

Limerick WWTP Upgrade and Regional Bioresource Centre

ElAR Chapter 7 - Odour

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Formerly JB Barry Partners who became part of Egis in 2023

Table of Contents

GLOSSARY AND DEFINED TERMS	V
7 ODOUR.....	1
7.1 Purpose of this Report	1
7.2 Outline Project Description.....	1
7.3 Methodology.....	1
7.3.1 Study Area.....	1
7.3.2 Relevant Legislation, Policy and Guidelines.....	3
7.3.3 Appraisal Method for the Assessment of Impacts.....	5
7.3.4 Dispersion Modelling for Operations Phase Impact assessment	6
7.4 Baseline Environment.....	8
7.4.1 Meteorological conditions.....	8
7.4.2 Baseline air quality	10
7.5 Evolution of the Environment in the Absence of the Proposed Development	11
7.6 Potential Impacts	12
7.6.1 Construction Phase.....	12
7.6.2 Operational Phase	15
7.7 Mitigation Measures.....	22
7.7.1 Construction Phase.....	22
7.7.2 Operational Phase	23
7.8 Residual Impacts	23
7.8.1 Construction Phase.....	23
7.8.2 Operational Phase	23
7.9 Cumulative Impacts and Interactions	23
7.9.1 Construction Phase.....	23
7.9.2 Operation Phase	23
7.10 Difficulties encountered in Compiling Information	24
7.11 References	24

List of Figures

Figure 7-1: Study area.....	3
Figure 7-2: Odour Receptor Locations.....	8
Figure 7-3: Wind rose for Shannon Airport	9
Figure 7-4: Wind roses for Cork Airport, 2019 -2023 and 1961 to 2014.....	10
Figure 7-5: EPA Licenced facilities in the area.....	11
Figure 7-6 Proposed Site Layout showing new elements in red	16
Figure 7-7: Isopleth showing the maximum predicted ground level concentration of odour arising from plant emissions, expressed as the 98 th percentile of the 1-hour GLC.....	22

List of Tables

Table 7-1: Describing the Significance of Effects from EPA Guidelines	5
Table 7-2: Describing the Duration of Effects from EPA Guidelines	5
Table 7-3 Potential Construction Phase Odour Effects	13
Table 7-4 assessment of Potential Construction Phase Odour Effects	14
Table 7-5 Potential Sources of Odour Emissions to Atmosphere	17

Table 7-6 Odour emission rates from existing WWTP activities.....	19
Table 7-7 Odour emission rates from existing activities	20
Table 7-8 predicted odour emission rates from the proposed wwtp	21
Table 7-9 Proposed development: Maximum Predicted Ground Level Concentration of Odour.....	21

GLOSSARY AND DEFINED TERMS

Acronym	Description
AA	Appropriate Assessment
AASR	Appropriate Assessment Screening Report
ACP	An Coimisiún Pleanála
AD	Anaerobic Digestion
AGS	Aerobic Granular Sludge
AER	Annual Environmental Report
BOD	Biochemical Oxygen Demand
BC	Bioresource Centre
C	Carbon
CAFÉ	Clean Air for Europe Directive
CHP	Combined Heat and Power
DIN	Dissolved Inorganic Nitrogen
ECJ	European Court of Justice
EIAR	Environmental Impact Assessment Report
ELV	Emission Limit Value
EPA	Environmental Protection Agency
ESB	Electrical Supply Board
EU	European Union
FOG	Fats Oils and Grease
FST	Final Settling Tank
GHG	Greenhouse Gas
HGV	Heavy Goods Vehicle
MLPS	Main Lift Pumping Station
MCA	Multi-Criteria Analysis
MRP	Molybdate Reactive Phosphate
IDA	Industrial Development Agency
IFAS	Integrated Fixed-Film Activated Sludge
N	Nitrogen
NDP	National Development Plan
NHA	National Heritage Area
NIS	Natura Impact Statement
NPF	National Planning Framework
NSO	National Strategic Outcomes
NSS	National Spatial Strategy
NWSMP	National Wastewater Sludge Management Plan
P	Phosphorous
PE	Population Equivalent - The amount of wastewater received at a treatment plant (and its design capacity) is measured in units known as population equivalent (or PE). The wastewater received from all sources, e.g. industrial, tourism, commercial, residential, etc., is converted into these units, with one unit of PE representing the wastewater treatment load typically generated by a single person.
PFF	Pass Forward Flow
PFT	Picket Fence Thickener
pNHA	Proposed National Heritage Area

Acronym	Description
SEA	Strategic Environmental Assessment
SBR	Sequencing Batch Reactor
SHC	Sludge Hub Centre
SIA	Stable Isotope Analysis
SID	Strategic Infrastructure Development
Sludge	Solid by-products of wastewater
SPA	Special Protection Area
SS	Suspended Solids
UWWTD	Urban Wastewater Treatment Directive
WFD	Water Framework Directive
WWDA	Wastewater Discharge Authorisation
WWTP	Wastewater Treatment Plant
WSPS	Water Services Policy Statement
ZTV	Zone of Theoretical Visibility
PS	Pumping Station
QI	Qualifying Interest
RAS	Return Activated Sludge
RBC	Regional Bioresource Centre
RSES	Regional Spatial and Economic Strategy
SAC	Special Area of Conservation
TDS	Total Dry Solids
THP	Thermal Hydrolysis Process

DEPARTMENTS AND STAKEHOLDERS

Departments & Stakeholders	Acronym (where applicable)
An Coimisiun Pleanála	ACP
Department of Public Expenditure and Reform	DPER
Department of Climate Action, Communication Networks and Transport	CACNaT
Department of Communications, Climate Action and Environment – Changed in 2020	DCCAE
Department of Culture, Heritage and the Gaeltacht – Changed in 2020	DCHG
Department of Finance	DoF
Department of Housing, Planning and Local Government – Changed in 2020	DHPLG
Department of Housing, Local Government and Heritage	HLGaH
Environmental Protection Agency	EPA
Geological Survey Ireland	GSI
Group Water Schemes	GWS
Inland Fisheries Ireland	IFI
Irish Rail (Iarnród Éireann)	IR
Uisce Éireann	UÉ
Limerick City & County Council	LCCC
Local Authority	LA
National Monuments Service	NMS
National Parks & Wildlife Service	NPWS
National Roads Authority	NRA
National Transport Authority	NTA
Office of Public Works	OPW
Ordnance Survey Ireland	OSi
Southern Regional Assembly	SRA

7 ODOUR

7.1 Purpose of this Report

This Chapter of the EIAR considers the potential odour effects associated with the Limerick Wastewater Treatment Plant (WWTP) Upgrade Project, hereafter referred to as the Proposed Development.

The purpose of the EIAR is to support the planning application for the Proposed Development to upgrade the existing WWTP capacity, sludge treatment capacity and stormwater storage capacity. The work requirements are spread over 2 No. sites, Limerick WWTP and Corcanree PS. Both sites are located in an industrial location near the Dock Road, Limerick. The existing land use at both locations comprises of wastewater treatment activities.

The EIAR presents an evaluation of the likely significant environmental impacts and applicable mitigation and monitoring measures associated with the construction and operation of the Proposed Development. This Chapter considers the potential odour impacts of the Proposed Development, describes the methodology used to prepare the report and presents the findings of the assessments.

7.2 Outline Project Description

The Proposed Development will cater for future population growth and industrial development in the area, in line with population projections for Limerick as set out in the National Planning Framework (NPF) Implementation Roadmap and the Southern Region Regional Economic Spatial Strategy (RSES). It will provide 20% Headroom allowance, in line with Uisce Éireann guidelines for large urban settlements. It will also ensure the WWTP continues to comply with requirements of the EPA Wastewater Discharge License (WWDL), Urban Wastewater Treatment Regulations (UWWTR) and other relevant Uisce Éireann Guidelines.

The initial upgrade works will cater for the +10-year growth projections, increasing to 285,000 PE including a future industrial committed load of 27,500 PE. There will be provision made in the civil infrastructural development of the plant (tank sizing and pipework) for the +25-year growth projections of 325,000 PE. However, a planning review will be required before any uplift above 285,000 PE can be instated.

Please refer to Chapter 3 (The Proposed Development) in Volume 2 of this EIAR for further details.

7.3 Methodology

7.3.1 Study Area

The Proposed Development is spread across two sites at Limerick WWTP and Corcanree Pumping Station (PS) located on the Dock Road west of Limerick City. The closest receptors are commercial and are located within approximately 20m of the site boundaries. The closest residential receptors are located within approximately 400m of the Corcanree Pumping Station site boundary and approximately 500m of the WWTP site boundary.

This aerial map of the Limerick region shows the River Suir flowing through the center. Key locations include Corcanree PS (marked with a red pin and a red rectangle) and Limerick WwTP (marked with a red pin and a red rectangle). Other labeled areas include Clonmacken, Ballykeeffe, Dooradoyle, and Rossbrien. A large blue circle highlights the central urban area. The map also shows various roads, including the N18 and N24, and landmarks like Mungret Park and the University Hospital Limerick.



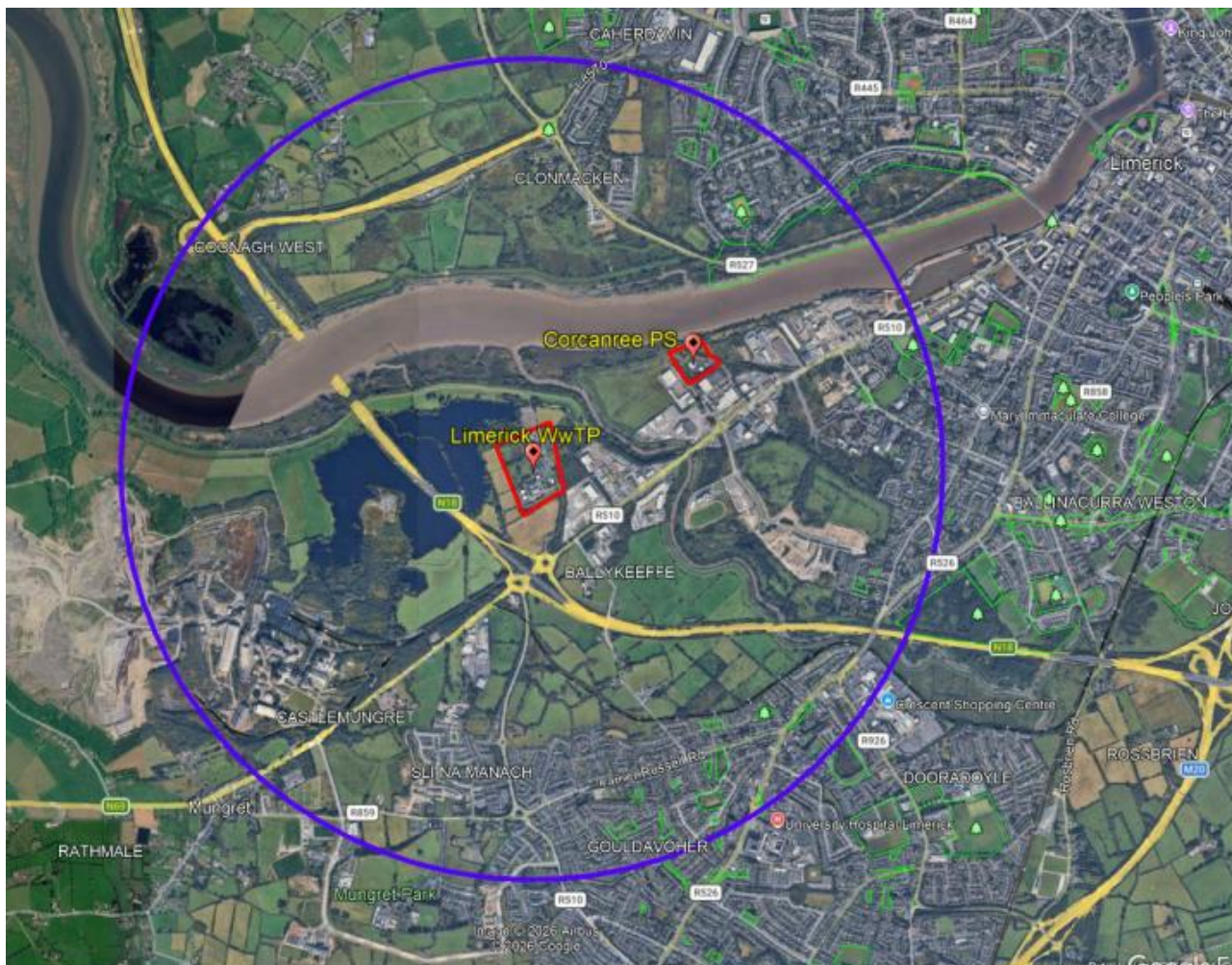


FIGURE 7-1: STUDY AREA

7.3.2 Relevant Legislation, Policy and Guidelines

The report has been prepared to meet the requirements of the relevant regulations and has been prepared in accordance with the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (EPA, 2022). The assessment:

- Has considered the Guidelines on the information to be contained in Environmental Impact Statements, 2022, as appropriate; and,
- Has considered the relevant topics contained in the EPA's Advice Notes on Current Practice in the preparation of Environmental Impact Statements, September 2003.

The EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports take account of the revised EIA Directive (2014/52/EU) which is considered in this assessment. Effects are described in the EPA Guidance in terms of quality, significance, magnitude, probability, duration and type. A description of the significance of effects is presented in Table 7-1 and Table 7-2 which present the description of the duration of effects as shown in the Guidelines.

Odour effects are possible during the Operational Phase. The Institute of Air Quality Management (IAQM, 2014) Guidance on the Assessment of Odour for Planning is one of the guidance documents used for the assessment of the odour effects of the project. This Guidance is especially suitable for the assessment of the temporary effects which could arise during the Construction Phase. The methodology adopted for the odour impact assessment study follows the Guidance recommendations and sets out a number of key stages in the odour impact assessment process as follows:

- The magnitude of the potential odour emissions from all sources are identified;

- Sensitive receptors are identified and classified according to their relative sensitivity;
- The magnitude of the odour impacts on receptors is identified; and
- The significance of the effect is assessed as either 'Significant' or 'Not Significant'.

In order to apply the assessment methodology, the magnitude of the odour impact on receptors is quantified and this is achieved using a dispersion modelling assessment. The EPA's (2020) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4), which includes guidance on appropriate odour standards against which odour emissions may be evaluated, is the most widely used Guidance in Ireland for assessments of this type. This Guidance recognises that the exposure of the population to odour is assessed based on the odour concentration as well as the length of time that the population may perceive the odour. By definition, one odour unit per cubic metre ($\text{OU}_\text{E}/\text{m}^3$) is the detection threshold of 50% of a qualified panel of observers working in an odour-free laboratory using odour-free air as the zero reference, and standards are defined relative to this benchmark.

The EPA has issued guidance specific to intensive agriculture which sets target values for odour for pig-production units of 1.5 to 6.0 $\text{OU}_\text{E}/\text{m}^3$ as a 98th percentile of one hour averaging periods. Guidance from the United Kingdom (UK) recommends that odour standards should vary from 1.5 to 6.0 $\text{OU}_\text{E}/\text{m}^3$ as a 98th percentile of one hour averaging periods at the site boundary based on the offensiveness of the odour and with adjustments for local factors such as population density. The benchmarks vary depending on the relative offensiveness of odours with a target benchmark of 1.5 $\text{OU}_\text{E}/\text{m}^3$ for the most offensive odours, 3 $\text{OU}_\text{E}/\text{m}^3$ for moderately offensive odours and 6 $\text{OU}_\text{E}/\text{m}^3$ for less offensive odours. The most offensive odour category includes raw sewage and septic sludge, while the moderately offensive odours include such sources as the aeration tanks and clarifiers. Final effluent after treatment is almost odourless and a moderately offensive odour target of 3 $\text{OU}_\text{E}/\text{m}^3$ is considered appropriate. The EPA Guidance specifies that these standards apply at the worst-affected sensitive receptors.

Guidance from New Zealand is based on consideration of the sensitivity of the receiving environment rather than the offensiveness of the odour and specifies odour criteria of 1 to 10 $\text{OU}_\text{E}/\text{m}^3$ for the 99.9 to 99.5 percentile of one-hour average ground level odour concentration, with target specifications of 1.0 to 2.0 $\text{OU}_\text{E}/\text{m}^3$ for high sensitivity receiving environments. Similar guidance from Europe, especially the Netherlands, sets similar performance criteria.

The only specific Irish legislation dealing with odour from WWTPs is the European Communities (Waste Water Treatment) (Prevention of Odours and Noise) Regulations 2005 (S.I. No. 787 of 2005),¹ which requires that WWTPs are designed, constructed, operated and maintained in order to avoid causing nuisance arising from odours or noise. The regulations do not define 'nuisance' in terms of a numerical standard, and there is no statutory odour limit or AQS for odour in Ireland.

The target specification is no odour nuisance beyond the project site boundary. Targets for odour nuisance vary as outlined above, but there is a general consensus from relevant guidance that the target performance specification for the 98th percentile of one-hour average concentration should be 1.0 to 3 $\text{OU}_\text{E}/\text{m}^3$. In this assessment, the target is set at the boundary, thereby ensuring that there is no odour nuisance to receptors beyond this point.

¹ The European Communities (Waste Water Treatment) (Prevention of Odours and Noise) Regulations 2005 (S.I. No. 787 of 2005) remain in force and have been amended by the Urban Wastewater (Nutrient-Sensitive Areas) Regulations 2025 (S.I. No. 403 of 2025), which updated the definition of "waste water treatment plant" to include those operated by Uisce Éireann.

TABLE 7-1: DESCRIBING THE SIGNIFICANCE OF EFFECTS FROM EPA GUIDELINES

“Significance” is a concept that can have different meaning for different topics – in the absence of specific definitions for different topics the following definitions are used.	
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.

TABLE 7-2: DESCRIBING THE DURATION OF EFFECTS FROM EPA GUIDELINES

‘Duration’ is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions are used.	
Momentary Effects	Effects lasting from seconds to minutes.
Brief Effects	Effects lasting less than a day.
Temporary Effects	Effects lasting less than a year.
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years.
Reversible Effects	Effects that can be undone, for example through remediation or restoration.

7.3.3 Appraisal Method for the Assessment of Impacts

The impact assessment methodology involves identification and characterisation of the odour impacts that may be associated with the project, characterisation of the baseline environment to benchmark the existing situation, quantitative prediction of air quality effects and assessment of the effects against recognised Air Quality Standards (AQS) and guidelines. From this assessment comes a definition of mitigation measures that are required to ensure that all aspects of the effects of the project, through the Construction Phase and Operational Phase, are managed and controlled to protect human health, the environment and amenity.

In addition to considering the above guidance, the general approach adopted for the air quality impact assessment is summarised as follows.

- Describe the existing baseline air quality at the site and in the vicinity of receptors – addressed in Section 7.4;
- Describe the potential odour effects of the project on air quality – addressed in Section 7.5;

- Identify appropriate criteria against which to assess the significance of the effects associated with the Proposed Development – addressed in Section 7.3.2;
- Propose mitigation and avoidance measures where required and set out residual impacts following implementation of mitigation measures.
- Identify and assess all cumulative effects with the potential to impact the receiving environment.

The effects of the Proposed Development are described by considering the possible impacts that could occur as a result of the Proposed Development, the probability of their occurrence and the nature and significance of such impacts. Potential Construction Phase impacts are assessed using the general methodology outlined in the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (EPA, 2022) and the Institute of Air Quality Management (IAQM, 2014). This Guidance is especially suitable for the assessment of the temporary impacts which could arise during the Operational Phase. The Guidance recommends a number of key stages in the odour impact assessment process as follows, which was adopted for the odour impact assessment study reported here:

- The magnitude of the potential odour emissions from all sources is identified;
- Sensitive receptors are identified and classified according to their relative sensitivity;
- The magnitude of the odour impact on receptors is identified; and
- The significance of the effect is assessed as either 'Significant' or 'Not Significant'.

The potential Operational Phase impacts are assessed principally by means of a dispersion modelling study using computerised dispersion modelling to evaluate the impact of emissions to atmosphere during the Operational Phase on ambient air quality. The results of the assessment are compared with benchmarks, discussed in Section 6.3.2. The assessment of impact significance is based on a comparison of predicted impacts with Air Quality Standards (AQS) and guidelines, and consideration of the magnitude and duration of the potential impact. A description of the approach is presented in Section 7.3.4.

7.3.4 Dispersion Modelling for Operations Phase Impact assessment

7.3.4.1 Dispersion modelling protocol

The EPA's AG4 guidance note (EPA 2020) gives guidance on the use of dispersion models which was followed in the execution of this study. A detailed modelling assessment was undertaken using the current version of the United States EPA's AERMOD modelling system. The model computes average ground-level concentrations of pollutants emitted from either elevated or ground-level emission sources. Separate utilities associated with the dispersion modelling software allow for computation of ground-level concentrations of pollutants over defined statistical averaging periods, and additional features permit suitable consideration to be given to building downwash effects and the effects of elevated terrain near the proposed WWTP.

Evaluation of the impact of the Proposed Development on air quality using dispersion modelling requires information on the following for model input data:

- Site layout and topography;
- Climatological data;
- Averaging intervals;
- Receptor locations; and
- Emissions characteristics.

The input data is summarised in the following sections of this Chapter.

7.3.4.2 Site layout and topography

The layout and area of the Proposed Development site and the dimensions of the various plant buildings were obtained from scaled drawings. Topographical information was obtained from a site survey and from maps, orthophotographs and digital Ordnance Survey data. As building downwash effects are possible from the buildings on-site, possible downwash effects were modelled using the modelling suite facilities.

The presence of terrain can lead to significantly higher ambient odour concentrations than would occur in the absence of terrain features, especially if there is a significant relative difference in elevation between the odour source and off-site receptors. International guidance and the Guidance Note AG4 (EPA 2020) suggest that, when modelling in a region of flat terrain, no digital mapping of the terrain will be necessary. In relation to AERMOD, the guidance in AG4 is that digital mapping of terrain should be conducted where terrain features are greater than 10% of the effective stack height within 5km of the stack (for effective stack heights of 100m or less). From a review, it is concluded that digital terrain data is not required because there are no terrain features greater than 10% of the effective stack height within 5km of the site. However, terrain data was included as part of the sensitivity analysis for the proposed project which tested the sensitivity of the projections to varying input approaches and datasets.

7.3.4.3 Meteorological data

The magnitude of potential impacts of the Proposed Development on air quality will largely be influenced by the local meteorological conditions, in particular wind speed and direction and precipitation rates. The meteorological data used as input to a dispersion model was selected on the basis of spatial and climatological (temporal) representativeness as well as the ability of the selected parameters to characterise the transport and dispersion conditions in the area under investigation. In accordance with the EPA's AG4 Guidance note (EPA 2020), data was selected for the most appropriate station (Shannon Airport) and five years of recent data (2019 to 2023) was used for the assessment. In addition, to test the sensitivity of the predictions to varying input data, five years of recent data (2019 to 2023) from Cork Airport was also used for aspects of the assessment. A discussion about the prevailing conditions and the representativeness of the data sets selected for the assessment is presented in Section 7.4.1.

7.3.4.4 Averaging Intervals

The dispersion model was used to predict the incremental additions to ground level concentrations (GLCs) of all substances emitted from the facility over defined averaging periods. These averaging intervals were chosen to allow direct comparison of predicted GLCs with the relevant assessment criteria as outlined in Section 7.3.2. In particular, one-hour average GLCs of odour were calculated at various distances from the site; percentiles of these average GLCs were also computed for comparison with the relevant AQS or Guidelines as set out in Section 7.3.2.

7.3.4.5 Receptor Locations

Two modelling approaches were adopted for the assessment. Ten (No.) discrete sensitive receptors were modelled to predict the air quality impacts that could arise as a result of the odour emissions from the Proposed Development. Human sensitive receptors were included in the assessment. Receptor Grids centred on the study area set at 20m to 100m intervals at a distance of up to 2km from the site were also modelled for the purpose of this assessment.

Key sensitive human receptors were identified within the study area that are considered representative of the worst-case locations where members of the public could potentially be affected by the emissions from the Proposed Development. These locations include residential, commercial and industrial properties. The locations of selected worst case sensitive receptors are shown in Figure 7-2 below and Appendix 7-1 Study Area in Volume 4 of this EIAR give the grid co-ordinates for the selected receptors. Operational Phase impacts on these receptors were specifically assessed by including the receptors in the scope of the modelling protocol.

Operational Phase impacts of the Proposed Development on sensitive ecological receptors were screened out of the assessment as odour is not a specific impact on ecological receptors.

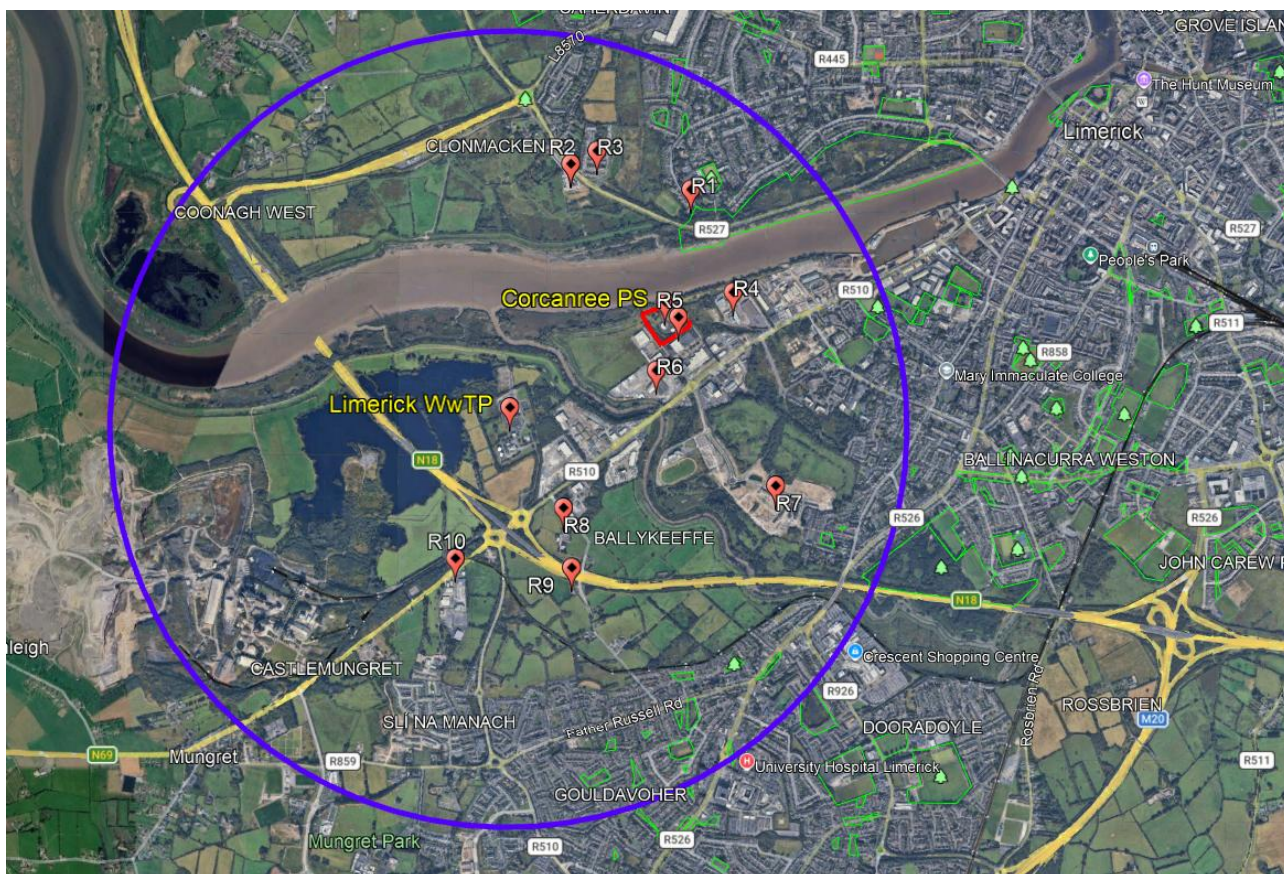


FIGURE 7-2: ODOUR RECEPTOR LOCATIONS

7.3.4.6 Impact assessment criteria

Impact assessment criteria are discussed in Section 7.3.2. The modelling predictions are assessed by comparing the predictions with the relevant assessment criteria.

7.3.4.7 Odour Emissions Characterisation

Information on dimensions and physical characteristics of the main emission sources were obtained by TMS Environment Ltd. from the Design Team for the Proposed Development, and from similar installations. A summary of the factors considered in deriving emission rates for modelling as well as the modelling scenarios considered is presented in Section 7.4. All of the emissions are treated as either area or point emission sources. An ambient temperature of 15°C has been assumed. Odour emission rates were derived using the approaches described in Section 7.6.2.2.

Modelling of other individual substances, such as H₂S, ammonia and mercaptans, has not been included in the model because there are no existing Irish Air Quality Standards against which compliance may be assessed for these substances. Modelling of odour emission rates rather than individual substances is considered a more reliable indicator of potential odour impact and atmospheric significance of the emissions, which is in accordance with standard procedures. Modelling of some individual substances at the proposed WWTP has been included to test the robustness of the odour modelling approach and the sensitivity of projections to varying input data.

7.4 Baseline Environment

7.4.1 Meteorological conditions

The magnitude of potential odour effects of the Proposed Development on air quality will largely be influenced by the local meteorological conditions, in particular wind speed and direction, and precipitation rates. An

evaluation of the climatic conditions at the site is therefore useful for an assessment of the type required for this study.

Met Éireann operate a Synoptic Network of weather stations at Belmullet, Malin Head, Rosslare (closed since 2008), Johnstown Castle, Birr, Clones, Kilkenny and Mullingar while the Aviation Division of Met Éireann maintains observing stations at Shannon Airport, Knock Airport, Casement Aerodrome, Dublin Airport and Cork Airport. There is no continuous meteorological monitoring on the subject site but the general guidance on selection of meteorological data for air quality impact assessments is to choose representative data, recently acquired, which best represents conditions at the site. At least three years of recently acquired data is preferred.

Comprehensive monitoring data is available for Shannon Airport (ca. 16km north west of the site) which would be indicative of the meteorological conditions that are experienced at the site. Therefore, for the purpose of obtaining reliable information about the climatological conditions at the site of the Proposed Development, a full set of meteorological data for the period 2019 – 2023 recorded at Shannon Airport was analysed. This is considered an appropriate data set for the study because of the close proximity of the station to the site and the similarity in topography in the immediate area of both Shannon Airport and the site of the Proposed Development.

The wind rose for Shannon is presented in Figure 7-3 for the years 2019 – 2023 together with the long term average wind rose for 1946 – 2010. The dominant wind direction for Shannon is from the southwest quadrant with wind blowing from this quadrant for more than 40% of the time. The average long-term wind speed over the period 1991 to 2020 is 4.7m/s.

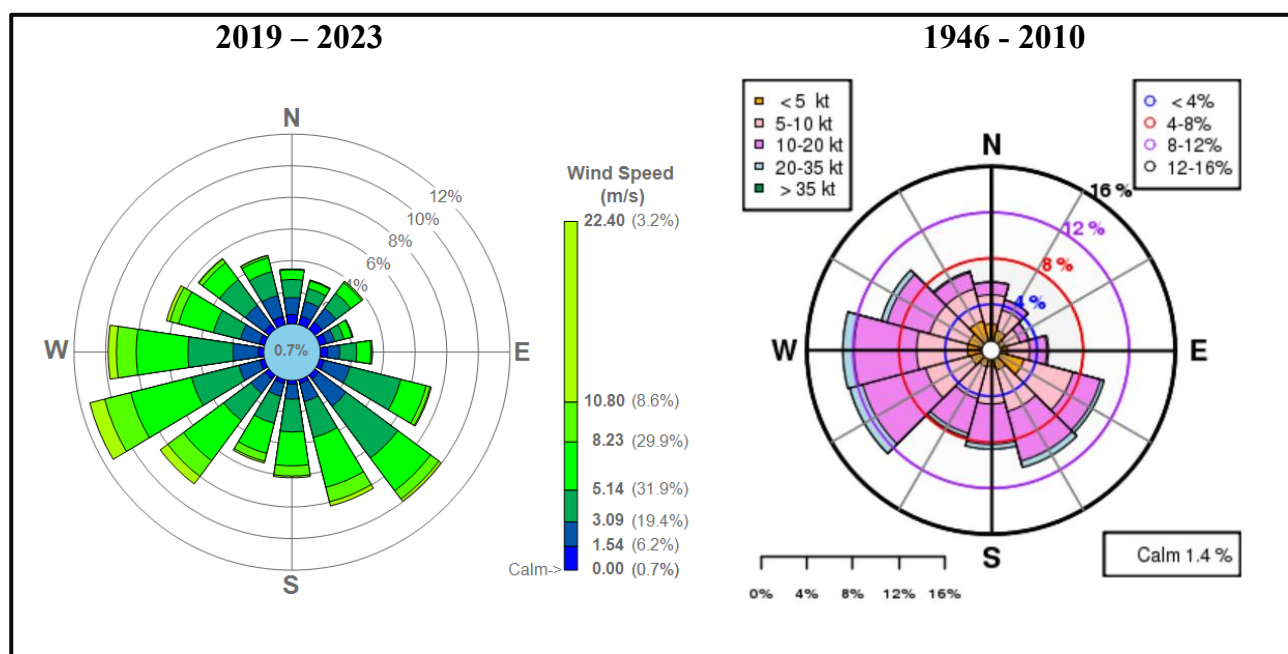


FIGURE 7-3: WIND ROSE FOR SHANNON AIRPORT

Comprehensive data for Cork Airport (located ca. 85km south of the site) is also available and was considered for the purpose of testing the sensitivity of the impact assessment predictions to the input meteorological data. Analysis of the monitoring data from the meteorological station at Cork Airport for the periods 2019 – 2023 shows that the dominant wind direction is from the S-SW-W quadrant, with in excess of 45% of wind directions in this quadrant, and wind from the W-NW-N quadrant for approximately 23%. The long term wind direction pattern is shown in the Wind rose in Figure 7-3 and the wind rose for 2019 – 2023 is also presented in Figure 7-4.

Wind speed and direction in particular is important in determining how emissions associated with the activity are dispersed. The prevailing wind direction determines which areas are most significantly affected by the emissions from the activity and wind speed determines in part the effectiveness of the dispersion of the emissions.

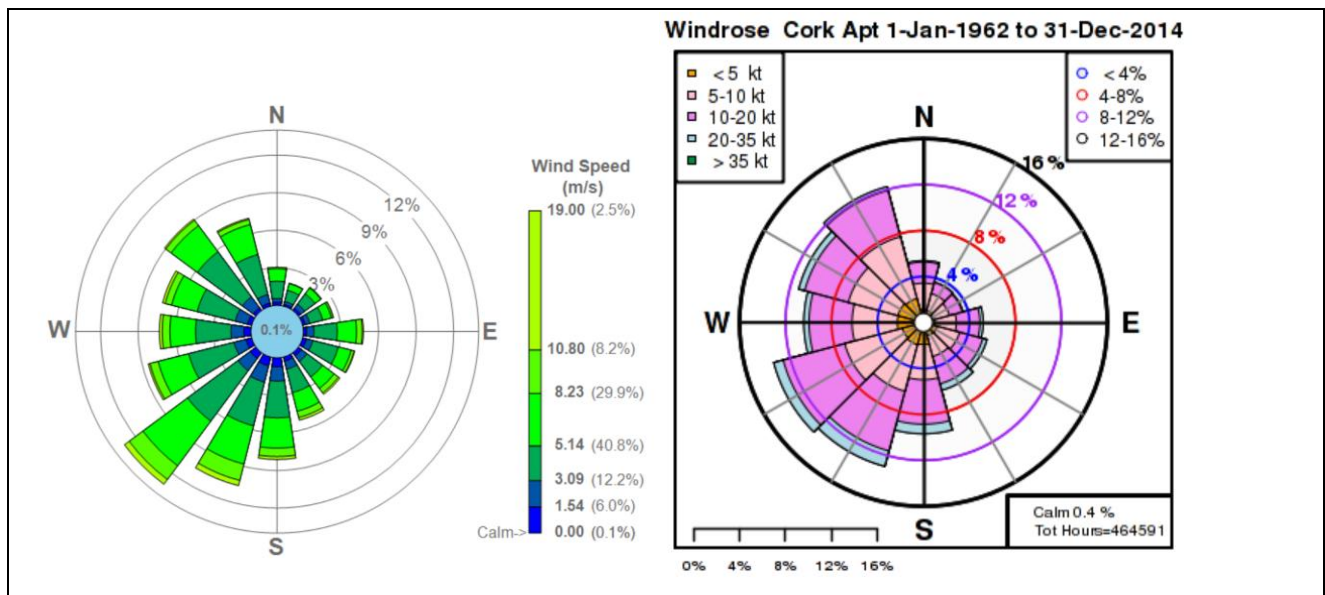


FIGURE 7-4: WIND ROSES FOR CORK AIRPORT, 2019 -2023 AND 1961 TO 2014

7.4.2 Baseline air quality

The existing activities at and near the Proposed Development site have the potential to exert an influence on ambient air quality by release of emissions to the atmosphere as follows:

- emissions of fine Particulate Matter (PM, PM₁₀ and PM_{2.5})², SO₂, NO_x, CO from domestic, commercial and industrial heating;
- emissions of fine PM (PM₁₀ and PM_{2.5}), SO₂, NO_x, CO and benzene from traffic on adjoining roads;
- emissions of dust and PM from agricultural activities.
- emissions of odour, ammonia, and hydrogen sulphide from the existing WWTP and outfall, and from the Pumping Station; and
- emissions of odour, ammonia, hydrogen sulphide and other odorous substances from licenced facilities in the area.

Overall, the contribution of traffic and commercial and industrial activities to air quality is considered to be the most significant influence on air quality in the immediate vicinity of the Proposed Development site, but all other sources also exert significant influences on air quality.

The main substances which are of interest in terms of existing air quality potentially affected by the Proposed Development are odorous substances and odour. Existing air quality indicator parameters are SO₂, NO_x (nitric oxide (NO) and nitrogen dioxide (NO₂), collectively referred to as NO_x), fine PM including PM₁₀ and PM_{2.5} which could originate from combustion sources, traffic and the existing commercial and industrial activities in the study areas. These indicator parameters are not specifically relevant to the odour impact assessment and are not considered further.

Odour emissions from the existing waste water treatment plant and Pumping Station are considered since the existing activities have potential to release odorous emissions to the environment. Baseline assessments were undertaken during visits to the site and surrounding areas in February 2024, October 2025 and December 2025. The Site inspections and odour assessments were completed in accordance with the Environmental Protection Agency AG5-2021 Guidance: Odour Impact Assessment Guidance for EPA Licensed Sites. During the assessments, there were site related odours found at boundary locations downwind of specific activities on the date of the February 2024 inspection. A faint odour of wastewater / sludge could be intermittently detected at a boundary location due to sludge being loaded into trailers at bays near the receptor. There were no

² PM₁₀ and PM_{2.5} are particulate matter fractions having aerodynamic diameter less than 10 micron and 2.5 micron, respectively

continuous odours detected during these inspections and none of the odour detections were classified as nuisance on the dates of the inspections. On-site odour assessments were also conducted during the February 2024 assessment visit and slight odours were detected in the vicinity of sludge handling activities; the odours had dissipated within 10m of the source where they were detected and therefore did not reach the site boundary at that time.

There are a number of industrial facilities in the immediate vicinity of the WWTP and PS sites which have the potential to release odorous emissions to atmosphere. The EPA map register was reviewed to identify licenced facilities in the immediate vicinity of the sites and the details are shown in Figure 7-5. The closest licenced facilities to the WWTP boundary are W0082 (Starrus Eco-Holdings Ltd, Waste Recovery & Disposal), P0029 (Irish Cement, cement manufacturing) and P1136 (Valcrock, Waste Recovery & Disposal). The Waste companies have the potential to release odorous emissions to atmosphere as a result of their activities. The closest licenced facility to the PS is an animal feed company (P01048) with no significant potential to release odorous emissions to atmosphere.

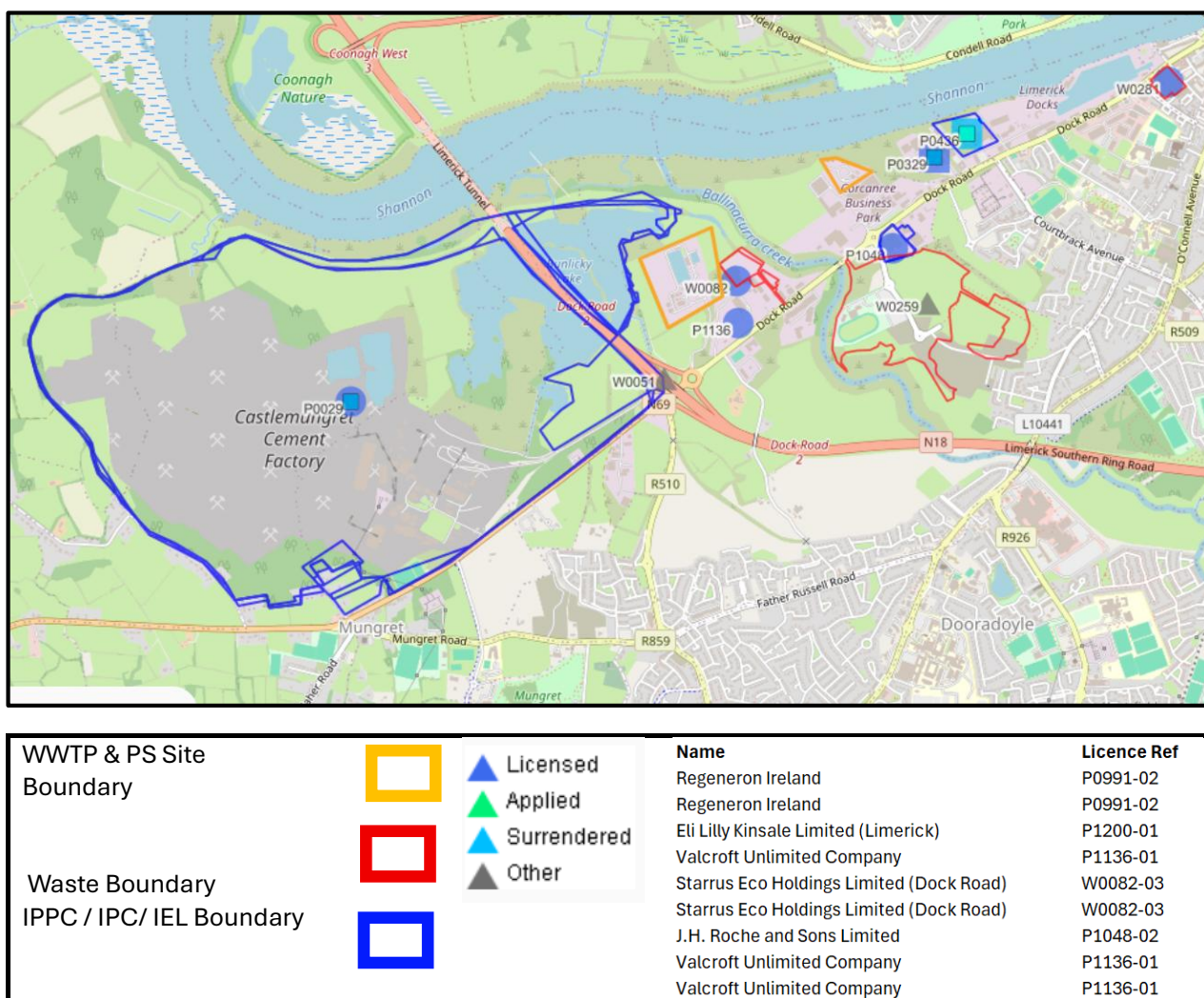


FIGURE 7-5: EPA LICENCED FACILITIES IN THE AREA

7.5 Evolution of the Environment in the Absence of the Proposed Development

In the absence of the Proposed Development, the existing facilities at Limerick WWTP and Corcanree PS would continue to operate. Limerick WWTP is currently operating at the limits of its design capacity as set out in Chapter 1 (Introduction) and growth projections indicate that, without intervention, it will become overloaded in the coming years. This would cause severe deterioration in the quality of the final effluent discharge, and there would be subsequent negative effects on receiving water quality in the Lower River Shannon and SAC

habitats. With the deterioration in water quality, and the overloading relative to capacity, it would be expected that odour emissions will increase and there is potential for adverse odour impacts to arise.

In addition to the potential for overloading relative to capacity, the WWTP is an aging facility having served the Limerick agglomeration since the early 2000's and several items of plant and equipment central to the process require replacement or refurbishment. There are specific commitments to providing capacity to industrial facilities not yet fully utilised, and there is a requirement to provide capacity for growth in domestic, commercial and institutional users. Meeting these demands will lead to significant overload of the existing facility with the potential for increased odour emissions and potential for adverse odour impacts to arise. In the event that the Proposed Development does not proceed, it would be expected that odour emissions would increase and it is likely that there would be an increase in the detection of odours at the site boundaries and at receptors in the area.

The Proposed Development addresses these problems by increasing the capacity of the WWTP to cater for +10-year population growth projections, extending the existing WWTP to provide for future industrial committed load provision made for the +25-year growth projections in the design of the Proposed Development, thereby preventing future adverse odour impacts that would be associated with capacity overload of the existing facility.

7.6 Potential Impacts

7.6.1 Construction Phase

The details of the Construction Phase are described in Chapter 4 (Construction Strategy) and these details have been considered in this assessment. An overview of the elements of work that will be undertaken during the Construction Phase is set out in Table 7-3 where an initial screening of potential odour impacts is summarised.

The WWTP will remain operational during the construction phase. All new structures will be constructed offline and connected during temporary shutdowns. The shutdowns will be planned in a manner that will not affect WWTP performance.

There is some potential for odour emissions to arise during elements of work that interact with the existing infrastructure and processes. There is no potential for odour emissions during the vast majority of the construction phase of the Proposed Development. Six of the thirteen Construction Stages have been screened out as having no potential to lead to odour emissions. The remaining 7 Construction Stages as set out in Table 7-3 do have some potential for the release of odour emissions but this potential is limited to a short defined period of time and does not extend to the full duration of the construction works for those elements. The methodology outlined in Section 7.3.2 which is based on the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (EPA, 2022) was applied to the assessment of significance of these potential effects and the assessment findings are presented in Table 7-4. Effects are assessed as either brief or Temporary and all potential effects are assessed as **Imperceptible** or **Not Significant**. This methodology is also entirely consistent with the IAQM Methodology and the same conclusions are reached using the two different assessment approaches.

TABLE 7-3 POTENTIAL CONSTRUCTION PHASE ODOUR EFFECTS

CONSTRUCTION STAGE	ESTIMATED DURATION	POTENTIAL ODOUR IMPACTS
Detailed design	3 months	None
Establishment of the compound and site clearance works	2 months	None
Construction of the new 157,000 PE inlet works and Activated Granular Sludge (AGS) process stream at the WWTP site and installation of the new Thermal Hydrolysis Process (THP)	18 months	Potential odour effects could arise during certain stages of work when existing facilities / activities are affected by Construction works
Construction of the new 12,500m ³ storm tank at Corcanree	18 months	Potential odour effects could arise during certain stages of work when existing facilities / activities are affected by works
Civil works to construct the remaining subsurface and above ground structures	12 months	Potential odour effects could arise during certain stages of work when existing facilities / activities are affected by works
Open cut construction of interconnecting pipework	2-months	None
Diversion of 1 No. rising main from Corcanree PS to the new process stream	2-months	Potential odour effects could arise during certain stages of work when existing facilities / activities are affected by works
Refurbishment of existing 2. No digester feed tanks	2-months	Potential odour effects could arise during certain stages of work when existing facilities / activities are affected by works
Installation of process, mechanical and electrical equipment	8-months	None
Site finishes and landscaping	2-months	None
Testing and commissioning	3-months	Potential odour effects could arise while processes are optimised
Performance testing of the upgraded processes	3-months	Potential odour effects could arise while processes are optimised
Decommissioning of process, pipework, mechanical and electrical equipment	2-months	None

Note

Some of the above activities will overlap and be undertaken in parallel.

TABLE 7-4 ASSESSMENT OF POTENTIAL CONSTRUCTION PHASE ODOUR EFFECTS

CONSTRUCTION STAGE	DURATION OF EFFECT	SIGNIFICANCE
Construction of the new 157,000 PE inlet works and Activated Granular Sludge (AGS) process stream at the WWTP site and installation of the new Thermal Hydrolysis Process (THP)	Brief Temporary	Some activities could lead to brief odour effects and other odour effects could be temporary. The extent of effects could be days but not a year. Both are assessed as Not Significant .
Construction of the new 12,500m ³ storm tank at Corcanree	Temporary	The extent of effects could be days but not a year. Integration of new pipework could lead to odour effects which are assessed as Not Significant .
Civil works to construct the remaining subsurface and above ground structures	Brief	Integration of new structures could lead to odour effects which are assessed as Not Significant .
Diversion of 1 No. rising main from Corcanree PS to the new process stream	Temporary	The extent of effects could be days but not a year. Integration of new systems for the diversion could lead to odour effects which are assessed as Not Significant .
Refurbishment of existing 2. No digester feed tanks	Temporary	The extent of effects could be days but not a year. Integration of new systems could lead to odour effects which are assessed as Not Significant .
Testing and commissioning	Brief Temporary	Most of the testing and commissioning works e.g. electrical and mechanical works has no potential to lead to odour effects. There is potential for a small number of activities to lead to odour effects over short periods of time (days). These effects are assessed as Imperceptible .
Performance testing of the upgraded processes	Temporary	Process testing and commissioning could lead to odour effects that last up to a few days. Such elements of process testing and commissioning could lead to odour effects which are assessed as ranging from Imperceptible to Not Significant .

7.6.2 Operational Phase

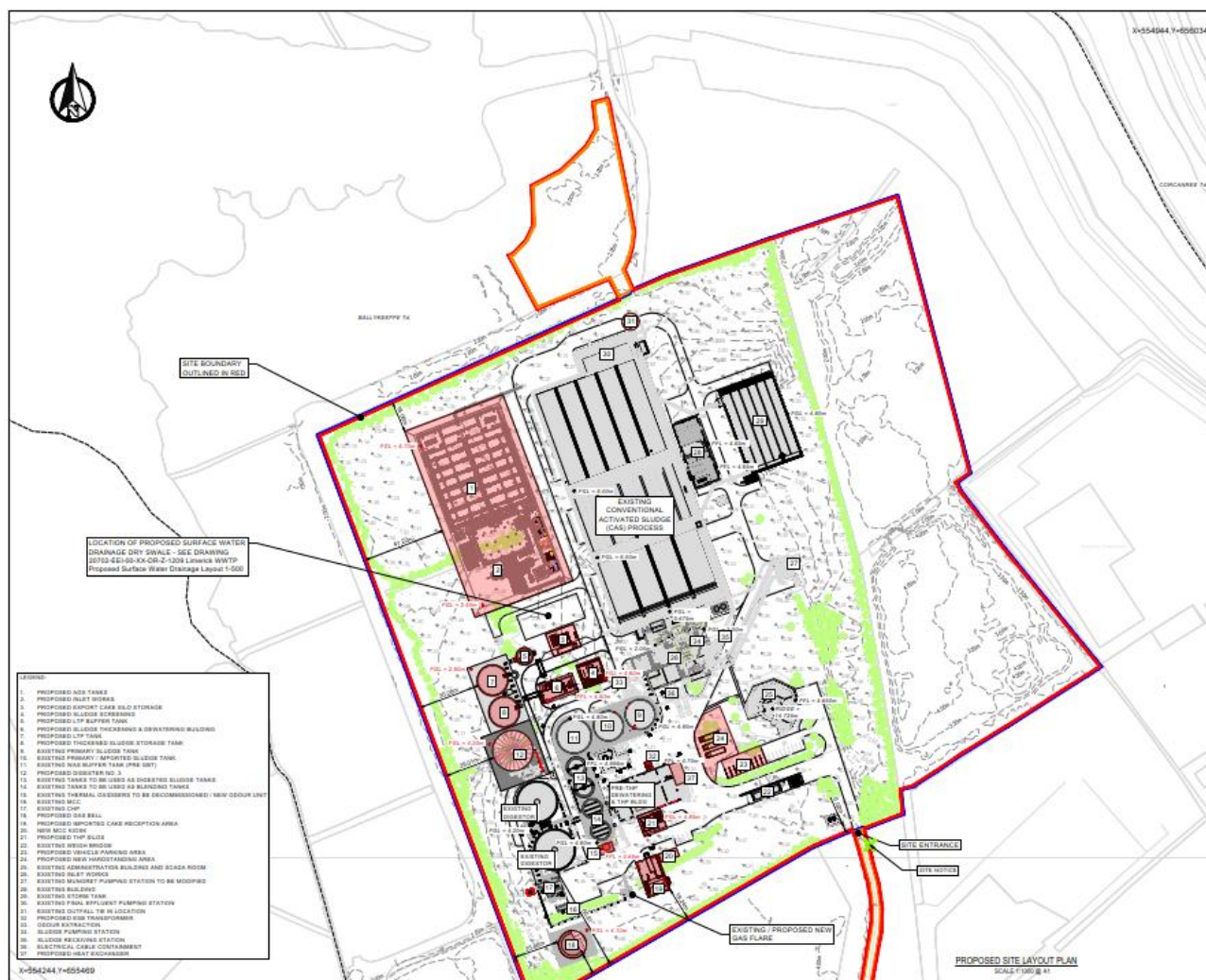
7.6.2.1 Potential sources of emissions

The details of the Proposed Development are described in Chapter 1 (Introduction) and Chapter 3 (The Proposed Development) and these details have been considered in this assessment. The Proposed Development proposals will upgrade the existing WWTP capacity, sludge treatment capacity and stormwater storage capacity. The work requirements are spread over 2 No. sites, Limerick WWTP and Corcanree PS. Both sites are located in an industrial location near the Dock Road, Limerick. The existing land use at both locations comprises of wastewater treatment activities. Land in the surrounding areas in the immediate vicinity of the sites is predominantly industrial and commercial with some land in agricultural use.

The existing WWTP operates as a conventional activated sludge plant, and the PS is a conventional pumping station with foul pumps to pump forward to the WWTP. The Proposed Development is primarily intended to increase capacity, and the main elements of the Proposed Development are summarised below:

- Wastewater Treatment Capacity Upgrade
 - Construct a new 157,000 PE inlet works and AGS process stream to operate in parallel with the existing WWTP arrangement.
 - Divert 1 no. rising main from Corcanree PS to the new process stream, allowing a 50:50 flow split between the new and existing works.
 - New Rising Main at Mungret pumping station.
- Stormwater Storage (Corcanree PS)
 - Complete acquisition of Shannon Foynes Port Company (SFPC) lands (greenfield) to the east of Corcanree PS site.
 - Construct new 12,500m³ stormwater storage tank with gravity overflow to existing Corcanree outfall chamber.
 - Retain existing rising mains to the WWTP site.
 - Upgrade existing foul pumps to increase pumping capacity to the WWTP.
- Regional Bioresource Centre
 - Retain existing imported cake sludge reception facility.
 - Construct a new dewatered sludge cake reception facility.
 - Retain & refurbish existing 2. No digester feed tanks as pre -THP dewatering feed tanks.
 - New odour control system to cater for overall sludge hub installation.
 - New dewatered sludge cake silo for blending and storage of cake imports.
 - New Thermal Hydrolysis plant (THP).
 - New 3rd Anaerobic Digestion tank to allow operational flexibility.
 - Provide additional gas storage to facilitate increased biogas production.
 - CHP and Biomethane production options.
 - New digested sludge dewatering installation to cater for full digested sludge.
 - Treated biosolid export storage silo.
 - Upgraded wash water system with added UV treatment.

An extract from the frozen design drawing showing the proposed layout is presented in Figure 7-6 with the new / upgraded elements shown in red alongside the existing activities. This extract is reproduced to illustrate the location and scale of the new elements of the WWTP alongside the existing structures and process.



The potential emissions to atmosphere at the sites during the operational phase therefore arise as follows:

- Emissions to atmosphere from the operation of the existing WWTP and PS.
- Emissions to atmosphere from the operation of the new inlet works and AGS process stream at the WWTP.
- Emissions to atmosphere from the new Regional Bioresource Centre at the WWTP.

Each of these separate sets of activities will lead to the release of emissions to atmosphere including odour. There are a number of possible sources of emissions to atmosphere during the Operational Phase from the various elements of the Proposed Project as summarised in Table 7-5. A discussion on the nature and significance of these emissions is presented in the following sections.

TABLE 7-5 POTENTIAL SOURCES OF ODOUR EMISSIONS TO ATMOSPHERE

WORKS ELEMENT AND EMISSIONS SOURCE	POTENTIAL EMISSIONS
Existing Inlet works	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing CAS Tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing Final Effluent Pumping Station	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing SBR Tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing Storm Tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing Thickened sludge storage tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing primary sludge tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing imported sludge tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing WAS Buffer tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing Digester Tank x 2	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing Pre-THP dewatering and THP building	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing Primary Sludge Tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing Imported Sludge Tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Existing WAS Buffer Tank (pre-GBT)	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
2 (No) Existing tanks to be used as Digested Sludge Tanks	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
2 (No) Existing tanks to be used as Digester Feed Blending Tanks	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed new AGS Tanks	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed new Inlet Works	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed new Liquids Import Reception	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed Cake Silo storage	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed WAS, Poly dosing, digested sludge dewatering	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed LPT Tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed LPT Buffer Tank	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed thickened sludge storage tank (post GBT pre-THP thickening)	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Potential future Gas Storage Bell	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed new Odour Control Unit	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed New CHP	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed imported cake reception area	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances
Proposed pre-THP silos	Odour; Hydrogen sulphide (H ₂ S), ammonia, organic substances

7.6.2.2 Quantitative estimate of emissions

Odour emissions may arise at all stages of the treatment process. Estimates of odour emission rates were made using information derived from the following sources:

- Literature references, including the UK Water Industry Research's (2000) Technical Reference Document *Odour Control in Wastewater Treatment (Ref 01/WW/13/3)* and the WRc publication CP149 *Reducing odour from Sludge*;
- Measurement data for existing similar WWTPs;
- Information provided by the operators of similar WWTPs throughout Europe; and
- Egis Report Odour Abatement System Requirements Limerick (Bunlicky) WWTP Interim Sludge Upgrade, April 2025.

The existing WWTP will continue to operate alongside the Proposed Development and therefore the odour emission rate data for the existing facilities is considered in assessing the cumulative impact of odour emissions from the existing facilities and the Proposed Development.

A detailed specification for odour control was provided by Egis in the *document Odour Abatement System Requirements: Limerick (Bunlicky) WWTP Interim Sludge Upgrade, April 2025*. The principal features specified are summarized as follows:

- An odour control plant comprising an Odour Control Unit (OCU), two odour fans (one duty, one standby) shall be provided to extract, convey, treat, and discharge air from the following units:
 - Transfer Sludge PS (12 ACH-1 / 452.39 m/hr)
 - Imported Sludge Storage Tank (2 ACH-1 / 3331.88 m/hr for each of two tanks)
 - WAS Tank (1 ACH-1 / 2246.25 m/hr)
- The total air extraction rate for all units combined is 9362.39 m/hr
- Odour concentrations must remain below 500 OU/m³ at the outlet, and below 3 OU/m³ at the boundary and 4 no. monitoring locations.

A detailed specification for the minimum hydrogen sulphide concentrations to be included in dispersion modelling as well as the odour emission rates was provided as set out in Table 7-6 below. Additional information was also provided in relation to the minimum and peak odour emission rate for each of the activities which were being extracted to the Odour Control Unit as reproduced in Table 7-7. The most important information derived from this report and data is that the outlet odour concentration from the Odour Control Unit would not exceed 500 OU_E/m³ and 0.035 ppb H₂S. Since the existing activities are continuing this emission rate data was considered in the assessment of overall impact of the Proposed Development.

TABLE 7-6 ODOUR EMISSION RATES FROM EXISTING WWTP ACTIVITIES

Process Unit	Odour Emission (OU/m ² /s)	Hydrogen Sulphide Emission (µg/m ² /s)
Screen	200 ⁽¹⁾	60
Screenings	150 ⁽²⁾	
Grease trap	1000 ⁽²⁾	
Grease from grease trap	4200 ⁽²⁾	
Grit channel	560 ⁽²⁾	
Sand from grit chamber	180 ⁽²⁾	
Channel to PST	250 ⁽¹⁾	75
PST including weirs	76 ⁽¹⁾	23
Distributor to aeration tank	1000 ⁽¹⁾	300
Activated sludge FBDA	40 ⁽¹⁾	0.6
Activated sludge surface aeration	100 ⁽¹⁾	1.5
Final tank	3 ⁽¹⁾	0.1
Tertiary biological treatment	27 ⁽¹⁾	0.4
Quiescent raw sludge tank/lagoon	160 ⁽¹⁾	120
Primary sludge thickener	970 ⁽²⁾	
Stabilised sludge thickener	140 ⁽²⁾	
Stabilised sludge, dewatered	450 ⁽²⁾	
Raw sludge tank, some disturbance	1400 ⁽¹⁾	1100
SAS tank	3 ⁽¹⁾	0
Digested sludge tank	280 ⁽¹⁾	210
Sludge cake	80 ⁽¹⁾	24
1) UKWIR: Odour Control in Wastewater Treatment: A Technical Reference Document. Report Refer No.: 01/ww/13/3. 2001.		
2) Prediction of odorous emissions' in Odours in Wastewater Treatment, measurement modelling control ed R. Stuetz and F-B Frechen, IWA Publishing, 2001 ISBN 1 900222 46 9 page 210.		

Reproduced from Egis Report *Odour Abatement System Requirements Limerick (Bunlicky) WWTP Interim Sludge Upgrade*, April 2025

TABLE 7-7 ODOUR EMISSION RATES FROM EXISTING ACTIVITIES

Minimum														
Parameter	Diameter	Surface Area	Height	Roof Height	Tank Empty Volume	Total Tank Empty Volume	ACH ⁻¹	Air Extraction Rate	Odour Release Rate	Total Odour Release Rate	Odour Concentration	H ₂ S inlet concentration	Desired Concentration	Required Reduction
Unit	m	m ²	m	m	m ³	m ³		m ³ /hr	OU/s/m ²	OU/hr	OU/m ³	ppm	OU/m ³	%
Transfer Sludge PS	4.00	12.57	3.00	0.00	37.70	37.70	12.00	452.39	1400	63334508	140000	70.00		
Imported Sludge Storage Tank 1	17.06	228.64	6.22	3.20	1422.13	1665.94	2.00	3331.88	160	131695896	39526	19.76		
Imported Sludge Storage Tank 2	17.06	228.64	6.22	3.20	1422.13	1665.94	2.00	3331.88	160	131695896	39526	19.76		
WAS Tank	19.62	302.46	6.22	3.62	1881.29	2246.25	1.00	2246.25	5	5444242	2424	1.21		
Total								9362.39		332170542	35479	17.74	500.00	98.6%
Peak														
Parameter	Diameter	Surface Area	Height	Roof Height	Tank Empty Volume	Total Tank Empty Volume	ACH ⁻¹	Air Extraction Rate	Odour Release Rate	Total Odour Release Rate	Odour Concentration	H ₂ S inlet concentration	Desired Concentration	Required Reduction
Unit	m	m ²	m	m	m ³	m ³		m ³ /hr	OU/s/m ²	OU/hr	OU/m ³	ppm	OU/m ³	%
Transfer Sludge PS	4.00	12.57	3.00	0.00	37.70	37.70	12.00	452.39	1400	63334508	140000	70.00		
Imported Sludge Storage Tank 1	17.06	228.64	6.22	3.20	1422.13	1665.94	2.00	3331.88	1400	1152339086	345853	172.93		
Imported Sludge Storage Tank 2	17.06	228.64	6.22	3.20	1422.13	1665.94	2.00	3331.88	1400	1152339086	345853	172.93		
WAS Tank	19.62	302.46	6.22	3.62	1881.29	2246.25	1.00	2246.25	50	54442424	24237	12.12		
Total								9362.39		2422455105	258743	129.37	500.00	99.8%

Reproduced from Egis Report *Odour Abatement System Requirements Limerick (Bunlicky) WWTP Interim Sludge Upgrade, April 2025*

TABLE 7-8 PREDICTED ODOUR EMISSION RATES FROM THE PROPOSED WWTP

WORKS ELEMENT AND EMISSIONS SOURCE	ODOUR EMISSION RATE $\text{OU}_E/\text{M}^2\text{-S}$
Inlet works	11
Preliminary treatment	20
Primary treatment	2
Activated Sludge Plant	2
Final settlement tanks	2
Sludge Treatment	90
Digesters	90
Dewatering and drying	12
THP	$500 \text{ OU}_E/\text{m}^3$
Sludge plant and OCU	$500 \text{ OU}_E/\text{m}^3$

7.6.2.3 Predicted Operational Phase Odour Impact

Odour emissions to atmosphere from the Proposed Development during the Operational Phase can arise as set out in Section 7.6.2.1 and Section 7.2.2.2. The predicted impact of the emissions is assessed by comparing the predicted ground level concentration of odour arising from the facility at and beyond the site boundary and at sensitive receptors with the assessment criterion of $3 \text{ OU}_E/\text{m}^3$ for the 1-hour ground level concentration expressed as a 98th percentile. The dispersion model was executed to consider all of the emissions from the facility, including fugitive emissions associated with the Proposed Development, and also considering the parallel ongoing operation of the existing activities alongside the new and upgraded activities and processes.

The odour modelling results are presented in Table 7-9 and isopleths showing modelling predictions are presented in Figure 7-7. Further modelling predictions and isopleths for other scenarios are presented in Appendix 7-1 in Volume 4 of this EIAR.

TABLE 7-9 PROPOSED DEVELOPMENT: MAXIMUM PREDICTED GROUND LEVEL CONCENTRATION OF ODOUR

AIR QUALITY IMPACT ASSESSMENT CRITERION	PREDICTED GROUND LEVEL CONCENTRATION (OU_E/M^3)				
	2019	2020	2021	2022	2023
$3 \text{ OU}_E/\text{m}^3$ 1-hour limit not to be exceeded more than 176 hours per year (98 th percentile)	0.86	0.51	0.62	0.63	0.62

Note

1. The target odour standard is applied at sensitive receptors near the facility in accordance with EPA Guidance.
2. The target to prevent nuisance at the site boundary is $3 \text{ OU}_E/\text{m}^3$ for the 98th percentile of one-hour average GLC.

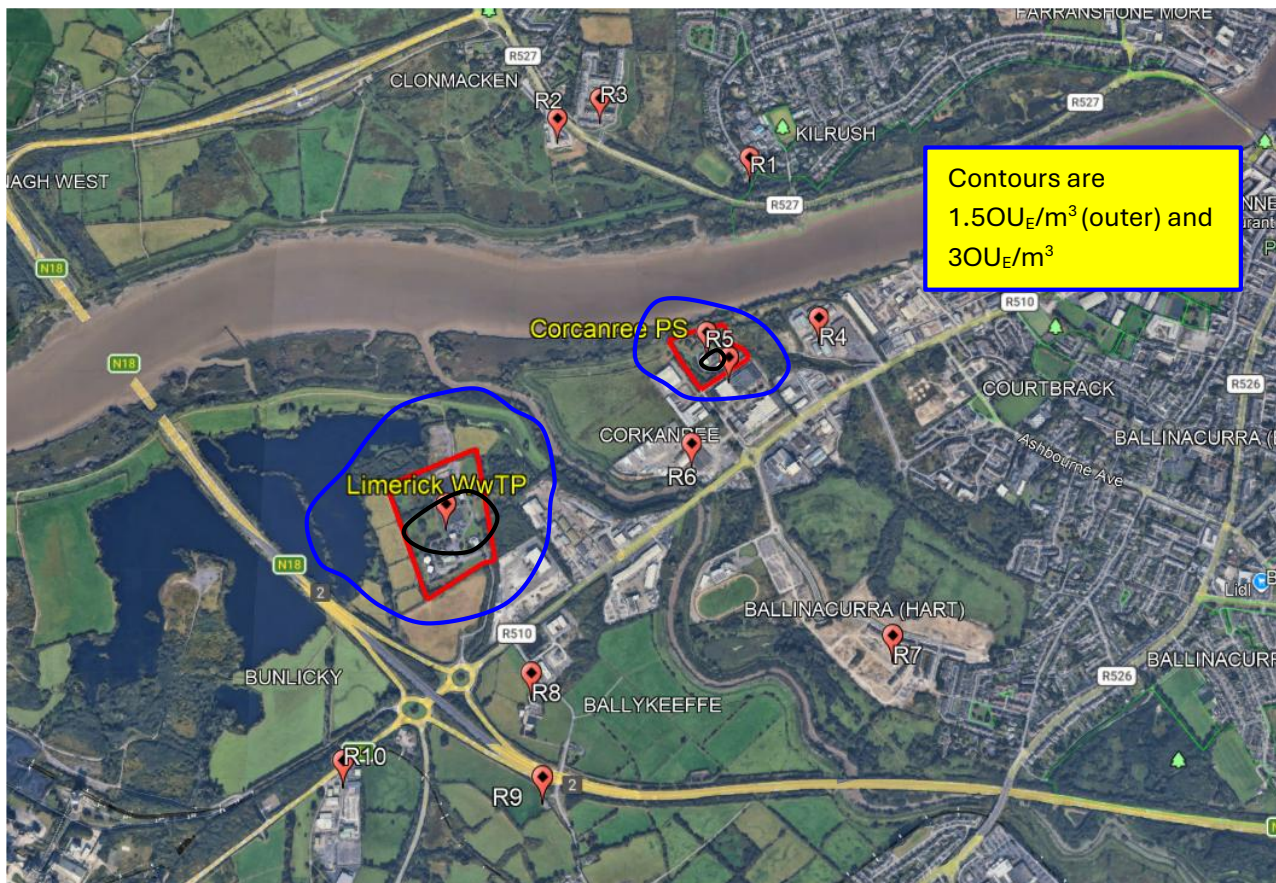


FIGURE 7-7: ISOPLETH SHOWING THE MAXIMUM PREDICTED GROUND LEVEL CONCENTRATION OF ODOUR ARISING FROM PLANT EMISSIONS, EXPRESSED AS THE 98TH PERCENTILE OF THE 1-HOUR GLC

The data presented in Table 7-9 represents the maximum potential ground level concentrations of odour expressed as the 98-percentile of 1-hour ground level concentrations for each of the modelled data sets. When the predictions are compared with the appropriate performance standard of $3.0 \text{ OU}_E/\text{m}^3$ for the combined impact of all emission sources, the model has demonstrated that the predicted concentrations are below the assessment criterion levels. This indicates that in accordance with the relevant Guidance that odour nuisance will not occur beyond the site boundary as a result of the emissions from the Proposed Development.

There is some potential for odour emissions to arise during the Operational Phase of the Proposed Development and as noted above, the dispersion modelling assessment has demonstrated that odour nuisance will not arise as a result of the emissions. The methodology outlined in Section 7.3.2 which is based on the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (EPA, 2022) was applied to the assessment of significance of the potential odour effects and the assessment findings are presented here. Effects are assessed as either **Brief** or **Temporary** and all potential effects are assessed as **Not Significant** based on the finding that the odour assessment criterion is satisfied as set out above.

7.7 Mitigation Measures

7.7.1 Construction Phase

Mitigation and monitoring measures have been identified which shall avoid, reduce or offset potential impacts which could arise throughout the Construction Phase of the Proposed Development. The principal mitigation measures proposed relate to the integration of the new infrastructure and process with the existing activity. Integration activities have the potential to lead to odour effects and the duration of integration activities should be minimised to minimise the potential for adverse impacts on the surrounding area. While the potential effects have been assessed as Imperceptible to Not Significant, it is recommended that the duration of these activities should be minimised in accordance with best practice.

7.7.2 Operational Phase

The principal mitigation measures for the Operational Phase of the Proposed Development relate to the containment of odours at source for the most significant odour sources and treatment in dedicated Odour Control Units. The performance of the Odour Control Units will be monitored during a comprehensive Process Proving Phase at commissioning and at regular intervals throughout the lifetime of the facility. Continuous monitors will be installed which monitor key elements of performance for the abatement systems, such as H₂S levels in the exit gases. Independent performance checks will be carried out by an ISO17025 accredited testing laboratory at quarterly intervals during the first two years of operation to verify the effectiveness of control measures and ongoing compliance with the required performance standards.

The most important factor that allows for verification of performance, and acts as a check on the effectiveness of the procedures and controls in place, is the odour emission rate from the abatement systems at the facility, which has been determined from the dispersion model to not cause odour nuisance at the site boundary. This level has been determined in the assessment reported here. During operation, measurements on the odour level in the outlets from the abatement systems will be carried out to ensure that the performance of the odour abatement systems meets the design specifications and ensures that odour is not detectable at nuisance levels beyond the site boundary.

The facility will continue to be regulated by the EPA, which ensures that best practice operating and management procedures will continue to be implemented at the facility. Ongoing adherence to the criteria outlined in the *Prevention of Odours and Noise Regulations 2005* and monitoring results for odour and noise performance will be included in the annual reports submitted to the EPA as part of the licencing process for the plants.

7.8 Residual Impacts

7.8.1 Construction Phase

There is very little potential for odour emissions during the Construction Phase of the Proposed Development. The only potential for odour emissions will be during the integration of the new and existing elements of the plants. This integration activity will be carefully managed, and the duration minimised to ensure that the potential for odour impacts to arise is minimised, and no residual effects are expected to occur. There will be no residual impacts after completion.

7.8.2 Operational Phase

The proposed mitigation and management measures are considered to be effective in the management of odour impacts associated with the Proposed Development and will ensure that there are no significant residual impacts. Operational Phase effects are assessed as either **Brief** or **Temporary** and all potential effects are assessed as **Not Significant** based on the finding that the odour assessment criterion is satisfied as set out above. Consequently, there will be no significant residual effects.

7.9 Cumulative Impacts and Interactions

7.9.1 Construction Phase

There is no **potential for cumulative odour impacts to arise during the construction phase of the Proposed Development**. The only odour emissions potential associated with construction at the WWTP and PS is at the integration stage and this stage will be very carefully managed to ensure that the predicted Imperceptible to Not Significant odour effects are achieved. Consequently, there is no potential for adverse odour impact during the construction phase.

7.9.2 Operation Phase

The cumulative effects of the Proposed Development in conjunction with current and future developments in the vicinity of the subject site are considered in this section. Cumulative odour impacts from the WWTP and

the PS were considered specifically in the assessment carried out and no significant adverse impacts were identified.

Permitted and proposed developments in the vicinity of the WWTP site were reviewed, including the following:

- Planning Ref. 2561339 – Retention and modification of an existing waste transfer facility and associated access road and hardstanding areas.
- Planning Ref. 16/642 – Permitted waste transfer facility including buildings, hardstanding, drainage infrastructure and connection to the wastewater network.
- Planning Ref. 19/672 – Installation of roof-mounted solar panels at an existing materials recovery facility and associated works.
- Planning Ref. 16/345 – Industrial development at Irish Cement involving alternative fuels and materials handling, with associated drainage and containment infrastructure.
- 2561339 - alterations to an existing Waste Transfer Station permitted by Limerick City and County Council - Mr. Binman, Dock Road, Ballykeeffe, Limerick. (Further Information is required)

Permitted and proposed developments adjacent to Corcanree Pumping Station include the following:

- Planning Ref. 22/1280 – Commercial and logistics development including warehouse units, drainage infrastructure, attenuation and pumping arrangements.
- Planning Ref. 20/687 – Extension and recladding works to an existing industrial building and associated site works.

The most relevant nearby sites are the Waste sites close to the WWTP and PS facilities as set out in Section 7.4.2. These sites are located adjacent to the WWTP site boundary and at a distance from the PS boundary. These sites may emit odour into the environment; however, these facilities are located predominantly downwind of the WWTP and due to the nature of the licenced activities are unlikely to lead to measurable cumulative impacts.

The largest EPA licenced facility in the area is the Irish Cement Works at Mungret which is located predominantly upwind of the Proposed Development. Due to the nature of activities at this site, the assessment concluded that there is no potential for cumulative odour impacts from this development.

The Review determined that most of the developments have no potential for cumulative odour impacts to arise. Developments at the waste facilities adjacent to the WWTP site boundary do have potential to generate odour emissions and there is potential for cumulative impacts to arise. All facilities, including the Limerick WWTP and PS, are regulated under Licence from the EPA and as a result the facilities must comply with stringent odour management conditions to ensure that odours are not detected at nuisance levels beyond the site boundary. In meeting these Licence Conditions, it is ensured that cumulative impacts do not result in adverse impact beyond the site boundary.

7.10 Difficulties encountered in Compiling Information

There were no specific difficulties encountered when carrying out this assessment.

7.11 References

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