V_{mstw}}$	mg/m³	2.220
$C_{dry} = \frac{M_n}{V_{mstd}}$	mg/m³	2.222
$C_{dry@X\%O2} = \frac{M_n}{V_{mstd@X\%oxygen}}$	mg/m³	No O2 Ref
Particulate Emission Rates, E		
$E = [(C_{wet})(Q_{stw})(60)] / 1000$		58.91

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

TOTAL PARTICULATE MATTER QUALITY ASSURANCE CHECKLIST

LEAK RATE						
Run	Mean Sampling Rate litre/min	Pre-sampling Leak Rate litre/min	Post-sampling Leak Rate litre/min	Maximum Vacuum mm Hg	Acceptable Leak Rate litre/min	Leak Tests Acceptable?
Run 1	13.77	0.10	0.00	-228.6	0.28	Yes

ISOKINETICITY		
Run	Isokinetic Variation %	Acceptable Isokineticity
Run 1	98.33	Yes

Acceptable isokinetic range 95% to 115%

WEIGHING BALANCE UNCERTAINTY			
Run	Result mg/m³	5% ELV mg/m³	LOD < 5% ELV
Run 1	0.23	No ELV	N/A - No ELV

The above is based on both the Filter and rinse uncertainty

BLANK VALUE				
Run	Overall Blank Value mg/m^3	Daily Emission mg/m^3	Acceptable Blank Value mg/m^3	Overall Blank Acceptable mg/m^3
Blank 1	0.59	-	-	-

FILTERS					
Run	Filter Material	Filter Size mm	Max Filtration Temperature °C	Pre-use Filter Conditioning Temperature °C	Post-use Filter Conditioning Temperature °C
Run 1	Glass Fibre	47	12	180	160

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

ODOUR SUMMARY					
Test	**Sampling Times**	**Concentration ouE/m³**	**Duration Minutes**	**ELV ouE/m³**	**Emission Rate ouE/s**
Run 1	12:44 - 12:54 09 March 2020	101.00	10	-	903.64
Run 2	12:55 - 13:05 09 March 2020	121.00	10	-	1082.58
Run 3	13:06 - 13:15 09 March 2020	81.00	10	-	724.70

Reference conditions are 273K, 101.3kPa, dry gas .

ODOUR QUALITY ASSURANCE CHECKLIST

Leak Test Results	Total Sample Volume @ ref Conditions m³	Mean Sampling Rate l/min	Pre sampling leak rate l/min	Post sampling leak rate l/min	Acceptable leak rate l/min	Leak Tests Acceptable?
Run 1	10.0	1.0	0.00	0.00	0.02	Yes
Run 2	10.0	1.0	0.00	0.00	0.02	Yes
Run 3	10.0	1.0	0.00	0.00	0.02	Yes

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

MOISTURE CALCULATIONS

Moisture Determination - Isokinetic							
Test Number	Sampling Time and Date	Start Weight kg	End Weight kg	Total gain kg	Concentration %	LOD %	Uncertainty %
Run 1	11:40 - 12:40 09 March 2020	3.2547	3.2552	0.0005	0.1	0.02	46.3

Moisture Quality Assurance							
Test Number	Sampling Duration mins	Total Volume Sampled l	Sampling Rate l/min	Start Leak Rate l/min	End Leak Rate l/min	Acceptable Leak Rate l/min	Leak Tests Acceptable?
Run 1	60	797	13.8	0.10	0.00	0.28	Yes

PRELIMINARY STACK SURVEY

Stack Characteristics		
Stack Diameter / Depth, D	1.25	m
Stack Width, W	-	m
Stack Area, A	1.23	m^2
Average stack gas temperature	12	^oC
Stack static pressure	-0.015	kPa
Barometric Pressure	100	kPa

Stack Gas Composition & Molecular Weights								
Component	Molar Mass M	Density kg/m^3 p	Conc Dry % Vol	Dry Volume Fraction r	Dry Conc kg/m^3 pi	Conc Wet % Vol	Wet Volume Fraction r	Wet Conc kg/m^3 pi
CO_2	44	1.963059	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
O_2	32	1.427679	20.950000	0.209500	0.299099	20.933628	0.209336	0.298865
N_2	28	1.249219	79.050000	0.790500	0.987508	78.988224	0.789882	0.986736
H_2O	18	0.803070	-	-	-	0.078148	0.000781	0.000628

Where: p = M / 22.41 pi = r x p

Calculation of Stack Gas Densities		
Determinand	Result	Units
Dry Density (STP), P_{STD}	1.2866	kg/m^3
Wet Density (STP), P_{STW}	1.2862	kg/m^3
Dry Density (Actual), P_{Actual}	1.2170	kg/m^3
Average Wet Density (Actual), $P_{ActualW}$	1.217	kg/m^3

Where:

P_{STD} = sum of component concentrations, kg/m^3 (not including water vapour)

$P_{STW} = (P_{STD} + pi \text{ of } H_2O) / (1 + (pi \text{ of } H_2O / 0.8036))$

$P_{Actual} = P_{STD}$ x (Ts / Ps) x (Pa / Ta)

$P_{ActualW} = P_{STW}$ x (Ts / Ps) x (Pa / Ta)

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

PRELIMINARY STACK SURVEY

TRAVERSE 1

Date of Survey	09 March 2020
Time of Survey	1124-11:33
Velocity Measurement Device:	S-Type Pitot

Sampling Line A								
Traverse Point	Distance into duct (m)	DP pt Pa (average of 3 readings)	DP pt mmH_2O (average of 3 readings)	Temp °C	Velocity m/s	Volumetric Flow Rate (actual) m^3/s	O_2 % Vol	Angle of Swirl °
1	0.08	31.0	3.2	11	7.0	8.6	-	<15
2	0.31	29.4	3.0	12	6.8	8.4	-	<15
3	0.94	37.6	3.8	12	7.7	9.5	-	<15
4	1.17	35.6	3.6	12	7.5	9.2	-	<15
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Mean	-	33.4	3.4	12	7.3	8.9	-	-

Sampling Line B								
Traverse Point	Distance into duct (m)	DP pt Pa (average of 3 readings)	DP pt mmH_2O (average of 3 readings)	Temp °C	Velocity m/s	Volumetric Flow Rate (actual) m^3/s	O_2 % Vol	Angle of Swirl °
1	0.08	38.2	3.9	12	7.8	9.6	-	<15
2	0.31	42.1	4.3	12	8.2	10.1	-	<15
3	0.94	45.7	4.7	12	8.5	10.5	-	<15
4	1.17	40.8	4.2	12	8.1	9.9	-	<15
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Mean	-	41.7	4.3	12	8.1	10.0	-	-

PRELIMINARY STACK SURVEY QUALITY ASSURANCE CHECKLIST

PITOT LEAK CHECK								
Run	Pre Traverse Leak Rate				Post Traverse Leak Rate			
	Start Value mmH2O	End Value mmH2O	Difference %	Outcome	Start Value mmH2O	End Value mmH2O	Difference %	Outcome
Run 1	112	110	1.8	Pass	132	133	-0.8	Pass

To complete a compliant pitot leak check a pressure of over 80 mmH_2O (or 800 Pa) is applied and the pressure drop monitored over 5 mins. A drop of less than 5% must be observed.

S-Type Pitot Stagnation Check				
Run	Stagnation (Pa)	Reference (Pa)	Difference (Pa)	Outcome (Permitted +/- 10 Pa)
Run 1	-14	-13	-1.0	Pass

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

PRELIMINARY STACK SURVEY (CONTINUED)

Sampling Plane Validation Criteria				
EA Technical Guidance Note (Monitoring) M1	Result	Units	Requirement	Compliant
Lowest Differential Pressure	29	Pa	>= 5 Pa	Yes
Lowest Gas Velocity	6.8	m/s	-	-
Highest Gas Velocity	8.5	m/s	-	-
Ratio of Gas Velocities	1.2	-	< 3 : 1	Yes
Maximum angle of flow with regard to duct axis	<15	°	< 15°	Yes
No local negative flow	Yes	-	-	Yes

Calculation of Stack Gas Velocity, V		
Velocity at Traverse Point, V = K_{pt} x (1-e) * O(2 * DP_{pt} / $P_{ActualW}$)		
Where: K_{pt} = Pitot tube calibration coefficient (1-e) = Compressibility correction factor, assumed at a constant 0.998		
Average Stack Gas Velocity, Va	**7.7**	m/s

Calculation of Stack Gas Volumetric Flowrate, Q			
Duct gas flow conditions	Actual	Reference	Units
Temperature	12	0	°C
Total Pressure	99.985	101.3	kPa
Oxygen	21.0	21	%
Moisture	0.08	0.00	%
Pitot tube calibration coefficient, K_{pt}	0.98		

Gas Volumetric Flowrate	Result	Units
Average Stack Gas Velocity (Va)	7.71	m/s
Stack Area (A)	1.23	m^2
Gas Volumetric Flowrate (Actual), Q_{Actual}	34079	m^3/hr
Gas Volumetric Flowrate (STP, Wet), Q_{STP}	32234	m^3/hr
Gas Volumetric Flowrate (STP, Dry), $Q_{STP,Dry}$	32209	m^3/hr
Gas Volumetric Flowrate (REF), Q_{Ref}	32209	m^3/hr

Where:
Q_{Actual} = Va x A x 3600
Q_{STP} = Q (Actual) x (Ts / Ta) x (Pa / Ps) x 3600
$Q_{STP,Dry}$ = Q (STP) / (100 - (100 / Ma)) x 3600
Q_{Ref} = Q (STP) x ((100 - Ma) / (100 - Ms)) x ((21 - O_2a) / (21 - O_2s))

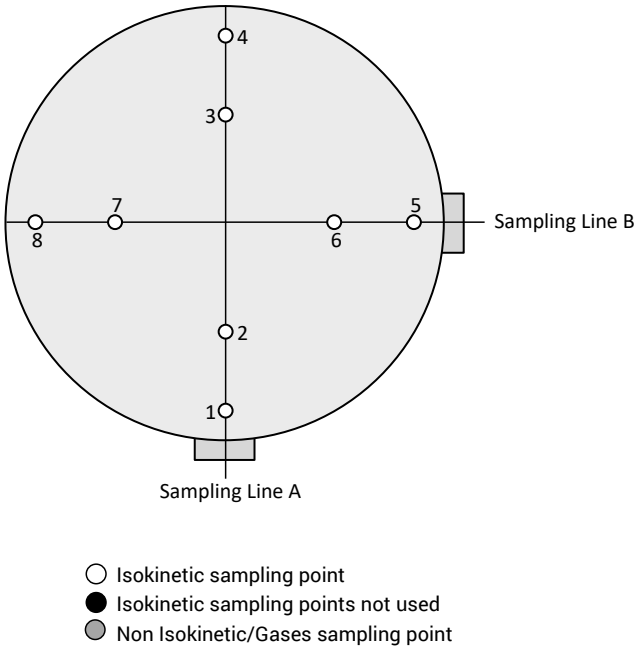
Nomenclature:
Ts = Absolute Temperature, Standard Conditions, 273 K
Ps = Absolute Pressure, Standard Conditions, 101.3 kPa
Ta = Absolute Temperature, Actual Conditions, K
Pa = Absolute Pressure, Actual Conditions, kPa
Ma = Water vapour, Actual Conditions, % Vol
Ms = Water vapour, Reference Conditions, % Vol
O_2a = Oxygen, Actual Conditions, % Vol
O_2s = Oxygen, Reference Conditions, % Vol

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

STACK DIAGRAM

	Value	Units
Stack Depth	1.25	m
Stack Width	-	m
Area	1.23	m^2

Non-Isokinetic/Gases Sampling			
Sampling Point	Distance (% of Depth)	Distance into Stack	Units
A	50	0.63	m



Isokinetic Sampling			
Sampling Point	Distance (% of Depth)	Distance into Stack (m)	Swirl °
1	6.7	0.08	< 15
2	25.0	0.31	< 15
3	75.0	0.94	< 15
4	93.3	1.17	< 15
5	6.7	0.08	< 15
6	25.0	0.31	< 15
7	75.0	0.94	< 15
8	93.3	1.17	< 15
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

SAMPLING LOCATION

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - TOTAL PARTICULATE MATTER

Run	Sampled Volume	Sampled Gas Temp	Sampled Gas Pressure	Sampled Gas Humidity	Oxygen Content	Limit of Detection	Leak	Uncollected Mass
	m³	K	kPa	% by volume	% by volume	% by mass	%	mg
MU required	**≤ 2%**	**≤ 2%**	**≤ 1%**	**≤ 1%**	**≤ 10%**	**≤ 5% of ELV**	**≤ 2%**	**≤ 10% of ELV**
Run 1	0.001	2.0	0.50	1.0	N/A	0.1800	-	-
as a %	0.13	0.70	0.50	1.0	N/A	N/A	0.73	N/A
compliant?	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**N/A**	**Yes**	**N/A**

Run	Volume (STP)	Mass of particulate	O_2 Correction	Leak	Uncollected Mass	Combined uncertainty
	m³	mg	-	mg/m³	mg	
Run 1	0.75	1.7700	1.0	0.009	0.0003	-
MU as mg/m³	0.03	0.2260	-	0.009	0.0003	**0.23**
MU as %	1.33	10.1695	-	0.419	0.0153	-

R1 - Uncertainty expressed at a 95% confidence level (where k = 2)	**0.46**	**mg/m³**	**20.53**	**% Result**	**N/A**	**% ELV**

(k is a coverage factor which gives a 95% confidence in the quoted figures)
Reference – SOCOTEC Technical Procedure AE150 Estimation of Uncertainty of Measurement

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - MOISTURE

Run	Sampled Volume m^3	Sampled Gas Temp K	Sampled Gas Pressure kPa	Sampled Gas Humidity % by volume	Oxygen Content % by volume	Leak %
MU required	**≤ 2%**	**≤ 2%**	**≤ 1%**	**≤ 1%**	**≤ 10%**	**≤ 2%**
Run 1	0.001	2.0	0.50	1.0	N/A	-
as a %	0.13	0.70	0.50	1.0	N/A	0.73
compliant?	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**Yes**

Run	Volume (STP) m^3	Mass Gained mg	O_2 Correction -	Leak mg/m^3	Uncollected Mass mg	Combined uncertainty
Run 1	0.75	500	1.0	2.63	58	-
MU as % v/v	0.00	0.02	-	0.00	0.009	**0.02**
MU as %	1.33	20.00	-	0.42	11.55	-

R1 - Uncertainty expressed at a 95% confidence level (where k = 2)	**0.04**	**% v/v**	**46.27**	**%**

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - VELOCITY & VOLUMETRIC FLOW RATE

Measured Velocity at Actual Conditions	7.7	m/s
Measured Volumetric Flow rate at Actual Conditions	34079	m³/hr

Performance Characteristics & Source of Value	Units	Values	Requirement	Compliant
Uncertainty of Local Gas Velocity Determination				
Uncertainty of pitot tube coefficient	-	0.010		
Uncertainty of mean local dynamic pressures	-	0.49		
Factor loading, function of the number of measurements.	3 readings	0.591	minimum 3	Yes
Range of measurment device	pa	1000		
Resolution	pa	1.00		
Calibration uncertainty	pa	7.37	<1% of Value or 20 Pa whichever is greater	Yes
Drift	% range	0.10		
Linearity	% range	0.06	<2% of value	Yes
Uncertainty of gas density determination				
Uncertainty of molar mass determination	kg/mol	0.00003		
Uncertainty of temperature measurement	K	1.45	<1% of value	Yes
Uncertainty of absolute pressure in the duct	pa	510		
Uncertainty associated with the estimate of density	-	0.007		
Uncertainty associated with the measurement of local velocity	-	0.0001		
Uncertainty associated with the measurement of mean velocity	-	0.0001		

Measurement Uncertainty - Velocity	m/s
Combined uncertainty	0.08
Expanded uncertainty at a 95% Confidence Interval	0.16

Note - The expanded uncertainty uses a coverage factor of k = 2.

Expanded Measurement Uncertainty of Velocity at a 95% Confidence Interval	%
Expressed as a % of the Measured Velocity	1.1
Expanded uncertainty at a 95% Confidence Interval	2.1

Measurement Uncertainty Volumetric Flow Rate	m³/hr
Combined uncertainty	870
Expanded uncertainty at a 95% Confidence Interval	1705

Note - The expanded uncertainty uses a coverage factor of k = 2.

Expanded Measurement Uncertainty of Volumetric Flow Rate at a 95% Confidence Interval	%
Expressed as a % of the Measured Volumetric Flow Rate	2.6
Expanded uncertainty at a 95% Confidence Interval	5.0

Reference – SOCOTEC Technical Procedure AE150 Estimation of Uncertainty of Measurement

END OF REPORT

Thank you for choosing SOCOTEC for your environmental monitoring needs. We hope our services have met your requirements and that you are fully satisfied with your experience of working with us, we really do value your custom and would welcome your feedback. We would appreciate it if you could take a moment to complete a short online questionnaire so that we can improve our operations and address any areas that have not met with your expectations, by clicking on the following

https://www.surveymonkey.co.uk/r/CAE_customer_feedback_weblink

STACK EMISSIONS MONITORING REPORT

2-4 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel: 01355 246 730
Fax: 01355 249 669

Your contact at SOCOTEC LTD
David Hay Business Manager - North Tel: 01355 246 730 Email: david.hay@socotec.com

Operator & Address:
Starrus Eco Holdings Limited (Panda Waste) Cappagh Road Cappogue Finglas Dublin 11

Permit Reference:
IE Licence: W0261-02

Release Point:
A2-1 (Odour Abatement)

Sampling Date(s):
3rd June 2020

SOCOTEC Job Number:	LEK 12208 / Q2
Report Date:	22nd July 2020
Version:	1
Report By: MCERTS Number: MCERTS Level: Technical Endorsements:	Brian Walsh MM 17 1414 MCERTS Level 2 - Team Leader 1, 2, 3 & 4
Report Approved By: MCERTS Number: Business Title: Technical Endorsements: Signature:	David Drylie MM 04 493 MCERTS Level 2 - Team Leader 1, 2, 3 & 4

1015

CONTENTS

EXECUTIVE SUMMARY

MONITORING OBJECTIVES

Starrus Eco Holdings Limited (Panda Waste) operates a recovery and disposal of non-hazardous waste process at Finglas which is subject to IE Licence W0261-02, under the EPA Act 1992.

SOCOTEC LTD were commissioned by Q.E.D. Engineering Limited to carry out stack emissions monitoring to determine the release of prescribed pollutants from the following Plant under normal operating conditions.

The results of these tests shall be used to demonstrate compliance with a set of emission limit values for prescribed pollutants as specified in the Plant's IE Licence, W0261-02.

Plant

A2-1 (Odour Abatement)

Operator

Starrus Eco Holdings Limited (Panda Waste)
Cappagh Road
Cappogue
Finglas
Dublin 11

IE Licence: W0261-02

Stack Emissions Monitoring Test House

SOCOTEC - East Kilbride Laboratory
2-4 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
UKAS and MCERTS Accreditation Number: 1015

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
MCERTS accredited results will only be claimed where both the sampling and analytical stages are UKAS accredited.

EXECUTIVE SUMMARY

EMISSIONS SUMMARY					
Parameter	**Units**	**Result**	**Calculated Uncertainty +/-**	**Emission Limit Value (ELV)**	**MCERTS accredited result**
Total Particulate Matter	mg/m³	0.2	0.4	-	✓
Particulate Emission Rate	g/hr	5.6	11.3	-	
Odour	ouE/m³	102.67	-	-	x
Odour Emission Rate	ouE/s	710.46	-	-	
Moisture	%	0.15	0.04	-	✓
Stack Gas Temperature	°C	30	-	-	
Stack Gas Velocity	m/s	6.2	0.15	-	
Gas Volumetric Flow Rate (Actual)	m³/hr	27600.0	1404.8	-	✓
Gas Volumetric Flow Rate (STP, Wet)	m³/hr	24912.3	1268.0	-	
Gas Volumetric Flow Rate (STP, Dry)	m³/hr	24874.6	1266.1	-	
Gas Volumetric Flow Rate at Reference Conditions	m³/hr	24912.3	1268.0	45936	

ND = None Detected,

Results at or below the limit of detection are highlighted by bold italic text.

The above volumetric flow rate is calculated using data from the preliminary survey. Mass emissions for non isokinetic tests are calculated using these values. For all isokinetic testing the mass emission is calculated using test specific flow data and not the above values.

Reference conditions are 273K, 101.3kPa without correction for water vapour

EXECUTIVE SUMMARY

MONITORING TIMES			
Parameter	**Sampling Date(s)**	**Sampling Times**	**Sampling Duration**
Total Particulate Matter Run 1	03 June 2020	14:30 - 15:30	60 minutes
Odour Run 1	03 June 2020	13:43 - 13:43	10 minutes
Odour Run 2	03 June 2020	15:55 - 15:55	11 minutes
Odour Run 3	03 June 2020	16:10 - 16:10	10 minutes
Preliminary Stack Traverse	03 June 2020	14:15 - 14:28	-

EXECUTIVE SUMMARY

PROCESS DETAILS

Parameter	Process Details
Description of process	Recovery and Disposal of Non-Hazardous Waste
Continuous or batch	Continuous
Product Details	Odour Abatement System
Part of batch to be monitored (if applicable)	N/A
Normal load, throughput or continuous rating	Normal Operation
Fuel used during monitoring	N/A
Abatement	Activated Charcoal
Plume Appearance	None Visible

EXECUTIVE SUMMARY

Monitoring Methods

The selection of standard reference / alternative methods employed by SOCOTEC is determined, wherever possible by the hierarchy of method selection outlined in Environmental Protection Agency Technical Guidance Note (Monitoring) AG2.

MONITORING METHODS							
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Limit of Detection (LOD)**	**Calculated MU +/- % Result**	**Calculated MU +/- % ELV**
Total Particulate Matter	SRM - EN 13284-1	AE 104	1015	Yes	0.22 mg/m³	200%	N/A - No ELV
Odour	EN 13725	AE 142	1015	No	-	-	N/A - No ELV
Moisture	SRM - EN 14790	AE 105	1015	Yes	0.02%	23.26%	N/A - No ELV
Velocity	SRM - EN ISO 16911-1	AE 154	1015	Yes	5 Pa	2.3%	N/A - No ELV
Volumetric Flow Rate	SRM - EN ISO 16911-1	AE 154	1015	Yes	-	5.1%	2.76

EXECUTIVE SUMMARY

Analytical Methods

The following tables list the analytical methods employed together with the custody details. Unless otherwise stated the samples are archived at the analysis lab location.

SAMPLING METHODS WITH SUBSEQUENT ANALYSIS							
Species	**Analytical Technique**	**Analytical Procedure**	**UKAS Lab Number**	**UKAS Accredited Lab Analysis**	**Analysis Lab**	**Analysis Report number**	**Archive Period**
Total Particulate Matter	Gravimetric	AE 106	1015	Yes	SOCOTEC (East Kilbride)	N/A	8 Weeks
Odour	Olfactometry	SOP 2042	0609	No	Odournet	030620 SOCOTEC	8 Weeks

ON-SITE TESTING							
Species	**Analytical Technique**	**Analytical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Analysis**	**Laboratory**	**Data Archive Location**	**Archive Period**
Moisture	Gravimetric	AE 105	1015	Yes	SOCOTEC (East Kilbride)	-	-

EXECUTIVE SUMMARY

SAMPLING LOCATION					
Sampling Plane Validation Criteria	**Value**	**Units**	**Requirement**	**Compliant**	**Method**
Lowest Differential Pressure	24	Pa	>= 5 Pa	Yes	EN 15259
Lowest Gas Velocity	5.7	m/s	-	-	-
Highest Gas Velocity	7.0	m/s	-	-	-
Ratio of Gas Velocities	1.2	: 1	< 3 : 1	Yes	EN 15259
Mean Velocity	6.2	m/s	-	-	-
Maximum angle of flow with regard to duct axis	<15	°	< 15°	Yes	EN 15259
No local negative flow	Yes	-	-	Yes	EN 15259

DUCT CHARACTERISTICS		
	Value	**Units**
Shape	Circular	-
Depth	1.25	m
Width	-	m
Area	1.23	m^2
Port Depth	125	mm

SAMPLING LINES & POINTS		
	Isokinetic	**Non-Iso & Gases**
Sample port size	4" BSP	-
Number of lines used	1	-
Number of points / line	8	-
Duct orientation	Horizontal	-
Filtration	In Stack	-
Filtration for TPM	Glass Fibre	-

SAMPLING PLATFORM	
General Platform Information	
Permanent / Temporary Platform / Ground level / Floor Level / Roof	Permanent
Inside / Outside	Outside

AG1 Platform requirements	
Is there a sufficient working area so work can be performed in a compliant manner	Yes
Platform has 2 levels of handrails (approximately 0.5 m & 1.0 m high)	Yes
Platform has vertical base boards (approximately 0.25 m high)	Yes
Platform has removable chains / self closing gates at the top of ladders	No
Handrail / obstructions do not hamper insertion of sampling equipment	Yes
Depth of Platform = >Stack depth / diameter + wall and port thickness + 1.5m	Yes

Sampling Platform Improvement Recommendations (if applicable)

Where possible, a removeable chain/self closing gate should be installed at the top of the ladder to meet all the requirements specified in EA Guidance Note AG1.

EXECUTIVE SUMMARY

Sampling & Analytical Method Deviations

Number Of Sample Lines

Only one sample line (Line A) is safely accessible for sampling to be carried out on. The number of sample points on line A was therefore doubled to meet the number required criteria, as specified, in the sampling method. The sampling location meets all flow stability criteria for periodic isokinetic sampling of particulate matter and is homogeneous for gas concentrations as specified in MID 13284-1. This deviation was therefore not deemed significant in relation to this overall result.

Calculated MU Value

The reported calculated maximum uncertainty % for TPM is higher than the level stated in EPA Guidance note AG2. This is primarily due to the low level measured in relative proximity to the LOD.

APPENDICES

CONTENTS

APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

MONITORING SCHEDULE					
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Number of Samples**
Total Particulate Matter	SRM - EN 13284-1	AE 104	1015	Yes	1
Odour	EN 13725	AE 142	1015	No	3
Moisture	SRM - EN 14790	AE 105	1015	Yes	1
Velocity	SRM - EN ISO 16911-1	AE 154	1015	Yes	1

APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

CALIBRATEABLE EQUIPMENT CHECKLIST

Extractive Sampling		Instrumental Analyser/s		Miscellaneous	
Equipment	**Equipment I.D.**	**Equipment**	**Equipment I.D.**	**Equipment**	**Equipment I.D.**
Control Box DGM	LEK 9.30	Horiba PG-250 Analyser	-	Laboratory Balance	LEK 15.21
Box Thermocouples	LEK 9.31	FT-IR Gasmet	-	Tape Measure	LEK 20.2
Meter In Thermocouple	LEK 9.31	FT-IR Oven Box	-	Stopwatch	-
Meter Out Thermocouple	LEK 9.31	Bernath 3006 FID	-	Protractor	-
Control Box Timer	LEK 17.17	Signal 3030 FID	-	Barometer	LEK 16.9
Oven Box	-	Servomex	-	Digital Micromanometer	LEK 1.19
Probe	LEK 6.11	JCT Heated Head Filter	-	Digital Temperature Meter	LEK 1.16
Probe Thermocouple	LEK 3.14	Thermo FID	-	Stack Thermocouple	LEK 3.163
Probe	-	Stackmaster	-	Mass Flow Controller	-
Probe Thermocouple	-	FTIR Heater Box for Heated Line	-	MFC Display module	-
S-Pitot	LEK 6.11	Anemometer	-	1m Heated Line (1)	-
L-Pitot	-	Ecophysics NOx Analyser	-	1m Heated Line (2)	-
Site Balance	LEK 23.20	Chiller (JCT/MAK 10)	-	1m Heated Line (3)	-
Last Impinger Arm	-	Heated Line Controller (1)	-	5m Heated Line (1)	-
Dioxins Cond. Thermocouple	-	Heated Line Controller (2)	-	10m Heated Line (1)	-
Callipers	LEK 15.1R	Site temperature Logger	-	10m Heated Line (2)	-
Small DGM	-		-	15m Heated Line (1)	-
Heater Controller	-		-	20m Heated Line (1)	-
Inclinometer (Swirl Device)	LEK 24.7		-	20m Heated Line (2)	-

NOTE: If the equipment I.D is represented by a dash (-), then this piece of equipment has not been used for this test.

CALIBRATION GASES

Gas (traceable to ISO 17025)	Cylinder I.D Number	Supplier	ppm	%	Analytical Tolerance +/- %
-	-	-	-	-	-

STACK EMISSIONS MONITORING TEAM

MONITORING TEAM								
Personnel	**MCERTS Number**	**MCERTS**		**TE / H&S Qualifications and Expiry Date**				
		Level	**Expiry**	**TE1**	**TE2**	**TE3**	**TE4**	**H&S**
Enda Flood	MM 12 1170	MCERTS Level 2	Apr 23	Mar 24	Mar 24	Jun 23	Nov 23	Apr 23
Philip Conway	MM 18 1474	MCERTS Level 1	Mar 23	-	-	-	-	Mar 23

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

TOTAL PARTICULATE MATTER SUMMARY					
Parameter	**Sampling Times**	**Concentration mg/m³**	**Uncertainty mg/m³**	**ELV mg/m³**	**Emission Rate g/hr**
Run 1	14:30 - 15:30 03 June 2020	0.22	0.44	-	5.6
Blank	-	0.22	-	-	-

Reference conditions are 273K, 101.3kPa without correction for water vapour

Acetone Blank Value mg/l	Acceptable Value mg/l
0.3	10

FILTER INFORMATION

SAMPLES								
Test	Filter & Probe Rinse Number	Filter Start Weight g	Filter End Weight g	Mass Gained on Filter g	Probe Rinse Start Weight g	Probe Rinse End Weight g	Mass Gained on Probe g	Combined Total Mass Gained g
Run 1	AC 1020	0.09745	0.09764	0.00019	156.14070	156.14040	-0.00030	0.00018

If total mass gained is less than the LOD then the LOD is reported

BLANKS								
Test	Filter & Probe Number	Filter Start Weight g	Filter End Weight g	Mass Gained Filter g	Probe Start Weight g	Probe End Weight g	Mass Gained Probe g	Combined Total Mass Gained g
Run 1	AC 1019	0.09823	0.09825	0.00002	148.82560	148.82470	-0.00090	0.00018

If total mass gained is less than the LOD then the LOD is reported

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

ISOKINETIC SAMPLING EQUATIONS - RUN 1 — TPM

Absolute pressure of stack gas, P_s		
Barometric pressure, P_b	Kpa	101.5
Stack static pressure, P_{static}	pa	25
$P_s = P_b + P_{static}$	Kpa	101.5
Vol. of water vapour collected, V_{wstd}		
Moisture trap weight increase,Vlc	g	1.0
$V_{wstd} = (0.001246)(V_{lc})$	m^3	0.001246
Volume of gas metered dry, V_{mstd}		
Volume of gas sample through gas meter, V_m		0.933
Gas meter correction factor, Y_d		0.944
Mean dry gas meter temperature, T_m		293
Mean pressure drop across orifice, DH	mmH_2O	22.868
$V_{mstd} = \frac{(0.3592)(V_m)(P_b+(DH/13.6))(Y_d)}{T_m}$	m^3	0.823
Volume of gas metered wet, V_{mstw}		
$V_{mstw} = V_{mstd} + V_{wstd}$	m^3	0.8244
Vol. of gas metered at O_2 Ref. Cond., $V_{mstd@X\%O2}$		
Is the process burning hazardous waste? *(If yes, no favourable oxygen correction)*		No
% oxygen measured in gas stream, act%O_2		21.0
% oxygen reference condition		21
O_2 Reference Factor O_2 Ref $= \frac{21.0 - act\%O_2}{21.0 - ref\%O_2}$		No O2 Ref
$V_{mstd@X\%oxygen} = (V_{mstd})(O_{2\,Ref})$	m^3	No O2 Ref
Moisture content, B_{wo}		
$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$		0.0015
	%	0.15
Moisture by FTIR	%	-
Velocity of stack gas, V_s		
Velocity pressure coefficient, C_p		0.84
Mean of velocity heads, DP_{avg}	Pa	34.79
Mean stack gas temperature, T_s	K	305
Gas density (wet, ambient), p		
p=(Ms*Ps)/(8.314*Ts)	kg/m^3	1.155
Stack Velocity, Vs $V_s = Cp\sqrt{\frac{\Delta DPavg}{p}}$	m/s	6.50

Molecular weight of dry gas, M_d		
CO_2	%	0.03
O_2	%	20.96
Total	%	20.99
N_2 (100 -Total)	%	79.01
$M_d = 0.44(\%CO_2)+0.32(\%O_2)+0.28(\%N_2)$		28.84
Molecular weight of wet gas, M_s		
$M_s = M_d(1 - B_{wo}) + 18(B_{wo})$	g/gmol	28.83
Actual flow of stack gas, Q_a		
Area of stack, A_s	m^2	1.23
$Q_a = (60)(A_s)(V_s)$	m^3/min	479.0
Total flow of stack gas, Q		
Conversion factor (K/mm.Hg)		0.3592
$Q_{std} = \frac{(Q_a)P_s(0.3592)(1-B_{wo})}{(T_s)}$	Dry	429.2
$Q_{stdO2} = \frac{(Q_a)P_s(0.3592)(1-B_{wo})(O_2REF)}{(T_s)}$	@O_2ref	No O2 Ref
$Q_{stw} = \frac{(Q_a)P_s(0.3592)}{(T_s)}$	Wet	429.83
Percent isokinetic, %I		
Nozzle diameter, D_n	mm	6.91
Nozzle area, A_n	mm^2	37.47
Total sampling time, q	min	60
$\%I = \frac{(4.6398E6)(T_s)(V_{mstd})}{(P_s)(V_s)(A_n)(q)(1-B_{wo})}$	%	104.7
Acceptable isokinetic range 95% to 115%		Yes
Particulate Concentration, C		
Mass collected on filter, M_f	g	0.00019
Mass collected in probe, M_p	g	-0.00030
Total mass collected, M_n	g	0.00018
$C_{wet} = \frac{M_n}{V_{mstw}}$	mg/m³	0.218
$C_{dry} = \frac{M_n}{V_{mstd}}$	mg/m³	0.219
$C_{dry@X\%O2} = \frac{M_n}{V_{mstd@X\%oxygen}}$	mg/m³	No O2 Ref
Particulate Emission Rates, E		
$E = [(C_{wet})(Q_{stw})(60)] / 1000$		5.63

As the total mass gained was less than the LOD, the LOD has been reported

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

TOTAL PARTICULATE MATTER QUALITY ASSURANCE CHECKLIST

LEAK RATE						
Run	Mean Sampling Rate litre/min	Pre-sampling Leak Rate litre/min	Post-sampling Leak Rate litre/min	Maximum Vacuum mm Hg	Acceptable Leak Rate litre/min	Leak Tests Acceptable?
Run 1	14.67	0.10	0.12	-228.6	0.29	Yes

ISOKINETICITY		
Run	Isokinetic Variation %	Acceptable Isokineticity
Run 1	104.71	Yes

Acceptable isokinetic range 95% to 115%

WEIGHING BALANCE UNCERTAINTY			
Run	Result mg/m³	5% ELV mg/m³	LOD < 5% ELV
Run 1	0.22	No ELV	N/A - No ELV

The above is based on both the Filter and rinse uncertainty

BLANK VALUE				
Run	Overall Blank Value mg/m^3	Daily Emission mg/m^3	Acceptable Blank Value mg/m^3	Overall Blank Acceptable mg/m^3
Blank 1	0.22	-	-	-

FILTERS					
Run	Filter Material	Filter Size mm	Max Filtration Temperature °C	Pre-use Filter Conditioning Temperature °C	Post-use Filter Conditioning Temperature °C
Run 1	Glass Fibre	47	36	180	160

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

ODOUR SUMMARY					
Test	**Sampling Times**	**Concentration ouE/m³**	**Duration Minutes**	**ELV ouE/m³**	**Emission Rate ouE/s**
Run 1	15:33 - 13:43 03 June 2020	121.00	10	-	837.33
Run 2	15:44 - 15:55 03 June 2020	101.00	11	-	698.93
Run 3	16:00 - 16:10 03 June 2020	86.00	10	-	595.13

Reference conditions are 273K, 101.3kPa without correction for water vapour

ODOUR QUALITY ASSURANCE CHECKLIST

Leak Test Results	Total Sample Volume @ ref Conditions m³	Mean Sampling Rate l/min	Pre sampling leak rate l/min	Post sampling leak rate l/min	Acceptable leak rate l/min	Leak Tests Acceptable?
Run 1	10.0	1.0	0.00	0.00	0.02	Yes
Run 2	10.0	0.9	0.00	0.00	0.02	Yes
Run 3	10.0	1.0	0.00	0.00	0.02	Yes

	Filter Material	Filter Size mm	Max. Filtration Temp. °C	Temperature during storage / transit <25°C	Type of Absorbers	Absorption Solutions
Run 1	N/A	N/A	21	N/A	-	-
Run 2	N/A	N/A	21	N/A	-	-
Run 3	N/A	N/A	21	N/A	-	-

ND - None Detected

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

MOISTURE CALCULATIONS

Moisture Determination - Isokinetic							
Test Number	Sampling Time and Date	Start Weight kg	End Weight kg	Total gain kg	Concentration %	LOD %	Uncertainty %
Run 1	14:30 - 15:30 03 June 2020	3.3685	3.3695	0.0010	0.2	0.02	23.3

Moisture Quality Assurance							
Test Number	Sampling Duration mins	Total Volume Sampled l	Sampling Rate l/min	Start Leak Rate l/min	End Leak Rate l/min	Acceptable Leak Rate l/min	Leak Tests Acceptable?
Run 1	60	824.4	14.7	0.10	0.12	0.29	Yes

PRELIMINARY STACK SURVEY

Stack Characteristics		
Stack Diameter / Depth, D	1.25	m
Stack Width, W	-	m
Stack Area, A	1.23	m^2
Average stack gas temperature	30	^oC
Stack static pressure	0.025	kPa
Barometric Pressure	101.5	kPa

Stack Gas Composition & Molecular Weights								
Component	Molar Mass M	Density kg/m^3 p	Conc Dry % Vol	Dry Volume Fraction r	Dry Conc kg/m^3 pi	Conc Wet % Vol	Wet Volume Fraction r	Wet Conc kg/m^3 pi
CO_2	44	1.963059	0.028571	0.000286	0.000561	0.028528	0.000285	0.000560
O_2	32	1.427679	20.960000	0.209600	0.299242	20.928321	0.209283	0.298789
N_2	28	1.249219	79.011429	0.790114	0.987026	78.892012	0.788920	0.985534
H_2O	18	0.803070	-	-	-	0.151138	0.001511	0.001214

Where: p = M / 22.41 pi = r x p

Calculation of Stack Gas Densities		
Determinand	Result	Units
Dry Density (STP), P_{STD}	1.2868	kg/m^3
Wet Density (STP), P_{STW}	1.2861	kg/m^3
Dry Density (Actual), P_{Actual}	1.1615	kg/m^3
Average Wet Density (Actual), $P_{ActualW}$	1.161	kg/m^3

Where:

P_{STD} = sum of component concentrations, kg/m^3 (not including water vapour)

$P_{STW} = (P_{STD} + pi \text{ of } H_2O) / (1 + (pi \text{ of } H_2O / 0.8036))$

$P_{Actual} = P_{STD}$ x (Ts / Ps) x (Pa / Ta)

$P_{ActualW} = P_{STW}$ x (Ts / Ps) x (Pa / Ta)

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

PRELIMINARY STACK SURVEY

TRAVERSE 1

Date of Survey	03 June 2020
Time of Survey	14:15 - 14:28
Velocity Measurement Device:	S-Type Pitot

Sampling Line A								
Traverse Point	Distance into duct (m)	DP pt Pa (average of 3 readings)	DP pt mmH_2O (average of 3 readings)	Temp °C	Velocity m/s	Volumetric Flow Rate (actual) m^3/s	O_2 % Vol	Angle of Swirl °
1	0.05	23.8	2.4	30	5.7	7.0	-	<15
2	0.13	24.5	2.5	30	5.8	7.1	-	<15
3	0.24	25.5	2.6	30	5.9	7.3	-	<15
4	0.40	28.1	2.9	30	6.2	7.6	-	<15
5	0.85	34.3	3.5	30	6.9	8.4	-	<15
6	1.01	35.3	3.6	30	7.0	8.6	-	<15
7	1.12	28.7	2.9	31	6.3	7.7	-	<15
8	1.20	27.1	2.8	30	6.1	7.5	-	<15
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Mean	-	28.4	2.9	30	6.2	7.7	-	-

Sampling Line B								
Traverse Point	Distance into duct (m)	DP pt Pa (average of 3 readings)	DP pt mmH_2O (average of 3 readings)	Temp °C	Velocity m/s	Volumetric Flow Rate (actual) m^3/s	O_2 % Vol	Angle of Swirl °
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Mean	-	-	-	-	-	-	-	-

PRELIMINARY STACK SURVEY QUALITY ASSURANCE CHECKLIST

PITOT LEAK CHECK								
Run	Pre Traverse Leak Rate				Post Traverse Leak Rate			
	Start Value mmH2O	End Value mmH2O	Difference %	Outcome	Start Value mmH2O	End Value mmH2O	Difference %	Outcome
Run 1	105	101	3.8	Pass	121	119	1.7	Pass

To complete a compliant pitot leak check a pressure of over 80 mmH_2O (or 800 Pa) is applied and the pressure drop monitored over 5 mins. A drop of less than 5% must be observed.

S-Type Pitot Stagnation Check				
Run	Stagnation (Pa)	Reference (Pa)	Difference (Pa)	Outcome (Permitted +/- 10 Pa)
Run 1	25	23	2.0	Pass

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

PRELIMINARY STACK SURVEY (CONTINUED)

Sampling Plane Validation Criteria				
EA Technical Guidance Note (Monitoring) M1	Result	Units	Requirement	Compliant
Lowest Differential Pressure	24	Pa	>= 5 Pa	Yes
Lowest Gas Velocity	5.7	m/s	-	-
Highest Gas Velocity	7.0	m/s	-	-
Ratio of Gas Velocities	1.2	-	< 3 : 1	Yes
Maximum angle of flow with regard to duct axis	<15	°	< 15°	Yes
No local negative flow	Yes	-	-	Yes

Calculation of Stack Gas Velocity, V		
Velocity at Traverse Point, V = K_{pt} x (1-e) * O(2 * DP_{pt} / $P_{ActualW}$)		
Where:		
K_{pt} = Pitot tube calibration coefficient		
(1-e) = Compressibility correction factor, assumed at a constant 0.998		
Average Stack Gas Velocity, Va	**6.2**	m/s

Calculation of Stack Gas Volumetric Flowrate, Q			
Duct gas flow conditions	Actual	Reference	Units
Temperature	30	0	°C
Total Pressure	101.525	101.3	kPa
Oxygen	21.0	21	%
Moisture	0.15	0.15	%
Pitot tube calibration coefficient, K_{pt}	0.90		

Gas Volumetric Flowrate	Result	Units
Average Stack Gas Velocity (Va)	6.25	m/s
Stack Area (A)	1.23	m^2
Gas Volumetric Flowrate (Actual), Q_{Actual}	27600.0	m^3/hr
Gas Volumetric Flowrate (STP, Wet), Q_{STP}	24912.3	m^3/hr
Gas Volumetric Flowrate (STP, Dry), $Q_{STP,Dry}$	24874.6	m^3/hr
Gas Volumetric Flowrate (REF), Q_{Ref}	24912.3	m^3/hr

Where:

Q_{Actual} = Va x A x 3600

Q_{STP} = Q (Actual) x (Ts / Ta) x (Pa / Ps) x 3600

$Q_{STP,Dry}$ = Q (STP) / (100 - (100 / Ma)) x 3600

Q_{Ref} = Q (STP) x ((100 - Ma) / (100 - Ms)) x ((21 - O_2a) / (21 - O_2s))

Nomenclature:

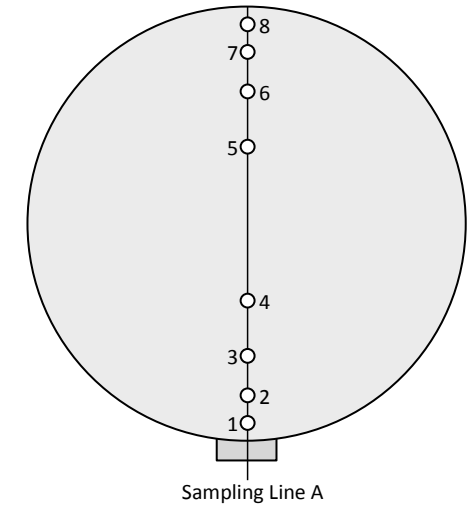
Ts = Absolute Temperature, Standard Conditions, 273 K
Ps = Absolute Pressure, Standard Conditions, 101.3 kPa
Ta = Absolute Temperature, Actual Conditions, K
Pa = Absolute Pressure, Actual Conditions, kPa
Ma = Water vapour, Actual Conditions, % Vol
Ms = Water vapour, Reference Conditions, % Vol
O_2a = Oxygen, Actual Conditions, % Vol
O_2s = Oxygen, Reference Conditions, % Vol

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

STACK DIAGRAM

	Value	Units
Stack Depth	1.25	m
Stack Width	-	m
Area	1.23	m^2

Non-Isokinetic/Gases Sampling			
Sampling Point	Distance (% of Depth)	Distance into Stack	Units
-	-	-	-



○ Isokinetic sampling point
● Isokinetic sampling points not used
● Non Isokinetic/Gases sampling point

Isokinetic Sampling			
Sampling Point	Distance (% of Depth)	Distance into Stack (m)	Swirl °
1	4.0	0.05	< 15
2	10.5	0.13	< 15
3	19.4	0.24	< 15
4	32.3	0.40	< 15
5	67.7	0.85	< 15
6	80.6	1.01	< 15
7	89.5	1.12	< 15
8	96.0	1.20	< 15
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

SAMPLING LOCATION

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - TOTAL PARTICULATE MATTER

Run	Sampled Volume	Sampled Gas Temp	Sampled Gas Pressure	Sampled Gas Humidity	Oxygen Content	Limit of Detection	Leak	Uncollected Mass
	m^3	K	kPa	% by volume	% by volume	% by mass	%	mg
MU required	**≤ 2%**	**≤ 2%**	**≤ 1%**	**≤ 1%**	**≤ 10%**	**≤ 5% of ELV**	**≤ 2%**	**≤ 10% of ELV**
Run 1	0.001	2.0	0.50	1.0	N/A	0.1800	-	-
as a %	0.12	0.66	0.49	1.0	N/A	N/A	0.82	N/A
compliant?	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**N/A**	**Yes**	**N/A**

Run	Volume (STP)	Mass of particulate	O_2 Correction	Leak	Uncollected Mass	Combined uncertainty
	m^3	mg	-	mg/m^3	mg	
Run 1	0.74	0.1800	1.0	0.001	0.0001	-
MU as mg/m^3	0.003	0.2183	-	0.001	0.0001	**0.22**
MU as %	1.30	100.00	-	0.472	0.0577	-

R1 - Uncertainty expressed at a 95% confidence level (where k = 2)	**0.44**	**mg/m^3**	**200.02**	**% Result**	**N/A**	**% ELV**

(k is a coverage factor which gives a 95% confidence in the quoted figures)
Reference – SOCOTEC Technical Procedure AE150 Estimation of Uncertainty of Measurement

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - MOISTURE

Run	Sampled Volume m^3	Sampled Gas Temp K	Sampled Gas Pressure kPa	Sampled Gas Humidity % by volume	Oxygen Content % by volume	Leak %
MU required	**≤ 2%**	**≤ 2%**	**≤ 1%**	**≤ 1%**	**≤ 10%**	**≤ 2%**
Run 1	0.001	2.0	0.50	1.0	N/A	-
as a %	0.12	0.66	0.49	1.0	N/A	0.82
compliant?	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**Yes**

Run	Volume (STP) m^3	Mass Gained mg	O_2 Correction -	Leak mg/m^3	Uncollected Mass mg	Combined uncertainty
Run 1	0.74	1000	1.0	5.74	58	-
MU as % v/v	0.002	0.02	-	0.001	0.009	**0.02**
MU as %	1.30	10.00	-	0.47	5.77	-

R1 - Uncertainty expressed at a 95% confidence level (where k = 2)	**0.04**	**% v/v**	**23.26**	**%**

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - VELOCITY & VOLUMETRIC FLOW RATE

Measured Velocity at Actual Conditions	6.2	m/s
Measured Volumetric Flow rate at Actual Conditions	27600.0	m³/hr

Performance Characteristics & Source of Value	Units	Values	Requirement	Compliant
Uncertainty of Local Gas Velocity Determination				
Uncertainty of pitot tube coefficient	-	0.010		
Uncertainty of mean local dynamic pressures	-	0.44		
Factor loading, function of the number of measurements.	3 readings	0.591	minimum 3	Yes
Range of measurment device	pa	1000		
Resolution	pa	1.00		
Calibration uncertainty	pa	6.05	<1% of Value or 20 Pa whichever is greater	Yes
Drift	% range	0.10		
Linearity	% range	0.06	<2% of value	Yes
Uncertainty of gas density determination				
Uncertainty of molar mass determination	kg/mol	0.00003		
Uncertainty of temperature measurement	K	1.55	<1% of value	Yes
Uncertainty of absolute pressure in the duct	pa	518		
Uncertainty associated with the estimate of density	-	0.007		
Uncertainty associated with the measurement of local velocity	-	0.0001		
Uncertainty associated with the measurement of mean velocity	-	0.0001		

Measurement Uncertainty - Velocity	m/s
Combined uncertainty	0.07
Expanded uncertainty at a 95% Confidence Interval	0.15

Note - The expanded uncertainty uses a coverage factor of k = 2.

Expanded Measurement Uncertainty of Velocity at a 95% Confidence Interval	%
Expressed as a % of the Measured Velocity	1.2
Expanded uncertainty at a 95% Confidence Interval	2.3

Measurement Uncertainty Volumetric Flow Rate	m³/hr
Combined uncertainty	716.7
Expanded uncertainty at a 95% Confidence Interval	1404.8

Note - The expanded uncertainty uses a coverage factor of k = 2.

Expanded Measurement Uncertainty of Volumetric Flow Rate at a 95% Confidence Interval	%
Expressed as a % of the Measured Volumetric Flow Rate	2.6
Expanded uncertainty at a 95% Confidence Interval	5.1

Reference – SOCOTEC Technical Procedure AE150 Estimation of Uncertainty of Measurement

END OF REPORT

Thank you for choosing SOCOTEC for your environmental monitoring needs. We hope our services have met your requirements and that you are fully satisfied with your experience of working with us, we really do value your custom and would welcome your feedback. We would appreciate it if you could take a moment to complete a short online questionnaire so that we can improve our operations and address any areas that have not met with your expectations, by clicking on the following

https://www.surveymonkey.co.uk/r/CAE_customer_feedback_weblink

STACK EMISSIONS MONITORING REPORT

2-4 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel: 01355 246 730
Fax: 01355 249 669

Your contact at SOCOTEC LTD
David Hay
Business Manager - North
Tel: 01355 246 730
Email: david.hay@socotec.com

Operator & Address:
Starrus Eco Holdings Limited (Panda Waste)
Cappagh Road
Cappogue
Finglas
Dublin 11

Permit Reference:
IE Licence: W0261-02

Release Point:
A2-1 (Odour Abatement)

Sampling Date(s):
07 September 2020

SOCOTEC Job Number:	LEK 12346 / Q3
Report Date:	20th October 2020
Version:	2
Report By:	Brian Walsh
MCERTS Number:	MM 17 1414
MCERTS Level:	MCERTS Level 2 - Team Leader
Technical Endorsements:	1, 2, 3 & 4
Report Approved By:	David Hay
MCERTS Number:	MM 04 552
Business Title:	MCERTS Level 2 - Business Manager
Technical Endorsements:	1, 2, 3 & 4
Signature:	

1015

CONTENTS

EXECUTIVE SUMMARY

MONITORING OBJECTIVES

Starrus Eco Holdings Limited (Panda Waste) operates a recovery and disposal of non-hazardous waste process at Finglas which is subject to IE Licence W0261-02, under the EPA Act 1992.

SOCOTEC LTD were commissioned by Q.E.D. Engineering Limited to carry out stack emissions monitoring to determine the release of prescribed pollutants from the following Plant under normal operating conditions.

The results of these tests shall be used to demonstrate compliance with a set of emission limit values for prescribed pollutants as specified in the Plant's IE Licence, W0261-02.

Plant

A2-1 (Odour Abatement)

Operator

Starrus Eco Holdings Limited (Panda Waste)
Cappagh Road
Cappogue
Finglas
Dublin 11

IE Licence: W0261-02

Stack Emissions Monitoring Test House

SOCOTEC - East Kilbride Laboratory
2-4 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
UKAS and MCERTS Accreditation Number: 1015

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
MCERTS accredited results will only be claimed where both the sampling and analytical stages are UKAS accredited.

This test report replaces and supersedes version 1 dated 15th October 2020. Please see APPENDIX 4 for the changes made.

EXECUTIVE SUMMARY

EMISSIONS SUMMARY					
Parameter	**Units**	**Result**	**Calculated Uncertainty +/-**	**Emission Limit Value (ELV)**	**MCERTS accredited result**
Total Particulate Matter Particulate Emission Rate	mg/m³ g/hr	0.5 13.6	0.5 12.2	- -	✓
Odour Odour Emission Rate	ouE/m³ ouE/s	80.67 600.65	- -	- -	×
Moisture	%	6.11	0.18	-	✓
Stack Gas Temperature	°C	20	-	-	✓
Stack Gas Velocity	m/s	6.5	0.16	-	
Gas Volumetric Flow Rate (Actual)	m³/hr	28762.4	1472.9	-	
Gas Volumetric Flow Rate (STP, Wet)	m³/hr	26805.7	1372.7	-	
Gas Volumetric Flow Rate (STP, Dry)	m³/hr	25168.3	1288.9	-	
Gas Volumetric Flow Rate at Reference Conditions	m³/hr	26805.7	1372.7	45936	

ND = None Detected,

Results at or below the limit of detection are highlighted by bold italic text.

The above volumetric flow rate is calculated using data from the preliminary survey. Mass emissions for non isokinetic tests are calculated using these values. For all isokinetic testing the mass emission is calculated using test specific flow data and not the above values.
Reference conditions are 273K, 101.3kPa without correction for water vapour

EXECUTIVE SUMMARY

MONITORING TIMES			
Parameter	**Sampling Date(s)**	**Sampling Times**	**Sampling Duration**
Total Particulate Matter Run 1	07 September 2020	10:37 - 11:37	60 minutes
Odour Run 1	07 September 2020	11:50 - 12:00	10 minutes
Odour Run 2	07 September 2020	12:15 - 12:25	11 minutes
Odour Run 3	07 September 2020	12:44 - 12:54	10 minutes
Preliminary Stack Traverse	07 September 2020	10:20-10:30	-

EXECUTIVE SUMMARY

PROCESS DETAILS

Parameter	Process Details
Description of process	Recovery and Disposal of Non-Hazardous Waste
Continuous or batch	Continuous
Product Details	Odour Abatement System
Part of batch to be monitored (if applicable)	N/A
Normal load, throughput or continuous rating	Normal Operation
Fuel used during monitoring	N/A
Abatement	Activated Charcoal
Plume Appearance	None Visible

EXECUTIVE SUMMARY

Monitoring Methods

The selection of standard reference / alternative methods employed by SOCOTEC is determined, wherever possible by the hierarchy of method selection outlined in Environmental Protection Agency Technical Guidance Note (Monitoring) AG2.

MONITORING METHODS							
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Limit of Detection (LOD)**	**Calculated MU +/- % Result**	**Calculated MU +/- % ELV**
Total Particulate Matter	SRM - EN 13284-1	AE 104	1015	Yes	0.23 mg/m³	90%	N/A - No ELV
Odour	EN 13725	AE 142	1015	No	-	-	N/A - No ELV
Moisture	SRM - EN 14790	AE 105	1015	Yes	0.02%	2.88%	N/A - No ELV
Velocity	SRM - EN ISO 16911-1	AE 154	1015	Yes	5 Pa	2.4%	N/A - No ELV
Volumetric Flow Rate	SRM - EN ISO 16911-1	AE 154	1015	Yes	-	5.1%	2.99

EXECUTIVE SUMMARY

Analytical Methods

The following tables list the analytical methods employed together with the custody details. Unless otherwise stated the samples are archived at the analysis lab location.

SAMPLING METHODS WITH SUBSEQUENT ANALYSIS							
Species	**Analytical Technique**	**Analytical Procedure**	**UKAS Lab Number**	**UKAS Accredited Lab Analysis**	**Analysis Lab**	**Analysis Report number**	**Archive Period**
Total Particulate Matter	Gravimetric	AE 106	1015	Yes	SOCOTEC (East Kilbride)	N/A	8 Weeks
Odour	Olfactometry	SOP 2042	0609	No	Odournet	030620 SOCOTEC	8 Weeks

ON-SITE TESTING							
Species	**Analytical Technique**	**Analytical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Analysis**	**Laboratory**	**Data Archive Location**	**Archive Period**
Moisture	Gravimetric	AE 105	1015	Yes	SOCOTEC (East Kilbride)	-	-

EXECUTIVE SUMMARY

SAMPLING LOCATION					
Sampling Plane Validation Criteria	**Value**	**Units**	**Requirement**	**Compliant**	**Method**
Lowest Differential Pressure	24	Pa	>= 5 Pa	Yes	EN 15259
Lowest Gas Velocity	6.0	m/s	-	-	-
Highest Gas Velocity	7.0	m/s	-	-	-
Ratio of Gas Velocities	1.2	: 1	< 3 : 1	Yes	EN 15259
Mean Velocity	6.5	m/s	-	-	-
Maximum angle of flow with regard to duct axis	<15	^{o}	< 15^{o}	Yes	EN 15259
No local negative flow	Yes	-	-	Yes	EN 15259

DUCT CHARACTERISTICS		
	Value	**Units**
Shape	Circular	-
Depth	1.25	m
Width	-	m
Area	1.23	m^2
Port Depth	125	mm

SAMPLING LINES & POINTS		
	Isokinetic	**Non-Iso & Gases**
Sample port size	4" BSP	-
Number of lines used	1	-
Number of points / line	8	-
Duct orientation	Horizontal	-
Filtration	In Stack	-
Filtration for TPM	Glass Fibre	-

SAMPLING PLATFORM	
General Platform Information	
Permanent / Temporary Platform / Ground level / Floor Level / Roof	Permanent
Inside / Outside	Outside

AG1 Platform requirements	
Is there a sufficient working area so work can be performed in a compliant manner	Yes
Platform has 2 levels of handrails (approximately 0.5 m & 1.0 m high)	Yes
Platform has vertical base boards (approximately 0.25 m high)	Yes
Platform has removable chains / self closing gates at the top of ladders	Yes
Handrail / obstructions do not hamper insertion of sampling equipment	Yes
Depth of Platform = >Stack depth / diameter + wall and port thickness + 1.5m	Yes

Sampling Platform Improvement Recommendations (if applicable)

The sampling location generally complies with EPA Guidance Note AG1 requirements.

EXECUTIVE SUMMARY

Sampling & Analytical Method Deviations

Number Of Sample Lines

Only one sample line (Line A) is safely accessible for sampling to be carried out on. The number of sample points on line A was therefore doubled to meet the number required criteria, as specified, in the sampling method. The sampling location meets all flow stability criteria for periodic isokinetic sampling of particulate matter and is homogeneous for gas concentrations as specified in MID 13284-1. This deviation was therefore not deemed significant in relation to this overall result.

Calculated MU Value

The reported calculated maximum uncertainty % for TPM is higher than the level stated in EPA Guidance note AG2. This is primarily due to the low level measured in relative proximity to the LOD.

APPENDICES

CONTENTS

APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

MONITORING SCHEDULE					
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Number of Samples**
Total Particulate Matter	SRM - EN 13284-1	AE 104	1015	Yes	1
Odour	EN 13725	AE 142	1015	No	3
Moisture	SRM - EN 14790	AE 105	1015	Yes	1
Velocity	SRM - EN ISO 16911-1	AE 154	1015	Yes	1

APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

CALIBRATEABLE EQUIPMENT CHECKLIST					
Extractive Sampling		Instrumental Analyser/s		Miscellaneous	
Equipment	**Equipment I.D.**	**Equipment**	**Equipment I.D.**	**Equipment**	**Equipment I.D.**
Control Box DGM	LEK 9.30	Horiba PG-250 Analyser	-	Laboratory Balance	LEK 15.21
Box Thermocouples	LEK 9.31	FT-IR Gasmet	-	Tape Measure	LEK 20.2
Meter In Thermocouple	LEK 9.31	FT-IR Oven Box	-	Stopwatch	-
Meter Out Thermocouple	LEK 9.31	Bernath 3006 FID	-	Protractor	-
Control Box Timer	LEK 17.17	Signal 3030 FID	-	Barometer	LEK 16.9
Oven Box	-	Servomex	-	Digital Micromanometer	LEK 1.19
Probe	LEK 6.11	JCT Heated Head Filter	-	Digital Temperature Meter	LEK 1.16
Probe Thermocouple	LEK 3.14	Thermo FID	-	Stack Thermocouple	LEK 3.163
Probe	-	Stackmaster	-	Mass Flow Controller	-
Probe Thermocouple	-	FTIR Heater Box for Heated Line	-	MFC Display module	-
S-Pitot	LEK 6.11	Anemometer	-	1m Heated Line (1)	-
L-Pitot	-	Ecophysics NOx Analyser	-	1m Heated Line (2)	-
Site Balance	LEK 23.20	Chiller (JCT/MAK 10)	-	1m Heated Line (3)	-
Last Impinger Arm	-	Heated Line Controller (1)	-	5m Heated Line (1)	-
Dioxins Cond. Thermocouple	-	Heated Line Controller (2)	-	10m Heated Line (1)	-
Callipers	LEK 15.1R	Site temperature Logger	-	10m Heated Line (2)	-
Small DGM	-		-	15m Heated Line (1)	-
Heater Controller	-		-	20m Heated Line (1)	-
Inclinometer (Swirl Device)	LEK 24.7		-	20m Heated Line (2)	-

NOTE: If the equipment I.D is represented by a dash (-), then this piece of equipment has not been used for this test.

CALIBRATION GASES					
Gas (traceable to ISO 17025)	**Cylinder I.D Number**	**Supplier**	**ppm**	**%**	**Analytical Tolerance +/- %**
-	-	-	-	-	-

STACK EMISSIONS MONITORING TEAM

MONITORING TEAM								
Personnel	**MCERTS Number**	**MCERTS**		**TE / H&S Qualifications and Expiry Date**				
		Level	**Expiry**	**TE1**	**TE2**	**TE3**	**TE4**	**H&S**
Brian Walsh	MM 17 1414	MCERTS Level 2	Jan-23	Jan-23	Nov-23	Nov-23	May-23	Sep-23
Daniel Scully	MM 19 1563	MCERTS Trainee	Oct-20	-	-	-	-	Oct-20

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

TOTAL PARTICULATE MATTER SUMMARY					
Parameter	Sampling Times	Concentration mg/m³	Uncertainty mg/m³	ELV mg/m³	Emission Rate g/hr
Run 1	10:37 - 11:37 07 September 2020	0.50	0.45	-	13.6
Blank	-	0.23	-	-	-

Reference conditions are 273K, 101.3kPa without correction for water vapour

Acetone Blank Value mg/l	Acceptable Value mg/l
0.3	10

FILTER INFORMATION

SAMPLES								
Test	Filter & Probe Rinse Number	Filter Start Weight g	Filter End Weight g	Mass Gained on Filter g	Probe Rinse Start Weight g	Probe Rinse End Weight g	Mass Gained on Probe g	Combined Total Mass Gained g
Run 1	AC 1244	0.09942	0.09962	0.00020	185.28900	185.28920	0.00020	0.00040

If total mass gained is less than the LOD then the LOD is reported

BLANKS								
Test	Filter & Probe Number	Filter Start Weight g	Filter End Weight g	Mass Gained Filter g	Probe Start Weight g	Probe End Weight g	Mass Gained Probe g	Combined Total Mass Gained g
Run 1	AC 1248	0.09761	0.09757	-0.00004	202.72490	202.72480	-0.00010	0.00018

If total mass gained is less than the LOD then the LOD is reported

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

ISOKINETIC SAMPLING EQUATIONS - RUN 1 — TPM

Absolute pressure of stack gas, P_s		
Barometric pressure, P_b	Kpa	101.3
Stack static pressure, P_{static}	pa	25
$P_s = P_b + P_{static}$	Kpa	101.3
Vol. of water vapour collected, V_{wstd}		
Moisture trap weight increase,Vlc	g	39.1
$V_{wstd} = (0.001246)(V_{lc})$	m^3	0.0487186
Volume of gas metered dry, V_{mstd}		
Volume of gas sample through gas meter, V_m		0.773
Gas meter correction factor, Y_d		1.022
Mean dry gas meter temperature, T_m		289
Mean pressure drop across orifice, DH	mmH_2O	24.121
$V_{mstd} = \frac{(0.3592)(V_m)(P_b+(DH/13.6))(Y_d)}{T_m}$	m^3	0.749
Volume of gas metered wet, V_{mstw}		
$V_{mstw} = V_{mstd} + V_{wstd}$	m^3	0.7976
Vol. of gas metered at O_2 Ref. Cond., $V_{mstd@X\%O2}$		
Is the process burning hazardous waste? *(If yes, no favourable oxygen correction)*		No
% oxygen measured in gas stream, act%O_2		21.0
% oxygen reference condition		21
O_2 Reference Factor $O_2\ Ref = \frac{21.0 - act\%O_2}{21.0 - ref\%O_2}$		No O2 Ref
$V_{mstd@X\%oxygen} = (V_{mstd})\ (O_{2\ Ref})$	m^3	No O2 Ref
Moisture content, B_{wo}		
$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$		0.0611
	%	6.11
Moisture by FTIR	%	-
Velocity of stack gas, V_s		
Velocity pressure coefficient, C_p		0.89
Mean of velocity heads, DP_{avg}	Pa	32.47
Mean stack gas temperature, T_s	K	298
Gas density $_{(wet, ambient)}$, p		
p=(Ms*Ps)/(8.314*Ts)	kg/m^3	1.152
Stack Velocity, Vs $V_s = Cp\sqrt{\frac{\Delta DPavg}{p}}$	m/s	6.68

Molecular weight of dry gas, M_d		
CO_2	%	0.03
O_2	%	20.96
Total	%	20.99
N_2 (100 -Total)	%	79.01
$M_d = 0.44(\%CO_2)+0.32(\%O_2)+0.28(\%N_2)$		28.84
Molecular weight of wet gas, M_s		
$M_s = M_d(1 - B_{wo}) + 18(B_{wo})$	g/gmol	28.18
Actual flow of stack gas, Q_a		
Area of stack, A_s	m^2	1.23
$Q_a = (60)(A_s)(V_s)$	m³/min	492.1
Total flow of stack gas, Q		
Conversion factor (K/mm.Hg)		0.3592
$Q_{std} = \frac{(Q_a)P_s(0.3592)(1-B_{wo})}{(T_s)}$	Dry	423.0
$Q_{stdO2} = \frac{(Q_a)P_s(0.3592)(1-B_{wo})(O_2REF)}{(T_s)}$	@O_2ref	No O2 Ref
$Q_{stw} = \frac{(Q_a)P_s(0.3592)}{(T_s)}$	Wet	450.56
Percent isokinetic, %I		
Nozzle diameter, D_n	mm	6.95
Nozzle area, A_n	mm^2	37.91
Total sampling time, q	min	60
$\%I = \frac{(4.6398E6)(T_s)(V_{mstd})}{(P_s)(V_s)(A_n)(q)(1-B_{wo})}$	%	95.5
Acceptable isokinetic range 95% to 115%		Yes
Particulate Concentration, C		
Mass collected on filter, M_f	g	0.00020
Mass collected in probe, M_p	g	0.00020
Total mass collected, M_n	g	0.00040
$C_{wet} = \frac{M_n}{V_{mstw}}$	mg/m³	0.502
$C_{dry} = \frac{M_n}{V_{mstd}}$	mg/m³	0.534
$C_{dry@X\%O2} = \frac{M_n}{V_{mstd@X\%oxygen}}$	mg/m³	No O2 Ref
Particulate Emission Rates, E		
$E = [(C_{wet})(Q_{stw})(60)] / 1000$		13.56

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

TOTAL PARTICULATE MATTER QUALITY ASSURANCE CHECKLIST

LEAK RATE						
Run	Mean Sampling Rate litre/min	Pre-sampling Leak Rate litre/min	Post-sampling Leak Rate litre/min	Maximum Vacuum mm Hg	Acceptable Leak Rate litre/min	Leak Tests Acceptable?
Run 1	13.16	0.10	0.12	-228.6	0.26	Yes

ISOKINETICITY		
Run	Isokinetic Variation %	Acceptable Isokineticity
Run 1	95.53	Yes

Acceptable isokinetic range 95% to 115%

WEIGHING BALANCE UNCERTAINTY			
Run	Result mg/m³	5% ELV mg/m³	LOD < 5% ELV
Run 1	0.23	No ELV	N/A - No ELV

The above is based on both the Filter and rinse uncertainty

BLANK VALUE				
Run	Overall Blank Value mg/m^3	Daily Emission mg/m^3	Acceptable Blank Value mg/m^3	Overall Blank Acceptable mg/m^3
Blank 1	0.23	-	-	-

FILTERS					
Run	Filter Material	Filter Size mm	Max Filtration Temperature °C	Pre-use Filter Conditioning Temperature °C	Post-use Filter Conditioning Temperature °C
Run 1	Glass Fibre	47	27	180	160

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

ODOUR SUMMARY					
Test	**Sampling Times**	**Concentration ouE/m³**	**Duration Minutes**	**ELV ouE/m³**	**Emission Rate ouE/s**
Run 1	11:50 - 12:00 07 September 2020	86.00	10	-	640.36
Run 2	12:15 - 12:25 07 September 2020	65.00	11	-	483.99
Run 3	12:44 - 12:54 07 September 2020	91.00	10	-	677.59

Reference conditions are 273K, 101.3kPa without correction for water vapour

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

MOISTURE CALCULATIONS

Moisture Determination - Isokinetic							
Test Number	Sampling Time and Date	Start Weight kg	End Weight kg	Total gain kg	Concentration %	LOD %	Uncertainty %
Run 1	10:37 - 11:37 07 September 2020	3.0069	3.0460	0.0391	6.1	0.02	2.9

Moisture Quality Assurance							
Test Number	Sampling Duration mins	Total Volume Sampled l	Sampling Rate l/min	Start Leak Rate l/min	End Leak Rate l/min	Acceptable Leak Rate l/min	Leak Tests Acceptable?
Run 1	60	797.6	13.2	0.10	0.12	0.26	Yes

PRELIMINARY STACK SURVEY

Stack Characteristics		
Stack Diameter / Depth, D	1.25	m
Stack Width, W	-	m
Stack Area, A	1.23	m^2
Average stack gas temperature	20	^oC
Stack static pressure	0.025	kPa
Barometric Pressure	101.3	kPa

Stack Gas Composition & Molecular Weights								
Component	Molar Mass M	Density kg/m^3 p	Conc Dry % Vol	Dry Volume Fraction r	Dry Conc kg/m^3 pi	Conc Wet % Vol	Wet Volume Fraction r	Wet Conc kg/m^3 pi
CO_2	44	1.963059	0.028571	0.000286	0.000561	0.026826	0.000268	0.000527
O_2	32	1.427679	20.960000	0.209600	0.299242	19.679685	0.196797	0.280963
N_2	28	1.249219	79.011429	0.790114	0.987026	74.185117	0.741851	0.926735
H_2O	18	0.803070	-	-	-	6.108372	0.061084	0.049054

Where: p = M / 22.41 p*i* = r x p

Calculation of Stack Gas Densities		
Determinand	Result	Units
Dry Density (STP), P_{STD}	1.2868	kg/m^3
Wet Density (STP), P_{STW}	1.2573	kg/m^3
Dry Density (Actual), P_{Actual}	1.1993	kg/m^3
Average Wet Density (Actual), $P_{ActualW}$	1.172	kg/m^3

Where:

P_{STD} = sum of component concentrations, kg/m^3 (not including water vapour)

$P_{STW} = (P_{STD} + pi \text{ of } H_2O) / (1 + (pi \text{ of } H_2O / 0.8036))$

$P_{Actual} = P_{STD} \times (Ts / Ps) \times (Pa / Ta)$

$P_{ActualW} = P_{STW} \times (Ts / Ps) \times (Pa / Ta)$

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

PRELIMINARY STACK SURVEY

TRAVERSE 1

Date of Survey	07 September 2020
Time of Survey	10:20-10:30
Velocity Measurement Device:	S-Type Pitot

Sampling Line A								
Traverse Point	Distance into duct (m)	D*P* pt Pa (average of 3 readings)	D*P* pt mmH_2O (average of 3 readings)	Temp °C	Velocity m/s	Volumetric Flow Rate (actual) m^3/s	O_2 % Vol	Angle of Swirl °
1	0.05	26.1	2.7	20	6.0	7.3	-	<15
2	0.13	27.8	2.8	20	6.2	7.6	-	<15
3	0.24	33.3	3.4	20	6.7	8.3	-	<15
4	0.40	31.7	3.2	20	6.6	8.1	-	<15
5	0.85	31.0	3.2	20	6.5	8.0	-	<15
6	1.01	35.6	3.6	20	7.0	8.6	-	<15
7	1.12	29.7	3.0	20	6.4	7.8	-	<15
8	1.20	33.3	3.4	20	6.7	8.3	-	<15
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Mean	-	31.1	3.2	20	6.5	8.0	-	-

Sampling Line B								
Traverse Point	Distance into duct (m)	D*P* pt Pa (average of 3 readings)	D*P* pt mmH_2O (average of 3 readings)	Temp °C	Velocity m/s	Volumetric Flow Rate (actual) m^3/s	O_2 % Vol	Angle of Swirl °
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Mean	-	-	-	-	-	-	-	-

PRELIMINARY STACK SURVEY QUALITY ASSURANCE CHECKLIST

PITOT LEAK CHECK								
Run	Pre Traverse Leak Rate				Post Traverse Leak Rate			
	Start Value mmH2O	End Value mmH2O	Difference %	Outcome	Start Value mmH2O	End Value mmH2O	Difference %	Outcome
Run 1	105	101	3.8	Pass	121	119	1.7	Pass

To complete a compliant pitot leak check a pressure of over 80 mmH_2O (or 800 Pa) is applied and the pressure drop monitored over 5 mins. A drop of less than 5% must be observed.

S-Type Pitot Stagnation Check				
Run	Stagnation (Pa)	Reference (Pa)	Difference (Pa)	Outcome (Permitted +/- 10 Pa)
Run 1	25	23	2.0	Pass

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

PRELIMINARY STACK SURVEY (CONTINUED)

Sampling Plane Validation Criteria				
EA Technical Guidance Note (Monitoring) M1	Result	Units	Requirement	Compliant
Lowest Differential Pressure	26	Pa	>= 5 Pa	Yes
Lowest Gas Velocity	6.0	m/s	-	-
Highest Gas Velocity	7.0	m/s	-	-
Ratio of Gas Velocities	1.2	-	< 3 : 1	Yes
Maximum angle of flow with regard to duct axis	<15	°	< 15°	Yes
No local negative flow	Yes	-	-	Yes

Calculation of Stack Gas Velocity, V		
Velocity at Traverse Point, V = K_{pt} x (1-e) * Ö(2 * DP_{pt} / $P_{ActualW}$)		
Where: K_{pt} = Pitot tube calibration coefficient (1-e) = Compressibility correction factor, assumed at a constant 0.998		
Average Stack Gas Velocity, Va	**6.5**	m/s

Calculation of Stack Gas Volumetric Flowrate, Q			
Duct gas flow conditions	Actual	Reference	Units
Temperature	20	0	°C
Total Pressure	101.325	101.3	kPa
Oxygen	21.0	21	%
Moisture	6.11	6.11	%
Pitot tube calibration coefficient, K_{pt}	0.90		

Gas Volumetric Flowrate	Result	Units
Average Stack Gas Velocity (Va)	6.51	m/s
Stack Area (A)	1.23	m^2
Gas Volumetric Flowrate (Actual), Q_{Actual}	28762.4	m^3/hr
Gas Volumetric Flowrate (STP, Wet), Q_{STP}	26805.7	m^3/hr
Gas Volumetric Flowrate (STP, Dry), $Q_{STP,Dry}$	25168.3	m^3/hr
Gas Volumetric Flowrate (REF), Q_{Ref}	26805.7	m^3/hr

Where:

Q_{Actual} = Va x A x 3600

Q_{STP} = Q (Actual) x (Ts / Ta) x (Pa / Ps) x 3600

$Q_{STP,Dry}$ = Q (STP) / (100 - (100 / Ma)) x 3600

Q_{Ref} = Q (STP) x ((100 - Ma) / (100 - Ms)) x ((21 - O_2a) / (21 - O_2s))

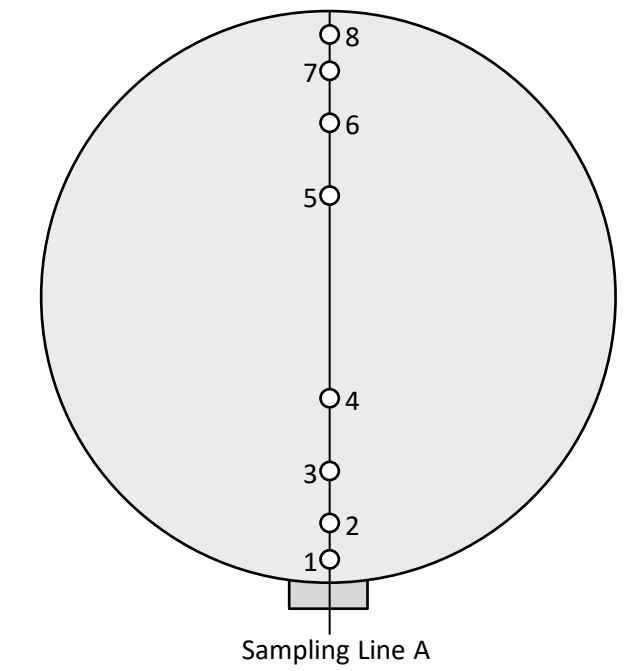
Nomenclature:

Ts = Absolute Temperature, Standard Conditions, 273 K
Ps = Absolute Pressure, Standard Conditions, 101.3 kPa
Ta = Absolute Temperature, Actual Conditions, K
Pa = Absolute Pressure, Actual Conditions, kPa
Ma = Water vapour, Actual Conditions, % Vol
Ms = Water vapour, Reference Conditions, % Vol
O_2a = Oxygen, Actual Conditions, % Vol
O_2s = Oxygen, Reference Conditions, % Vol

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

STACK DIAGRAM

	Value	Units
Stack Depth	1.25	m
Stack Width	-	m
Area	1.23	m^2



○ Isokinetic sampling point
● Isokinetic sampling points not used
● Non Isokinetic/Gases sampling point

Non-Isokinetic/Gases Sampling			
Sampling Point	Distance (% of Depth)	Distance into Stack	Units
-	-	-	-

Isokinetic Sampling			
Sampling Point	Distance (% of Depth)	Distance into Stack (m)	Swirl °
1	4.0	0.05	< 15
2	10.5	0.13	< 15
3	19.4	0.24	< 15
4	32.3	0.40	< 15
5	67.7	0.85	< 15
6	80.6	1.01	< 15
7	89.5	1.12	< 15
8	96.0	1.20	< 15
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

SAMPLING LOCATION

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - TOTAL PARTICULATE MATTER

Run	Sampled Volume m³	Sampled Gas Temp K	Sampled Gas Pressure kPa	Sampled Gas Humidity % by volume	Oxygen Content % by volume	Limit of Detection % by mass	Leak %	Uncollected Mass mg
MU required	**≤ 2%**	**≤ 2%**	**≤ 1%**	**≤ 1%**	**≤ 10%**	**≤ 5% of ELV**	**≤ 2%**	**≤ 10% of ELV**
Run 1	0.001	2.0	0.50	1.0	N/A	0.1800	-	-
as a %	0.13	0.67	0.49	1.0	N/A	N/A	0.91	N/A
compliant?	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**N/A**	**Yes**	**N/A**

Run	Volume (STP) m³	Mass of particulate mg	O_2 Correction -	Leak mg/m³	Uncollected Mass mg	Combined uncertainty
Run 1	0.69	0.4000	1.0	0.003	0.0001	-
MU as mg/m³	0.007	0.2257	-	0.003	0.0001	**0.23**
MU as %	1.31	45.00	-	0.526	0.0260	-

R1 - Uncertainty expressed at a 95% confidence level (where k = 2)	**0.45**	**mg/m³**	**90.04**	**% Result**	**N/A**	**% ELV**

(k is a coverage factor which gives a 95% confidence in the quoted figures)
Reference – SOCOTEC Technical Procedure AE150 Estimation of Uncertainty of Measurement

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - MOISTURE

Run	Sampled Volume m^3	Sampled Gas Temp K	Sampled Gas Pressure kPa	Sampled Gas Humidity % by volume	Oxygen Content % by volume	Leak %
MU required	**≤ 2%**	**≤ 2%**	**≤ 1%**	**≤ 1%**	**≤ 10%**	**≤ 2%**
Run 1	0.001	2.0	0.50	1.0	N/A	-
as a %	0.13	0.67	0.49	1.0	N/A	0.91
compliant?	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**Yes**

Run	Volume (STP) m^3	Mass Gained mg	O_2 Correction -	Leak mg/m^3	Uncollected Mass mg	Combined uncertainty
Run 1	0.69	39100	1.0	274.81	58	-
MU as % v/v	0.086	0.02	-	0.035	0.010	**0.09**
MU as %	1.31	0.26	-	0.53	0.15	-

R1 - Uncertainty expressed at a 95% confidence level (where k = 2)	**0.19**	**% v/v**	**2.88**	**%**

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - VELOCITY & VOLUMETRIC FLOW RATE

Measured Velocity at Actual Conditions	6.5	m/s
Measured Volumetric Flow rate at Actual Conditions	28762.4	m³/hr

Performance Characteristics & Source of Value	Units	Values	Requirement	Compliant
Uncertainty of Local Gas Velocity Determination				
Uncertainty of pitot tube coefficient	-	0.010		
Uncertainty of mean local dynamic pressures	-	0.46		
Factor loading, function of the number of measurements.	3 readings	0.591	minimum 3	Yes
Range of measurment device	pa	1000		
Resolution	pa	1.00		
Calibration uncertainty	pa	6.44	<1% of Value or 20 Pa whichever is greater	Yes
Drift	% range	0.10		
Linearity	% range	0.06	<2% of value	Yes
Uncertainty of gas density determination				
Uncertainty of molar mass determination	kg/mol	0.00003		
Uncertainty of temperature measurement	K	1.49	<1% of value	Yes
Uncertainty of absolute pressure in the duct	pa	517		
Uncertainty associated with the estimate of density	-	0.007		
Uncertainty associated with the measurement of local velocity	-	0.0001		
Uncertainty associated with the measurement of mean velocity	-	0.0001		

Measurement Uncertainty - Velocity	m/s
Combined uncertainty	0.08
Expanded uncertainty at a 95% Confidence Interval	0.16

Note - The expanded uncertainty uses a coverage factor of k = 2.

Expanded Measurement Uncertainty of Velocity at a 95% Confidence Interval	%
Expressed as a % of the Measured Velocity	1.2
Expanded uncertainty at a 95% Confidence Interval	2.4

Measurement Uncertainty Volumetric Flow Rate	m³/hr
Combined uncertainty	751.5
Expanded uncertainty at a 95% Confidence Interval	1472.9

Note - The expanded uncertainty uses a coverage factor of k = 2.

Expanded Measurement Uncertainty of Volumetric Flow Rate at a 95% Confidence Interval	%
Expressed as a % of the Measured Volumetric Flow Rate	2.6
Expanded uncertainty at a 95% Confidence Interval	5.1

Reference – SOCOTEC Technical Procedure AE150 Estimation of Uncertainty of Measurement

APPENDIX 4 - Record of Report Amendments

Version	Issue Date	Amendments
2	20th October 2020	Update of sampling platform info following confirmation removable chain/self-closing gate in place.

END OF REPORT

Thank you for choosing SOCOTEC for your environmental monitoring needs. We hope our services have met your requirements and that you are fully satisfied with your experience of working with us, we really do value your custom and would welcome your feedback. We would appreciate it if you could take a moment to complete a short online questionnaire so that we can improve our operations and address any areas that have not met with your expectations, by clicking on the following

https://www.surveymonkey.co.uk/r/CAE_customer_feedback_weblink

STACK EMISSIONS MONITORING REPORT

2-4 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel: 01355 246 730
Fax: 01355 249 669

Your contact at SOCOTEC LTD
David Hay Business Manager - North Tel: 01355 246 730 Email: david.hay@socotec.com

Operator & Address:
Starrus Eco Holdings Limited (Panda Waste) Cappagh Rd. Cappogue Finglas Dublin 11

Permit Reference:
IPPC Licence: W0261-02

Release Point:
A2-1 (Odour Abatement)

Sampling Date(s):
14 December 2020

SOCOTEC Job Number:	LEK 12537 / Q4
Report Date:	11-Jan-21
Version:	1
Report By: MCERTS Number: MCERTS Level: Technical Endorsements:	Daniel Scully MM 19 1563 MCERTS Level 1 Technician
Report Approved By: MCERTS Number: Business Title: Technical Endorsements: Signature:	Enda Flood MM 12 1170 MCERTS Level 2 - Team Leader 1, 2, 3 & 4

1015

CONTENTS

EXECUTIVE SUMMARY

MONITORING OBJECTIVES

Starrus Eco Holdings Limited (Panda Waste) operates a odour abatement process process at Finglas which is subject to IPPC Licence W0261-02, under the EPA Act 1992.

SOCOTEC LTD were commissioned by Q.E.D. Engineering Limited to carry out stack emissions monitoring to determine the release of prescribed pollutants from the following Plant under normal operating conditions.

The results of these tests shall be used to demonstrate compliance with a set of emission limit values for prescribed pollutants as specified in the Plant's IPPC Licence, W0261-02.

Plant

A2-1 (Odour Abatement)

Operator

Starrus Eco Holdings Limited (Panda Waste)
Cappagh Rd.
Cappogue
Finglas
Dublin 11

IPPC Licence: W0261-02

Stack Emissions Monitoring Test House

SOCOTEC - East Kilbride Laboratory
2-4 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
UKAS and MCERTS Accreditation Number: 1015

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
MCERTS accredited results will only be claimed where both the sampling and analytical stages are UKAS accredited.

EXECUTIVE SUMMARY

EMISSIONS SUMMARY					
Parameter	**Units**	**Result**	**Calculated Uncertainty +/-**	**Emission Limit Value (ELV)**	**MCERTS accredited result**
Total Particulate Matter Particulate Emission Rate	mg/m³ g/hr	0.3 6	0.57 11.2	- -	✓
Odour Odour Emission Rate	ouE/m³ ouE/s	60.33 300.54	- -	- -	x
Moisture	%	0.16	0.05	-	✓
Stack Gas Temperature	°C	18	-	-	
Stack Gas Velocity	m/s	4.5	0.11	-	
Gas Volumetric Flow Rate (Actual)	m³/hr	19668	1022	-	✓
Gas Volumetric Flow Rate (STP, Wet)	m³/hr	17961	933	-	
Gas Volumetric Flow Rate (STP, Dry)	m³/hr	17933	932	-	
Gas Volumetric Flow Rate at Reference Conditions	m³/hr	17933	932	45936	

ND = None Detected,

Results at or below the limit of detection are highlighted by bold italic text.

The above volumetric flow rate is calculated using data from the preliminary survey. Mass emissions for non isokinetic tests are calculated using these values. For all isokinetic testing the mass emission is calculated using test specific flow data and not the above values.

Reference conditions are 273K, 101.3kPa, dry gas .

EXECUTIVE SUMMARY

MONITORING TIMES			
Parameter	**Sampling Date(s)**	**Sampling Times**	**Sampling Duration**
Total Particulate Matter Run 1	14 December 2020	10:57 - 11:57	60 minutes
Odour Run 1	14 December 2020	11:15 - 11:15	5 minutes
Odour Run 2	14 December 2020	11:21 - 11:21	6 minutes
Odour Run 3	14 December 2020	11:31 - 11:31	8 minutes
Preliminary Stack Traverse	14 December 2020	10:26-10:38	-

EXECUTIVE SUMMARY

PROCESS DETAILS

Parameter	Process Details
Description of process	Odour abatement process
Continuous or batch	Continuous
Product Details	N/A
Part of batch to be monitored (if applicable)	N/A
Normal load, throughput or continuous rating	Normal
Fuel used during monitoring	N/A
Abatement	Activated charcoal
Plume Appearance	None visible

EXECUTIVE SUMMARY

Monitoring Methods

The selection of standard reference / alternative methods employed by SOCOTEC is determined, wherever possible by the hierarchy of method selection outlined in Environmental Protection Agency Technical Guidance Note (Monitoring) AG2.

MONITORING METHODS							
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Limit of Detection (LOD)**	**Calculated MU +/- % Result**	**Calculated MU +/- % ELV**
Total Particulate Matter	SRM - EN 13284-1	AE 104	1015	Yes	0.29 mg/m³	200%	N/A - No ELV
Odour	BS EN 13725	AE 142	1015	Yes	-	-	N/A - No ELV
Moisture	SRM - EN 14790	AE 105	1015	Yes	0.02%	28.99%	N/A - No ELV
Velocity	SRM - EN ISO 16911-1	AE 154	1015	Yes	5 Pa	2.6%	N/A - No ELV
Volumetric Flow Rate	SRM - EN ISO 16911-1	AE 154	1015	Yes	-	5.2%	202.84%

EXECUTIVE SUMMARY

Analytical Methods

The following tables list the analytical methods employed together with the custody details. Unless otherwise stated the samples are archived at the analysis lab location.

SAMPLING METHODS WITH SUBSEQUENT ANALYSIS							
Species	**Analytical Technique**	**Analytical Procedure**	**UKAS Lab Number**	**UKAS Accredited Lab Analysis**	**Analysis Lab**	**Analysis Report number**	**Archive Period**
Total Particulate Matter	Gravimetric	AE 106	1015	Yes	SOCOTEC (East Kilbride)	N/A	8 Weeks
Odour	olfactometry	SOP 2040	0609	No	Odournet	0 - SOCOTECTL21	8 Weeks

ON-SITE TESTING							
Species	**Analytical Technique**	**Analytical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Analysis**	**Laboratory**	**Data Archive Location**	**Archive Period**
Moisture	Gravimetric	AE 105	1015	Yes	SOCOTEC (East Kilbride)	-	-

EXECUTIVE SUMMARY

SAMPLING LOCATION					
Sampling Plane Validation Criteria	**Value**	**Units**	**Requirement**	**Compliant**	**Method**
Lowest Differential Pressure	11	Pa	>= 5 Pa	Yes	EN 15259
Lowest Gas Velocity	4.0	m/s	-	-	-
Highest Gas Velocity	4.7	m/s	-	-	-
Ratio of Gas Velocities	1.2	: 1	< 3 : 1	Yes	EN 15259
Mean Velocity	4.5	m/s	-	-	-
Maximum angle of flow with regard to duct axis	<15	°	< 15°	Yes	EN 15259
No local negative flow	Yes	-	-	Yes	EN 15259

DUCT CHARACTERISTICS		
	Value	**Units**
Shape	Circular	-
Depth	1.25	m
Width	-	m
Area	1.23	m^2
Port Depth	125	mm

SAMPLING LINES & POINTS		
	Isokinetic	**Non-Iso & Gases**
Sample port size	4"BSP	-
Number of lines used	1	-
Number of points / line	8	-
Duct orientation	horizontal	-
Filtration	in stack	-
Filtration for TPM	in stack	-

SAMPLING PLATFORM	
General Platform Information	
Permanent / Temporary Platform / Ground level / Floor Level / Roof	Outside
Inside / Outside	Permanent

AG1 Platform requirements	
Is there a sufficient working area so work can be performed in a compliant manner	0
Platform has 2 levels of handrails (approximately 0.5 m & 1.0 m high)	Yes
Platform has vertical base boards (approximately 0.25 m high)	Yes
Platform has removable chains / self closing gates at the top of ladders	Yes
Handrail / obstructions do not hamper insertion of sampling equipment	No
Depth of Platform = >Stack depth / diameter + wall and port thickness + 1.5m	Yes

Sampling Platform Improvement Recommendations (if applicable)

EXECUTIVE SUMMARY

Sampling & Analytical Method Deviations

In this instance there were no deviations from the sampling and analytical methods employed.

APPENDICES

CONTENTS

APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

MONITORING SCHEDULE					
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Number of Samples**
Total Particulate Matter	SRM - EN 13284-1	AE 104	1015	Yes	1
Odour	BS EN 13725	AE 142	1015	Yes	3
Moisture	SRM - EN 14790	AE 105	1015	Yes	1
Velocity	SRM - EN ISO 16911-1	AE 154	1015	Yes	1

APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

CALIBRATEABLE EQUIPMENT CHECKLIST

Extractive Sampling		Instrumental Analyser/s		Miscellaneous	
Equipment	**Equipment I.D.**	**Equipment**	**Equipment I.D.**	**Equipment**	**Equipment I.D.**
Control Box DGM	LEK 9.44	Horiba PG-250 Analyser	-	Laboratory Balance	LEK 15.21
Box Thermocouples	LEK 9.46	FT-IR Gasmet	-	Tape Measure	LEK 20.2
Meter In Thermocouple	LEK 9.46	FT-IR Oven Box	-	Stopwatch	-
Meter Out Thermocouple	LEK 9.46	Bernath 3006 FID	-	Protractor	-
Control Box Timer	LEK 17.25	Signal 3030 FID	-	Barometer	LEK 16.9
Oven Box	-	Servomex	-	Digital Micromanometer	LEK 1.19
Probe	LEK 6.11	JCT Heated Head Filter	-	Digital Temperature Meter	LEK 1.16
Probe Thermocouple	-	Thermo FID	-	Stack Thermocouple	-
Probe	-	Stackmaster	-	Mass Flow Controller	-
Probe Thermocouple	-	FTIR Heater Box for Heated Line	-	MFC Display module	-
S-Pitot	LEK 6.11	Anemometer	-	1m Heated Line (1)	-
L-Pitot	-	Ecophysics NOx Analyser	-	1m Heated Line (2)	-
Site Balance	LEK 23.20	Chiller (JCT/MAK 10)	-	1m Heated Line (3)	-
Last Impinger Arm	-	Heated Line Controller (1)	-	5m Heated Line (1)	-
Dioxins Cond. Thermocouple	-	Heated Line Controller (2)	-	10m Heated Line (1)	-
Callipers	LEK 15.1r	Site temperature Logger	-	10m Heated Line (2)	-
Small DGM	-		-	15m Heated Line (1)	-
Heater Controller	-		-	20m Heated Line (1)	-
Inclinometer (Swirl Device)	LEK 24.7		-	20m Heated Line (2)	-

NOTE: If the equipment I.D is represented by a dash (-), then this piece of equipment has not been used for this test.

CALIBRATION GASES

Gas (traceable to ISO 17025)	Cylinder I.D Number	Supplier	ppm	%	Analytical Tolerance +/- %
-	-	-	-	-	-

STACK EMISSIONS MONITORING TEAM

MONITORING TEAM								
Personnel	**MCERTS Number**	**MCERTS**		**TE / H&S Qualifications and Expiry Date**				
		Level	**Expiry**	**TE1**	**TE2**	**TE3**	**TE4**	**H&S**
Enda Flood	MM 12 1170	MCERTS Level 2	Apr-23	Mar-24	Mar-24	Jun-23	Nov-23	Apr-23
Aidan Whiteny	MM 20 1603	MCERTS Trainee	Sep-25	-	-	-	-	Sep-25

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

TOTAL PARTICULATE MATTER SUMMARY					
Parameter	**Sampling Times**	**Concentration mg/m³**	**Uncertainty mg/m³**	**ELV mg/m³**	**Emission Rate g/hr**
Run 1	10:57 - 11:57 14 December 2020	0.3	0.57	-	6
Blank	-	0.29	-	-	-

Reference conditions are 273K, 101.3kPa, dry gas .

Acetone Blank Value mg/l	Acceptable Value mg/l
0.3	10

FILTER INFORMATION

SAMPLES								
Test	Filter & Probe Rinse Number	Filter Start Weight g	Filter End Weight g	Mass Gained on Filter g	Probe Rinse Start Weight g	Probe Rinse End Weight g	Mass Gained on Probe g	Combined Total Mass Gained g
Run 1	AC 1616	0.09874	0.09875	0.00001	161.72710	161.72710	0.00000	0.00018

If total mass gained is less than the LOD then the LOD is reported

BLANKS								
Test	Filter & Probe Number	Filter Start Weight g	Filter End Weight g	Mass Gained Filter g	Probe Start Weight g	Probe End Weight g	Mass Gained Probe g	Combined Total Mass Gained g
Run 1	AC1019	0.09823	0.09367	-0.00456	215.16780	215.16690	-0.00090	0.00018

If total mass gained is less than the LOD then the LOD is reported

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

ISOKINETIC SAMPLING EQUATIONS - RUN 1 — TPM

Absolute pressure of stack gas, P_s		
Barometric pressure, P_b	Kpa	98.6
Stack static pressure, P_{static}	pa	10
$P_s = P_b + P_{static}$	Kpa	98.6
Vol. of water vapour collected, V_{wstd}		
Moisture trap weight increase,Vlc	g	0.8
$V_{wstd} = (0.001246)(V_{lc})$	m^3	0.0009968
Volume of gas metered dry, V_{mstd}		
Volume of gas sample through gas meter, V_m		0.710
Gas meter correction factor, Y_d		0.950
Mean dry gas meter temperature, T_m		286
Mean pressure drop across orifice, DH	mmH_2O	13.833
$V_{mstd} = \frac{(0.3592)(V_m)(P_b+(DH/13.6))(Y_d)}{T_m}$	m^3	0.627
Volume of gas metered wet, V_{mstw}		
$V_{mstw} = V_{mstd} + V_{wstd}$	m^3	0.6277
Vol. of gas metered at O_2 Ref. Cond., $V_{mstd@X\%O2}$		
Is the process burning hazardous waste? *(If yes, no favourable oxygen correction)*		No
% oxygen measured in gas stream, act%O_2		21.0
% oxygen reference condition		21
O_2 Reference Factor O_2 Ref = $\frac{21.0 - act\%O_2}{21.0 - ref\%O_2}$		No O2 Ref
$V_{mstd@X\%oxygen} = (V_{mstd})(O_{2\,Ref})$	m^3	No O2 Ref
Moisture content, B_{wo}		
$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$		0.0016
	%	0.16
Moisture by FTIR	%	-
Velocity of stack gas, V_s		
Velocity pressure coefficient, C_p		0.86
Mean of velocity heads, DP_{avg}	Pa	18.88
Mean stack gas temperature, T_s	K	290
Gas density (wet, ambient), p		
p=(Ms*Ps)/(8.314*Ts)	kg/m^3	1.180
Stack Velocity, Vs $V_s = Cp\sqrt{\frac{\Delta DPavg}{p}}$	m/s	4.84

Molecular weight of dry gas, M_d		
CO_2	%	0.03
O_2	%	20.96
Total	%	20.99
N_2 (100 -Total)	%	79.01
$M_d = 0.44(\%CO_2)+0.32(\%O_2)+0.28(\%N_2)$		28.84
Molecular weight of wet gas, M_s		
$M_s = M_d(1 - B_{wo}) + 18(B_{wo})$	g/gmol	28.83
Actual flow of stack gas, Q_a		
Area of stack, A_s	m^2	1.23
$Q_a = (60)(A_s)(V_s)$	m^3/min	356.3
Total flow of stack gas, Q		
Conversion factor (K/mm.Hg)		0.3592
$Q_{std} = \frac{(Q_a)P_s(0.3592)(1-B_{wo})}{(T_s)}$	Dry	326.0
$Q_{stdO2} = \frac{(Q_a)P_s(0.3592)(1-B_{wo})(O_2REF)}{(T_s)}$	@O_2ref	No O2 Ref
$Q_{stw} = \frac{(Q_a)P_s(0.3592)}{(T_s)}$	Wet	326.51
Percent isokinetic, %I		
Nozzle diameter, D_n	mm	6.91
Nozzle area, A_n	mm^2	37.47
Total sampling time, q	min	60
$\%I = \frac{(4.6398E6)(T_s)(V_{mstd})}{(P_s)(V_s)(A_n)(q)(1-B_{wo})}$	%	104.9
Acceptable isokinetic range 95% to 115%		Yes
Particulate Concentration, C		
Mass collected on filter, M_f	g	0.00001
Mass collected in probe, M_p	g	0.00000
Total mass collected, M_n	g	0.00018
$C_{wet} = \frac{M_n}{V_{mstw}}$	mg/m³	0.287
$C_{dry} = \frac{M_n}{V_{mstd}}$	mg/m³	0.287
$C_{dry@X\%O2} = \frac{M_n}{V_{mstd@X\%oxygen}}$	mg/m³	No O2 Ref
Particulate Emission Rates, E		
$E = [(C_{wet})(Q_{stw})(60)] / 1000$		5.62

As the total mass gained was less than the LOD, the LOD has been reported

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

TOTAL PARTICULATE MATTER QUALITY ASSURANCE CHECKLIST

LEAK RATE						
Run	Mean Sampling Rate litre/min	Pre-sampling Leak Rate litre/min	Post-sampling Leak Rate litre/min	Maximum Vacuum mm Hg	Acceptable Leak Rate litre/min	Leak Tests Acceptable?
Run 1	11.24	0.00	0.00	-254	0.22	Yes

ISOKINETICITY		
Run	Isokinetic Variation %	Acceptable Isokineticity
Run 1	104.95	Yes

Acceptable isokinetic range 95% to 115%

WEIGHING BALANCE UNCERTAINTY			
Run	Result mg/m³	5% ELV mg/m³	LOD < 5% ELV
Run 1	0.29	No ELV	N/A - No ELV

The above is based on both the Filter and rinse uncertainty

BLANK VALUE				
Run	Overall Blank Value mg/m^3	Daily Emission mg/m^3	Acceptable Blank Value mg/m^3	Overall Blank Acceptable mg/m^3
Blank 1	0.29	-	-	-

FILTERS					
Run	Filter Material	Filter Size mm	Max Filtration Temperature °C	Pre-use Filter Conditioning Temperature °C	Post-use Filter Conditioning Temperature °C
Run 1	Glass Fibre	47	18	180	160

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

ODOUR SUMMARY					
Test	**Sampling Times**	**Concentration ouE/m³**	**Duration Minutes**	**ELV ouE/m³**	**Emission Rate ouE/s**
Run 1	11:10 - 11:15 14 December 2020	76.00	5	-	378.58
Run 2	11:15 - 11:21 14 December 2020	45.00	6	-	224.16
Run 3	11:23 - 11:31 14 December 2020	60.00	8	-	298.88

Reference conditions are 273K, 101.3kPa, dry gas .

ODOUR QUALITY ASSURANCE CHECKLIST

Leak Test Results	Total Sample Volume @ ref Conditions m³	Mean Sampling Rate l/min	Pre sampling leak rate l/min	Post sampling leak rate l/min	Acceptable leak rate l/min	Leak Tests Acceptable?
Run 1	10.0	2.0	0.00	0.00	0.04	Yes
Run 2	10.0	1.7	0.00	0.00	0.03	Yes
Run 3	10.0	1.3	0.00	0.00	0.03	Yes

ODOUR ABSORPTION EFFICIENCY

Parameter	**Total ug**	**IMP C ug**	**Absorption Efficiency %**	**Acceptable Absorption Efficiency %**	**Absorption Efficiency Acceptable ?**
Run 1	-	-	Not Determined	Not Determined	Not Determined
Run 2	-	-	Not Determined	Not Determined	Not Determined
Run 3	-	-	Not Determined	Not Determined	Not Determined

ND - None Detected

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

MOISTURE CALCULATIONS

Moisture Determination - Isokinetic							
Test Number	Sampling Time and Date	Start Weight kg	End Weight kg	Total gain kg	Concentration %	LOD %	Uncertainty %
Run 1	10:57 - 11:57 14 December 2020	3.2395	3.2403	0.0008	0.2	0.02	29.0

Moisture Quality Assurance							
Test Number	Sampling Duration mins	Total Volume Sampled l	Sampling Rate l/min	Start Leak Rate l/min	End Leak Rate l/min	Acceptable Leak Rate l/min	Leak Tests Acceptable?
Run 1	60	628	11.2	0.00	0.00	0.22	Yes

PRELIMINARY STACK SURVEY

Stack Characteristics		
Stack Diameter / Depth, D	1.25	m
Stack Width, W	-	m
Stack Area, A	1.23	m^2
Average stack gas temperature	18	^oC
Stack static pressure	0.01	kPa
Barometric Pressure	98.6	kPa

Stack Gas Composition & Molecular Weights								
Component	Molar Mass M	Density kg/m^3 p	Conc Dry % Vol	Dry Volume Fraction r	Dry Conc kg/m^3 pi	Conc Wet % Vol	Wet Volume Fraction r	Wet Conc kg/m^3 pi
CO_2	44	1.963059	0.028571	0.000286	0.000561	0.028526	0.000285	0.000560
O_2	32	1.427679	20.960000	0.209600	0.299242	20.926715	0.209267	0.298766
N_2	28	1.249219	79.011429	0.790114	0.987026	78.885957	0.788860	0.985459
H_2O	18	0.803070	-	-	-	0.158802	0.001588	0.001275

Where: p = M / 22.41 pi = r x p

Calculation of Stack Gas Densities		
Determinand	Result	Units
Dry Density (STP), P_{STD}	1.2868	kg/m^3
Wet Density (STP), P_{STW}	1.2861	kg/m^3
Dry Density (Actual), P_{Actual}	1.1752	kg/m^3
Average Wet Density (Actual), $P_{ActualW}$	1.174	kg/m^3

Where:

P_{STD} = sum of component concentrations, kg/m^3 (not including water vapour)

$P_{STW} = (P_{STD} + pi \text{ of } H_2O) / (1 + (pi \text{ of } H_2O / 0.8036))$

$P_{Actual} = P_{STD}$ x (Ts / Ps) x (Pa / Ta)

$P_{ActualW} = P_{STW}$ x (Ts / Ps) x (Pa / Ta)

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

PRELIMINARY STACK SURVEY

TRAVERSE 1

Date of Survey	14 December 2020
Time of Survey	10:26-10:38
Velocity Measurement Device:	S-Type Pitot

Sampling Line A								
Traverse Point	Distance into duct (m)	DP pt Pa (average of 3 readings)	DP pt mmH_2O (average of 3 readings)	Temp °C	Velocity m/s	Volumetric Flow Rate (actual) m^3/s	O_2 % Vol	Angle of Swirl °
1	0.05	17.0	1.7	18	4.6	5.6	-	<15
2	0.13	14.4	1.5	18	4.2	5.2	-	<15
3	0.24	18.0	1.8	18	4.7	5.8	-	<15
4	0.40	17.3	1.8	18	4.6	5.7	-	<15
5	0.85	17.0	1.7	18	4.6	5.6	-	<15
6	1.01	16.0	1.6	18	4.5	5.5	-	<15
7	1.12	15.4	1.6	18	4.4	5.4	-	<15
8	1.20	12.7	1.3	18	4.0	4.9	-	<15
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Mean	-	16.0	1.6	18	4.5	5.5	-	-

Sampling Line B								
Traverse Point	Distance into duct (m)	DP pt Pa (average of 3 readings)	DP pt mmH_2O (average of 3 readings)	Temp °C	Velocity m/s	Volumetric Flow Rate (actual) m^3/s	O_2 % Vol	Angle of Swirl °
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Mean	-	-	-	-	-	-	-	-

PRELIMINARY STACK SURVEY QUALITY ASSURANCE CHECKLIST

PITOT LEAK CHECK								
Run	Pre Traverse Leak Rate				Post Traverse Leak Rate			
	Start Value mmH2O	End Value mmH2O	Difference %	Outcome	Start Value mmH2O	End Value mmH2O	Difference %	Outcome
Run 1	118	120	-1.7	Pass	115	112	2.6	Pass

To complete a compliant pitot leak check a pressure of over 80 mmH_2O (or 800 Pa) is applied and the pressure drop monitored over 5 mins. A drop of less than 5% must be observed.

S-Type Pitot Stagnation Check				
Run	Stagnation (Pa)	Reference (Pa)	Difference (Pa)	Outcome (Permitted +/- 10 Pa)
Run 1	10	15	-5.0	Pass

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

PRELIMINARY STACK SURVEY (CONTINUED)

Sampling Plane Validation Criteria				
EA Technical Guidance Note (Monitoring) M1	Result	Units	Requirement	Compliant
Lowest Differential Pressure	13	Pa	>= 5 Pa	Yes
Lowest Gas Velocity	4.0	m/s	-	-
Highest Gas Velocity	4.7	m/s	-	-
Ratio of Gas Velocities	1.2	-	< 3 : 1	Yes
Maximum angle of flow with regard to duct axis	<15	°	< 15°	Yes
No local negative flow	Yes	-	-	Yes

Calculation of Stack Gas Velocity, V		
Velocity at Traverse Point, V = K_{pt} x (1-e) * O(2 * DP_{pt} / $P_{ActualW}$)		
Where: K_{pt} = Pitot tube calibration coefficient (1-e) = Compressibility correction factor, assumed at a constant 0.998		
Average Stack Gas Velocity, Va	**4.5**	m/s

Calculation of Stack Gas Volumetric Flowrate, Q			
Duct gas flow conditions	Actual	Reference	Units
Temperature	18	0	°C
Total Pressure	98.61	101.3	kPa
Oxygen	21.0	21	%
Moisture	0.16	0.00	%
Pitot tube calibration coefficient, K_{pt}	0.86		

Gas Volumetric Flowrate	Result	Units
Average Stack Gas Velocity (Va)	4.45	m/s
Stack Area (A)	1.23	m^2
Gas Volumetric Flowrate (Actual), Q_{Actual}	19668	m^3/hr
Gas Volumetric Flowrate (STP, Wet), Q_{STP}	17961	m^3/hr
Gas Volumetric Flowrate (STP, Dry), $Q_{STP,Dry}$	17933	m^3/hr
Gas Volumetric Flowrate (REF), Q_{Ref}	17933	m^3/hr

Where:
Q_{Actual} = Va x A x 3600
Q_{STP} = Q (Actual) x (Ts / Ta) x (Pa / Ps) x 3600
$Q_{STP,Dry}$ = Q (STP) / (100 - (100 / Ma)) x 3600
Q_{Ref} = Q (STP) x ((100 - Ma) / (100 - Ms)) x ((21 - O_2a) / (21 - O_2s))

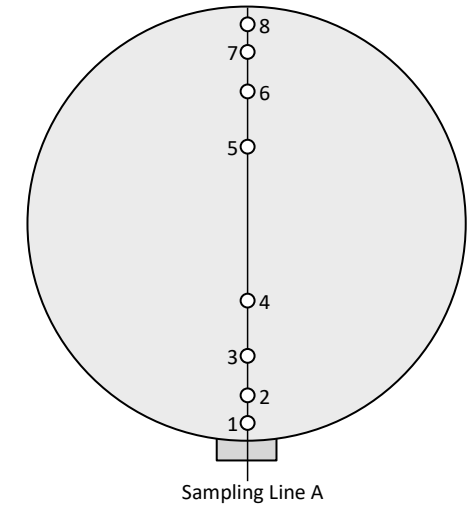
Nomenclature:
Ts = Absolute Temperature, Standard Conditions, 273 K
Ps = Absolute Pressure, Standard Conditions, 101.3 kPa
Ta = Absolute Temperature, Actual Conditions, K
Pa = Absolute Pressure, Actual Conditions, kPa
Ma = Water vapour, Actual Conditions, % Vol
Ms = Water vapour, Reference Conditions, % Vol
O_2a = Oxygen, Actual Conditions, % Vol
O_2s = Oxygen, Reference Conditions, % Vol

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

STACK DIAGRAM

	Value	Units
Stack Depth	1.25	m
Stack Width	-	m
Area	1.23	m^2

Non-Isokinetic/Gases Sampling			
Sampling Point	Distance (% of Depth)	Distance into Stack	Units
-	-	-	-



○ Isokinetic sampling point
● Isokinetic sampling points not used
◉ Non Isokinetic/Gases sampling point

Isokinetic Sampling			
Sampling Point	Distance (% of Depth)	Distance into Stack (m)	Swirl °
1	4.0	0.05	< 15
2	10.5	0.13	< 15
3	19.4	0.24	< 15
4	32.3	0.40	< 15
5	67.7	0.85	< 15
6	80.6	1.01	< 15
7	89.5	1.12	< 15
8	96.0	1.20	< 15
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

SAMPLING LOCATION

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - TOTAL PARTICULATE MATTER

Run	Sampled Volume	Sampled Gas Temp	Sampled Gas Pressure	Sampled Gas Humidity	Oxygen Content	Limit of Detection	Leak	Uncollected Mass
	m^3	K	kPa	% by volume	% by volume	% by mass	%	mg
MU required	**≤ 2%**	**≤ 2%**	**≤ 1%**	**≤ 1%**	**≤ 10%**	**≤ 5% of ELV**	**≤ 2%**	**≤ 10% of ELV**
Run 1	0.001	2.0	0.50	1.0	N/A	0.1800	-	-
as a %	0.16	0.69	0.51	1.0	N/A	N/A	0.00	N/A
compliant?	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**N/A**	**Yes**	**N/A**

Run	Volume (STP)	Mass of particulate	O_2 Correction	Leak	Uncollected Mass	Combined uncertainty
	m^3	mg	-	mg/m^3	mg	
Run 1	0.57	0.1800	1.0	0.000	0.0001	-
MU as mg/m^3	0.00	0.2872	-	0.000	0.0002	**0.29**
MU as %	1.33	100.0000	-	0.000	0.0577	-

R1 - Uncertainty expressed at a 95% confidence level (where k = 2)	**0.57**	**mg/m^3**	**200.02**	**% Result**	**N/A**	**% ELV**

(k is a coverage factor which gives a 95% confidence in the quoted figures)
Reference – SOCOTEC Technical Procedure AE150 Estimation of Uncertainty of Measurement

MEASUREMENT UNCERTAINTY BUDGET - MOISTURE

Run	Sampled Volume m^3	Sampled Gas Temp K	Sampled Gas Pressure kPa	Sampled Gas Humidity % by volume	Oxygen Content % by volume	Leak %
MU required	**≤ 2%**	**≤ 2%**	**≤ 1%**	**≤ 1%**	**≤ 10%**	**≤ 2%**
Run 1	0.001	2.0	0.50	1.0	N/A	-
as a %	0.16	0.69	0.51	1.0	N/A	0.00
compliant?	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**Yes**

Run	Volume (STP) m^3	Mass Gained mg	O_2 Correction -	Leak mg/m^3	Uncollected Mass mg	Combined uncertainty
Run 1	0.57	800	1.0	0.00	58	-
MU as % v/v	0.00	0.02	-	0.00	0.012	**0.02**
MU as %	1.33	12.50	-	0.00	7.22	-

R1 - Uncertainty expressed at a 95% confidence level (where k = 2)	**0.05**	**% v/v**	**28.99**	**%**

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - VELOCITY & VOLUMETRIC FLOW RATE

Measured Velocity at Actual Conditions	4.5	m/s
Measured Volumetric Flow rate at Actual Conditions	19668	m³/hr

Performance Characteristics & Source of Value	Units	Values	Requirement	Compliant
Uncertainty of Local Gas Velocity Determination				
Uncertainty of pitot tube coefficient	-	0.010		
Uncertainty of mean local dynamic pressures	-	0.38		
Factor loading, function of the number of measurements.	3 readings	0.591	minimum 3	Yes
Range of measurment device	pa	1000		
Resolution	pa	1.00		
Calibration uncertainty	pa	4.26	<1% of Value or 20 Pa whichever is greater	Yes
Drift	% range	0.10		
Linearity	% range	0.06	<2% of value	Yes
Uncertainty of gas density determination				
Uncertainty of molar mass determination	kg/mol	0.00003		
Uncertainty of temperature measurement	K	1.48	<1% of value	Yes
Uncertainty of absolute pressure in the duct	pa	503		
Uncertainty associated with the estimate of density	-	0.007		
Uncertainty associated with the measurement of local velocity	-	0.0001		
Uncertainty associated with the measurement of mean velocity	-	0.0002		

Measurement Uncertainty - Velocity	m/s
Combined uncertainty	0.06
Expanded uncertainty at a 95% Confidence Interval	0.11

Note - The expanded uncertainty uses a coverage factor of k = 2.

Expanded Measurement Uncertainty of Velocity at a 95% Confidence Interval	%
Expressed as a % of the Measured Velocity	1.3
Expanded uncertainty at a 95% Confidence Interval	2.6

Measurement Uncertainty Volumetric Flow Rate	m³/hr
Combined uncertainty	521
Expanded uncertainty at a 95% Confidence Interval	1022

Note - The expanded uncertainty uses a coverage factor of k = 2.

Expanded Measurement Uncertainty of Volumetric Flow Rate at a 95% Confidence Interval	%
Expressed as a % of the Measured Volumetric Flow Rate	2.7
Expanded uncertainty at a 95% Confidence Interval	5.2

Reference – SOCOTEC Technical Procedure AE150 Estimation of Uncertainty of Measurement

END OF REPORT

Thank you for choosing SOCOTEC for your environmental monitoring needs. We hope our services have met your requirements and that you are fully satisfied with your experience of working with us, we really do value your custom and would welcome your feedback. We would appreciate it if you could take a moment to complete a short online questionnaire so that we can improve our operations and address any areas that have not met with your expectations, by clicking on the following

https://www.surveymonkey.co.uk/r/CAE_customer_feedback_weblink

APPENDIX 7

NOISE MONITORING SURVEY
2020

Brendan O'Reilly
Durhamstown
Bohermeen
Navan
Co. Meath

Phone: 046-9073497
Mobile:087-8199010
Email: boreilly1@eircom.net

Noise and Vibration Consultants Ltd
Reg No: IE 8298170M
Principal: Brendan O'Reilly MPhil (Noise & Vibration) ISEE SFA EAA

Waste Licence Reg. No W0261-02

Noise Compliance Report
Panda Waste Services

Prepared For: Panda Waste Services
Cappagh Road
Finglas
Dublin 11

Report Prepared by; Brendan O'Reilly (November'20)

TABLE OF CONTENTS

Environmental Noise Survey at Panda Waste Services at Cappagh Rd

1.0 Introduction

This report deals with the noise monitoring requirement conditions of Panda Waste Services, Waste Licence No**.** W0261-02 located at Cappagh Rd, Finglas. The noise conditions of the licence are:

- Daytime dBA L_{Ar},T (30min) of 55 (defined as 07.00 to 19.00hrs)
- Evening dBA L_{Ar},T (30min) of 50 (defined as 19.00 to 23.00hrs)
- Night time dBA L_{eq}, T (15 to 30min) of 45 (defined as 23.00 to 07.00hrs)
- 1/3 Octave band analysis

There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise-sensitive location.

2.0 Noise Monitoring Survey

The noise survey was carried out in the environs surrounding the waste services facility and close to noise sensitive locations (NSL's) (see map attached). Monitoring was carried out at four locations to determine compliance with respect to NSL's and site boundary noise level limits. Weather condition during monitoring was dry with easterly wind speeds of 1-4m/s. The following conditions were adhered to in undertaking the survey:

- Measurement of noise levels from the works was undertaken using Type 1 instruments.
- Cognisance was taken of the EPA's Guidance Note for Noise (NG4).
- The survey was carried out in accordance with ISO 1996 Acoustics - Description and Measurement of Environmental Noise: Parts 1/2/3.
- Measurements were recorded when all mobile and fixed plant was operating.

2.1 Instrumentation Used

The following instrumentation was used in the noise assessment survey:

- Three Larson Davis LxT Sound Expert Precision Integrating Sound Level Analyser/Data logger with *Real-Time* Frequency Analyser Facility.
- One Larson Davis 831 Precision Integrating Sound Level Analyser/Data logger with *Real-Time* Frequency Analyser Facility incl.

- Wind Shields Type: Double Skinned Wind Screens.
- Calibration Type: Larson Davis Precision Acoustic Calibrator Model CAL250.

Details on Calibration Certification

Instrument/Model	Date of Calibration	Serial Number	Calibration By
L & D Sound Expert	25th Jan'19	0004570	MTS, England
L & D Sound Expert	25th Jan'19	0004643	MTS, England
L & D Sound Expert	25th Jan'19	0004647	MTS, England
L & D 831	24th June'19	0002904	MTS, England
L & D CAL200	26th Aug'20	18140	L& D, USA

NB All instruments have been calibrated with pre-amp and microphone, with certificates available on request

2.2 Measurement Procedure

Noise monitoring was carried out on 6th to 7th November 2020 during the day/evening and night-time periods (for 30-minute intervals) at four locations on-site. Location ANSL2 has been moved across the road to the Panda site (the derelict house at the old ANSL2 has been demolished). All the environmental noise analysers had data logging facilities set on real-time, the logged data was later downloaded via a personal computer using software. One-third octave frequency analysis was undertaken at the four locations using Precision Integrating Sound Level Analyser/Data logger with *real-time* frequency analyser facility.

The measurement locations were all away from reflecting surfaces and at 1.5m height above local ground. Measurements were carried with all plant in operation.

All acoustic instrumentation was calibrated before and after the survey period and no drift of calibration was observed.

Observations were made at each monitoring location to verify the contribution of noise from the activity and to quantify the levels of extraneous noise. The noise levels from the site closely corelated the L90 level at all locations.

2.3 Results of Noise Survey

The results of the noise survey (mean values) are given in Tables 1.0 to 4.0 while the 1/3 Octave frequency analysis data is given in graphical format in the attachment.

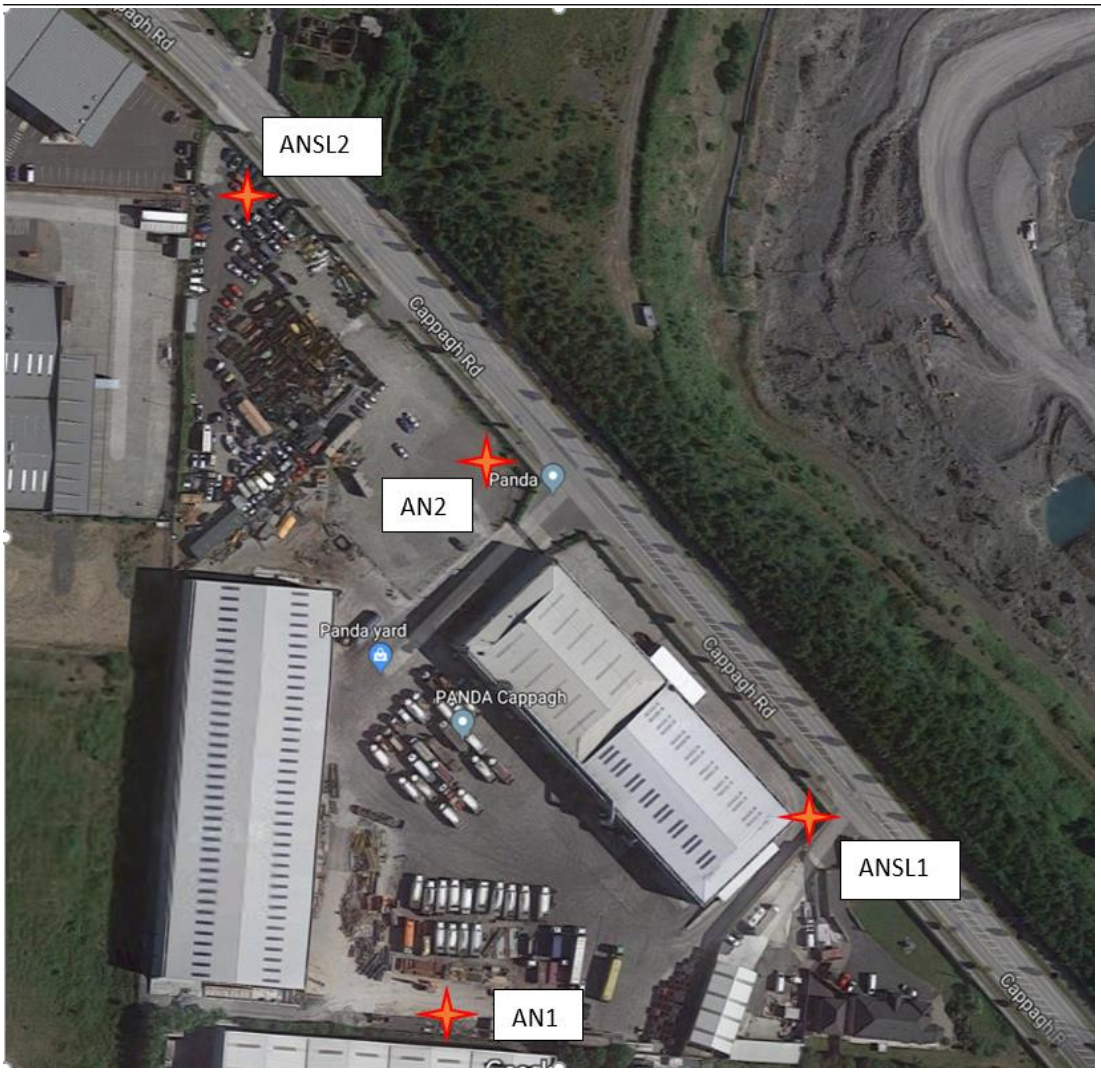


Figure 1: Noise monitoring locations

Table 1.0: Day, Evening and Night-time Noise Levels at 30-minute intervals

AN1	Day							
Date	**Time**	**Duration**	**LAeq**	**LAFmin**	**LAF10**	**LAF50**	**LAF90**	
2020-11-06	16:00:00	00:30:00.0	60.6	49.1	58.2	53.2	51.5	Vehicles close
2020-11-06	16:30:00	00:30:00.0	60.8	48.9	59.3	53.2	51.4	to monitor
2020-11-06	17:00:00	00:30:00.0	61.8	47.4	60.8	51.5	49.5	Waste less than 55dBA
		mean	61.1	48.5	59.4	52.6	50.8	
Evening								
2020-11-06	20:00:00	00:30:00.0	58.2	47.1	58.4	51.6	49.5	
2020-11-07	20:30:00	00:30:00.0	60.8	47.5	59.6	52.7	49.6	Waste less than 50dBA
		mean	59.5	47.3	59.0	52.2	49.6	
Night								
2020-11-07	02:00:00	00:30:00.0	55.3	39.7	53.1	45.5	43.2	
2020-11-07	02:30:00	00:30:00.0	52.7	37.6	48.0	44.5	41.6	Waste less than 45dBA
		mean	54.0	38.6	50.6	45.0	42.4	

Table 2.0: Day, Evening and Night-time Noise Levels at 30 minute intervals

AN2	Day							
Date	Time	Duration	LAeq	LAFmin	LAF10	LAF50	LAF90	
2020-11-06	16:30:00	00:30:00.0	66.5	52.6	70.8	60.2	54.9	Vehicles close
2020-11-06	17:00:00	00:30:00.0	66.4	51.7	71.0	59.5	54.8	to monitor
2020-11-06	17:30:00	00:30:00.0	65.2	51.0	69.5	57.4	52.9	Waste less than 55dBA
		mean	66.0	51.8	70.4	59.0	54.2	
Evening								
2020-11-06	19:30:00	00:30:00.0	64.1	45.9	63.1	50.7	48.5	
2020-11-06	20:00:00	00:30:00.0	63.4	47.2	62.0	51.5	49.9	Waste less than 50dBA
		mean	63.7	46.5	62.6	51.1	49.2	
Night								
2020-11-07	02:00:00	00:30:00.0	57.7	40.9	54.9	47.8	44.7	
2020-11-07	02:30:00	00:30:00.0	57.1	41.4	55.9	46.8	44.0	Waste less than 45dBA
		mean	57.4	41.1	55.4	47.3	44.4	

NB Location close to very busy road traffic route

Table 3.0: Day, Evening and Night-time Noise Levels at 30-minute intervals

ANS1	Day							
Date	Time	Duration	LAeq	LAFmin	LAF10	LAF50	LAF90	
2020-11-06	16:00:00	00:30:00.0	67.8	49.7	71.9	61.2	52.6	
2020-11-06	16:30:00	00:30:00.0	68.8	52.1	73.2	64.8	55.6	Mainly road traffic
2020-11-06	17:00:00	00:30:00.0	67.3	52.9	71.5	62.0	55.1	
		mean	68.0	51.5	72.2	62.7	54.4	Waste less than 55dBA
Evening								
2020-11-06	20:00:00	00:30:00.0	62.8	47.2	65.8	51.5	48.8	Mainly road traffic
2020-11-06	20:30:00	00:30:00.0	62.2	46.6	64.7	51.4	49.4	
		mean	62.5	46.9	65.3	51.5	49.1	Waste less than 50dBA
Night								
2020-11-07	02:00:00	00:30:00.0	61.4	43.1	55.7	46.5	44.9	
2020-11-07	02:30:00	00:30:00.0	55.4	42.3	50.2	46.6	44.8	
		mean	58.4	42.7	53.0	46.6	44.9	Waste less than 45dBA

NB Location ANSL1 close to a very busy road traffic route

Table 4.0: Evening and Night-time Noise Levels at 30-minute intervals

ANSL2	Day							
Date	Time	Duration	LAeq	LAFmin	LAF10	LAF50	LAF90	
2020-11-06	15:30:00	00:30:00.0	67.1	51.0	71.6	61.0	53.9	
2020-11-06	16:00:00	00:30:00.0	67.4	51.5	71.7	62.2	54.4	Mainly road traffic
2020-11-06	16:30:00	00:30:00.0	68.4	51.6	72.9	60.9	53.5	
		mean	67.6	51.4	72.1	61.4	53.9	Waste less than 55dBA
Evening								
2020-11-06	20:30:00	00:30:00.0	65.5	47.4	66.0	52.3	49.7	Mainly road traffic
2020-11-06	21:00:00	00:30:00.0	63.8	47.2	62.9	51.9	49.4	
		mean	64.7	47.3	64.5	52.1	49.6	Waste less than 50dBA
Night								
2020-11-07	01:30:00	00:30:00.0	55.4	42.6	50.5	46.5	44.8	
2020-11-07	02:00:00	00:30:00.0	57.4	41.2	48.0	44.7	43.0	
		mean	56.4	41.9	49.3	45.6	43.9	Waste less than 45dBA

NB Location ANSL2 alongside a busy road traffic route (house across road demolished)

3.0 Summary/Conclusion

The noise levels from the site closely corelated the L90 level at all locations. The noise emissions at all the NSL's on site boundary were within the terms of their noise emissions limits for day, evening and night.

There was no clearly audible tonal component or impulsive components in the noise emission from the activity at any noise sensitive locations.

There have been no noise nuisance complaints received relating to this operation.

ATTACHMENT

Night-time frequency data

Freq.	dB.
31.5	58.8
40	55.2
50	50.6
63	53.9
80	50.7
100	52.7
125	53.3
160	47.7
200	47.9
250	46.1
315	44.8
400	46.5
500	47.6
630	49.7
800	49.5
1000	49.2
1250	44.1
1600	39.6
2000	36.6
2500	34.4
3150	31.3
4000	26.7
5000	23.6
6300	20.4
8000	18.2
10000	16.8
12500	16.9
16000	17.6

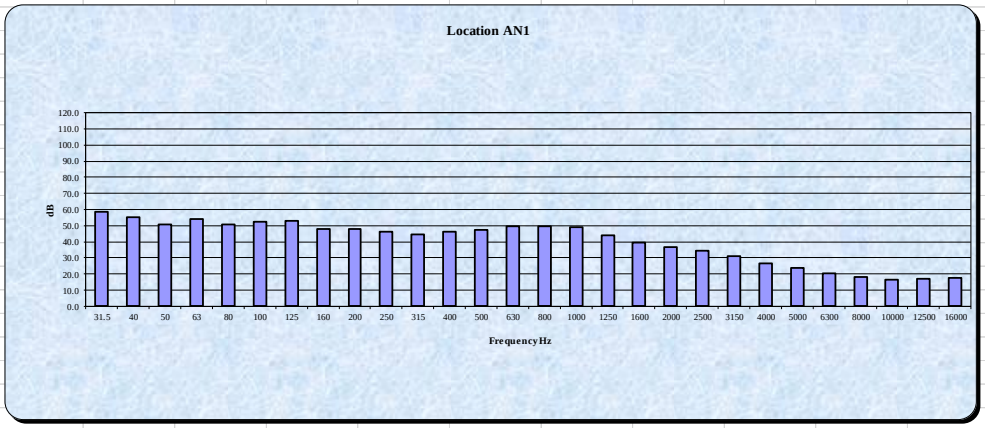


Plate 1

Freq.	dBZ
31.5	62.1
40	58.0
50	59.5
63	60.2
80	56.5
100	57.1
125	58.2
160	55.6
200	55.8
250	53.5
315	52.6
400	52.2
500	54.3
630	55.5
800	54.3
1000	52.4
1250	48.4
1600	44.5
2000	42.0
2500	39.2
3150	34.9
4000	31.4
5000	27.1
6300	22.5
8000	19.9
10000	17.6
12500	17.0
16000	16.7

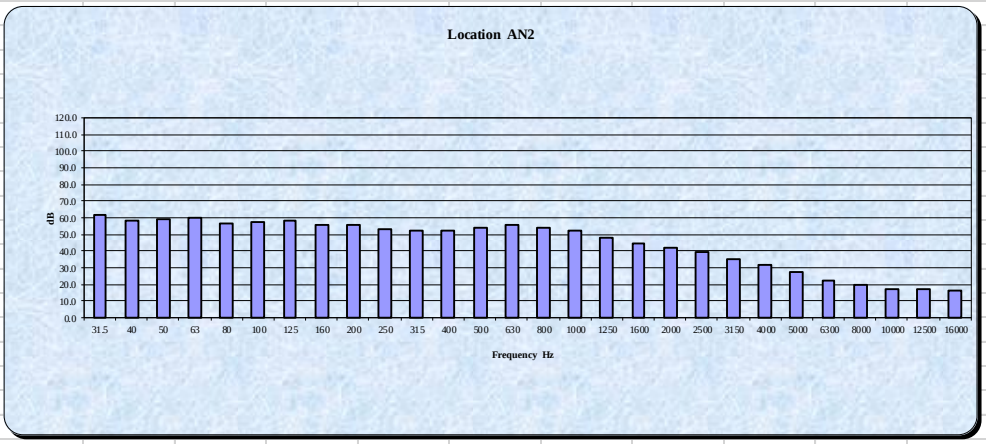


Plate 2

Freq.	dBZ.
31.5	56.5
40	59.2
50	53.7
63	54.6
80	57.7
100	47.4
125	48.2
160	51.1
200	51.4
250	47.5
315	48.6
400	48.2
500	49.5
630	50.1
800	48.1
1000	46.4
1250	45.3
1600	40.5
2000	37.2
2500	34.1
3150	30.2
4000	27.9
5000	26.1
6300	20.4
8000	17.0
10000	16.5
12500	15.5
16000	16.2

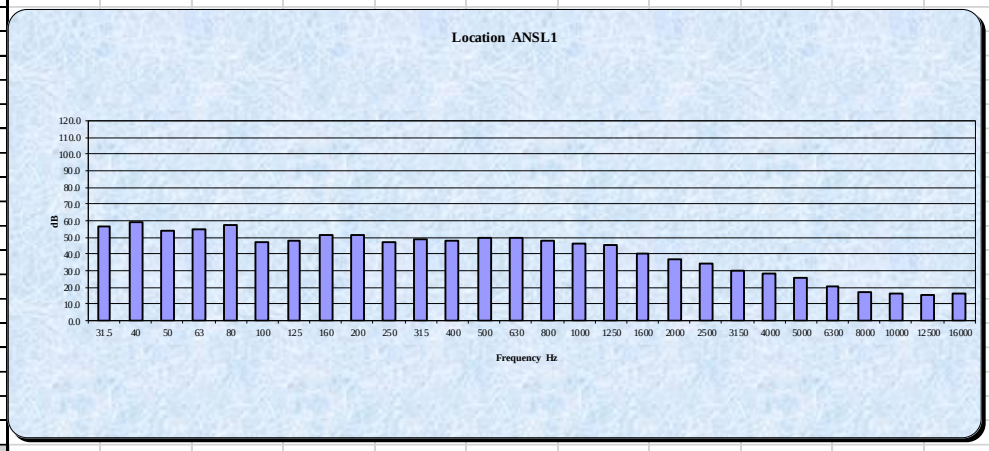


Plate 3

Freq.	dB.
31.5	56.2
40	58.9
50	52.9
63	49.0
80	56.5
100	43.6
125	44.1
160	44.6
200	45.8
250	45.7
315	43.7
400	44.2
500	44.1
630	45.6
800	48.8
1000	51.1
1250	46.8
1600	41.9
2000	37.4
2500	32.8
3150	28.4
4000	27.0
5000	25.4
6300	19.4
8000	15.6
10000	14.8
12500	15.3
16000	16.1

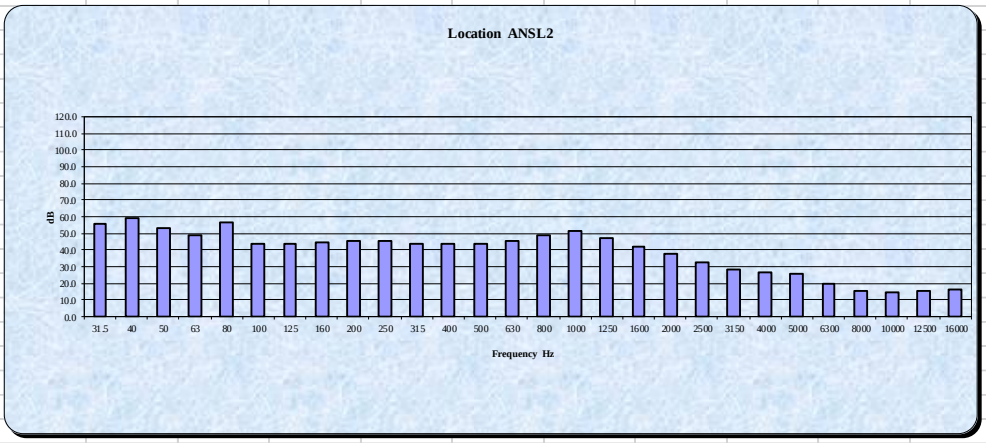


Plate 4

Location AN2

Location AN1

Location ANSL1

Location ANSL2