Greater Dublin Drainage Project

Irish Water

Environmental Impact Assessment Report: Volume 3 Part A of 6

Chapter 20 Waste

June 2018

Contents

20. Waste

This Chapter of the Environmental Impact Assessment Report identifies and assesses the potential environmental impacts associated with waste during the Construction Phase and Operational Phase of the proposed Greater Dublin Drainage Project (hereafter referred to as the Proposed Project).

Waste will be generated during the Construction Phase and Operational Phase of the Proposed Project. Waste generated from the Proposed Project will be managed in accordance with the principles of the waste hierarchy as outlined in the current version of the European Communities (Waste Directive) Regulations, i.e. prevention, preparing for reuse, recycling, other recoveries and disposal.

The majority of excess material generated throughout the Construction Phase will be soil, clay and rock as a result of excavation. Where possible, materials will be reused on-site, as follows:

- **Subsoil arisings along the proposed pipeline routes will be reused as reinstatement and backfill;**
- **Topsoil material at the proposed Wastewater Treatment Plant site and Abbotstown pumping station site will be reused for landscaping purposes at these locations; and**
- **Excavated rock will be reused for sub-base, drainage trenches and engineered fill where further testing confirms its suitability. Only unsuitable excavated rock will be sent to landfill.**

There will be approximately 238,700m^3 of surplus material generated out of the total 1,395,900m^3 excavated. Surplus materials will be reused where possible to minimise the quantity of waste sent to landfill. Should the Proposed Project proceed as planned, it will have the potential to impact available capacities of licensed landfills in the Eastern and Midlands Region and on traffic volumes on the surrounding roads. The resulting predicted impacts are as follows:

The Construction Phase impacts are predicted to be moderate, negative and short-term.

The main source of waste arising during the Operational Phase of the proposed Wastewater Treatment Plant will be sludge. A regional Sludge Hub Centre is proposed to be developed at the site, which will receive and process the sludge generated. A 'biosolid' end product, suitable for reuse in agriculture, will be produced, and biogas produced during the treatment process will be used on-site for energy recovery. The 'biosolid' end product will be transported to the proposed Regional Biosolids Storage Facility where it will be stored prior to reuse in agriculture. In some instances, waste products will not be suitable for reuse, and these will be disposed of to waste to energy, or alternatively to landfill. The resulting predicted impacts are as follows:

The Operational Phase impacts are predicted to be not significant, negative and long-term.

Mitigation measures, including the implementation of a Waste Management Plan, economical design and construction methodologies and the reuse of materials as described above, will aid in the reduction of waste produced.

During the Operational Phase, the implementation of the mitigation measures described above will ensure resource efficiency and waste reduction and will also result in a reduction in the volume of traffic generated as a result of the Proposed Project.

The application of these mitigation measures will result in no significant residual impacts on the environment due to waste associated with the Proposed Project.

20.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) looks to identify and assess the potential for environmental impacts as a result of waste associated with both the Construction Phase and Operational Phase of the Greater Dublin Drainage Project (hereafter referred to as the Proposed Project).

This Chapter of the EIAR sets out the methodology used, describes the existing waste environment, examines the predicted impacts of the Proposed Project, proposes mitigation measures and identifies residual impacts. The assessment has been conducted in the context of current relevant standards and guidance, and identifies any requirements or possibilities for mitigation. The residual impacts arising after the application of mitigation measures are also described.

The Proposed Project will form a significant component of a wider strategy to meet future wastewater treatment requirements within the Greater Dublin Area (GDA) as identified in a number of national, regional and local planning policy documents. The plant, equipment, buildings and systems associated with the Proposed Project will be designed, equipped, operated and maintained in such a manner to ensure a high level of energy performance and energy efficiency.

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.

Proposed Project Element	Outline Description of Proposed Project Element
Proposed Wastewater Treatment Plant (WwTP)	• WwTP to be located on a 29.8 hectare (ha) site in the townland of Clonshagh (Clonshaugh) in Fingal. • 500,000 population equivalent 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 per 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 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 at Abbotstown. • Abbotstown pumping station will consist of a single 2-storey building with a ground level floor area of 305m^2 and 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 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 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 North Fringe Sewer (NFS) diversion sewer	• 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 R107 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	• 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.

The total Construction Phase will be approximately 48 months, including a 12 month commissioning period to the final Operational Phase. The Proposed Project will serve the projected wastewater treatment requirements of existing and future drainage catchments in the north and north-west of the Dublin agglomeration, up to the Proposed Project's 2050 design horizon.

20.2 Methodology

20.2.1 Legislation, Policy and Best Practice Guidelines

Waste management takes place in a legislative and policy framework. A review of current legislation, policies and best practice guidelines relevant to the Proposed Project was undertaken to identify the potential impacts and recommended mitigation. Waste policy and legislation is largely regulated by the Environmental Protection Agency (EPA) and the Local Authorities. Below are the most relevant legislation and policies relating to the Proposed Project and waste management.

The most recent regional waste management plan for the GDA was developed by the Eastern Midlands Waste Regional Office (EMWRO) and is the *Eastern-Midlands Region Waste Management Plan* (EMRWMP) *2015-2021* (EMWRO 2015) which was published in 2015. This plan replaced the *Waste Management Plan* (WMP) *for the Dublin Region 2005-2010* (RPS 2005) following the publication in July 2012 of the Government's outline for a circular waste economy, *A Resource Opportunity – Waste Management Policy in Ireland* (Department of the Environment, Community and Local Government 2012). The new regional plan also takes into account Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Waste Framework Directive). The plan sets out a number of policies and objectives, including the following which are relevant to the Proposed Project as shown in Table 20.1 below.

Table 20.1: Policies and Objectives Outlined in the *Eastern-Midlands Region Waste Management Plan 2015-2021* Relating to the Proposed Project

Policy	Objective
Take measures to ensure the best overall outcome by applying the waste hierarchy to the management of waste streams.	The region will implement European Union and national waste and related environmental policy, legislation, guidance and codes of practice to improve waste management of material resources and wastes.
Local Authorities in the region will ensure that the resources required to implement waste prevention activities are available throughout the lifetime of the plan.	Prioritise waste prevention through behavioural change activities to decouple economic growth and resource use.
Establish reuse, repair and preparing for reuse activities and networks to recirculate and extend the lifespan of items.	The region will encourage the transition from a waste management economy to a green circular economy to enhance employment and increase the value of recovery and recirculation of resources.

Fingal County Council's (FCC's) policies and objectives are outlined in the *Fingal Development Plan 2017-2023* (FCC 2017), which looks to secure the development and improvement of the economic, environmental, cultural and social assets of the County in a sustainable manner. This plan sets out a number of objectives to promote a waste prevention and minimisation programme in line with the principles of sustainable development, including those described below which are relevant to the Proposed Project.

Policies

Statement of Policy: Conform to the European Union, national and regional policy in all matters relating to the production, handling, treatment and disposal of waste.

Objectives

- WM05: Prevent and minimise the generation of waste in accordance with the WMP for the Eastern-Midlands Region;

- WM15: Implement the adopted Sludge Management Plan for the County and update the plan as required (Irish Water have developed a *National Wastewater Sludge Management Plan* (NWSMP) (Irish Water 2016) which shall be adhered to); and
- WM18: Ensure that construction and demolition (C&D) WMPs meet the relevant recycling/recovery targets for such waste in accordance with national legislation and regional waste management policy.

The EPA's *Guidelines on the Information to be Contained in Environmental Impact Statement*s (EPA 2002; 2015a) (EPA Guidelines) and the draft *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA 2017a) (draft EPA Guidelines) were produced to improve the quality of EIARs, thereby resulting in better environmental protection.

The *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* was produced in July 2006 by with the Department of the Environment, Heritage and Local Government (2006) and outline the issues that need to be addressed at the pre-planning stage and through to the completion of the Proposed Project.

20.2.2 Establishing the Baseline Environment and the Proposed Project Description

The publications outlined above were reviewed to establish and describe the baseline environment for waste management in the GDA.

Waste materials will be generated during the Construction Phase and Operational Phase of the Proposed Project. Estimates for the volume of materials that will be generated during these stages are presented in this Chapter together with an explanation of how this waste will be dealt with in the context of legislation, policy and best practice.

Estimates for the amount of excavated material generated during the Construction Phase of the Proposed Project are based on the volume of material to be excavated to lay the proposed orbital sewer route and the proposed outfall pipeline route and to construct the proposed Abbotstown pumping station and the proposed WwTP. The majority of construction will occur on greenfield sites. This will result in predominantly inert soil and stone material making up the bulk of the C&D waste generated. There will also be waste generated by staff and biosolids generated by the wastewater treatment during the Operational Phase.

20.2.3 Impact Assessment Criteria

The assessment of the potential impact of the Proposed Project on the waste management environment has been undertaken in accordance with the EPA Guidelines and the draft EPA Guidelines which have been drafted to facilitate compliance with Directive 2014/52/EU of 16 April 2014 on the assessment of the effects of certain public and private projects on the environment (EIA Directive).

Impacts are described in the Guidelines under various headings which are summarised in Table 20.2 below. Further details on the definitions of impacts on the environment can be found in Section 3.7.3 of the draft Guidelines (EPA 2017a).

Table 20.2: Description of Impacts as set out in the Draft Guidelines (EPA 2017a)

Quality of Effects	
It is important to inform the non-specialist reader whether the effect is positive, negative or neutral.	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity, improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative/adverse Effects A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Describing the Significance of Effects	
'Significance' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	**Imperceptible** An effect capable of measurement but without noticeable consequences.
	Not significant An effect which causes noticeable changes in the character of the environment but without significant
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment.
	Very Significant An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects	
Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.	**Extent** Describe the size of the area, the number of sites and the proportion of a population affected by an effect.
	Context Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions. (Is it the biggest, longest effect ever?)
Describing the Probability of Effects	
Descriptions of effects should establish how likely it is that the predicted effects will occur – so that the Competent Authority can take a view of the balance of risk over advantage when making a decision.	**Likely Effects** The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Describing the Duration and Frequency of Effects	
'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	**Momentary Effects** Effects lasting from seconds to minutes
	Brief Effects Effects lasting less than a day
	Temporary Effects Effects lasting less than a year
	Short-term Effects Effects lasting one to seven years
	Medium-term Effects Effects lasting seven to 15 years
	Long-term Effects Effects lasting 15 to 60 years
	Permanent Effects Effects lasting over 60 years
	Reversible Effects Effects that can be undone, for example through remediation or restoration
	Frequency of Effects Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Describing the Types of Effects	
Describing the types of effects	**Cumulative Effects** The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing' Effects The environment as it would be in the future should the subject project not be carried out.
	'Worst case' Effects The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable Effects When the full consequences of a change in the environment cannot be described.
	Irreversible Effects When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual Effects The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic Effects Where the resultant effect is of greater significance than the sum of its constituents.
	Indirect Effects (a.k.a Secondary Effects) Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.

20.2.4 Criteria for Selection of Mitigation Measures

Following assessment of the impacts of the Proposed Project, a methodical review was carried out so that mitigation measures could be conceived that will avoid, prevent or reduce any negative effects on the environment. These are described in further detail in Section 20.6.

The waste produced during the Construction Phase and Operational Phase of the Proposed Project should be processed in a way that follows the waste hierarchy as outlined in the current European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) and shown in Diagram 20.1 below (i.e. the least preferred option being disposal and the most preferred option being prevention).

Diagram 20.1: Waste Hierarchy (Eastern-Midlands Region Waste Management Plan) (EMWRO 2015)

Prevention

The primary objective of the hierarchy is to reduce the quantity of waste being produced.

Preparing for Reuse

Reuse is any operation by which products or components that have become waste are used again for the same purpose for which they were conceived, without the need for reprocessing.

Recycling

Recycling is a process by which waste materials are collected, processed and remanufactured into new products or used as a raw material substitute. 'Recycling' is defined in Section 5 of the Waste Management Acts 1996 to 2015 as follows: '*the subjection of waste to any process or treatment to make it re-usable in whole or part*'. This definition includes the reprocessing of organic material but does not include energy recovery or the reprocessing of materials that are to be used as fuels or for backfilling operations.

Energy Recovery

Any operation of which the principal result is the waste serving a useful purpose by replacing other materials which would have otherwise have been used to fulfil a particular function, e.g. energy recovery, land treatment resulting in benefit to agriculture or ecological improvement, backfilling operations.

Disposal

This is the least favoured option and involves landfilling or sea disposal of the waste. Any waste will have to be disposed of at a suitable licensed facility. This option will only be explored if surplus material cannot be processed higher up in the waste hierarchy.

20.3 Baseline Environment

The Proposed Project will be located in the Local Authority area of FCC. The receiving environment in the FCC area is governed by the requirements set out in the EMRWMP 2015-2021 (EMWRO 2015).

20.3.1 Current Waste Disposal/Recovery Routes

Currently, the majority of C&D waste generated in Ireland is recovered or reused. Where recovery or reuse is not feasible, it is disposed of at suitably licensed facilities.

The Waste Framework Directive requires that a target of 70% recovery by weight of C&D waste generated be met by the year 2020. The latest figures published by the EPA (*Ireland – Progress towards EU waste, recycling, recovery and diversion targets – November 2017* (EPA 2017b)) state that Ireland is on track to meet this target. According to the latest figures, 68% of C&D waste generated in the country has been recovered. The C&D waste can be categorised into two main groups: soil and stone waste.

According to the EMRWMP 2015-2021 (EMWRO 2015), soil and stone waste makes up approximately 66% of the collected C&D waste. Soil and stone waste is typically managed at Local Authority–permitted infill sites. Backfilling activities account for a significant portion of the recovery rate being achieved. The most recent figures available for the soil and stone element of C&D waste arising in Ireland, and that waste's disposal and recovery routes, are shown in Table 20.3. It should be noted that these figures are likely to have increased since then, and will continue to do so in the coming years, due to the renewed growth in the economy.

Table 20.3: Collection and Management of Soil and Stone Element of Construction and Demolition Waste (*National Waste Report 2011* (EPA 2013))

Management	Recovery (t)	Disposal (t)	Total (t)
EPA licensed landfills	225,873	23,400	249,273
EPA licensed waste treatment facilities	135,341	-	135,341
Local Authority–permitted sites	1,032,164	-	1,032,164
Treatment of contaminated soil (Republic of Ireland)	7,094	-	7,094
Treatment of contaminated soil (abroad)	-	10,203	10,203
In storage at end 2011	-	-	11,957
Estimations for non-submission of waste facility permit Annual Environmental Reports	-	-	92,870
Total	**1,400,472**	**33,603**	**1,538,902**

Other Construction and Demolition Waste

Other C&D waste accounts for approximately 34% of collected C&D waste in the Eastern Midlands Region. These C&D wastes are, where appropriate, tested and reused in backfilling operations. Table 20.4 outlines details of the collection and waste management of the Other C&D waste in Ireland in 2011.

Table 20.4: Collection and Management of Construction and Demolition Waste Excluding Soil and Stone (*National Waste Report 2011* (EPA 2013))

Management	Recovery in Republic of Ireland (t)	Recovery abroad (t)	Disposal in Republic of Ireland (t)	Disposal abroad (t)	Total (t)
Metal	4,579	329,771	-	-	334,350
Wood	31,678	-		-	31,678
Glass	-	-	27	-	27
Gypsum-based waste	487	-		-	487
Rubble	158,835	-	17	-	158,852
Mixed or other C&D waste	409,491	-	5,657	19,501	434,649
In storage at end 2011	-	-	-	-	45,968
Total (t)	**605,070**	**329,771**	**5,701**	**19,501**	**1,006,011**

According to the *Construction & Demolition Waste: Soil and Stone Recovery/Disposal Capacity* report (the Report) (EMWRO 2016), there are 12 dedicated soil recovery facilities in the waste licensing system. Eight of the facilities currently hold a valid waste licence and have been authorised by the EPA. Two of the four remaining sites have been authorised since the Report was published. Waste licence applications have also been made for two more soil recovery facilities.

The Report concluded that the capacity available to recover soil and stone wastes is an issue in the region due to the growth in construction activities. There is a lack of licensed capacity nationally and in the GDA to meet current and forecasted growth. Should there be a failure to provide additional capacity to alleviate the present and future shortfall, this will lead to increased costs along the waste supply chain. There is, however, additional licensed capacity expected to be available in the market over the next five years to alleviate the shortfall.

The locations of soil recovery facilities relevant to the Proposed Project are shown in Figure 20.1 Location of Active Landfills in the Study Area. The details of these facilities are presented in Table 20.5.

Table 20.5: Licensed Capacity at Active Soil Recovery Facilities in the Region

Landfill Soil Recovery Facility Name	Waste Licence Reg. No.	Annual Authorised Intake (Tonnes)	Remaining Capacity (Tonnes) at Start of 2016	Expected Closure (Year)	Status 2018
Blackhall Soil Recovery Facility	W0247-01	344,000	2,677,500	2022/2023	Active
Calary Quarry	W0293-01	300,000	3,280,000	Unknown	Application
Clashford Recovery Facilities Limited	W0265-01	180,000	805,200	Unknown	Application
Fassaroe Waste Recovery Facility	W0269-01	550,000	0	Unknown	Active
Huntstown Inert Waste Recovery Facility	W0277-01	750,000	~7,000,000	2033	Active
Kiernan Sand & Gravel Limited	W0262-01	167,400	1,110,550	2024	Active
Kildare Sand & Gravel Limited	W0295-01	225,000	2,250,000	Unknown	Application
Kilsaran Concrete	W0296-01	400,000	5,600,000	Unknown	Application
Milverton Waste Recovery Facility	W0272-01	400,000	1,900,000	2024	Active

Landfill Soil Recovery Facility Name	Waste Licence Reg. No.	Annual Authorised Intake (Tonnes)	Remaining Capacity (Tonnes) at Start of 2016	Expected Closure (Year)	Status 2018
Mullaghcrone Quarry	W0278-01	150,000	1,800,000	Unknown	Active
Murphy Concrete Manufacturing Limited	W0151-01	738,000	1,500,000	2017/2018	Active
Integrated Materials Solutions Limited	W0129-02	500,000	~8,000,000	2028	Active
N&C Enterprises Limited	W0292-01	345,000	2,127,472	Unknown	Active
Walshestown Restoration Limited	W0254-01	330,000	~3,600,000	2026/2027	Active
Total (t)		5,379,400	41,650,722		

There are a number of non-hazardous municipal landfill sites in the region which have an ongoing requirement for soil and stone material for daily cover, capping and other remediation activities at the sites. These facilities relevant to the Proposed Project are shown in Figure 20.1 Location of Active Landfills in the Study Area. The details of these facilities are presented in Table 20.6.

Table 20.6: Licensed Capacity at Active Landfills for Inert Construction and Demolition Waste

Landfill Facility Name	Industrial Emissions Licence Reg. No.	Licensed Limitation for Acceptance of Construction and Demolition Waste at Active Sites (Tonnes Per Annum) at Start of 2016	Status 2018
Drehid Waste Management Facility	W0201-03	120,000	Active
Knockharley Residual Landfill	W0146-02	200,000	Active
Ballynagran Residual Landfill	W0165-02	175,000	Active
Total		**495,000**	

There is also a number of materials recover facilities/waste transfer stations in operation in the region which are suitable for the acceptance of C&D wastes should they be required. The locations of the facilities relevant to the Proposed Project are shown in Figure 20.1 Location of Active Landfills in the Study Area. The details of these facilities are presented in Table 20.7.

Table 20.7: Licensed Capacity at Active Materials Recovery Facility/Waste Transfer Stations

Waste Transfer Station Name	Industrial Emissions Licence Reg. No.	Licensed Limitation for Acceptance of Construction and Demolition Waste at Active Sites (Tonnes Per Annum) at Start of 2016	Status 2018
Starrus Eco Holdings Limited (now Greenstar) – Bray Depot	W0053-03	54,040	Active
Nurendale Ltd., trading as Panda Waste – Rathdrinagh	W0140-04	120,000	Active
Greyhound Recycling and Recovery – Clondalkin	W0205-01	3,000	Active
Thorntons Recycling Centre – Dunboyne	W0206-01	28,020	Active
Nurendale Ltd., trading as Panda Waste – Finglas	W0261-02	40,000	Active
Dean Waste Company Ltd. – Upper Sherriff Street	W0042-01	105,000	Active
Labre Park Civic Amenity Site – Ballyfermot	W0221-01	6,000	Active
Total		**356,060**	

20.4 Impact of the Proposed Project – Construction Phase

20.4.1 Sources and Types of Waste

The Proposed Project consists of the proposed orbital sewer route, Abbotstown pumping station, WwTP and outfall pipeline route (land based section and marine section).

The majority of waste arising during the Construction Phase will comprise soil and stone materials. Preliminary site investigations indicate that the material to be excavated is clean inert material (waste that does not undergo any significant physical, chemical or biological transformations) which may be suitable for off-site reuse. This waste will be managed carefully in line with legislation and current best practice, and recovery/reuse options will be prioritised.

The main waste streams that could be generated by C&D activities are shown in Table 20.8 along with their associated EPA waste codes (EPA 2015b).

Table 20.8: Construction and Demolition Wastes and Environmental Protection Agency (2015b) Codes

Environmental Protection Agency Code	Waste Material
17 01	Concrete, bricks, tiles and ceramics
17 02	Wood, glass and plastic
17 03	Bituminous mixtures, coal tar and tarred products
17 04	Metals (including their alloys)
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil
17 06	Insulation materials and asbestos-containing construction materials
17 07	Gypsum-based construction material
17 08	Other C&D wastes

Efforts will be made to reuse and recycle as much of the generated excess material as practicable during construction. Any topsoil excavated shall be reused as part of the reinstatement works. Authorised sites where surplus material can be reused will be sought. Any remaining excess material will be removed from site by a licensed waste collection permit holder and transferred to relevant authorised facilities for recovery or disposal.

The following sections detail the impacts that each of the Proposed Project elements will have on the existing environment.

20.4.2 General Construction Waste

General wastes generated during the Construction Phase of the Proposed Project will include concrete, packaging, bituminous materials (bituminous macadam and asphalt) and hazardous liquids (e.g. oils, paints, adhesives, cleaning agents). It is difficult to predict quantities of general construction wastes arising as exact materials and quantities are due to the nature of the works associated with the waste product. The estimated quantities of these wastes will be provided in the detailed WMP following detailed design and the appointment of the appointed contractor(s).

Concrete

Concrete waste arising during the Construction Phase will be sent back to the supplier for reuse where possible. If this is not possible, the waste concrete will be crushed and screened on-site for use as aggregate and sub-base where suitable. Should any excess concrete waste arise that cannot be sent back to the supplier or reused on-site, this concrete waste will be removed from site by a licensed waste collection permit holder and transferred to relevant authorised facilities for recovery or disposal.

Packaging

Packaging waste will be generated on-site during construction. The packaging will be separated and segregated and placed in separate containers which will be covered. The wastes will then be transported to suitably licensed packaging recycling facilities.

Many suppliers provide a facility where they remove and recycle their own waste packaging, and this will be checked prior to construction works.

Hazardous Liquids (e.g. oils, paints, adhesives, cleaning agents)

Hazardous liquids will require careful handling and storage throughout the Proposed Project. These liquids will be stored in covered, carefully labelled, suitable containers and kept in a separate storage area. There are a small number of facilities and private contractors in the region should disposal of these materials be required.

Proposed Pipeline Routes

The majority of waste associated with the Proposed Project will arise due to excavation materials (soil and stone) along the proposed pipeline routes. The proposed pipeline routes are divided into a number of sections as outlined in Table 20.9.

Table 20.9: Surplus Materials from the Construction of the Proposed Pipeline Routes

Section	Distance	Approximate Total Excavated Volume	Expected Recycled Volume	Expected Surplus Material
Proposed orbital sewer route	13.7km	251,500m^3	150,900m^3	100,600m^3
Proposed outfall pipeline route (land based section)	5.4km	123,000m^3	73,800m^3	49,200m^3
Proposed outfall pipeline route (marine section)	5.9km	17,000m^3	8,500m^3	8,500m^3
Proposed NFS diversion sewer	0.6km	11,250m^3	6,750m^3	4,500m^3
Total	**25.6km**	**402,750m^3**	**239,950m^3**	**162,800m^3**

The proposed orbital sewer route and outfall pipeline route (land based section) construction methodology combines open cut and trenchless methods. Along the majority of the proposed orbital sewer route and outfall pipeline route (land based section), the methodology employed will be conventional open cut, whereby the wayleave for the pipe is stripped of topsoil, a trench of suitable dimension is excavated and the pipe is installed, on suitable bedding material, to the lines and levels determined by design, and the trench is backfilled.

The topsoil will be stockpiled and stored on-site to be reused again for the same purpose. Any subsoil arising from the excavation will similarly be stored on-site to be reused as backfill. The appointed contractor(s) will be required to deal with surplus material in a manner that follows the waste hierarchy as described in Section 20.2.4.

There will be certain sections of the proposed orbital sewer route and outfall pipeline route (land based section) where trenchless methods will be employed (refer to Planning Drawing Nos. 32102902-2100 to 32102902-2108). The proposed NFS diversion sewer will also be constructed using trenchless techniques. The proposed trenchless works will generate materials that will be predominantly made up of rock cuttings, stone, sands and gravels, with lesser quantities of silts and other residue materials. There will be approximately 14,000m^3 of excavated material arising from the major trenchless crossings.

The materials arising from the trenchless operations will be pumped from the cutting head of the Tunnel Bore Machine to the launch shaft where they will pass through a separation plant. A drilling fluid consisting of a suspension of bentonite in water will be used as an aid to pump the materials from the Tunnel Boring Machine. An amount of spent bentonite will be produced at the end of the tunnelling process. If an alternative use for this material is not identified, it will be disposed of in an appropriately licensed landfill facility.

The proposed outfall pipeline route (marine section) construction methodology is a combination of microtunnelling and subsea pipe laying techniques. The proposed outfall pipeline route (marine section) is approximately 5.9km in total. It will be tunnelled from the western side of the Baldoyle Estuary to a point beyond Baldoyle Bay approximately 600m offshore. The remainder of the proposed outfall pipeline route (marine section) will then be constructed using subsea pipe laying techniques.

The tunnel section will require two proposed temporary construction compounds onshore (refer to Planning Drawing No. 32102902-2011): one west of Baldoyle Bay (proposed temporary construction compound no. 9) in the fields between the Dublin to Belfast railway line and the R106 Coast Road and one east of Baldoyle Bay (proposed temporary construction compound no. 10) at the car park/public open space just north of Portmarnock Golf Club on Golf Links Road. Construction of the tunnel shafts and the tunnelling operation will generate approximately 17,000m^3 of waste material. This material will be stored on-site and recovered where possible as backfill for the tunnel shafts and reinstatement. The appointed contractor(s) will be required to deal with surplus material in a manner that follows the waste hierarchy as described in Section 20.2.4.

The construction of the subsea section of the proposed outfall pipeline route (marine section) will require the excavation, by means of dredging, of approximately 689,000m^3 of material. This material will be temporarily stored on the seabed parallel to the trench within the 250m working corridor. The pipe will then be floated into place and sunk into the trench, with the previously excavated material replaced around and over the pipe. Consequently, no waste will result from the laying of the subsea pipeline. Refer to Chapter 8 Marine Water Quality in Volume 3 Part A of this EIAR for further detail on the impact on the receiving waters during excavation, storage and replacement.

A second option was considered which involved tunnelling the entire length of the proposed outfall pipeline route (marine section). This method would have resulted in the generation of a considerable amount of surplus waste materials (approximately 18,000m^3) along the entire length. As such, using subsea pipe laying techniques for the final section of the proposed outfall pipeline route (marine section) was selected to mitigate impacts.

Proposed Abbotstown Pumping Station

The Proposed Project involves the construction of the proposed Abbotstown pumping station. The proposed Abbotstown pumping station is designed as a wet well/dry well arrangement and will involve the construction of a below ground structure. Approximately 9,000m^3 of excess material will arise due to the construction of the proposed Abbotstown pumping station. The breakdown of materials generated are outlined in Table 20.10.

Table 20.10: Surplus Material from Construction of the Proposed Abbotstown Pumping Station

Description	Description of Materials	Expected Surplus Material
Abbotstown	Soil and stone, possibly bedrock	9,050m^3
	Total	**9,050m^3**

The majority of waste arising from the construction of the proposed Abbotstown pumping station will be rock. Any suitable material will be temporarily stockpiled for reuse in backfill and reinstatement operations, where possible. All topsoil will be reused for landscaping purposes. The appointed contractor(s) will be required to process any surplus materials in a manner that follows the waste hierarchy as described in Section 20.2.4 (Criteria for Selection of Mitigation Measures).

Proposed Wastewater Treatment Plant

The majority of waste generated by the construction of the proposed WwTP will be topsoil, subsoil and stone waste as a result of levelling and excavation for the construction of buildings, tanks and pipework.

Approximately 271,000m^3 of material will be excavated during the construction of the proposed WwTP. Of this quantity, 222,400m^3 will be reused in the construction of the landscaping berm around the proposed WwTP. Therefore, there will be approximately 48,600m^3 excess material arising from the construction of the proposed WwTP, as shown in Table 20.11 below.

Table 20.11: Surplus Materials from Construction of the Proposed Wastewater Treatment Plant

Description	Expected Excavation Volume	Volume Required for Berm	Expected Surplus Material
Proposed WwTP	270,950m^3	222,400m^3	48,550m^3
		Total	**48,550m^3**

Any suitable material will be reused as backfill and for reinstatement at the site. Topsoil will be reused for landscaping purposes at the site. Excess material will be processed in a manner that follows the waste hierarchy

as described in Section 20.2.4. The preference will be to reuse the material where possible, with disposal being the least preferred option.

20.4.3 Summary of Construction Phase Impacts

The majority of excess material generated throughout the Proposed Project will be soil, clay and rock as a result of excavation. Where possible, materials will be reused on-site. Of the materials generated:

- Subsoil arisings along the pipeline will be reused as reinstatement and backfill, where possible;
- Topsoil material at the proposed WwTP site and at the proposed Abbotstown pumping station site will be reused for landscaping purposes at these locations; and
- Excavated rock will, where further testing confirms its suitability, be reused for sub-base, drainage trenches and engineered fill.

It is estimated that there will be approximately 220,400m^3 of surplus material generated, a breakdown of which is shown in Table 20.12 below.

Surplus material arising will be excess excavated material where the pipe, bedding and surround are placed. It will be dealt with in accordance with the waste hierarchy and the relevant legislation. Currently, 97% of equivalent material is recovered in Ireland, and it will be a condition of the contract(s) awarded that waste recovery or reuse will be required, wherever possible.

The transportation of waste materials from the various working areas to the receiving facilities will impact on the traffic in the surrounding area. The potential impacts on traffic and the mitigation measures considered are outlined in more detail in Chapter 13 Traffic and Transport in Volume 3 Part A of this EIAR, which assumes the worst case scenario, in which the waste hierarchy is not observed and all surplus material is transported to waste disposal facilities.

Table 20.12: Total Surplus Material Generated

Proposed Project Element	Expected Surplus Material
Proposed orbital sewer route	100,600m^3
Proposed Abbotstown pumping station	9,050m^3
Proposed WwTP	48,550m^3
Proposed outfall pipeline route (land based section)	49,200m^3
Proposed outfall pipeline route (marine section)	8,500m^3
Proposed NFS diversion sewer	4,500m^3
Total	**220,400m^3**

Following analysis of the current waste environment, it has been determined that there is sufficient capacity available for the recovery and disposal of the C&D waste that will be generated as a result of the Proposed Project. The total surplus volume of waste generated of approximately 220,400m^3 is equivalent to approximately 474,400 tonnes. Should the worst case scenario occur, and all inert surplus materials were sent to waste disposal facilities, there is sufficient capacity available at soil recovery facilities in the area as shown in Table 20.5. There is also capacity available at landfill facilities and at waste transfer stations in the area as highlighted in Table 20.6 and Table 20.7. Drehid Waste Management Facility also has no limit on the acceptance of inert waste materials for use in landfill engineering. These facilities will be more than sufficient to accommodate the excess material. There is also the possibility of contacting nearby sites requiring fill/capping material to investigate reuse

opportunities for the surplus materials in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011), subject to EPA approval.

A breakdown of excavated materials and surplus materials arising from the Proposed Project is given in **Table 20.13** below.

Table 20.13: Expected Construction Materials Balance

	Proposed Orbital Sewer Route (Blanch. to Proposed Wastewater Treatment Plant)	Proposed Abbotstown Pumping Station	Proposed Wastewater Treatment Plant	Proposed Outfall Pipeline Route (Land Based Section)	Proposed Outfall Pipeline Route (Marine Section) – Tunnel	Proposed Outfall Pipeline Route (Marine Section) – Subsea	Proposed North Fringe Sewer Diversion Sewer	Total
Quantity of excavated material (m^3)	251,500	9,050	270,950	123,000	17,000	688,625	11,250	1,371,375
Quantity of surplus excavated material (m^3)	100,600	9,050	48,550	49,200	8,500	-	4,500	220,400
Quantity of topsoil stripped for reuse – 0.3m over 40m construction width (m^3)	181,810	1,180	88,100	64,550	-	-	7,200	342,840

20.4.4 Predicted Impacts

'Do Nothing' Scenario

Should the construction of the Proposed Project not occur, there will be no changes to the resource and waste management at the lands of the Proposed Project.

'Do Something' Scenario

Should the Proposed Project proceed as planned, it will have the potential to impact upon the available waste management capacities of the licensed landfills in the Eastern-Midlands Region There will also be an increase in traffic on the surrounding roads due to the number of Heavy Goods Vehicles required during the Construction Phase.

Using the Description of Impacts assessment in the EPA's draft Guidelines (EPA 2017a) and Table 20.2, the resulting predicted impact of the Proposed Project is predicted to be Moderate, Negative and Short-term.

The planned implementation of the mitigation measures as outlined in Section 20.6 will ensure that there will be a high rate of reuse, recovery and recycling achieved throughout the Proposed Project during the Construction Phase. It will also ensure that European, national and regional legislative waste requirements are met.

Worst Case Scenario

The worst case scenario would be if no recycling or reuse of waste takes place on-site. This would mean that 100% of the generated waste is sent for disposal.

While this is unlikely and against national, regional and local legislation and policies, and would also be an uneconomical scenario due to the high costs associated with disposal, it is noted that the anticipated volume of materials generated by the Proposed Project is significantly less than the available licensed landfill capacity in the Eastern-Midlands Region.

20.5 Impact of the Proposed Project – Operational Phase

20.5.1 Sources of Waste

Wastes arising during the Operational Phase will be as a result of the operation and maintenance activities carried out. The sources will include:

- Staff/office activities;
- Inlet Works – screenings and grit;
- Waste products from maintenance activities, e.g. lubricating oils; and
- Wastewater treatment sludge.

Any waste materials will be processed in a manner that follows the waste hierarchy as described in Section 20.2.4.

It is envisaged that the main source of waste arising as a result of the operation of the proposed WwTP will be sludges created as a result of wastewater treatment.

Currently, wastewater treatment sludges generated at WwTPs operated by Irish Water are dewatered and sent to a third party contractor for handling, treatment and beneficial reuse in agriculture. With the construction of the proposed WwTP, a SHC will be developed by Irish Water which will receive and process sludge from the proposed WwTP and a number of existing WwTPs in the region. A total of 118,700 wet tonnes per annum of sludge will require treatment at the proposed WwTP (54,800 wet tonnes of which are imported). Following treatment, 39,570 wet tonnes will be exported per annum.

As outlined in Irish Water's NWSMP (Irish Water 2016), advanced anaerobic digestion is recommended to maximise energy recovery. The design of the site will also allow for the provision of thermal drying. As the whole life cost of thermal drying is high at present, it may not be justified. However, the availability of land use outlets may decrease before or during the construction of the proposed WwTP, so it is considered sensible to provide for the potential of thermal drying. The need for the thermal drying option shall be reviewed as the Proposed Project progresses. Irish Water has proposed a feasibility study to further develop alternative sludge reuse or disposal options.

Irish Water's NWSMP (Irish Water 2016) highlights that 98% of wastewater sludge is currently reused in agriculture. The sludges generated as a result of the operation of the proposed WwTP will be processed 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 Regional Biosolids Storage Facility via the road network in covered trucks. Here, it will be stored pending delivery to lands for agricultural reuse.

20.5.2 Predicted Impacts

'Do Nothing' Scenario

Should the operation of the Proposed Project not occur, there will be no waste produced and, as such, there will be no impact.

'Do Something' Scenario

Should the Proposed Project proceed as planned, it will have the potential to impact upon the following:

- The available sludge waste management capacities of the licensed landfills in the Eastern-Midlands Region for disposal of screenings and other waste products;
- There will also be an increase in traffic on the surrounding roads due to the number of Heavy Goods Vehicles required to transport sludge and screenings to the proposed Regional Biosolids Storage Facility and landfill, respectively; and
- All of the waste produced will be recycled and reused in agriculture – subject to compliance with applicable laws.

Using the Description of Impacts as set out in the EPA's draft Guidelines (EPA 2017a) in Table 20.2, the resulting predicted impact of the Proposed Project is predicted to be not significant, negative and long-term.

The implementation of the mitigation measures as outlined in Section 20.6 will ensure that there will be a high rate of reuse, recovery and recycling achieved throughout the Proposed Project during the Operational Phase. It will also ensure that European, national and regional legislative waste requirements are met.

Worst Case Scenario

The worst case scenario would be if no recycling or reuse of waste takes place on-site. This would mean that 100% of the generated waste is disposed of (sent to landfill and/or incineration).

While this is against national, regional and local legislation and policies, and would also be an uneconomical scenario due to the high costs associated with landfill disposal, it is noted that the anticipated volume of material generated by the Proposed Project is significantly less than the available licensed landfill capacity in the Eastern-Midlands Region, such that it is reasonable to regard the predicted impact as Not Significant.

20.6 Mitigation Measures

Mitigation measures are set out below which minimise the effect of the Proposed Project on the environment, reduce the amount of waste sent for disposal and promote sustainable waste management practices. Any waste generated from the Proposed Project will be managed in accordance with the principles of the waste hierarchy as outlined in the current version of the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011), i.e. prevention, preparing for reuse, recycling, other recoveries and disposal. The preferable outcome from an environmental, transportation and resource efficiency perspective is to maximise the reuse of material generated from the Proposed Project.

Throughout the design of the Proposed Project, care was taken to minimise the waste arising from the Proposed Project. This included comparing construction methodologies employed for different elements throughout the Proposed Project. These measures are also included within this Section.

20.6.1 Construction Phase Mitigation Measures

Waste Management Plan

An Outline Construction Environmental Management Plan (CEMP) has been prepared for the proposed works. The Outline CEMP identifies construction methodologies that will be used for the Proposed Project. These have been selected to mitigate negative environmental impacts of the Proposed Project.

Mitigation measures and guidance on the potential for reuse of materials on-site are provided in this Chapter. However, the Contract Documents shall include provisions which set out how waste is to be controlled and managed during the course of the Proposed Project.

The appointed contractor(s) will be required to prepare a WMP for the Proposed Project as part of their contractual responsibilities. At the Construction Phase, a C&D waste manager shall be appointed to implement the WMP and to educate all colleagues and site staff about alternatives to conventional construction waste disposal.

The WMP shall adopt the measures indicated in the Contract Document and set out to minimise waste, manage materials on-site effectively, prioritise reuse and recycling on-site and make sub-contractors responsible for procurement of materials. It will comply with all relevant aspects of this EIAR and shall also take cognisance of the final CEMP and all current local and national waste management legislative obligations.

Where waste generation cannot be avoided, implementation of the WMP will maximise the quantity and quality of waste delivered for recycling and reuse and allow it to move up in the waste hierarchy away from the option of landfill disposal, reducing its environmental impact.

Potential for reuse of appropriate excavation material as fill on-site around the proposed pipeline routes or in landscaping works will be considered, subject to appropriate testing to ensure the material is suitable for its proposed end use. Where excavated material is not suitable for reuse, the appointed contractor(s) will aim to send material for recovery or recycling as far as reasonably practicable.

Training and copies of the WMP will be made available to all relevant personnel on-site. All site personnel will be instructed about the objectives of the WMP and informed of the responsibilities which fall upon them as a consequence of its provisions.

Mitigation along the Proposed Orbital Sewer Route and Outfall Pipeline Route (Land Based Section)

The majority of suitable excavated material will be used for backfill along the proposed outfall pipeline route (land based section). This means a reduction of the amount of waste produced as a result of excavation as only the bedding and surround material will have to be imported, as shown in Diagram 20.3. If required, the backfill material will go through standard screening and/or grading processes to ensure the end material is of suitable quality. Topsoil shall be reused as part of the reinstatement works. Construction best practices in relation to the stockpile management and materials storage shall be in accordance with the relevant CIRIA guidance.

The majority of the proposed orbital sewer route will be constructed by conventional open cut methods. Trench boxes, as shown in Diagram 20.2, will be used for deep excavations to avoid the necessity for battering or sloping of the sides of the trench.

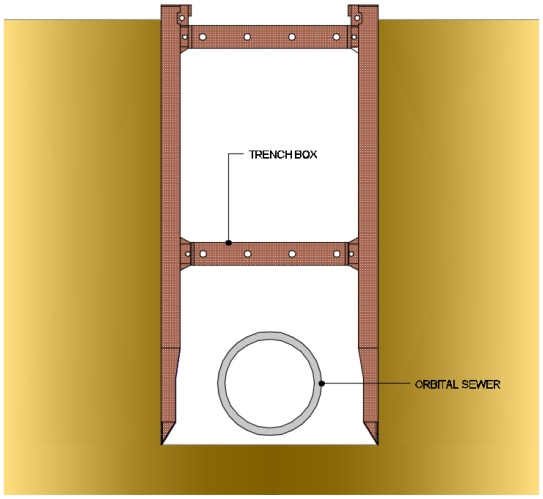

Diagram 20.2: Trench Box Installed and Pipe Laid

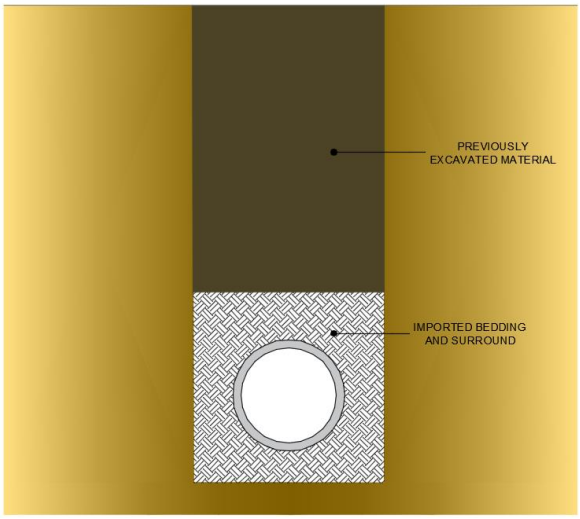

Diagram 20.3: Bedding and Surround Imported and Trench Backfilled

Sections of the proposed orbital sewer route which would otherwise result in a significant generation of waste will be constructed using trenchless methods. These sections include physical, natural and manmade obstructions. The crossings of main concern that occur along the proposed orbital sewer route are the road and rail crossings as described in the *Engineering Specialist Report for Crossings* (Jacobs Tobin 2017). The proposed methodology for the trenchless crossings is a microtunnelling pipe jacking technique.

The methodologies considered above are described in more detail in the Outline CEMP.

Mitigation at the Proposed Abbotstown Pumping Station

The preliminary design of the proposed 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.

Construction of the Abbotstown pumping station will be undertaken using conventional construction methodologies and will involve deep excavation for basement wet well/dry well, reinforced concrete works, erection of reinforced concrete building frame, erection/building walls (concrete/blockwork); erection of prefabricated cladding panels to walls and roofs of building, mechanical and electrical fit out of building, construction of access road car park and footpaths, landscaping and final planting.

Preliminary site investigation indicates rock at approximately 2.5m below ground level. The rock shall be excavated to the required invert level. Overburden above the rock will most likely be retained using a temporary concrete retaining wall. All excavated material will be removed off site to an appropriately licenced facility.

It is recommended that the above methodology be employed during the Construction Phase in order to reduce the amount of material that is produced, thus mitigating the impact on the environment. The methodologies considered above are described in more detail in the Outline CEMP.

The majority of waste arising from the construction of the proposed Abbotstown pumping station will be primarily rock. The preferred approach for the management of the excess materials will be to reuse them as fill material in third party development projects including existing quarries. The reuse of material off-site as fill in third party construction projects represents a good use of the resource and reduces the quantity of virgin material required for construction. Any material that is sent for reuse off-site will be tested to confirm its suitability for its intended end use. The suitability of the material will be validated by the Project Engineer from the destination site prior to the transportation of the material to the destination site. These controls will ensure that the material will be treated and handled as a resource and not a waste material. In the event that a suitable off-site third party development cannot be sourced, the material will be sent for disposal at a licensed facility as outlined below in the 'Disposal' Section.

Mitigation at the Proposed Wastewater Treatment Plant

The excavated material will be reused on-site in construction of the screening berms and landscaping. This will ensure that there will be a reduction in excess material that will have to be removed from site.

Mitigation along the Proposed Outfall Pipeline Route (Marine Section)

The proposed outfall pipeline route (marine section) is divided into two main sections. The first section will involve a tunnel from the western side of the Baldoyle Estuary to a point offshore of Velvet Strand. From this point, the tunnel will connect to a pipeline that will be laid by subsea pipe laying methods to a point approximately 1km north-east of Ireland's Eye. Subsea pipe laying methods generate a significantly lower volume of excess material when compared to the option of tunnelling the full length of the proposed outfall pipeline route (marine section). This is due to the fact that there will be no waste material arising during the construction of the subsea pipeline section of the proposed outfall pipeline route (marine section). This construction methodology reduces the amount of excess material generated and, subsequently, the volume of traffic generated during the Construction Phase of the Proposed Project. The methodologies considered above are described in more detail in the Outline CEMP.

The tunnel spoil will be inert and could be suitable for use as an infill material or possibly an aggregate after suitable treatment (e.g. crushing, screening and washing), subject to any regulatory approval required.

The material excavated during the subsea pipe laying method will be temporarily stored on the seabed along the length of the trench or in an adjacent temporary storage area. There will be monitoring of suspended solid plumes during dredging operations. Dredging works in the shallow areas will be carried out using backhoe dredging with the spoil side cast at the seabed to minimise the lifting of the bucket through the water column. This will reduce the loss of suspended sediments from the excavated material and preserve the sediment composition as much as

possible at bed level. Dredging carried out close to the Ireland's Eye Special Area of Conservation will be carried out on neap tides where possible. Monitoring of turbidity will be carried out during peak dredging activity and operations. Proposed temporary construction compounds no. 9 and no. 10, which will span either side of the Baldoyle Estuary, will be subject to surface water management to prevent runoff into the watercourses and the Estuary (refer to Surface Water Management Plan which is appended to the Outline CEMP). The pipe will then be floated into place and sunk into the trench, with the previously stored material replaced around and over the pipe.

Disposal

For material that cannot be reused, the disposal options will depend on whether the spoil is regarded as hazardous, non-hazardous or inert. Non-hazardous and hazardous wastes are required to be disposed of at appropriately licensed landfills or other appropriately licensed facilities. Similarly, inert wastes must be reused, recycled or disposed of at appropriately licensed facilities. All material arising from the Proposed Project will be managed sustainably and in accordance with best practice as set out in the EMRWMP 2015-2021 (EMWRO 2015). It is not envisaged that hazardous waste will be encountered, but any hazardous materials would be treated in accordance with the *National Hazardous Waste Management Plan 2014-2020* (EPA 2014).

If the options to reuse the material either on or off-site cannot be achieved, the excess material will be sent for recovery at a facility with a waste authorisation in place. Disposal of the excess material generated will only be considered when all other options to reuse or recover the material have been exhausted. Any material that is transported off-site for recovery will be done so by a haulier holding a valid waste collection permit. The traffic impact assessment carried out in Chapter 13 Traffic and Transport in Volume 3 Part A assumes the disposal of all material.

20.6.2 Operational Phase Mitigation Measures

Reuse/Recovery

The majority of waste associated with the proposed WwTP will be produced as sludge during the Operational Phase as a result of the wastewater treatment process.

It is recommended that advanced anaerobic digestion be utilised in the sludge treatment process to recover energy from the sludge and reduce the volume of sludge, following which the material can be dewatered and treated to produce a 'biosolid' end product suitable for reuse in agriculture. The biogas produced during the treatment process will be used on-site for energy recovery.

Irish Water's NWSMP (Irish Water 2016) allows for the future provision of thermal drying at the proposed WwTP. Should this materialise in the future, the sludge should be thermally dried on-site to produce a by-product with a high solids content which will allow the greatest flexibility in terms of the number of markets for reuse.

Disposal

On the basis that it cannot be reused or recycled, excess material shall be disposed of in accordance with Section 20.6.1. Screening material and grit shall be disposed of at appropriately licensed facilities.

20.7 Residual Impacts

The mitigation measures that have been established for the Proposed Project will result in a reduction in the waste that will be generated, thereby reducing the residual impacts resulting from the Proposed Project.

The implementation of a WMP will result in higher levels of reuse and recycling throughout the Proposed Project to assist with national and European targets. Economical design and construction methodologies employed as

described in Section 20.6.1 will result in further waste reduction. The reuse of materials in operations such as backfilling and reinstatement will aid in the reduction of waste produced and therefore reduce the impact on waste disposal outlets and facilities such as landfills.

During the Operational Phase, the implementation of the mitigation measures will ensure resource efficiency and waste reduction. The implementation of these mitigation measures will also result in a reduction in the volume of traffic generated as a result of the Proposed Project.

The application of these mitigation measures will ensure that there will not be significant residual impacts on the environment as a result of the Construction Phase and Operational Phase of the Proposed Project.

20.8 Difficulties Encountered in Compiling Required Information

No difficulties were encountered when compiling information for this Chapter.

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