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Environmental Licensing Programme
Office of Environmental Sustainability

20th January 2023

Reg. No: W0261-03

Regulation 10(2)(b)(ii) of the EPA (Industrial Emissions) (Licensing) Regulations 2013, in respect of a licence review from Starrus Eco Holdings Limited for an installation located at Starrus Eco Holdings Limited (Cappagh), Cappagh Road, Finglas, Dublin 11, D11 NP68

Dear Ms Cope,

I refer to the Agency's letter dated 19th December 2022 in accordance with Regulation 10(2)(b)(ii) of the EPA (Industrial Emissions) (Licensing) Regulations 2013. The requested information is set out herein, with the EPA's requests in italics followed by the Starrus Eco Holdings Ltd (SEHL) response.

Waste *(Regulation 9(2)(t))*

1. *Provide details on the existing abatement and its capacity to handle the proposed increase in waste to be accepted at the installation. Confirm that there is sufficient storage at the installation for the raw materials, intermediates and products used or generated on the site and waste.*

Details of the existing abatement measures required by the current Licence are provided in Section 4.15 of Chapter 4 of the Environmental Impact Assessment Report (EIAR) that accompanies the application, with information on its capacity to handle the proposed increase in the wastes to be accepted provided in the Prevention & Mitigation Sections of Chapters 5 to 15 of the EIAR.

SEHL has prepared a Waste Storage Plan, as required by Condition 8.3 of the current Licence. The Plan identifies the waste types, storage locations, storage capacity and the maximum quantities of materials on site at any one time. The Plan is a dynamic document that is regularly updated to reflected operational changes and market conditions. A copy of the current Storage Plan is in Attachment A. The regulatory compliance site visits conducted by the Office of Environmental Enforcement (OEE) include an evaluation of compliance with the Storage Plan.

The primary reason for seeking the additional capacity is to allow for increased production of Solid Recovered Fuel (SRF) from the non-recyclable materials separated during the on and off-site mechanical treatment of municipal, commercial and industrial wastes. SRF is produced and consigned on a 'Just In Time' (JIT). In JIT operations, stockpiles at input or output do not increase, the only increase is in throughput.

SEHL confirms that there is sufficient storage at the installation for the raw materials, intermediates and products used or generated on the site and waste.

2. *Provide a copy of the waste acceptance procedures employed or to be employed at the installation.*

SEHL has prepared a documented Waste Acceptance Procedure that has regard to Condition 8.5 Waste Acceptance and Characterisation of the current Licence. A copy of the current Waste Acceptance Procedure is in Attachment B.

3. *Provide a precise breakdown of all wastes to be increased and accepted at the installation including list of waste (LoW) codes and tonnages.*

The waste types accepted at the installation, the LoW codes and proposed tonnages are listed in Attachment C. The installation accepts waste types not listed in Table A.1 of Schedule A.2 in the current Licence. All of the additional waste types have been approved by the OEE, as required by Note 1 to the Schedule. It should be noted that the proposed tonnages assigned to each waste type are estimates and the actual quantity accepted in any one year will be based on market conditions, as approved by Note 2 to the Schedule. SEHL records all of the waste types and quantities accepted at the installation and maintains the records for inspection by the OEE.

Odour *(Regulation 9(2)(k))*

4. *Provide an odour assessment to determine the impact of odour emissions from your installation. Ensure that all modelling input parameters are in accordance with the EPA (2020) OEE Air Dispersion Modelling Guidance Note (AG4) 2020.*

Map *(Regulation 9(4)(d))*

The OEE Air Dispersion Modelling Guidance Note (AG4) issued in 2010 was revised in 2020 to *inter alia* update the guidance on odour impact to reflect the contents of Air Guidance Note AG9 : Odour Emissions Guidance Note (2019).

Section 3.3.1 of AG 9 discusses relevant odour standards. It notes that currently there is no general odour standard in Ireland relating to industrial installations. It states that the EPA has issued guidance to specific intensive agriculture, which outlines a range of standards. The most stringent target value applies to new pig production units and is 1.5OUe/m^3 as a 98%ile of one hour averaging periods.

Section 3.3.2 of AG9 describes the approved air dispersion models, which are ADMS and AERMOD. The Guidance states that an appropriate odour guideline value should be selected depending on the offensiveness of the odour and that good professional judgement should be applied in selecting an appropriate odour assessment criterion

The Guidance also states that compliance with the indicative odour standard, confirmed through modelling, does not reduce a licensee's requirement to ensure that the activity does not cause nuisance and that odour management should be proactive and may require additional measures to ensure the activity is in compliance with their licence.

The sections of the AG 9 relating to modelling, including the relevant odour target values and types of air dispersion models, are described in Appendix H of AG4 (2020).

It is not proposed to change the existing odour control system described in Section 4.15.3 of the EIAR. The system comprises negative air extraction, a dust filter and a carbon filter odour control unit (OCU) and was installed in 2015. The installation of the system was the subject of a Specified Engineering Works (SEW) submission, as required by Condition 3.23 and Schedule E of the current Licence.

The odour impact assessment report completed to determine the impact of odour emissions from the installation and submitted with the SEW is in Attachment D. The modelling was completed using the AERMOD model and the most stringent odour target value of 1.5 OUe/m^3 at the 98th percentile, both of which are recommended in AG 9 (2019) and AG 4 (2020). The 1.5 OUe/m^3 target value was selected, based on professional judgement, to represent 'worst case' scenario.

Following the commissioning of the odour control unit, SEHL prepared and implemented the Test Programme required by Condition 6.1 of the current Licence and this was approved by the OEE.

SEHL, in accordance with the guidance in AG9 and Condition 6.16.3 of the current Licence, takes a proactive approach to odour management. SHEL has completed an odour assessment of the installation operations and prepared an Odour Management Plan, which is subject to regular review. A copy of the current Odour Management Plan is in Attachment E.

5. *Provide a map of the installation that clearly identifies all the emission points on-site (e.g. storm water, air and dust monitoring locations).*

A Figure showing the emission points and monitoring locations authorised by the current Licence is in Attachment F. The proposed increase in waste processing will not result in any new emission points.

In addition to the above, please also provide an updated non-technical summary (Application Form, and EIAR where applicable) to reflect the information provided in your reply, insofar as that information impinges on the non-technical summary.

The information provided in the response does not impinge on the non-technical summary.

Yours faithfully

Jim O'Callaghan

ATTACHMENT A


Intake Pit
C&I waste
Residual waste
foam
Compactor Off Loading
Unpicked C&I
Fe+
non-fe+
al+
fines 1
lights
heavies
>5m
metal
optical rejects
fire camera
lagen material
SRF Pile 1
SRF Baler
SRF pile 2
SRF
Tipping Area
hard plastic
film
Plastic Baler
OINP/ Cardboard
2ND Grade newspaper
OINP Bales
2nd grade newspaper bales
hangers
bagged hanger
plastic/ cardboard bales
cardboard
QA
Baler
DMR
Food waste
Loading Pit
5 m fire break
2 hr fire wall
finished cardboard bales
attentuation tank
manual shut off valve

Area	EWC Code	Limit Tonnage	Holding Period for Waste	Max Stockpile Size m
Shed A1/A2				
Shed A1 - IPR				
Tipping Area	N/A	N/A	N/A	10m x 10m x 6m
Hangers	15 01 02	15	2 days	5m x 5m x one pallet high
film	15 01 02	60	2 days	8m x 10m x 6m
hardplastic	15 01 02	60	2 days	8m x 10m x 6m
Cardboard 1/OINP	15 01 01	60	2 days	8m x 10m x 6m
2nd grade newspaper	15 01 01	60	2 days	8m x 10m x 6m
Shed A2 - IPR				
Clean Dolav Storage	N/A	N/A	N/A	6m x 10m x 4 dolav high
2nd grade newspaper bales	15 01 06	50	2 days	8m x 10m x 6m
Bagged Hangers	15 01 02	25	10 days/Enough until a load	8m x 10m x 6m
Cardboard 1/OINP	15 01 01	100	2 days	2 x (6m x 10m x 6m)
plastic bales	15 01 02	50	2 days	8m x 10m x 6m
Shed A2 - Food Surplus Shed				
Tipping Area	N/A	N/A	N/A	10m x 5m x 6m
Dry Mixed Recyclables	20 03 01	100	5 days	6m x 6m x 6m
MFW	20 01 08	30	2 day	6m x 6m x 6m
Settlement Tank for Sludge	20 01 08	15,000 litres	Enough until a load	15,000 litres
Shed B1				
C&I Waste (Pit) *if no 19 05 01 material is present, then the pit shall contain 200 tonne 19 12 12	19 12 12	150	1 day	12m x 12m x 6m
	19 05 01	50	1 day	12m x 12m x 6m
C&I Unpicked (Side Wall)	19 12 12	20	1 day	4m x 4m x 4m
Tyres	16 01 03	5	Enough until a load	1 x Standard Skip
Fines 1	19 12 12	80	2-3 days	10m 5m x 4m
Fines 2	19 12 12	40	2-3 days	10m x 10m x 6m
Hard Plastics	15 01 02	20	2-3 days	1 x RORO Skip
Steel Skip (2)	20 01 40	20	7 days	2 x Standard Skip
Steel 2	20 01 40	20	7 days	4m x 2m x 2m
Steel 3	20 01 40	20	7 days	4m x 2m x 2m
Aluminium 1	20 01 40	20	7 days	8m x 5m x 4m
Aluminium 2	20 01 40	20	7 days	6m x 6m x 6m
Heavies 1	19 12 12	50	1-2 days	10m x 10m x 6m
Heavies 2	19 12 12	50	1-2 days	10m x 10m x 6m
Heavies 3	19 12 12	50	1-2 days	10m x 10m x 6m
Optical Rejects 1	19 12 12	50	2-3 days	10m x 14m x 6m
Optical Rejects 2	19 12 12	50	2-3 days	10m x 14m x 6m
Pre Shred 1 (Lagans)	19 12 12	80	1-2 days	10m x 8m x 6m
Pre Shred 2 (Lagans)	19 12 12	80	1-2 days	10m x 8m x 6m
SRF 1	19 12 10	100	2-3 days	16m x 20m x 6m
SRF 2	19 12 10	100	2-3 days	12m x 12m x 6m
SRF 3	19 12 10	100	2-3 days	14m x 10m x 6m
Outside Storage				
Gas Cylinders	16 05 04	1	Enough until a load	Gas Cylinder Storage Cage
Timber (pallets)	15 01 03	20	4 days/Enough for a load	12m x 25m x 6m
cardboard bales	15 01 01	500	3 weeks	27m x 10m x 4m

ATTACHMENT B

EP-05 Waste Acceptance Procedure

1. Purpose

The purpose of this document is to outline the process for the acceptance of waste at Greenstar sites in accordance with the site specific Waste Licence/Permit and current Waste Management legislation.

2. Scope

This procedure applies to all Greenstar activities as listed in the scope of certification.

3. Responsibility

- The **Operations/Facility Manager** has ultimate responsibility for the acceptance of waste, in accordance with the site specific Waste Licence/Permit and documentation of the associated records.
- The **Environmental Engineer** may provide advice and assistance as appropriate.

4. References

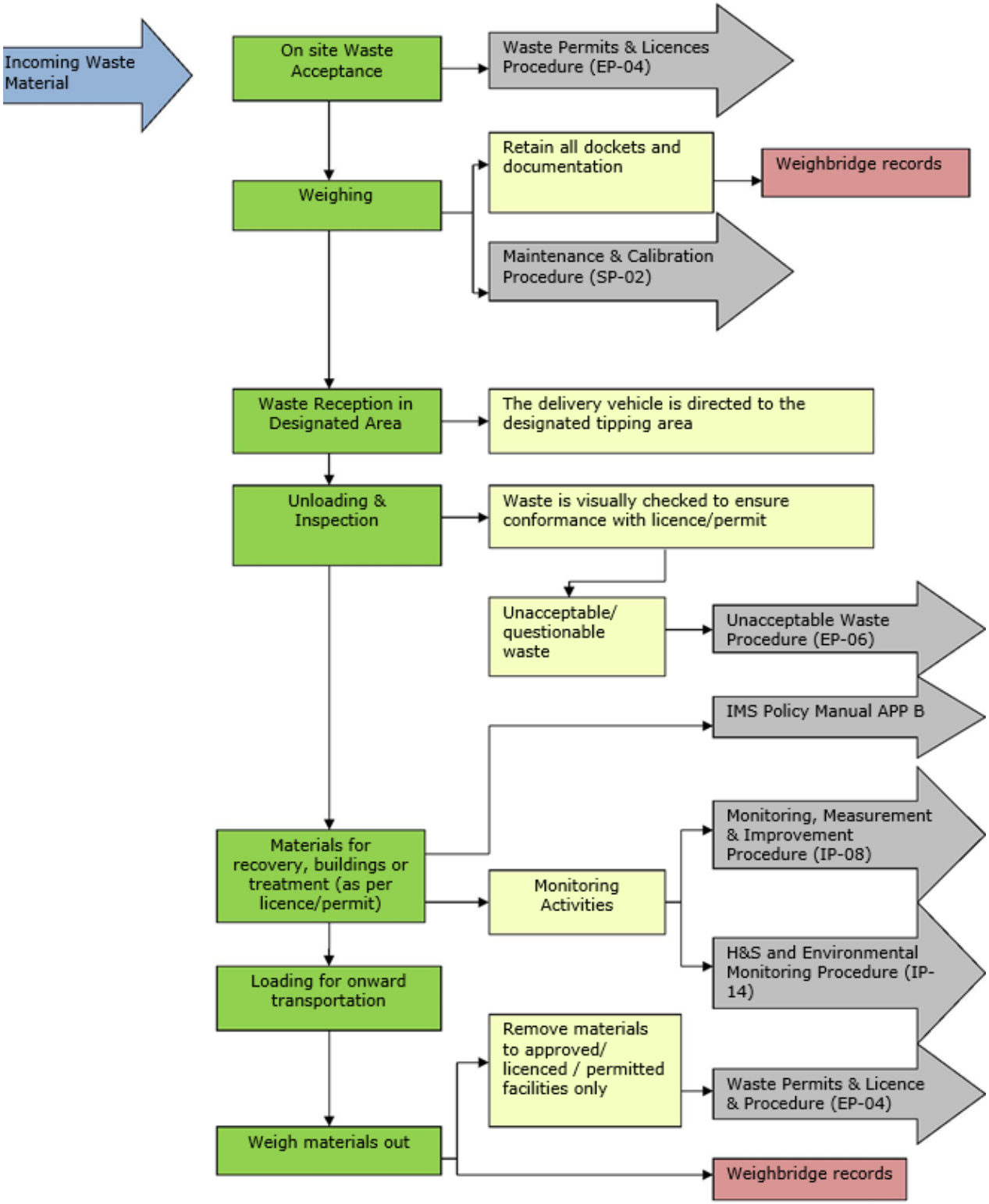
Documents

IP-01 Document & Record Control Procedure
IP-08 Monitoring, Measurement & Improvement Procedure
IP-14 Health & Safety & Environmental Monitoring
SP-02 Maintenance & Calibration Procedure
EP-04 Waste Permits & Licences Procedure
EP-06 Unacceptable Waste Procedure
EP-08 Waste Processing Procedure
Site Specific Waste Licence/Permit
IMS Policy Manual Appendix B

Records

Weighbridge Records
Permit/Licences File

5. PROCEDURE


Incoming Waste Material
On site Waste Acceptance
Waste Permits & Licences Procedure (EP-04)
Weighing
Retain all dockets and documentation
Weighbridge records
Maintenance & Calibration Procedure (SP-02)
Waste Reception in Designated Area
The delivery vehicle is directed to the designated tipping area
Unloading & Inspection
Waste is visually checked to ensure conformance with licence/permit
Unacceptable/ questionable waste
Unacceptable Waste Procedure (EP-06)
IMS Policy Manual APP B
Materials for recovery, buildings or treatment (as per licence/permit)
Monitoring Activities
Monitoring, Measurement & Improvement Procedure (IP-08)
H&S and Environmental Monitoring Procedure (IP-14)
Loading for onward transportation
Remove materials to approved/ licenced / permitted facilities only
Waste Permits & Licence & Procedure (EP-04)
Weigh materials out
Weighbridge records

ATTACHMENT C

Proposed Tonnages

LoW Code	Description	Maximum Tonnes /Year
02 02 03	wastes from the preparation and processing of meat, fish and other foods of animal origins	500
02 03 04	wastes from fruit, vegetable, cereals, etc	500
02 05 01	waste from dairy products industry	500
02 06 01	waste from baking and confectionary industry	500
02 07 04	Waste from prod of alcoholic and non-alcoholic beverages	500
15 01 01	Paper and Cardboard	45,000
15 01 02	Plastic Packaging	32,000
15 01 03	Wooden Packaging	1,000
15 01 04	Metallic Packaging	500
15 01 05	Composite Packaging	500
15 01 06	Mixed Packaging	500
15 01 07	Glass Packaging	1,000
16 01 03	Tyres	200
16 03 36	Off Spec Batches and unused products	2,000
17 01 07	Mix of Concrete, Bricks, Tiles and Ceramics	500
17 02 01	C&D Wastes - Wood	500
17 02 03	C&D Wastes - Plastic	200
17 02 04	C&D Wastes - glass, plastic and wood containing or contaminated with dangerous substances	100
17 04 06	Metals - tin	500
17 04 07	C&D Wastes - mixed metals	300

17 05 04	Soil and Stones	300
17 08 02	Gypsum Based Construction Materials	200
17 09 04	Mixed Construction and Demolition Waste	200
19 12 02	Ferrous Metal	1,000
19 12 12	SRF	25,000
19 12 12	Other wastes from Mechanical Treatment	140,500
20 01 02	Paper and Cardboard	15,000
20 01 02	Glass	500
20 01 08	Biodegradable Kitchen and Canteen Waste	30,000
20 01 38	wood other than mentioned in 20 03 07	1,000
20 01 39	Plastic Waste	10,000
20 01 40	Metals	1,000
20 02 01	Municipal Wastes- garden and parks	1,000
20 03 01	Dry Mixed Recyclables	40,000
20 03 01	Municipal Solid Waste	30,000
20 03 02	Municipal Waste –wastes from markets	1,000
20 03 07	Bulky Waste	65,000
		450,000

ATTACHMENT D

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DESKTOP ODOUR IMPACT ASSESSMENT OF PROPOSED ODOUR CONTROL SYSTEM TO BE INSTALLED IN PANDA WASTE SERVICES LTD, CAPPAGH RD, FINGLAS, DUBLIN 11

PERFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF PANDA WASTE SERVICES

REFERENCE NUMBER:	2015142(1)
ATTENTION:	Mr. Alan Friel
PREPARED BY:	Dr. Brian Sheridan
DATE:	11th May 2015
DOCUMENT VERSION:	Document Ver.001
Licence:	W00261-01

TABLE OF CONTENTS

This document is submitted as assessment information for the installation of an odour control system.

Respectively submitted,

Brian Sheridan B.Sc. M.Sc. (Agr) Ph.D (Eng).

For and on behalf of Odour Monitoring Ireland™

Document Amendment Record

Client: ***Panda Waste Services***

Project: Desktop odour impact assessment of proposed odour control system to be installed in Panda Waste Services, Cappagh Rd, Finglas, Dublin 11.

Project Number: 2015142(1)			**Document Reference:** Desktop odour impact assessment of proposed odour control system to be installed in Panda Waste Services, Cappagh Rd, Finglas, Dublin 11.		
2015142(1)	Document for review	JWC	BAS	JWC	11/05/2015
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

Executive summary

Odour Monitoring Ireland was commissioned by Panda Waste Services Ltd to perform a desktop odour impact assessment of the proposed odour control system to be installed on the waste transfer station to be located in Panda Waste Services, Cappagh Rd, Finglas, Dublin 11. Details and specifics describing the odour control system are contained in supporting information provided by the client.

The main aims of the study were to assess if the proposed odour control system would minimise odour impact in the vicinity of the proposed facility.

This document will provide information on the following:

- The expected odour treatment levels including the expected odour emission concentration from the proposed odour control system.
- Odour dispersion modelling of emissions from the stack and projected ground level concentrations as a result of operating the odour control system.

It was concluded from the study that:

- The proposed odour control system will treat approximately 45,936 m^3 [odourous air]/hr.
- The maximum proposed odour emission rate expected from the odour control system will be 5,903 Ou_E/s with a maximum odour concentration of 460 Ou_E/m^3 in the exhaust gas.
- Following detailed dispersion modelling assessment using AERMOD Prime (12345), all GLC's predicted at receptor locations at or beyond the facility boundary will be less than 1.50 Ou_E/m^3 at the 98^{th} percentile of hourly averages over 5 years of screened hourly sequential meteorological data.

1. Introduction and scope

1.1 Introduction

Odour Monitoring Ireland was commissioned by Panda Waste Services Ltd to perform a desktop odour impact assessment of the proposed odour control system to be located in Panda Waste Services, Cappagh Rd, Finglas, Dublin 11.

This document presents the materials and methods, results, discussion of results, conclusions gathered throughout this desktop study.

The results conclude that the proposed odour control system will be adequate in minimising odours at or beyond the facility boundary with all predicted ground level concentrations of odour less than 1.50 Ou_E/m^3 at the 98^{th} percentile of hourly averages for 5 years of screened data.

1.2 Scope of the work

The main aims of the study were as follows:

- Provide data on the expected odour treatment levels including the expected odour emission concentration from the odour control system.
- To perform an odour dispersion modelling assessment to illustrate that the odour treatment system will not result in an odour impact at or beyond the boundary of the facility.

2. Materials and methods

2.1 Odour emission rate calculation

The odour emission rate calculation was performed using data gathered from information supplied by the client.

The total volume of air to be treated in the proposed odour control system is 45,936 m^3/hr or 12.76 m^3/s.

The guaranteed exhaust odour threshold concentration to be achieved on the odour control system exhaust is less than or equal to 460 Ou_E/m^3.

The building will be sealed to an integrity / building envelope leakage of less than or equal to 2 m^3/m^3/hr. Based on this value, the maximum extraction rate required to maintain the building under negative pressure is 8,720 m^3/hr (leakage rate by the total building envelope surface area).

The total volume of the building is 22,968 m^3 void volume. Based on an overriding requirement for comfort conditions inside the building for workers, the total extraction rate will be 45,936 m^3/hr thereby providing 2 AC/hr.

This is in excess of the building leakage rate so negative pressure will be maintained on the building envelope which in turn will prevent odour leakage from the building under a wind pressure in excess of 50 Pa minimum.

The maximum total odour emission rate as a result of operating the odour control system will be 5,903 Ou_E/s (Volume flow rate by the guaranteed odour threshold concentration).

2.2 Dispersion modelling

Any material discharged into the atmosphere is carried along by the wind and diluted by the turbulence, which is always present in the atmosphere. This dispersion process has the effect of producing a plume of polluted air that is roughly cone shaped with the apex towards the source and can be mathematically described by the Gaussian equation (Carney and Dodd, 1989). Atmospheric dispersion modelling has been applied to the assessment and control of odours for many years, originally using Gaussian form ISC (Industrial Source Complex) (Keddie et al., 1980) and more recently utilising advanced boundary-layer physics models such as ADMS (Atmospheric Dispersion Modelling Software) and AERMOD. Once the odour emission rate from the source is known, Ou_E s^{-1}, the impact on the vicinity can be estimated.

These models can be applied to facilities in three different ways:

1. To assess the dispersion of odours and to correlate with complaints;
2. To estimate which source is causing greatest impact;
3. In a “reverse” mode, to estimate the maximum odour emissions which can be permitted from a site in order to prevent odour complaints occurring (Zannetti, 1990; McIntyre et al., 2000; Sheridan, 2002).

In this latter mode, models can be employed to predetermine the amount of abatement required to prevent odour complaints, therefore reducing capital investment in abatement technologies (Sheridan et al., 2001).

2.3 Meteorological Data

Five years worth of hourly sequential meteorology data representative of the area will be used for the operation of Aermod Prime. This will allow for the determination of the worst-case scenario for the overall impact of odour emissions from the facility on the surrounding vicinity.

Odour Monitoring Ireland currently has licensed met data for the existing site. Dublin Airport 2002 to 2006 inclusive was used.

2.4 Terrain Data

There are no topographical features in the vicinity of the facility with the surrounding terrain relatively flat and less than half the actual stack height. Based on this, simple terrain prevails and therefore no topographical data was included in the model. Building wakes affects were accounted for within the dispersion modelling assessment through the use of the Prime algorithm.

2.5 Dispersion models used

For this study BREEZE AERMOD Prime (12345) was used.

2.5.1 AERMOD Prime

The AERMOD model was developed through a formal collaboration between the American Meteorological Society (AMS) and U.S. Environmental Protection Agency (U.S. EPA). AERMOD is a Gaussian plume model and replaced the ISC3 model in demonstrating compliance with the National Ambient Air Quality Standards (Porter et al., 2003) AERMIC (USEPA and AMS working group) is emphasizing development of a platform that includes air turbulence structure, scaling, and concepts; treatment of both surface and elevated sources; and simple and complex terrain. The modelling platform system has three main components: AERMOD, which is the air dispersion model; AERMET, a meteorological data pre-processor; and AERMAP, a terrain data pre-processor (Cora and Hung, 2003).

AERMOD is a Gaussian steady-state model which was developed with the main intention of superseding ISCST3 (NZME, 2002). The AERMOD modeling system is a significant departure from ISCST3 in that it is based on a theoretical understanding of the atmosphere rather than depend on empirical derived values. The dispersion environment is characterized by turbulence theory that defines convective (daytime) and stable (nocturnal) boundary layers instead of the stability categories in ISCST3. Dispersion coefficients derived from turbulence theories are not based on sampling data or a specific averaging period. AERMOD was especially designed to support the U.S. EPA's regulatory modeling programs (Porter at al., 2003)

Special features of AERMOD include its ability to treat the vertical in-homogeneity of the planetary boundary layer, special treatment of surface releases, irregularly-shaped area sources, a three plume model for the convective boundary layer, limitation of vertical mixing in the stable boundary layer, and fixing the reflecting surface at the stack base (Curran et al., 2006). A treatment of dispersion in the presence of intermediate and complex terrain is used that improves on that currently in use in ISCST3 and other models, yet without the complexity of the Complex Terrain Dispersion Model-Plus (CTDMPLUS) (Diosey et al., 2002).

2.6 Model assumptions

The approach adopted in this assessment is considered a worst-case investigation in respect of emissions to the atmosphere from the proposed scheduled emission point to be located within the operational plant. These predictions are therefore most likely to overestimate the GLC's that may actually occur for each modelled scenario. The assumptions are summarised and include:

1. All emissions were assumed to occur at maximum potential emission concentration and mass emission rates for each scenario and were assumed to occur for 100% of an operating year, simultaneously.

2. Five years of hourly sequential meteorological data from Dublin airport inclusive was used in the modelling screen which will provide statistical significant results in terms of the short and long term assessment. The worst case year 2004 was used for data analysis; this is in keeping with guidance presented in Environment Agency and Irish EPA publications. In addition, AERMOD incorporates a meteorological pre-processor AERMET PRO. The AERMET PRO meteorological pre-processor requires the input of surface characteristics, including surface roughness (z0), Bowen Ratio and Albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of Albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc.) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the meteorological station for Bowen Ratio and Albedo and to a distance of 1km for surface roughness in line with USEPA recommendations.
3. AERMOD Prime (12345) dispersion modelling was utilised throughout the assessment in order to provide the most conservative dispersion estimates;
4. All building wake affects were assessed within the dispersion model and taken into account within the assessment;
5. All receptors were established at normal breathing height of 1.8 m above ground level.

2.7 Odour impact criteria

An odour impact criterion of less than or equal 1.50 Ou_E m^{-3} at the 98^{th} percentile was used for the odour impact assessment criterion in this instance.

3. Results

This section will present the results obtained during the survey.

3.1 Emission point characteristics and Dispersion modelling results

Table 3.1 presents the overall exhaust stream and source characteristics used within the dispersion modelling assessment. This data is inputted into the dispersion model whereby maximum downwind ground level concentrations (GLC's) of odour are predicted for 5 years of screened hourly sequential meteorological data (Dublin 2002 to 2006 inclusive). The 11.9 metre high recycling buildings throughout the site were incorporated into the dispersion model in order to take into account any building wake affects. Maximum ground level concentrations of odours are presented in tabular format in *Table 3.2*.

Table 3.1. Overall exhaust stream characteristics of odour control system located in Panda Waste Services Ltd and input data for dispersion model.

Identity	Exhaust stack characteristics for A2-1
X coordinate (m)	310520
Y coordinate (m)	240433
Stack base level (m)	2
Average outlet odour concentration for A2-1 (Ou_E/m^3)	460
Average Volumetric airflow rate for A2-1 (m^3/s)	12.76
Average Odour emission rate for A2-1 (Ou_E/s)	5,903
Average Exhaust air stream temperature (K)	293
Stack height for A2-1 (m)	14
Diameter of exit area for A2-1 (m)	1.0
Exit area for A2-1 (m^2)	0.7855
Efflux velocity A2-1 (m/s)	16.25
Breathing level of sensitive receptors (m)	1.80
Recycling building height above ground level (m)	2

Table 3.2 illustrates comparison of the predicted ground level concentrations and the proposed limit ground level concentration at the 98th percentile of hourly averages at or beyond the boundary of the facility. As can be observed, the predicted ground level concentrations are within the proposed limit values. In addition, *Appendix I* illustrate the odour contours generated by the dispersion model for the 98th percentile of hourly averages for 5 years of screened hourly sequential meteorological data.

Table 3.2. Predicted ground level concentrations using AERMOD Prime dispersion model.

Model used	Maximum GLC at the 98th percentile value at or beyond the facility boundary (Ou_E/m^3)	Limit values
AERMOD Prime (12345)	1.40	≤1.50 Ou_E m^{-3} at the 98th percentile

In addition to *Table 3.2*, odour contour plots are presented in *Appendix I* in order to allow visual interpretation of odour plume spread.

As can be observed the predicted maximum ground level concentrations of odour in the vicinity of the facility are in compliance with the odour impact criterion of less than or equal to 1.50 Ou_E/m^3 at the 98th percentile of hourly averages for 5 years of screened meteorological data.

4. Discussion of results

This section will describe the results obtained during the study.

4.1 Operational parameters

- The odour control system will treat approximately 45,936 Nm^3 [odourous air]/hr.

4.2 Odour emission rate of odour control system

- The average odour emission rate from the odour control system will be no greater than 5,903 Ou_E/s.
- The system will be expected to achieve an odour removal efficiency of between 75% to 95%.
- There is no predicted odour impact from the odour control system exhaust stack with all ground level odour concentrations less than 1.40 Ou_E/m^3 at the 98th percentile of hourly averages over 5 years of screened hourly sequential meteorological data.

5. Conclusions

The following conclusions were drawn:

1. The odour emission rate calculation was performed using data gathered from information provided by the client.
2. The total volume of air to be treated in the proposed odour control system was 45,936 m^3/hr or 12.76 m^3/s.
3. The guaranteed exhaust odour threshold concentration to be achieved on the odour control system exhaust is less than or equal to 460 Ou_E/m^3.
4. The building will be sealed to an integrity / building envelope leakage of less than or equal to 2 $m^3/m^3/hr$. Based on this value, the maximum extraction rate required to maintain the building under negative pressure is 8,720 m^3/hr (leakage rate by the total building envelope surface area).
5. The total volume of the building is 22,968 m^3 void volume. Based on an overriding requirement for comfort conditions inside the building for workers, the total extraction rate will be 45,936 m^3/hr thereby providing 2 AC/hr.
6. This is in excess of the building leakage rate so negative pressure will be maintained on the building envelope which in turn will prevent odour leakage from the building under a wind pressure in excess of 50 Pa minimum.
7. The maximum total odour emission rate as a result of operating the odour control system will be 5,903 Ou_E/s (Volume flow rate by the guaranteed odour threshold concentration).
8. The system will be expected to achieve an odour removal efficiency of between 75% to 95%.
9. There is no predicted odour impact from the odour control system exhaust stack with all ground level odour concentrations less than 1.40 Ou_E/m^3 at the 98th percentile of hourly averages over 5 years of screened hourly sequential meteorological data.

6. *Appendix I* – Desktop Odour Contour plots for the proposed odour control system to be installed in Panda Waste Services

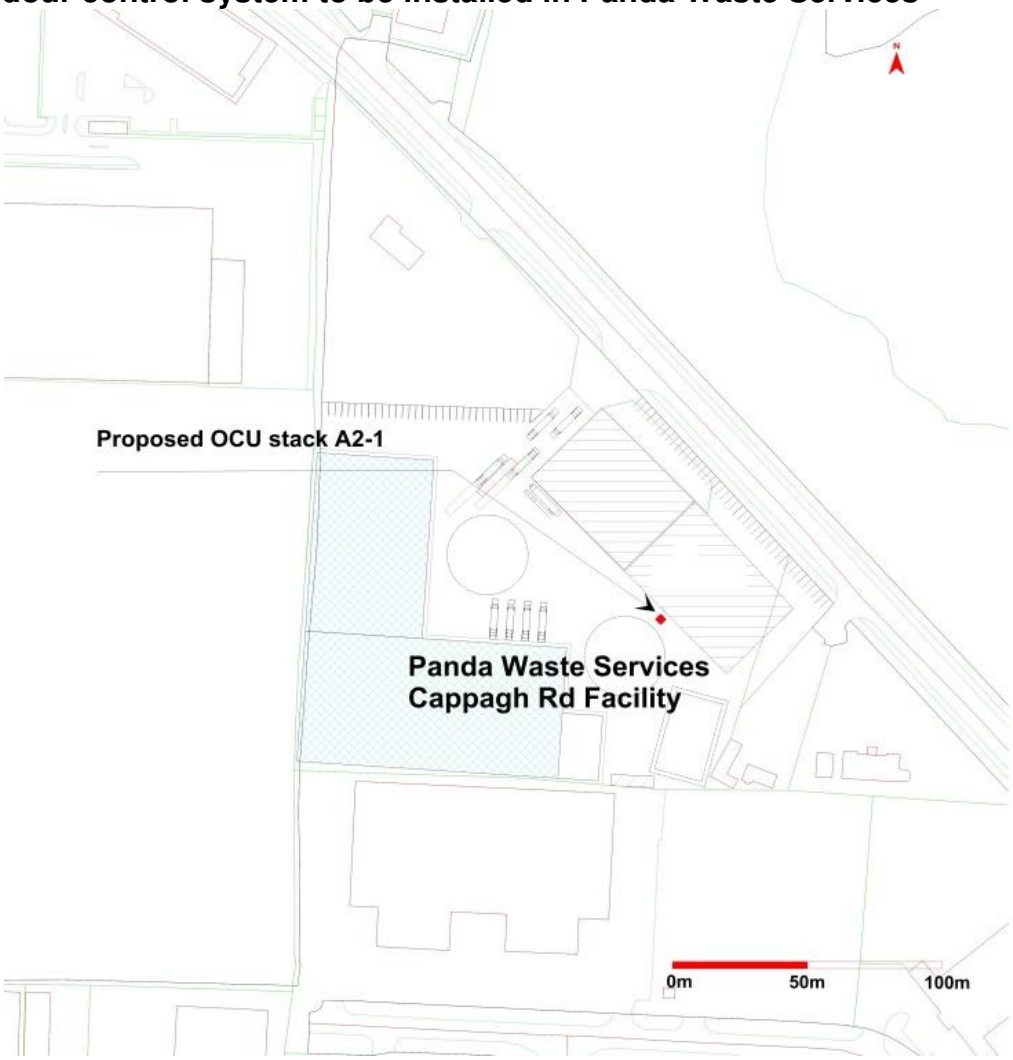


Figure 6.1. Schematic of Panda Waste Services site location and odour control stack location (•).

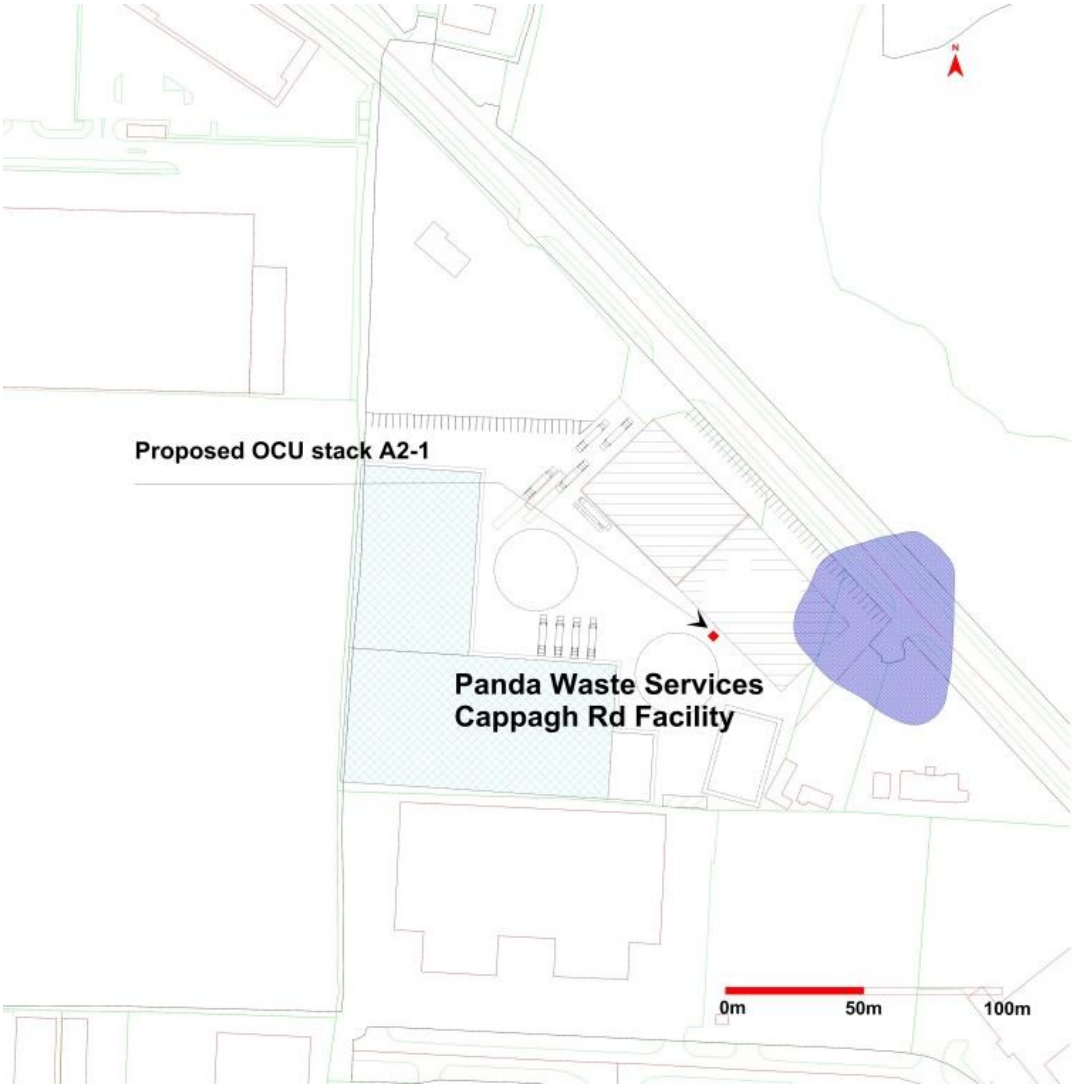


Figure 6.2. Predicted odour emission contribution of odour control unit operation for AERMOD Prime dispersion model for an odour concentration of less than or equal to 1.40 Ou_E m^{-3} (▬) at the 98th percentile of hourly averages for 5 years of screened hourly sequential meteorological data (Worst case year 2004).

ATTACHMENT E

Starrus Eco Holdings Limited

Cappagh Road

Finglas

Dublin 11

Waste Licence No W0261-02

Odour Management Plan

17th January 2023

1.0 Introduction

The facility is authorised to accept 250,000 tonnes per annum of non-hazardous waste as listed in Schedule A of the waste licence with the reference number W0261-02.

Following the installation of the Odour Abatement System, MSW and Brown Bin waste was accepted in W0261. Other waste types accepted are dry recyclables, skip waste, source segregated paper, plastic, cardboard and C&I Dry wastes.

In September 2018, Shed B1, for the processing of waste to create SRF, started operating. This process involves dry pre-sorted skip waste. This waste is pre-sorted at sister facilities (W0183, W0039, W0188 etc) and then delivered via articulated vehicle to W0261. The waste is then processed to become Solid Recovered Fuel. This waste is odourless (as is the case in our Beauparc facility W0140) and as such, odour creation is minimal.

Any potential odour produced is mitigated by fast acting doors that remain closed at all times, except for vehicle movements into and out of the building. Daily odour checks are also completed onsite, and following the Agency guidance on odour assessments, Air Guidance Note 5 (AG5).

Additionally W0261 has recently been approved to accept ABP Food waste. This waste is processed in Building A2, which has the Odour Abatement System installed in it. Odour impact assessments conducted prior to the installation of the odour abatement system concluded that any odorous waste would not result in nuisances beyond the facility boundary, provided the unit is operation correctly.

2.0 Potential Odour Sources

The waste types that are currently approved for acceptance at W0261 are listed below:

EWC Code	**Description**	**Maximum Tonnes Per Annum**
02 02 03	wastes from the preparation and processing of meat, fish and other foods of animal origins	2,000
02 03 04	wastes from fruit, vegetable, cereals, etc	2,000
02 05 01	waste from dairy products industry	2,000
02 06 01	waste from baking and confectionary industry	2,000
02 07 04	Waste from prod of alcoholic and non-alcoholic beverages	2,000
15 01 01	Paper and Cardboard	20,000
15 01 02	Plastic Packaging	10,000
15 01 03	Wooden Packaging	1,000
15 01 04	Metallic Packaging	100

15 01 05	Composite Packaging	1,000
15 01 06	Mixed Packaging	1,000
15 01 07	Glass Packaging	1,000
16 01 03	Tyres	100
16 03 36	Off Spec Batches and unused products	1,000
17 01 07	Mix of Concrete, Bricks, Tiles and Ceramics	100
17 02 01	C&D Wastes - Wood	100
17 02 03	C&D Wastes - Plastic	100
17 02 04	C&D Wastes - glass, plastic and wood containing or contaminated with dangerous substances	100
17 04 06	Metals - tin	1,000
17 04 07	C&D Wastes - mixed metals	100
17 05 04	Soil and Stones	100
17 08 02	Gypsum Based Construction Materials	100
17 09 04	Mixed Construction and Demolition Waste	100
19 05 99	waste from aerobic treatment of solid wastes - waste not otherwise specified	3,500
19 06 99	waste from anaerobic treatment of waste	3,500
19 12 02	Ferrous Metal	1,000
19 12 10	SRF	10,000
19 12 12	Combustible Waste	1,000
19 12 12	Other wastes from Mechanical Treatment	35,000
20 01 01	Paper and Cardboard	15,000
20 01 02	Glass	1,000
20 01 08	Biodegradable Kitchen and Canteen Waste	12,500
20 01 38	wood other than mentioned in 20 03 07	1,000
20 01 39	Plastic Waste	10,000

20 01 40	Metals	1,000
20 02 01	Municipal Wastes - garden and parks	1,000
20 03 01	DMR	50,000
20 03 01	MSW	10,000
20 03 02	Municipal Waste - waste from markets	1,000
20 03 07	Bulky Waste	46,500
TOTAL		**250,000**

The potential sources of odour are, brown bin waste and ABP Food waste. Odour nuisance is directly related to the length of time that wastes remain on site and the type of processing, the handling and the storage areas. Seasonal factors such as warm weather can also be influential. Also waste transport vehicles can be a source of nuisance if not regularly cleaned.

3.0 Mitigation Measures

Fast turnaround times for wastes prevent the accumulation of large volumes of odour generating waste at the facility. Condition 6.16.1 pf the licence for W0261 requires that *"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 onsite"*.

All door openings at the facility are kept to a minimum with the use of automatic doors. No waste transport vehicle will be off loaded or loaded until all doors are fully closed. Odour forming wastes such as MSW, brown bin or food waste will be transferred directly to sister facilities for processing. These facilities include:

- South Dublin County Council (SDCC) Baling Station, Ballymount
- Covanta Waste to Energy
- Indaver
- Acorn Recycling
- Huntstown Bioenergy
- ALS

The floor of each building is cleaned daily using an in house sweeper. The waste collection vehicles, including the hoppers at the back of the back of the vehicle are regularly cleaned. Trucks waiting to be loaded wait in designated areas throughout the yard, and as far away as possible from our nearest sensitive receptors.

4.0 Monitoring

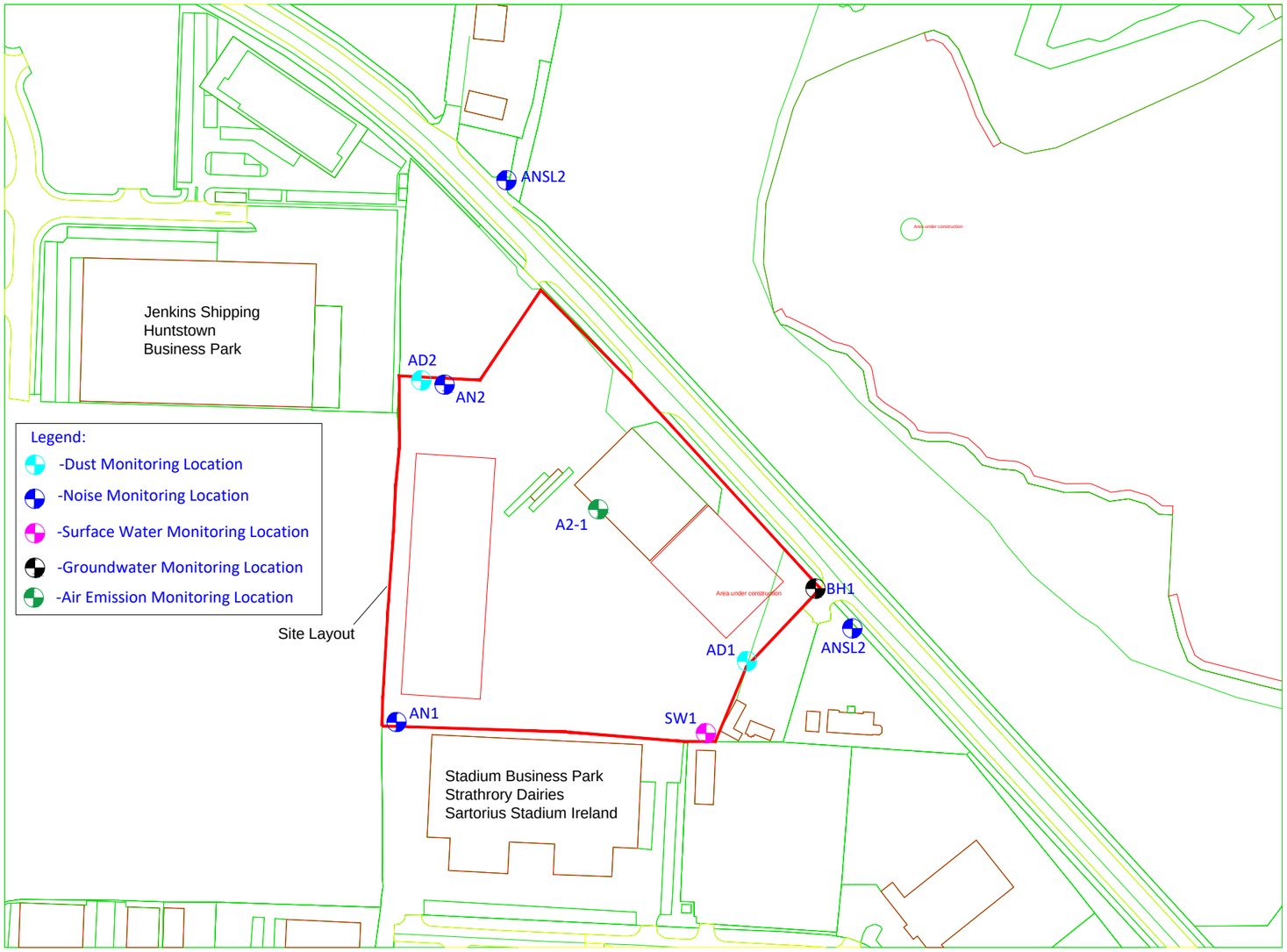
Daily odour assessments are carried out on the Cappagh Road and throughout that facility having regard for EPA Air Guidance Note (AG5) Odour Impact Assessment Guidance for EPA Licenced Sites.

The Odour Abatement System is checked daily, via the sniff ports externally and internally on the Scada system to ensure it is working accurately. The system is also monitored quarterly by a third party contractor to ensure everything is working correctly.

5.0 Communication

Panda regularly liaise with neighbours to verify that the facility is not causing any odour nuisances or nuisances of any kind.

ATTACHMENT F



O' Callaghan Moran & Associates.
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environmental management for business

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CLIENT

Starrus Eco Holdings Ltd

TITLE

Monitoring Locations

Details:

Ordnance Survey Ireland Limited
No. CYAL50295879
Ordnace Survey Ireland/Government of Ireland

Date	FIGURE No.
17/01/2023	11.1
SCALE	REV.
1:2500	A