UISCE ÉIREANN : IRISH WATER

Greater Dublin **Drainage Project**

Engineering Design Report

JACOBS® TOBIN Consulting Engineers

Contents

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List of Acronyms

AOD	Above Ordnance Datum
ASP	Conventional Activated Sludge Plant
CHP	Combined Heat and Power
CQA	Construction Quality Assurance
DCC	Dublin City Council
EIAR	Environmental Impact Assessment Report
FCC	Fingal County Council
GDA	Greater Dublin Area
GDD	Greater Dublin Drainage
GDSDS	Greater Dublin Strategic Drainage Study
ha	Hectare
LLLD	Long Length Large Diameter
NFS	North Fringe Sewer
NRA	National Roads Authority
NSC	National Sports Campus
OCU	Odour Control Unit
P.E.	Population Equivalent
RBSF	Regional Biosolids Storage Facility
SHC	Sludge Hub Centre
SuDS	Sustainable Urban Drainage Systems
TDS	Tonnes of Dry Solids
WFD	Water Framework Directive
WwTP	Wastewater Treatment Plant

1. Introduction

On 1 January 2014, Irish Water assumed responsibility for managing Ireland's water and wastewater investment and maintenance programmes. On that date, Irish Water also took over the management of the planning stage of the Proposed Project from Fingal County Council (FCC) (who previously led the Proposed Project on behalf of Dún Laoghaire-Rathdown County Council, Kildare County Council, Meath County Council, South Dublin County Council and Dublin City Council).

The largest and critical strategic catchment was identified as the contributing catchment to Ringsend Wastewater Treatment Plant (WwTP). The provision of additional wastewater treatment capacity therefore revolved around the ability of Ringsend WwTP to meet future needs. Given the constraints on the future expansion of Ringsend WwTP beyond its ultimate capacity, it was determined that the provision of additional wastewater treatment capacity would require the construction of an alternative wastewater treatment facility, or facilities, for the contributing catchment to Ringsend WwTP to augment the treatment capacity provided at the expanded Ringsend WwTP.

The Proposed Project is a significant component of a wider strategy to meet the need for additional wastewater treatment within the Greater Dublin Area (GDA) as identified in a number of national, regional and local planning policy documents as referenced in the Proposed Project Planning Report (AOS 2018). The Proposed Project will serve the estimated and planned wastewater needs of existing and future drainage catchments, up to a 2050 horizon in the north, west and north-west of the Dublin agglomeration (including Clonshagh (Clonshaugh), Ballymun, Finglas, Blanchardstown, Mulhuddart, Ratoath, Ashbourne, Clonee and Dunboyne) and the Lower Liffey Valley catchment in north-east Kildare. The Proposed Project will also have the capacity to provide treatment for municipal wastewater sludge and domestic septic tank sludges, generated in Fingal.

The table below includes a summary of the Proposed Project elements. A full description of the Proposed Project is detailed within Volume 2 Part A, Chapter 4 Description of the Proposed Project of this EIAR and is illustrated in Figure 1 Proposed Project Overview.

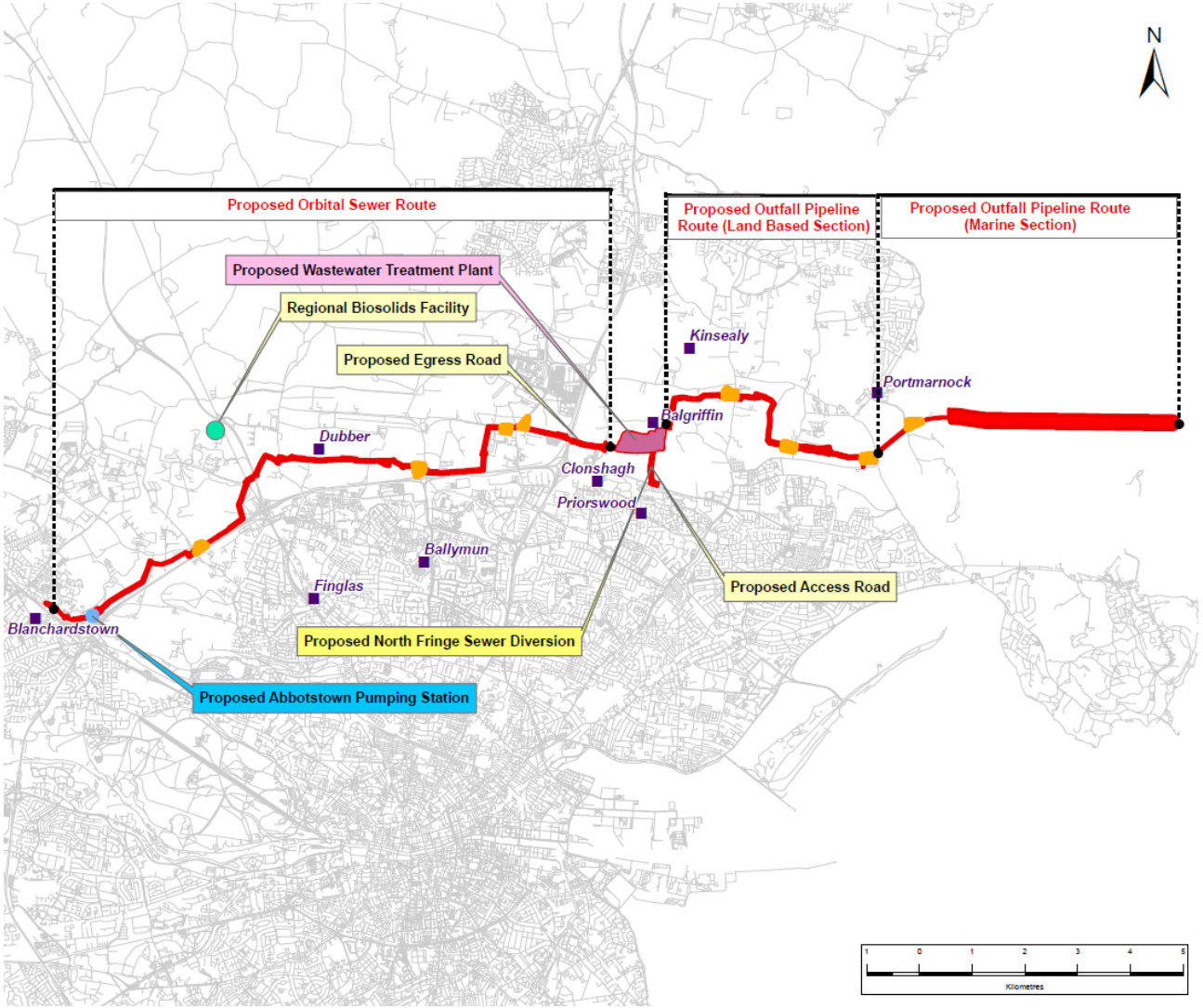

Figure 1: Proposed Project Overview

Table 1: Summary of the Proposed Project Elements

Proposed Project Element	Outline Description of Proposed Project Element
Proposed WwTP	• Regional WwTP to be located on a 29.8 hectare (ha) site in the townland of Clonshagh in Fingal. • 500,000 Population Equivalent (PE) wastewater treatment capacity. • Maximum building height of 18m. • Sludge Hub Centre (SHC) to be co-located on the same site as the WwTP with a sludge handling and treatment capacity of 18,500 tonnes of dry solids (TDS)/annum. • SHC will provide sustainable treatment of municipal wastewater sludge and domestic septic tank sludges generated in Fingal to produce a biosolid end-product. • Biogas produced during the sludge treatment process will be utilised as an energy source. • Access road from the R139 Road, approximately 400m to the southern boundary of the site. • Egress road, approximately 230m from the western boundary of the site to the Clonshaugh Road. • A proposed temporary construction compound to be located within the site boundary.
Proposed Abbotstown Pumping Station	• Abbotstown pumping station to be located on a 0.4ha site in the grounds of the National Sports Campus (NSC) at Abbotstown. • Abbotstown pumping station will consist of a single 2-storey building with a ground level floor area of 305m^2 maximum height of 10m and a below ground basement 17m in depth with floor area of 524m^2 incorporating the wet/dry wells. • The plan area of the above ground structure will be 305m^2 and this will have a maximum height of 10m. • A proposed temporary construction compound to be located adjacent to the Abbotstown pumping station site.
Proposed Orbital Sewer Route	• The orbital sewer route will intercept an existing sewer at Blanchardstown and will divert it from this point to the proposed WwTP at Clonshagh • Constructed within the boundary of a temporary construction corridor. • 13.7km in length; 5.2km of a 1.4m diameter rising main and 8.5km of a 1.8m diameter gravity sewer. • Manholes / service shafts / vents along the route. • Odour Control Unit (OCU) at the rising main/gravity sewer interface. • Proposed temporary construction compounds at Abbotstown, Cappoge, east of Silloge, Dardistown and west of Collinstown Cross to be located within the proposed construction corridor.
Proposed Diversion of the North Fringe Sewer (NFS)	• The NFS will be intercepted in the vicinity of the junction of the access road to the WwTP with the R139 Road in lands within the administrative area of Dublin City Council. • NFS diversion sewer will divert flows in the NFS upstream of the point of interception to the WwTP. • 600m in length and 1.5m in diameter. • Operate as a gravity sewer between the point of interception and the WwTP site.
Proposed Outfall Pipeline Route (Land Based Section)	• Outfall pipeline route (land based section) will commence from the northern boundary of the WwTP and will run to the R106 Coast Road. • 5.4km in length and 1.8m in diameter. • Pressurised gravity sewer. • Manholes / service shafts / vents along the route. • Proposed temporary construction compounds (east of Malahide Road and east of Saintdoolaghs) located within the proposed construction corridor.
Proposed Outfall Pipeline Route (Marine Section)	• Outfall pipeline route (marine section) will commence at the R106 Coast Road and will terminate at a discharge location approximately 1km north-east of Ireland's Eye. • 5.9km in length and 2m in diameter. • Pressurised gravity tunnel/ subsea (dredged) pipeline. • Multiport marine diffuser to be located on the final section. • Proposed temporary construction compounds (west and east of Baldoyle Bay) to be located within the proposed construction corridor.
Proposed Regional Biosolids Storage Facility (RBSF)	• Located on an 11ha site at Newtown, Dublin 11. • Maximum building height of 15m. • Further details and full impact assessment are provided in Volume 4 Part A of this EIAR.

This Report addresses the proposed infrastructural requirements of the development and will support the Planning Application for the development of the Proposed Project.

1.1 Site Location

The Proposed Project will be located along the southern fringe of Fingal in north County Dublin, between Blanchardstown and Baldoyle, and in the marine environment off north County Dublin between Baldoyle Bay and Ireland's Eye. An overview of the Proposed Project in its entirety is shown on Drawing No. 3212902-2000.

1.1.1 Abbotstown Pumping Station

The proposed Abbotstown pumping station, outlined in Drawing No. 32102902-2140, is located within the County Dublin townland of Abbotstown.

The site boundary outlined on Drawing No. 32102902-2141, is defined as the area in which all activities associated with the pumping station will occur, is confined to the townland of Abbotstown (Blanchardstown).

The proposed Abbotstown pumping station will be constructed on an area of approximately 0.40ha which will allow for landscaping, general civil works, structures and security measures to be put in place on site. The proposed pumping station site area is located immediately west of the M50 and to the east of Connolly Hospital.

1.1.2 Orbital Sewer

The orbital sewer will collect sewage arising from the Blanchardstown 9C Sewer catchment and from future development lands bounded by the M2, M50, M1 and Dublin Airport, and the Dublin Airport Authority and transport it to the proposed WwTP at Clonshagh. The proposed route of the sewer is shown in Figure 2.

The proposed orbital sewer route will commence in the grounds of Waterville Park, Blanchardstown, where it will intercept the existing Blanchardstown main sewer line, known as the 9C Sewer. From this point, it will be routed through the grounds of Connolly Hospital and the grounds of the National Sports Campus (NSC) to the proposed Abbotstown pumping station, located adjacent to the M50 Motorway. From the proposed Abbotstown pumping station, the proposed orbital sewer route will be routed north of, and generally parallel to, the M50 Motorway to Clonshagh, and will pass south of Dublin Airport complex.

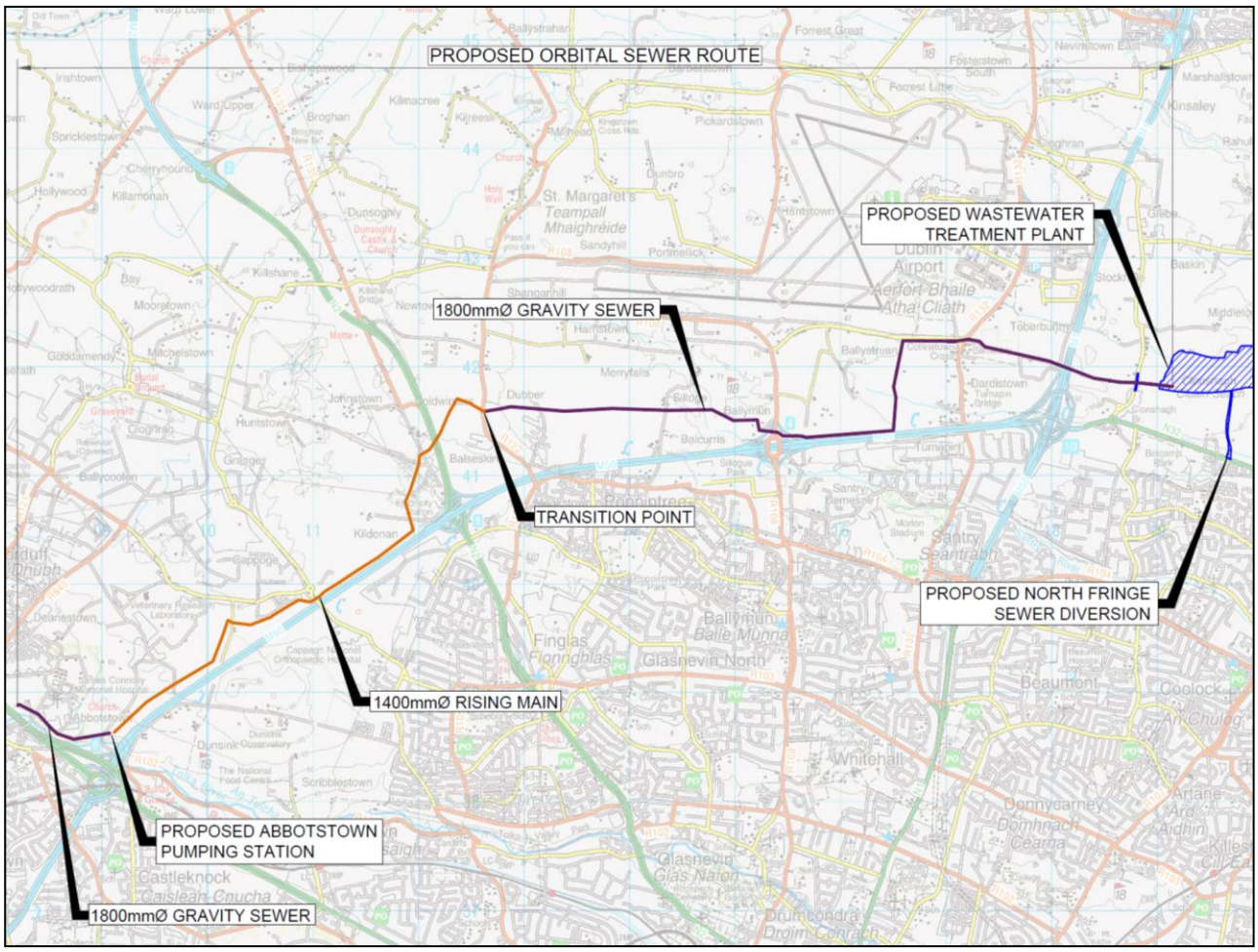

Figure 2: Route of Proposed Orbital Sewer

1.1.3 Diversion of North Fringe Sewer

The proposed NFS diversion sewer will transfer flows in the NFS upstream of the point of interception to the proposed WwTP. It is proposed to intercept the NFS at the junction of the proposed access road to the proposed WwTP with the R139 Road. From this point, the proposed NFS diversion sewer will be routed to the proposed WwTP along the proposed access road from the R139.

1.1.4 Wastewater Treatment Plant & Sludge Hub Centre

The proposed site for the proposed wastewater treatment plant (WwTP) and Sludge Hub Centre (SHC), outlined in Drawing No. 32102902-2119, is located within the townland of Clonshagh, in Fingal. It is situated in open agricultural land approximately 2.4km east of Dublin Airport and approximately 500m north of the R139 Road. The Cuckoo Stream (a tributary of the Mayne River) lies immediately north, with the Mayne River itself approximately 400m south of the proposed WwTP site.

The site boundary outlined on Drawing No. 32102902-2119, is defined as the area in which all activities associated with WwTP will occur, is confined to the townland of Clonshagh.

The WwTP will be constructed on an area of approximately 29.8ha which will allow for landscaping, general civil works, structures and security measures to be put in place on site.

1.1.5 Outfall Pipeline

The proposed outfall pipeline route will consist of a land based section (Clonshagh to Baldoyle) and a marine section (Baldoyle to Ireland's Eye). A multiport marine diffuser will be integral to and located on the final section of the proposed outfall pipeline route (marine section).

The proposed outfall pipeline route (land based section) will commence at the proposed WwTP and will be routed in an easterly direction towards the coast, terminating at the R106 (Coast Road) between Baldoyle and Portmarnock. The lands along the length of the proposed outfall pipeline route (land based section) are generally open fields and agriculture is the main land use pattern.

The proposed outfall pipeline route (marine section) will commence at the R106 (Coast Road), north of Baldoyle, and will be routed in a north-easterly direction across Baldoyle Estuary to the public car park immediately north of Portmarnock Golf Club, where it will turn in an easterly direction and will terminate approximately 1km north-east of Ireland's Eye within the Irish Sea Dublin (HA 09) Coastal Water Body as defined under the Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (Water Framework Directive (WFD))

The proposed multiport marine diffuser will consist of a number of vertical risers from the proposed outfall pipeline (marine section) to above seabed level. Diffuser valves will be attached onto the vertical risers to allow the treated wastewater to achieve the required initial dilution on discharge to the marine environment.

1.1.6 Regional Biosolids Storage Facility

The location for the proposed RBSF is at a site in Newtown, Dublin 11. It comprises approximately 11 hectares of partially developed land and is situated off the R135 road, on the western side of the N2 national road. It is approximately 1.6km north of Junction 5 (Finglas) on the M50 motorway and 1.5km west of Dublin Airport. The proposed site is to be known as the Regional Biosolids Storage Facility (RBSF).

1.2 Site Topography

1.2.1 Topography at Proposed Abbotstown Pumping Station

The proposed site of the proposed Abbotstown Pumping Station slopes from approximately 55.5m AOD at the north-eastern corner of the site down to approximately 52.5m AOD along its southern boundary. The ground between the southern boundary and the Tolka River, to the south of the site, slopes from 52.5m AOD at the southern boundary to levels of approximately 35.0m AOD at the northern bank of the Tolka.

1.2.2 Topography along Proposed Orbital Sewer Route

Existing ground levels along the 1,800mm diameter gravity sewer section from the interception of the 9C sewer to the Abbotstown Pumping Station site vary from a maximum of 54.73m AOD down to 44.98m AOD at the crossing of the Tolka River.

The ground levels along the route of the 1,400mm diameter rising main, from the proposed Abbotstown Pumping Station to the transition point adjacent to the R122 regional road, rise from 54.0m AOD at Abbotstown to 87.5m OD near the transition point.

The ground levels along the route of the 1,800mm diameter gravity sewer from the transition point adjacent to the R122 regional road to the Wastewater Treatment Plant site at Clonshagh. Ground levels vary from approximately 81.0m AOD at the transition point to 44.2m AOD at the WwTP.

1.2.3 Topography at Proposed WwTP and Sludge Hub Centre

The proposed site of the WwTP and SHC slopes in a west-east direction from 45.00m AOD to 39.00m AOD with a central elevation of approximately 42.30m AOD.

1.2.4 Topography along NFS Diversion Sewer

The topography along the proposed NFS diversion sewer will generally be a rising profile from 36.30m AOD at the point of interception to 40.20m AOD at the main gate of the proposed WwTP site and 44.50m AOD at the inlet works

1.2.5 Topography along Outfall Pipeline Route

The topography along the proposed outfall pipeline route (land based section) is generally a falling profile from 39.00m AOD at the boundary fence of the proposed WwTP to 9.00m AOD at the R106 (Coast Road).

The coast in the vicinity of the proposed outfall pipeline route (marine section) is characterised by sandy beaches. Water depths in this area range from 0m to 25m Lowest Astronomical Tide.

1.2.6 Topography at Proposed Regional Biosolids Storage Facility

The site generally slopes from east to west. There is a difference of approximately 2 to 3 metres between the highest and lowest areas on the site. A tributary of the Huntstown Stream, which in turn is a tributary of the River Ward, flows along the western and southern boundary of the site. The site naturally drains to this watercourse.

1.3 Supporting Information

This Report supports the Planning Application and is supported by the Planning Drawings, the Outline CEMP, the RBSF Engineering Design Report and the EIAR Drawings, which are included with the Planning Application and EIAR respectively.

2. Detail of the Proposed Development

2.1.1 Proposed Abbotstown Pumping Station

The estimated pumping capacity required for the proposed Abbotstown pumping station is for a peak flow of 2.5m3/s. The estimated pumping power requirement is 2,300kW.

Site Infrastructure

The proposed site layout of the proposed Abbotstown pumping station is outlined on Drawing No. 32102902-2145 of the planning drawings and the details of each element of the development are further described elsewhere in this Report, and in the EIAR.

The following is a schedule of the main infrastructure elements which will be constructed at the proposed Abbotstown pumping station:

- Pumping Station Building;
- Access routes, parking areas and hard standing areas;
- Surface water infrastructure;
- Foul water infrastructure;
- Potable water supply;
- Landscaping features; and
- Security fence.

Pumping Station Buildings

A single storey building above a pumping station substructure consisting of wet wells and dry well is proposed for development at Abbotstown. The building will provide all necessary welfare facilities, office spaces, monitoring and control equipment required for the operation and maintenance of the pumping station. It is envisaged that the building will be rendered in block work and precast concrete with a copper sheeted roof.

Details of the pumping station structure at Abbotstown are included in Drawing Nos. 3210292-2142 to 32102902-2144 of the Planning Drawings. The building will comprise of a ground floor containing the following areas as shown on Drawing No. 32102902-2143:

- Office;
- Odour control/dosing and chemical stores room;
- WC/wash room;
- Pump access room;
- MCC room;
- Backup generator room;
- ESB substation;

and a sub-structure (basement) containing the:

- Wet well;

- Dry well.

The maximum height of the building is 10m above ground level and the depth of the sub-structure (basement) is 17m below ground level. The height and depth of the structure are shown on the relevant planning application drawings.

Construction

The preliminary design of Abbotstown pumping station indicates that the invert level of the inlet sewer is approximately 17m deep and as a result the base slab for the wet well and dry well will be constructed significantly below the existing ground level.

Preliminary site investigation indicates rock at approximately 2.5m. The rock shall be excavated in such a manner as to minimize noise generation and the pumping station shall be constructed of in-situ reinforced concrete and traditional construction techniques. Overburden above the rock will most likely be retained during construction using a temporary retaining wall.

The above ground structures, which will be a maximum height of 10m, will be constructed using conventional construction techniques

Site Security

Site security arrangements to prevent unauthorized access at the pumping station include the following:

- Fencing around the entire compound footprint, with the exception of the entrance, will comprise of 2.6m high palisade fencing. The fencing layout for the site is shown on Drawing No. 32102902-2145. Details of the proposed fencing and entrance gate are shown on Drawing No. 32102902-2205; and
- Anti-intruder alarms will be located in the building.

2.1.2 Proposed Orbital Sewer

The proposed orbital sewer, with a total length of approximately 13,700m, is comprised of three segments as follows:

- A 1,800mm diameter gravity sewer, approximately 1,000m in length, will convey sewage from the interception point with the Blanchardstown 9C sewer and Abbotstown Pumping Station.
- A 1,400mm diameter rising main, approximately 5,200m long will convey sewage pumped from the proposed Abbotstown Pumping Station to the head of a gravity sewer at the R122 regional road in the townland of Dubber.
- A 1,800mm diameter gravity sewer, approximately 7,500m in length will convey sewage from the end point of the rising main at the R122 regional road in the townland of Dubber, to the inlet of the proposed WwTP at Clonshagh. This section of the orbital sewer is designed to accommodate potential peak future flow of 5.26m3/s.

Manholes will be located at each change in direction and/or gradient along the route of the gravity sewer sections.

The rising main section will incorporate seven air valves and three scour valves along its route. Air valves will be placed at high points along the rising main. Air valves serve two primary functions. The first is the regular release of accumulated air that comes out of solution within a pressurised system and the second is to discharge large volumes of air from the pumped rising system when the pipeline is initially filled.

Scour valves are required at the low points on pumped rising main systems to facilitate the drain down of the pumped rising main system during maintenance.

An odour control unit will be installed at the transition point between the rising main and gravity sewer, adjacent to the R122 regional road in the townland of Dubber.

Construction

A construction corridor will be temporarily acquired for the construction of the proposed orbital sewer route. The proposed construction corridor will be a temporary corridor, approximately 40m wide along all land-based elements of the Proposed Project

The construction methodology for the proposed orbital sewer route will be a combination of open cut and trenchless methods. The construction methodology that will be employed for the majority of the proposed orbital sewer route will be conventional open cut methodology. Trenchless methods, such as pipe jacking and micro-tunnelling, will be used at crossings of physical, natural and manmade obstructions, such as significant watercourses, significant topographical features, major roads, railways and major infrastructure.

Further detail of the construction methodology for the proposed orbital sewer route is provided in the Outline CEMP for the Proposed Project.

2.1.3 Proposed North Fringe Diversion Sewer

The proposed North Fringe diversion sewer will be 1,500mm diameter gravity sewer approximately 600m in length.

Construction

The proposed North Fringe diversion sewer will be constructed using trenchless methods.

2.1.4 Proposed Wastewater Treatment Plant and Sludge Hub Centre

As outlined in Section 3.6.3 in Chapter 3 The Need for the Proposed Project in Volume 2 Part A of this EIAR, the wastewater treatment capacity to be provided under the Proposed Project is 500,000 Population Equivalent (PE).

Contractors will be appointed to design, build and operate the proposed WwTP and SHC to achieve the required emission limit values as conditioned by the EPA, within defined design constraints. Therefore, the exact details regarding the design of the Proposed Project and processes to be used are not confirmed at this stage.

Nevertheless, an indicative design has been undertaken to assess the environmental impacts of the Proposed Project. Where different treatment processes are possible, the maximum impact is assessed with respect to the potential impact of the design.

The proposed WwTP will consist of a number of buildings and tanks of various shapes, sizes and heights, part below ground and part above ground. The maximum height of buildings will be 18m above ground level. The design of these structures will largely be dictated by the type of treatment process which will be ultimately proposed, within a design envelope defined by the wastewater discharge licence, planning and the EIAR, and by the successful Design, Build, Operate contractor.

Three preliminary indicative layouts for the proposed WwTP and SHC have been developed for the site based on a conventional ASP plant, a Sequencing Batch Reactor plant and an Aerated Granular Sludge plant, as shown on Planning Drawing Nos. 32102902 – 2120, 32102902 - 2138 and 32102902 - 2139 respectively.

Each of the indicative layouts have been broken into three zones, as illustrated in Figure 4.5 Zonal Arrangement of the Proposed Wastewater Treatment Plant, with the western zone (Zone 1) containing the inlet works, which includes the preliminary unit treatment processes, and the primary sedimentation tanks. The middle zone (Zone 2) contains the biological treatment tanks and final settlement tanks (clarifiers). The sludge treatment facilities are contained in the eastern zone (Zone 3).

Typical wastewater unit treatment processes will include:

- Preliminary Treatment (Zone 1), which is a physical/mechanical process which is designed to remove gross suspended and floating materials from the raw wastewater before they damage/clog the pumps or downstream treatment processes. Preliminary treatment involves screening (coarse and fine screens) to remove papers and plastics as well as fats, oils, grease and grit removal, prior to sedimentation;

- Primary Sedimentation (Zone 1) which is a settling process where the larger solids in the wastewater are settled out by gravity in large tanks (settlement or sedimentation tanks). The settled solids are removed from the tanks by mechanical scrapers and transferred to the sludge treatment facilities;

- Biological Treatment (Zone 2) where organic matter in the wastewater is broken down through the action of bacteria which is facilitated by the addition of air (aeration). Sludge produced during this process is removed from the tanks and transferred to the sludge treatment facilities;

- Final Settlement (Zone 2) where any organic matter carried over from the biological treatment is settled out in large tanks, removed from the tanks by mechanical scrappers and transferred to the sludge treatment facilities; and

- Testing of final treated wastewater (Zone 2) prior to discharge.

The maximum height for any building at the proposed WwTP site will be 18m.

The proposed SHC will have the capacity to provide sustainable treatment for municipal wastewater sludge and domestic septic tank sludges generated in Fingal to produce a ‘biosolid’ end-product. In addition, the proposed SHC will be designed to accept sludge from private property owners within the area of Fingal who are currently served by septic tank or individual domestic wastewater treatment systems.

The sludge treatment capacity to be provided under the Proposed Project is 18,500 tonnes of dry solids (TDS)/annum to provide for a projected 750,000 PE at the design year horizon of 2050. This figure caters for the import of sludge from other municipal WwTPs in Fingal.

The construction of the proposed SHC will include all the necessary buildings, tanks, ancillary structures, and mechanical and electrical plant that will be required to provide the required design treatment capacity.

The wastewater sludges generated at other municipal WwTPs, septic tanks and individual domestic wastewater treatment systems will be transported to the proposed SHC via the road network in tankers and/or covered skips.

In accordance with the *National Wastewater Sludge Management Plan* (Irish Water 2016), it is proposed to treat the sludge using advanced anaerobic digestion to produce a 'biosolid' end-product suitable for reuse in agriculture, with the biogas produced during the treatment process used on-site for energy recovery.

The 'biosolid' end-product will be transported to the proposed RBSF via the road network in covered trucks for seasonal storage.

The proposed SHC will be included as part of the overall Design, Build, Operate contract for the proposed WwTP, whereby the appointed contractor(s) will be appointed to design, build and operate the plant to achieve the required design standards. Therefore, the exact details regarding the design of the proposed SHC element of the Proposed Project and processes to be used are not confirmed at this stage.

Nevertheless, an indicative design has been undertaken in order to assess the environmental impacts of the Proposed Project. Indicative unit processes in the SHC include:

- Buffer tanks;
- Dewatering (centrifuges);
- Thermal hydrolysis (providing pasteurisation) tanks;
- Mesophilic anaerobic digestion tanks;
- Thermal drying;
- Sludge/biosolid storage building; and
- Biogas storage.

Site Infrastructure

The following is a schedule of the main infrastructure elements which will be constructed at the proposed WwTP and SHC:

- Inlet Works including Coarse Screen Building and Fine Screen Building
- Admin/control Building;
- Aeration Blower Building;
- Sludge thickening Building;
- Sludge Dewatering Building;
- Sludge storage and Loading Building;
- CHP Building;

- Primary settlement tanks;
- Biological reactor tanks
- Final settlement tanks;
- Various sludge holding/transfer tanks;
- Anaerobic digestion tanks;
- Biogas storage tanks;
- Access/Egress roads, internal circulation roads, parking areas and hard standing areas;
- Odour control units;
- Surface water infrastructure;
- Foul water infrastructure;
- Potable water supply;
- Site lighting;
- Landscaping features; and
- Security fence.

Construction

Construction of the proposed WwTP will involve excavation for building foundations and tanks, reinforced concrete works, erection of structural steel/concrete building frames, erection/building walls (concrete/blockwork); erection of prefabricated cladding panels to walls and roofs of buildings, erection of prefabricated steel tanks, mechanical and electrical fit out of buildings and tanks, installation of below and above ground pipework, construction of screening berms, construction of access/egress roads to site and internal circulation roads, car parks and footpaths, landscaping and final planting.

Over the estimated three-year construction period these activities will be sequentially scheduled by the contractor to optimise his resources and programme moving various work crews from building to building in a sequential manner. A typical sequence of work is described in the Outline CEMP which accompanies the Planning Application.

Site Security

Site security arrangements to prevent unauthorized access at the pumping station include the following:

Fencing along the north, east and west boundaries of the site, will comprise of 2.6m high palisade fencing at the access and egress points. A plinth wall and system railing will be provided along the southern boundary of the site and will be an attractive, subtle and secure physical boundary.

Anti-intruder alarms will be located in all buildings.

2.1.5 Proposed Outfall Pipeline

The proposed outfall pipeline, with a total length of approximately 11,300m, is comprised of two segments as follows:

A land based section comprising 5,400m of 1,800mm diameter pipeline; will convey treated wastewater from the WwTP to the interception point with the marine section of the outfall pipeline at the R106 (Coast Road); and

A marine section, including the multiport diffuser, comprising 5,900m of 2,000mm diameter pipeline, will convey treated wastewater from the end of the land based section of the outfall pipeline at the R106 (Coast Road) to the final discharge point approximately 1km north-east of Ireland's Eye.

Construction

Outfall Pipeline (land based section)

A proposed construction corridor will be temporarily acquired for the construction of the proposed outfall pipeline (land based section). The proposed construction corridor will be a temporary corridor, approximately 40m wide along all land-based elements of the Proposed Project

The construction methodology for the proposed outfall pipeline (land based section) will be a combination of open cut and trenchless methods. The construction methodology that will be employed for the majority of the proposed outfall pipeline (land based section) will be conventional open cut methodology. Trenchless methods, such as pipe jacking and micro-tunnelling, will be used at crossings of physical, natural and manmade obstructions, such as significant watercourses, significant topographical features, major roads, railways and major infrastructure.

Further detail of the construction methodology for the proposed outfall pipeline (land based section) is provided in the Outline CEMP for the Proposed Project.

Outfall Pipeline (marine section)

The proposed outfall pipeline route (marine section) will be constructed using microtunnelling and subsea pipe laying (dredging) techniques.

Microtunnelling techniques will be used between chainage 0000m and chainage 2,000m, from the open fields immediately west of the R106 (Coast Road) to approximately 600m offshore terminating below the low tide water mark.

The microtunnelled section will have an internal diameter 2,000mm and will be constructed at depths ranging between 15m and 20m below ground level using a microtunnelling machine, with pipe sections installed as the microtunnelling machine progresses.

The microtunnelled section will require two proposed temporary construction compounds onshore, in the open field immediately west of the R106 Coast Road (chainage 0000m) (proposed temporary construction compound no. 9) and in the grassed area (chainage 1,010m) adjacent to the public car park off the Golf Links Road, immediately north of Portmarnock Golf Club (proposed temporary construction compound no. 10). At proposed temporary construction compound no. 9 and no. 10, the drive/reception shafts will be constructed, tunnelling equipment will be located and the tunnel materials will be stored temporarily. Waste material from the tunnel will be removed and disposed of in accordance with waste management legislation. Preliminary analysis estimates that microtunnelling will progress at a rate of approximately 60m per week and that the tunnelling will take in the region of 12 months, which will include for site mobilisation. Microtunnelling will operate on a continuous 24 hour/ 7-day for the duration of the tunnelling works.

On completion of the construction works, proposed temporary construction compound no. 9 and no. 10 will be dismantled and the ground will be reinstated to its original condition.

Subsea pipe laying (dredging) techniques will be used between chainage 2,000m and the final outfall location (chainage 5,940m).

A 5m deep trench of trapezoidal section will be excavated using a combination of backhoe dredger in the shallower areas and trailer suction hopper dredger (TSHD) where the water depths are beyond the limits of the backhoe dredger.

Excavated material will be temporarily stored on the sea bed within the working construction corridor and parallel to the pipeline trench.

Long length large diameter (LLLD) polyethylene pipe will be utilised on this dredged section of the proposed outfall pipeline route (marine section). These pipes will be constructed at the factory in the required diameter in continuously extruded strings up to 650m long. The pipe strings will then be towed to a pipe assembly/ballasting area in close proximity to the proposed outfall location.

At the pipe assembly/ballasting areas the pipe strings will be joined together into long lengths of pipeline and a concrete ballast will be placed over the pipe.

The typical method for connection of pipe strings are flanged connections, however alternatives such as mechanical couplings or welding of sections may also be used.

It is noted that there are a number of alternatives for concrete ballast and the concrete ballast design will be project specific depending on the installation scenario, pipeline parameters and contractor preferences. Options include rectangular, circular or starred ballast blocks or alternatively continuous concrete collars.

The assembled pipeline will then be towed to the proposed outfall location and surface positioned over the dredged trench. The pipeline will then be installed in the dredged trench in a continuous operation involving:

- Surface to seabed transfer utilising the polyethylene pipe's flexible properties (the 'S-bend' installation method); and
- Submersion by water filling / air evacuation.

Once the pipe is confirmed to be in place at the bottom of the trench the previously excavated material will be replaced around and over the pipe.

Further detail of the construction methodology for the proposed outfall pipeline (marine section) is provided in the Outline CEMP for the Proposed Project

2.1.6 Proposed Regional Biosolids Storage Facility

Two Biosolids Storage Buildings will provide the required storage volume requirements. Each building will be approximately 105m long and approximately 50m wide.

At the highest point, the roof level will be approximately 15.2m above ground level and the eaves level of the building will be approximately 12m above ground level. Haulage vehicles bringing biosolids to and from the storage facility will access the buildings from the eastern end and will exit from the western end

The storage capacity of the buildings is related to the quantities of biocake and biofert expected be stored at the facility. Biocake can be stacked between 3m to 4m high and biofert can be stacked approximately 7m high, thus making the storage of biofert more efficient.

The two storage buildings could store over 48,000m^3 of biofert. On the other hand, the storage buildings will have an approximate capacity of 26,200m^3 if all biosolids were in the form of biocake.

A building for general management of operations and welfare facilities for staff working at the facility will be provided near the entrance gate. The building will contain an office, a meeting room, a canteen, toilets and a changing room with shower. A parking area will be provided beside the Administration and Welfare Building and will provide up to 10 parking spaces for staff and visitors.

For further detail of the RBSF design please refer to the RBSF Engineering Design Report which accompanies this document.

3. Access and Internal Roads

3.1 Access Roads at Abbotstown Pumping Station

Permanent access to the Abbotstown pumping station for operation and maintenance will be from the R843 Regional Road and via existing roads through the National Sports Campus grounds. The adequacy of this junction at the R843 and the National Sports Campus road network is considered by a Traffic Impact Assessment, which forms part of the Environmental Impact Statement which accompanies the Planning Application.

Internal circulation within the pumping station compound has been designed using Autotrack software to confirm adequate turning areas.

Internal roads within the pumping station site are typically designed as asphalt pavements, or where appropriate, concrete pavements, with cross falls and longitudinal falls to promote drainage of the surfaces. Drainage of access roads and paved areas is by means of 'french drains' (or infiltration drains) which will collect and attenuate surface water prior to discharge at green-field run off rates to a local water course to the south of the site.

As part of the development it is proposed to provide a car parking area at the site. This car parking area, which will provide 4 no. parking spaces at the site, will be located as shown on Drawing No. 32102902-2145. The parking area has been designed to the same standards as the internal roads, as asphalt pavements, with cross falls and longitudinal falls to promote drainage of the surfaces. Edge restraints shall be provided by an appropriate kerbing system. Detailed design of the pavements shall be undertaken prior to the construction stage of the proposed facilities.

3.2 Access Roads to Orbital Sewer and Outfall Pipeline (land based section)

There are no new permanent access roads required for the orbital sewer.

During construction access to the sites of the pipeline route will be via the public road network and along the construction wayleave, where practicable. The access points and their locations are shown in Drawings 32102902-1110 to 1112. However, in certain circumstances it will not be possible to access the proposed pipeline routes along the proposed construction corridor, and in these circumstances access will be along permanent wayleaves acquired through third party lands. Temporary working areas will be required for construction compounds, such as at trenchless crossings and at satellite construction compounds.

During the operational phase access to the sites of the pipeline routes for maintenance purposes will be via the public road network and along the permanent wayleave corridor and a number of permanent wayleaves to be acquired by Irish Water through third party lands.

3.3 Access/Egress Roads to Wastewater Treatment Plant and Sludge Hub Centre

Construction and operation access for the proposed WwTP and SHC will be from the R139 (formerly the N32) with egress to the Clonshaugh Road. A comprehensive traffic management plan will be put in place for the construction period incorporating a left turn in/left turn out policy. The entry to site would be limited to left

turn only from the R139 and egress from the site would be limited to left-turn out only to the Clonshaugh Road.

The adequacy of the junctions at the R139 and the Clonshaugh Road is considered by a Traffic Impact Assessment, which forms part of the EIAR which accompanies the Planning Application.

The access, egress and internal roads within the proposed WwTP and SHC site are typically designed as asphalt pavements with cross falls and longitudinal falls to promote drainage of the surfaces. Drainage of all roads is discussed in Section 6 of this report.

3.4 Access Roads to Regional Biosolids Storage Facility

Biosolids will be transported to the RBSF from the Ringsend WwTP (and GDD WwTP if permitted) in articulated trucks with tipping trailers. The site is situated off the R135 road, on the western side of the N2 national road. It is approximately 1.6km north of Junction 5 (Finglas) on the M50 motorway. The trailers each have a capacity of approximately 40m3. These haulage vehicles, referred to hereafter as HGVs, are approximately 14 m long and have 6 axles. In transporting biosolids to the RBSF, HGVs will operate throughout the year and the generated traffic volumes will be relatively constant.

For further detail of the RBSF design please refer to the RBSF Engineering Design Report which accompanies this document.

4. Earth Works

4.1 Earthworks at Proposed Abbotstown Pumping Station

The topography of the proposed Abbotstown pumping station site is such that significant earthworks are not required for building up or reducing site levels during the construction of buildings or roadways. However, there will be significant excavation works for the construction of the pumping station sub structure with approximately 9,050m^3 of material to be excavated and disposed of offsite to an appropriately licenced facility.

It is intended that the finished ground levels will largely match the existing ground levels, as far as possible, while taking into consideration, operational constraints and physical constraints for the drainage of surface water from roads and hardstanding areas.

Proposed finished site levels are shown on Drawing Nos. 32102902-2142 to 32102902-2144 of Appendix 4.

4.2 Earthworks along Proposed Orbital Sewer Route

The earthworks associated with the construction of the orbital sewer pipeline route includes the following:

- Topsoil stripping, temporary storage within the construction corridor, and reinstatement;
- Subsoil excavation, temporary storage within the construction corridor, and reinstatement; and
- Excavation of material from pipeline trench, temporary storage within the construction corridor, proposed return to trench with surplus material (c.100,600m^3) disposed of offsite to an appropriately licenced facility.

4.3 Earthworks at Proposed Wastewater Treatment Plant

The earthworks associated with the construction of the WwTP and SHC includes the following:

- Strip topsoil from site and access roads, set aside for reuse in final landscaping.
- Grade site/access roads to finished profile. Excavated material deposited in screening berms.
- Excavation of access roads (and associated pipework) and site circulation. Excavated material deposited in screening berms.
- Excavate foundations for buildings and tanks. Excavated material deposited in screening berms.
- Construction of screening berms.

All excavated material will be re-used on site in construction of the screening berms and landscaping such that quantities of excavated material will balance the fill material required in the screening berms and site landscaping.

4.4 Earthworks along Proposed Outfall Pipe Route

The earthworks associated with the construction of the proposed outfall pipeline route (land based section) includes the following:

- Topsoil stripping, temporary storage within the working corridor, and reinstatement;
- Subsoil excavation, temporary storage within the working corridor, and reinstatement; and
- Excavation of material from pipeline trench, temporary storage within the working corridor, return to trench with surplus material disposed of offsite.

The earthworks associated with the construction of the outfall pipeline route (marine section) includes the following:

- Micro-tunnelling with disposal of excavated material (c.8,500m^3) offsite to an appropriately licenced facility.
- Dredging of pipeline trench in seabed, temporary storage parallel to trench within working corridor, and reinstatement to trench following installation of pipe.

4.5 Earthworks at Proposed Regional Biosolids Storage Facility

Earth moving machinery such as tipper trucks and large excavators will excavate topsoil and high ground. A large proportion of topsoil material can be retained on site for use in landscaping.

A site investigation carried out in 2017 indicates that the ground conditions are relatively stable, and it is expected that this will provide good bearing capacity for construction of the buildings proposed for this project. Foundations for the Storage Buildings will be approximately 1 metre below the finished ground level at the deepest locations. The design of the buildings does not require deep excavations and piling is not expected. At the highest point of the site, the existing ground level is approximately 1.5 metres above the proposed finished ground levels.

The proposed floor levels of the buildings are such that the volumes of excavated and fill material will be generally balanced. Therefore, if the excavated material is suitable it is possible that it could be used on the site as fill material or to form landscaped areas.

For further detail of the RBSF design please refer to the RBSF Engineering Design Report which accompanies this document.

5. Water Supply

5.1 Water Supply to Abbotstown Pumping Station

The proposed Abbotstown pumping station will require a water supply for:

- Use in wash room and WC; and
- For fire fighting purposes.

The daily water demand at the site will be low. However, to provide a fire fighting flow of 20l/s at the pumping station an extension of the existing 150mm diameter water main serving the National Sports Campus will be laid from the vicinity of Abbotstown House to the pumping station site and will have sluice valves as appropriate for isolation. The water usage will be metered in the same way that all of the facilities within the National Sports Campus are currently metered. Fire hydrants will be installed in accordance with the Building Regulations (Technical Guidance Document B) for firefighting purposes.

5.2 Water Supply to Wastewater Treatment Plant and Sludge Hub Centre

Water supply to the proposed WwTP and SHC will be provided by a new metered connection from the existing public supply on the Clonshaugh Road. The new connection will be routed into the proposed WwTP and SHC site along the proposed egress road to the Clonshaugh Road.

5.3 Water Supply to Regional Biosolids Storage Facility

An existing water supply on the site will provide potable water to the Administration and Welfare Building and it will supplement the supply to the Wheel Cleaning Area. The watermain will be extended around the storage buildings to provide a water supply for firefighting purposes. The watermain will be supplied by a fire water holding tank located to the southwest corner of the two storage buildings.

For further detail of the RBSF design please refer to the RBSF Engineering Design Report which accompanies this document.

6. Surface Water

6.1 General

In accordance with the recommendations of the GDSDS, surface water runoff from the Proposed Project will be managed using a number of SuDS features (Sustainable Urban Drainage Systems). SuDS features proposed include rain water harvesting, swales, filter drains, permeable paving, and underground attenuation storage.

The management of surface water runoff using SuDS features aims to provide an effective system to mitigate the adverse effects of urban storm water runoff on the environment by reducing runoff rates, volumes and frequency, reducing pollutant concentrations in storm water, and by contributing to amenity, aesthetics and biodiversity enhancement. In addition, SuDS features aim to replicate the natural characteristics of rainfall runoff by providing control of run-off at source.

SUDS schemes must utilise a volume of storage within each source control feature to allow long-term attenuation of rain water within the feature, for example through the use of porous material. This will enable intercepted water to be delayed from flowing downstream until after storm events have subsided and ensure that it is discharged at an insignificant rate.

Surface water runoff from each of the Proposed Project sites will be attenuated to greenfield runoff or 2 l/s (whichever is highest).

6.2 Design Standards

The following is a summary of the primary design standards and references which will be used to design the new surface water drainage network at the proposed Abbotstown Pumping Station and the proposed Wastewater Treatment Plant:

- 'Greater Dublin Strategic Drainage Study' (GDSDS), Dublin Drainage Consultancy (2005);
- 'Greater Dublin Regional Code of Practice for Drainage Works', Version 6.0;
- 'Part H: Drainage and Waste Water Disposal' Building Regulations 2010;
- 'I.S. EN 752 Drain and Sewer Systems outside buildings';
- The National Roads Authority (NRA) 'Design Manual for Roads and Bridges' (NRA DMRB);
- Recommendations for Site Development Works for Housing Areas, Department of the Environment & Local Government;
- The SuDS Manual 2015 (C753), CIRIA; and
- BRE 365:2016 Soakaway Design, British Research Establishment.

6.3 Surface Water Drainage at Abbotstown Pumping Station

Surface water runoff from the Abbotstown Pumping Station buildings and hardstanding areas on the site will be discharged to a perforated pipe laid in crushed stone which will run around the perimeter of the hardstanding areas of the compounds. The surface water runoff will discharge to a water course at the southern boundary of the site as indicated on Drawing No. 32102902-2145. The crushed stone acts as a filter to allow infiltration into the ground but also provides the required attenuation for the worst case scenario, i.e. assuming that there is no infiltration. Surface water design has been carried out in accordance with requirements of BS 752:Drain and sewer systems outside buildings; the GDSDS (Greater Dublin Strategic Drainage Study) and the "Recommendations for Site Development Works for Housing Areas" – published by the then Department of the Environment (D.O.E.).

Applying the GSDS, in conjunction with site specific rainfall data, an allowable outflow from the site of 2.654 l/s/ha was calculated for the site at Abbotstown. As discussed above, it is proposed to limit outflow from the site through a flow control device installed in a manhole within the site.

Bearing in mind the requirements of the GDSDS and in order to avoid flooding of the sites, a 1 in a 100 yr storm event was deemed appropriate with provision included for a climate change factor of 20%, as per the guidelines in the GDSDS. This determined a storage requirement of 140m3 for the pumping station at Abbotstown. The detailed calculations are contained in **Appendix 1**.

6.4 Surface Water Drainage at Wastewater Treatment Site

Surface water runoff from the WwTP site will be attenuated to greenfield runoff rates through the utilisation of SuDS devices including rainfall harvesting of runoff from buildings, swales and infiltration ditches along internal circulation roads, permeable pavement at car parking/hardstanding areas and underground surface water attenuation tanks with the final controlled discharge to the Cuckoo Stream.

Surface water drainage for the egress road from the WwTP site will consist of swales/infiltration ditches and will discharge into the drainage system of the WwTP site.

Preliminary design calculations have indicated that the allowable greenfield runoff from the site is 3.51 l/s/ha and total volume of attenuation storage required is approximately 2,900m3 for a 1 in a 100 yr storm event with provision included for a climate change factor of 20%.

Surface water drainage for the access road to the proposed WwTP from the R139 will consist of swales/infiltration ditches with final discharge to the Mayne River.

6.5 Surface Water Drainage at Regional Biosolids Storage Facility

Rainfall run-off from building roofs, road surfaces and other impermeable areas within the area of the proposed development will be conveyed in a new drainage system, incorporating a treatment train comprising of sustainable drainage systems (SuDS). The surface water treatment train approach follows guidance from the Greater Dublin Strategic Drainage Study (Appendix A, Glossary, Volume 3, Environmental Management) and SuDS Manual (C753) (CIRIA, 2015). The proposals are summarised as follows:

A rainwater harvesting system, incorporating a storage tank, will collect run off from the roofs of both storage buildings and will be designed in accordance with Section 11.3 of the SuDS Manual.

A maintenance access road between the buildings will be constructed of reinforced grass or a similar permeable pavement.

Dry Swales (a grassed channel with a filter drain directly beneath) will convey other surface run-off, including roads and footpaths, to an underground attenuation area at the northwest corner of Storage Building A. Dry swales are proposed following consultation with DAA (the authority responsible for the operation of Dublin Airport). DAA raised concern regarding the potential for areas of open water to develop and attract birds. The incorporation of a filter drain (referred to as a 'dry swale') will avoid standing water within the swales.

There is an existing underground attenuation area, comprising of plastic storage units surrounded in filter stone, in the northwest corner of the site. It will be expanded to cater for the RBSF element of the Proposed Upgrade Project. There is an existing discharge point from this attenuation area into the adjacent watercourse which will be retained. At the discharge point to the stream a flow control device will be provided to limit discharge flows to acceptable levels (equivalent to the greenfield run-off). An emergency shut-off device will also be provided in order to prevent discharge to the stream in the event of a fuel spillage from a vehicle or wash-out from the storage buildings due to firefighting water.

Swales and detention basins will be lined with a geotextile membrane to mitigate against risk of pollution to groundwater. In addition to the SuDS features, grit traps will be provided in the sumps of road gullies. Furthermore, and oil/fuel separator will be provided prior to the connection to the existing retention area to capture pollutants in run-off on roads and parking areas within the site.

The swales, permeable pavement and detention basin will be constructed in accordance with details provided in the SuDS Manual (C753). Chambers and surface water pipes will be in accordance with the Greater Dublin Region Code of Practice for Drainage Works (Dublin Region Local Authorities).

For further detail of the RBSF design please refer to the RBSF Engineering Design Report which accompanies this document.

6.6 Temporary Surface Water Pollution Prevention & Control During Construction

During construction surface water runoff will be controlled and managed to prevent pollution of watercourses in accordance with the procedures and mitigation measures contained in the Outline Surface Water Management Plan.

6.7 Permanent Surface Water Pollution Prevention & Control Post Construction

The following surface water pollution prevention and control measures will be incorporated post construction at the proposed Abbotstown Pumping Station and the proposed WwTP:

6.7.1 Petrol/Hydro Carbon Contamination Prevention

At the proposed Abbotstown Pumping Station the surface water runoff will pass through a Class 1 By-Pass oil/petrol interceptor before discharging to the nearby watercourse (tributary of the Tolka River).

The surface water runoff from the proposed WwTP site and its egress road will pass through a Class 1 By-Pass oil/petrol interceptor before discharging into the underground attenuation tanks.

The surface water runoff from the access road to the proposed WwTP will pass through a Class 1 By-Pass oil/petrol interceptor before discharging into the Mayne River.

7. Foul Sewage

7.1 Foul Sewage at Proposed Abbotstown Pumping Station

The foul sewage drainage proposals at Abbotstown Pumping Station have to cater for the wastewater from the welfare facilities at the site, including a toilet and wash hand basin, in the proposed Abbotstown pumping station. Foul sewage from this facility will discharge directly to the manhole on the incoming gravity sewer immediately upstream of the pumping station inlet chamber, as shown on Drawing No. 32102902-2146.

7.2 Foul Sewage at Proposed Wastewater Treatment Plant and Sludge Hub Centre

The foul sewage drainage proposals at the proposed WwTP at Clonshagh have to cater for the wastewater from the welfare facilities at the site, including toilets, showers and wash hand basins. Foul sewage from this facility will be routed around the site and discharge directly to the manhole on the incoming gravity sewer immediately upstream of the WwTP inlet works.

7.3 Foul Sewage at Proposed Regional Biosolids Storage Facility

Foul drainage requirements will be accommodated in the existing foul drainage network on the site. Foul drainage pipes currently drain to a pump station in the southern part of the site. This pump station is connected to the public sewer via an existing rising main, which connects to a pump station outside the site on the opposite side of the R135.

Provision of foul drainage is required for the following elements of the proposed development:

- Wastewater from the Administration and Welfare Building from general daily activities, such as showers, toilets and canteen; and
- Wastewater from the Wheel Cleaning Area, as described in the earlier paragraphs in this section.

Surface run-off at the entrance to the storage buildings will be connected to the foul drainage network, rather than the surface water network, due to the potential for biosolids content. Any run-off due to cleaning or other water usage within the buildings will be directed to the same foul drainage system in the same manner.

For further detail of the RBSF design please refer to the RBSF Engineering Design Report which accompanies this document.

8. Utility Connections

8.1 Electricity Supply

Electricity supply to the proposed WwTP and SHC will be provided by a new metered connection from the existing local grid, which runs adjacent to the R139. The new connection will be routed into the WwTP and SHC site along the proposed access road off the R139.

The RBSF site has an existing electricity substation at the northeast corner of the site. It will be rebuilt at the same location to bring it into line with current ESB standards. A new customer electrical room will adjoin the substation. This room is a requirement identified during consultation with ESB. Overall, the footprint of the substation and customer electrical room will be approximately 9.2m long and 4.4m wide. Electrical supply will be brought from the customer electrical room to a mechanical and electrical control building and onward to the mechanical and electrical equipment within the storage buildings. Where feasible existing underground ducting routes on the site will be retained. The Control Building will be located between the storage buildings.

8.2 External Lighting

External lighting at the proposed WwTP, proposed Abbotstown Pumping Station and proposed RBSF will be provided along the internal roads, pedestrian routes and around the buildings, plant rooms and parking areas. This will be subject to review at detailed design stage. Road-side lighting columns will be approximately 6m high. The external lighting design is based on using LED lighting, promoting onsite energy efficient systems. External lighting will be directed downwards. For further detail of the RBSF design please refer to the RBSF Engineering Design Report which accompanies this document.

8.3 Natural Gas Supply

The supply of natural gas to the WwTP and SHC will be provided by a new metered connection from the existing local grid on Clonshaugh Road. The new connection will be routed into the WwTP and SHC site along the proposed egress road from the WwTP to the Clonshaugh Road.

9. Sustainability

Sustainability has been to the fore in the design and planning of the proposed Abbotstown pumping station and WwTP. The following elements have been included in the design of the facilities.

9.1 Sustainable Urban Drainage (SuDs)

The principals of Sustainable Urban Drainage (Suds), as set down by the Greater Dublin Strategic Drainage Study, have been implemented in the design of these facilities and specific reference should be made to Section 5 of this Report. The following specific measures have been incorporated into the design which will reduce the quantity of runoff produced and improve the quality of the runoff:

- Attenuation of storm water run-off (1:100yr event) and discharge at green-field runoff rates [controlled by a flow controlled device].

9.2 Materials Re-use

It is envisaged that materials onsite will be tested and reused where possible. Topsoil will be utilised in reinstating the lands along the pipeline corridor and for landscaping purposes at the proposed Abbotstown pumping station and the proposed WwTP. Suitable excavated material at the proposed WwTP site will be used to form the screening berms.

9.3 Energy Efficient Design

Irish Water is committed to designing, building and operating assets to ensure energy efficiency. The plant, equipment, buildings and systems associated with this project will be designed, equipped, operated and maintained in such a manner to ensure a high level of energy performance and that energy is used efficiently.

This project will be designed following the requirements set out in IS 399 Energy Efficient Design and Management. This standard requires that any design features or methods that may reduce energy consumption are considered and the process of their consideration is clearly documented.

The Energy Performance of Buildings Directive (EPBD) requires Near Zero Energy Buildings (NZEB) by 2020 and significantly increases the amount of onsite renewable energy used in buildings. This requires consideration in the lifecycle assessment and embodied carbon calculation. It will be relevant to all buildings constructed as part of the Proposed Project.

The detailed design will account for this and also follow SEAI guidelines including development of energy balances, determination of the minimum achievable energy performance indicator (EnPi) for the design, energy Benchmarks, energy variables for the design that quantify variables that impact energy performance and preparation of Measurement and Verification (M&V) Plans to detail how the energy performance of the design will be measure and verified as per ISO5 0015.

9.4 Energy Recovery and Reuse

Policy objective PM30 of the Fingal Development Plan 2017 – 2023 states "Encourage the production of energy from renewable sources, such as from Bio-Energy, Solar Energy, Hydro Energy, Wave/Tidal Energy, Geothermal, Wind Energy, Combined Heat and Power (CHP), Heat Energy Distribution such as District Heating/Cooling Systems, and any other renewable energy sources, subject to normal planning considerations and in line with any necessary environmental assessments.".

The Proposed Project proposes to maximise energy recovery from the WwTP and sludge treatment processes. This will be achieved using thermal hydrolysis and anaerobic digestion in the treatment of the sludge and using the bio-gas produced from this process to fuel onsite Combined Heat & Power (CHP) generators to produce electrical and thermal energy. Primary and secondary sludge produced by the WwTP can be mixed with the sludge imported to the Sludge Hub Centre (SHC) prior to undergoing the treatment process. Use of thermal hydrolysis with anaerobic digestion will reduce the dry matter and increase production of biogas.

A well-designed CHP system will produce power at a cost below that of retail electricity, will reduce the overall energy consumption of the plant and reduce emissions of greenhouse gases. Typical CHP systems can have total efficiencies of up to 80%.

10. Construction Quality Assurance

In order to provide assurance that the pumping stations are constructed in accordance with intended design and technical specifications, a comprehensive Construction Quality Assurance (CQA) plan will be implemented during the construction stage. The CQA plan will include Construction Quality Control (CQC) procedures to ensure that materials and workmanship meet defined specifications.

Construction quality control procedures will include the integrity testing of all surface water, foul water, process water pipe work, and underground structures in accordance with industry accepted standards and procedures.