SECTION 3: The Proposed Development

3.1 Introduction

This Section describes the Proposed Development for which Uisce Éireann is seeking consent. Specifically, this section describes the design, operation and decommissioning elements of the Proposed Development whilst the construction strategy is described separately in **Section 4**. This Section of the EIAR has been prepared in accordance with Part 1 of Annex IV of the EIA Directive and describes the following:

- The strategy for procurement of the Proposed Development and how it will influence the detailed design;
- Design requirements;
- The design of the Proposed Development; and
- The operation of the Proposed Development.

The Proposed Development comprises of the construction of new wastewater treatment plant upgrades at the existing Castletroy WwTP site. All works will be constructed within the existing site boundary.

The constituent elements are described as follows;

- Replacement of the existing storm pumps in the inlet pumping station including the modification of pipework and fittings;
- Construction of a 4,500m^3 capacity stormwater tank plus an additional freeboard of 1.05m, to provide capacity for the projected +10-year and +25-year loadings;
- Stormwater return pumping station to return flows from the stormwater tank for primary and secondary treatment;
- Upgrade of the existing preliminary treatment screens to cater for higher flows;
- Construction of a new grit trap to provide redundancy to the preliminary treatment process.
- Installation of decking over the existing inlet works structure and installation of odour abatement equipment;
- A new forward feed pumping station which will transfer flows to primary treatment;
- Wastewater will be pumped to a new elevated splitter chamber to allow flows gravitate through the primary treatment process;
- Installation of primary treatment filtration units in a proposed treatment building. The structure will also be used for the installation of control panels, operational equipment and instrumentation. Solar photovoltaic (PV) panels that produce electricity will be installed on the roof;
- Construction of a new primary sludge holding tank which will store sludge removed from primary treatment. Sludge will be pumped from the new primary sludge holding tank to the upgraded dewatering plant within the site;
- Upgrade of the existing secondary treatment tanks with an integrated fixed film activated sludge (IFAS) process;
- Installation of Stamford and McKinney baffles within two of the existing clarifiers to increase flow through each tank;
- A new scum pumping station will collect and transfer scum removed from the clarifiers to the thickened sludge storage tank;
- The existing 7.1m diameter ‘Picket Fence Thickener’ (PFT) will be repurposed as a thickened sludge storage tank;
- A new larger diameter PFT will be constructed;

- The existing sludge dewatering equipment will be upgraded with new centrifuges. Internal modifications to the existing sludge treatment building first floor will be required for the equipment;
- Sludge storage skips will be located on external concrete plinths. Sludge transfer pipework and valves will be installed to control sludge transfer from the dewatering units to the skips;
- An odour abatement unit will be installed external of the sludge treatment building;
- A bulk storage tank (to supplement the existing) will be installed with integrated bunds to contain Ferric Sulphate (Fe_2SO_4) for phosphorous removal, complete with eye-wash station and dosing pumps;
- A flood event pumping station is required to allow the plant to remain operational during high river levels. The walls of the existing final effluent inspection chamber will be raised to defend the plant from flood water;
- A tank will be installed adjacent the existing groundwater well on site to provide storage of washwater. The borehole is used to supply washwater to various existing treatment processes and will also be used for proposed upgrades. The storage tank will ensure sufficient supply is available to meet peak demands; and
- A surface water attenuation system will be installed to collect, store and dispose of additional surface water arising from the Proposed Development.

3.2 Procurement Strategy

Uisce Éireann intends to procure the detailed design and construction of the Proposed Development using a Design and Build type contract. This form of contract has the benefit of encouraging innovation and value engineering, particularly for a project of this nature and scale, by giving the contractor ownership of both the detailed design and construction of the development. Design and Build contracts traditionally also lead to shorter construction programmes. Under this type of contract, the successful contractor will ultimately be responsible for the final detailed design of the Proposed Development, within the constraints as outlined herein.

The contractor is required to comply with all of the performance requirements set out in the tender documentation including the statutory consent approvals and any associated conditions that may be granted by An Bord Pleanála, Department of Housing, Planning and Local Government, EPA and other statutory stakeholders.

Uisce Éireann has developed a detailed specimen design of the Proposed Development for assessment within this EIAR. This EIAR has considered the likely significant effects on the environment associated with our detailed specimen design. The contractor will develop this design further, in accordance with the proposed mitigation measures, and any conditions that may be prescribed as part of the consent for the Proposed Development, ensuring that there is no material change in terms of significant effects on the environment.

3.3 Design Requirements

3.3.1 Organic Loading

Domestic, Commercial, and Institutional Contribution

The future loading projections for Castletroy WwTP were calculated by Uisce Éireann in 2018. The population estimates for Castletroy considered the information from the following sources:

- Local Authority Core Strategies;

- Local Authority County Development Plans;
- Regional Planning Guidelines;
- Regional Spatial and Economic Strategies;
- National Planning Framework (as currently available);
- Central Statistics Office census data; and
- Economic and Social Research Institute population growth models.

Population growth was high in Castletroy between 1996 and 2011, ranging from 4.7% to 7.69% per year over this period. However, 2016 CSO figures show that it stabilised in subsequent years, in fact there was a slight decline with a negative rate of -0.34%. It was assumed the negative growth rate was related to student numbers and not a decline in the permanent residential population.

Given these findings, Uisce Éireann produced the Wastewater Asset Planning Growth and Headroom Technical Guidance Note (TGN) in 2017 contained in **Appendix 3A** and sets out the methodology required to estimate the agglomeration PE. The TGN provides a projected urban average annual percentage growth rate for Castletroy of 3.28% for the next 10 years up to 2028 and a growth rate of 0.63% for the following 15 years up to the year 2042. It is assumed that the commercial (estimated at 16% of domestic population) and institutional load (PE) will grow at the same rate as the domestic load. A headroom allowance is added to the projected population growth figure to cater for variability in loading demand on the WwTP. The headroom allowance figure is related to the Regional Planning Guidelines designation of the agglomeration, which is 20% for a large urban settlement such as Castletroy.

Growth rates for the Castletroy agglomeration have been broken down against domestic, commercial and institutional categories and include the 20% headroom allowance. The projected loading for the +10-year growth period from 2017 up to the year 2028 is taken as 35,942 PE, as per Table 3.1 below. Further to this, the projected loading for the +25-year growth period up to the year 2042 is taken as 39,492 PE, Table 3.2.

The 2016 CSO provided significant details and information, including small area populations and house count, required to estimate the 2017 baseline population which was validated with a flow and load survey undertaken in 2018. 2022 CSO detailed figures will not be available until December 2023 and therefore the agreed growth rate of 3.28% is applied to estimate the 2022 population. The current loading to the WwTP (2022) as contained in Appendix 3A is c. 22,500 PE (excluding the Trade Effluent Industrial Loading which currently accounts for 16,500 PE).

Applying the agreed growth rates to the current year (2022) and projecting to 2033, there is a difference of c. 1,100 PE when compared to 2028 projected growth. Should this growth rate of 3.28% occur up to 2028 and 0.63% up to 2033, there is provision made in the design PE for 20% headroom which equates to 5,990 PE and therefore adequate redundancy is provided to cater for this growth variation. Headroom is spare capacity above demand to cater for production risk and provide flexibility in capacity to meet new demands, also to cater for variability in demand arising from factors such as weather and operational risk and some upward variation around projected development demand. Refer to Growth and Headroom TGN contained in Appendix 3A.

As noted previously in **Section 1.4**, this planning application is for the +10-year growth projections, however, +25-year projections were also assessed regarding the sizing of civil infrastructure(s). These are elements of the Proposed Development that are not feasible to replace or expand upon in the medium term, such as the stormwater storage tank and underground pipework. A new planning application will need to be submitted for the phase 2 uplift from 77,500 PE to 81,100 PE, whereby the remaining available volumes will be utilised.

Table 3.1: Design PE +10-year Loading Projections (Domestic, Commercial, and Institutional)

Populations	Year 2017	Current Year 2022 (3.28% Growth)	Growth Rate (3.28%) to Year 2028	Growth Rate (0.63%) to Year 2033	Headroom (20% on +10 Year Growth)	Total Future +10 Year Loading
Domestic Population	15,517	18,234	21,427	22,250	4,285	25,713
Commercial Loading	2,483	2,917	3,428	3,538	686	4,114
Institutional Population	3,690	4,336	5,096	5,258	1,019	6,115
Total Loading	**21,690**	**25,488**	**29,951**	**31,046**	**5,990**	**35,942**

Table 3.2: Design PE +25-year Loading Projections (Domestic, Commercial, and Institutional)

Populations	Year 2017	Growth Rate (0.63%) Year 2028 to 2042	Headroom (20% on +25 year Growth)	Total Future +25 Year Loading
Domestic Population	15,517	23,544	4,709	28,253
Commercial Loading	2,483	3,767	753	4,520
Institutional Population	3,690	5,599	1,120	6,719
Total Loading	**21,690**	**32,910**	**6,582**	**39,492**

Industrial Contribution

The current Integrated Pollution Control (IPC) Licenses total committed load to the Castletroy agglomeration is 2,170 kgBOD/day (36,667 PE where 1 PE is defined as 0.06 kg BOD/day) of which a significant industrial contributor has a licence to discharge 1,650 kg BOD/day (maximum) to sewer, which equates to 27,500 PE and for a maximum emitted volume of 1,800m^3 in any one day (20.8 l/s). The maximum rate per hour is stipulated at 145m^3 (40 l/s). The 2021 average discharge from this significant contributor was 16,460 PE, refer to **Appendix 3A**. An additional uplift to 1,965 m^3/day has been sought from Uisce Éireann (from 1,800 m^3/day). A flow rate of 2,500 m^3/day is therefore used in the design calculations. This projected flow of 2,500 m^3/day is inclusive of a 5,500 PE loading committed by the IDA, which assuming a concentration of 1,000 mg/l equates to a flow rate of 330 m^3/day and loading of 330 kg BOD/day. This provides a loading of 2,500 kg BOD/day and equates to a Population Equivalent of 41,667. The projected industrial projections for Castletroy WwTP are shown in Table 3.3.

Table 3.3: Committed Allowances as per Existing IPC (Industrial) Licences

Facility	Daily Average Flow (m3/d)	BOD Concentration (mg/l)	Organic Loading kg/BOD/day	Total Future Loading
IDA Committed Load	330	1,000	330	5,500
Existing IPC Licences	2,170	1,000	2,170	36,167
Total Loading	**2,500**	**1,000**	**2,500**	**41,667**

Summary of Design Loadings

Table 3.4 provides a summary of all projected +10-year PE growth and organic loadings for domestic, commercial, institutional, and industrial sectors. The total +10-year design capacity for Castletroy WwTP is 77,609 PE. Table 3.5 lists the relative average daily loading (kg/day) of the individual wastewater components to the WwTP.

Table 3.4: Design PE +10-year Loading Projections Summary

Facility	Total Future Loading
Domestic, Commercial, and Institutional	35,942
Industrial	36,167
IDA Committed Load	5,500
Total	**77,609**

Table 3.5 :Average Daily +10-Year Organic Loading Projections

Parameter	Value (kg/day)
Carbonaceous Biological Oxygen Demand (CBOD)[1]	4,650
Chemical Oxygen Demand[2]	9,765 (CBOD:COD ratio is 2:1)
Total Suspended Solids[2]	3,375
Total Nitrogen[2]	540
Total Phosphorus[2]	90

**Industrial organic loading is negligeable for parameters TSS, TN and TP.*

Table 3.6 provides a summary of all projected 25-year growth including for domestic, commercial, institutional, and industrial loadings. The total design capacity for Castletroy WwTP is 81,159 PE. Table 3.7 lists the relative average daily loading (kg/day) of the individual wastewater components to the WwTP.

Table 3.6: Design PE +25-year PE Loading Projections Summary

Facility	Total Future Loading
Domestic, Commercial, and Institutional	39,492
Industrial	36,167
IDA Committed Load	5,500
Total	**81,159**

Table 3.7: Average Daily +25-Year Organic Loading Projections

Parameter	Value
Carbonaceous Biological Oxygen Demand (CBOD)[1]	5,068 kg/day
Chemical Oxygen Demand[2]	10.64 kg/day (CBOD:COD ratio is 2.1)

[1] Average daily CBOD loads have been based on per-capita contributions of 60 g BOD/c/d.

[2] Average daily loads of 75 g TSS/PE/d, 2g TP/PE/d and 12g TN/PE/d is used on the domestic, institution and commercial contributions. In addition, COD:BOD ratio for industrial trade effluent organic loading is 1:8 therefore an overall CBOD:COD ratio of 2:1 is used.

Parameter	Value
Total Suspended Solids[2]	3,679 kg/day
Total Nitrogen[2]	589 kg/day
Total Phosphorus[2]	98 kg/day

3.3.2 Hydraulic Loadings

Domestic, Commercial, and Institutional Contribution

The projected +10-year and +25-year loading rates were used to determine incoming design flows to Castletroy WwTP, both Dry Weather Flow (DWF) and flow to full treatment (FFT). The following flows were used for the purpose of calculations and are obtained from Uisce Éireann specification 'Inlet works & stormwater treatment (wastewater)' (IW-TEC-700-99-02). Summary of values used are listed below:

- Water Consumption: 175 l/head/day
- Infiltration: 50 l/head/day
- Population served (P): 35,942
- Trade effluent(E): 2,500 m^3/day

Hydraulic loads have been based on per-capita contributions of 225 l/PE/d for 'Dry Weather Flow' in line with industry practice. The following formulas were used in calculating 'Dry Weather Flow' and 'Flow to Full Treatment' for Castletroy WwTP and is based on a Fully Combined System:

- DWF: (P x C) + I + E
- FFT: 3(P x C) + I + E

Table 3.8: Design Hydraulic Loading Projections (Domestic, Commercial, and Institutional)

Projection Period	Population Equivalent	DWF m^3/day	DWF l/s	FFT m^3/day	FFT l/s
+10-Year	35,942	8,087	94	860	239
+25-Year	39,492	8,886	103	946	263

Industrial Contribution

Projected industrial loadings for the IPC Licence allowance were previously established. As already noted, recent laboratory testing at the major industrial contributor reports a BOD concentration of 1,000mg/l. Using this concentration with the estimated PE of 41,667, the projected average industrial flow to Castletroy WwTP is calculated at 2,500 m^3/day.

Table 3.9: Design Hydraulic Loading Projections (Industrial)

Population Equivalent	Organic Loading kg/BOD/day	BOD Concentration (mg/l)	Max. Daily Flow (m^3/day)	Peak Flow (l/s)
41,667	2,500	1,000	2,500	58

Summary of Total Design Loadings

The summary of the hydraulic loading to be used for design purposed are presented in Table 3.10 below.

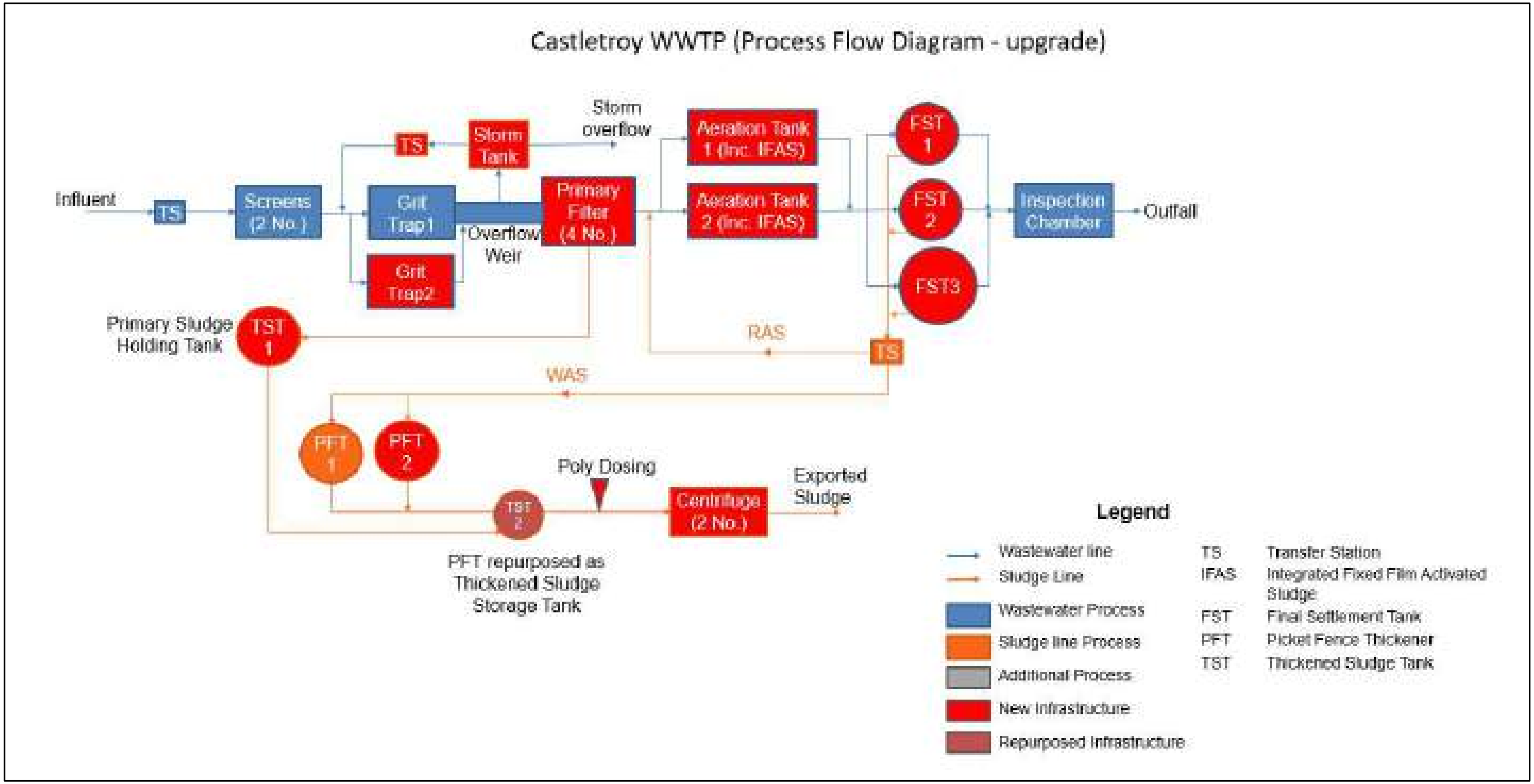
Table 3.10: Hydraulic Loading Projections Summary

Projected Period	Total Average Flow (m^3/day)	Total Average Flow (l/s)	Total Peak Flow (FFT) (m^3/hour)	Total Peak Flow (FFT) (l/s)
+10-Year	10,541	122	1,069	297
+25-Year	11,386	132	1,155	321

3.4 Design of the Proposed Development

3.4.1 Overview

The proposed upgrades will be developed at the existing Castletroy WwTP site and will provide preliminary, primary and secondary treatment of the wastewater prior to discharge to the Lower River Shannon. Stormwater storage, sludge treatment and ancillary process elements such as pumping, control and measurement will also be provided. Ancillary site works such as buildings, kiosks, and site roads will also be constructed. The process flow diagram for the proposed upgrade it is shown in Figure 3.1


Castletroy WWTP (Process Flow Diagram - upgrade)
Influent
TS
Screens (2 No.)
TS
Storm Tank
Storm overflow
Grit Trap1
Grit Trap2
Overflow Weir
Primary Filter (4 No.)
Aeration Tank 1 (inc. IFAS)
Aeration Tank 2 (inc. IFAS)
FST 1
FST 2
FST3
Inspection Chamber
Outfall
Primary Sludge Holding Tank
TST 1
RAS
TS
WAS
PFT 1
PFT 2
Poly Dosing
TST 2
Centrifuge (2 No.)
Exported Sludge
PFT repurposed as Thickened Sludge Storage Tank
Legend
Wastewater line
Sludge Line
Wastewater Process
Sludge line Process
Additional Process
New Infrastructure
Repurposed Infrastructure
TS Transfer Station
IFAS Integrated Fixed Film Activated Sludge
FST Final Settlement Tank
PFT Picket Fence Thickener
TST Thickened Sludge Tank

3.4.2 Inlet Pumping Station

The Drainage Area Plan (DAP) study reported high incoming flows to the plant based on a 30-year storm event. During this scenario, incoming flows to the inlet pumping station would reach a maximum 1,200 l/s, which is greater than the +25-year flow calculated of 811 l/s. This would result in unscreened spills upstream of the inlet works being discharged directly to the Lower River Shannon. It was reported that incoming flows will exceed the +25-year flow of 811 l/s approximately 20 times per annum. On this basis, provision for managing this flow is required.

Formula A flows are the industry standard for design that considers the Dry Weather Flow (DWF) plus allowance for storm flows as a factor of population. Allowances for water consumption and infiltration per head per day are in accordance with Uisce Éireann Document No. IW-TEC-700-99-02 'Inlet works & stormwater treatment (wastewater)': Summary of values used are listed below:

- Water Consumption (C): 175 l/head/day
- Infiltration (I): 50 l/head/day
- Population served (P): 39,492
- Trade effluent(E): 2,500 m3/day

The following formulas were used in calculating Formula A for Castletroy WwTP and is based on a Fully Combined System:

- Dry Weather Flow (P x C) + I + E
- Flow to Full Treatment 3(P x C) + I + E
- Formula A DWF + 1.36P + 2E

A summary of the design Formula A flows calculated are as follows:

Table 3.11: Summary of Formula A Flows

Growth Period	Formula A (l/s)
+10-year	746
+25-year	811

It was agreed with Uisce Éireann that incoming flows greater than Formula A must be screened with excess storm water pumped directly to the new stormwater storage tank, avoiding the scenario of a spill event where storm storage volume is not fully utilised. As these flows will bypass preliminary treatment and hence unscreened when entering the stormwater tank, it is proposed to install a screen on the overflow weir of the stormwater tank with any screenings <6mm retained within the tank and returned to the preliminary treatment during period of low incoming flow.

The works required to be undertaken for this process include the following:

- Replacement of the existing storm pumps;
- Increase of suction pipework to cater for larger flows (400mm to 600mm);
- Increase of delivery pipework to cater for larger flows (400mm to 500mm); and
- Construction of a new 500mm rising main from inlet pumping station to storm water overflow.

The 2 no. storm pumps will be replaced to cater for the increased flows during the 30-year storm event. Modification to pipework and valving is required to allow a single pump to convey the additional flows to the storm tank, while the second pump would operate to assist the 'Dry Weather Flow' pumps to deliver Formula A flows forward to preliminary treatment. Proposed upgrade pumps are shown in

Table 3.12.

Table 3.12: Storm Pump Replacement

Scenario	Motor Power	Duty Point
Existing	2 no. 55 kW pumps	320 l/s
Proposed	2 no. 80 kW pumps	540 l/s

A series of actuated valves would allow the pumps operate simultaneously during the 30-year event, while also allowing the pumps operate on a duty/standby arrangement during normal operating conditions i.e. Formula A flows.

A new 500mm diameter rising main will be constructed and connect to the storm water overflow located downstream of the grit removal process. A discharge manhole will be constructed prior to connecting to the 1,000mm diameter storm water overflow pipe. This 1,000mm diameter gravity pipe will convey flows to the stormwater tank.

3.4.3 Stormwater Storage

Stormwater Volume

The following formula was used to calculate the required volume for the storm storage tank which is taken from Uisce Éireann Document No. IW-TEC-700-99-02 'Inlet works & stormwater treatment (wastewater)'.

Required Volume = 2 hours retention at Formula A – FFT

The design Formula A flow rate and required volume for the Storm Tank are produced in Table 3.13.

Table 3.13: Formula A and Storm Tank Sizing

DWF (m^3/hour)	Formula A (m^3/hour)	FFT (m^3/hour)	Storm Tank Volume (m^3)	+20% Climate Change (m^3)	+1.05m Freeboard (m^3)
474	2,921	1,050	3,741*	4,500	5,445

**volume rounded to 3,750m³*

A storm storage tank with a minimum operational volume of 3,750m^3 is required as part of the Castletroy WwTP upgrade works calculated in accordance with Uisce Éireann specifications. It was agreed with Uisce Éireann that an additional 20% capacity should be added to the stormwater storage tank to allow for climate change. This results in an increased required storage volume of 4,500m^3 with an additional 945m^3 to include freeboard.

The two existing emergency overflows connecting to the existing overflow 1,050mm pipe will be retained for emergency measures. The 900mm overflow from the SWO chamber will be intercepted and diverted to the new storm tank via a 1,000mm diameter pipe. A manhole will be constructed at the point of interception and constructed in accordance with Uisce Éireann Standard Details. There are no records or reports of an emergency overflow event at the inlet pumping station.

Stormwater Tank Design

Due to the available area on the existing site for constructing a stormwater storage tank and given that a portion of the current site lies within Flood Zone A and Flood Zone B, a rectangular structure is proposed to provide a more efficient design. The proposed stormwater tank will be constructed partially above ground with the top of walls located at an elevation above the 1% AEP fluvial design flood level of +6.97mOD which includes suitable freeboard and climate change allowance.

Specific design criteria for a rectangular storm tank as per IW-TEC-700-99-02 is as follows:

- The length: breadth ratio will be in the range 3:1 to 4:1;
- The maximum width of a horizontal flow tank will be 20.0 m;
- An inlet baffle will be fitted to each tank;
- A suitable tank cleaning system will be provided;
- The weir loading will have a maximum of 450 m3/m/day; and
- Overflow weirs will be protected with scum boards.

Due to constraints associated with the location of existing infrastructure, the above requirements cannot be fully satisfied without increasing the depth of the structure and as such construction costs. Maximising available space between the 25m diameter Clarifier and the proposed primary treatment system allows for a tank length of 45m (internal dimension). Allowing for a width of 20m (internal dimension) an operating depth of 5m is required. The length:breath ratio for the above dimensions is 2.25:1. This depth does not allow for lost storage volume as a result of benching and internal dividing walls.

The DAP project confirms that the Recreational Water (IW-TEC-800-03) requirements can be achieved (less than 7 no. spills per bathing season) with the proposed stormwater storage tank.

Stormwater Tank Cleaning System

Tipping buckets are currently proposed for the tank cleaning system. The following are design requirements as per Uisce Éireann specifications:

- Static plus dynamic loading;
- Low noise tipping mechanism;
- Max drop height 6 m;
- Max flushing length 8 m;
- Curved wave wall; and
- The minimum floor slope will be 7.5° or '1 in 13.3'.

Design of the stormwater tank was undertaken which incorporates a tipping bucket cleaning system with reference to manufacture literature. The tank is proposed to be split into two cells connected through a high-level opening. Each cell will comprise of four lanes for a total of eight lanes.

Storm water will discharge into a lane located within the first cell which will concentrate the first flush of solids during a storm event. Each lane will be separated by a low internal wall to improve flushing performance. The second cell will start filling only when the first cell has reached capacity. Each cell is connected to a storm water return pumping station, which will return flows to the inlet works when incoming flows have reduced below 'Flow to Full Treatment'.

Each lane will have a flushing length of approximately 22m with a drop height of over 4m. The floor has a design slope of 1:100 which discharges into a collection sump sized at 1.2 times the volume of the tipping buckets. The proposed flushing lengths are in exceedance of the maximum length of 8m specified in IW-TEC-700-99-02 and will therefore require a derogation from Uisce Éireann technical requirements. Jacopa technical literature shows that 20m flushing lengths, as proposed for Castletroy WwTP, are achievable subject to flushing volume, drop height, and floor slope. Tipping buckets are currently installed in Bunlicky WwTP and Enniscorthy WwTP for reference.

Flushing bells were also investigated as a potential alternative cleaning system. Information was provided by ELIQUO HYDROK, who are also assisting in the preliminary design of the IFAS system for the secondary treatment process.

The CWF Storm Flush system is a non-powered cleaning system which utilises storm water for the flushing process therefore requiring no additional wash water. The images below are from installations at Lifford WwTP.

Figure 3.2: Lifford WwTP CWF Storm Flush Image 1

Figure 3.3: Lifford WwTP CWF Storm Flush Image 2

Selected advantages of this system are noted as follows:

- Requires no power, water supply or controls;
- Flushes even after partial fillings;
- Fully self-priming and flushing operation
- No moving parts;
- Utilises storm water for the flushing process;
- Retains total volume of storm tank; and
- Final flush polishing stage utilizes settled storm water.

A preliminary design was provided by ELIQUO HYDROK for the Castletroy WwTP stormwater tank. The design involved dividing the tank into four lanes, with each lane containing one 3.0m x 3.0m CWF and one 2.5m x 2.5m CWF.

Stormwater Tank Overflow Screen

It is proposed to install a screen similar to the Huber Storm Screen ROTAMAT® RoK2 as shown in the images below. The requirement for this screen is set out in **Section 3.4.2.** The screen will be installed along the length of the high level overflow weir of the structure. Any screenings will be retained within the storm tank and removed via the agreed storm tank cleaning system. The screen can be visually inspected from an overhead walkway. Maintenance will be undertaken when the tank is empty and using working at height equipment. Extracts from the Revit 3D model are shown in Figure 3.7. The following text is provided from Huber in relation to the above product:

"RoK2 screens are horizontally installed before the downstream side of overflow weirs. A screw flight is mounted on a half cylinder of perforated plate. As the stormwater flows down to up through the horizontal perforated half-pipe of the screen trough the solids are retained. A screw, with a brush attached on its flights, rotates within the semi-circular screen trough. It cleans the screen and pushes the screenings gently towards the end of the trough. At the end of the trough, the screenings are returned into the sewer and carried to the wastewater treatment plant. During storm conditions the screen is automatically started and then works fully automatic".

The overflow weir level from the stormwater tank is proposed at 7.2mOD and will discharge to the Final Effluent Inspection Chamber upstream of the outfall. Therefore, the 'Top Water Level' (TWL) upstream of the screen will be 7.5mOD allowing for head loss across the overflow screen. This overflow will have an event monitor and flowmeter installed. The invert level of the 900mm stormwater overflow pipe from the inlet works is 5.60mOD with an overflow weir level of 8.65mOD. The new 1,000mm SWO pipe will be designed to be surcharged as the storm water tank overflow weir level is 7.2mOD.

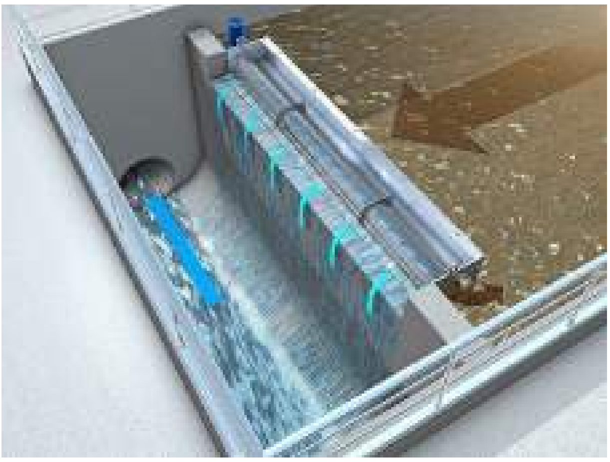


Figure 3.4: HUBER ROTAMAT® RoK2 Design Sketch

Figure 3.5: HUBER ROTAMAT® RoK2 Photograph

Stormwater Return Pumping Station

Stormwater will be returned upstream of the inlet works stormwater overflow and downstream of the grit removal process. A pipework manifold will connect pipework from the stormwater return rising main with influent prior to entering the filtration process. The stormwater return pumping station will be integrated as part of the stormwater tank structure. A sump of $12m^2$ capacity is required based on a maximum return flow rate of 132l/s and 10 starts per hour. Stormwater will be returned at a rate not exceeding 'Dry Weather Flow' when incoming flow have been reduced to 2 times 'Dry Weather Flow'. The storm return sequence will terminate should the incoming flow rate increase to the point that the combined incoming flow and storm return flow exceed 'Flow to Full Treatment'.

Figure 3.6: Proposed Area for Stormwater Tank

The area proposed for the construction of the stormwater tank is the green area shown on Figure 3.6. The views are from the existing Picket Fence Thickener overlooking the most recent constructed clarifier (25m diameter), and from the inlet works overlooking the existing 500mm inlet pipe in the direction of the sludge building.

Figure 3.7 shows a Revit model of the proposed twin cell stormwater tank, tipping bucket cleaning system, stormwater return pumping station, pipework, gantry beams, and access platforms. The tank is partially above ground and with the top of walls at a level above the 1% AEP design flood level.

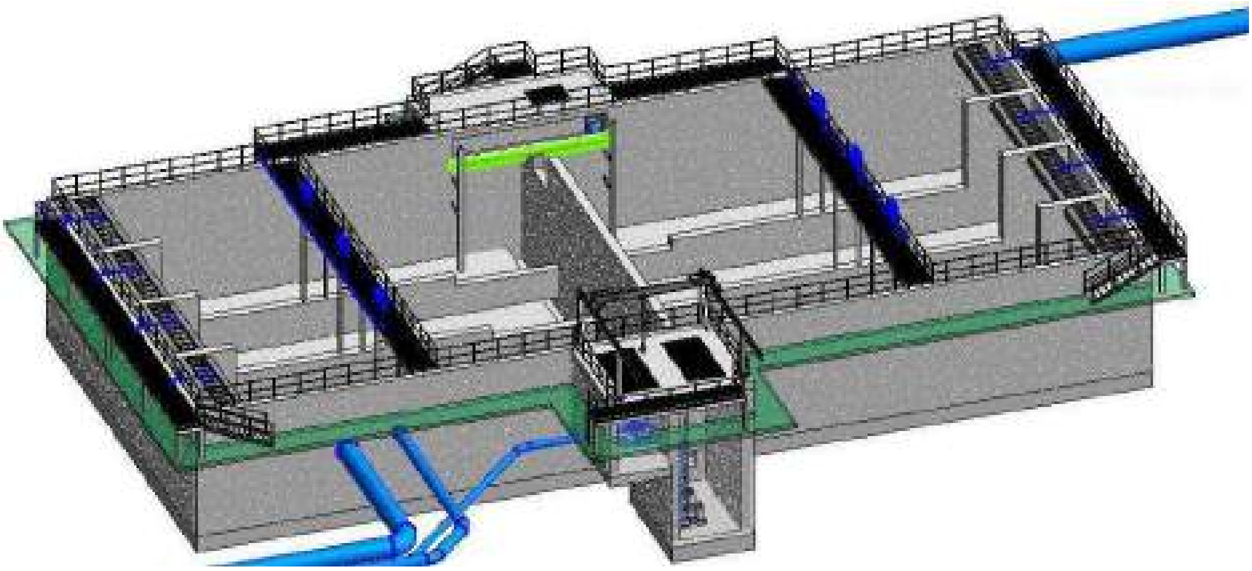


Figure 3.7: Revit Model of Proposed Storm Tank And Return Pumping Station

3.4.4 Preliminary Treatment

Screening

Replacement of the existing screens with higher capacity band screens within the existing inlet works structure is proposed. The existing screens are approaching the end of their design life and should be replaced.

Grit Removal

The Irish Specification IW-TEC-700-99-02 for 'Inlet works & stormwater treatment (wastewater)' specifies an additional grit trap is to be considered for plant sizes in excess of 25,001 PE. This requirement was discussed with Uisce Éireann and agreed that a standby grit trap is included as part of the proposed upgrade development. The single existing grit trap has caused operational issues in the past and poses a risk to the treatment downstream processes, particularly the current Salsnes Filter. The additional grit trap would not only benefit the primary filtration system proposed, but also the proposed IFAS process upgrade.

The proposed location of the additional grit trap is shown in Figure 3.8. The structure would be constructed adjacent to the storm water overflow. Storm water overflow from this chamber will be intercepted and diverted to the proposed new storm tank. The area proposed for the standby grit trap is underlain with pipes, cables, and ducts. Services and pipework will require relocating to accommodate construction. Construction using pre-cast concrete rings connected to the main inlet works structures through pipework could be used to reduce the working space required and the impact on services.

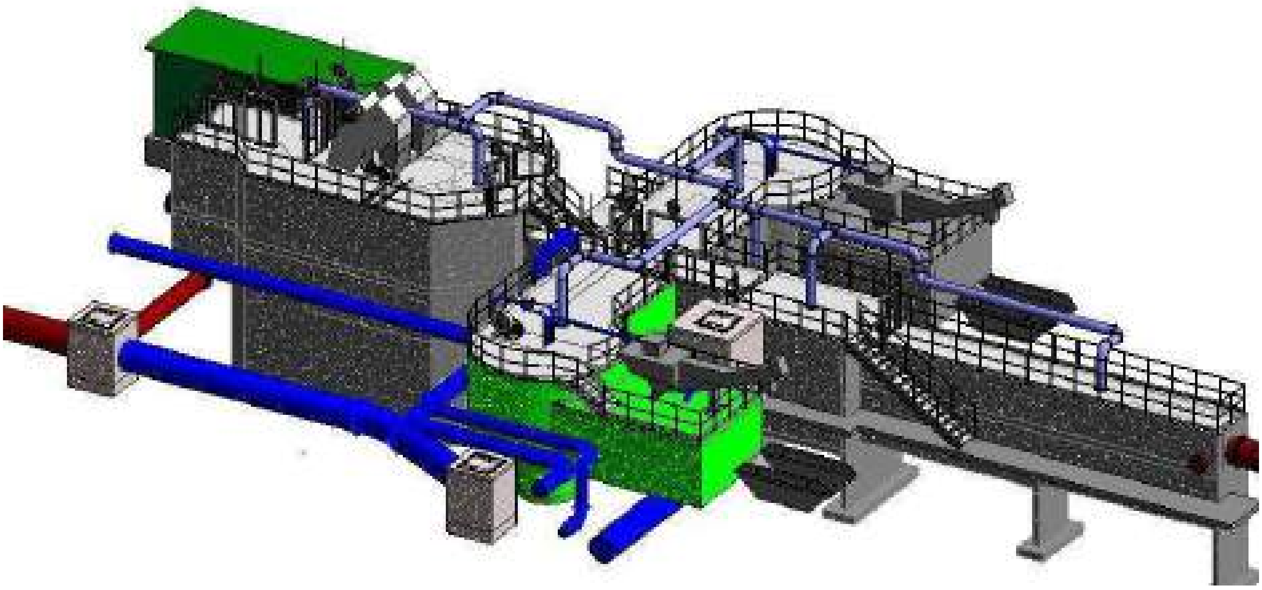


Figure 3.8: Additional Grit Trap

Odour Control

It is proposed to cover the inlet works with solid decking and install odour abatement equipment to contain and treat odours arising to improve working conditions for operators. ATEX rated extraction fans will ensure positive air displacement of 6-8 air changes per hour to minimise odour emissions and ensure a <3OU/m^3 at the site boundary as typically stipulated as part of planning conditions. An example of the proposed odour control unit is shown in Figure 3.9.

Figure 3.9: Example of Proposed Odour Control Unit

3.4.5 Primary Treatment

Primary Sludge Mechanical Filtration

Primary treatment is required to reduce the loading on the secondary treatment process, while also reducing sludge volumes at the end of the works. The proposed solution for handling sludge removed at the primary treatment system is outlined further in the EIAR. A mechanical filtration system is proposed an alternative option to conventional primary treatment as previously discussed.

As discussed previously under **Section 2.4.3**, 3 no. additional primary sludge mechanical filtration units are proposed to allow for increased capacity to the design 77,500 PE. Flow to full treatment can be achieved through operating four number units on a duty/assist/assist/standby basis. Average flow through the plant can be achieved operating the filters on a duty/assist/standby/standby arrangement. The assessment is based on the capacity of the unit currently installed, which has a maximum hydraulic flow of 576m^3/hour and a treated flow specified of 325m^3/hour.

The existing filtration unit is currently installed in an uncovered area adjacent to the inlet works. This filter will be relocated to accommodate other upgrade works and will be installed with the additional new filters required. An above ground pipe manifold will include any necessary flow control and measurement fittings.

It is proposed to construct a building for the primary treatment process which will provide protection to the treatment units while also allowing for the installation of control panels, equipment and monitoring instrumentation within the structure. A steel frame structure with blockwork and insulated composite roof and wall panels is proposed.

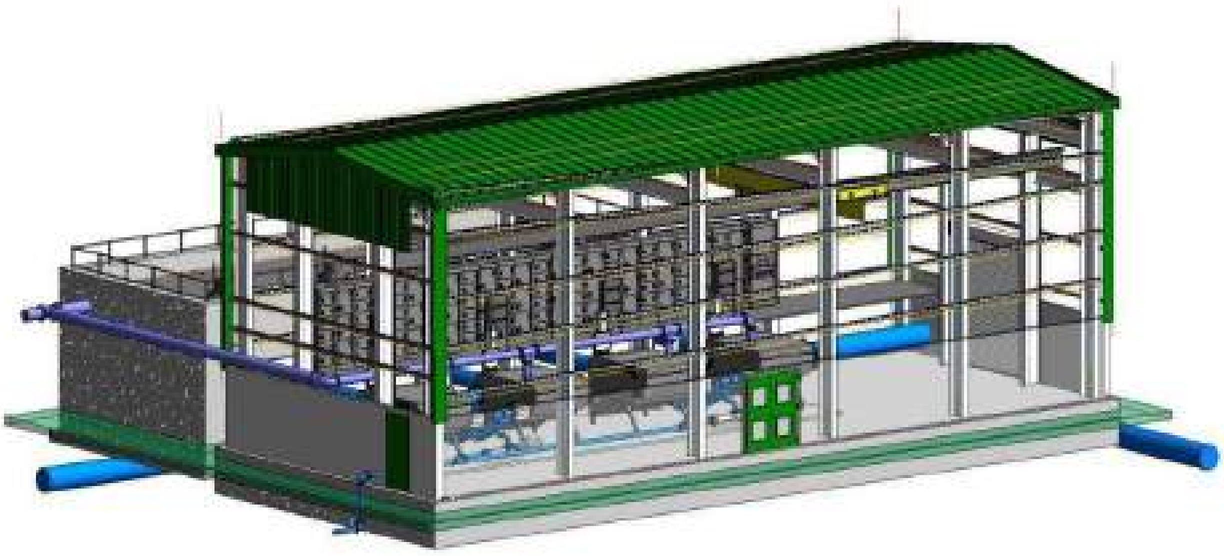


Figure 3.10: Revit model of proposed primary filter building

A floor drainage system will connect to the forward feed pumping station to avoid contamination of surface water drainage. Overhead travelling cranes with sufficient clearance will allow individual units to be lifted and relocated to a service area located within the building without impacting the treatment process. A roller shutter door will provide access to the servicing area and allow for the removal of plant and equipment.

Photovoltaic (PV) panels (c. 80 No.) will be installed on the roof of the primary filter building to provide an onsite source of renewable energy. The PV installation will tie-into the low voltage electrical installation at the main distribution board. There will be 10 rows of panels (4 panels in each row) on each side of the roof, with approximately 1m separation distance between every panel to allow for maintenance access and to prevent shading. Panels are 2m x 1m x 0.35m high.

The PV installation will connect into the main distribution board of the facility and assist in reducing the daytime power requirement from the national grid. The anticipated energy yield for the first year is estimated to be 40,000 kWh / annum power generation.

Primary Sludge Management

Primary sludge from the filtration process will be recovered and stored as liquid sludge. The proposed sludge holding tank will provide thickening of the sludge up to 5% dry solids and will be sized for 5-days storage.

The industrial contribution which represents approximately 50% of the total load to the WwTP (25% of the total DWF flow) contains a very low solids contribution. Therefore, solids in the influent is calculated by 39,492 PE (domestic, commercial, and institutional) with a solids load of 0.075 kg/head/day which corresponds with current flow and load and future projections. The required 5-day storage volume is 150m^3 allowing for peak removal at 50%.

The mild steel or concrete storage tank will be constructed adjacent to the structure housing the primary treatment system. Sludge will be transferred to the holding tank through inline progressive cavity pumps operating on a duty/standby arrangement.

Sludge will be removed in liquid form from the primary sludge treatment process and pumped to the sludge dewatering area within the site. The sludge will be mixed with the 'Surplus Activated Sludge' (SAS) in the repurposed 'Thickened Sludge Storage Tank' (TSST) before de-watering on site. The expected dry solids from the primary sludge is expected to be 3%. Both sludges will be mixed to provide a consistent sludge and stored prior to entering the dewatering stage. The capacity of the existing sludge stream is proposed to be increased to cater for the increased sludge volumes.

The storage tank will be fitted with a Bauer connection to allow a tanker remove liquid sludge in emergency situations (i.e. no dewatering available). A lay bye will be constructed to allow a vehicle park next to the storage tank. An allowance for a mobile sludge dewatering unit to be connected to the tank will also be provided under the Contract. Decanting of the primary sludge holding tank will be available to reduce volumes pumped to the sludge treatment process.

Splitter Chamber

Influent from the forward feed pumps will enter a splitter chamber upstream of the primary treatment system. The splitter chamber will be constructed of reinforced concrete and will promote even distribution across a total number of four weirs prior to entering primary treatment. The weirs will be installed with actuated penstocks to control flow based on operational requirements.

An overflow within the splitter chamber will be installed in the event of an emergency. The overflow can also operate as a controlled bypass of the treatment process if required by closing all penstocks within the chamber. The splitter chamber will be covered to allow odour extraction with an odour control until installed. Access covers will be provided to allow inspection and entry to the chamber when required.

Pipework

A 600mm diameter section of pipework is required to gravitate flows from the inlet works to the proposed forward feed pumping station. A connection will be made to the concrete inlet works structure immediately downstream of the existing measurement flume. A new 500mm rising main pipe will run from the forward feed pumping station to the splitter chamber located upstream of the primary treatment process.

A new 600mm pipe is required to convey flows from primary treatment to secondary treatment. This pipe will cross beneath the existing internal access road prior to connecting through the wall of the secondary aeration tank structure. The existing above ground 500mm diameter pipe can be retained and used as a secondary bypass of the primary sludge filtration system and forward feed pumping station.

It should be noted that existing pipework is supported by piles, a similar design is likely to be required for any new or upgraded sections of pipework.

3.4.6 Secondary Treatment

IFAS System

It is proposed to upgrade the secondary treatment process with an 'Integrated Fixed-Film Activated Sludge' (IFAS) system. The cages are also designed to be lifted to allow inspection work on the curtains without interrupting the process treatment. Due to the bespoke nature of the cages, the curtain material can be positioned directly over the diffusers of the biological treatment tank. The curtains allow horizontal effluent flow to pass between them. The effluent flow combined with the vertical rising air bubbles from the diffusers allows continued rather than periodic shock sloughing (shedding) of excess biomass. Sloughing of the biomass continually promotes aerobic conditions within the biofilm, essential for the process treatment. The benefits of the flexible curtain material are summarised as:

- Enhances aerobic conditions within the biomass, essential for optimum process treatment;
- No blockages within the media, therefore greater oxygen supply to the biological active surface; and no shock loads to the final settlement tanks (FSTs);
- Promotes excellent biomass settling properties;
- Allows the opportunity to operate the treatment plant at lower O2 concentrations;
- No additional scour or mixing required, therefore lower operational costs;
- Low transportation volume;
- Minimal hydraulic head loss; and
- No treatment loss during maintenance, as the media can be lifted for inspection during process treatment.

An overview of the proposed solution to upgrade the treatment capacity of the oxidation tanks is as follows:

- Installation of a system of textile curtains housed in a removable Integrated Fixed-Film Activated Sludge (IFAS) frame in the oxidation tanks;
- Retain the existing air blowers and install additional units including a new control panel;
- Provision of IFAS frame lifting cranes; and
- Retain the existing 3 no existing final settlement tanks / clarifiers as this will be sufficient for IFAS system.

The 'Aerostrip' diffusers installed as part of a previous upgrade were supplied by Jaegar and are suitable for use with the IFAS system. The FBDA diffuser is integrated into the IFAS Frame. The operational life of a FBDA diffuser is typically in the range of 14 – 20 years, and with the unique way in which the membranes self-clean, whole-life costs are reduced, and man entry into tanks for maintenance purposes is minimised.

By positioning a system of textile curtains housed in a removable IFAS frame directly above the aeration diffusers, a large surface area is created on which the biomass can grow. The configuration of the material allows for flexibility and movement within the flow of the tank, increasing the process performance, this in turn increases the capacity of the WwTP. IFAS media can be 100% polypropylene and the construction of this curtain material permits good oxygen supply and prevents excessive growth of thick layers of biomass thus maintaining the optimum efficiency of the process.

The IFAS frames can be specifically designed to accommodate both FBDA diffusers and biotextile sessile media, allowing the operator to remove and maintain them without the costly need to drain the aeration tank. The IFAS frames will not require removal for routine operation and maintenance.

The advantages of IFAS is that it operates very similar to a conventional activated sludge process (DO, MLSS and ammonia monitors can be provided for optimised and energy efficient aeration control). The additional capacity is provided to allow biofilm/biomass develop on the biotextile sessile media. Media surface area provided in addition to the suspended biomass (3,500 mg/l x 5,500m^3 = 19,000 kg) is an important part of IFAS design. This media allows for an additional 33,000 kg (52,000 kg in total) of Biomass which gives an equivalent suspended biomass of 9,000 mg/l within same volume.

The specific requirements identified for all future upgrade options are identified as follows:

- 36 No. IFAS Frames (18 frames per tank) consisting of the following elements: stainless steel grade 304 Frames. Length = 8.20m, width = 2.20m, total height = 4.70m 3-19 approx.;

- 11,232 no. curtains in total: Length of curtain = 4.7m, Width of curtain = 0.96m. Each curtain fixed in the IFAS Frame by a 3-loop system;
- 2 no. lifting spreader beams (for erecting and deploy/retract IFAS Frames);
- Header pipework;
- Stainless steel grade 304 thin wall metric tru-bore, DN250 tapering to DN80;
- Stainless steel grade 304 pipe supports with A2 fixings;
- 59 no. isolation valves (5 x DN150 for blowers & 54 x DN80 for IFAS frames in Phase 1): wafer pattern butterfly valves, having a ductile iron body epoxy coated, ductile iron disc Rilsan coated, stainless steel shaft with a vulcanised EPDM liner & fitted with a worm gear box, handwheel & locking facility;
- 2 no. control valves (serving the common standby blower):
- 5 no. blowers – (duty/assist/common standby/duty/assist): Blowers (75kW), c/w acoustic hood: 74dB(A) per blower.
- Pipe extensions stainless steel grade 304 thin wall metric tru-bore, DN80 (to reach their central location in the tank).

Figure 3.11: Example of IFAS frames and textile curtains (courtesy of Eliquo Hydrok, Appendix 2A)

Figure 3.12 shows a 3D model of the upgraded aeration tanks with 36 no. IFAS frames integrated into the existing structure. Existing chambers located external of the tank are also shown as well as existing and proposed pipework.

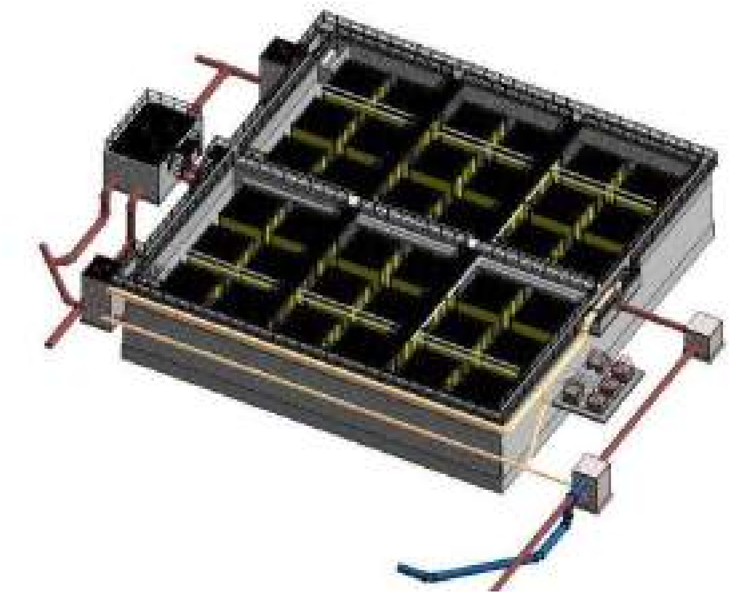


Figure 3.12: Revit Model of Upgraded Aeration Tanks with IFAS System

The full design PE loading will not be available at the time of commissioning. The following is proposed to allow handover of the plant to Uisce Éireann following the upgrade:

1) Process Guarantees will be required as part of the Contract.
2) Oxygenation Capacity Test will be completed to calculate the KLa and SOTR to ensure sufficient oxygen is available to treat the BOD load (in line with the requirements of '*EN 12255-15:2003 Wastewater treatment plants – Part 15: Measurement of the dissolved oxygen transfer in clean water in aeration tanks of activated sludge plants)*'.
3) In addition, Day 1 Load will be in excess of 40,000 PE and consideration will be given to operating/process proving 1 tank (with IFAS retro-fit) for a period time (minimum 28 days) before returning 2nd tank to service. once all works is substantially complete and all commissioning checks are completed (Uisce Éireann Testing, Commissioning and Handover SOP Uisce Éireann-TEC-600-05), a minimum Process Proving period of 3 months (daily SS, COD, BOD, Ammonia and Ortho-P) will be required before successful completion of the Design-Build Period stage and final handover to the Operate Service Period.

Final Settlement Clarifiers Optimisation

The clarifier flow splitter chamber was installed in 2010 during construction of the 25m diameter clarifier. The inlet pipe diameter to each of the 20m diameter clarifiers from the splitter is 500mm, and 600mm to the larger 25m dia. clarifier. All 3 no. clarifiers have 250mm diameter sludge return pipe to the RAS/WAS.

IFAS can achieve a (supplier's) reported SVI design of less than 80 ml/g (compared to 110 – 120 ml/g in conventional activated sludge). A figure of 90 ml/g has been used in the clarifier design check and is sufficient to cater for the hydraulic and solids loading.

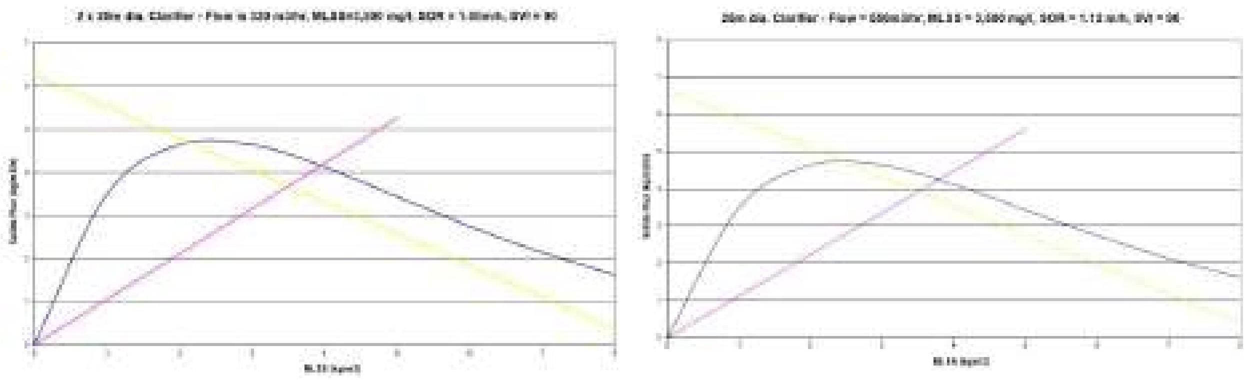


Figure 3.13: Solids Flux Curve at operating MLSS of 3,500mg/l and SVI 90 ml/g

It is proposed to increase the hydraulic throughput capacity of each of the existing 20m diameter clarifiers with the installation of Stamford baffles within the existing structures. Density current baffles mounted inside the clarifier are an effective method of minimising the effects of short-circuiting and improving effluent quality. Flow will be equally split to each clarifier and the increased capacities will provide future redundancy should a tank be required to be taken offline for maintenance.

Stamford baffles are proposed to be installed in a tangential arrangement along the outer edge of the two 20m diameter tanks. A 3D model of the proposed works is shown in Figure 3.14. The rotating bridge scrapers will require modification or replacement to accommodate the works.

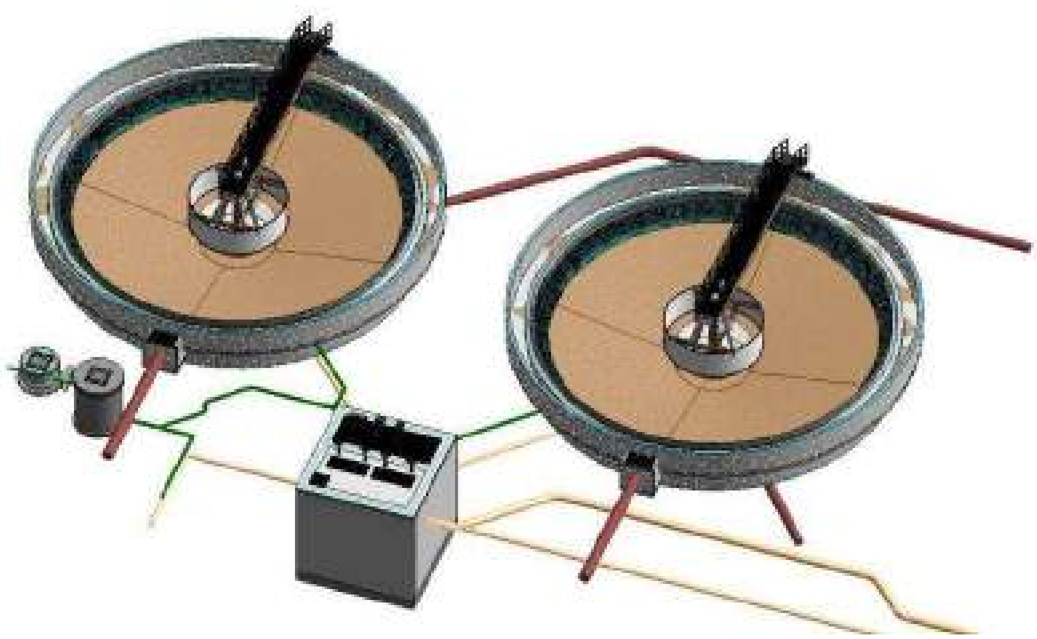


Figure 3.14: Revit model of upgraded clarifiers

Installation of density current baffles mounted inside the clarifier are an effective method minimising the effects of short-circuiting and improving effluent quality. They can also act to separate the stilling zone from the settling zone and this design can increase the volume flow rate. A McKinney baffle cuts the density current and, if designed correctly, completely separates the stilling and settling zones. Examples of Stamford and McKinney baffles can be seen in Figures 3.15 and 3.16.

Figure 3.15: Stamford Baffle

Figure 3.16: McKinney Baffle

Scum Pumping Station

Nocardia is currently an issue at Castletroy WwTP which can be improved through separating scum from the RAS/WAS chamber. Scum removed from the surface of the clarifiers will be discharged to a proposed chamber where it is pumped directly to the sludge treatment process, therefore separating it from the existing RAS/WAS chamber.

RAS/WAS Pumping Station

The existing RAS pumps will be upgraded to a higher capacity of approximately 30kW. The existing scum inlet pipes which discharge from the clarifiers into the chamber will be intercepted and diverted to a new scum pumping station. The existing manual bell mouth arrangement to control the rate of sludge draw off will be removed and replaced with actuators.

Pipework

The capacity of the RAS pipework will be increased to cater for increased hydraulics through the plant. The existing 250mm diameter above ground pipe will be replaced to allow increased return activated sludge be pumped to the aeration tank. It is proposed to install a new 450mm pipe from the RAS pumping station directly to the inlet to the activated sludge tank. This will allow the full design flow to be catered through the newly installed pipe. The 250mm existing underground pipe will be retained for redundancy.

Mobile Crane Access

Concrete hard standing area(s) will be provided for the set-up of a mobile crane when required for the removal of IFAS frames from the aeration tank. The existing access road which runs parallel to the activated sludge tank can be used as a temporary crane set-up area (used as required). A new secondary road which runs along the Western boundary of the site is proposed to improve traffic management within the site. The road will be required for construction traffic during the upgrade and is proposed to be retained permanently. This new road will also allow access for sludge tankers to the sludge treatment building while a temporary crane is setup on the existing access road.

3.4.7 Chemical Phosphorus Removal

It is proposed to install 1 no. new 20m^3 bulk storage tank with integrated bunds to contain Ferric Sulphate (Fe_2SO_4) for phosphorous removal. The tank will be installed adjacent to the inlet works structure where an existing Ferric Sulphate bulk storage tank is installed. An eye wash station will be provided beside the chemical storage area for the Health and Safety of personnel. A new dosing pump will be installed, suitable for the required dosing rate and will operate on a duty/standby configuration.

Figure 3.17: 2 no. 20m^3 tanks installed at Bunlicky WwTP (courtesy – Silotank)

3.4.8 Sludge Treatment

Sludge Thickening and Storage

A new 12m diameter PFT with a volume of 450m^3 is proposed to be constructed. This new PFT along with the existing 12m diameter PFT will be used to thicken SAS. The existing 7.1m diameter PFT will be repurposed as a 'Thickened Sludge Storage Tank' (TSST). Thickened SAS from the PFT's and sludge from the primary treatment will be collected into the TSST. The tank will include a mixer and provide a more consistent sludge feed for dewatering, improving the effectiveness of the dewatering system.

The TSST will be fitted with a Bauer connection to allow the removal of liquid sludge via tankers in emergency situations (i.e. no dewatering available).

Sludge Dewatering

Sludge from the TSST will be conveyed using progressive cavity pumps to the dewatering units. A full upgrade of the sludge dewatering systems is required taking into consideration the age and condition of the existing units.

2 no. duty/assist centrifuges with a capacity of 400kgDS/h/unit are required, operating for approximately 6 hours per day. Centrifuges can dewater sludge up to 20-24% Dry Solids (DS) and have an approximate power consumption of 25kW/unit based on manufacturers literature. Wash water will be required for cleaning the centrifuge when not in dewatering mode.

Figure 3.18 is taken from manufacturer's literature and is representative of centrifuges suitable for installation as part of the upgrade works. Dimensions for the length (L), width (W), and height (H) of a preliminary selected unit are 4.749m, 1.060m, and 1.376m respectively.

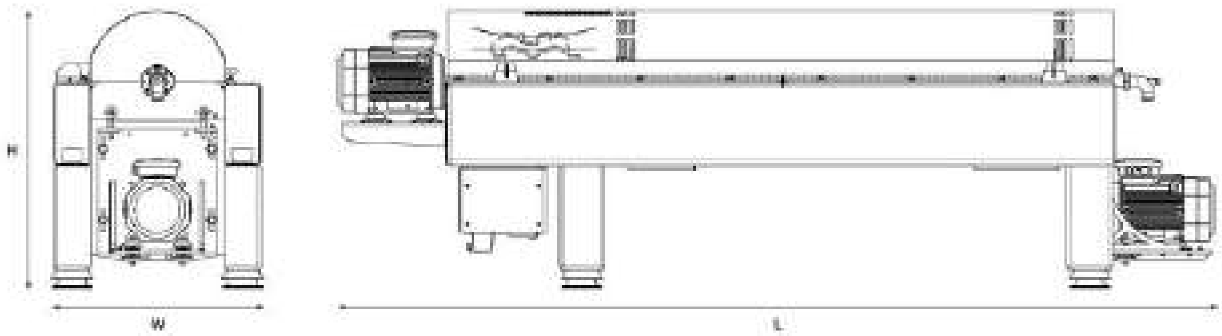


Figure 3.18: Required Centrifuge Dimensions

The centrifuges will be installed on an elevated platform within the sludge dewatering building requiring removal of the first floor. The steel supports holding up the first floor will be dismantled, allowing the building to be modified internally to accommodate the centrifuges. A pumping station will be required to return supernatant to the RAS/WAS chamber. A pump is required for each centrifuge to transfer sludge to covered skips located externally. An odour control unit will also be installed externally to manage odours arising from the sludge dewatering building.

A new automatic polymer make-up system will be installed which can use both liquid or powder forms.

Storage of Dewatered Sludge

Two skips will be required based on peak loadings, with a third skip provided for additional capacity. An automated system will be installed to control the filling of each skip. Trailers are currently being moved by the WwTP operators using an on-site shunter. It is envisaged that transport and replacement of the skips will be undertaken by a contracted third party.

Storage of dewatered sludge will be more appropriately facilitated in larger skips mounted outside (minimum 3 days storage). Skips will be sealed (with air extraction) and connected to the odour control unit for the sludge dewatering building. Refer to the similar applications shown in Figure 3.19 and Figure 3.20.

Figure 3.19: Enniscorthy WwTP Dewatered Sludge Storage

Figure 3.20: Bunlicky WwTP Dewatered Sludge Storage

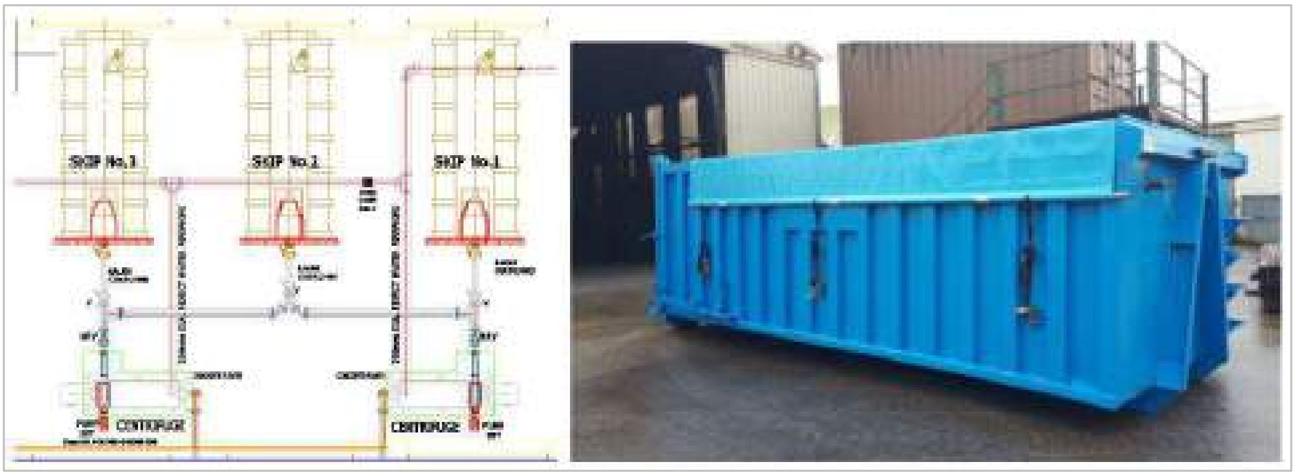


Figure 3.21: Suggested installation and larger skips c/w cover for odour control

3.4.9 Flood Event Pumping Station

A flood event pumping station is required to allow the plant to remain operational during a significant flood event. A portion of Castletroy WwTP is located within Flood Zone A and B. Catchment Flood Risk Assessment and Management (CFRAM) mapping indicates that the 1% Annual Exceedance Probability (AEP) fluvial flood level (Flood Zone A) is +6.37mOD and the 0.1% AEP fluvial flood level is +6.93mOD. Water levels are also presented in Table 3.14: CFRAM fluvial mapping water levels.

Table 3.14: CFRAM fluvial mapping water levels

10% AEP (1 in 10 year)	1% AEP (1 in 100 year)	0.1% AEP (1 in 1000 year)
5.77 mOD	6.38 mOD	6.94 mOD

To overcome the hydraulic constraint during periods of high flood level, a flood event pumping station is proposed to pump the treated effluent to the final effluent inspection chamber and allow gravity discharge from the inspection chamber to the outfall. The walls of the inspection chamber structure are proposed to be increased in height from 6.55mOD to approximately. 8.2mOD which includes a free board allowance to prevent overtopping during the 0.1% AEP flood event.

The structure is proposed to be constructed offline from the final effluent pipework, downstream of the connection manhole with the storm water overflow. The pumping station will be bypassed during normal river conditions. During higher river levels, levels within the pumping station sump will trigger operation of the pumps. The pumps will lift final effluent to the inspection chamber where it will gravitate through the existing outfall. The final effluent pipework entering the inspection chamber is already fitted with a non-return valve to prevent backflow through the plant resulting in potential surcharging of the system. This valve will be replaced due to its age.

Figure 3.22 shows an example of submersible cannister pumps which are proposed to be installed in the 108m^3 wet well sump of the pumping station.

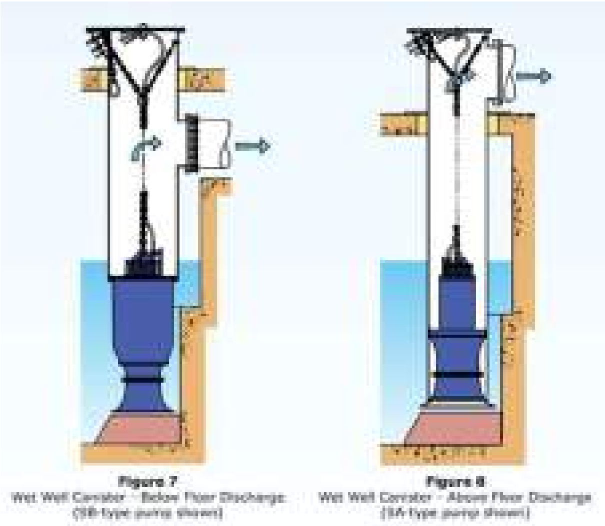


Figure 3.22: Submersible Pump Example (Bedford Pumps)

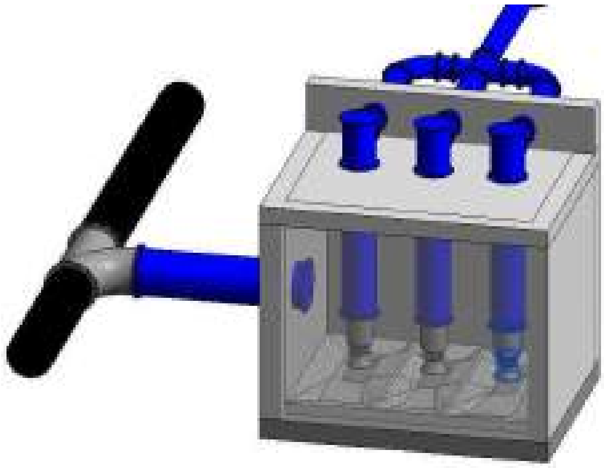


Figure 3.23: Revit 3D Model of Flood Event Pumping Station

Pumps can be installed operating on either a duty/duty/assist (3 no.) or a duty/assist basis (2 no.) depending on the model of pump selected. The pumps are required to deliver a high flow rate of 1,200 l/s with a low dynamic head of approximately 3m.

3.4.10 Wash Water

Increased wash water supply will be required for the additional treatment processes as part of the Castletroy WwTP upgrade. At a minimum, supply will be required at the following locations:

- Storm tank and return pumping station (filling of tipping buckets cleaning system and washdown points);
- Forward feed pumping station (washdown point);
- Primary sludge mechanical filtration (cleaning system and washdown point);
- New sludge holding tank (washdown point);
- New sludge thickening tank (washdown point); and
- Scum removal pumping station (washdown point).

The stormwater tank cleaning system and proposed primary treatment will require the largest demand of wash water. Preliminary selected tipping buckets have a capacity of 500 litres per metre, with a bucket width of approximately 4.6m located within each of the eight lanes.

Screens will generally use 2 to 3 l/s when required, and centrifuges have a much lower wash water usage compared to alternatives. Primary mechanical filters belt cleaning typically use 1.5 l/s per machine during a cleaning operation. Wash water is not required during the filtration process (normal operation). Cleaning can also be via an air scouring negating the need to wash water.

There may be additional capacity in the existing borehole source which could be utilised. Yield testing reports were not available at the time of this report, however will be investigated and additional yield testing undertaken if required. A second well can be drilled if it is found that the capacity of the existing well is insufficient. A pre-cast concrete storage tank of circa 36m³ is proposed to be installed adjacent to the borehole to provide storage which can be drawn down during periods of increased wash water demand.

3.4.11 Site Drainage

Storm water runoff from the new hard standing areas and structures will require on-site attenuation before discharging to the Lower River Shannon at an agreed flow rate through a hydro break. Typical solutions are shown in Figure 3.24 and Figure 3.25. Existing site drainage may be incorporated into the proposed attenuation storage area if required.

Figure 3.24: StormTech Storm Storage Tank

Figure 3.25: StormCell Storm Storage System

3.4.12 Power Supply

A transformer was previously installed to cater for 630 kVA as part of a recent electrical upgrade including an LV mains incomer and autochanger panel suitable for 1,250 Amps. A concrete base was also constructed to allow for the temporary or permanent installation of a generator.

Provision of a permanent generator as part of the upgrade works was considered as it was raised previously by the EPA. The only power outage reported was as a result of vandalism on the network. Due to the plant being located on a high priority line adjacent to the University Limerick, the installation of a permanent generator deemed not to be required. Provision of a permanent generator would result in ongoing maintenance, servicing, and fuel costs.

It is proposed to upgrade the transformer to 1,000 kVA to accommodate for the proposed and any future upgrade and any future works. No works in relation to provision of a generator are proposed.

3.5 Operation of the Proposed Development

3.5.1 Overview

This section describes the likely operational activities of relevance to this EIAR. It should be noted that as outlined previously, the contractor will be responsible for operating the WwTP for an agreed period at the outset of the Proposed Development.

3.5.2 General Management

Maintenance and Monitoring

Maintenance activities will typically include the following:

- General maintenance on a daily basis;
- Preventative maintenance as scheduled by the operator;
- Inspections of equipment including the SWOs on a weekly basis;
- Inspection of chambers on pipelines on an annual basis; and
- Inspection of diffusers via dive survey on an annual basis.

Monitoring activities will be undertaken in accordance with the WWDA and will typically include:

- Quality and quantities of influent and treated effluent discharge;
- Individual elements of the treatment processes in the WwTP;
- Individual elements of the pumping station;
- SWO's; and
- Air, noise and odour emissions.

3.5.3 Sludge Management

The sludge generated by the WwTP will be produced in accordance with the National Wastewater Sludge Management Plan which requires dewatering to a minimum 18% dry solids for treatment plants in excess of 10,000PE.

The dewatered sludge will be placed in one of three covered skips, with the skips removed by licensed contractors once filled. The dewatered sludge will be transported to a Sludge Hub Centre, or alternative Uisce Éireann approved licenced facility, for further treatment and appropriate disposal in accordance with the National Wastewater Sludge Management Plan. The Uisce Éireann Regional Sludge Hub Centre project seeks to create a more efficient national sludge management system by centralising and standardising sludge treatment. Regional Sludge Hub Centres will eventually replace the traditional method of lime stabilisation with technology such as thermal hydrolysis or pasteurisation to produce a Class A biosolid that can be disposed of safely and in a way that does not pose a risk to public health, the environment or agricultural lands. In the medium term, sludge produced at Castletroy will continue to be treated by lime stabilisation (via Bunlicky Sludge Hub Centre and/or alternative Uisce Éireann approved licenced facility). Refer to **Part B, Section 15** Resource and Waste Management for further information.

As outlined in **Section 3.4.8**, it is anticipated that approximately 14m^3 of dewatered sludge will be typically generated per day under normal conditions. It is therefore estimated that removal of dewatered sludge from the skip may be required every day (worst case scenario).

The vehicles required for this purpose will utilise the Limerick City and County Council access road to Plassey Park Road where they will travel onwards to the relevant sludge hub centres.

3.5.4 Site Access and Deliveries

The Proposed Development will be located within the existing site which is secured by perimeter fencing and controlled access gates, with appropriate security measures in place. This will restrict site access and ensure that only relevant personnel can access these assets during the operation of the Proposed Development.

There will be a number of deliveries of the necessary equipment and materials to the WwTP site once operational, e.g. polymer will be regularly required to support the activated sludge process and deliveries may be required to the Administration Building including chemicals, office consumables etc.

Further, a number of vehicles will regularly come to the WwTP site to remove waste such as the grit produced in the Inlet Works structure and municipal waste generated from the Administration building.

It is anticipated that these vehicular movements would be minimal in the context of existing traffic levels in the local area (Refer to **Part B, Section 6** for further information).

3.5.5 Environmental, Health and Safety Management

In accordance with the Uisce Éireann procurement procedures, the operator will be required to have certified health and safety (OHSAS 18001) and environmental (ISO 14001) management systems. The management systems provide for the monitoring of environmental and safety performance and implementation of continuous improvement through associated action programmes. These programmes are frequently and routinely monitored by Uisce Éireann and will continue to be developed over the operating life of the Proposed Development.

In accordance with the typical requirements of a WWDA, existing procedures to notify the EPA of emergencies, exceedance of licence conditions and/or environmental pollution occurrences, will be updated based on the requirements of the new license.

3.5.6 Employment

When completed and fully operational, the Proposed Development is likely to employ approximately 3 - 5 personnel, some of whom would work in shifts as the facility will be operational 24 hours per day.

3.5.7 Decommissioning

This section describes the relevant assumptions that have been made with regard to the decommissioning of the Proposed Development. It should be noted that the design life for the Proposed Development is 50 years and Uisce Éireann considers the Proposed Development to be a key strategic asset in its portfolio.

As such, it is anticipated that the Proposed Development will be maintained and upgraded by Uisce Éireann as required in line with all their other strategic assets. In the event of decommissioning, the following measures will be undertaken by Uisce Éireann to ensure that there will be no likely significant effects associated with the decommissioning of the Proposed Development:

- All raw materials, chemicals, oils, fuel etc. on site at the time of closure will be returned to the supplier, or collected and recycled or disposed of by an authorised waste contractor, as appropriate;
- All WwTP buildings and process equipment will be decontaminated and decommissioned in an appropriate manner;
- Infrastructure and underground pipelines are not anticipated to be removed. Generally, specialist equipment will be sold for reuse, where possible, or disposed of off-site;
- All buildings, structures and pipelines will be decommissioned;
- Roads, hard-standing and site fencing will be retained; and
- When operations have ceased, it is expected that there will be no requirement for long-term aftercare management at the site.

The decommissioning measures are required to be implemented to the satisfaction of the competent authority and any relevant licenses and discharges will be surrendered in accordance with the relevant requirements.

3.6 References

Department of Communications, Climate Action and Environment (2017) *Public Sector Energy Efficiency Strategy*

Department of Communications, Energy and Natural Resources (2015) *Ireland's Transition to a Low Carbon Energy Future 2015-2030*

Department of Communications, Energy and Natural Resources (2014) *National Energy Efficiency Plan*

Department of the Environment (1993) *Procedures and Criteria in relation to Storm Water Overflows*

Department of Housing, Planning, Community and the Local Government (2016) *Code of Practice for Inspecting and Certifying Buildings and Works: Building Control Regulations 2007 to 2015*

Government of Ireland (2018) Project Ireland 2040 – *National Planning Framework*

HMSO (1970) *Report of the Technical Committee on Storm Overflows and the Disposal of Storm Sewage*

Uisce Éireann (2015) *Water Services Strategic Plan*

NSAI (2012) *IS EN 671-1:2012: Fixed firefighting systems. Hose systems. Hose reels with semi-rigid hose*

NSAI (2015) *IS291:2015 Selection, commissioning, installation, inspection and maintenance of portable fire extinguishers*