

Limerick WWTP Upgrade and Regional Bioresource Centre

Appendix 4.1 – Construction Environmental Management Plan

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Formerly JB Barry Partners who became part of Egis in 2023

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1 INTRODUCTION

1.1 Overview

This Construction Environmental Management Plan (CEMP) has been prepared by Egis to support Uisce Éireann's application for consent for the proposed Limerick WWTP upgrade and Regional Bioresource Centre project (hereafter referred to as the Proposed Development). CEMP sets out the procedures, standards, work practices and management responsibilities to address potential environmental effects that may arise from construction of the Proposed Development. A detailed Construction Environmental Management Plan (CEMP) will be prepared by the contractor based on this CEMP. The CEMP will be prepared prior to the commencement of the Construction Phase, so as to ensure any additional measures required pursuant to conditions attached to any decision to grant approval are included in the plan.

The detailed CEMP shall also comply with the requirements of the relevant authorities/environmental bodies.

The detailed CEMP shall be updated as necessary during the course of the Construction Phase and will be reviewed on a regular basis by the project manager/environmental manager on site. As an absolute minimum requirement, the CEMP shall be reviewed by the Contractor every three months.

Notwithstanding the above requirements, the CEMP shall be reviewed by the Contractor and agreed with the Project Manager at least two weeks prior to the construction stages listed below:

- Setting-up the construction compound; and
- Commencement of any site activity that may potentially have an effect on wildlife or the environment (in particular surface water drainage discharges).

Towards the end of the Construction Phase, the CEMP will be further refined by the Contractor into a Handover Environmental Management Plan (HEMP) for the future maintenance and operation of the Proposed Development.

1.2 Purpose of CEMP

The purpose of the CEMP is to set out the management framework for the delivery of the proposed construction works and to illustrate how the Proposed Development could be delivered in a logical, sensible, and safe sequence with the incorporation of specific environmental commitments, as set out in Section 6.

The CEMP will be used by the appointed contractor(s) and their personnel as a guidance document for the Construction Phase of the Proposed Development outlining procedures for the delivery of environmental mitigation measures and for addressing general day-to-day environmental issues that could arise during the Construction Phase of the Proposed Development.

This CEMP will document the commitment to safeguarding the environment through the identification, avoidance and mitigation of the potential negative environmental impacts which are associated with the construction of the Proposed Development.

The CEMP aims to define good practice as well as specific actions or mitigation measures required to be implemented. This CEMP is a live document which will be developed further and/or amended where necessary, subsequent to any information that may be made available from additional consultations, ongoing monitoring on site etc. The CEMP will form part of the Construction works Contract for the Proposed Development and will inform the preparation of method statements required for works associated with the construction of the Proposed Development.

1.3 Reference Documents

The CEMP has been prepared as part of the EIAR and the NIS, and should be read in conjunction with the following specific documents:

- The EIAR, with particular reference to Chapter 4 (Construction Strategy);
- The NIS; and
- Copies of An Coimisiún Pleanála's Order, Inspector's Report and associated documentation.

This document has been prepared in accordance with relevant best practice guidance of Construction Industry Research and Information Association's (CIRIA) *Environmental Good Practice on Site Guide* (C811, 2023) and CIRIA's *Guidance Control of Water Pollution from Construction Sites* (C532, 2001). This Plan aims to define good practice as well as specific actions required to implement mitigation requirements at the site of the Proposed Development.

All available information of the Proposed Development has been incorporated into this CEMP. This document provides a detailed overview of key environmental considerations for the project as a whole, while also allowing for further refinement as the project progresses through to the construction stage. This CEMP identifies the key environmental considerations to be adhered to and delivered during the site Construction Phase.

1.4 Scope

This CEMP provides the framework to:

- Describe the programme for environmental management during construction;
- Implement those mitigation and monitoring measures identified in the EIAR;
- Outline the principles and minimum standards required of the contractor during the development of the detailed CEMP (and associated Method Statements) and throughout construction;
- Identify the relevant roles and responsibilities for developing, implementing, maintaining and monitoring environmental management; and
- Outline the procedures for communication and reporting on environmental aspects of the Proposed Development throughout construction.

It is intended that this CEMP would be expanded and updated prior to the commencement of any construction activities on site.

2 OUTLINE OF THE PROPOSED DEVELOPMENT

2.1 Background

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 from 130,000 PE 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.

2.1.1 Wastewater Treatment Plant Capacity Upgrade

As outlined in Chapter 3 (The Proposed Development) of this EIAR, the upgrade works will support growth demands in the agglomeration by improving the treatment processes at Limerick WWTP. The WWTP capacity

upgrade element of the project will cater for the 10-year growth projections, extending the existing WWTP from 130,000PE to 285,000 PE. Additional capacity will be provided by a new Aerobic Granular Sludge (AGS) process stream with a capacity of up to 157,000PE. The new process stream will operate in parallel with the existing CAS system. The additional treatment capacity will facilitate domestic, commercial, and industrial future projected loadings, and it will ensure compliance with the requirements of UWWTD, WWDL and Uisce Éireann policies.

2.1.2 Stormwater Storage Capacity Upgrade

The proposed stormwater storage tank is a large piece of infrastructure that must cater for the long-term 25-year expansion. Total storage volume for the long term projected 325,000 PE is calculated to be c. 20,000m³ in accordance with UWWTD stormwater storage requirements. The existing stormwater holding tank at the WWTP can accommodate 7,500m³, therefore a minimum storage volume of 12,500m³ must now be provided.

The proposed location for the stormwater tank is a greenfield site adjacent to Corcanree PS. Space is limited at the main WWTP site, so locating it at Corcanree leaves sufficient room at the WWTP for the other elements of the upgrade works, and for any future upgrades that may be required. Locating the storm tank at Corcanree MLPS also negates the need for extensive pipeline upgrades; increased pumping of storm flows to the WWTP site from the MLPS would require complete upgrades to the Pass Forward Flow (PFF) twin rising mains (1km) and the WWTP outfall pipe to the Shannon Estuary (1.1km). Further to this, any upgrades to the final effluent pipeline would require a temporary shutdown of the entire WWTP which would cause significant environmental risks.

2.1.3 Regional Bioresource Centre (RBC)

The proposed Regional Bioresource Centre will be designed to treat indigenous sludge and imported sludges from Counties Limerick, Clare and Tipperary to the required Code of Good Practice standard for reuse of Biosolids in Agriculture, in alignment with the NWSMP. The current national strategy is to regionalise sludge treatment and achieve a Class A Biosolid through a combination of Anaerobic Digestion (AD) and heat treatment. Through Anaerobic Digestion, the plant can generate biogas, a source of renewable energy, which will be used to generate electrical power for use on site and to produce heat which is required for the AD process. There will be liquor treatment plant for centrate returns from the RBC to the main treatment process works, so there will be minimal risk to ammonia overloading in the main treatment process.

3 REGULATORY AND POLICY FRAMEWORK

3.1 Introduction

Throughout the lifecycle of any construction project, environmental management procedures are required to ensure that all appropriate legislation, policy and construction best practice are complied with, and the environmental effects of a development are minimised within best practicable means. Consideration is also given to relevant adjacent developments in the management of future construction activities on site.

The environmental legislation, policy and best practice guidance contained within this CEMP are applicable at the time of writing. However, it is acknowledged that these can be subject to change. As such, the Contractor shall be responsible for complying with current legal, policy and best practice guidance requirements applicable to their scope of works through the construction of the Proposed Development.

Through effective implementation of the CEMP, the Contractor shall demonstrate how construction activities and supporting design will properly integrate the requirements of environmental legislation, policy, good practice, and those of the environmental regulatory authorities and third parties.

3.2 Legislation

The Contractor must comply with and implement all relevant Irish and EU safety, health and environmental legislation. The Contractor shall be responsible for ensuring that any developments or changes to regulation and environmental legislation are complied with, even if they are not noted within this CEMP.

Irish legislation is available from the <http://www.irishstatutebook.ie>.

3.3 Policy and Guidance

This CEMP makes reference to various industry standard best practice guidance and policy documents that can be used to address significant environmental risks. In addition to Transport Infrastructure Ireland's (TII) Construction Guidance, the fifth edition of CIRIA's Environmental Good Practice on Site Guide (C811, 2023) and CIRIA's Guidance on Control of Water Pollution From Construction Sites (C532, 2001) should also be consulted for practical guidance about managing construction sites to control environmental impacts and how to deliver sustainable construction on site by effectively managing a range of environmental issues. At a minimum, the Contractor shall adhere to this guidance.

4 ENVIRONMENTAL MANAGEMENT FRAMEWORK

4.1 Overview

The appointed contractor(s) will comply with relevant documentation including EIAR, planning (and other statutory consent) conditions received, this CEMP and subsequent detailed CEMP.

The appointed contractor will be required to develop and implement an Environmental Management System (EMS) that follows the principles of ISO 14001. Further, the contractor's EMS should include an environmental policy, operational, monitoring and auditing procedures to ensure compliance with all environmental requirements and to monitor compliance with environmental legislation and the environmental management provisions outlines in the relevant documentation.

4.2 Roles and Responsibilities

4.2.1 Employer

Uisce Éireann will be the employer responsible for ensuring that competent parties are appointed to undertake construction and that sufficient resources are made available to facilitate the appropriate management of risks to the environment.

4.2.2 Employer's Representative

Uisce Éireann will employ an Employer's Representative team with appropriate competence to administer and monitor each construction contract for compliance with the Employer's Requirements and the CEMP. The ER may be required to appoint temporary or permanent specialists with appropriate skills and experience as required to implement on site procedures and monitor construction on behalf of Uisce Éireann, i.e. competent experts in biodiversity and architecture, archaeology and heritage, noise, dust, waste, land and soil contamination and/or water.

4.2.3 The Contractor(s)

The appointed contractor(s) will be responsible for the organisation, direction and execution of environmental related activities during the construction of the Proposed Development.

The appointed contractor's CEMP will define the roles and responsibilities of its project team. The contractor is responsible for ensuring that all members of the project team, including Subcontractors comply with the procedures set out in the CEMP. The contractor will ensure that all persons working on site are provided with sufficient training, supervision and instruction to fulfil this requirement.

Key staff will be notified of their appointment and confirm that their responsibilities are clearly understood.

The appointed contractor(s) is required to undertake all activities in accordance with the relevant environmental requirements including the consent documentation and other regulatory and contractual requirements.

4.2.4 Site Manager

A Site Manager will be appointed by the contractor to oversee the day-to-day management of working areas within the site and ensure that effective, safe, planned construction activities are delivered on an ongoing basis to the highest standards. The Site Manager will be a suitably qualified, competent and experienced professional that will oversee site logistics, communicate regularly with construction staff, accommodate project-specific inductions for staff on site and ensure that all work is compliant with the relevant design standards and health and safety legislation.

4.2.5 Environmental Manager

An Environmental Manager (EM) will be appointed by the contractor to ensure that the CEMP is effectively implemented. The EM will be suitably qualified, with sufficient training, experience and knowledge appropriate to the nature of the task to be undertaken. The EM will be responsible for co-ordinating the day-to-day management of environmental impacts during the Construction Phase and for assisting and advising the appointed contractors when programming construction activities and devising methodologies, taking cognisance of the Environmental Commitments. The EM will be responsible for performing inspections as deemed necessary. In addition, the EM will be responsible for:

- Preparing, implementing and maintaining the CEMP;
- Conducting regular environmental inspections and audits as specified in the contract and checking adherence to the CEMP;
- Ensuring that construction occurs in accordance with the relevant environmental requirements and that such compliance is adequately recorded and documented;
- Completing a site inspection and compiling an environmental compliance report on a monthly basis;
- Attending site and stakeholder meeting as required;
- Keeping up-to-date with relevant environmental best practice and legislative changes;
- Liaising with the relevant staff to prepare Method Statements and relevant plans for all activities where there is a risk of environmental damage;
- Ensure all personnel have undertaken adequate environmental inductions, awareness briefings and training (including subcontractors);
- Dealing with environmental complaints; and
- Managing and responding to environmental incidents and ensuring that all incidents are recorded and reported in an appropriate manner.

4.2.6 Environmental Specialists engaged by the Contractor

To fulfil its obligations under the CEMP and to support its Environmental Manager, the contractor will be responsible for engaging suitably qualified and experienced professionals including where necessary the following (i.e. depending on the scope of the contract) competent experts:

- Project archaeologist;
- Project ecologist;
- Project aquatic ecologist;
- Noise and vibration specialist;
- Air quality specialist;
- Land and soils specialist; and
- Water specialist.

4.3 Communications

Uisce Éireann and its appointed contractor(s) will take all reasonable steps to engage with stakeholders in the local community, focusing on those who may be affected by the construction works including residents, business, community resources and specific vulnerable groups.

Communication with the local community, Limerick CCC and other stakeholders will be undertaken at an appropriate level and frequency throughout construction. Uisce Éireann will establish a Community Engagement Plan that will specify obligations in relation to community and stakeholder engagement that the contractor must adhere to. Where communications are related to environmental issues the EM will be informed and engaged with, as appropriate. An overall Communications Plan will be prepared by the contractors in advance of construction works which will be cognisant of the Community Engagement Plan and will ensure proper notification and engagement with all residents, businesses and stakeholders in advance and during the construction works.

An emergency contact list will be established and made available to all construction staff employed. The contact list shall be displayed prominently on site as well as at suitable locations where construction activity is being carried out around working areas. The contact list will include key environmental representatives that may need to be contacted in the event of an incident.

5 ENVIRONMENTAL MANAGEMENT PROCEDURES

The following topics and procedures will be incorporated in the detailed CEMP for the construction of the Proposed Development.

5.1 Training, Awareness and Competence

All site personnel will receive environmental awareness information as part of their initial site briefing and this information will be updated within each Method Statement for the specific work element being undertaken. The details of the information will be tailored to the scope of their work on site. This will ensure that personnel are familiar with the environmental aspects and impacts associated with their activities, that appropriate procedures are in place to control these impacts and that they fully understand the consequences of departure from agreed procedures. Formal records of such training along with records verifying the competency of the trainer will be maintained onsite for the duration of the project.

The CEMP will be posted on the main site notice board during the Construction Phase. The environmental performance at the construction site will be on the agenda of all project management meetings. Elements of the CEMP, such as objectives, targets and the effectiveness of environmental procedures will be discussed at these meetings. All personnel will be invited to offer their comments on environmental performance at the site. All site monitoring results will be evaluated by the Environmental Manager. Key findings along with any mitigation measures as required will be clearly communicated to the project team.

The contractor must establish an Environmental Training and Awareness Programme and ensure that all personnel receive adequate training prior to the commencement of construction activities. A baseline level of environmental awareness will be established through the site induction programme.

Nobody will work on site without first receiving environmental induction. Signed records of environmental training will be established, maintained and made available to the Employer's Representative.

5.2 Monitoring, Inspections, Audits

5.2.1 Monitoring

Monitoring will be carried out in accordance with the requirements of the EIAR and NIS so that construction activities are undertaken in a manner that does not give rise to significant negative effects. Suitable monitoring

programmes will need to be developed, implemented, documented and assessed in accordance with the specification outline in the detailed CEMP.

The results of all environmental monitoring activities will be reviewed by the EM on an ongoing basis to enable trends or exceedance of criteria to be identified and corrective actions to be implemented as necessary. The contractor will be required to inform the Employer's Representative of any continuous exceedances of criteria.

5.2.2 Inspections

Routine inspections of construction activities will be carried out by the EM on a daily basis to ensure all necessary environmental measures relevant to the construction activities are being effectively implemented by construction staff, ensuring legal and contractual conformity.

More detailed inspections will be undertaken by the EM on a weekly basis which will be appropriately documented by the EM. Copies of these records and any action required to be undertaken will be available to the Employer's Representative.

5.2.3 Audit

The construction contract documents will require the appointed contractor(s) to further develop the CEMP within 28 days after receiving notice of Commencement of Works from the Uisce Éireann (UE). The EM, and the UE will carry out audits of the CEMP at designated intervals, to determine whether the CEMP is effective in ensuring that the appointed contractor(s) meets all the Environmental Commitments. All changes to the CEMP will be made by the EM and approved by the UE.

The EM, in conjunction with the Construction Manager, will carry out an annual audit of the CEMP to determine whether the CEMP is effective in ensuring that the contractors are meeting all Environmental Commitments/requirements or legislation changes. Where required as a result of such audits, the Environmental Manager will make all necessary changes to the plan, with the approval of the ER, and bring them to the attention of all contractors.

5.3 Emergency Preparedness and Response

An Emergency Preparedness and Response Procedure will be required to prevent environmental pollution incidents. Suitable spill kits and absorbent material for dealing with oil spills will be maintained on site in the event of pollution or potential risk of pollution. The Project Manager will be responsible for preparation of an Environmental Incident Emergency Response Plan which must be made available to all relevant site staff in addition to being displayed on the main noticeboard within the construction compounds. The emergency procedures will include contact details of the local authority and statutory authorities including the National Parks and Wildlife Service (NPWS), Inland Fisheries Ireland (IFI), Environmental Protection Agency (EPA) and LCCC. The contact details of key personnel will be included in the response plan. The CEMP developed by the Contractor will consider any environmental implications of fuel storage, refuelling, casting of built elements on site etc., including the preparation of method statements as appropriate.

5.4 Emergency Incident Response Plan (EIRP)

Emergency incidents are those occurrences that give rise to significant negative environmental effects including but not limited to the following:

- Any malfunction of any mitigation measure and/or environmental protection system;
- Any emission that does not comply with the requirements of the contracts and relevant licences;
- Any circumstance with the potential for environmental pollution; and
- Any emergency that may give rise to environmental effect (e.g. significant spillages or fire outbreak).

The appointed contractor will be required to develop an Emergency Incident Response Plan (EIRP). The EIRP will contain emergency phone number and the method of notifying local authorities, statutory authorities and

stakeholders. Contractors will be required to adhere to and implement these procedures and ensure that all staff and personnel on site are familiar with the emergency arrangements.

The EIRP will identify the onsite risks and appropriate responses. The focus of the measures in the EIRP is prevention of the incident arising in the first place. The EIRP will be reviewed and updated regularly so that it continues to apply to construction activities and is amended when applicable regulations are revised or when amendments are required by a regulatory authority. It will be the responsibility of the EM, or equivalent, as stipulated by the appointed contractor to maintain and change the EIRP as required. The EIRP may also require amendments from the various stakeholders or suppliers as the Proposed Development progresses.

When an incident happens, it is important to learn from it and ensure that such an incident does not occur again. This may involve changing the method of work for a particular activity, providing containment or treatment materials, or simply training personnel so they are aware of the correct method of work. Similarly, if an audit of planned arrangements indicates that measures are not in place, or those in place need to be improved, action will be taken immediately.

A record of corrective actions and lessons learned will be kept and communicated to all relevant persons, teams, sub-contractors etc. across the Proposed Development.

5.5 Construction Stage Mobility Management Plan

The appointed contractor will prepare a CSMMP to actively discourage personnel (including client, design teams and construction contractors involved in this project) from using private vehicles to travel to the Proposed Development. The CSMMP will promote the use of public transport, cycling and walking by personnel. Appropriate measures may include, for example, provision of a minibus, encouraging car-pooling or prescribing specific routes for journeys (including access arrangements, compounds, parking and public transport). The CSMMP may comprise the following headings, as well as other relevant topics identified by the appointed contractor:

- Introduction;
- Objectives and targets;
- Strategy of travel;
- Construction phase specific measures;
- Access and surrounding road network;
- Opportunities for car sharing;
- Implementation and co-ordination;
- Monitoring; and
- Adherence to public health guidelines.

5.6 Environmental Compliance Report

The contractor will be required to submit a monthly report to the Employer's Representative for review and approval. The report will address the following as a minimum:

- Summary of compliance with the CEMP including identification of any non-conformances;
- Interpretation of the results of ongoing monitoring;
- Detailed description of any issues and/or non-conformances identified during inspections and/or audits;
- Record of incidents and corrective actions;
- Synopsis of environmental complaints received / queries raised by stakeholders; and
- Records of environmental training undertaken (as appropriate).

5.7 Environmental records

The contractor will be required to maintain records of all environmental documentation including monitoring, test results, method statements and plans. All records will be kept up to date and be made available for audits,

inspections and periodical reporting. The contractor will maintain the following environmental records (as a minimum) that will be made available for inspection to the Employer's Representative and the relevant authorities, if required:

- Management Plans;
- Records of environmental incidents;
- Monthly environmental reports;
- Records of environmental training;
- Register of environmental complaints;
- Corrective action reports;
- All monitoring data;
- Waste register;
- Health and Safety records; and
- Environmental inspection and audit reports.

5.8 General Site Management

5.8.1 Working Hour

The timing of construction activities, standard working hours and the rate of progress of construction works are a balance between efficiency of construction and minimising nuisance and significant effects. The contractors will require their staff and subcontractors to adhere to the standard construction working hours.

On-site construction works will be permitted to take place between 07:00hrs and 19:00hrs Monday to Friday and between 08:00hrs and 14:00hrs on Saturdays.

The removal of waste material off site by road and regular deliveries to site will be generally confined to daytime hours but outside of peak traffic hours (10am to 4pm). However, for large concrete pours (storm tank) and waste removal, deliveries and haulage may take place during peak hours.

Working outside these hours will only take place in exceptional circumstances or when the Contractor is working adjacent to operational areas and disruption to sensitive receptors and sensitive core activities associated with operation of the other areas is kept to a minimum. Any construction outside of the construction core working hours will need to be agreed in advance with Limerick City and County Council and scheduling of such works will have regard to nearby sensitive receptors.

Start up and shut down

The contractor may require a period of up to one hour before and one hour after core working hours for start-up and shut down activities in working areas. Activities permitted include deliveries and unloading of materials, movement of staff to their place of work, maintenance and general preparation works. The use of plant or machinery likely to cause disturbance will not be permitted outside the of the core working hours.

5.8.2 Site Housekeeping

Good housekeeping is an important part of good environmental practice and helps to maintain a more efficient and safer site. The site shall be tidy, secure, and have clear access routes that are well signposted. The appearance of a tidy, well-managed site can reduce the likelihood of theft, vandalism, complaints and/or specific hazards that could affect the safe operation of the other businesses in the area, such as bird hazards and wind-blown litter.

The contractors will always ensure good housekeeping practices on site to prevent negative visual impacts, accidents and/or complaints from the public. This will include, but not be limited to, the following requirements:

- General maintenance of working areas and cleanliness of welfare facilities and storage areas; All contractors will be made aware of material storage arrangements at induction and through toolbox talks. Materials will be stored in a designated area in an organised manner so as to protect them from damage, deterioration and loss;

- Provision of a site layout map showing key areas such as first aid posts, material storage, spill kits, material and waste storage and welfare facilities;
- Weekly environmental inspections to identify any evidence of poor housekeeping practices;
- Maintenance of all construction plant, material and equipment and ensure these are in good order, clean and tidy;
- Keep construction compounds, access routes and designated parking areas free and clear of excess dirt, scrap wood, rubbish piles at all times;
- Details of site managers contact numbers and public information signs (including warning signs) will be provided at the boundaries of the working areas. Any complaints from the public regarding waste and housekeeping will be entered in the complaints register and actioned as required;
- Provision of appropriate welfare facilities for site personnel at all main compounds. The facilities will include canteens, toilets, showers, locker rooms and first aid posts. The facilities will be connected to the mains services and drainage, where reasonably practicable;
- Installation of appropriate security, lighting, fencing and hoarding at each working area;
- Keep hoarding and fencing free of graffiti or posters;
- Effective prevention of oil, grease or other objectionable matter being discharged from any working area;
- Provision of appropriate waste management facilities at each working area and regular collections to be arranged;
- Maintenance of wheel washing facilities and other contaminant measures as required in each working area;
- Effective prevention of infestation from pests and vermin, including arrangements for regular disposal of food and material attractive to pests;
- No discharge of site runoff or water discharge without agreements of the relevant authorities;
- Protection of any historical heritage on site; and
- Material handling and/or stockpiling of materials/spoil, where permitted, will be appropriately located to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

5.8.3 Hoarding and Fencing

Site security fencing is currently erected around the perimeter of the site. Hoarding and decking will be erected within the site to segregate construction works areas from plant operations that will remain in-situ for the duration of the construction works.

The hoarding/fencing would be up to approximately 2.4m high to provide a secure boundary to what can be a dangerous environment for those that have not received the proper training and are unfamiliar with construction operations.

Site hoarding also performs an important function in relation to minimising nuisance and effects including:

- Noise emissions (by providing a buffer);
- Visual impact (by screening the working areas, plant and equipment); and
- Dust minimisation (by providing a buffer).

The erection of hoarding will be of a similar nature to what is carried out on most construction sites. Mounting posts will be erected by using a mini-digger and the posts would be set in concrete. Where practicable, hoarding and fencing will be retained, re-configured and re-used between working areas as the construction activities progress.

5.8.4 Services and Lights

Site services will be installed in parallel with the rearrangement and diversion of existing utilities, where relevant. The site will be powered by mains supplies or diesel generators (for construction use only) where an electrical supply is not available.

Site lighting will typically be provided by tower mounted 1000W metal halide floodlights at the various work areas in the Proposed Development site. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The contractor's site will be powered by mains supplies or diesel generators.

5.8.5 Reinstatements of working areas on completion

The contractor will reinstate all working areas and access routes as work proceeds during construction. All plants, equipment, materials, temporary infrastructure and vehicles will be removed at the earliest opportunity and the surface of the ground restored as near as practicable to its original condition.

5.8.6 Health and safety

The contractor would be required to ensure all relevant health and safety, fire safety and security requirements are in place prior to commencement of construction and in accordance with relevant legislative requirements in addition to the specifications of Limerick City and County Council and Uisce Éireann.

The requirements of the Safety, Health and Welfare at Work Act 2005, the Safety, Health and Welfare at Work (Construction) Regulations, 2013 and other relevant Irish and EU safety legislation will be complied with at all times by the construction staff and personnel during construction. Further, contractors would also have to ensure that all aspects of their works comply with good industry practice and all necessary consents, licences and authorisations that have been put in place for the Proposed Development.

6 ENVIRONMENTAL MANAGEMENT

This section describes the specific environmental requirements identified as part of the specimen design and EIAR and NIS that will need to be adhered to by the contractor.

It should be noted that Section 6.1 – 6.13 provides a summary of minimum requirements that should be built upon by the contractor when developing the detailed CEMP. It is intended that the measures set out herein will be discussed in more detail with relevant stakeholders as required in order to support the identification of any additional measures to be taken account during construction.

6.1 Traffic and Transport

The contractor is required to implement and details the following measures in relation to traffic and transport during construction:

- A Preliminary Traffic Management Plan will be drafted by the Project Supervisor Design Process for the works in full consultation with Limerick City and County Council, An Garda Síochána, the Fire Service and the Ambulance service prior to the issuing of tender documents. When the works are awarded to a contractor, the Preliminary Traffic Management Plan will be developed by the Project Supervisor Construction Phase into a Detailed Traffic Management Plan in full consultation with the same stakeholders. All traffic management plans, including working times, will be agreed with and approved by Limerick City and County Council Transportation Department in advance of implementation.
- Tracked excavators will be moved to and from the site on low-loaders and will not be permitted to drive on the street pavements.
- The appointed contractor is to arrange for staff parking on-site. Contractor's, subcontractor's or supplier's vehicles or staff vehicles, or any vehicles associated with the works are not permitted to park, idle or queue on the public road network.
- Set construction traffic routes to and from the site will be agreed with Limerick City and County Council prior to the commencement of construction activities on site. Where necessary, the time of day permissible for such routes will also be agreed upon and outside of the morning/evening peak hours.
- During construction, the appointed Contractor should monitor traffic flows and vehicle queue lengths at Junction 3 as part of the Detailed Traffic Management Plan. If deemed necessary following monitoring, then mitigation measures (i.e. all construction vehicles (i.e. HGVs) will travel to/from the sites outside the morning peak hour of 08:00-09:00) should be proposed and agreed with the relevant Authorities in order to minimise the traffic impact to public.
- To minimize the traffic impact to public, regular deliveries to site will be generally confined to daytime hours but outside of peak traffic hours (i.e. 10am to 4pm).

- Good planning and coordination of works will be conducted in order to avoid an overlapping of peak traffic generated from the Limerick WWTP Site and Corcanree Pump Station Site as far as possible.
- Wheel washers/ judder bars will be placed at all site access points to minimise the migration of detritus onto the public roads, where appropriate. The roads will be inspected and cleaned on a regular basis.
- Haul vehicles will be covered after loading to ensure there is no risk of construction material falling or to any prevent any nuisance due to dust particles.
- Water bowsers will be deployed within the sites during periods of hot weather to damp down potential dust generation from unbound surfaces.
- Access to the Limerick WWTP Site, including construction access, will be provided from the Dock Road East Roundabout via the existing access road.
- An Application for an Abnormal Load Permit will be made to Limerick City and County Council in advance for any abnormal loads exceeding the thresholds laid out in the Road Traffic (Construction and Use of Vehicles) (S.I. No. 5/2003) Regulations 2003. Where possible abnormal load movements will be restricted to evening or night-time to minimize disruption to local traffic and traffic on strategic routes.

6.2 Air Quality

6.2.1 Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager; and
- Display the head or regional office contact information.

6.2.2 Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints log available to the local authority when asked;
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook; and
- Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

6.2.3 Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This will include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary;
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked;
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; and
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during earthworks and construction.

6.2.4 Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below; and
- Cover, seed or fence stockpiles to prevent wind whipping.

6.2.5 Operating vehicle/machinery and sustainable travel

- Ensure all vehicles switch off engines when stationary – no idling vehicles;
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable;
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate);
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials; and
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

6.2.6 Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

6.2.7 Waste management

- Bonfires and burning of waste materials are legally prohibited

6.2.8 Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as is practicable; and
- Only remove the cover in small areas during work and not all at once.

6.2.9 Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible;
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;

- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and
- For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.

6.2.10 Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site logbook;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and
- Access gates to be located at least 10 m from receptors where possible.

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors in the highest dust generating location during the construction phase of the Proposed Development. During dry and windy periods is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/m²/day during the monitoring period of 30 days (+/- 2 days).

6.3 Climate

6.3.1 Embedded design mitigation

The Proposed Development is designed with energy efficiency, reduction in carbon intensity and climate adaptation in mind, as set out in the Energy and Climate Statement (Appendix 9.1, Volume 4 of the EIAR):

- Stormwater tank installation to reduce the frequency and duration of untreated storm discharges during extreme rainfall events;
- Installation of an Aerobic Granular Sludge (AGS) process system will reduce energy demand from the existing AGS process;
- Development of Regional Bioresource Centre with Thermal Hydrolysis Process which reduces energy demand required for sludge treatment and reduces biosolids volume whilst increasing biogas production. Biogas can then be used on the site as fuel for the CHP to generate heat and power;
- Increased biogas storage capacity to reduce the need for gas flaring;
- Incorporation of THP reduces biosolids production and therefore transportation of sludge offsite, relative to the increased capacity of the sites processes; and
- The biosolids that are produced are Class A and can therefore be reused as fertiliser. This supports a circular economy and lowers demand for the production of synthetic fertilisers.

6.3.2 Construction phase

Measures will include:

- Appointed contractor will be required to minimise construction-related CO₂ emissions through best-practice construction management;

- Efficient programming of works, consolidation of deliveries associated with tank construction, optimisation of haul routes, and the use of modern, fuel-efficient plant compliant with current emissions standards;
- Where practicable, electrically powered or hybrid equipment will be used in preference to diesel-powered plant, and temporary site power will be sourced from the electricity grid rather than diesel generators, consistent with national objectives to reduce fossil fuel consumption and emissions intensity;
- Given that the two tanks (AGS tanks and stormwater storage tank) represent the most material-intensive elements of the scheme, embodied carbon will be reduced where practicable through the specification of optimised concrete mixes, responsible sourcing of steel, and the reuse of excavated materials on site in accordance with the Site Waste Management Plan;
- Construction energy use and fuel consumption will be monitored and recorded through the Construction Environmental Management Plan (CEMP), enabling identification of inefficiencies and implementation of corrective actions;
- In terms of impact on the Proposed Development due to climate change, during construction the Contractor will be required to mitigate against the effects of extreme wind/storms, temperature extremes through site risk assessments and method statements; and
- All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction.

6.4 Odour

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.

6.5 Noise and Vibration

During the Construction Stage, the Contractor will employ the best practical means to minimise noise and vibration produced by their works including plant maintenance and will comply with the recommendations of:

- BS5228-1: Code of practice for noise and vibration control on construction and open sites – Part 1: Noise
- BS5228-2: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibrations
- Noise and Vibration and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001 and 2016 so as to acknowledge the EC (Noise Emission by Equipment for Use Outdoors) (Amendment) Regulations 2006.

A noise survey must be conducted at each Working Area before construction commences to establish the base line noise levels at the perimeter and nearest receptors. The Contractor will undertake continuous noise monitoring at the three nearest sensitive receptors to the works during the Construction Phase, to ensure compliance with limits outlined above and provide to the Employer's Representative copies of all recordings, on a daily basis. All measurements shall be made 1m outside the facade of each building in question (or at a representative location, where it is not possible to access properties) using a sound level meter conforming to EN/IS EN 61672-1. Sound levels shall be monitored by methods set out in Appendix B of BS 5228.

To avoid potentially significant construction noise impacts during the Construction Phase, the following mitigation measures will be adopted:

- To protect residential amenity, construction activities will be restricted to daytime hours as outlined (except during exceptional circumstances):
 - Monday to Friday: 07:00 hours – 19:00 hours;

- Saturday: 08:00 hours – 14:00 hours.

- An on-site speed limit will be enforced for all traffic;
- Best practicable means will be employed to minimise noise emissions and will comply with the general recommendations of BS 5228;
- All plant will be maintained in good working order. Where practicable, machines will be operated at low speeds and will be shut down when not in use;
- Mechanical plant used on site will be fitted with effective exhaust silencers. Vehicle reverse alarms will be silenced appropriately to minimise noise breakout from the site while still maintaining their effectiveness;
- If required, compressors will be of the “noise reduced” variety and fitted with properly lined and sealed acoustic covers;
- In all cases, engine and/or machinery covers should be closed whenever the machines or engines are in use;
- All pneumatic percussive tools will be fitted with mufflers or silencers as recommended by the equipment manufactures. Where practicable all mechanical static plant will be enclosed by acoustic sheds or screens;
- Employees working on the site will be informed about the requirement to minimise noise and undergo training on the following aspects:
 - The proper use and maintenance of tools and equipment;
 - The positioning of machinery on-site to reduce the emission of noise to the noise sensitive receivers;
 - Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment; and
 - The use and maintenance of sound reduction equipment fitted to power pressure tools and machines.
- It is recommended that if complaints are received from nearby residential properties, periodic noise monitoring will be undertaken during construction works to determine noise levels at noise sensitive receivers. Based on the findings of such noise monitoring, appropriate noise mitigation measures will be implemented to reduce noise impacts. Where excessive noise levels are recorded, further mitigation measures will be employed which may include temporary screening of the nearest receiver to on-site activities;
- Responsible Person - It is recommended that the Contractor will appoint a responsible and trained person (e.g. Community Liaison Officer) who will be present on site and who will be willing to answer and act upon complaints and queries from the local public; and
- To protect residential amenity, the cumulative noise level from construction activities on the development site (including plant and equipment) shall not exceed 65 dB LAeq (12 hour) at residential dwellings outside the nearest window of the occupied room closest to the site boundary (SR 11).

6.6 Biodiversity Marine

To minimise potential adverse impacts on marine biodiversity during the Construction Phase of the Limerick WWTP Upgrade Project, a suite of targeted mitigation measures will be implemented. These measures are aligned with best practice guidance, ecological sensitivities identified in the survey area, and statutory obligations under the EU Habitats and Birds Directives.

Sediment Control and Water Quality Protection:

- Settlement ponds or silt traps will be employed in all areas where surface water runoff may occur. Discharges from construction areas will comply with the Environmental Quality Standards (EQS) for turbidity and suspended solids. Continuous monitoring is not anticipated but may be deployed if risk levels require heightened control;
- All excavation groundwater and surface water runoff will be fully contained and managed in a controlled system. No uncontrolled discharge to ground, drainage features or the receiving environment will be permitted;
- Water arising from dewatering will be collected in lined sumps and treated, for example by settlement tanks or equivalent treatment, prior to discharge. Final treated water will be required to achieve a

suspended solids concentration of less than 35 mg/L prior to discharge. Dewatering infrastructure, including sumps, pumps, pipework and tanks, will be inspected weekly and following significant rainfall events, with records maintained;

- All construction materials and stockpiles will be stored within designated compound areas and away from site drainage points to prevent sediment or contaminant runoff to adjacent watercourses;
- Existing drainage features within and adjacent to the construction areas will be identified and clearly demarcated prior to the commencement of works;
- Localised silt fencing and other sediment control measures will be installed at points where construction activities interface with drainage pathways or where there is a risk of sediment migration. Exposed soils will be minimised through sequencing of works and areas not actively under construction will be stabilised as soon as practicable;
- Stockpiles will be located within the active construction footprint and managed using bunding, covers or temporary stabilisation to prevent erosion and runoff;
- Sediment control measures will be inspected weekly, and following significant rainfall events, with any damaged or ineffective controls repaired promptly. Where reasonably possible, bulk earthworks will be undertaken during drier periods to reduce sediment generation; and
- Construction materials, stockpiles, plant and hazardous substances will not be stored in areas identified as being at risk of flooding. Where relevant, temporary flood protection and containment measures will be deployed if weather forecasts or water levels indicate increased flood risk, and drains, sumps and pumping systems will be maintained to prevent uncontrolled release.

Noise and Vibration Management

- Construction activities will be carried out in accordance with standard good practice controls to minimise noise and vibration, including the use of modern, well-maintained plant; avoidance of unnecessary engine idling; implementation of noise barriers where required; and adherence to site working hours; and
- Predicted noise and vibration levels are well below thresholds at sensitive estuarine receptor locations, and no underwater noise mitigation is required, as there will be no in-water piling, percussion, excavation or other impulsive noise sources.

Pollution Prevention Measures:

- Refuelling, plant maintenance, and fuel or chemical storage will take place within designated bunded areas located at least 10 m from drainage features and outside mapped flood zones. Oils and fuels will be stored in bunded tanks with 110% retention capacity. No refuelling will take place within 10 m of the excavation perimeter or drains, and vehicles will not be left unattended during refuelling;
- All machinery will use biodegradable hydraulic oils where possible and be subject to daily inspection for leaks;
- A Spill Response Plan will be in place, including staff training and spill kits on site;
- Cementitious and other hazardous materials will be handled in designated areas with controlled washout procedures to prevent discharge to drainage pathways; and
- The contractor will comply with relevant Control of Substances Hazardous to Health (COSHH) and Safety, Health and Welfare at Work (Chemical Agents Regulations) requirements.

Monitoring and Ecological Supervision:

- Baseline ecological and water quality conditions have been established through surveys and modelling undertaken to inform this EIAR. Construction-phase monitoring will therefore focus on verifying the effectiveness of mitigation measures and ensuring compliance with environmental requirements, rather than reproducing baseline datasets.
- Monitoring and inspection will be undertaken by the Contractor under the supervision of the Environmental Manager, with support from suitably qualified ecological or aquatic specialists where required.

This will include:

- Weekly inspections of drainage controls, sediment control measures, dewatering systems, fuel and chemical storage areas, and spill response equipment;
 - Additional inspections following significant rainfall events or where there is an increased risk of sediment mobilisation or pollutant release; and
 - Routine visual checks to confirm that no visible sediment-laden runoff or contamination is entering drainage pathways connected to Ballinacurra Creek or the Shannon Estuary.
- Targeted water quality monitoring (e.g. turbidity or suspended solids measurements) will be undertaken where there is a risk of discharge to drainage pathways, including during dewatering activities or where control measures are compromised;
 - Where monitoring or inspections identify ineffective controls, elevated turbidity, or any evidence of pollutant release, corrective actions will be implemented immediately, including repair or replacement of control measures, modification of working methods, and, where necessary, temporary cessation of relevant construction activities; and
 - All inspections, monitoring results, incidents and corrective actions will be recorded and reported through the project's environmental compliance reporting procedures in accordance with the CEMP.

6.7 Biodiversity Terrestrial

Temporary habitat losses:

There will be some loss of sections of Linear woodland (WD1) to facilitate construction access as depicted in Figure 13-5 in Chapter 13. The following measures will be in place:

- Trees to be lost for construction access will be strictly limited to the width required for access (approx. 5m);
- After construction, trees will be replanted to restore the habitat and connectivity. Trees will be of native stock and will be species that are already present within the habitat and will comprise semi-mature specimens; and
- Any trees that are felled to facilitate construction access will be re-used as deadwood for biodiversity enhancement purposes as part of the proposed Landscape Masterplan and Planting Plan.

Permanent Habitat Losses:

A Landscape Masterplan and Planting Plan with measures for biodiversity enhancement is included as part of the Proposed Development. The Plan includes the following measures.

Limerick WWTP:

- Meadow management of existing amenity grassland areas in line with All Ireland Pollinator Plan;
- Grasscrete in new hardstanding areas where feasible;
- Any trees that are felled to facilitate construction access will be re-used as deadwood for biodiversity enhancement purposes as part of the proposed Landscape Masterplan and Planting Plan;
- Installation of 1 or more swift boxes to a building/infrastructure in an appropriate location to be agreed with the Project Ecologist, in line with Bird Watch Ireland guidelines¹;
- Installation of kestrel nesting box within the linear woodland edge to the west of Limerick WWTP, given that kestrel were regularly recorded hunting in the area. The nest should be very sturdy and not rock or move. It is vital that the box is not covered or obstructed by branches or leaves in order to achieve a clear flight path. Installation will require a lone standing tree, or if unavailable, a constructed bare pole. The entrance of the nest should face away from prevailing winds and be installed at a height of at least 3 metres; and
- Installation of 3 no. bat boxes along linear woodland edge to the west of Limerick WWTP, where bat roosting suitability is currently limited. Bat boxes will be of a design that is suitable for installation on trees. It will be ensured that there is no obstruction to flight path for access to the bat box by vegetation. The bat boxes will be installed at least 3m from the ground. The locations will be chosen based on an

¹ https://birdwatchireland.ie/app/uploads/2019/10/Saving-Swifts-Guide_pdf.pdf

assessment of proposed external lighting and lux contours and it will be ensured that they are installed in areas of darkness. This will be decided by a qualified ecologist or the project ECoW.

Corcanree PS:

- Meadow management of existing amenity grassland areas in line with All Ireland Pollinator Plan;
- New trees proposed around the new storm tank (both linear treeline and tree clusters);
- Green roof on top of the storm tank, with planting in line with the All-Ireland Pollinator Plan;
- Green walls around the storm tank (i.e ivy walls); and
- Swift boxes (as many as feasible) to be incorporated onto storm tank.

Disturbance on Waterbirds

Mitigation measures will be in place to limit potential noise impacts on waterbirds. These will include:

- Construction activities will be restricted to daytime hours as outlined:
 - Monday to Friday: 07:00 hours – 19:00 hours;
 - Saturday: 08:00 hours – 14:00 hours.
- An on-site speed limit will be enforced for all traffic;
- Noise emissions and will comply with the recommendations of BS 5228;
- Machines will be operated at low speeds and will be shut down when not in use;
- Mechanical plant used on site will be fitted with effective exhaust silencers. Vehicle reverse alarms will be silenced appropriately to minimise noise breakout from the site while still maintaining their effectiveness;
- Compressors will be of the “noise reduced” variety and fitted with properly lined and sealed acoustic covers;
- In all cases, engine and/or machinery covers will be closed whenever the machines or engines are in use;
- All pneumatic percussive tools will be fitted with mufflers or silencers. Mechanical static plant will be enclosed by acoustic sheds or screens;
- For sheet piling, vibration hammer will be used, with impact hammer used only when vibration hammer is unable to complete the drive due to high ground resistance.
- Furthermore, for sheet piling, an acoustic screen will be used, enclosing the hammer head and the top of the pile, which will reduce noise by 5 to 10dB (BS5228 2009-2014).
- The use of the impact hammer sheet piling method, if needed, will be avoided at Limerick WWTP during the cormorant breeding period 1st March to 30th June.
- Employees working on the site will be informed about the requirement to minimise noise and undergo training on the following aspects:
 - The proper use and maintenance of tools and equipment;
 - The positioning of machinery on-site to reduce the emission of noise;
 - Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment; and
 - The use and maintenance of sound reduction equipment fitted to power pressure tools and machines.

Habitat Degradation

- Mitigation measures with regard to impacts on water quality thus affecting supporting habitat for waterbirds in the freshwater environment, i.e., the Bunlicky Lake adjacent to Limerick WWTP, are provided in Chapter 16 ‘Water’.
- Mitigation measures with regard to impacts on water quality thus affecting supporting habitat for waterbirds in the marine/estuarine environment are provided in Chapter 12 ‘Biodiversity (Marine)’. With the construction phase mitigation measures in place to prevent impacts on water quality, there is no potential for residual significant effect on waterbirds as a result of habitat degradation within Bunlicky Lake or the Shannon Estuary.

Impacts on other bird species

- Any requirement for removal of vegetation will be carried out in line with the provisions of the Wildlife Act. Therefore, the necessary removal of trees, and clearance of wet grassland and swamp habitat within the site will not be carried out between 1st of March and 31st of August inclusive, unless a breeding bird survey is carried out by a qualified ecologist 2 weeks before scheduled clearance, and a second survey no more than 48 hours before the felling.

Impacts on bat

Bat Habitat Loss

- Some vegetation removal is required for construction site access and to facilitate new infrastructure. As discussed in Section 13.4.2.3.3 in Chapter 13, no significant effect as a result of loss of commuting/foraging habitat is anticipated and the site will remain suitable for commuting and foraging overall, with connectivity within the site and to the wider area being largely retained. In addition, all areas requiring clearance to facilitate construction access will be restored and replanted with native tree species common to the site and local area; and
- A Landscape Masterplan and Planting Plan is also in place for the Proposed Development which will result in a net gain in linear and commuting habitats for bats. In addition, new roosting habitat potential will be provided for bats in the form of bat boxes installed in the western linear woodland at Limerick WWTP.

Disturbance

Regarding the linear woodland section to be removed at Corcanree Pump Station, a number of trees are currently in poor condition, with some affected by ash dieback. On a precautionary basis, it is acknowledged that their roost suitability could change if deterioration occurs over the planning consent process (e.g., due to disease or wind damage). Therefore, the following mitigation measures will be implemented:

- Although no potential roost features (PRF) were found during the dedicated baseline assessments, on a precautionary basis the condition of the trees to be felled will be assessed again in advance of felling, due to the possibility of deterioration of trees and development of PRFs;
- If any trees have developed a new Potential Roost Feature (PRF), this will be inspected by a licenced bat ecologist no more than 24 hours in advance of felling;
- If roosting bats are detected, the felling of the tree in question will not progress until a derogation is obtained from the NPWS;
- The requirement for a pre-commencement survey does not present a lacuna in the survey assessment but is fully in line with best practice guidance. The purpose of the pre-commencement survey will be to assess any changes in the baseline conditions of the site since the time of carrying out the baseline surveys. Should a bat roost be identified during this pre-commencement survey, a bat derogation licence will need to be obtained from NPWS and further mitigation prescribed by a licenced ecologist prior to commencement of works;
- Further, to prevent any potential barrier effects associated with construction phase lighting spillage onto linear habitats, the following mitigation will also be in place. These measures will also include for construction lighting, if required, along the construction access route to the proposed stormtank area at Corcanree PS:
 - Work will be completed during daylight hours. However, if lighting is needed for construction during certain periods over winter months, this lighting will be downwards facing with downward lighting accessories used including louvres, baffles or shields. In addition, any required lighting will be directed away from key commuting corridors including the linear woodlands surrounding Limerick WWTP and Corcanree PS.
 - Construction phase lighting along the proposed construction access route into Corcanree PS in the vicinity of Spillane's Tower will be avoided. If absolutely necessary, it will be ensured that lighting is installed away from the Tower and underground cavity, and this will be checked and signed off by the project ecologist/ECOW.

Impacts on Otter

No otter holts were recorded within 150m of the Proposed Development sites. However, given the suitability of habitats adjacent to Limerick WWTP and Corcanree PS to support otter as well as recorded otter activity during the surveys undertaken, the following mitigation will be in place:

- A pre-commencement survey for Otter will be carried out prior to any works commencing. Should Otter holts be recorded within 150m of the proposed works at Limerick WWTP or Corcanree PS, a derogation license will be obtained from NPWS and works carried out in accordance with NRA (2006) *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*. The otter survey will be carried out no more than 10 months in advance of commencement. The survey will be supplemented with an additional inspection immediately prior to commencement.
- The requirement for a pre-commencement survey does not present a lacuna in the survey assessment but is fully in line with best practice guidance. The purpose of the pre-commencement survey will be to assess any changes in the baseline conditions of the site since the time of carrying out the baseline surveys. Should an otter holt be identified during this pre-commencement survey, and if it is deemed that the construction works have the potential to significantly disturb otter, a derogation licence will be obtained from NPWS and further mitigation prescribed by a suitably qualified ecologist prior to commencement of works.
- Mitigation measures with regard to impacts on water quality thus affecting supporting habitat for otter in the freshwater environment, i.e., the Bunlicky Lake adjacent to Limerick WWTP, are provided in Chapter 16 'Water'. Mitigation measures with regard to impacts on water quality thus affecting supporting habitat for otter in the marine/estuarine environment are provided in Chapter 12 'Biodiversity (Marine)'. With the construction phase mitigation measures in place to prevent impacts on water quality, there is no potential for residual significant effect on otter as a result of habitat degradation within Bunlicky Lake or the Shannon Estuary.

6.8 NIS

6.8.1 Water Quality Deterioration

Mitigations include use of silt fencing to prevent run-off to perimeter drainage ditches, management of excavation dewatering and deep excavations, and management of spoil, concrete and hydrocarbons.

6.8.1.1 Limerick WWTP

Dewatering and Surface Water Management

- All surface water, construction runoff, and excavation groundwater shall be fully contained and managed in a controlled system. No uncontrolled discharge to ground, drainage channels, or the receiving environment is permitted;
- Excavation groundwater and surface water runoff shall be collected in lined sumps and pumped to mobile settlement tanks or equivalent treatment systems to allow suspended solids to settle prior to discharge;
- Temporary surface drains and bunds shall be lined to prevent infiltration and interaction with groundwater;
- Pumping and treatment systems shall be sized to manage combined excavation groundwater and surface runoff, including rainfall events up to the 1-in-30-year return period intensity, and maintained to prevent overtopping or system failure;
- Dewatering shall be undertaken in a controlled manner to manage groundwater drawdown to minimise hydraulic gradients, sediment mobilisation, or instability within the excavation;
- Groundwater levels shall be monitored during dewatering using standpipe piezometers (or other suitable methods), to verify that drawdown remains localised to the excavation area and does not adversely affect surrounding soils or structures;
- Water quality monitoring of key parameters (e.g. pH, turbidity, and suspended solids) shall be undertaken at the treatment system outlet, with daily visual inspections and routine sampling using calibrated field equipment and standard grab sampling methods, as agreed with the Project Supervisor and ECoW and in accordance with the CEMP and applicable discharge licence conditions;

- Final treated water shall meet a Suspended Solids limit of <35 mg/L prior to discharge;
- Treated water shall be discharged to the existing WWTP final effluent chamber and subsequently to the Shannon Estuary; and
- All dewatering infrastructure (sumps, pumps, pipework, tanks) shall be inspected weekly and following significant rainfall events, with records maintained.

Monitoring & Inspection: The Project Supervisor shall inspect containment structures, pumps, and temporary controls weekly. The ECoW will inspect water quality daily and verify compliance using visual assessments and field monitoring equipment. The frequency and scope of monitoring shall be defined in the final CEMP and may be adjusted by the ECoW based on monitoring results and site conditions.

The ECoW has the authority to suspend pumping immediately if suspended solids limits are exceeded or if any control measure fails, and all inspections, monitoring results (including field measurements and any laboratory analysis), maintenance, and corrective actions shall be fully documented in site environmental records and retained for compliance and audit purposes.

Drainage Protection and Sediment Control

- The contractor shall identify and map all existing drainage features prior to works commencing and protect them with temporary fencing and targeted silt control measures where they interface with construction areas;
- Silt fences shall be supported by timber posts and geotextile buried in an 'L' configuration to a minimum depth of 250 mm;
- Targeted silt fencing and sediment control measures shall be installed at locations where sediment mobilisation risk is identified during weekly or post-rainfall (>10 mm) inspections. Continuous perimeter fencing is not required due to full containment of surface water and the protected nature of drainage features;
- Construction works shall be sequenced to minimise exposed soil, ensuring no disturbed area remains uncovered for more than 7 days. Exposed areas where works are paused or completed shall be stabilised or covered to prevent sediment mobilisation;
- Temporary stockpiles shall be located within the active construction footprint, at least 20 m from drainage features, and managed with bunding, covers, or perimeter silt fencing to prevent erosion and runoff into drainage pathways;
- Drainage protection and sediment controls shall be inspected weekly by the Project Supervisor, and within 24 hours after rainfall events exceeding 10 mm, with any damaged or ineffective controls repaired or replaced within 48 hours; and
- Where reasonably possible, bulk earthworks shall be scheduled during drier months (April–September) to reduce sediment generation.

Monitoring & Inspection: The Project Supervisor and ECoW will oversee weekly inspections, review corrective actions, and verify compliance with sediment control measures.

Pollution and Spill Prevention

- Designated bunded areas shall be provided for refuelling, plant maintenance, and fuel/chemical storage, located at least 10 m from drainage features;
- Oils and fuels shall be stored in bunded tanks providing 110% retention capacity;
- No refuelling shall occur within 10 m of the excavation perimeter or drains, and vehicles must not be left unattended during refuelling;
- Spill kits, absorbent materials, and oil containment booms shall be available on-site, proportionate to the volume of materials stored, with staff trained in their correct use;
- Cementitious and hazardous materials shall be handled in designated areas at least 5 m from drainage features or the excavation, with controlled washout procedures to prevent discharge;
- An Emergency Spill Response Plan shall be implemented and maintained, including contact details for relevant statutory bodies, and made accessible to all site personnel; and

- All spill response equipment shall be maintained in fully operational condition at all times.

Monitoring & Inspection: Project Supervisor shall inspect bunded areas, fuel/chemical storage, and spill kits weekly; ECoW to verify compliance and respond to any spills or breaches of handling protocols.

Piling and Groundwater Controls

- Excavation and piling for the AGS tank shall use low-vibration methods, with no hard rock expected, to minimise disturbance to saturated soils and surrounding groundwater;
- Temporary drainage protection measures (silt fences, sediment traps) shall be inspected and maintained to ensure any vibration-mobilised sediments are captured at source; and
- Inspection and monitoring of drainage features shall be undertaken during piling through regular visual inspections of on-site drains to ensure that any mobilisation of sediments or changes in local groundwater conditions remain localised and controlled, and that no silt-laden runoff enters the drainage network or downstream lake.

Monitoring & Inspection: Project Supervisor to verify vibration-sensitive areas are protected during piling or heavy compaction; ECoW to monitor ground vibration at sensitive drainage locations and ensure drainage protection measures remain effective.

6.8.1.2 Corcanree PS

Dewatering and Surface Water Management

- All excavation groundwater and surface water runoff shall be fully contained and managed in a controlled system. No uncontrolled discharge to ground, drainage features, or the receiving environment shall occur;
- Groundwater abstracted during excavation shall be collected in lined sumps and pumped to mobile settlement tanks or equivalent treatment systems to remove suspended solids prior to discharge;
- Pumping and treatment systems shall be sized at detailed design stage to manage combined groundwater inflows and surface runoff, including rainfall events up to the 1-in-30-year return period intensity, and shall be maintained to prevent overtopping or system failure;
- Dewatering shall be undertaken in a staged and controlled manner to manage groundwater drawdown, minimise excessive hydraulic gradients, and reduce the risk of sediment mobilisation or instability within the excavation;
- Groundwater levels shall be monitored during dewatering using standpipe piezometers (or other suitable methods), to verify that drawdown remains localised to the excavation area and does not adversely affect surrounding soils or structures;
- Water quality monitoring of key parameters (e.g. pH, turbidity, and suspended solids) shall be undertaken at the treatment system outlet, with daily visual inspections and routine sampling using calibrated field equipment and standard grab sampling methods, as agreed with the Project Supervisor and ECoW and in accordance with the CEMP and applicable discharge licence conditions;
- Final treated water shall meet a Suspended Solids limit of <35 mg/L prior to discharge;
- Treated water shall be discharged to the storm overflow chamber and subsequently to the Shannon Estuary via the existing controlled outfall; and
- All dewatering infrastructure (sumps, pumps, pipework, tanks) shall be inspected weekly and following significant rainfall events, with records maintained.

Monitoring & Inspection: All containment structures, sumps, pumps, and temporary controls shall be inspected weekly by the Project Supervisor, with daily water quality checks by the ECoW. The ECoW has the authority to suspend pumping immediately if suspended solids limits are exceeded or if any control measure fails, and all inspections, maintenance, and corrective actions shall be fully documented.

Drainage and Sediment Control

- All existing drainage features, including the OPW drain located approximately 50 m north-west of the excavation area, shall be identified and clearly demarcated prior to commencement of works;

- Temporary protective fencing shall be installed along the eastern and northern site boundaries to prevent encroachment, trafficking, or accidental discharge toward the OPW drain;
- Localised silt fencing and sediment control measures shall be installed at points where construction activities interface with drainage pathways or where there is a risk of sediment migration. Continuous perimeter buffering is not required given the site layout and flood defence embankments;
- Exposed soils shall be minimised through sequencing of works. Areas not actively under construction shall be stabilised as soon as practicable;
- Stockpiles shall be located within the active construction footprint, at least 15 m from any watercourse, and managed to prevent erosion, including bunding, covering, or temporary stabilisation during heavy rainfall; and
- Sediment control measures shall be inspected weekly by the Project Supervisor, with daily checks by the ECoW in high-risk areas such as near drainage features, steep benches, or stockpiles. Any ineffective controls shall be repaired immediately, and all inspections and corrective actions documented.

Monitoring and inspection: All sediment control measures shall be checked weekly by the Project Supervisor, with daily checks by the ECoW for high-risk areas (adjacent to the watercourse, steep benches, or stockpiles). Any damaged or ineffective controls shall be repaired or replaced immediately, and records of inspections, maintenance, and corrective actions maintained.

Pollution Prevention and Spill Management

- Refuelling, plant maintenance, and fuel/chemical storage shall take place within designated bunded areas located at least 10 m from drainage features and outside the mapped flood zone;
- Oils and fuels shall be stored in bunded tanks providing 110% retention capacity;
- No refuelling shall occur within 10 m of the excavation perimeter or drains, and vehicles must not be left unattended during refuelling;
- Spill kits and absorbent materials shall be available on-site at all times, proportionate to the volume of materials stored, with staff trained in their correct use;
- Cementitious and hazardous materials shall be handled in designated areas at least 5 m from drainage features or the excavation, with controlled washout procedures to prevent discharge;
- An Emergency Spill Response Plan shall be implemented and maintained for the duration of the works, including contact details for relevant statutory bodies; and
- All spill response equipment shall be maintained in fully operational condition at all times.

Monitoring & Inspection: The Project Supervisor shall inspect bunded areas, fuel and chemical storage, and spill kits weekly, with the ECoW verifying compliance, ensuring all handling protocols are followed, and responding immediately to any spills or breaches; records of inspections, maintenance, and corrective actions shall be maintained.

Piling and Groundwater Controls

- Excavation and sheet pile installation for the storm tank shall use low-vibration methods to minimise disturbance to saturated soils and surrounding groundwater conditions; and
- Sumps and sediment traps shall be inspected and secured prior to piling works and maintained throughout construction to ensure any mobilised sediment is captured at source.

Monitoring & Inspection: The Project Supervisor shall verify that vibration-sensitive areas and drainage features are protected, with the ECoW conducting inspections and reviewing monitoring data to confirm that drainage controls remain effective; any failures shall be corrected immediately and documented.

Flood Risk Management

- Stockpiles, plant and hazardous materials will be managed and stored in designated areas to minimise the risk of flood-related damage or pollution.

- Deployable measures such as portable bunds, sandbags, or silt fencing shall be installed if weather forecasts or river level monitoring indicate potential flooding.
- Drains, sumps, and pumping systems shall be maintained to ensure that any incidental water does not cause uncontrolled release or damage.

Monitoring & Inspection: The Project Supervisor shall monitor weather and river levels daily during the construction stage; the ECoW shall review flood mitigation measures where the area is in use. Any observed risk or breaches shall be managed immediately and recorded.

6.8.2 Disturbance on Fauna

6.8.2.1 SCI Bird Species

- Construction activities will be restricted to daytime hours as outlined:
 - Monday to Friday: 07:00 hours – 19:00 hours;
 - Saturday: 08:00 hours – 14:00 hours.
- An on-site speed limit will be enforced for all traffic;
- Noise emissions and will comply with the recommendations of BS 5228;
- Machines will be operated at low speeds and will be shut down when not in use;
- Mechanical plant used on site will be fitted with effective exhaust silencers. Vehicle reverse alarms will be silenced appropriately to minimise noise breakout from the site while still maintaining their effectiveness;
- Compressors will be of the “noise reduced” variety and fitted with properly lined and sealed acoustic covers;
- In all cases, engine and/or machinery covers will be closed whenever the machines or engines are in use;
- All pneumatic percussive tools will be fitted with mufflers or silencers. Mechanical static plant will be enclosed by acoustic sheds or screens;
- For sheet piling, vibration hammer will be used, with impact hammer used only when vibration hammer is unable to complete the drive due to high ground resistance;
- Furthermore, for sheet piling, an acoustic screen will be used, enclosing the hammer head and the top of the pile, which will reduce noise by 5 to 10dB (BS5228 2009-2014);
- The use of the impact hammer sheet piling method, if needed, will be avoided at Limerick WWTP during the cormorant breeding period 1st March to 30th June; and
- Employees working on the site will be informed about the requirement to minimise noise and undergo training on the following aspects:
 - The proper use and maintenance of tools and equipment;
 - The positioning of machinery on-site to reduce the emission of noise;
 - Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment; and
 - The use and maintenance of sound reduction equipment fitted to power pressure tools and machines.

6.8.2.2 Otter

- A pre-commencement survey for Otter will be carried out prior to any works commencing. Should Otter holts be recorded within 150m of the proposed works at Limerick WWTP or Corcanree PS and a potential for disturbance identified thereon, a derogation license will be obtained from NPWS and works carried out in accordance with NRA (2006) *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*. The otter survey will be carried out no more than 10 months in advance of commencement. The survey will be supplemented with an additional inspection immediately prior to commencement; and
- The requirement for a pre-commencement survey does not present a lacuna in the survey assessment but is fully in line with best practice guidance. The purpose of the pre-commencement survey will be to assess any changes in the baseline conditions of the site since the time of carrying out the baseline surveys. Should an otter holt be identified during this pre-commencement survey, and if it is deemed that the construction works have the potential to significantly disturb otter, a derogation licence will be obtained

from NPWS and further mitigation prescribed by a suitably qualified ecologist prior to commencement of works.

6.9 Archaeology, Architectural and Cultural Heritage

A potential direct effect on previously unknown archaeological heritage lies in the uncovering of subsurface remains. Accordingly, the following mitigation measures will be carried out subject to the approval of the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage (DHLGH), and further mitigation may be sought by the NMS:

- Archaeological monitoring of all groundworks will be undertaken by an experienced, licence-eligible archaeologist working under licence from the DHLGH. Test trenching is not feasible as the site is located within flood plains, with the potential for archaeological remains to survive deeply stratified in natural sediment accumulations, hence identification during test trenching would be particularly challenging;
- Any archaeological features, deposits or artefacts identified during monitoring will require mitigation. Groundworks within that area should be halted and the appropriate authorities informed. The archaeological remains will be preserved *in situ* or by record (excavation) following consultation with the National Monuments Service. Adequate time and resources will be provided by the developer for the resolution of any archaeology identified within the development site that will be directly impacted by groundworks. Time and resources will also be allowed for any post-excavation work and specialist analysis necessary following any archaeological excavation that takes place;
- A report is required to be compiled on completion of any archaeological monitoring and excavation and will be submitted to the relevant authorities.

Potential direct effects on previously unknown architectural/cultural heritage were therefore identified, and the following mitigation measures will be carried out:

- The subsurface remains of the embankment and any associated features will be recorded during monitoring.

6.10 Landscape and Visual

The Limerick WWTP and Corcanree PS are lined with mature vegetation around their boundaries. This vegetation largely screens the sites from the surrounding area. Limited vegetation removal is anticipated for the construction of the Proposed Development at both sites to accommodate the proposed works as well as access to the sites. This vegetation removal is minimal and localised to a maximum width of 5m. The remaining retained existing vegetation at both sites is to be protected and enhanced. To mitigate the losses, reinstating planting at the location where existing vegetation was removed is proposed. Additionally, further tree and herbaceous planting aiming to increase the baseline provision of habitat following the recommendations of the project ecologist has been included to the mitigation.

6.11 Land and Soils

The proposed construction shall comply with the requirements of statutory bodies (Building Control Amendment Regulations, Health Service Executive inspections, Uisce Éireann and Health Safety Authority (HSA) inspections).

The contractor is required to implement the following measures in relation to land and soils during construction:

Loss or damage of topsoil:

- Topsoil will be stripped and stored separately from subsoil by the appointed contractor using appropriate methods;
- Stockpiles will be kept at $\leq 3\text{m}$, located away from drainage pathways, and managed to minimise the effects of degradation and erosion;

- Stripped topsoil will be reused on site for reinstatement and landscaping purposes, thereby reducing the need for off-site disposal. All topsoil will be appropriately handled, stored and reinstated to maintain its structure and quality; and
- Where practical, the removal of topsoil from the Proposed Development will be avoided.

Construction of Structures:

- During construction of structures, including foundation excavation works, the extent of excavation will be limited to the structure footprints to minimise disturbance to surrounding soils and subsoils;
- Excavation works will be controlled and sequenced to prevent over excavation and unnecessary exposure of founding strata. Where deep excavation is required, temporary or permanent lateral support (sheet piles or cofferdams) will be implemented to maintain ground stability and prevent collapse or lateral movement of soils as outlined in Chapter 4 (Construction Strategy). Soft ground removal will be limited to the minimum depth required to achieve suitable formation levels;
- Construction plant and equipment will operate within designated working areas only, with clearly defined haul routes to avoid compaction of adjacent soils outside the construction footprint;
- Where dewatering is required, physical cut-off barriers and controlled pumping stations will be used to limit groundwater ingress, avoiding softening of founding strata and all pumped water will be treated prior to discharge;
- Excavated materials will be stockpiled in a designated temporary stable area. A substantial proportion of excavated materials is anticipated to be unsuitable for reuse, requiring off-site disposal as outlined in Chapter 17 (Resource and Waste Management), while suitable materials for reuse will be reinstated after the appropriate tests are carried;
- Erosion and sediment control measures will be implemented to prevent mobilisation of fine materials from exposed or stockpiled soils; and
- An Environmental Clerk of Works will oversee implementation of these measures, supported by regular site inspections.

Pollution from construction activities:

- All fuels, oils and chemicals will be stored in designated bunded areas, located away from drainage pathways and watercourses. Refuelling and maintenance activities will be undertaken in designated areas equipped with spill kits, and plant will be regularly inspected to prevent leaks;
- Concrete and cement washout will be contained and managed to prevent discharge to soils or groundwater; and
- An Environmental Clerk of Works (ECoW) will oversee implementation of all prevention measures, and works will be carried out in accordance with the Construction Environmental Management Plan (CEMP), including emergency spill response procedures.

Piling activities:

- Piling works will be undertaken in accordance with the best practice geotechnical and environmental guidance to minimise disturbance to soils, subsoils and groundwater;
- Piling works will be undertaken using Continuous Flight Auger (CFA) piling, as outlined in Chapter 4 (Construction Strategy), which is a low-vibration and low-displacement technique suitable for the prevailing soft ground conditions;
- To prevent the formation of preferential pathways for groundwater movement; piling will be undertaken using the continuous flight auger method, whereby the auger is continuously drilled to the required depth and concrete is pumped through the hollow of the auger as it is being withdrawn, thereby maintaining support to the surrounding soils and ensuring that the bored holes are not left open; and
- All piling activities will be supervised by suitably qualified personnel to ensure compliance with specifications and protocols.

Dewatering:

- Dewatering works will be controlled and limited in extent and duration to minimise localised groundwater drawdown and associated effects on surrounding soils;
- Physical cut-off barriers (sheet piles or cofferdams) and controlled pumping system will be implemented to minimise groundwater ingress and softening of founding strata;
- All abstracted water will be treated through lined sumps and settlement ponds, along with any other treatment required by the governing bodies before discharge to the Lower River Shannon; and
- Monitoring of water discharge will be completed to ensure compliance.

Groundwater contamination:

- Control measures to prevent groundwater contamination will include the implementation of standard construction management and pollution control measures;
- All fuels, oils and chemicals will be stored in bunded areas, the use of designated refuelling areas with spill kits, and the implementation of spill response procedures; and
- All surface water and dewatering activities will be contained and treated as necessary prior to discharge, and no direct discharge of untreated water to ground will be permitted.

These measures will prevent the infiltration of contaminants into soils and groundwater, thereby minimising the potential for groundwater contamination.

6.12 Water

The Project Manager has overall responsibility for the CEMP, ensuring that all mitigation measures are implemented, monitored, and maintained throughout the construction phase. Subcontractors will be required to comply fully with the CEMP and may prepare detailed method statements to demonstrate how they will implement the prescribed controls in their areas of work.

An Ecological Clerk of Works (ECoW) and the independent Project Supervisor for the Construction Stage (PSCS) will provide oversight and coordination across all contractors. The ECoW will ensure that ecological and hydrological protections are followed, particularly near Bunlicky Lake, Ballinacurra Creek, and the Shannon Estuary, while the PSCS will coordinate health and safety aspects associated with the environmental measures.

The contractor is required to implement the following measures in relation to water during construction in Limerick WWTP site:

Dewatering and Surface Water Management

- All surface water, construction runoff, and excavation groundwater shall be fully contained and managed in a controlled system. No uncontrolled discharge to ground, drainage channels, or the receiving environment is permitted;
- Excavation groundwater and surface water runoff shall be collected in lined sumps and pumped to mobile settlement tanks or equivalent treatment systems to allow suspended solids to settle prior to discharge;
- Temporary surface drains and bunds shall be lined to prevent infiltration and interaction with groundwater;
- Pumping and treatment systems shall be sized to manage combined excavation groundwater and surface runoff, including rainfall events up to the 1-in-30-year return period intensity, and maintained to prevent overtopping or system failure;
- Dewatering shall be undertaken in a controlled manner to manage groundwater drawdown to minimise hydraulic gradients, sediment mobilisation, or instability within the excavation;
- Groundwater levels shall be monitored during dewatering to verify that drawdown remains localised to the excavation area and does not adversely affect surrounding soils or structures;
- Final treated water shall meet a Suspended Solids limit of <35 mg/L prior to discharge;
- Water quality monitoring shall be undertaken at the treatment system outlet, with daily visual inspections and routine sampling as agreed;
- Treated water shall be discharged to the existing WWTP final effluent chamber and subsequently to the Shannon Estuary;

- All dewatering infrastructure (sumps, pumps, pipework, tanks) shall be inspected weekly and following significant rainfall events, with records maintained; and
- The ECoW has the authority to suspend pumping immediately if suspended solids limits are exceeded or if any control measure fails, and all inspections, maintenance, and corrective actions shall be fully documented.

Drainage Protection and Sediment Control

- The contractor shall identify and map all existing drainage features prior to works commencing and protect them with temporary fencing and targeted silt control measures where they interface with construction areas;
- Silt fences shall be supported by timber posts and geotextile buried in an 'L' configuration to a minimum depth of 250 mm;
- Targeted silt fencing and sediment control measures shall be installed at locations where sediment mobilisation risk is identified during weekly or post-rainfall (>10 mm) inspections. Continuous perimeter fencing is not required due to full containment of surface water and the protected nature of drainage features;
- Construction works shall be sequenced to minimise exposed soil, ensuring no disturbed area remains uncovered for more than 7 days. Exposed areas where works are paused or completed shall be stabilised or covered to prevent sediment mobilisation;
- Temporary stockpiles shall be located within the active construction footprint, at least 20 m from drainage features, and managed with bunding, covers, or perimeter silt fencing to prevent erosion and runoff into drainage pathways;
- Drainage protection and sediment controls shall be inspected weekly by the Project Supervisor, and within 24 hours after rainfall events exceeding 10 mm, with any damaged or ineffective controls repaired or replaced within 48 hours;
- Where reasonably possible, bulk earthworks shall be scheduled during drier months (April–September) to reduce sediment generation; and
- The Project Supervisor and ECoW shall oversee all inspections, verify compliance with sediment control measures, and review corrective actions to ensure that drainage features and the receiving water environment remain protected throughout construction.

Pollution Prevention and Spill Management

- Designated bunded areas shall be provided for refuelling, plant maintenance, and fuel/chemical storage, located at least 10 m from drainage features;
- Oils and fuels shall be stored in bunded tanks providing 110% retention capacity;
- No refuelling shall occur within 10 m of the excavation perimeter or drains, and vehicles must not be left unattended during refuelling;
- Spill kits, absorbent materials, and oil containment booms shall be available on-site, proportionate to the volume of materials stored, with staff trained in their correct use;
- Cementitious and hazardous materials shall be handled in designated areas at least 5 m from drainage features or the excavation, with controlled washout procedures to prevent discharge;
- An Emergency Spill Response Plan shall be implemented and maintained, including contact details for relevant statutory bodies, and made accessible to all site personnel;
- All spill response equipment shall be maintained in fully operational condition at all times; and
- Weekly inspections of storage areas, bunds, and spill response equipment shall be undertaken by the Project Supervisor, with verification by the ECoW, and all inspections, maintenance, and corrective actions documented.

Piling and Groundwater Controls

- Excavation and piling for the AGS tank shall use low-vibration methods, with no hard rock expected, to minimise disturbance to saturated soils and surrounding groundwater;
- Temporary drainage protection measures (silt fences, sediment traps) shall be inspected and maintained to ensure any vibration-mobilised sediments are captured at source;

- Targeted monitoring of water quality and drainage features shall be undertaken during piling to verify that any mobilisation of sediments, changes in groundwater levels, or temporary hydraulic gradients remain localised and controlled; and
- Drainage features, sediment controls, and water-sensitive areas shall be inspected by the Project Supervisor, with verification by the EcOW. Any failures or breaches shall be corrected immediately and fully documented.

The contractor is required to implement the following measures in relation to water during construction in Corcanree PS site:

Dewatering and Surface Water Management

- All excavation groundwater and surface water runoff shall be fully contained and managed in a controlled system. No uncontrolled discharge to ground, drainage features, or the receiving environment shall occur.
- Groundwater abstracted during excavation shall be collected in lined sumps and pumped to mobile settlement tanks or equivalent treatment systems to remove suspended solids prior to discharge.
- Pumping and treatment systems shall be sized at detailed design stage to manage combined groundwater inflows and surface runoff, including rainfall events up to the 1-in-30-year return period intensity, and shall be maintained to prevent overtopping or system failure.
- Dewatering shall be undertaken in a staged and controlled manner to manage groundwater drawdown, minimise excessive hydraulic gradients, and reduce the risk of sediment mobilisation or instability within the excavation.
- Groundwater levels shall be monitored during dewatering to verify that drawdown remains localised to the excavation area and does not adversely affect surrounding soils or structures.
- Final treated water shall meet a Suspended Solids limit of <35 mg/L prior to discharge.
- Treated water shall be discharged to the storm overflow chamber and subsequently to the Shannon Estuary via the existing controlled outfall.
- Water quality monitoring shall be undertaken at the treatment system outlet, with daily visual inspections and routine sampling as agreed.
- All dewatering infrastructure (sumps, pumps, pipework, tanks) shall be inspected weekly and following significant rainfall events, with records maintained.
- The EcOW has the authority to suspend pumping immediately if suspended solids limits are exceeded or if any control measure fails, and all inspections, maintenance, and corrective actions shall be fully documented.

Drainage and Sediment Control

- All existing drainage features, including the OPW drain located approximately 50 m north-west of the excavation area, shall be identified and clearly demarcated prior to commencement of works.
- Temporary protective fencing shall be installed along the eastern and northern site boundaries to prevent encroachment, trafficking, or accidental discharge toward the OPW drain.
- Localised silt fencing and sediment control measures shall be installed at points where construction activities interface with drainage pathways or where there is a risk of sediment migration. Continuous perimeter buffering is not required given the site layout and flood defence embankments.
- Exposed soils shall be minimised through sequencing of works. Areas not actively under construction shall be stabilised as soon as practicable.
- Stockpiles shall be located within the active construction footprint, at least 15 m from any watercourse, and managed to prevent erosion, including bunding, covering, or temporary stabilisation during heavy rainfall.
- Sediment control measures shall be inspected weekly by the Project Supervisor, with daily checks by the ECoW in high-risk areas such as near drainage features, steep benches, or stockpiles. Any ineffective controls shall be repaired immediately, and all inspections and corrective actions documented.

Pollution Prevention and Spill Management

- Refuelling, plant maintenance, and fuel/chemical storage shall take place within designated bunded areas located at least 10 m from drainage features and outside the mapped flood zone.

- Oils and fuels shall be stored in bunded tanks providing 110% retention capacity.
- No refuelling shall occur within 10m of the excavation perimeter or drains, and vehicles must not be left unattended during refuelling.
- Spill kits and absorbent materials shall be available on-site at all times, proportionate to the volume of materials stored, with staff trained in their correct use.
- Cementitious and hazardous materials shall be handled in designated areas at least 5m from drainage features or the excavation, with controlled washout procedures to prevent discharge.
- An Emergency Spill Response Plan shall be implemented and maintained for the duration of the works, including contact details for relevant statutory bodies.
- All spill response equipment shall be maintained in fully operational condition at all times.
- Weekly inspections of storage areas, bunds, and spill response equipment shall be undertaken, with verification by the ECoW, and all records of inspections, maintenance, and corrective actions shall be documented.

Piling and Groundwater Controls

- Excavation and sheet pile installation for the storm tank shall use low-vibration methods to minimise disturbance to saturated soils and surrounding groundwater conditions.
- Sumps and sediment traps shall be inspected and secured prior to piling works and maintained throughout construction to ensure any mobilised sediment is captured at source.
- Targeted monitoring of water quality and drainage features shall be undertaken during piling to verify that any mobilisation of sediments or changes in groundwater conditions remain temporary and localised.
- Drainage features, sediment controls, and water-sensitive areas shall be inspected by the Project Supervisor, with verification by the ECoW. Any failures or breaches shall be corrected immediately and fully documented.

Flood Risk Management

- Stockpiles, plant and hazardous materials will be managed and stored in designated areas to minimise the risk of flood-related damage or pollution.
- Deployable measures such as portable bunds, sandbags, or silt fencing shall be installed if weather forecasts or river level monitoring indicate potential flooding.
- Drains, sumps, and pumping systems shall be maintained to ensure that any incidental water does not cause uncontrolled release or damage.
- Flood risk mitigation shall be inspected daily by the Project Supervisor, with review and verification by the ECoW where the area is in use. Any observed risk, breach, or failure shall be addressed immediately, and all actions recorded.

6.13 Resource and Waste Management

The appointed contractor(s) will ensure that waste arisings will be managed in accordance with the waste hierarchy and in compliance with the provisions of the Waste Management Act 1996, as amended. The contractor is required to implement the following measures in relation to resource and waste management during construction:

- A Construction and Resource and Waste Management Plan (CRWMP) will be developed by the appointed contractor(s) prior to commencing works on site and in line with the Best Practice Guidelines for the Preparation of Resource & Management Plans for Construction and Demolition Projects (EPA 2021b). The CRWMP outlines how waste arising during the Construction Phase of the Proposed Development will be managed in a way that ensures compliance with the provisions of the Waste Management Act 1996, as amended. The following is an indicative summary of the content of the CRWMP:
 - Description of the project;
 - Wastes arising including procedures for minimisation/reuse/recycling;
 - Estimated cost of waste management;
 - Roles including trainings and responsibilities for construction waste;

- Procedures for education of workforce and plan dissemination programme;
- Record keeping procedures;
- Waste collectors, recycling and disposal sites including copies of relevant permits and licences; and
- Waste auditing protocols. Using the information identified in this section the contractor will be required to develop, implement and maintain a CRWMP during the construction of the Proposed Development.

In addition to the inherent design measures which will be implemented during construction, the following mitigation measures will also be implemented:

Waste Prevention and Material Management

- The Contractor will minimise waste generation and disposal insofar as reasonably practicable, with priority given to prevention and reuse in accordance with the waste hierarchy;
- Opportunities for reuse of materials, by-products and wastes will be identified and implemented throughout the construction phase;
- Excavated materials will be managed to maximise on-site reuse, including balancing cut and fill and reusing suitable materials for backfilling, drainage layers, landscaping and site levelling, subject to appropriate testing;
- Where the off-site reuse or recovery of soil and stone is proposed, an Article 27 by-product notification will be prepared and submitted to the EPA, as required. Notifications will be submitted in advance of excavation works, allowing sufficient time for regulatory approval and coordination with receiving sites;
- 'Just-in-time' delivery of materials will be implemented, where practicable, to minimise material wastage; and
- The Contractor will engage with supply chain partners to minimise packaging and promote reuse of packaging materials where feasible.

Segregation, Reuse and Recycling

- Where reuse on-site is not feasible, materials (including excavation materials) will be prioritised for recovery or recycling over disposal;
- Waste materials such as metals, timber, glass and packaging will be segregated at source and stored in clearly labelled containers (including use of colour coding and signage) to maximise recycling rates and material quality;
- Suitable materials from site clearance and existing infrastructure (e.g. stone, concrete, paving materials and vegetation) will be reused on-site where practicable; and
- Materials that cannot be reused on-site (e.g. asphalt or tarmac) will be sent to appropriately authorised facilities for recovery or recycling.

Waste Handling, Storage and Transport

- All waste materials will be stored in designated areas on-site prior to removal;
- Hazardous wastes (e.g. waste oils and fuels) will be stored in secure, bunded areas prior to collection;
- Waste will be transported by authorised waste collectors in accordance with the Waste Management (Collection Permit) Regulations, 2007, as amended;
- Waste will be delivered to appropriately authorised waste facilities in accordance with the Waste Management Acts 1996–2022, as amended; and
- Any off-site interim storage or recovery of excavated materials will only take place at facilities holding the appropriate waste authorisations.

Waste Recording and Monitoring

- The Contractor will maintain records of the types and quantities (in tonnes) of waste and materials generated and removed from site; and
- Records will include details of the destination facilities, including their name, address and authorisation status, and will identify whether materials are recovered or disposed.

6.14 Population and Human Health

- Dust mitigation measures from Chapter 8 (Air Quality) will be implemented;
- While it is noted that as all works are confined within the site boundary and envisaged direct impacts on stakeholders are considered to be minimal, the timeframe of the proposed works in general and specific works impacting indirectly on recreational uses will be communicated to ensure that any impacts from these works are minimised;
- A preliminary Traffic Management Plan will be prepared by the design team in consultation with Limerick Council and other stakeholders to manage vehicle, pedestrian and cyclist movements adjacent to the site, including road closures, diversions, to mitigate any traffic congestion or road safety impacts which may arise for road and pavement users, signage and manning hazard points during busy periods;
- All construction traffic shall only travel to and from the site along the eastern section of Dock Road, to minimise any potential for temporary disruptions to the operation of education and businesses in the vicinity. Where possible abnormal load movements, on receipt of a permit from the council, will be restricted to off peak times;
- Construction staff parking will not be permitted on the public road network. Restrictions to the movement of tracked vehicles and haul loads shall apply, in conjunction with the use of wheel washers and water bowsers to prevent migration of detritus and dust built-up on public roads;
- Construction noise mitigation from Chapter 10 (Noise and Vibration) will follow best practice, including monitoring, restricted hours for high-noise works, traffic speed limits, stakeholder communication, staff training and careful plant selection and placement to minimise noise levels;
- No vegetation removal is anticipated for the Proposed Development at Limerick WWTP. However, some vegetation will be removed at Corcanree PS to accommodate the proposed works. To mitigate this, additional screening planting is proposed at Corcanree PS. Temporary hoardings will be put in place on the edge of the construction zone for both sites;
- Chapter 16 (Water) notes that construction will be managed under a Construction Environmental Management Plan (CEMP), which sets out all measures to protect water quality, manage runoff and dewatering, control sediment, and prevent accidental spills. All of which could impact either directly or indirectly on human health; and
- Monitoring measures outlined in Chapters 6 to 18 and 20 will be implemented throughout construction phase and will identify any issues arising during this phase of the Proposed Development.

6.15 Material Assets

The contractor is required to implement the following measures in relation to material assets during construction:

- The Proposed Development has been designed to minimise interactions with existing utility infrastructure, with the majority of works undertaken offline. Where works are required in proximity to existing utilities, these will be managed through standard protection measures and established construction practices;
- Prior to the commencement of works, the Contractor will obtain up-to-date utility records, consult with relevant service providers, and undertake confirmatory surveys as necessary to verify the location of existing infrastructure;
- Works in the vicinity of utilities will be carried out in accordance with best practice methodologies and the requirements of the relevant service providers. Protection measures will include appropriate signage and marking of services, use of safe digging techniques, and implementation of exclusion zones where required; and
- Where localised works are required near existing infrastructure, these will be carefully planned and coordinated to avoid damage and minimise disruption. Any required service interruptions will be short-term and planned in advance in consultation with the relevant site and utility operators.

6.16 Major Accidents and Natural Disaster

The contractor is required to implement the following measures in relation to major accidents and natural disaster during construction:

Inherent design

- The design of the Proposed Development has been developed in compliance with the relevant design standards which include provisions to reduce the likelihood of risk events occurring (e.g. structures have been designed to avoid the risk of collapse, new infrastructure has been designed to cater for increased rainfall events, etc.)
- In addition to the duties imposed by Regulation 15 of the Safety, Health and Welfare (Construction) Regulations, designers must comply with Section 17(2) of the Safety, Health and Welfare at Work Act which requires persons who design a project for construction work to ensure, so far as is reasonably practicable, that the project is designed and is capable of being constructed to be safe and without risk to health, can be maintained safely and without risk to health during use, and complies in all respects, as appropriate, with other relevant legislation. This includes S.I. No. 138/2012 - Building Regulations (Part A Amendment) Regulations 2012 (as amended) and, if the works being designed are intended for use as a workplace, the relevant parts of the Safety, Health and Welfare at Work (General Application) Regulations. In accordance with these requirements, the Project Team established a consistent and appropriate means of assessing the risks that may arise from design decisions and of applying the General Principles of Prevention, mitigation measures that are to be embedded into the design of the Proposed Development.

Construction

By implementing plans focused on environmental protection, the Proposed Development can bolster its resilience against risk events.

- A Construction Resource and Waste Management Plan (CRWMP) will be prepared by the appointed contractor to ensure all construction and demolition waste is managed in full compliance with the Waste Management Act 1996 (as amended);
- A Construction Traffic Management Plan will be developed in consultation with the local authority and emergency services, then finalised by the contractor and kept as a live document to safely manage construction traffic, control vehicle movements and minimise accident risks throughout the works. All traffic management plans, including working times, will be agreed with and approved by Limerick City and County Council Transportation Department in advance of implementation;
- An Invasive Species Management Plan will be prepared and further developed by the contractor, with input from a qualified ecologist, to manage and prevent the spread of non-native invasive plant species identified within and near the Proposed Development boundary;
- A Surface Water Management Plan will be developed by the contractor to detail the procedures and technical practices for implementing effective sediment, erosion and pollution control measures and ensure effective management of surface water impacts during construction; and
- An Environmental Incident Response Plan will be prepared by the contractor detailing procedures that could be undertaken in the event of a significant release of sediment into a watercourse, or a significant spillage of chemical, fuel or other hazardous substances (e.g., concrete), non-compliance incident with any permit or license, or other such risks that could lead to a pollution incident, including flood risks.
- In scenarios where a hazard remains that may potentially give rise to significant effects, consideration is given to the incorporation of secondary mitigation measures in order to mitigate the associated risk level(s) to be ALARP.



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