

Limerick WWTP Upgrade and Regional Bioresource Centre

ElAR Chapter 4 - Construction Strategy

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Formerly JB Barry Partners who became part of Egis in 2023

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4 CONSTRUCTION STRATEGY

4.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) provides an overview of the construction activities and methods that are anticipated to be used during construction, systems testing and commissioning of the Limerick WWTP & RBC (hereafter referred to as the 'Proposed Development'). This chapter describes the strategy to construct the Proposed Development. It has been prepared in accordance with Part 1 of Annex IV of the EIA Directive and has therefore been structured to describe the following:

- Indicative duration and phasing during the construction period;
- Land use requirements to support the construction of the Proposed Development;
- Likely activities required to prepare the site and undertake the enabling works to support the construction of the Proposed Development;
- Methodologies to undertake demolition and construction activities;
- An overview of anticipated construction traffic, access points and haulage routes that are likely to be used during construction;
- An overview of employment and typical site management measures associated with the construction of the Proposed Development;
- Proposed landscaping and site infrastructure; and
- An overview of the Construction Environmental Management Plan to provide minimum requirements that the contractor(s) will be required to implement (Refer to Appendix 4.1 for the CEMP).

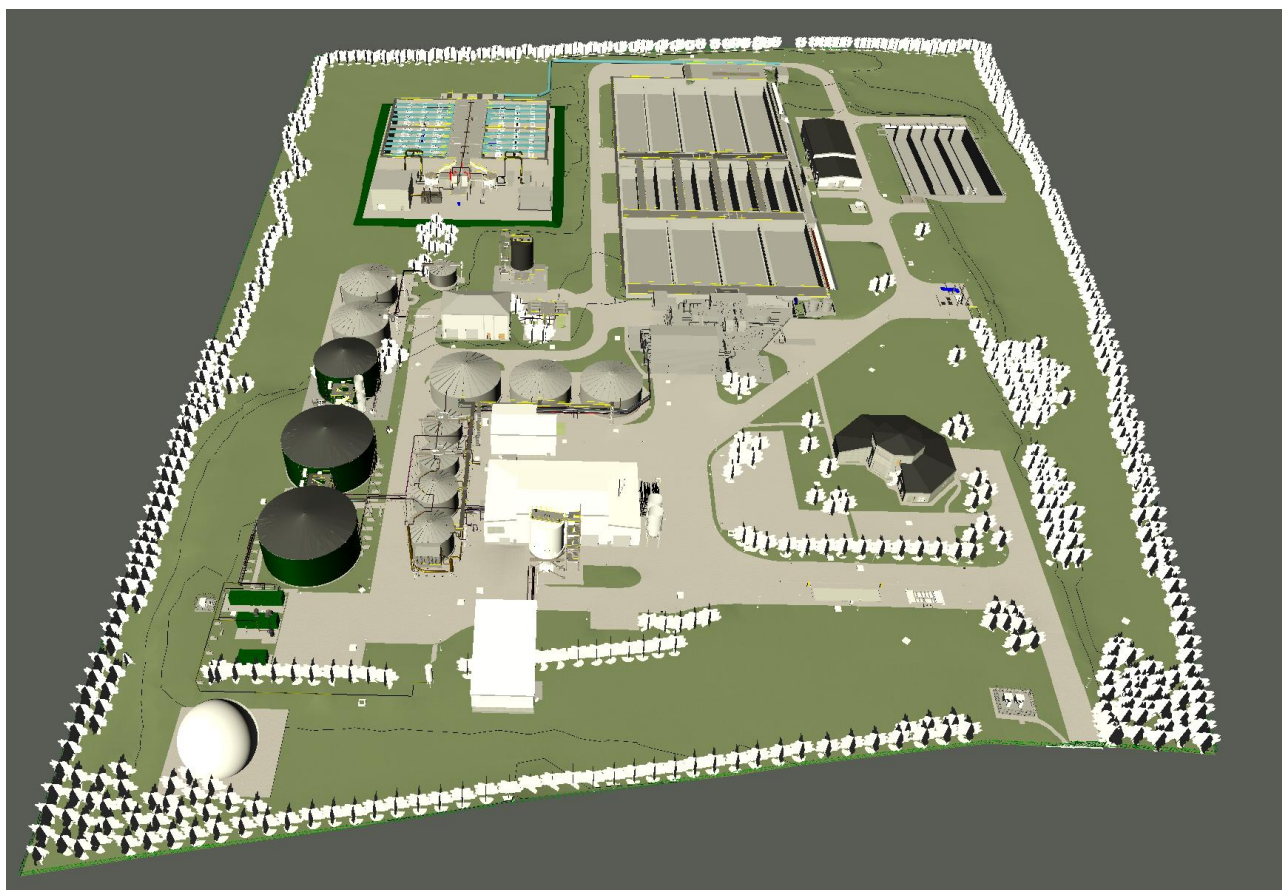


FIGURE 4-1 LIMERICK WWTP PROPOSED SITE LAYOUT (3D MODEL IMAGE)

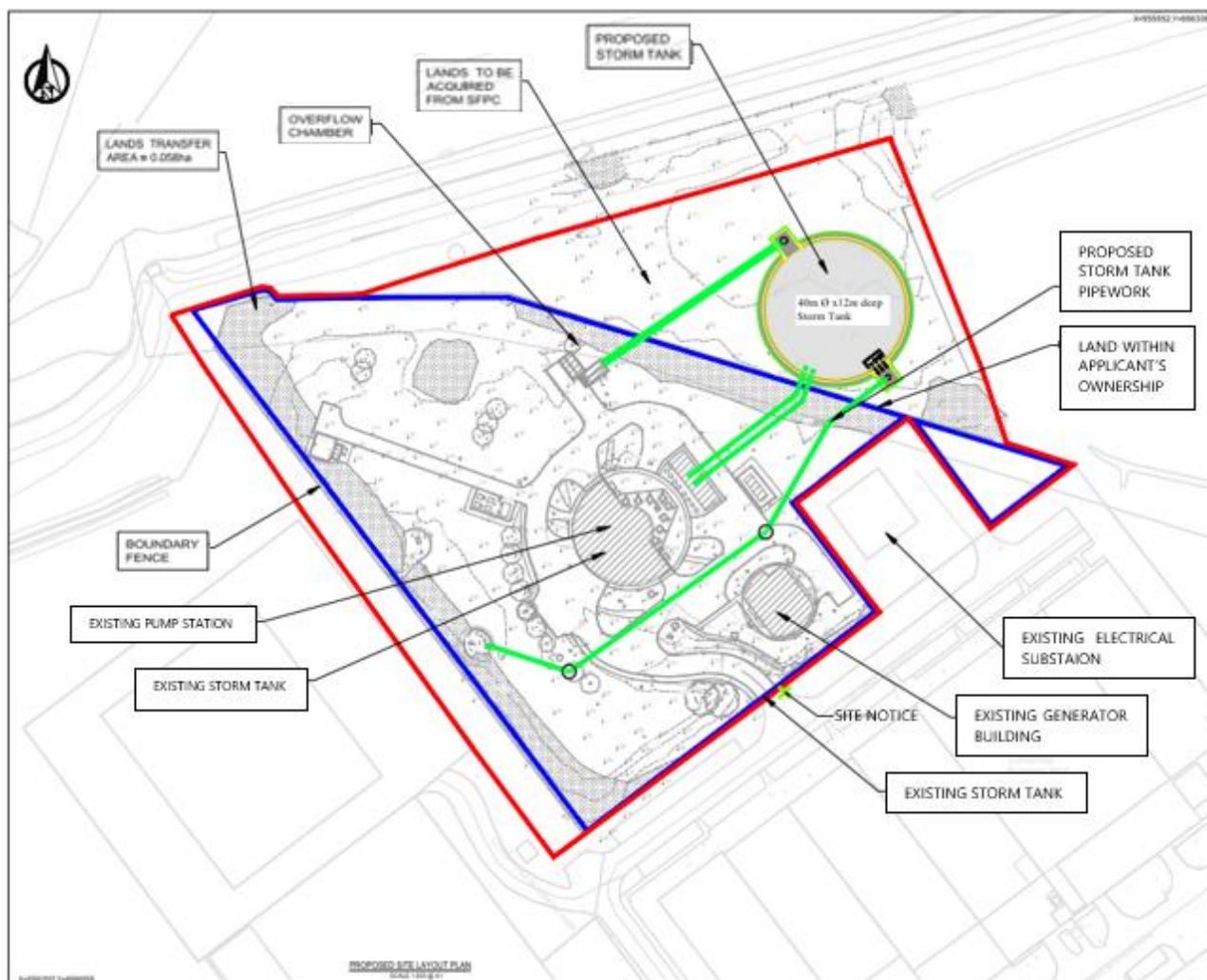


FIGURE 4-2: CORCANREE PS PROPOSED SITE LAYOUT

4.2 Approach

The approach to construction which has been assumed for the purpose of this EIAR is illustrated in Sections 4.3 to 4.8 herein. This information describes the main construction activities that are relevant for the assessment of likely significant environmental effects.

The final contracting structure will be determined through the procurement strategy, which is being developed in parallel with this EIAR. Uisce Éireann proposes to procure the construction works by means of a design-and-build type contract, or through separate design-and-build contracts for the various elements of the works. Under this arrangement, the appointed contractor(s) will assume responsibility for the detailed design and the identification of appropriate construction methodologies, thereby facilitating innovation and value engineering suitable to a project of this scale and complexity.

For the purposes of this EIAR, the construction methodology has been considered on a whole-project basis to ensure a comprehensive assessment of potential environmental effects. While the overall construction duration is known, the detailed phasing of activities may be refined at the final design stage by the appointed contractor(s). Accordingly, the construction approach described in Sections 4.3 to 4.8 represents the reasonable worst-case scenario, taking account of existing site constraints, adjacent land uses, and the range of methodologies that could feasibly be adopted.

Irrespective of the final procurement structure, the contractor(s) will be required, under the obligations of the design-and-build contract, to comply with all environmental measures, mitigation commitments, and best-practice controls set out in this EIAR to avoid and/or reduce significant adverse effects. Should a contractor

propose alternative methodologies or working areas to those described herein, or to those defined within the granted planning consent, it will be their responsibility to ensure continued regulatory compliance and to secure any additional licences, permits, or consents prior to implementing such changes.

4.3 Indicative Duration and Phasing

4.3.1 Overview

The construction of the Proposed Development is estimated at between 36 and 48-months, based on the reasonable worst case assessed herein. Annotated site lay out drawings, indicating each element of the works, are available in Planning Drawings. The estimated construction programme for the Proposed Development is outlined below to include the following tasks:

- Detailed design will take approximately 5-months;
- Establishment of the compound and site clearance works will take approximately 2-months;
- Construction of the new 157,000 PE inlet works and Activated Granular Sludge (AGS) process stream at the WWTP site will take approximately 18-months;
- Construction of the new 12,500m³ storm tank at Corcanree will take approximately 18-months;
- Civil works to construct the remaining subsurface and above ground structures will take approximately 12-months;
- Open cut construction of interconnecting pipework will take approximately 2-months;
- Diversion of 1 No. rising main from Corcanree PS to the new process stream will take approximately 2-months.
- Refurbishment of existing 2. No digester feed tanks will take approximately 2-months;
- Installation of process, mechanical and electrical equipment will take approximately 8-months;
- Site finishes and landscaping will take approximately 2-months;
- Testing and commissioning activities will take approximately 3 months, with individual elements commissioned at suitable stages of progression.
- Upon overall works completion, a final integrated commissioning phase will be undertaken to confirm that the entire system performs in accordance with its specified requirements.
- Performance testing of the upgraded processes will take approximately 3-months; and
- Decommissioning of process, pipework, mechanical and electrical equipment will take approximately 2-months.

Some of the above activities will overlap and be undertaken in parallel. It should be noted that some of the construction activities could be subject to seasonality restrictions.

4.3.2 Sequencing

4.3.2.1 Overview

Whilst the final sequencing and phasing of the works will be for the contractor(s) to determine, we have considered the various likely options in this regard and have set out below, a likely sequence of works that will enable the assessment of the reasonable worst case to be considered herein.

It is envisaged that the contractor(s) will mobilise on the site and set up a compound immediately following contract award. An initial approximate 3-month period will be required to undertake site investigations and detailed design.

Following completion of mobilisation, surveys and site investigations, the following sequential activities will be undertaken:

- Site clearance and topsoil stripping;
- Location and diversions of existing underground services;
- Installation of a dewatering system where appropriate;
- Installation of sheet piles and excavation of the cofferdam for the storm tank;
- Construction and phased commissioning of the storm tank at Corcanree Pumping Station;

- Construction and piled foundations for subsurface and surface structure foundations;
- Construction and phased commissioning of the new inlet works and AGS process stream;
- Construction of surface structures;
- Construction and phased commissioning of new Thermal Hydrolysis Process (THP);
- Construction of other subsurface structures;
- Modification and upgrade works to the existing imported sludge reception facility and foul pumps;
- Construction of interconnecting pipework;
- Finishing and fitout of buildings and site-wide landscaping;
- Final integrated commissioning of the upgraded storm tank, WWTP & RBC; and
- Decommissioning of pipework.

4.3.2.2 Deep Excavation Works

Deep excavation works will be required to accommodate tanks and interconnecting pipework. It is envisaged that cofferdams are required for the following structures at a minimum:

- AGS Tank at the WWTP site; and
- Storm tank at Corcanree Pumping Station.

Due to the nature of the ground conditions, groundwater and proximity to existing infrastructure, deep unsupported excavations are not considered viable for a number of structures. Information on land and soils is available in Chapter 14 (Lands and Soils) of this EIAR. The proposed excavations will therefore require temporary lateral support to maintain stability during the construction.

Dewatering systems will also be employed to facilitate dry excavation areas (further described in EIAR Chapter 14 (Land and Soils)).

4.3.2.3 Construction of Subsurface Structures

Once the deep excavations have been completed to the required depths, the subsurface elements of the works will be constructed. As described in Section 4.6, this will involve construction of concrete structures for the storm tank.

Pipework through the walls of the reinforced concrete structures will also be completed at this stage. Interconnecting pipework to be constructed between structures will be completed following completion of the subsurface and surface structures. Piling may be required for interconnecting pipework which will be confirmed during the detailed design stage of the contract.

4.3.2.4 Construction of Above-Ground Structures

On completion of below ground structures, the above ground construction works for the Wastewater treatment plant and Bioresource Centre will commence. These structures will likely be primarily constructed of steel, blockwork and reinforced concrete.

4.3.2.5 External Finishing and Internal Fitout

On completion of all structures, the external hard standing (roads, skip plinths, crane set-up pad) as well as the soft landscaping (planting, landscaping, etc.) will be installed. This will be followed by finishing works including site and task lighting, etc.

A new inlet works and AGS process stream will be constructed to operate in parallel with the existing WWTP arrangement. The construction of each process stream will be upgraded sequentially to allow the process to remain operational during the upgrade.

In parallel, the installation of all process, mechanical, and electrical equipment will take place in the buildings.

4.3.2.6 Commissioning and Connection of Existing Outfall

Once construction works are complete, the testing and commissioning phase will commence (refer to Section 4.6.7 for further detail).

Once the new Wastewater treatment plant upgrades are commissioned, flows will be diverted to the new infrastructure. Some sectional upgrades may be commissioned at an earlier stage to allow the plant to return to its current operation (secondary treatment and sludge dewatering).

4.4 Construction Compound and Working Areas

4.4.1 Overview

Temporary working areas will be required to accommodate construction and material storage, and construction compounds will provide site offices and welfare facilities for construction employees. For the proposed development, there will be two construction compounds across two sites: one compound at the main Limerick WWTP site and one compound at Corcanree PS. Each compound may be operated by a separate contractor depending on the contract structure. Temporary working area and compound drawings, including temporary site access routes, are provided in Appendix 4.1 CEMP in Volume 4 of this EIAR.

Initial site clearance and establishment activities for putting in place the construction compounds will include:

- Establish temporary site access routes;
- Clear and level the compound area as required;
- Install the site hoarding and gates to ensure that the site is secure;
- Establish hardstanding areas for units, parking and storage;
- Provide construction compound services including necessary connections to mains water, sewage, power and communications;
- Install general site lighting and CCTV; and
- Install the site office, welfare facilities and security facilities.

The construction compounds will contain car parking, in line with the principles of the Construction Stage Mobility Management Plan (CSMMP), as it is outlined in the CEMP in Volume 4 - Appendix 4.1 of this EIAR. Items of plant and equipment will be stored within the construction compound. Measures will be put in place at the compounds to ensure surface run-off is properly managed and treated in accordance with industry standards.

Materials for reuse such as topsoil, subsoil, concrete, rock etc., may also be stored at the construction compound for reuse as necessary where space permits. All necessary authorisations, under the Waste Management Act 1996, as amended, will be obtained prior to undertaking temporary storage.

4.4.2 Construction Compound Services

The construction compounds will be fenced off and secured, along with CCTV to ensure safe storage of all material, plant and equipment. Temporary lighting, including security lighting will be at the construction compounds for the duration of the Construction Phase. Access to the construction compound will be restricted to site personnel and authorised visitors only. The construction compound will be engineered with appropriate services. Water, wastewater, power, and communications connections will be organised by the appointed contractor(s) via locally available connection points agreed by the contractor(s) with service providers.

Appropriate environmental management measures will be implemented at the construction compound, for example, in order to minimise the risk of fuel spillage (including where refuelling). Other measures such as dust suppression and runoff containment will be implemented to ensure that the construction compound and the approaches to it are appropriately maintained. Further information on the air quality, noise and vibration, and water-related mitigation measures that will be implemented are described in the CEMP included in Volume 4 - Appendix 4.1 of this EIAR.

Following completion of the construction works, the construction compound area will be cleared and reinstated to match pre-existing conditions.

4.4.3 Temporary Construction Access Route (Internal)

4.4.3.1 Location and Function

Internal temporary construction access routes will be established to facilitate the movement of construction plant, materials, and personnel within the red line boundaries of the Proposed Development, while segregating operational areas and minimising potential environmental impacts.

The purpose of the temporary access routes is to provide controlled, efficient circulation, maintain safety for site personnel, and minimise disturbance to surrounding land and water resources.

Maps illustrating site layouts, access routes, and existing drainage network are provided in Planning Drawings.

Main WWTP Site

- Dedicated routes will be assigned to construction traffic, preventing any interference with existing site traffic or its management plan.
- AGS tank traffic will primarily use the internal access route.
- Pedestrian routes within the site will be segregated.
- Designated construction parking areas are located to the north of the site and will be managed to avoid interaction with operational areas or drainage features.

Corcanree PS

- Construction access is expected via the existing track in the north-west of the site, which passes through part of Flood Zone B. The route will provide controlled access for plant, materials, and personnel while avoiding operational areas.

Details of off-site haulage routes and associated traffic impacts are provided in Chapter 6 (Traffic and Transportation) of this EIAR.

4.4.3.2 Construction Methodology and Operation

Prior to installation of the temporary access route, topsoil will be stripped to an appropriate depth and stored separately in bunds for reuse during reinstatement. A geotextile membrane will be placed over the prepared formation level, followed by the placement and compaction of a 3.5 m wide hydraulically bound granular aggregate layer to form the running surface. Granular materials will be sourced from licensed local quarries and delivered directly to the Proposed Development.

Appropriate temporary drainage measures will be implemented where required to prevent ponding and to control surface water runoff during construction and operation of the route. The access track will be maintained for the duration of the Construction Phase to ensure safe and stable passage of vehicles. Wheel cleaning facilities will be provided where necessary to prevent the transfer of mud or debris onto the public road network.

Upon completion of the Construction Phase, the temporary aggregate layer and geotextile membrane will be removed, the underlying ground lightly cultivated where necessary to alleviate compaction, and soils reinstated in the correct sequence to restore the land to its pre-existing agricultural condition.

4.5 Enabling Works

Enabling works are required for various aspects of the Proposed Development, in order to prepare the site for construction activities. A description of the enabling works required is provided in Sections 4.5.2 to 4.5.5.

4.5.1 Overview

The following will be required at the development site:

- Establish and get appropriate approvals for construction traffic management requirements for delivery and haulage routes in consideration of the existing Site Traffic Management Plan;

- Establish and implement appropriate surface water management procedures in accordance with the requirements set out in the CEMP in Appendix 4.1;
- Install secure hoarding and fencing (2.4m in height as a minimum) within the site to segregate construction works areas from plant operations that will remain in-situ for the duration of the construction works;
- Install vehicle set down and material storage areas (typically by laying down hardcore to a depth of approximately 300mm) in relevant working areas;
- Undertake vegetation removal and stripping of topsoil as required in relevant working areas;
- Install the main construction compound to accommodate site offices and welfare facilities; and
- Undertake all required utility and services diversions required.

4.5.2 Utilities and Services

Utility works entail three categories of works namely Protect, Decommission and Diversion of the various utilities. These are identified in Chapter 18 (Material Assets). Underground services and utilities including telemetry, power, watermain and process pipework will need to be located and relocated in areas of the site to be developed. In particular, the diversion of ESB underground power lines will be required to accommodate the construction of the storm tank at Corcanree.

The construction of buried utility installations will follow these construction activities:

- Establishing the extents and locations of the existing utility apparatus is determined using a combination of utility records, surveys and site investigations. Prior to excavation utilities will first be traced using established techniques. Trial pits are excavated to confirm the locations of existing services;
- The area will be cleared and the surfacing removed;
- Pipes (and other material) will be delivered into the compound area and offloaded or to the works area where there is sufficient space away from the excavation;
- The main bulk excavation of trenches required for the Proposed Development will be completed by mechanical excavators and manually in the vicinity of services. Utility providers' guidance and requirements will be adhered to whilst excavating in the vicinity of their services. Excavated material will be removed from the work area almost immediately;
- Temporary support to trenches will be provided as necessary throughout the pipe installation works;
- Imported bedding material and the pipe/ducting will be placed into position;
- The pipe(s)/ducting will then be backfilled up to the required level. Pipes and ducting will be laid in accordance with the specifications of the utility owner;
- Once the utility diversion works are complete, reinstatement will be in accordance with the local authority's specification and guidance; and
- Protection and decommissioning works for existing utilities will be undertaken in tandem with the excavations and reinstatement of the Main Works.

4.5.3 Drainage

The drainage systems on existing internal access roads include carrier drains located in the traffic lanes which are fed by traditional kerb side gullies. For the temporary road and track drainage, carrier drains and gully connections will be installed early on and in advance of road and track works.

Carrier drains will be installed in trenches which are mechanically dug. Trenches less than 1.25 m in depth will typically not require trench support. Trenches that are greater in depth than 1.25 m will require trench support either by poling boards, waling and struts, trench boxes or sheet piles in the case of excessive depths. Gully connections and gully pots will be laid similarly to the carrier drains.

The construction activities applied during the construction of a pipe installation are like those identified previously for utilities. The pipe system is laid ensuring gradients are sufficient to allow flow of water.

The Proposed Development includes adopting SuDS (Sustainable Drainage Systems) for surface water collection and attenuation. SuDS are designed to manage stormwater locally (and as close to source as possible) to mimic natural drainage and encourage its infiltration, attenuation and passive treatment, before discharge to the existing Final Effluent Chamber.

Further detail on drainage design is included in EIAR Chapter 3 (The Proposed Development).

4.5.4 Site Investigation

In May 2021, Whiteford Geoservices Ltd were commissioned by the Applicant to undertake site investigation works to obtain geotechnical information for Limerick WWTP and Corcanree PS sites. At Limerick WWTP, works were completed within the WWTP site boundary, primarily in the vegetated area to the west of the main treatment works. Field work was undertaken between the 18th May and 6th July 2021 and comprised of 5 No. trial holes, 6 No. percussive boreholes and 5 No. rotary cored boreholes.

At Corcanree, investigative works (2 No. trial holes, 6 No. percussive boreholes and 4 No. rotary cored boreholes) were completed between the 24th May and 6th September 2021. These works took place within the pumping station site, and within adjacent lands owned by Shannon Foynes Port Company. Further information on site investigation works to date is presented in EIAR Volume 2, Chapter 14 (Land & Soils).

It is anticipated that the contractor(s) may undertake further site investigation works within the planning boundary to confirm the existing information on the land and soils. The specification of such works will be developed by the contractor(s) during the detailed design.

4.5.5 Excavation, Remediation and Dewatering

4.5.5.1 Excavation

As per Volume 2 - EIAR Chapter 14 (Land & Soils), while no observations relating to contamination were made during the ground investigations contract, construction and demolition materials (e.g. concrete, plastic, timber, and reinforcement) were identified, it is recommended that further environmental sampling and testing of the made ground is undertaken.

All excavated material will be disposed of at a suitable licensed facility in respect of which a waste permit or a waste licence is granted, if there is no opportunity for reuse on site. The majority of the overburden material within the storm tank footprint is unlikely to be suitable for re-use as an engineered fill.

Excavations in made ground will be monitored by a suitably qualified person to ensure that any evidence of contamination (e.g. asbestos, hydrocarbons, etc.) encountered are identified, segregated and appropriately contained.

4.5.5.2 Remediation

Any contaminated or construction waste material encountered will be removed off site to a licensed facility. In areas of landscaping, some depth of made ground will be removed to allow clean topsoil to be placed on the areas of landscaping. It is anticipated that all of the excavated topsoil may be reused in landscaping throughout the site.

Should the Contractor(s) seek to reuse excavated material, acceptability of the material will need to be confirmed. Refer to EIAR Chapter 14 (Land and Soils) for the control and management of material to be stockpiled, should the material be shown to be suitable

4.6 Indicative Construction Methods

4.6.1 Overview

The main construction activities are listed below:

4.6.1.1 Wastewater Treatment Capacity Upgrade

- Construction of a new inlet works and AGS process stream to operate in parallel with the existing WWTP arrangement;
- Diversion 1 No. rising main from Corcanree PS to the new process stream, allowing a 50:50 flow split between the new and existing works;
- Continued use of Mungret pumping arrangement through existing works;

- Continued use of the existing 1.2 km outfall pipe to the Shannon Estuary;
- Construction of interconnecting pipework using open cut techniques and connection to existing infrastructure; and
- Testing and commissioning of the upgraded Limerick WWTP treatment processes.

4.6.1.2 Stormwater Storage (Corcanree PS)

- Construction of new 12,500m³ stormwater storage tank with gravity overflow to existing Corcanree outfall chamber;
- Construction of interconnecting pipework using open cut techniques and connection to existing infrastructure; and
- Upgrade existing foul pumps to increase pumping capacity to the WWTP (<1,100 l/s per rising main).
- Testing and commissioning of the Stormwater Tank.

4.6.1.3 Bioresource Centre

- Upgrade existing imported sludge reception facility;
- Installation of new dewatered sludge cake reception facility;
- Installation of new mechanical thickening system and associated polymer dosing;
- Continued use & refurbishment of existing 2. No digester feed tanks as pre-THP dewatering feed tanks;
- Upgrade mixing system & transfer pumps for pre-THP dewatering blend tank;
- Installation of new odour control system to cater for overall Bioresource Centre installation;
- Installation of new dewatering and storage installation for pre-THP dewatering and cake imports;
- Installation of new Thermal Hydrolysis Process (THP); and
- Upgrade of electrical power capacity, including installation of new Combined Heat and Power Engine (CHP).
- Testing and commissioning of the RBC and system as a whole (WWTP & RBC).

These construction activities will occur in sequence as described previously in Section 4.3.2.

4.6.2 Stormwater Storage Tank

4.6.2.1 Overview

The storm tank is located near the centre of the Corcanree Pumping Station site and the structure will extend up to approximately 3m above ground level and approximately 10-15m below ground. The structure will be roofed and partially buried, with the walls of the tank extending c. 2.5 m above ground level (4.7 m OD), in accordance with the design flood level (min 5.10m OD). Footpaths will be constructed around the perimeter of the tank to connect with other operational and hardstanding areas. Handrailing and walkway platforms will be located above the structure to a height of approximately 1.2 m.

Due to the depth of the structure, ground conditions, groundwater and proximity to existing infrastructure, unsupported excavation is not considered viable. The proposed excavation will therefore require temporary or permanent lateral support to maintain stability during construction.

Given the presence of a high-permeability gravel layer and the proximity of the site to the Shannon Estuary, groundwater inflows are anticipated to be moderate to high. Appropriate dewatering measures and/or installation of a temporary physical cut-off barrier will be implemented, as required, to facilitate dry and stable working conditions.

An existing drainage feature is located approximately 60 m from the proposed excavation area. This feature will be identified and appropriately protected during the Construction Phase to maintain downstream water quality. All dewatering, discharge management and associated water quality protection measures will be implemented in accordance with the mitigation measures set out in the CEMP. See CEMP in Volume 4, Appendix 4.1 of this EIAR.

A combination of sheet piles with temporary propping/anchors is commonly used for this type of excavation. However, there is a risk that sheet piles may not penetrate the dense granular till with potential refusal on

cobbles and boulders a risk, resulting in insufficient toe capacity for stability and failure to control groundwater. Therefore, the adoption of a secant pile wall may be a more robust solution. The use of a secant pile wall cofferdam is assumed as the indicative construction method for this structure, however sheet piles may be used subject to further ground investigations and detailed design.

4.6.2.2 Construction Process

Construction will progress as per the following sequence:

1. The works area will be cleared and prepared, and a temporary hardstanding will be provided to facilitate the safe mobilisation and operation of piling plant and associated equipment. Topsoil will be stripped where required and managed appropriately for reuse in reinstatement.
2. All environmental protection measures will be implemented in accordance with the Construction Environmental Management Plan (CEMP), including the approved schedule of mitigation and monitoring measures.
3. A detailed survey will be conducted to set out the locations for the guide walls and secant piles on the ground. The trench for the guide wall will be excavated along the marked lines. The depth of the trenches should be sufficient to provide stability for the guide walls. Excavated material will be placed adjacent to the excavation and will then be removed to maintain a level site platform and allow access for concrete deliveries.
4. Sand/Concrete blinding will be installed and levelled at the bottom of the excavation. Polystyrene pods (or alternative material) will be installed in accordance with the set out locations.
5. Steel reinforcement (typically mesh and straight rebar) will be placed in the trenches according to the design specifications. Shuttering will be positioned prior to commencement of the concrete pour which will form the guide walls. These walls will serve as a guide for the alignment and positioning of the secant piles. Trench walls will be cast in sections allowing sufficient time for concrete curing.
6. "Firm/soft" piles will be installed using a rotary drilling technique (e.g. continuous flight auger) whereby the pile is rotated into the ground until the design depth is achieved, or until refusal. Concrete is placed into the drilled void as the auger is extracted. Reinforcement of "firm/soft" piles will be in accordance with the design specifications. The "firm/soft" piles may be installed using a "hit and miss" sequence to protect uncured piles during construction. Spoil arising at ground level surrounding the pile will be removed from the area and stockpiled at the appropriate location.
7. Once the primary "firm/soft" piles have cured, secondary "hard" piles will be installed using a similar technique and positioned to overlap with the primary piles. Prefabricated reinforcement cages will be placed into the wet concrete following extraction of the auger. Spoil arising at ground level surrounding the pile will be removed from the area and stockpiled at the appropriate location.
8. The guide wall will be carefully demolished to expose the secant pile walls. The top of the secant piles will be cropped and removed from the area. Construction and demolition waste will be disposed of as per requirements. A reinforced concrete capping beam will be constructed around the perimeter of the secant pile wall.
9. Excavation will commence and material removed off-site. If deemed necessary, material will be temporarily stockpiled to assist with loading. Some material will be retained to form a temporary bund around the perimeter of the excavation to provide edge protection, and a wheel stop for trucks.
10. A shoring system may be required subject to detailed design which will comprise levels of waler beams and additional supports using knee bracing. This internal shoring system may be required to be installed at various depths within the excavation.
11. Excavation is anticipated to result in the removal of made ground, soft silt and clay deposits, and granular glacial till beneath the tank footprint, with the base slab likely founding on medium strong to strong, partially weathered to unweathered limestone bedrock.
12. Dewatering will be undertaken as required or as per a pre-installed site dewatering system

13. A layer of concrete blinding will be placed at formation level prior to construction of the tank's reinforced concrete base slab. Rock anchors or tension piles may be required to provide uplift resistance of the structure.
14. It is envisaged that the secant wall cofferdam will be used to form the permanent tank structure. Sealing of the joints between the secant piles will be completed to ensure there are no gaps through which water can seep. A waterproof membrane will be applied to the interior surface of the secant piles to further prevent water from penetrating through the concrete.
15. The tank will be lined internally with a concrete mix (or alternative) to provide a smooth, continuous surface. Additional waterproofing may be applied over the concrete finish.
16. Alternatively, the tank structure will be constructed of reinforced concrete within the secant pile cofferdam.
17. Pipework will be installed through the walls of the tank and sealed to ensure water tightness. Testing will be undertaken for watertightness in accordance with the CESWI (2023) Civil Engineering Specification for the Water Industry, 8th Edition.
18. Once constructed, mechanical and electrical installation will commence. The contractor(s) may install larger equipment at an earlier stage of the sequence to avail of easier lifting arrangements. Access platforms, walkways, and handrailing will then be installed. Footpaths and vehicle access will be constructed at a later stage in parallel with overall site finishes.

4.6.3 Activated Granular Sludge (AGS) Tank

4.6.3.1 Overview

The AGS tank is located within the wastewater treatment plant site and will require an anticipated excavation level of approximately 4.5 m below ground level (BGL). Excavation to this level will result in excavation to very soft to soft silt which is unsuitable founding material. The in-situ materials represent potentially challenging geotechnical conditions for surface structures. While a surface layer of made ground exhibits low to medium strength, the underlying layers of soft silt, clay and peat are characterised by very low strength and high compressibility.

As such, in their current state, these layers are not considered suitable as a load bearing stratum for any significant surface or near surface structures. The structure will need to be piled in order to transmit loads to more competent layers at depth to avoid potential bearing failure and/or excessive total and differential settlement.

The tank will be constructed on a reinforced concrete plinth which will also be connected to the new inlet works base. The plinth will be designed to accommodate equipment associated with the inlet works and AGS process. For the purpose of this assessment, it is assumed that Continuous Flight Augured (CFA) piles will be installed to support the AGS tank and inlet works structures.

The footprint of the proposed tank excavation intersects an existing drainage feature. This feature will be identified, isolated, and appropriately managed during the Construction Phase to prevent uncontrolled water ingress and to maintain downstream water quality. Additionally, the site is located in an area of moderate to high groundwater, which will be taken into account during excavation and construction to prevent localised flooding or instability. All dewatering, discharge management, and water quality protection measures will be implemented in accordance with the mitigation measures set out in the CEMP. See CEMP in Volume 4, Appendix 4.1 of this EIAR.

The proposed excavation will require temporary or permanent lateral support to maintain stability during construction. A combination of sheet piles with temporary propping/anchors may be feasible for this structure. Should detailed design confirm that sheet piling is not a viable option, a secant wall will be constructed following the methodology outlined for the stormwater storage tank at Corcanree Pumping Station in Section 4.6.2.2 in this report.

The structure will be unroofed and partially buried, with the walls of the tank extending above ground level and the design flood level. Footpaths will be constructed around the perimeter of the tank and to connect with other operational and hardstanding areas. Handrailing and walkway platforms will be located above the structure to a height of approximately 1.2 m.

4.6.3.2 Construction Process

Construction will likely progress as per the following sequence:

1. The works area will be cleared and prepared, and a temporary hardstanding will be provided to facilitate the safe mobilisation and operation of piling plant and associated equipment. Topsoil will be stripped where required and managed appropriately for reuse in reinstatement.
2. All environmental protection measures will be implemented in accordance with the Construction Environmental Management Plan (CEMP), including the approved schedule of mitigation and monitoring measures.
3. The piling rig will auger to the required depth for each pile. Once the required depth is achieved, concrete will be pumped into the bottom of the shaft as the auger is lifted.
4. Concrete will be poured to the piling platform level and will later be cut to the required depth. Prefabricated reinforcement cages will be placed into the wet concrete following extraction of the auger.

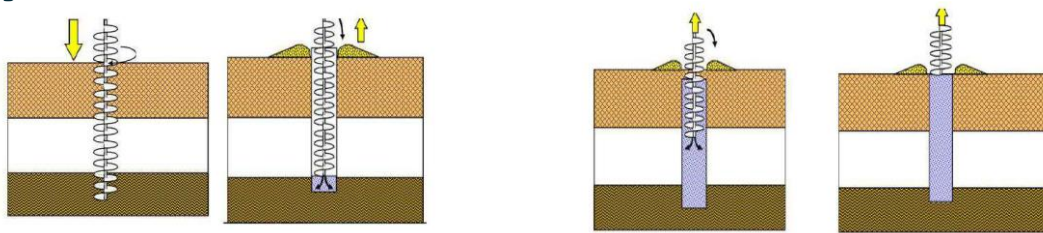


FIGURE 4-3: CFA PILING SEQUENCE ILLUSTRATION

5. Install perimeter watertight barrier (sheet piles, secant wall, or similar), with particular regard to the interception of an existing drain.
6. Excavation will commence and material will be removed off-site. If deemed necessary, material will be temporarily stockpiled to assist with loading. Some material will be retained to form a temporary bund around the perimeter of the excavation to provide edge protection, and a wheel stop for trucks.
7. The top of the piles will be cropped and removed from the area during excavation works. Construction and demolition waste will be disposed of as per requirements.
8. A shoring system may be installed following an initial excavation phase subject to detailed design. Individual waler beams will be lifted into place and the shoring system assembled within the cofferdam. Additional supports using knee bracing may be installed. Once the frame system is complete, the final excavation and pile cropping works will then commence. Excavation to formation level will result in very soft to soft silt which is unsuitable founding material. Ground improvement works may be required to provide a suitable formation layer for the tank floor slab.
9. Construction will commence on the pile caps and ground beams which will support the tank structure, access platforms, and ancillary equipment. A layer of concrete blinding will be placed, and construction of the tank's reinforced concrete base slab will commence.
10. The tank walls will likely be constructed of reinforced concrete cast in-situ. Alternatively, pre-cast concrete wall units may be used. The walls will be poured in sections until all external and internal walls of the tank are constructed.
11. Pipework will be installed through the walls of the tank and sealed to ensure water tightness. Testing will be undertaken for watertightness in accordance with the CEWSI (2023) Civil Engineering Specification for the Water Industry, 8th Edition.
12. Once constructed, mechanical and electrical installation will commence. The contractor(s) may install larger equipment at an earlier stage of the sequence to avail of easier lifting arrangements. Access platforms, walkways, and handrailing will then be installed. Footpaths and vehicle access will be constructed at a later stage in parallel with overall site finishes.

4.6.4 Surface Tank Structures

4.6.4.1 Overview

The in-situ materials represent potentially challenging geotechnical conditions for surface structures. While a surface layer of made ground exhibits low to medium strength, the underlying layers of soft silt, clay and peat are characterised by very low strength and high compressibility.

As such, in their current state, these layers are not considered suitable as a load bearing stratum for any significant surface structures. Surface structures will likely need to be piled to transmit loads to more competent layers at depth to avoid potential bearing failure and/or excessive total and differential settlement.

Several tanks will be constructed across the WWTP site including the tanks identified below:

1. Liquor Treatment Plant (LTP) Tank
2. Thermal Hydrolysis Process (THP) Silo
3. Sludge Digester Tank
4. Sludge Export Silo

The tanks will likely be constructed using pre-cast concrete units on a reinforced concrete base cast in-situ. External staircases will provide access to a platform and walkover installed over each tank. Handrailing will be installed along the access platforms.

4.6.4.2 Construction Sequence

Piled foundations are likely required due to ground conditions as described in Volume 2 - Chapter 14 (Land and Soils). For the purpose of this assessment, it is assumed that Continuous Flight Augured (CFA) piles will be installed to support all tanks identified under the previous sub-heading.

Sequencing of tanks will be dependent on the contractor's programme and site constraints. Permanent piling works may be undertaken in sequence or through demobilisation and remobilisation. The pile columns can be buried and protected by a suitable fill material if required until such time construction of the tanks is programmed.

Following the enabling works, as described in Section 4.5, construction of each tank is likely to progress under the following sequence of works:

1. The works area will be cleared and prepared, and a temporary hardstanding will be provided to facilitate the safe mobilisation and operation of piling plant and associated equipment. Topsoil will be stripped where required and managed appropriately for reuse in reinstatement.
2. All environmental protection measures will be implemented in accordance with the Construction Environmental Management Plan (CEMP), including the approved schedule of mitigation and monitoring measures.
3. Auger and install the CFA piles required to support the tank structures. Clearance of the works area will be undertaken and a hard standing provided to allow for the set-up of piling plant and equipment.
4. The piling rig will auger to the required depth for each pile. Once the required depth is achieved, concrete will be pumped into the bottom of the shaft as the auger is lifted.
5. Concrete will be installed to piling platform level. Prefabricated reinforcement cages will be placed into the wet concrete following extraction of the auger.
6. The top of the piles will be cropped and removed from the area during excavation works. Construction and demolition waste will be disposed of as per requirements.
7. The footprint of the tanks will be excavated to formation level and soft materials will be removed and replaced with an engineering fill material. A layer of concrete blinding will then be placed. Pile caps will be constructed and incorporated into the reinforced concrete bases.
8. Prefabricated tanks constructed from glass / epoxy coated steel will be delivered to site in sections and assembled into place.
9. Once constructed, the mechanical and electrical installation phase will commence. Access platforms, walkways, and handrailing will then be installed for all tanks.

10. Footpaths and vehicle access will be constructed at a later stage in parallel with overall site finishes.

4.6.5 SuDS and Landscaping

The proposed SuDS infrastructure is a minor component of the overall development works within the site. The proposed attenuation will consist of a porous paving and swale allowing a combined storage volume of 295.8m³. With the addition of manholes and pipes the total storage of the system is 330m³. Temporary access and defined working corridors will be established to avoid unnecessary disturbance of adjacent works areas. Environmental protection measures, as set out in the Construction Environmental Management Plan (CEMP), will be implemented, including silt control, runoff management and appropriate material storage procedures.

The swale is located close to the western boundary of the site, in the vicinity of the proposed works (subject to infiltration rates). An impermeable liner will be installed to prevent infiltration to underlying wetland soils, ensuring no alteration of the local groundwater regime. The swale will be backfilled with specified granular and topsoil layers and finished with a suitable vegetative cover to promote habitat creation and enhance biodiversity. See specific biodiversity measures in the Landscape Masterplan and Planting Plan in Volume 4, Appendix 15.1.

The attenuation sump will be situated below ground, either as an in-situ reinforced concrete structure or a lined storage system. Construction is recommended to be scheduled during summer, when the groundwater level is approximately 5m below ground, to minimise or avoid the need for dewatering. The storage structure will include appropriate access for inspection and maintenance.

Connecting pipework will link the attenuation sump to the existing storm drainage network. Connection to the storm network will be carried out during a period of dry weather to ensure safe installation. Installation will be undertaken within narrow excavations, with progressive reinstatement to minimise the duration of exposed ground.

The landscaping works associated with the site will be implemented upon completion of construction activities at this location. Hard landscaping will be installed between the buildings in the form of kerbs, roads and pathways with concrete and gravel finishes and appropriate marking and parking added. Soft landscaping in the form of the placing of soil, levelling and planting of vegetation will also be undertaken. See detailed Landscape Masterplan and Planting Plan in Volume 4, Appendix 15.1.

4.6.6 Process, Mechanical and Electrical Installation

The process, mechanical and electrical equipment will be brought to site and installed upon completion of the construction of the buildings. It is likely that major installations such as the process equipment and new transformer will be installed in the first instance followed by smaller equipment (such as secondary treatment air blowers and odour control unit [OCU]) and then services in the buildings.

The contractor(s) will be responsible for determining the specific methods and sequence of works for the process, mechanical and electrical installation in each of the buildings.

4.6.7 Testing and Commissioning

Testing and commissioning is based on separate contracts and separate construction teams for the various elements of the project. Testing and commissioning of individual elements of the works will be carried out at suitable stages of progression. Upon works completion, final commissioning of the whole works will be undertaken to confirm that the system responds in accordance with its specified requirements. Each testing and commissioning phase will comprise the following activities occurring in sequence:

- Level 1 testing - Pre-commissioning;
- Level 2 testing - Factory and Site acceptance tests; and
- Level 3 testing - Performance tests.

4.6.7.1 Level 1 Testing - Pre-commissioning

Level 1 testing will encompass all offline testing associated with pre-commissioning and start-up activities including the completion of all tests that can be conducted without the connection of any services (electrical power, chemicals, compressed air, fuel, or pressurisation), other than for the purpose of hydrostatic testing, any part of the equipment. Pre-commissioning will include commissioning checks including mechanical, electrical and instrumentation, control and automation elements as a minimum.

4.6.7.2 Level 2 Testing – Factory and Site Acceptance Tests

Level 2 testing will comprise any online dry and wet functionality testing required following connection of services. Site acceptance testing will incorporate:

- Testing of each piece of plant and equipment individually;
- Testing of each system within the works both manually and automatically; and
- The interactions of the various systems and the setting to work of the plant as a whole.

Once each of the principal systems has been tested and accepted, the works will be process commissioned and optimised to achieve a status of process established. Factory acceptance testing (FAST) will be carried out for all electrical and building services panels, PLCs, Motive Power units, Software etc., Site acceptance testing (SAT) will include general testing (including domestic electrical installation, emergency lighting, fire and intruder alarms) in addition to functional testing of preliminary, secondary processes, sludge processes and associated pumping systems, generator changeover and a full (clean water) operational test of the Wastewater treatment plant.

4.6.7.3 Level 3 Testing - Performance Tests

Level 3 testing will comprise performance testing during which the contractor(s) must ensure that the wastewater treatment plant complies with the performance requirements as outlined in the tender documents. Performance tests will be undertaken following completion of the entire wastewater treatment plant and will not accommodate testing of individual items or sections within the Wastewater treatment plant.

Performance tests will include:

- Process commissioning including flow diversion and initial wastewater reception; and
- Final test on completion including continuous plant operation for a fixed period of time.

4.7 Traffic Management

4.7.1 Overview

A Construction Traffic Management Plan (CTMP) will be prepared prior to the commencement of works and form part of the Construction Environmental Management Plan (CEMP), in accordance with the CEMP (CEMP, Volume 4 – Appendix 4.1).

The CTMP will manage the interface between construction traffic and the public road network, controlling vehicular movements and minimising disruption to all road users during the Construction Phase. It will demonstrate how impacts identified in Chapter 6 (Traffic and Transport) of this EIAR will be mitigated, ensuring residual effects on the local transport network are minimised.

High-level consultation with Limerick City and County Council will inform the CTMP, and any requirements or constraints, alongside mitigation measures identified in the EIAR (and any conditions imposed by An Coimisiún Pleanála), will be incorporated into the Works Requirements and contract documentation.

The CTMP will be finalised by the Contractor(s) at Final Design Stage and submitted to Limerick City and County Council for approval. The Project Supervisor Construction Stage (PSCS) will coordinate its implementation throughout the Construction Phase.

4.7.2 Construction Traffic Management

At this stage, the CTMP provides a high-level framework to guide construction works and align with the assessment in Chapter 6 (Traffic and Transport).

Temporary traffic management measures included in the CTMP will address, as appropriate:

- Routing and control of construction traffic;
- Safe interface with general traffic and vulnerable road users;
- Maintaining flow of all transport modes where practicable;
- Sequencing and phasing of works to ensure safety and minimise disruption;
- Implementation of all mitigation measures identified in this EIAR.

The detailed CTMP will be refined by the Contractor(s) at Final Design Stage to reflect construction methods, programme, and site-specific constraints, and will be implemented only after approval by the relevant authority.

4.8 Site Management

4.8.1 Employment

Throughout the Construction Phase, the construction workforce numbers will vary depending on the stage of the Proposed Development. However, it is anticipated that there will be a construction workforce of approximately 80 people directly employed during peak construction period.

In addition, it is anticipated that there will be significant indirect employment supported by the Proposed Development, e.g. in logistical support companies, material and plant suppliers, traffic management companies and in the local service industry.

4.8.2 Hours of Working

The timing of construction activities, core working hours and the rate of progress of construction works are a balance between efficiency of construction and minimising nuisance and significant effects.

The core construction working hours for the Proposed Development will be:

- 7am - 7pm: Monday to Friday; and
- 8am - 2pm: Saturday.

Standard working times will be included in the Works Requirements and construction will take consideration of sensitive receptors, in particular, any nearby residential areas. These working hours correspond to the current construction programme, sequencing and durations as described in Section 4.3.2.

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.

It may be necessary in exceptional circumstances to undertake certain activities outside of the construction core working hours. 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.

4.8.3 Hoarding

Site security fencing is currently erected around the perimeter of the site. As outlined previously, 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 will be up to approximately 2.4m high to provide a secure boundary to 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 will 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.

4.8.4 Services and Lighting

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.

Construction 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.

4.8.5 Materials

Construction of the Proposed Development will require the import of materials to site for construction activities as well as the export of materials generated and surplus to requirements. Where practicable, efforts will be made to manage materials in accordance with the waste hierarchy and promote the reuse and recycling of materials on site.

A temporary compound has been provided to the north of Limerick WWTP for the storage of materials. Stockpiling of materials outside of the site boundary will not be permitted and management measures (as described in detail in the CEMP in Volume 4 - Appendix 4.1) will be implemented to ensure effective containment and handling of all materials during construction.

A summary of the estimated material types and indicative quantities of each type of material to be managed is provided in Table 4-1.

TABLE 4-1: ESTIMATED BULK MATERIALS QUANTITIES AND MANAGEMENT DURING CONSTRUCTION

Nature	Structure	Nature / Source	Quantity (m ³)
Export	Corcanree	Non-hazardous excavation material	15,500
	Bunlicky	Non-hazardous excavation material	15,980

4.8.6 Construction Health and Safety

The requirements of the Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction) Regulations 2013 will be complied with at all times. Following contract award, the Contractor will undertake the detailed design of the Proposed Development and will be appointed as both Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS). The Contractor will manage and coordinate health and safety during the construction phase, including the development and implementation of the Construction Stage Safety and Health Plan, building on the Preliminary Safety and Health Plan prepared during the design stage. The Safety and Health Plan will be maintained and updated throughout the construction phase.

4.9 Environmental Management

A Construction Environmental Management Plan (CEMP) and schedule of mitigation measures has been prepared (also refer to EIAR Volume 2 - Chapter 22 (Summary of Mitigation and Monitoring)). These documents define the minimum standards required of the contractor(s) as they affect the environment, amenity and safety of local residents, businesses, the general public and the surroundings in the vicinity of the Proposed Development.

The contractor(s) is required to integrate these measures into a Detailed CEMP following appointment (prior to the commencement of any construction activities). Effective implementation of the CEMP will ensure that disruption and nuisance are kept to a minimum throughout the construction of the Proposed Development.

The Detailed CEMP will be required to have regard to the guidance (CIRIA (2023) (C811D) Environmental Good Practice on Site Guide, 5th Edition) and industry best practice. The Detailed CEMP will be implemented throughout construction, and the contractor(s) will be required to review and update them as construction progresses.

In addition to the Detailed CEMP, it is anticipated that the contractor(s) will prepare a Construction Management Plan and relevant Risk Assessment Method Statements (RAMs) in advance of any works commencing on site. Every effort will be made to ensure that any significant environmental effects as described in this EIAR will be avoided, prevented or reduced by adopting the mitigation measures outlined in this EIAR.

4.9.1 Communications

Uisce Éireann and its appointed contractor(s) will ensure that local residents, occupiers, businesses, local authorities and all other stakeholders affected by the proposed construction works, as outlined in this EIAR, will be informed in advance of work taking place. The notifications will detail the estimated duration of the works, the working hours and the nature of the works. In the case of works required in response to an emergency, the local authority, local residents and businesses will be advised as soon as reasonably practicable. All notifications will include a local helpline number. In addition, information on the works will also be available on the Proposed Development website. Uisce Éireann will further develop the Community Engagement Plan to encompass the Construction and Operational Phases of the Proposed Development.

An overall Communications Plan will be prepared by the contractor(s) 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.

4.9.2 Surface Water Management Plan

The Surface Water Management Plan (SWMP) details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. It will be a condition of the Works Requirements that the successful contractor(s), immediately following appointment, must prepare a construction stage plan in accordance with the SWMP so as to ensure it effectively implements all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Coimisiún Pleanála with any grant of approval.

As identified in Volume 2 - Chapter 13 (Biodiversity) of this EIAR, and in order to protect surface water and existing hydrological pathways throughout the Proposed Development, the construction contractor(s) will develop and implement a SWMP with the minimally required list of mitigation measures outlined to be incorporated into that plan.

4.9.3 Dewatering Plan

Significant dewatering is likely to be required given the anticipated excavation depths; therefore, the contractor(s) is required to develop a site-specific dewatering plan as part of the overall construction strategy. This plan should clearly define the proposed dewatering approach, including methods, anticipated discharge volumes, monitoring arrangements, and measures to control potential environmental effects such as

settlement, erosion, or mobilization of contaminated groundwater. The plan must incorporate all relevant mitigation measures, including containment of surface water and excavation runoff, treatment of collected water through lined sumps and mobile settlement tanks, protection of drainage features, temporary bunding, silt fencing, and ongoing water quality monitoring. The contractor(s) must ensure that the plan is aligned with regulatory requirements and is implemented in a manner that protects surrounding receptors, maintains excavation stability, and prevents uncontrolled inflows during construction.

4.9.4 Construction Within an Existing Land Drain

Construction within an existing drain, as well as wetland-influenced soils, will be carefully managed to prevent water ingress, maintain excavation stability, and protect surrounding ecosystems. Excavation for the below ground portion of the 4.5 m-deep AGS tank will be supported by temporary watertight barriers, such as secant or sheet piles, to control groundwater and localized inflows during construction. Excavation will proceed in controlled stages, with ongoing monitoring of water levels and wall performance. All works will be undertaken in conjunction with the proposed surface water, dewatering, and sediment control measures to ensure containment of runoff and excavation water, protection of drainage features, and compliance with water quality requirements. Temporary bunds, lined sumps, mobile treatment tanks, silt fencing, and water quality monitoring will be employed as appropriate to minimize environmental impacts while maintaining safe and stable construction conditions.

The existing drain intersecting the proposed AGS tank footprint will be permanently removed as part of the construction works. This will result in a localised loss of approximately 140 m³ of storage.

In the context of the Lower Shannon and Shannon Estuary catchment and given the hydraulic connectivity of the site to Bunlicky Lake, this volume represents an extremely small proportion of available floodplain and estuarine storage. The drain itself is minor in scale and does not function as a primary conveyance route within the wider drainage network.

The loss of 140 m³ of storage is considered negligible at the catchment scale and will not result in any measurable alteration to flood extents, downstream flow regimes, water levels within Bunlicky Lake, or associated wetland function.

4.9.5 Construction Resource and Waste Management Plan

The contractor(s) is required to develop a Construction Resource and Waste Management Plan (CRWMP), which incorporates all of the measures outlined in Volume 2 - Chapter 14 (Land and Soils) and Volume 2 - Chapter 18 (Material Assets). The CRWMP will identify how waste arisings are to be controlled and managed during the lifetime of the Proposed Development, in particular how waste prevention principles will be applied and how on-site waste will be minimised. Refer to Volume 4 – Appendix 4.1 (CEMP) of this EIAR for the plan and for further details of the Construction Phase mitigation measures which the appointed contractor(s) will comply with to reduce waste.

The Plan shall be produced by the construction contractor(s) in accordance with the 'Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects' (EPA, 2021) which clearly sets out the contractor's proposals regarding the treatment, storage and disposal of waste.

4.9.6 Environmental Incident Response Plan

An Environmental Incident Response Plan (EIRP) will be prepared by the contractor(s) to ensure that in the unlikely event of an incident (environmental, or non-environmental), response efforts are prompt, efficient, and suited to particular circumstances. The EIRP, as described in Volume 4 – Appendix 4.1 (CEMP) of this EIAR, details the procedures to 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. It will be a condition of the Employer's Requirements that the successful construction contractor(s), immediately following appointment, must detail in developed Pollution Control Plans and EIRP, the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR,

together with any additional measures required pursuant to conditions imposed by An Coimisiún Pleanála with any grant of approval.

4.9.7 Sustainable Construction Principles

The CEMP for the Proposed Development has been developed with consideration for the following sustainability principles:

- Minimise the use of materials, natural resources and the production of waste including implementing a Waste Management Plan for Construction and Demolition Waste;
- Reduce the carbon footprint of the Proposed Development including using sustainable and reusable materials and construction methods;
- Encouraging innovation during the construction process and ensuring sustainable measures are safely and efficiently implemented in the Proposed Development; and
- Avoid, mitigate, and if not possible, reduce the adverse effects on workers and communities during the construction of the Proposed Development. Implementing Safety, health and wellbeing measures in accordance with best practice throughout the Construction Phase.

4.9.8 Mitigation Measures

Mitigation and monitoring measures have been identified which shall avoid, reduce or offset potential impacts which could arise throughout the Construction Phase of the Proposed Development. These mitigation and monitoring measures are detailed in the various Chapters of this EIAR and summarised in Volume 2 - Chapter 22 (Summary of Mitigation and Monitoring) and in the CEMP included in this EIAR.

4.10 References

CEWSI (2023) Civil Engineering Specification for the Water Industry, 8th Edition

CIRIA (2023) Environmental Good Practice on Site Guide, 5th Edition.

CIRIA (1996) Sea outfalls - construction, inspection and repair: Report 159.

Health and Safety Authority (2013) Asbestos-containing materials (ACMs) in Workplaces: Practical Guidelines on ACM Management and Abatement.

Safety, Health and Welfare at Work (Exposure to Asbestos)(Amendment) Regulations 2025 (S.I. No 632 of 2025)
2025 Code of Practice for the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2025

Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries During Construction Works in and adjacent to Water.

UK Water Industry Research Limited (2023) Civil Engineering Specification for the Water Industry, 8th Edition

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