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Ms Jennifer Cope
Environmental Licensing Programme
Office of Environmental Sustainability

25th August 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 10th August 2023 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.

1. Odour Dispersion Model [Regulation 9(2)(k)]

The licensee is required to submit an up-to-date odour dispersion model that assesses the impact of emissions from the installation. The updated model and report should include the following:

a) Identification of all the odorous waste streams and processes and confirmation that all odorous waste streams are stored and processed in the building where the extraction system is in place.

An up-to-date odour dispersion model prepared by Odour Monitoring Ireland Ltd (OMI) is in Attachment A.

The odorous waste streams comprise food waste and green waste. These are accepted for bulking up and transfer only and are not processed on-site. All odorous waste streams are stored and processed in the building where the extraction system is in place.

b) up-to-date meteorological data. It is noted that the odour dispersion model received by the Agency on 21 January 2023 included five years of meteorological data for Dublin Airport for the years 2002 to 2006 inclusive in the model. AG4 guidance in relation to meteorological data is that the most recent year of the five-year dataset should be within the last ten years.

The OMI dispersion model is based on meteorological data from Dublin Airport for the period 2018 to 2022.

c) *Odour impact assessment using maximum volumetric flow rate and maximum odour concentration for A2-1. It is noted that only the average volumetric flow rate and average odour concentration for A2-1 is used in the model submitted.*

The odour impact assessment is based on the maximum volumetric flow rate and the maximum odour concentration.

d) *all required details as set out in section 6.12 of EPA Guidance Note (AG4) on Air Dispersion Modelling from Industrial Installations, and in particular a gridded receptor network and additionally provide results at specific sensitive receptors.*

Refer to OMI dispersion model and report.

e) *Confirmation whether the average outlet odour concentration for A2-1 of 460 OuE/m^3 will remain or increase due to the proposed 'depackaging plant' and all the odorous waste streams from the proposed increase of waste acceptance at the installation.*

As referred to in the FI response of 01/08/2023 the 'depackaging plant' has been decommissioned. As a precautionary measure and worst case evaluation a maximum odour outlet concentration of 1000 OuE/m^3 has been modelled.

f) *Confirmation whether the average outlet volumetric flow rate for A2-1 of 45,936 m^3/hr will remain or increase due to the proposed 'depackaging plant' and all the odorous waste streams from the proposed increase of waste acceptance at the installation.*

The average outlet volumetric flow rate for A2-1 is, based on compliance monitoring conducted in 2021, 2022 and to date in 2023, 16,000m^3/hr.

g) *A cumulative assessment of the impact of industrial installations/waste facilities emissions sources in the region or justify why a cumulative assessment is not required.*

The AG 4 Guidance requires that the modelling of the release of pollutants from an industrial installation should give consideration to the presence of other significant industrial installations within the modelling domain. A review of the maps on the EPA Geoportal website identified three licensed installations within 600 m of the applicant's installation (Figure 1) (Note the location of the applicant's installation is incorrectly shown on the EPA map).

These are the Lagan Materials Ltd bituminous production plant (P0081-01) approximately 500m to the north west; the Blancomet Recycling Ltd metal recycling plant approximately 500m to the west and the SEHL Material Recovery Facility (W0183-01) approximately 420m to the north.

A review of the current licences for the three facilities identified the presence of one channelled emission point to air at the Blancomet Recycling installation, which is an air extraction system. The Licence specifies emission limit values for particulates, lead and sulphuric acid only and does not set emission limits for odours. There is one channelled emission point to air from a boiler house at the Lagan Materials installation, but emission limit values are not specified. There are no channelled emission points to air at the SEHL Millennium Park installation.

Box 6 of AG4 states that where a nearby installation emits the same pollutant as the applicant installation, both at a significant level, a cumulative impact assessment may be necessary. As there is no evidence of significant levels of odorous substances in the channelled point air emissions at both the Blancomet Recycling and Lagan Materials installations and there is no channelled point air emission at the SEHL Millennium Park installation, a cumulative assessment is not required.

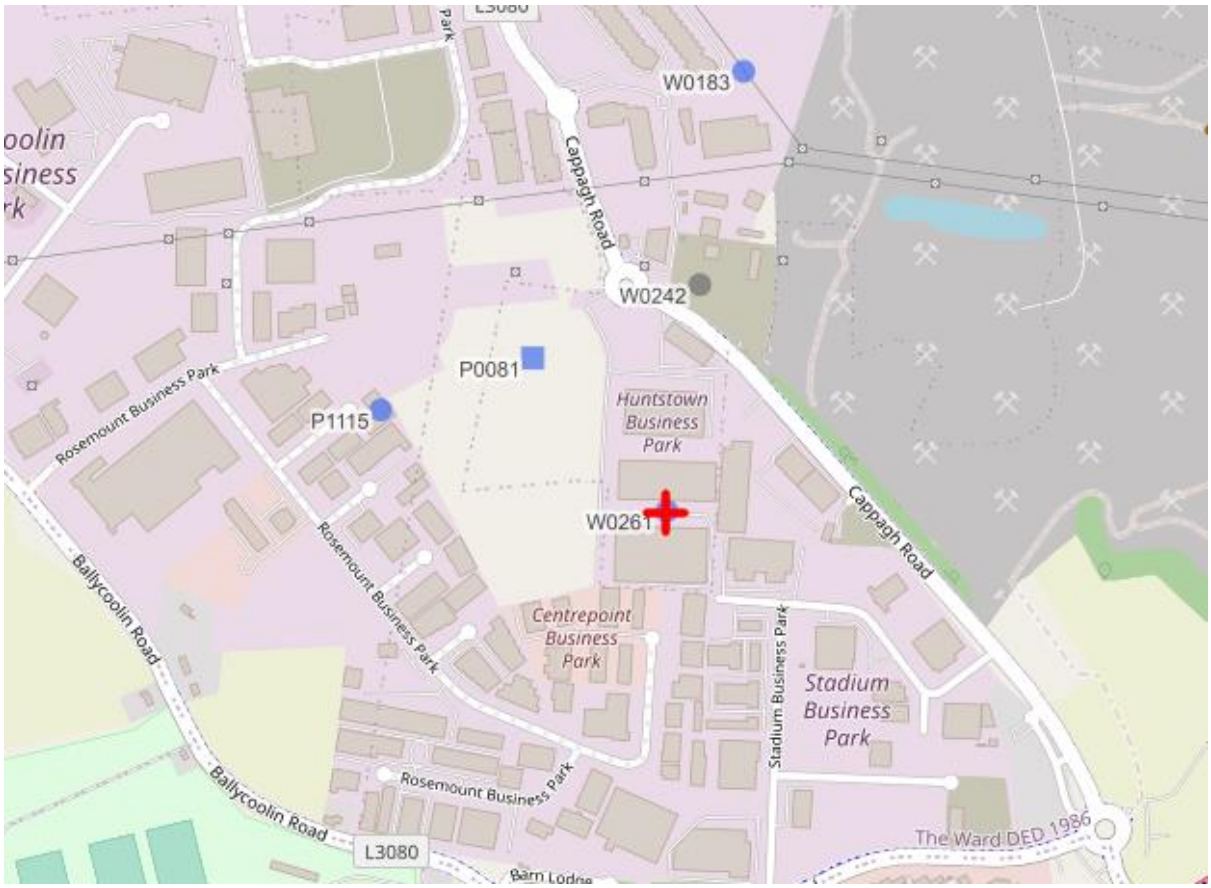

Figure 1

h) Clarify whether A2-1 has appropriate access for monitoring.

There is appropriate access to A2-1 for monitoring.

Yours Sincerely

Jim O' Callaghan

ATTACHMENT A

ODOUR MONITORING IRELAND LTD

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

PERFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF PANDA WASTE SERVICES

REFERENCE NUMBER:	20231567(2)
ATTENTION:	Mr. David Tobin
PREPARED BY:	Dr. Brian Sheridan
DATE:	25th Aug 2023
DOCUMENT VERSION:	Document Ver.002
License:	W00261-02

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This document is submitted in response to request for additional information from the Environmental Protection Agency.

Respectively submitted,

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

For and on behalf of Odour Monitoring Ireland™ LTD

Document Amendment Record

Client: ***Panda Waste Services***

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

Project Number: 20231567(2)			**Document Reference:** Desktop odour impact assessment of existing odour control system installed in Panda Waste Services, Cappagh Rd, Finglas, Dublin 11.		
20231567(1)	Document for review	JWC	BAS	JWC	23/08/2023
20231567(2)	Minor amendments	JOC	BAS	JWC	25/08/2023
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

Executive summary

Odour Monitoring Ireland Ltd was commissioned by Panda Waste Services Ltd to perform a desktop odour impact assessment of the existing odour control system installed on the waste processing facility located in Panda Waste Services, Cappagh Rd, Finglas, Dublin 11. The odour control system consists of a dust filtration and carbon filtration plant for the removal of dust and odours from the extracted air from the odourous part of the facility.

The main aims of the study were to assess if the existing odour control system operation parameters would comply with Irish EPA odour impact compliance limits of less than or equal to 1.50 Ou_E/m^3 for the 98th percentile of hourly averages for the worst-case meteorological years over 5 years of met data at the nearest sensitive receptor.

This document will provide information on the following:

- The odour treatment levels including the odour emission concentration from the 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:

1. Dispersion modelling study was carried out in accordance with EPA Guidance AG4.
2. The odour control system will treat a maximum of 25,000 Nm^3 [odourous air]/hr (293.15K, 101.3Kpa, wet gas).
3. The odour control system will achieve a maximum exhaust odour threshold concentration less than 1,000 Ou_E/m^3.
4. The odour emission rate limit for the odour control system will be no greater than 6,944 Ou_E/s.
5. The system will be expected to achieve an odour removal efficiency of between 75% to 95%.
6. With regards to the dispersion modelling study outcome, the predicted maximum 98th percentile ground level concentration of odour at the worst-case receptor location is in compliance with the stated odour impact criterion. The predicted value was less than or equal to 0.53 Ou_E/m^3 for the 98th percentile of hourly averages for the worst-case meteorological year Dublin Airport 2020.

1. Introduction and scope

1.1 Introduction

Odour Monitoring Ireland Ltd was commissioned by Panda Waste Services Ltd to perform a desktop odour impact assessment of the existing odour control system 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 operation of the odour control system will not cause odour impact at identified sensitive receptors 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 odour treatment volume and odour concentration including the expected odour emission rates from the odour control system.
- To perform an odour dispersion modelling assessment in accordance with AG4 EPA Guidance to illustrate that the odour treatment system will not result in an odour impact at identified sensitive receptors beyond the boundary of the facility.

2. Materials and methods

2.1 Odour emission rate calculation

Table 3.1 includes the odour emission rate calculation for the odour control system. The odour emission rate calculation is based on data gathered from information supplied by the client and test reports.

The total maximum volume of air to be treated in the existing odour control system is 25,000 Nm^3/hr, 293.15K, 101.3 Kpa, wet gas.

The guaranteed maximum exhaust odour threshold concentration to be achieved on the odour control system exhaust is less than or equal to 1,000 Ou_E/m^3.

The guaranteed maximum total odour emission rate as a result of operating the odour control system will be 6,944 Ou_E/s (Guaranteed Volume flow rate multiplied 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 was used for the operation of Aermod Prime 22112. This will allow for the determination of the worst-case scenario for the overall impact of odour emissions from the odour control unit on the surrounding sensitive receptors beyond the boundary of the facility. Odour Monitoring Ireland currently has licensed met data for the existing site. Dublin Airport 2018 to 2022 inclusive was used in the dispersion model.

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 (22112) 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 existing scheduled emission point 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 statistically significant results in terms of the short and long term assessment. The worst-case year was determined as 2020. All five years of predictions are presented for clarity. 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 (22112) 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 source characteristics

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 2018 to 2022 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* for all modelled years and all nearby sensitive receptors.

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)	310522
Y coordinate (m)	240434
Stack base level (m)	2
Average outlet odour concentration for A2-1 (Ou_E/m^3)	**1,000**
Average Volumetric airflow rate for A2-1 (Nm^3/s)	6.944
Average Volumetric airflow rate for A2-1 (Nm^3/hr, 293.15K, 101.3Kpa, wet gas)	**25,000**
Average Odour emission rate for A2-1 (Ou_E/s)	**6,944**
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)	8.84
Breathing level of sensitive receptors (m)	1.80
Recycling building height above ground level (m)	2
Recycling building height A.G.L (m)	11.90

4. Results and Discussion

This section will describe the results obtained from the study.

4.1 Operational parameters results

- The odour control system will treat a maximum of 25,000 Nm^3 [odourous air]/hr (293.15K, 101.3Kpa, wet gas).
- The odour control system will achieve an maximum exhaust odour threshold concentration less than 1,000 Ou_E/m^3.
- The odour emission rate limit for the odour control system will be no greater than 6,944 Ou_E/s.
- The system will be expected to achieve an odour removal efficiency of between 75% to 95%.

4.2 Dispersion modelling results

Table 3.2 illustrates the predicted ground level concentrations for the 98th percentile of hourly averages for all five screen meteorological years Dublin Airport 2018 to 2022 inclusive. These predictions are made at each of the nearest sensitive receptors in the vicinity of the operational facility.

As can be observed, the predicted ground level concentrations are well within the proposed limit value of less than or equal to 1.50 Ou_E/m^3 for the 98th percentile of hourly averages for worst case screen meteorological station.

In addition, *Appendix I – Figures 6.2 to 6.7* illustrate the odour contours generated by the dispersion model for the 98th percentile of hourly averages for each of the 5 years of screened hourly sequential meteorological data.

Table 3.2. Predicted 98th percentile ground level odour concentrations at each nearby sensitive receptor in the vicinity of the facility.

Receptor ID	Identity	X coordinate (m)	Y coordinate (m)	Yr. 2018 - Predicted 98%ile odour conc. (Ou_E/m^3)	Yr. 2019 - Predicted 98%ile odour conc. (Ou_E/m^3)	Yr. 2020 - Predicted 98%ile odour conc. (Ou_E/m^3)	Yr. 2021 - Predicted 98%ile odour conc. (Ou_E/m^3)	Yr. 2022 - Predicted 98%ile odour conc. (Ou_E/m^3)
R1	Residential	310858	240084	0.04	0.04	0.04	0.04	0.04
R2	Residential	310866	240058	0.04	0.04	0.03	0.04	0.04
R3	Residential	310878	240032	0.03	0.03	0.03	0.03	0.04
R4	Residential	310886	240006	0.03	0.03	0.03	0.03	0.03
R5	Residential	310898	239981	0.03	0.03	0.03	0.03	0.03
R6	Commercial	310370	240875	0.07	0.07	0.15	0.22	0.18
R7	Commercial	310428	240868	0.07	0.07	0.14	0.18	0.18
R8	Commercial	310372	240829	0.10	0.10	0.19	0.25	0.22
R9	Commercial	310295	240798	0.10	0.10	0.24	0.29	0.27
R10	Commercial	310348	240650	0.21	0.25	0.43	0.49	0.46
R11	Commercial	310313	240554	0.24	0.25	0.27	0.36	0.32
R12	Commercial	310008	240337	0.04	0.05	0.12	0.14	0.11
R13	Commercial	310021	240279	0.04	0.04	0.11	0.12	0.10
R14	Commercial	310074	240208	0.04	0.04	0.13	0.11	0.11
R15	Commercial	310118	240244	0.05	0.05	0.15	0.14	0.13
R16	Commercial	310163	240250	0.07	0.06	0.18	0.16	0.16
R17	Commercial	310238	240265	0.10	0.08	0.24	0.20	0.19
R18	Commercial	310275	240265	0.12	0.10	0.27	0.24	0.22
R19	Commercial	310360	240254	0.17	0.13	0.33	0.25	0.23
R20	Commercial	310458	240341	0.34	0.25	0.53	0.34	0.29
R21	Commercial	310446	240248	0.16	0.12	0.31	0.16	0.12
R22	Commercial	310103	240135	0.04	0.03	0.11	0.09	0.09
R23	Commercial	310163	240188	0.06	0.04	0.15	0.13	0.12
R24	Commercial	310215	240187	0.07	0.05	0.18	0.14	0.14
R25	Commercial	310260	240184	0.09	0.06	0.19	0.14	0.14
R26	Commercial	310362	240207	0.13	0.09	0.29	0.15	0.16
R27	Commercial	310402	240193	0.12	0.08	0.25	0.14	0.09
R28	Commercial	310447	240207	0.11	0.09	0.25	0.14	0.11
R29	Commercial	310163	240138	0.05	0.04	0.13	0.10	0.11
R30	Commercial	310229	240101	0.05	0.03	0.14	0.10	0.10
R31	Commercial	310349	240155	0.09	0.06	0.21	0.13	0.11
R32	Commercial	310427	240140	0.07	0.05	0.19	0.10	0.08
R33	Commercial	310124	240040	0.03	0.02	0.09	0.07	0.06
R34	Commercial	310333	240106	0.07	0.04	0.17	0.10	0.08
R35	Commercial	310419	240092	0.05	0.04	0.15	0.08	0.07
R36	Commercial	310218	239993	0.03	0.02	0.10	0.06	0.06
R37	Commercial	310329	240052	0.05	0.03	0.14	0.08	0.05
R38	Commercial	310369	240034	0.04	0.03	0.14	0.06	0.04
R39	Commercial	310426	240035	0.04	0.03	0.11	0.06	0.05

Table 3.2 continued. Predicted 98th percentile ground level odour concentrations at each nearby sensitive receptor in the vicinity of the facility.

Receptor ID	Identity	X coordinate (m)	Y coordinate (m)	Yr. 2018 - Predicted 98%ile odour conc. (Ou_E/m^3)	Yr. 2019 - Predicted 98%ile odour conc. (Ou_E/m^3)	Yr. 2020 - Predicted 98%ile odour conc. (Ou_E/m^3)	Yr. 2021 - Predicted 98%ile odour conc. (Ou_E/m^3)	Yr. 2022 - Predicted 98%ile odour conc. (Ou_E/m^3)
R40	Commercial	310275	239945	0.03	0.02	0.10	0.05	0.04
R41	Commercial	310397	239913	0.02	0.02	0.08	0.05	0.04
R42	Commercial	310529	239973	0.03	0.02	0.04	0.04	0.03
R43	Commercial	310569	240213	0.11	0.09	0.09	0.10	0.11
R44	Commercial	310645	240300	0.27	0.27	0.24	0.27	0.28
R45	Commercial	310718	240222	0.13	0.12	0.11	0.13	0.13
R46	Commercial	310651	240144	0.08	0.07	0.06	0.08	0.07
R47	Commercial	310661	240120	0.07	0.06	0.05	0.07	0.06
R48	Commercial	310701	240090	0.06	0.06	0.04	0.06	0.06
R49	Commercial	310639	240059	0.04	0.04	0.03	0.04	0.04
Max worst case predicted 98%ile odour conc. (Ou_E/m^3)	-	-	-	**0.34**	**0.27**	**0.53**	**0.49**	**0.46**
Limit value (98%ile Ou_E/m^3)	-	-	-	**<1.5**	**<1.5**	**<1.5**	**<1.5**	**<1.5**

With regards to the dispersion modelling study outcome, the predicted maximum 98th percentile ground level concentration of odour at the worst-case receptor location is in compliance with the stated odour impact criterion. The maximum predicted value was less than or equal to 0.53 Ou_E/m^3 for the 98th percentile of hourly averages for the worst-case meteorological year Dublin Airport 2020.

5. Conclusions

The following conclusions were gathered from the study and include:

1. Dispersion modelling study was carried out in accordance with EPA Guidance AG4.

2. The odour control system will treat a maximum of 25,000 Nm^3 [odourous air]/hr (293.15K, 101.3Kpa, wet gas).

3. The odour control system will achieve an maximum exhaust odour threshold concentration less than 1,000 Ou_E/m^3.

4. The odour emission rate limit for the odour control system will be no greater than 6,944 Ou_E/s.

5. The system will be expected to achieve an odour removal efficiency of between 75% to 95%.

6. With regards to the dispersion modelling study outcome, the predicted maximum 98^{th} percentile ground level concentration of odour at the worst-case receptor location is in compliance with the stated odour impact criterion. The predicted maximum value was less than or equal to 0.53 Ou_E/m^3 for the 98^{th} percentile of hourly averages for the worst-case meteorological year Dublin Airport 2020.

6. *Appendix I* – Desktop Odour Contour plots for modelling scenarios

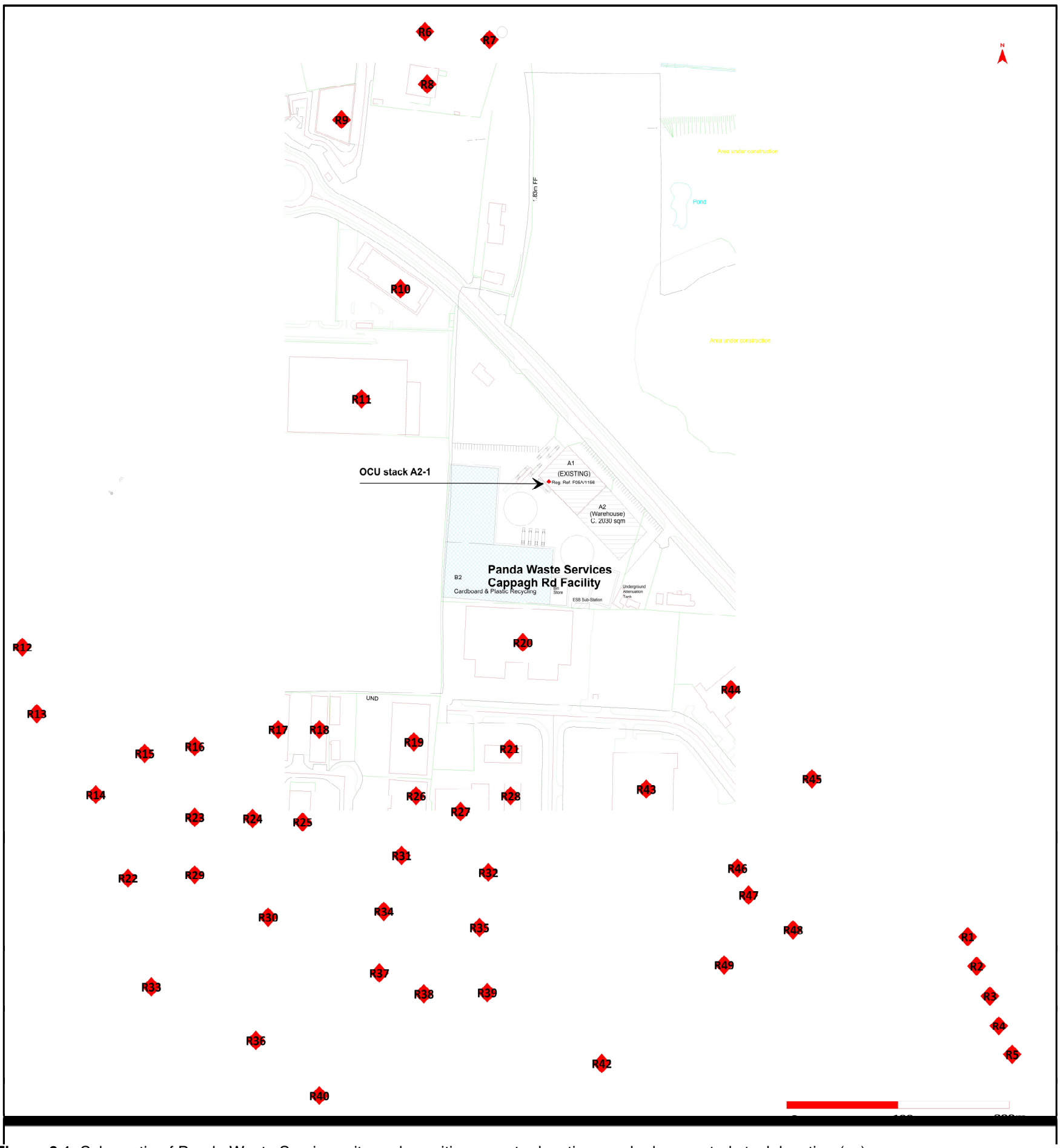

Figure 6.1. Schematic of Panda Waste Services site and sensitive receptor locations and odour control stack location (•).

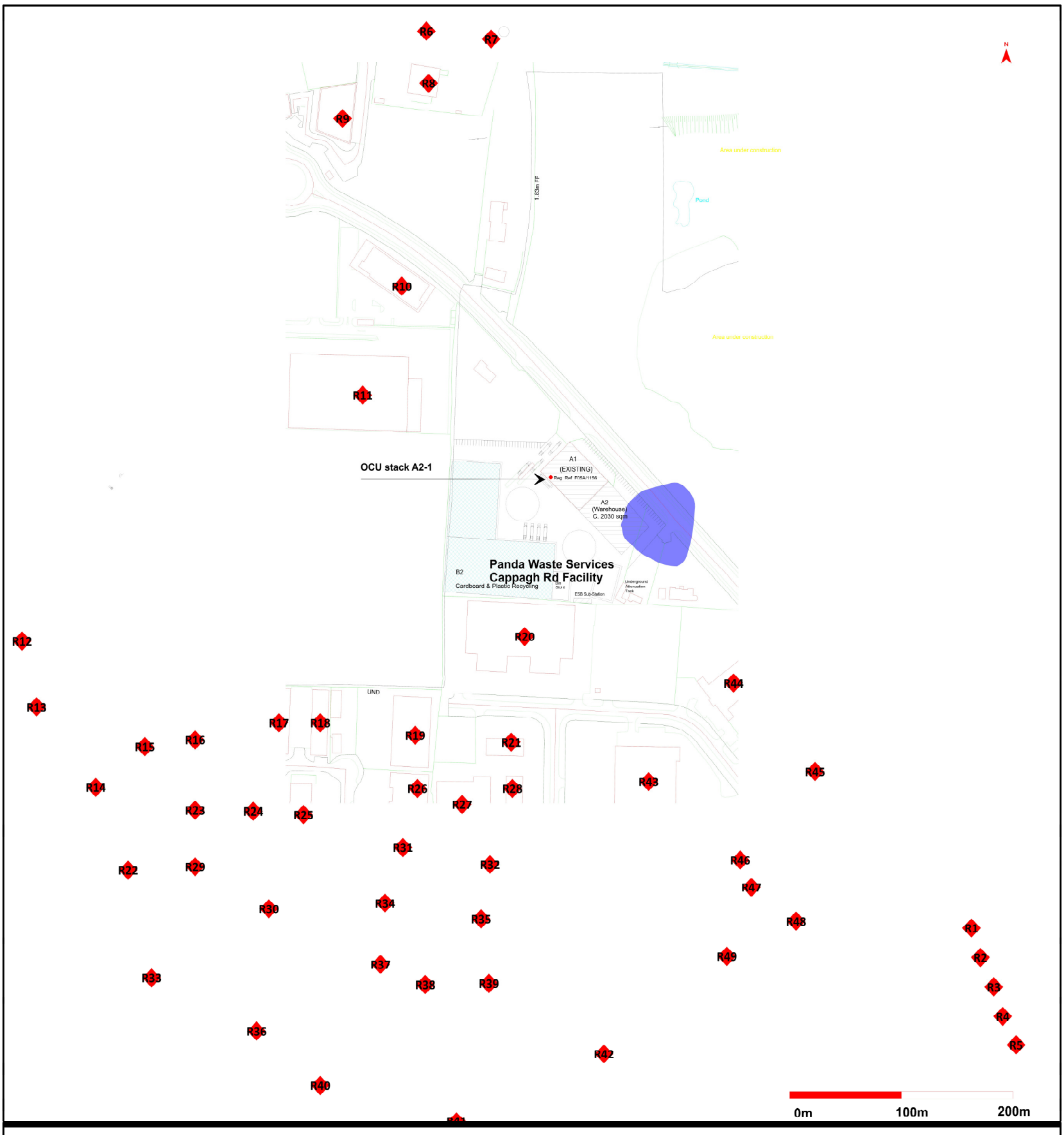

Figure 6.2. Predicted ground level odour contribution of odour control unit operation located in Panda Waste Services Cappagh for an odour concentration of less than or equal to 1.50 Ou_E/m^3 (▬) for the 98th percentile of hourly averages for screened hourly sequential meteorological year Dublin Airport 2018.

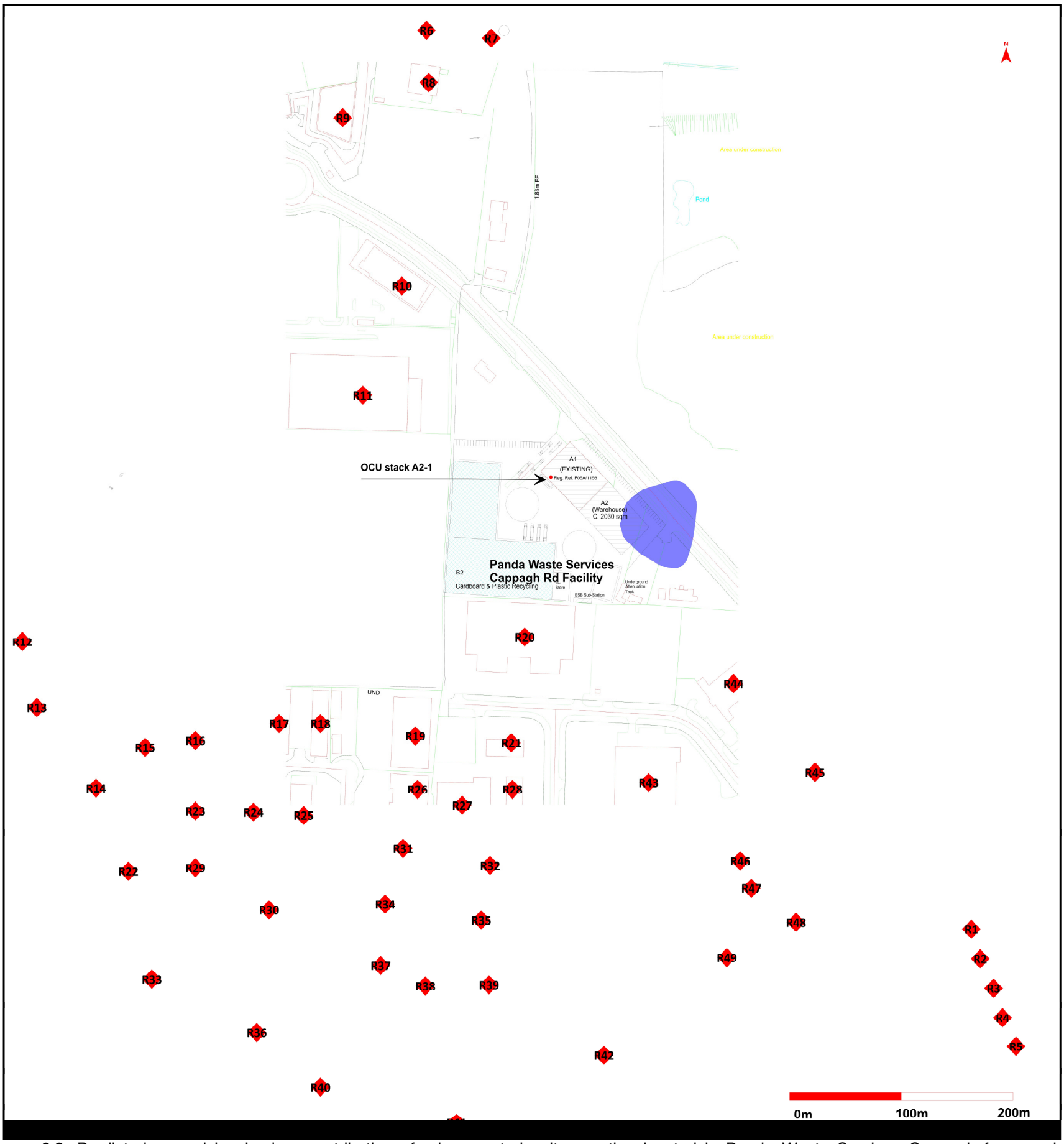

Figure 6.3. Predicted ground level odour contribution of odour control unit operation located in Panda Waste Services Cappagh for an odour concentration of less than or equal to 1.50 Ou_E/m^3 (▬) for the 98th percentile of hourly averages for screened hourly sequential meteorological year Dublin Airport 2019.

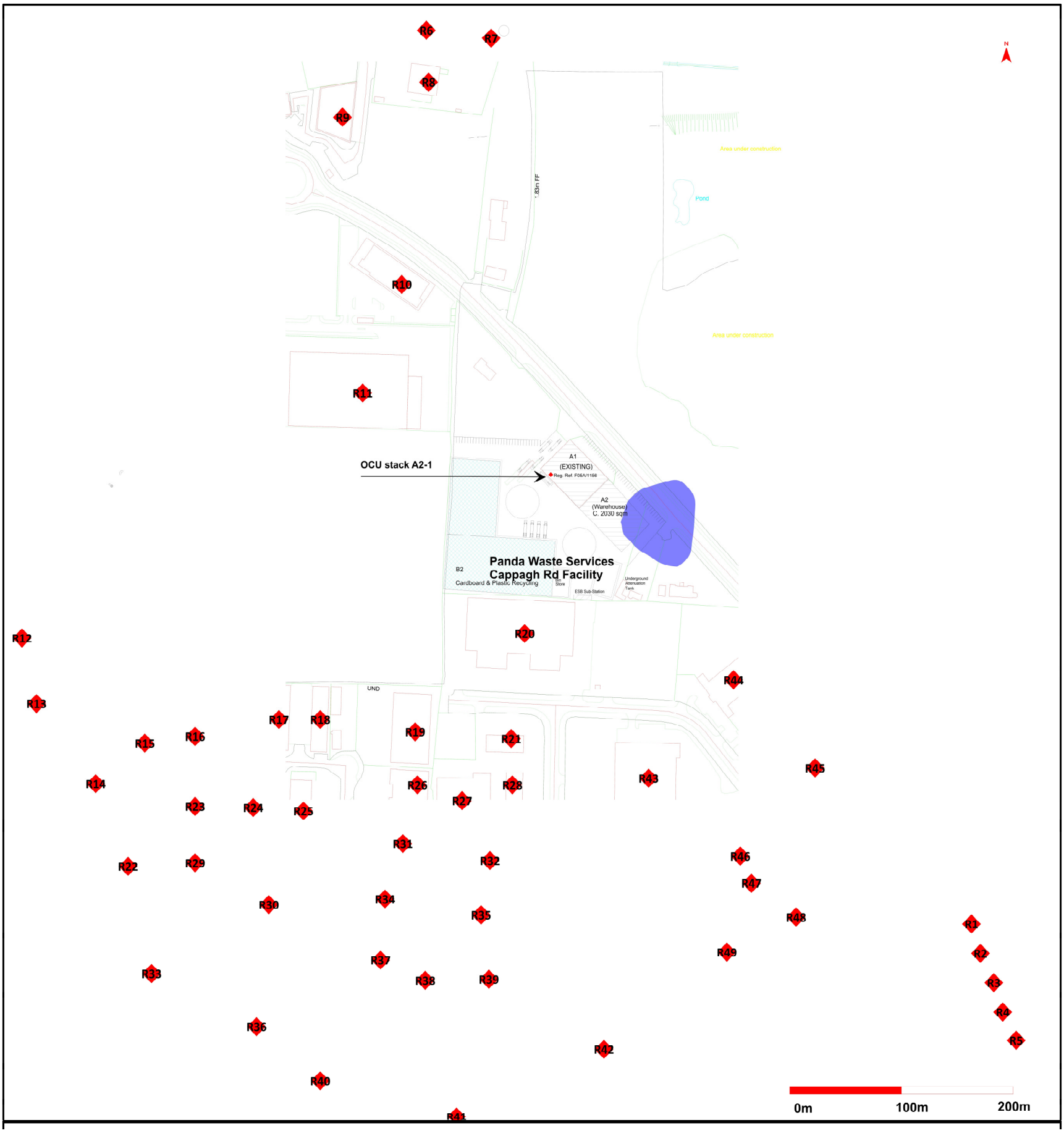

Figure 6.4. Predicted ground level odour contribution of odour control unit operation located in Panda Waste Services Cappagh for an odour concentration of less than or equal to 1.50 Ou_E/m^3 (▬) for the 98th percentile of hourly averages for screened hourly sequential meteorological year Dublin Airport 2020.

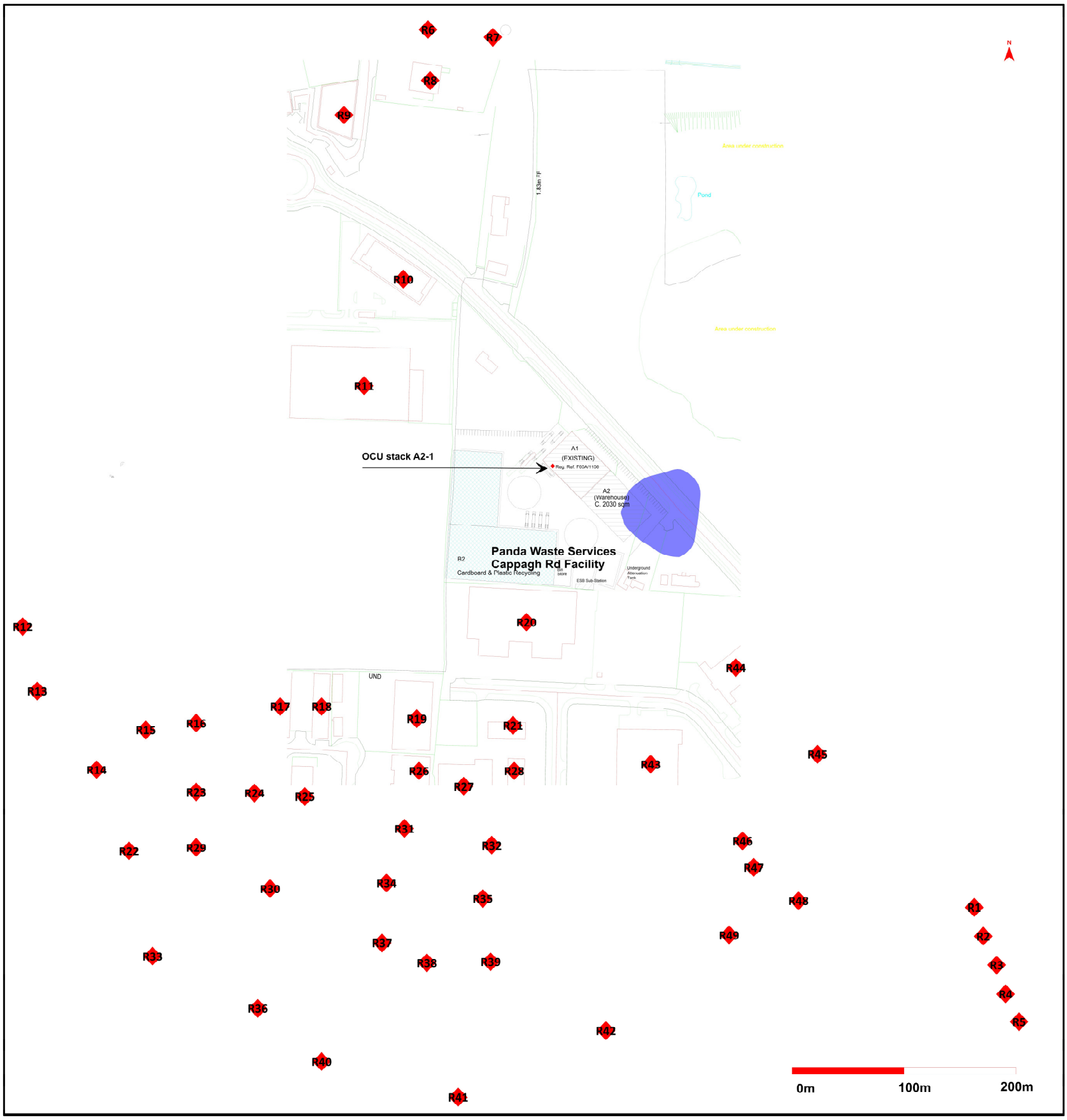

Figure 6.5. Predicted ground level odour contribution of odour control unit operation located in Panda Waste Services Cappagh for an odour concentration of less than or equal to 1.50 Ou_E/m^3 (▬) for the 98th percentile of hourly averages for screened hourly sequential meteorological year Dublin Airport 2021.

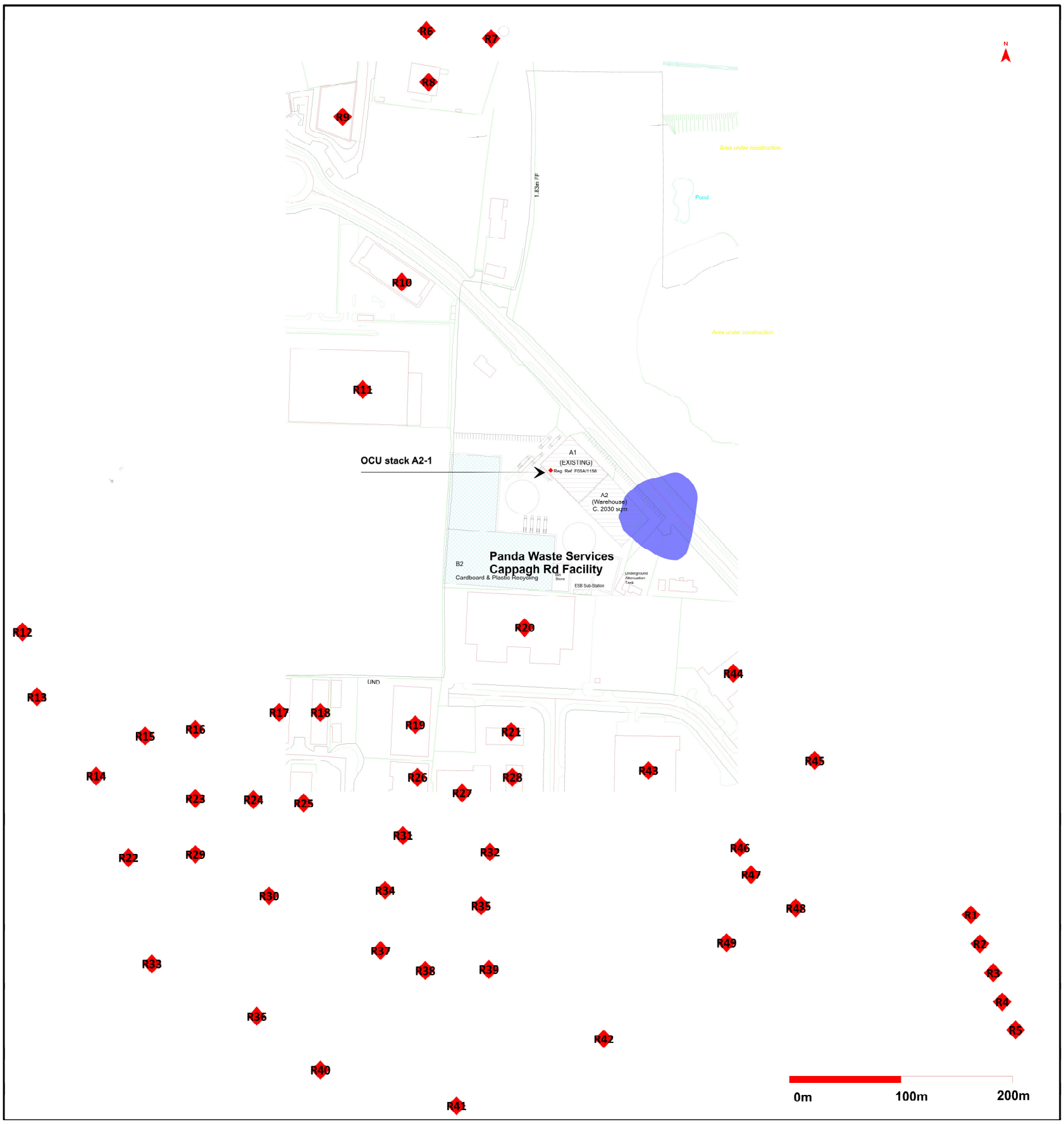

Figure 6.6. Predicted ground level odour contribution of odour control unit operation located in Panda Waste Services Cappagh for an odour concentration of less than or equal to 1.50 Ou_E/m^3 (▬) for the 98th percentile of hourly averages for screened hourly sequential meteorological year Dublin Airport 2022.