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Greater Dublin Drainage Project

Irish Water

Environmental Impact Assessment Report: Volume 3 Part A of 6

Chapter 24 Summary of Mitigation Measures

June 2018

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24. Summary of Mitigation Measures

24.1 Introduction

The purpose of this Chapter is to collate the mitigation measures identified in the Environmental Impact Assessment Report (EIAR) that are considered necessary to protect the environment prior to the commencement of and during the Construction Phase and/or during the Operational Phase of the Greater Dublin Drainage Project (hereafter referred to as the Proposed Project).

As described throughout this EIAR, the outline design of the Proposed Project has been progressed taking account of environmental constraints and considerations that have been identified. This has enabled the avoidance of potential environmental impacts.

24.2 Mitigation Schedules

Mitigation and environmental commitments have been identified as overarching general requirements which shall avoid, reduce or offset potential impacts and are relevant to a number of the environmental aspects addressed in the EIAR. These measures are provided in 24.3 to Section 0.

Mitigation measures specified within the EIAR technical assessments are provided in Chapter 6 to Chapter 21.

The timing of the implementation of the mitigation measure is indicated within the tables as either the:

- Construction Phase: The undertaking of the physical works to construct all elements of the Proposed Project as outlined in Chapter 4 Description of the Proposed Project in Volume 3 Part A of this EIAR; and
- Operational Phase: When the Proposed Project commences operation, as well as any ongoing maintenance.

24.3 General Mitigation Requirements

Table 24.1: General Mitigation Measures

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
G1	<ul style="list-style-type: none"> The mitigation strategy outlined in this chapter will be incorporated by the appointed contractor(s) into the future design proposals for the proposed Project. The strategy will be incorporated into the overall Construction Environmental Management Plan (CEMP), by the appointed contractor(s) and approved by Irish Water. 	Construction Phase

24.4 Population and Human Health: Population

Table 24.2: Population and Human Health: Population Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
P1	6.8.1	All Proposed Project elements	<ul style="list-style-type: none"> All construction areas, including the proposed temporary construction compounds, will be suitably fenced and screened, and access to the sites will be limited to authorised personnel in the interest of public health and safety. 	Construction Phase
P2	6.8.1	All Proposed Project elements	<ul style="list-style-type: none"> Safe working practices, in accordance with the relevant legislation, will be in place during the Construction Phase to protect workers and visitors accessing the construction sites. 	Construction Phase
P3	6.8.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Details of the general construction process/phasing will be publicised prior to implementation to ensure local residents and businesses are fully informed on the nature and duration of construction works taking place in the vicinity. 	Construction Phase
P4	6.8.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Residents and businesses situated in close proximity to the proposed temporary construction compounds will receive notification in advance of their establishment. An open dialogue and positive engagement approach will be adopted by construction management teams to ensure that the concerns of residents and business owners are considered and that ad hoc mitigation measures are undertaken, as necessary. This will be in addition to the implementation of measures set out in Table 24.8, Table 24.9, Table 24.10 and Table 24.11. 	Construction Phase
P5	6.8.1	Proposed orbital sewer route	<ul style="list-style-type: none"> Alternative access arrangements (or diversions) will be put in place at the locations where open cut techniques are required for the proposed orbital sewer route (namely, local road to Coolbrook Cottages from Ballycoolin Road, local road at Sillogue Green, local road at Dubber Cottages and the local road to waste recycling facility off Coolmine Road). 	Construction Phase
P6	6.8.1	Proposed orbital sewer route	<ul style="list-style-type: none"> Appropriate temporary signage will be put in place on local roads (as referred to above) that will be temporarily affected by the construction works. This signage will guide local residents, commercial activities and visitors to the temporary access arrangements in place and will allow continuous access to homes and 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			businesses.	
P7	6.8.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Advance notice will be given to the owners of all residential/commercial/community properties before construction starts and in advance of any major planned disruptions of services. In particular, residents and businesses affected by temporary construction works crossing the local roads referred to above and those located in close proximity to the construction works would be noted, including the following: <ul style="list-style-type: none"> St. Francis' Hospice, the National Sports Campus (NSC), Premier Business Park on the Coolmine Road, Silloge Park Golf Club, ALSAA sports grounds, Trinity Gael Football Club, Dardistown Cemetery, Royal College of Surgeons Ireland sports grounds, Malahide/Portmarnock Educate Together and St. Nicholas of Myra National Schools, and other homes and businesses located at Sillogue Green, the R132 Swords Road, the R107 Malahide Road and Clonshaugh Road. 	Construction Phase
P8	6.8.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> A Construction Phase Traffic Control and Management Plan will be produced to mitigate against potential traffic delays and to facilitate the movements of 'through' traffic. 	Construction Phase
P9	6.8.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Local businesses will be given advanced warning of any traffic management arrangements, to minimise any hindrance to local businesses during the Construction Phase, particularly with regard to access. 	Construction Phase
P10	6.8.1	Proposed orbital sewer route	<ul style="list-style-type: none"> Temporary adjustments will be made to the layout of affected pitches at ALSAA during the works and rehabilitation of its pitches will be carried out following the Construction Phase 	Construction Phase
P11	6.8.1	Proposed orbital sewer route/ Abbotstown pumping station	<ul style="list-style-type: none"> A temporary replacement route will be provided for the national cross-country facility at NSC Ireland while works are undertaken near the existing facility. The existing route will be reinstated following completion of Construction Phase works at this site. 	Construction Phase
P12	6.8.1	Proposed orbital sewer route/ WwTP	<ul style="list-style-type: none"> A permanent re-routing of the access road to Chraobh Chiaráin GAA Club grounds will be developed to ensure that access remains fully open and undisrupted during the works. 	Construction Phase
P13	6.8.1	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> A Fisheries Liaison Officer will be appointed to ensure all fishermen receive timely notifications of any restrictions/exclusion zones in place during the Construction Phase of the proposed outfall pipeline route (marine section). 	Construction Phase
P14	6.8.1	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> Notifications of the timing and duration of offshore works, and any safety advisory zones in place, will be publicised in popular marine and fisheries publications such as the Marine Times and the Irish Skipper. 	Construction Phase
P15	6.8.1	All elements of the Proposed Project	<ul style="list-style-type: none"> A Community Liaison Officer (CLO) shall be employed during the Construction Phase of the Proposed Project: <ul style="list-style-type: none"> The role of the CLO will be to maintain an open, transparent and positive relationship with members of the public, groups and organisations affected by the works; The CLO will work closely with Irish Water and the appointed contractor(s) to ensure that all efforts to address public concerns are made, and to ensure that information on the nature and duration of all works is provided; and 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<ul style="list-style-type: none"> The CLO will also act as a contact point for sporting clubs and community facilities in the area. 	
P16	6.8.1	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> Advance notice will be given to the public in advance of the marine offshore works commencing and in advance of any major planned disruptions of walkways or car parks. 	Construction Phase
P17	6.8.1	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> Timelines and positioning of marine offshore working structures will avoid potential impacts on the scheduling of regattas and race events organised by Howth Yacht Club and the Irish Sailing Association (ISA). Howth Yacht Club and the ISA will be consulted as part of the scheduling/timing of proposed offshore works to minimise all inconvenience. The CLO will act as the contact point between these groups, Irish Water and the appointed contractor(s). 	Construction Phase
P18	6.8.1	Proposed WwTP	<ul style="list-style-type: none"> Appropriate engagement will be undertaken with Fingal County Council (FCC) and relevant parties on the preparation of the Masterplan for the High Technology zone reserved for the Clonsbaugh East lands (M11.D) situated directly south of the proposed WwTP. 	Construction Phase
P19	6.8.2	All land based elements of the Proposed Project	<ul style="list-style-type: none"> A Traffic Control and Management Plan will be implemented and communicated to all staff to ensure plant related traffic does not give rise to adverse impacts in the local area. Refer to Table 24.9 for mitigation measures. 	Operational Phase
P20	6.8.2	Proposed WwTP	<ul style="list-style-type: none"> A CLO will be maintained at the proposed WwTP to liaise with members of the public in the event of an issue being raised relating to the operation of the proposed WwTP. 	Operational Phase
P21	6.8.2	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> Notifications of the timing and duration of any maintenance works required to be carried out on the proposed outfall pipeline route (marine section) during the Operational Phase will be publicised in popular marine and fisheries publications such as the Marine Times and the Irish Skipper. 	Operational Phase
P22	6.8.2	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> Advance notification of the timing and duration of any maintenance works required to be carried out on the proposed outfall pipeline route (marine section) during the Operational Phase will be provided to sailing and recreational clubs operating in the area, including, for example, Howth Yacht Club and the ISA. 	Operational Phase

24.5 Population and Human Health: Human Health

Table 24.3: Population and Human Health: Human Health Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
HH1	7.8	All elements of the Proposed Project	<ul style="list-style-type: none"> The Proposed Project will be designed and constructed to best industry standards and practices. The Proposed Project aims to reduce health risks to employees, local residents and the community it will serve. 	Construction Phase/ Operational Phase
HH2	7.8	All elements of the Proposed Project	<ul style="list-style-type: none"> During the Construction Phase and Operational Phase, comprehensive mitigation measures will be implemented in order to minimise/prevent the potential for human health impacts caused by the Proposed Project. Mitigation measures are outlined in detail within each of the following tables for the below relevant chapters in Volume 3 Part A of this EIAR: <ul style="list-style-type: none"> Chapter 8 Marine Water Quality, Table 24.4; Chapter 13 Traffic and Transport, Table 24.9; Chapter 14 Air Quality, Odour and Climate, Table 24.10; Chapter 15 Noise and Vibration, Table 24.11; Chapter 17 Hydrology and Hydrogeology, Table 24.13; and Chapter 18 Soils and Geology, Table 24.14. 	Construction Phase/ Operational Phase
HH3	7.8	All elements of the Proposed Project	<p><u>Air Quality</u></p> <ul style="list-style-type: none"> The preliminary design of the proposed Abbotstown pumping station and the proposed WwTP has incorporated several mitigation measures to minimise the impact of the Proposed Project. These include the following measures: <ul style="list-style-type: none"> All buildings at the proposed Abbotstown pumping station will be fully enclosed to contain all process activities; All gases at the proposed Abbotstown pumping station will be contained and treated in Odour Control Units; Stack heights for all emission sources will be optimised to ensure that AQS are met; All tanks and structures at the proposed WwTP will be covered; Layout of the site of the proposed WwTP has been optimised to promote effective dispersion of emissions; All activities in buildings at the proposed WwTP will be fully enclosed, including sludge intake in the SHC; Odours at the proposed WwTP will be contained at source and will be treated in Odour Control Units; and Two-stage and three-stage Odour Control Units will be put in place, where necessary. The Construction Phase of the Proposed Project will be carefully managed, and a Dust Management Plan will be formulated to ensure that construction activities are managed to minimise dust emissions associated with construction activities. In order to mitigate against air quality effects at receptors during the 	Construction Phase/ Operational Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>Construction Phase, Best Practice Measures will be adopted. These measures will include techniques such as those outlined in the Institute of Air Quality Management's (2014) Guidance on the Assessment of Dust from Demolition and Construction.</p> <ul style="list-style-type: none"> The appointed contractor(s) will be required to produce an Air Quality and Dust Management Plan (AQDMP) as part of their CEMP, including Best Practice Measures to control dust and, in particular, measures to prevent dust nuisance. The principal objective of the AQDMP is to ensure that dust emissions do not cause significant nuisance at receptors near the Proposed Project, and the AQDMP will include measures such as enclosure of material stockpiles, hard surfacing of heavily used areas and covering of vehicles carrying spoil. Please refer to Table 24.10 and Section 14.8 in of Chapter 14 Air Quality, Odour and Climate in Volume 3 Part A of this EIAR for measures specific to maintaining AQS with respect to site planning, construction traffic and site activities. 	
HH4	7.8	All elements of the Proposed Project	<p>Noise</p> <ul style="list-style-type: none"> Please refer to Table 24.11 and Section 15.7 of Chapter 15 Noise and Vibration in Volume 3 Part A of this EIAR for a comprehensive description of proposed mitigation measures to reduce impacts to sensitive receptors which are related to noise. The main mitigation measure to be undertaken is the preparation of a Noise and Vibration Management Plan (NVMP) by the appointed contractor(s) prior to the commencement of any site works. The NVMP will be developed as part of the overall CEMP developed by the appointed contractor(s) and will be approved by Irish Water. The NVMP will detail how the appointed contractor(s) will comply with the noise criteria set out in this EIAR and will deal specifically with construction activities in a strategic manner to remove or reduce significant noise and vibration impacts associated with the Construction Phase. The NVMP will detail the provision and installation of localised acoustic screens and the best practice noise measures that the appointed contractor(s) will adhere to for construction activities and the noise and vibration monitoring programme that the appointed contractor(s) will undertake during the construction works. The construction works will be managed through the use of construction noise limits which the appointed contractor(s) will work within. Best practice control measures, including choice of plant, scheduling of works on-site, provision of temporary acoustic screening, on-site noise monitoring and other measures, will be employed in order to ensure noise limits are not exceeded. Best practice noise management procedures for the control of noise and vibration from construction activities as presented in BS 5228 (British Standards Institution 2014) will be followed. Such measures to be adhered to will include the following: <ul style="list-style-type: none"> Good on-site work practices; Selection of quiet plant; Acoustic screens and barriers; Noise control; Communications with the community; Monitoring; and Noise auditing. 	Construction Phase/ Operational Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
HH5	7.8	All elements of the Proposed Project	<p><u>Traffic and Transport</u></p> <ul style="list-style-type: none"> In order to control risks to road safety, a number of suggested controls are listed in Table 24.9 and Section 13.10.3 of Chapter 13 Traffic and Transport in Volume 3 Part A of this EIAR. These include: <ul style="list-style-type: none"> Carry out a Stage 2 Road Safety Audit at detailed design stage; Maintain hedgerows to maintain optimum visibility; Maintain road signage and add signage where necessary; Maintain road surfacing and improve where necessary; Maintain lighting along road and improve where necessary; Maintain road drainage and improve where necessary; Maintain a stock of salt and chips and apply prior to snow/frost fall; Apply temporary signage where need to notify public of risk and/or road closures; Walkways to be maintained and kept clear; Personnel to use internal walkways and wear high-vis; Supervision of Heavy Goods Vehicles to enforce safe procedures; and It is recommended that cycle lanes and pedestrian facilities are installed along the access road, frontage to the site and internal roads within the proposed WwTP to facilitate pedestrians and cyclists. 	Construction Phase/ Operational Phase
HH6	7.8	All elements of the Proposed Project	<p><u>Marine Water Quality</u></p> <ul style="list-style-type: none"> Please refer to Table 24.4 and Section 8.5 of Chapter 8 Marine Water Quality in Volume 3 Part A of this EIAR for the mitigation measures with respect to marine water quality impacts. The following is an overview of the mitigation measures. Disposal of dredged material will only take place on local flooding tides to ensure suspended sediments are not transported to sensitive receptors around Ireland's Eye. The timing of the flood tide will be confirmed with reference to Howth Harbour tide gauge. Turbidity and suspended sediment concentrations of the receiving waters will be monitored during the course of the dredging operations. Suspended sediment concentrations will have to be monitored during the course of the operations as part of the Construction Environmental Management Plan as the consenting authority will more than likely issue conditions on any dredging licence stipulating a suspended sediment limit, beyond which mitigation measures have to be implemented. The dredging operation will be modified to reduce water column dispersion and/or spread of material along the bottom. An operational modification to clamshell dredging will be considered, if water column concentrations of dredged material are exceeded for proposed hopper dredge discharge. 	Construction Phase
HH7	7.8	All elements of the Proposed Project	<p><u>Hydrology and Hydrogeology</u></p> <ul style="list-style-type: none"> All hydrology and hydrogeology mitigation measures are detailed in Table 24.13. The mitigation described in Section 17.5 of Chapter 17 Hydrology and Hydrogeology in Volume 3 Part A of this EIAR is embedded in the design, and the potential impact as designed was assessed. Additional mitigation measures are 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>described in Section 17.7 of the same chapter. The Proposed Project will be designed in accordance with the report entitled <i>The Planning System and Flood Risk Management: Guidelines for Planning Authorities</i> (Office of Public Works 2009) and the Flood Risk Assessment carried out for the Proposed Project. (Appendix A17.1). With these safeguards, it is considered that the proposed WwTP and the proposed Abbotstown pumping station will not be vulnerable to flooding. Climate change has been considered under the Fingal East Meath (FEM) Flood Risk Assessment Management Study (FRAMS) Project (Halcrow Barry Consultants 2011) and the River Tolka Flooding Study (M.C. O'Sullivan & Co. 2003).</p> <ul style="list-style-type: none"> • The surface water drainage design of the proposed WwTP and the proposed Abbotstown pumping station sites and access roads will incorporate Sustainable Drainage System principles, with attenuation systems in place to limit discharges from the site to the greenfield-site flow rate. Consequently, there will be no impact on the nearby water courses. • Mitigation measures for the management of hydrology and hydrogeology impacts include, but are not limited to: <ul style="list-style-type: none"> • All temporary construction compounds, storage areas and launch pits (for trenchless techniques) will be located within Flood Zone C – low risk; • Immediate removal/disposal of surplus material off-site will be implemented; • Drainage within soil bunds will be provided to reduce the influence upon the surface runoff pathways of flood water; • Direct discharge of surface water from any temporary impervious area to the nearby watercourse without proper attenuation will be avoided; • Temporary attenuation ponds will be provided if the stream to which surface water from the construction area is discharged has limited capacity; • The shafts/construction fronts for any trenchless techniques will be located beyond the floodplain of the summer peak flood of an appropriate return period (i.e. 1 in 20 years). (For 10% risk over a two-year construction period, the required return interval for construction period flood is approximately 20 years, as per Flood and Reservoir Safety (Institute of Civil Engineers UK 2015)); • The surface water runoff at the construction sites will be managed to prevent flow of silt-laden surface water flowing into adjoining surface watercourses. To achieve this, the appointed contractor(s) must comply with the CIRIA publication Control of water pollution from linear construction projects. Technical Guidance (C648) (CIRIA 2006); • For the construction on any watercourse crossings, a detailed Pollution Control Plan (PCP), Sediment and Erosion Control Plan (SECP), Emergency Response Plan (ERP) and Method Statements (MS) will be drafted and will have regard to relevant pollution prevention guidelines. All works in or adjacent to watercourses will comply with the EPA, Inland Fisheries Ireland and OPW requirements; • Direct disposal of water from excavations and from temporary groundwater dewatering to the nearby watercourse will not be allowed, as these could both impact on water quality of the watercourse and increase flood risk. Any discharge of such water, after proper treating/de-silting will be discussed and agreed with the landowner, and if necessary, discharge consent will be acquired from the concerned authority (EPA, Inland Fisheries Ireland, etc.) prior to the commencement of work; 	

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<ul style="list-style-type: none"> On-site fuel storage and refuelling of plant and vehicles will be undertaken on impermeable and bunded areas and away from any rivers or other watercourses; and The appointed contractor(s) will inspect and monitor the water quality of surface waters near any works, particularly in relation to increased silt levels. This monitoring process will form part of the Construction Environmental Management Plan for the Construction Phase. Further mitigation measures are detailed in Section 17.6 of Chapter 17 Hydrology and Hydrogeology, in Volume 3 Part A of this EIAR. 	
HH8	7.8	All elements of the Proposed Project	<p><u>Soils and Geology</u></p> <ul style="list-style-type: none"> With respect to managing and mitigating against impacts from ground contamination, the following mitigation measures are required. For more details, please refer to Table 24.14 and Section 18.7 of Chapter 18 Soils and Geology in Volume 3 Part A of this EIAR. Excavations in made ground will be monitored by an appropriately qualified person to ensure that, should any hotspots of contamination be encountered, they are identified, segregated and disposed of appropriately. Any identified hotspots shall be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage. Care will be taken to ensure that the hotspot does not cross-contaminate clean soils elsewhere along the alignment. Potential soil and water pollution will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel washers and dust suppression on site roads, and regular plant maintenance. The Construction Industry Research and Information Association (CIRIA) provides guidance on the control and management of water pollution from construction sites in their publication Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors (Masters-Williams et al. 2001), and this shall be reflected in the CEMP. A contingency plan for pollution emergencies will also be developed by the appointed contractor(s) prior to work and regularly updated, which would identify the actions to be taken in the event of a pollution incident. The CIRIA document recommends that a contingency plan for pollution emergencies will address the following: <ul style="list-style-type: none"> Containment measures; Emergency discharge routes; List of appropriate equipment and clean-up materials; Maintenance schedule for equipment; Details of trained staff, location, and provision for 24-hour cover; Details of staff responsibilities; Notification procedures to inform the relevant environmental protection authority; Audit and review schedule; Telephone numbers of statutory water undertakers and local water company; and List of specialist pollution clean-up companies and their telephone numbers. 	Construction Phase

24.6 Marine Water Quality

Table 24.4: Marine Water Quality Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
WQ1	8.5.1	Proposed outfall pipeline route (marine section) dredged section	<ul style="list-style-type: none"> Disposal of dredged material will only take place on local flooding tides to ensure suspended sediments are not transported to sensitive receptors around Ireland's Eye. The timing of the flood tide will be confirmed with reference to Howth Harbour tide gauge. 	Construction Phase
WQ2	8.5.1	Proposed outfall pipeline route (marine section) dredged section	<ul style="list-style-type: none"> Turbidity and suspended sediment concentrations of the receiving waters will be monitored during the course of the dredging operations. 	Construction Phase
WQ3	8.5.1	Proposed outfall pipeline route (marine section) dredged section	<ul style="list-style-type: none"> Suspended sediment concentrations will have to be monitored during the course of the operations as part of the CEMP as the consenting authority will more than likely issue conditions on any dredging licence stipulating a suspended sediment limit, beyond which mitigation measures have to be implemented. The dredging operation will be modified to reduce water column dispersion and/or spread of material along the bottom. An operational modification to clamshell dredging will be considered, if water column concentrations of dredged material are exceeded for proposed hopper dredge discharge. 	Construction Phase

24.7 Biodiversity (Marine)

Table 24.5: Biodiversity (Marine) Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
BM1	9.7.1	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> The use of trenchless construction methods beneath the Baldoyle Estuary SAC will minimise the impact to the marine ecology in the sensitive inshore areas during construction, although there is a minor risk of an air or bentonite breakout. On completion of the tunnel, the remainder of the planned surface construction is based on dredging in the offshore location. Additional mitigation will be required to minimise the impacts of noise and suspended sediments in order to prevent negative interaction with sensitive receptors in the area (in particular the cetaceans and the pinnipeds). This mitigation is also included in the Outline CEMP, which will form part of the contract documents. Irish Water will be responsible for ensuring all mitigation measures are implemented and complied with by the contractor(s). 	Construction Phase
BM2	9.7.1	Proposed outfall pipeline route (marine section)	<p><u>Microtunnelling Beneath Baldoyle Estuary- Leakage of Pollutants</u></p> <ul style="list-style-type: none"> No discharges to estuary under any circumstances. Managed operations with bunded storage areas and sediment settlement areas. CEMP including Surface Water Management Plan. 	Construction Phase
BM3	9.7.1	Proposed outfall pipeline route (marine section)	<p><u>Microtunnelling Beneath Baldoyle Estuary- Air Breakout to Surface</u></p> <ul style="list-style-type: none"> Pressures will be managed 	Construction Phase
BM4	9.7.1	Proposed outfall pipeline route (marine section)	<p><u>Microtunnelling Beneath Baldoyle Estuary- Bentonite Breakout</u></p> <ul style="list-style-type: none"> Volumes and pressures of bentonite used will be managed. The control and management of pressures during the microtunnelling processes will be undertaken to prevent air and bentonite breakouts. However, in the unlikely event of a bentonite breakout occurring, which results in a saltmarsh area high up on the foreshore being covered, intervention will be required. Intervention will involve washing the vegetation using a seawater pump and spray. Typically, this would be carried out during a high water period where washings can disperse out of the estuary naturally. Sites will only be accessed by foot (without the use of plant). Should bentonite breakout in a saltmarsh area lower down on the shoreline in areas routinely covered by seawater, this will be left to disperse naturally over the tidal cycle. All bentonite usage will be monitored through materials balance calculations, pressure monitoring in the lines and above ground visual assessment of the works to ensure that, should a breakout occur, the volume is minimised. In the event of a bentonite breakout, the site will be monitored for chemistry and macroinvertebrate communities to ensure no residual impacts. This may include both benthic and water quality measurements. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
BM5	9.7.1	Proposed outfall pipeline route (marine section)	<p><u>Dredging Activity – Suspended Sediments</u></p> <ul style="list-style-type: none"> Dredging discharges from the hopper will be restricted to flooding tides only. Plume will be monitored during dredging operations. Disturbance of intertidal and subtidal habitats will be minimised so as to reduce the creation of suspended solids within the marine and estuarine habitats. The tunnelling compound spanning either side of the Baldoyle Estuary will be subject to surface water management as part of the CEMP to prevent all runoff into the watercourses and the estuary. The potential for an accidental release of bentonite will be minimised by closely monitoring its use during all works. <ul style="list-style-type: none"> Dredging works in the shallow areas will be carried out using a backhoe dredger with the spoil side cast at the seabed to minimise the lifting of the bucket through the water column. This will reduce losses of suspended sediments from this material and preserve the sediment composition as much as possible at bed level. Dredging carried out close to the Ireland's Eye SAC will be carried out on neap tides where possible. Monitoring of turbidity will be carried out during peak dredging activity, and operations will be restricted to flooding tides if a plume is detected >50mg/l Total Suspended Solids (TSS) above background on the northern coastline of Ireland's Eye. The turbidity will be monitored using a buoy-mounted turbidity meter with telemetering back to the dredger to monitor potential impacts from dredging activity. As the reef is only prone to sedimentation during slack water periods, a slightly elevated level of TSS up to 40mg/l (the natural standard deviation for the year) above a daily background will be permitted off the northern coastline of Ireland's Eye. If this level increases above this threshold as a result of dredging activity, then the discharge of material will be temporarily halted to allow the resulting plume to disperse. This is particularly important 30 minutes before and after slack water where increased suspended sediments can settle within the SAC. 	Construction Phase
BM6	9.7.1	Proposed outfall pipeline route (marine section)	<p><u>Dredging Activity – Noise and Vibration</u></p> <ul style="list-style-type: none"> Detailed mitigation plan will be required and seasonal considerations. Passive acoustic monitoring will be carried out and marine mammal observers (MMOs) will be employed to establish safe zone. Noise and vibration from the microtunnelling and dredging operations during the construction of the proposed outfall pipeline route (marine section) (including the proposed marine diffuser) will be minimised by selecting the most appropriate equipment, dependent upon ground conditions and noise signatures. The specifications of piling systems for caisson deployments for the construction of the proposed marine diffuser, the interface connection with the microtunnelling or the fibre optic cable crossing will be assessed for likely noise outputs to assess noise impacts when working within the Rockabill to Dalkey Island SAC. Mitigation will be undertaken during piling and dredging works to ensure there are no noise impacts to marine mammals (including harbour porpoises) near the works. This will include MMOs using a high frequency hydrophone system to establish an operational safe zone around the site. This will prevent the commencement of operations in the event that sensitive receptors (pinnipeds and cetaceans) are observed within this perimeter. The following mitigation measures will also be implemented: <ul style="list-style-type: none"> Following appropriate guidelines from the regulatory authorities, the NPWS (2014), the following 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>measures are proposed to remove the risk of direct injury to marine mammals in the area of operations: A trained and experienced MMO will be put in place during piling, dredging and pipeline laying. The MMO will scan the surrounding area to ensure no marine mammals are in a pre-determined exclusion zone in the 30-minute period prior to operations. It is proposed that this exclusion zone is 500m for dredging activities and 1,000m for piling activities. No works will take place should mammals be recorded in the exclusion zone.</p> <ul style="list-style-type: none"> Noise-producing activities will only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring is not possible, the sound-producing activities will be postponed until effective visual monitoring is possible. Visual mitigation for marine mammals (in particular harbour porpoise) will only be effective during daylight hours and if the sea state is 2-3 or less (Beaufort scale) or less. For piling activities, where the output peak sound pressure level (in water) exceeds 170dB, a ramp-up procedure must be employed following the pre-start monitoring. Underwater acoustic energy output will commence from a lower energy start-up and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20 to 40 minutes. Once operations have begun, operations will cease temporarily if a cetacean or seal is observed swimming in the immediate (<50m) area of piling and dredging and work can be resumed once the animal(s) have moved away. Any approach by marine mammals into the immediate (<50m) works area should be reported to the NPWS. If there is a break in piling activity for a period greater than 30 minutes, then all pre-activity monitoring measures and ramp-up will recommence as for start-up. Once normal operations commence (including appropriate ramp-up procedures), there is no requirement to halt or discontinue the activity at night-time, nor if weather or visibility conditions deteriorate, nor if marine mammals occur within a radial distance of the sound source that is 500m for dredging works, and 1,000m for piling activities. The MMO will keep a record of the monitoring using 'MMO form location and effort (coastal works)' available from the NPWS and submit to the NPWS on completion of the works, as described in the NPWS guidance (2014). In order to reliably quantify the zone of responsiveness associated with the proposed programme of piling activities associated with the interface pit or cable crossing, a vessel-deployed hydrophone will be used to confirm the sound source level of the operation. Additionally, passive acoustic monitoring will be used to provide additional support to the identification of harbour porpoises or other cetaceans within the survey area. The effective range of the passive acoustic monitoring system will be dictated by the frequency, with the ultra-high frequency used by porpoises likely to be limited to within 500m of the passive acoustic monitoring system. 	
BM7	9.7.1	Proposed outfall pipeline route (marine section)	<p><u>Dredging Activity – Pollution</u></p> <ul style="list-style-type: none"> Implementation of CEMP. This includes strict adherence to MARPOL guidelines, auditing of CEMP, bunded storage areas for fuels and control of compound drainage, etc. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<ul style="list-style-type: none"> No discharge or disposal of waste to sea under any circumstances. A detailed CEMP will be established prior to construction (see Outline CEMP). This will follow best practice for the storage, handling and disposal of hazardous/non-hazardous materials to prevent chemical pollution. All fuels or chemicals kept on the construction site will be stored in protected containers, and all refuelling and maintenance will be carried out in bunded containment areas. Refuelling and maintenance in areas draining directly to water habitats will be avoided where possible. Oil interceptors will also be installed in appropriate locations. Equipment will be regularly maintained and leaks repaired immediately. Accidental spillages will be contained and cleaned up immediately. Remediation measures will be carried out in the unlikely event of pollution of the marine environment. 	
BM8	9.7.1	Proposed outfall pipeline route (marine section) marine diffuser	<p><u>Installation of Proposed Marine Diffuser</u></p> <ul style="list-style-type: none"> The duration of dredging operations will be minimised. Acoustic output levels and carry out marine mammal observations. 	Construction Phase
BM9	9.7.2	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> The Sustainable Drainage Systems in place at the proposed WwTP and Abbotstown pumping station will need to be maintained to ensure proper functioning during the operation of the Proposed Project. Output to be secondary treated with strict targets for suspended sediment and DIN level outputs 	Operational Phase

24.8 Biodiversity (Marine Ornithology)

Table 24.6: Biodiversity (Marine Ornithology) Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
BMO1	10.9.1	Proposed temporary construction compounds no. 9 and no. at Baldoye	<p><u>Estuarine Ornithology</u></p> <ul style="list-style-type: none"> Hoarding will be installed at both proposed temporary construction compounds for the duration of Construction Phase. A 2.4m high hoarding will be used for the duration of the construction works at both microtunnelling compounds (proposed temporary construction compounds no. 9 and 10). Compound construction will not proceed without the installation of hoarding around the entire perimeter of each compound and any associated access track. The deployment of this hoarding will mean that works within the microtunnelling compounds will occur out of sight of birds in the Baldoye Bay SPA, meaning that disturbance impacts on birds are reduced to a very low level (Cutts et al. 2013). Ikuta and Blumstein (2003) found that protective barriers allow birds to behave as they would in an undisturbed environment. To avoid disturbance to wintering birds, the hoarding will only be erected and uninstalled between April and August under supervision by a professional ecologist. 	Construction Phase
BMO2	10.9.2	Proposed outfall pipeline route (marine section) interface between microtunnelled section and subsea section	<p><u>Marine Ornithology</u></p> <ul style="list-style-type: none"> Adherence to Vessel Management Plan (VMP) (see Appendix A10.2 in Volume 3 Part B of this EIAR), including withdrawing from area in event of large-scale auk movement towards vessels 	Construction Phase
BMO3	10.9.2	Proposed outfall pipeline route (marine section) subsea section	<p><u>Marine Ornithology</u></p> <ul style="list-style-type: none"> Adherence to VMP (see Appendix A10.2), including withdrawing from area in event of large-scale auk movement towards vessels Adjustment to temporal restriction of marine construction activities from March to October, to April to October 	Construction Phase
BMO4	10.9.2	Proposed outfall pipeline route (marine section) marine diffuser	<p><u>Marine Ornithology</u></p> <ul style="list-style-type: none"> Adherence to VMP (see Appendix A10.2), including use of bird observer during July and August and withdrawing from area in event of large-scale auk movement towards vessels Adjustment to temporal restriction of marine construction activities from March to October, to April to October 	Construction Phase
BMO5	10.9.2	Proposed outfall pipeline route (marine section) marine diffuser	<p><u>Marine Ornithology</u></p> <ul style="list-style-type: none"> It should be noted that the VMP has been prepared by the Proposed Project ornithologist. Due to the potential presence of large numbers of birds with very high ecological value and also the sensitivity of breeding seabirds within and near the Ireland's Eye SPA, it will be necessary to put in place a VMP (see Appendix A10.2 in Volume 3 Part B of this EIAR). The VMP will have two key functions. The first is to ensure that the Ireland's Eye SPA boundary is not unnecessarily approached or crossed by 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>construction vessels working on the proposed marine diffuser and subsea section of the proposed outfall pipeline route (marine section) at any time during the Construction Phase. This will also increase the certainty that the impact significance on the breeding colony itself during construction will be Negligible. Every vessel used on the Proposed Project will have a copy of the VMP and the crews will be acquainted with the boundary of Ireland's Eye SPA and the ornithological importance of these waters.</p> <ul style="list-style-type: none"> • The second is to ensure the protection of rafting auks leaving the Ireland's Eye colony in July to mid-August. These birds are flightless, and thus particularly susceptible to disturbance by vessels. Whilst such rafts tend to immediately leave the area to moult in locations far from the shore, unfavourable winds can result in them being unable to control the direction in which they are travelling when leaving their colony. A bird observer (present either on the island or a vessel) will keep watch in July to mid-August only, noting wind direction and monitoring whether any auks that may be on the water are drifting out towards the proposed marine diffuser. • In the event of a sighting of rafting auks between Ireland's Eye and the proposed marine diffuser construction area, vessels on-site will be informed. All vessels will be obliged to immediately report the sightings to the other Proposed Project vessels with exact position of sighting, and reduce speed to less than 10 knots if within 1km of the reported sighting. Vessels should thereafter avoid coming closer than 1km to any rafting auks, and keep extra lookout for rafting auks. This may result in vessels having to temporarily leave the work area until rafting auks are no longer present. If this does occur, it is not expected that such birds would persist in the area. 	

24.9 Biodiversity (Terrestrial and Freshwater Aquatic)

Table 24.7: Biodiversity (Terrestrial and Freshwater Aquatic) Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
TFA1	11.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> An Ecological Clerk of Works (ECoW) will be appointed by Irish Water to advise on effective implementation of biodiversity mitigation specified in the EIAR, NIS and the Outline CEMP, and to act as a liaison between Irish Water and ABP in the discharge of planning conditions relating to biodiversity. The ECoW shall be supported by other specialist ecologists as necessary to ensure effective implementation of biodiversity mitigation. Tool-box talks will be provided for the appointed contractor(s), subcontractors and operatives on their legal obligations in relation to wildlife legislation, and good practice in relation to construction and protected species. Tool-box talks will be provided by the ECoW in consultation with the appointed Environmental Manager of the main appointed contractor(s), prior to the commencement of the Construction Phase. 	Construction Phase
TFA2	11.7.3	Proposed WwTP	<ul style="list-style-type: none"> All hedgerows removed during the Construction Phase shall be replaced. Planting of native hedgerow and perimeter screening with native species of trees will be implemented as part of the landscape strategy presented in Chapter 12 Landscape and Visual. 	Construction Phase
TFA3	11.7.3	Proposed pipeline routes and all proposed temporary construction compounds	<ul style="list-style-type: none"> Grassland sward along the proposed construction corridor will be reinstated. Sections of hedgerows and treelines which are removed to facilitate construction will be replanted. Topsoil shall be retained from wet grassland and neutral grassland habitats subject to topsoil stripping and will be reused for reinstatement in its original location. 	Construction Phase
TFA4	11.7.4	Proposed WwTP	<p><u>Bats – Loss of Fragmentation of Habitat</u></p> <ul style="list-style-type: none"> Hedgerow removal will create a barrier and reduce the foraging area for foraging and commuting bats during the construction of the proposed WwTP. This will be mitigated by the landscape proposed, which include the planting of hedgerow, specimen trees and wildflower meadow to the north, east and west of the proposed WwTP site (refer to Chapter 12 Landscape and Visual, Section 12.7 for further details). 	Construction Phase
TFA5	11.7.4	Proposed WwTP	<p><u>Bats – Loss of Potential Roost Sites</u></p> <ul style="list-style-type: none"> In order to protect potential roost sites, any existing mature trees adjacent to the Proposed Project or construction areas which will not be removed shall be protected from root damage in accordance with BS 5837:2012 Trees in relation to design, demolition and construction (British Standards Institution 2012) as part of the construction contract. Mature standard trees within the hedgerows to be cleared at the proposed WwTP site shall be felled in the period from late August to late October, or early November, in order to avoid the disturbance of any roosting bats as per the Guidelines for the Treatment of Bats Prior to the Construction of National Road Schemes (NRA 2005a). During this period bats, are still capable of flight having not entered hibernation, and undertaking works 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>in this period may reduce the risks of tree-felling if proper measures are undertaken.</p> <ul style="list-style-type: none"> Once felled, trees that have potential bat roost features shall be left intact on-site for 24 hours prior to disposal to allow any bats to escape overnight. Tree roosts may be established for short periods and may not be detectable when bats are not occupying the roost from an examination of a suitable tree. Furthermore, trees may become suitable for roosting bats through damage from storm, machinery, rot or human interference. Therefore, trees that are at present unsuitable may become roosts between the pre-planning assessment contained within this EIAR and the Construction Phase of the Proposed Project. All trees within the boundary of the Proposed Project shall be checked for Potential Roost Features (PRFs) by an experienced bat ecologist as part of a pre-construction survey. Resulting from the pre-construction PRF survey, all trees with medium to high roost potential shall be examined by an experienced bat ecologist reporting to the ECoW prior to work commencing by any appointed contractor(s) or subcontractor on any part of the Construction Phase (including enabling works) of the Proposed Project, including fencing, vegetation clearance or topsoil stripping. Following this examination, should any tree be identified as a bat roost then a derogation licence application will be made to exclude the bats and fell the tree. The roost must not be altered or affected in any way prior to works being undertaken as stipulated within the derogation licence and using the measures stipulated in the licence for the exclusion of bats and felling must be carried out under the supervision of a bat specialist named on the licence. The loss of PRFs in trees as a result of vegetation clearance will necessitate the installation of bat boxes to compensate for potential roost loss. Bat boxes will be installed at least three months in advance of removal of existing potential roosting sites. One box per tree with moderate to high bat suitability scheduled to be felled will be installed by the appointed contractor(s); the appropriate number of bat boxes to compensate for loss of potential roosting features will be finalised following pre-construction PRF inspection presence/absence surveys. The boxes will be attached to suitable trees in hedgerows, treelines and woodland along the route but outside the area of clearance. The final box locations will be confirmed on-site with the bat specialist. The principal recommended type along the proposed pipeline routes is the Schwegler 1FF bat box. Boxes shall be erected in pairs and all boxes placed in sites that will be protected from disturbance. These boxes must be away from any felling or trimming to ensure that they are not accidentally damaged or removed. Bat boxes must be clear of scrub and away from ivy encroachment as well as lighting and traffic. 	
TFA6	11.7.4	Proposed WwTP	<p><u>Bats – Monitoring</u></p> <ul style="list-style-type: none"> It is essential to monitor boxes for their acceptance of use by bats, and those boxes that remain unused two years after the date of erection should be relocated. Seasonal inspection of bat boxes shall be undertaken (excluding mid-June to mid-August, the lactation period of females, where any disturbance at this time can be detrimental to the survival of young) to monitor bat usage and in wintertime for general wear and tear and to remove droppings following use the previous summer. This should be undertaken by a licensed bat-handler (NRA 2005a). 	Construction Phase
TFA7	11.7.4	Proposed WwTP	<p><u>Bats – Light Pollution</u></p> <ul style="list-style-type: none"> Where construction lighting is required, lighting will be directed away from all woodland, hedgerow and linear habitats. Directional lighting (i.e. lighting which only shines on the Proposed Project and not on the nearby countryside) will be used to prevent overspill. This will be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
TFA8	11.7.4	Proposed Abbotstown pumping station	<p>Bats – Loss or Fragmentation of Habitat</p> <ul style="list-style-type: none"> The loss of foraging and commuting habitat as a result of the removal of immature and mixed broadleaved woodland for construction of the proposed Abbotstown pumping station will be mitigated by planting schemes utilising advanced nursery stock. 	Construction Phase
TFA9	11.7.4	Proposed Abbotstown pumping station	<p>Bats – Light Pollution</p> <ul style="list-style-type: none"> Where construction lighting is required, lighting will be directed away from all woodland, hedgerow and linear habitats to be retained. This can be achieved by the use of directional lighting to prevent overspill. 	Construction Phase
TFA10	11.7.4	Proposed orbital sewer route	<p>Bats – Loss or Fragmentation of Habitat</p> <ul style="list-style-type: none"> The loss of foraging and commuting habitat as a result of hedgerow and treeline removal for construction will be mitigated by replacement and replanting. Where feasible, trees and hedgerows disturbed by the construction works will be re-instated. Depending on the season in which construction work takes place, it may be possible to store and replace sections of dormant hedgerows once work in a particular section is complete. Where this is not practicable, new planting will take place utilising advanced nursery stock. 	Construction Phase
TFA11	11.7.4	Proposed orbital sewer route	<p>Bats – Loss of Potential Roost Sites</p> <ul style="list-style-type: none"> Mitigation as per measure TFA5 at the proposed WwTP. 	Construction Phase
TFA12	11.7.4	Proposed orbital sewer route	<p>Bats – Light Pollution</p> <ul style="list-style-type: none"> Where construction lighting is required, lighting will be directed away from all woodland, hedgerow and linear habitats to be retained. This can be achieved by the use of directional lighting. There will be no direct illumination of known bat roosts. Lights will be positioned to avoid sensitive areas and restricted so that there are dark areas. When works are conducted adjacent to known or potential bat roosts (as identified in Figure 3.5 of the Bat Survey Report at Appendix A11.1, the timing of lights shall be restricted to avoid bat activity (i.e. from dusk until dawn). 	Construction Phase
TFA13	11.7.4	Proposed outfall pipeline route (land based section)	<p>Bats – Loss or Fragmentation of Habitat</p> <ul style="list-style-type: none"> Mitigation as per measure TFA10 at the proposed WwTP. 	Construction Phase
TFA14	11.7.4	Proposed outfall pipeline route (land based section)	<p>Bats – Loss of Potential Roost Sites</p> <ul style="list-style-type: none"> Mitigation as per measure TFA5 at the proposed WwTP. 	Construction Phase
TFA15	11.7.4	Proposed outfall pipeline route (land based section)	<p>Bats – Light Pollution</p> <ul style="list-style-type: none"> Mitigation as per measure TFA9 at the proposed WwTP. 	Construction Phase
TFA16	11.7.4	Proposed WwTP	<p>Bats</p> <ul style="list-style-type: none"> Landscaping treatment for the proposed WwTP includes planting of hedgerow, specimen trees and wildflower meadow to the north, east and west of the proposed WwTP site. Lighting will be minimised in these areas, and 	Operational Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			the times during which the lighting is on will be limited to provide some dark periods. Should security lighting be necessary, directional lighting will be used to prevent overspill.	
TFA17	11.7.5	Proposed orbital sewer route and proposed Abbotstown pumping station	<p><u>Mammals (Other than Bats)</u></p> <ul style="list-style-type: none"> In order to ensure there are no significant changes to the badger territory's identified in the EIAR and the mitigation measures specified, a pre-construction badger survey should be undertaken prior to the commencement of any works. A wildlife disturbance licence will be obtained from NPWS for the exclusion and closure (two temporarily and three permanently) of five badger setts identified within the Proposed Project boundary. The licence application will be made by the appointed ECoW, who will conduct or otherwise supervise all licensed activities. All works under licence will be monitored as necessary by the appointed ECoW throughout the Construction Phase. Setts closed for the duration of the Construction Phase shall be re-opened at the earliest opportunity in consultation with the licencing authority. An Ecological Exclusion Zone will be set up around setts S2 and S3 at a radius of 25m to protect them from construction activities, facilitating their re-opening after the Construction Phase is complete. The Ecological Exclusion Zone fence will keep appointed contractor(s) out of the Ecological Exclusion Zone, and warning signs will be erected at intervals on the fence. No vehicles, storage or stockpiling of materials will be allowed within the Ecological Exclusion Zone. An ECoW will supervise the erection of each Ecological Exclusion Zone and inspect it regularly to ensure that it is in working condition and functioning as required. The specification of the temporary fence for the proposed construction corridor will allow unimpeded movement of badger at the bottom of the fence so they can continue to move within their territorial boundaries. Open excavations and/or trenches will either be covered to avoid access by wildlife or a means of escape installed to facilitate egress at the end of each working day. All pipes will be capped overnight to prevent access by mammals. 	Construction Phase
TFA18	11.7.6	All land based elements of the Proposed Project	<p><u>Farmland Birds</u></p> <ul style="list-style-type: none"> Grassland sward along the proposed construction corridor will be reinstated. Sections of hedgerows and treelines which are removed to facilitate construction will be replanted. Vegetation clearance and topsoil stripping will be programmed to be undertaken outside of the breeding bird season between 1 March and 31 August. If any small pockets of vegetation must be cleared within the breeding season, due to circumstances beyond the control of the applicant, then an experienced ornithologist, appointed by Irish Water or its agents, will report to the ECoW and inspect the vegetation to check for breeding birds. These checks will be done no more than three days ahead of the required clearance, and if a nest is found, suitable buffers will be cordoned off and clearly marked. The ECoW shall ensure that no works including fencing, vegetation clearance or topsoil stripping shall occur within a cordoned area. Nest boxes and nest cavities shall be incorporated into the building design of the proposed Abbotstown pumping station and proposed regional WwTP. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
TFA19	11.7.6	Proposed orbital sewer route	<p><u>Other Species Groups</u></p> <ul style="list-style-type: none"> A disturbance licence shall be obtained from NPWS. Smooth newts shall be captured at Coldwinters under licence during the spring migration period. Smooth newts shall be relocated from affected ponds to an alternative pond at Coldwinters prior to the commencement of construction. All works under licence will be monitored as necessary by the appointed ECoW throughout the Construction Phase. The pond within the Proposed Project boundary from which newts are removed must be drained down and remain unavailable to smooth newts throughout the Construction Phase until the land is reinstated. 	Construction Phase
TFA20	11.14.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> An ECoW will be appointed by Irish Water or its agents to monitor and regularly inspect the implementation of all ecological mitigation contained in this EIAR, associated NIS and the Outline CEMP, and to act as a liaison between Irish Water and ABP in the discharge of planning conditions relating to biodiversity. A detailed CEMP will be developed by the appointed contractor(s). An Outline CEMP and Outline Surface Water Management Plan have been developed and are included as part of the Planning Documentation for the Proposed project. This includes the best practice measures outlined in this Chapter, and site specific mitigation measures, where identified. All site operatives shall be fully informed in advance of any works of the ecological sensitivities in the surrounding environment, and the required mitigation measures will be in place in advance of works. 	Construction Phase
TFA21	11.14.1	All land based elements of the Proposed Project	<p><u>Suspended Solid Pollution</u></p> <ul style="list-style-type: none"> The reduction and prevention of suspended solid pollution will be required during all elements of the Proposed Project works, including: <ul style="list-style-type: none"> During site preparation and clearance works (cut/fill operations); Where trenchless operations are undertaken; Where the culvert system at location 5 is constructed along with the new proposed access road to the proposed WwTP; Where site proposed access roads are constructed; Where the proposed WwTP and Abbotstown pumping station construction works are undertaken, and Where proposed temporary construction compounds are temporarily installed. As such, this Section outlines best practice mitigation measures for the control of suspended solid pollution to the freshwater environment, and site-specific measures, where required. The key factors in erosion and sediment control are to intercept and manage runoff. This limits the potential for soils to be eroded and enter streams in runoff and traveling downstream to marine protected areas. Best practice measures to be implemented are: <ul style="list-style-type: none"> The appointed contractor(s) will develop the Outline Surface Water Management Plan and Sediment Control Plan, which will form part of the CEMP, in advance of any construction activities commencing for the Proposed Project (the principles of which are detailed in the Outline CEMP). The Surface Water Management Plan will adopt mitigation proposed in Chapter 17 Hydrology and Hydrogeology of this EIAR; 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<ul style="list-style-type: none"> All discharges to surface waters will be suitably treated prior to discharge. There will be no direct discharge of surface water from any element of the works without proper attenuation and treatment. The level of suspended solids in any discharges to fisheries waters, e.g. the Tolka River (or waters with fisheries potential e.g. the Santry River, Mayne River and Cuckoo Stream), as a consequence of construction works shall not exceed 25mg/l¹ nor result in the deposition of silts on gravels or any element of aquatic flora and fauna as per IFI guidelines (IFI 2016). If baseline suspended solid levels in pre-construction monitoring show that these rivers exceed this threshold, the baseline suspended solid levels will not exceed baseline levels during the Construction Phase of the Proposed Project; Pathways of preferential flow are identified within the works area in the Outline Surface Water Management Plan, and the appropriate mitigation measures will be undertaken by the appointed contractor(s), as presented, to ensure contaminated water from the site is treated before being discharged to the watercourse. Pathways of preferential flow on a small scale are determined by the topography of the site and are subject to change as works are undertaken, and therefore will need to be determined on-site by the appointed contractor(s), and agreed with the ECoW. All vulnerable infrastructure, e.g. the proposed WwTP and Abbotstown pumping station, are to be located in Flood Zone C – low risk. Similarly, all proposed temporary construction compounds, storage areas and launch pits (for trenchless technologies) will be located, where possible, within Flood Zone C – low risk. The following best practice guidelines for erosion and sediment control will be adhered to during the Construction Phase, and will inform appropriate mitigation. These guidelines are largely based on publications by CIRIA (Murnane et al. 2006), Goldman et al. (1986), Murphy (2004) and IFI (2016): Sediment traps or settlement ponds shall be provided for all works near watercourses during construction in order to attenuate and treat all water prior to discharge, and will adhere to the IFI guidelines (IFI 2016); Works within and adjacent to watercourses will only be conducted during forecast low flow periods; The design of the outfalls and settlement ponds and the construction Method Statements (MSs) for their installation shall be agreed with IFI prior to construction; Topsoil stripping near to any watercourses will be undertaken in dry weather conditions, and all stockpiles will be located further than 100m from a watercourse or removed off site. Stockpiles within 200m of a watercourse will be covered; Stripped areas will be revegetated, particularly cut and fill slopes and disturbed slopes, as soon as possible (for example by use of hydroseeding (larger areas) and replacement of turves (smaller areas)). Mulches or other organic stabilisers will be used to minimise erosion until vegetation is established on sensitive soils. Hydroseeding shall not be carried out in close proximity to water, and these areas will be seeded by hand or placement turves used; Runoff velocities and erosive energy will be minimised by maximising the lengths of flow paths for precipitation runoff, constructing interceptor ditches and transport, and lining unavoidably steep interceptors or conveyance channels with low gradients to minimise secondary erosion and ditches with filter fabric, rock 	

¹ The standard is expressed as an average concentration over a period of 12 months and does not apply to suspended solids with harmful chemical properties. European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988).

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>or polyethylene lining to prevent channel erosion;</p> <ul style="list-style-type: none"> • The crossing of watercourses at natural fords will not be permitted due to the uncontrolled sedimentation that can be generated; • The creation of fords on streams and rivers through the introduction of stone shall be prohibited; • There will be designation of appropriate locations set back from watercourses and methods for stockpiling, for example, soil, aggregates and chemicals; • Heavy vehicle movements will be restricted adjacent to watercourses and tidal areas in order to avoid inputs; • Runoff from stockpiles will be collected via a shallow toe-drain which will discharge to a settlement pond. Settlement ponds will be designed and sized to adequately attenuate suspended solid runoff from stockpile areas. Sediment build-up will be removed at regular intervals by manual means only and will be treated at an appropriately authorised waste management facility; • Existing and proposed surface water drainage and discharge points shall be mapped on a site plan including the location of existing and proposed measures such as monitoring points, sediment traps, settlement lagoons and hydrocarbon separators; • Site access roads shall be constructed of a non-friable, clean, well-graded material, typically of NRA Clause 804, to ensure the material does not break down under loading; • No water that has gathered on-site from any source (groundwater, surface water or precipitation) will be pumped directly to the surface water drainage network. All water intercepted on-site must be attenuated in sediment control structures for sufficient time to ensure that sediment concentrations are appropriate before discharge; • No in-stream structures, strictly no temporary stream crossings or temporary culverting shall take place without the prior agreement of IFI; and • Excavations for foundations will be carried out so as to minimise sediment runoff. • Chapter 17 Hydrology and Hydrogeology provides further specification for suspended solid control. • Site specific measures to be implemented are as follows: <ul style="list-style-type: none"> • The northern boundary of the proposed WwTP site is set back from the Cuckoo Stream. Earth mounds and planting will occur within 50m of the stream. However, these works will not take place within 20m of the stream, as riparian vegetation plays a crucial role in removing sediment in over-land flows. Riparian vegetation is a vital component of a healthy stream ecosystem and will be preserved. The site will be stripped and earth mounds will be formed as work progresses along the site boundary. These mounds/planting will provide a buffer to further protect the Cuckoo Stream in conjunction with the maintained 20m riparian buffer. Earth mounds will be revegetated as soon as possible, e.g. by use of hydroseeding (for larger areas). Broadleaves will be planted in this area adjacent to the Cuckoo Stream to encourage a mixture of dapple and shade conditions benefiting in-stream flora and fauna; • Where trenchless crossing works take place, i.e. within 200m of the Tolka River and crossing under the Santry River, Mayne River and Cuckoo Stream, a riparian buffer strip at least 20m in width (from the edge of the watercourse on either bank) shall be clearly marked and maintained, to protect the watercourse from any potential impact. Reception and launch pits from trenchless operations will not be located within this 	

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>20m buffer. Silt fencing will be installed along the 20m buffer line to isolate the works area from the relevant watercourses. A detailed Pollution Control Plan (PCP), Emergency Response Plan (ERP) and MS will be drafted in agreement with IFI and other relevant authorities;</p> <ul style="list-style-type: none"> Suspended solid pollution associated with culvert system installation will be avoided by use of a clear span structure if possible or, where a bottomless box culvert is installed, will follow IFI guidelines (IFI 2016) for works in or adjacent to watercourses. Mitigation will include protection of the riparian bank structure, minimisation of sedimentation to the watercourse by use of silt fencing, sand bags or other sediment reducing measures, and minimisation of in-stream activity; and The appointed contractor(s) will inspect and monitor the water quality of surface waters near any works, paying particular attention to suspended solids and turbidity levels. This monitoring will form part of the CEMP for the works. 	
TFA22	11.14.1	All elements of the Proposed Project	<p><u>Trenchless Crossing of Watercourses</u></p> <ul style="list-style-type: none"> The primary mitigation measure for the protection of the freshwater environment during the Construction Phase of the Proposed Project is the use of trenchless techniques to cross the watercourses. This approach will protect the streams and downstream marine protected areas from the significant impacts of traditional trench based methods. Nevertheless, there are some risks associated with the various trenchless methods, and mitigation for these is outlined below: <ul style="list-style-type: none"> Reception and launch pits for the directional drilling process shall not be located within 20m of any watercourse; Direct disposal of arisings from excavations and from groundwater dewatering activities to the nearby watercourses will not be allowed. Any discharge of such water, after proper treating/de-silting, will be discussed and agreed with the landowner, and if necessary, discharge consent will be acquired from the concerned authority (EPA, IFI) prior to the commencement of work; If drilling fluids are being returned for cleaning and reuse or recirculation through a temporary fluid return line, pneumatic leak testing shall be carried out to confirm the integrity of the return line; Spent drilling fluids including separated drill materials shall be contained in secure bunded areas within selected proposed temporary construction compounds for off-site disposal at a licensed disposal facility; To avoid reception and launch pits being open for longer than is necessary, all ducting required shall be available on-site prior to commencement of pit excavation; Marker posts will be placed at each side of the streams/rivers identifying the location of the crossing; Stream crossing works, including preparatory works, shall be carried out under the supervision of a suitably qualified ECoW; Upon completion of works at each stream crossing, the site shall be cleaned and any waste disposed of to a suitably licensed facility; Pipes, once in place, will be hydrostatic/water tested to design capacity to validate pipe integrity; and The appointed contractor(s) will inspect and monitor the water quality of surface waters near trenchless works, paying particular attention to signs of blowout and silt plumes. In the event of a bentonite break-out, then the site will be monitored for chemicals and macroinvertebrates to ensure no residual impacts 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			following clean-up operations. This monitoring will form part of the CEMP for the works.	
TFA23	11.14.1	Proposed access road to the proposed WwTP	<p><u>Construction of Culvert System</u></p> <ul style="list-style-type: none"> There is one culvert system proposed as part of the Proposed Project. This culvert system will be located on the proposed access road to the proposed WwTP at Clonshagh, and will cross the Mayne River at survey location number 5. The following mitigation has been included within the design of the Proposed Project, which is in line with the IFI's Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), in particular Section 6 (River and Stream Permanent Crossing Structures). During the Construction Phase, the appointed contractor(s) shall ensure that: <ul style="list-style-type: none"> In-stream works shall be undertaken during the period 1 July to 30 September, as required by IFI guidelines (IFI 2016), to avoid accidental damage or siltation of spawning beds, unless otherwise specified by IFI during consultations in advance of works. This shall include preparatory work near all watercourses and all river bank works; Bank protection works will be required (e.g. upstream and downstream of the new structure) to ensure no undercutting or destabilisation of either the structure or riparian bank areas occurs. Rock armour will be installed and will include large enough boulders, strategically positioned to ensure they cannot be undercut; and Bridge and culvert design has avoided impacting on flow regimes and river bed profiles upstream and downstream of the structure and has allowed for unimpeded movement of fish by ensuring a minimum depth of water within the structure. The river substrate will be maintained. The design will ensure that the flow regime for this crossing, which has the potential to support salmonids in the future, shall allow for the unimpeded passage of fish upstream and downstream by having the invert buried 500m below bed level. Due to the width of the river, and to prevent the foundations of these structures encroaching on the river, a precast box culvert will be installed at this location. 	Construction Phase
TFA24	11.14.1	All elements of the Proposed Project	<p><u>Pollution with Other Substances</u></p> <ul style="list-style-type: none"> Where the construction works are close to a watercourse, and at all watercourse crossings, the following best practice guidelines, adapted from Chilibeck et al. (1992), NRA (2005b) and Murphy (2004), shall be followed: <ul style="list-style-type: none"> Fuels, lubricants and hydraulic fluids for equipment used on the construction site should be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to Best Practice Guidelines BPGCS005 – Oil Storage Guidelines (Enterprise Ireland); Best Practice Guidelines BPGCS005 – Oil Storage Guidelines (Enterprise Ireland); Fuelling and lubrication of equipment shall not be carried out on-site within 20m of any watercourse or drainage ditch; Any spillage of fuels, lubricants or hydraulic oils shall be immediately contained and a pollution control kit used. The contaminated soil shall be removed from the site and properly disposed of; In the event of any spillage of fuels, lubricants or hydraulic oils, the ECoW will be notified immediately; Oil booms and oil soakage pads shall be kept on-site to deal with any accidental spillage, and replenished immediately once used; 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<ul style="list-style-type: none"> Waste oils and hydraulic fluids shall be collected in leak-proof containers and removed from the site for disposal or recycling; All pumps using fuel or containing oil shall be locally and securely banded and shall not be located within 20m of a watercourse or drainage ditch; and Prior to any in-stream works, the appointed contractor(s) will ensure that all construction equipment is mechanically sound to avoid leaks of oil, fuel, hydraulic fluids and grease. 	
TFA25	11.14.1	All elements of the Proposed Project	<p><u>Use of Concrete</u></p> <ul style="list-style-type: none"> Concrete will be required as part of works undertaken to construct the proposed WwTP at Clonshagh, to construct the proposed Abbotstown pumping station and at manholes (at bends, changes in gradient and at specific locations along the proposed pipeline routes) and chambers. Mitigation in the form of avoidance of the use of concrete has been built into the design of the Proposed Project for the culvert discussed above, with a precast box culvert utilised. It is possible that the chosen pipe material may be concrete; however, the suitability of the particular materials will be considered further at the detailed design stage. Therefore, mitigation proposed here, includes for the scenario in which the pipe material is concrete. The use and management of concrete, which has a deleterious effect on water chemistry and aquatic habitats and species, in or close to watercourses shall be carefully controlled to avoid spillage. Where the use of concrete near water cannot be avoided, the following control measures will be employed: <ul style="list-style-type: none"> When working in or near the surface water and the application of in situ materials cannot be avoided, alternative materials such as biodegradable shutter oils shall be used; Any plant operating close to the water will require special consideration of the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe. Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters; Placing of concrete near watercourses will be carried out only under the supervision of the ECoW; There will be no hosing of concrete, cement, grout or similar material spills into surface water drains. Such spills shall be contained immediately and runoff prevented from entering the watercourse; Concrete waste and wash-down water will be contained and managed at Clonshagh and Abbotstown, where concrete works are proposed, and sediment allowed to settle out and reach pH neutral, before clarified water is discharged back to a watercourse or removed off-site; On-site concrete batching and mixing activities will not be allowed and will be specifically prohibited in the contract documents; Washout from concrete lorries, with the exception of the chute, will not be permitted on-site and will only take place at the batching plant (or other appropriate facility designated by the manufacturer); Chute washout will be carried out at designated locations only. These locations will be signposted. The concrete plant and all delivery drivers will be informed of their location with the order information and on arrival on-site; Chute washout locations will be provided with appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks, and The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			means of one of the Construction Phase settlement facilities) or alternatively disposed of as waste to a licensed facility.	
TFA26	11.14.1	All elements of the Proposed Project	<p>Surface Water Management along the Route</p> <ul style="list-style-type: none"> Surface water management measures will be installed along the proposed pipeline routes in order to manage runoff through the wayleave in which construction is occurring. There will be shallow toe-drains located along the edges of the wayleave in order to catch runoff from the stockpiles of topsoils and subsoils resulting from the digging of the trenches for the pipeline. These toe-drains will drain into temporary settlement ponds which will be located along the proposed pipeline routes at regular intervals as required as construction progresses, and shall be sized based on calculations of hourly runoff volumes based on a 1 in 10 year rainfall event. These settlement ponds will collect surface waters flowing over the wayleave and into the toe-drains. The routes will be split into 19 separate sections for the purposes of surface water management. The Surface Water Management Plan provides details of the volumes of attenuation to be provided at each section along the proposed route, as well as outfall information. Sediment will be removed from the surface water prior to discharge through measures as per the guidance on control of water pollution from construction projects (CIRIA 2001) (for example silt screens or hay bales). The treated surface water will be discharged to local watercourses, ditches or road drainage as deemed suitable at locations along the pipeline route. There will be no direct discharge of surface waters from the site without prior attenuation and treatment. During pipeline construction, trenches shall not be left open overnight or for extended periods of time. Trenches shall only be dug to lengths which can be constructed each day. All trenches will be backfilled once the section of pipe is installed. This will prevent pooling of surface waters within open trenches. 	Construction Phase
TFA27	11.14.1	Proposed temporary construction compounds	<p>Proposed Temporary Construction Compound Areas Including Office and Welfare Facilities</p> <ul style="list-style-type: none"> There will be a number of proposed temporary construction compounds (including those at the proposed WwTP and Abbotstown pumping station sites) as part of the Proposed Project. The following mitigation will apply together with suspended solids pollution measures outlined above: <ul style="list-style-type: none"> Sites for storage areas, machinery depots, site offices, construction of temporary access roads or the disposal of spoil will be located at least 50m from any watercourse; All materials will be stored in compounds and shall be stored in a manner that is safe and in line with best industry practice. Fuels and chemicals will be stored in an appropriately bunded area/with double skinned tanks. All potential harmful substances will be stored in accordance with the manufacturer's guidelines; All aspects of the works will be watertight, which will include the pipelines, tanks, storage containers and pump sumps; Wheel washing facilities will be installed at the entrance to the proposed WwTP site and other locations deemed appropriate; Invasive species biosecurity measures will be installed at the entrance to the proposed WwTP site, proposed Abbotstown pumping station site and all proposed temporary construction compounds. This will adhere to the Biosecurity Protocol for Field Survey Work (IFI 2010); and Foul drainage from compounds will be disposed of through the provision of a direct connection to a local sewer or be serviced by means of a waste water storage tank, which will be emptied by means of a suction 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			tanker and the wastewater shall be disposed of to a licenced facility.	
TFA28	11.14.1	All elements of the Proposed Project	<p><u>Invasive Species</u></p> <ul style="list-style-type: none"> No invasive species were found during freshwater surveys within the proposed pipeline routes. However, invasive species records are known from the wider catchments of the Tolka River and Santry River. There may be a risk associated with the spread of, or introduction of, invasive species via soil or other materials which will be imported to the site during construction work, or via machinery or equipment. The following mitigation shall be adhered to: <ul style="list-style-type: none"> All plant and equipment employed on the proposed construction corridor (e.g. excavator, footwear) will be thoroughly cleaned using a power washer unit prior to arrival on-site, and prior to leaving site, to prevent the spread of invasive aquatic/riparian species such as Japanese knotweed in accordance with the Office of Public Works' (2011) Environmental Standard Operating Procedures and the IFI's (2010) Biosecurity Protocols for Field Survey Work. A sign-off sheet must be maintained to confirm cleaning; Staff involved in the works shall be informed as to the presence of invasive species in the area downstream along the Tolka River and Santry River. All staff working on the Proposed Project shall be familiar with the sections within the document Guidelines on the Management of Noxious Weeds and Non-Native Plant Species on National Roads (NRA 2008) which detail the treatment necessary for each of the aforementioned species, together with the required reporting procedure if encountered. All site staff will also be familiar with Information and Guidance Document on Japanese Knotweed Asset Strategy and Sustainability (Irish Water 2012); and If invasive species are found within the works area during the course of construction works, a buffer zone will be marked around the invasive species, and plant and equipment that could transport the species within the site will be excluded. This will be reported to the ECoW, who will develop a plan of action in association with the appointed contractor(s). The significance of the buffer will be explained to machinery operators. 	Construction Phase
TFA29	11.14.1	All elements of the Proposed Project	<p><u>Environmental Incidents and Accidents</u></p> <ul style="list-style-type: none"> An emergency operating plan shall be established to deal with incidents or accidents during construction that may give rise to pollution within any watercourse. This shall include means of containment in the event of accidental spillage of hydrocarbons or other pollutants (including, for example, oil booms and soakage pads); Throughout all stages of the Construction Phase of the Proposed Project, the appointed contractor(s) shall ensure that good housekeeping is maintained at all times and that all site personnel are made aware of the importance of the freshwater environments and the requirement to avoid pollution of all types; All hazardous materials on-site will be stored within secondary containment designed to retain at least 110% of the storage contents; Temporary bunds for oil/diesel storage tanks will be used on the site during the Construction Phase of the Proposed Project, as appropriate; Safe handling of all potentially hazardous materials will be emphasised to all construction personnel employed during the Construction Phase of the Proposed Project, and an ERP shall be in place in case of accidental spillage; Raw or uncured waste concrete will be disposed of by removal from the site; Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>removed from the site and properly disposed of; and</p> <ul style="list-style-type: none"> There shall be no discharge of un-attenuated water to the adjacent marine environment. 	
TFA30	11.14.2	Proposed WwTP	<ul style="list-style-type: none"> The primary discharge from the proposed WwTP at Clonshagh will be to the marine environment, and mitigation for associated impacts must be assigned as per Table 24.5. 	Operational Phase
TFA31	11.14.2	All elements of the Proposed Project	<ul style="list-style-type: none"> To mitigate against the potential for pipe failure or leakage during the Operational Phase, the proposed orbital sewer route design and construction will be to best practice requirements, as outlined in Chapter 4 Description of the Proposed Project. This includes the reduction in the number of pipe joints, which mitigates the potential for operational leakage. All pipelines will be subject to watertightness testing prior to sewage being passed through them. Flow monitors will be installed on the rising main leaving the proposed Abbotstown pumping station and on the inlet to the proposed WwTP. These will identify possible pipe bursts or significant leaks on rising mains, as this leads to a pressure drop off in the main which is monitored. 	Operational Phase
TFA32	11.14.2	Proposed WwTP and Abbotstown pumping station	<ul style="list-style-type: none"> A Sustainable Drainage System shall be installed at the proposed WwTP site and the proposed Abbotstown pumping station site to manage water from hard surfaces from entering surface waters un-attenuated and untreated. Attenuation systems will be in place to limit discharges from the site to the greenfield site flow rate. The purpose of the Sustainable Drainage System will be to prevent sediment, grit and hydrocarbons from entering watercourses. Hydrocarbon and grit interceptors shall be located at outfalls to watercourses from hard standing areas of the proposed WwTP. Design of those interceptors shall conform to the recommendations of Control of pollution from highway drainage discharges (R142) (Luker and Montague 1994). 	Operational Phase
TFA33	11.14.2	Proposed WwTP	<ul style="list-style-type: none"> Surface water from the WwTP will be discharged to the Cuckoo Stream after attenuation and treatment. Treatment will include interceptors and attenuation tanks before discharge to the Cuckoo Stream. Surface water from the proposed WwTP's roof will be collected in grey-water tanks. It will then either be recycled on the site, or discharged into the surface water drainage downstream of the fuel interceptors. Interceptors will require proper maintenance in order to function properly. Irish Water shall adopt a program of regular cleaning, maintenance and inspection of the Sustainable Drainage System and associated interceptors to ensure they are functioning correctly. 	Operational Phase
TFA34	11.14.2	Proposed WwTP and Abbotstown pumping station	<ul style="list-style-type: none"> The proposed WwTP and the proposed Abbotstown pumping station will be designed with secondary containment to ensure that, in the unlikely event of leakage, the untreated wastewater is fully contained on-site. 	Operational Phase

24.10 Landscape and Visual

Table 24.8: Landscape and Visual Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
LV1	12.7	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The mitigation strategy outlined in this Table will be incorporated by the appointed contractor(s) into the final design proposals and layout for the Proposed Project. The strategy will be incorporated into a Landscape Masterplan Statement, which will be developed as part of the overall CEMP by the appointed contractor(s) and will be approved by Irish Water. 	Construction Phase/ Operational Phase
LV2	12.7	Proposed pipeline routes	<ul style="list-style-type: none"> For the pipeline aspects of the Proposed Project, the main landscape mitigation measure will be the reinstatement, insofar as possible, of ground cover, trees or hedgerows disturbed during the Construction Phase. Depending on the season in which construction works take place, it may be possible to store and replace sections of dormant hedgerows once work on a particular section of the proposed pipeline routes is complete. In other instances, new planting will be undertaken and this will utilise advanced nursery stock so as to reduce the timeframe over which any temporary landscape and visual impacts from vegetation loss are experienced. 	Operational Phase
LV3	12.7	Proposed WwTP	<p><u>Site Layout</u></p> <ul style="list-style-type: none"> Following detailed consideration, a hybrid solution was devised which maintained buffer zones between the built edge of the Proposed Project and the boundaries (north-east and west), which will accommodate planted berms for visual screening. This design will be carried through to the Construction Phase by the appointed contractor(s). The tall buildings have been arranged to present a consolidated, utilitarian, but well-spaced, building line to the southern boundary (next to the East-West Distributor Road and lands zoned for a future IDA Business Park). The arrangement of built elements within the Proposed Project was also 'loosened' to allow for internal green spaces and tree lines to visually divide the various precincts and soften the intensive industrial character of the site. Internal green spaces have been identified and will be managed as green spaces and planted areas until future needs require otherwise. 	Operational Phase
LV4	12.7	Proposed WwTP	<p><u>Colour Treatment and External Finishes of Buildings</u></p> <ul style="list-style-type: none"> The colour scheme for buildings on the proposed WwTP site has focused on reducing the perceived bulk and massing of the largest structures and blend them with the background context to reduce visual prominence. The final building heights will be a maximum of 18m. The building colour scheme that shall be applied to the proposed WwTP site is described below: <ul style="list-style-type: none"> A dark plinth around the base of all buildings and tanks (approximately 3m) to tie in with the hedgerow pattern and diminish the perceived vertical height of buildings; A medium tone band around the central portion of buildings (up to about 8m) to tie in with the surrounding mature tree lines and field patterns and also to provide a transition between the dark and light tones; A light tone top to the tallest buildings (9m+) to reduce the degree of contrast against the sky when seen from surrounding receptor locations – thereby diminishing overall visual presence and perceived vertical 	Operational Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>massing; and</p> <ul style="list-style-type: none"> 'Horizontal Disruption' of long facades (20m+) by extending the dark tone plinth to the top of those buildings for half of the length of the facades that run perpendicular to site boundaries. Again, this is intended to diminish the perceived lateral bulk of buildings in a subtle way using solid and shade. 	
LV5	12.7	Proposed WwTP	<p><u>Perimeter Screening</u></p> <ul style="list-style-type: none"> In relation to visual screening, for those boundaries of the proposed WwTP site adjoining the rural context to the east, north and west, a series of flowing organic embankments will be planted with dense bands (approximately 15m to -20m wide) of hedgerow tree species and these will provide visual screening of the Proposed Project. The embankments will rise to a maximum height of 4m with gentle outward facing slopes in order to blend with the flat to mildly undulating terrain that surrounds the proposed WwTP site. This will be achieved using a buffer zone width of approximately 60m. Between the mounds, specimen trees will be provided, rising from a more open wildflower meadows context. The dense but linear bands of hedgerow vegetation topping the mounds will reference the hedgerows and tree-lined field boundaries of the agricultural fields in the vicinity. The meadow and specimen trees between the dense sections of hedgerow planting will reference the parkland aesthetic of the nearby demesne landscapes to the east. In deliberate contrast to the organic and semi-rural boundary treatments of all other site boundaries, the southern boundary will be presented as a bold architectural landscape treatment in order to tie in with the future development of the lands to the south (future IDA Business Park). The buildings along this boundary of the proposed WwTP site will be aligned to provide a consolidated facade to front the future East-West Distributor Road between the proposed WwTP site and the IDA Business Park lands. The buildings will be set back to a sufficient degree in order to reduce their perceived height and bulk within the future street scene. This area will incorporate geometric blocks of dense ornamental shrubs and a 'bosque' or grid of tall narrow specimen trees such as poplars. A plinth wall and system railing will be provided and will be an attractive, subtle and secure physical boundary. Semi-mature tree planting (minimum 14cm to 16cm girth) will be used for all planting along the southern boundary and internal treelines to aid early establishment. Mixed age classes ranging from semi-mature (minimum 14cm to 16cm girth) down to feathered whips (approximately 1.25m tall) will be utilised for perimeter berms in order to establish a dense screen over a longer period of time. It is envisaged that it will take up to seven years for all planting to reach a maturity that will afford the intended screening effectiveness. 	Operational Phase
LV6	12.7	Proposed WwTP	<p><u>Internal Planting</u></p> <ul style="list-style-type: none"> Additional treelines and grids will be provided within the southern half of the proposed WwTP site running both perpendicular and parallel to the southern boundary, surrounding car parks and screening tanks. Treelines will also be provided to link between the southern and northern boundaries and to act as both a division of precincts within the proposed site and as a reference to hedgerows and treelines that currently exist within, or connect to, the boundaries of the proposed site. A high degree of visual permeability will be provided into this side of the site rather than presenting a barrier. These landscape treatments will all combine to give the impression of a campus-style development in order to blend with the future business park neighbours (IDA lands) to the south. The schematic of the landscape and visual mitigation concept is provided in Figure 12.4 Landscape and Visual Mitigation Concept, and the Landscape Masterplan is provided in Figure 12.5 Wastewater Treatment Plant 	Operational Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			Landscape Mitigation Plan in Volume 5 of this EIAR.	
LV7	12.7	Proposed Abbotstown pumping station	<p>Proposed Abbotstown Pumping Station Mitigation</p> <ul style="list-style-type: none"> The proposed Abbotstown pumping station will be designed and constructed to tie in with the architectural vernacular of the surrounding area. This will consist of a traditional-style structure that references the nearby St. Francis' Hospice building. Subtle screen planting will be provided around the perimeter of the proposed Abbotstown pumping station site and will also be employed to soften the appearance of security fencing. This will 'bed' the proposed site into the surrounding landscape structure. See Figure 12.6 Proposed Abbotstown Pumping Station for the Landscape Mitigation Plan for the proposed Abbotstown pumping station site. 	Operational Phase

24.11 Traffic and Transport

Table 24.9: Traffic and Transport Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
TT1	13.11.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> A detailed construction programme shall be developed that gives consideration to traffic flows and aims to avoid coincidentally high volumes of traffic using the same roads where possible. 	Construction Phase
TT2	13.11.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Deliveries to site will be scheduled outside of the peak traffic hours. 	Construction Phase
TT3	13.11.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> In the vicinity of school locations, restrictions on construction activities during the drop off and peak collection times shall be implemented in order to minimise disruption. 	Construction Phase
TT4	13.11.1	Proposed WwTP	<ul style="list-style-type: none"> A wheel wash will be installed and utilised by vehicles at the entrance to the proposed WwTP site. 	Construction Phase
TT5	13.11.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Roads used by construction traffic will be monitored visually for loose material and a road sweeper will be used to remove debris from construction routes when required. 	Construction Phase
TT6	13.11.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Materials leaving site will be assessed and covered where necessary to reduce dust impacts. 	Construction Phase
TT7	13.11.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The local communities and relevant stakeholders (such as An Garda Síochána) will be informed of construction activities and the scheduling of construction works in their area by leaflet drop by the appointed contractor(s). This is particularly relevant for the construction of the proposed pipeline routes. Cognisance will be taken of any feedback with regard to conflicts with local events and construction activities will be scheduled to minimise such conflicts where possible. 	Construction Phase
TT8	13.11.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Construction site entrances will be signposted appropriately in accordance with Chapter 8 of the <i>Traffic Signs Manual</i> (Department of Transport 2010). All entrances will be designed and managed such that Heavy Good Vehicles (HGVs) do not queue on the public road network. 	Construction Phase
TT9	13.11.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> It shall be noted that the Outline Construction Traffic Management Plan will be required to be further developed by the appointed contractor(s) following appointment and prior to commencement of construction. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
TT10	13.11.2	Proposed WwTP	<ul style="list-style-type: none"> Sufficient car parking spaces will be provided within the development to ensure that parking associated with the proposed WwTP does not occur along the public road network. 	Operational Phase
TT11	13.11.2	Proposed WwTP	<ul style="list-style-type: none"> Sufficient space will be provided along the proposed access road to accommodate three HGVs in advance of any proposed barrier (installed to restrict access into the proposed WwTP site) to prevent queuing. 	Operational Phase
TT12	13.11.2	Proposed WwTP/ Abbotstown pumping station	<ul style="list-style-type: none"> Stop markings and signage in accordance with the <i>Traffic Signs Manual</i> will be provided at the exits from the proposed WwTP and proposed Abbotstown pumping station sites. 	Operational Phase
TT13	13.11.2	Proposed WwTP	<ul style="list-style-type: none"> Pedestrian and cycling facilities will be provided within the proposed WwTP site. Pedestrian and cycling routes will tie into existing facilities on the public road network where possible. 	Operational Phase
TT14	13.11.2	Proposed WwTP	<ul style="list-style-type: none"> Measures encouraging the use of sustainable modes of transport to access the proposed WwTP will be implemented where possible. Such measures may include: <ul style="list-style-type: none"> tax saver commuter tickets; car sharing options; and the scheduling of shifts such that start and end times do not coincide with peak traffic flows on the network. 	Operational Phase
TT15	13.11.2	Proposed WwTP/ Abbotstown pumping station	<ul style="list-style-type: none"> Appropriate visibility splays will be provided at entrances to the proposed WwTP site and proposed Abbotstown pumping station. 	Operational Phase
TT16	13.11.2	All land based elements of the Proposed Project	<ul style="list-style-type: none"> A Stage 2 Road Safety Audit will be carried out at the detail design stage. 	Operational Phase
TT17	13.11.3	All land based elements of the Proposed Project	<p><u>Road Safety</u></p> <ul style="list-style-type: none"> The proposed entrance to the proposed WwTP is proposed from the R139 Road. This junction will operate as a left-turn entry-only priority junction to minimise conflicts caused by traffic attempting to turn right across the R139 Road. (It is recommended that this junction be omitted should the remainder of the Malahide Road Realignment Scheme be constructed). The proposed exit from the proposed WwTP will be an exit-only priority junction onto Clonshaugh Road. It is recommended that visibility splays of 120m from a set-back of 3m are provided in accordance with the TII's <i>Geometric Design of Junctions</i> (DN-GEO-03060) (TII 2017). A Road Safety Audit was prepared for the proposed new entrance and the internal road layout for the proposed WwTP the main points that arose will be incorporated into the design, as follows: <ul style="list-style-type: none"> Drainage of the proposed WwTP will be fully designed at detailed design stage by the appointed contractor(s) with the responsibility for Design under the Design Build or Design Build Operate Contract; The proposed access junction to the proposed WwTP has been redesigned with a compound curve on the western edge of the access road to provide additional margins of safety for large articulated vehicles to 	Operational Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>safely turn. Refer to Figure 13.3 Proposed Left-Turn Site Access Junction on R139 Road and Figure 13.4 Proposed Left-Turn Site Exit on Clonshaugh Road. Anti-skid surfacing will be provided at both junctions and to be developed at detailed design stage by the appointed contractor(s). Detailed design development will include liaison with FCC with regards to the future operation of the bus lane along the R139 Road. Following these discussions, the detailed design of this junction will take account of FCCs plans for public transport in the area. It is further proposed that a Stage 2 Road Safety Audit will be undertaken of the junctions on completion of the detailed design;</p> <ul style="list-style-type: none"> • Boundary treatments and landscaping will be developed at detailed design to ensure that the required visibility splays are maintained; • Gates will be provided at both the proposed access and egress junctions in order to restrict unauthorised access to the proposed WwTP. The location of the gates at the proposed access will be located to ensure that vehicles waiting to access the proposed WwTP will not impact on the through movements along the R139 Road. Details of these gates will be developed at detailed design stage, with proposals to be included within the scope of the Stage 2 Road Safety Audit; • Access to Craobh Chiaráin Gaelic Athletic Association Cub will be maintained. Details will be developed at detailed design stage, with proposals to be included within the scope of the Stage 2 Road Safety Audit; • Provisions for Vulnerable Road Users shall be developed at detailed design stage; • Lighting provision for the proposed WwTP and Abbotstown pumping station will be developed at detailed design stage and will be subject to the Stage 2 Road Safety Audit; and • A full review of existing signs and markings will be undertaken at detailed design stage. Additional signage and road markings will be provided at detailed design stage and will be included in the scope of the Stage 2 Road Safety Audit. 	
TT18	13.11.3	All land based elements of the Proposed Project	<p><u>Unplanned Events</u></p> <ul style="list-style-type: none"> • In the event of an incident occurring along any of the haul routes, the emergency diversion routes provided by An Garda Síochána will be utilised. As shown in Figure 13.1 Traffic Assessment Locations, the haul routes provide alternative options for the vehicles travelling to/from the proposed WwTP and proposed Abbotstown pumping station. • An incident at the proposed access or egress at the proposed WwTP or Abbotstown pumping station is similar to the occurrence of an incident along the haul routes. An Garda Síochána emergency diversion routes will be utilised and the facility operators will also contact the HGV drivers to inform them of the significance of the incident and the necessary protocol. • Where an incident occurs within the proposed WwTP or Abbotstown pumping station, existing emergency protocols in place at both facilities will be enacted and on-site personnel will respond in accordance with these protocols. • In order to estimate the likelihood of the above mentioned incidents, a Preliminary Health and Safety Risk Assessment is required. 	Construction Phase/ Operational Phase
TT19	13.11.3	Proposed WwTP	<p><u>Fear, Intimidation and Pedestrian Amenities</u></p> <ul style="list-style-type: none"> • A footway will be installed along the proposed access road, frontage to the site and internal roads within the proposed WwTP to facilitate Vulnerable Road Users. 	Operational Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
TT20	13.11.3	Proposed WwTP	<p><u>Severance</u></p> <ul style="list-style-type: none"> The Operational Phase traffic of the proposed WwTP will be distributed between the proposed access and egress and, therefore, will minimise the additional vehicles on the surrounding road network. 	Operational Phase
TT21	13.11.3	Proposed WwTP	<p><u>Parking Provision</u></p> <ul style="list-style-type: none"> 66 car parking spaces will be provided. Covered cycle parking will also be provided to allow for a minimum of 10 bicycles. 	Operational Phase

24.12 Air Quality, Odour and Climate

Table 24.10: Air Quality and Odour Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
AQ1	14.8	All elements of the Proposed Project	<ul style="list-style-type: none"> The preliminary design of the proposed Abbotstown pumping station and the proposed WwTP has incorporated several mitigation measures to minimise the impact of the Proposed Project. These include the following measures: <ul style="list-style-type: none"> All buildings at the proposed Abbotstown pumping station will be fully enclosed to contain all process activities; All gases at the proposed Abbotstown pumping station will be contained and treated in Odour Control Units; Stack height will be optimised for all emission sources to ensure that AQS are met; All tanks and structures will be covered at the proposed WwTP; Layout of the site of the proposed WwTP in Clonshagh has been optimised to promote effective dispersion of emissions; All activities in buildings at the proposed WwTP, including sludge intake in the SHC, will be fully enclosed; Odours at the proposed WwTP will be contained at source and will be treated in Odour Control Units; and Two-stage and three-stage Odour Control Units will be used, where necessary. 	Construction Phase/ Operational Phase
AQ2	14.8	All elements of the Proposed Project	<ul style="list-style-type: none"> The Construction Phase of the Proposed Project will be carefully managed and a Dust Management Plan will be formulated to ensure that construction activities are managed to minimise dust emissions associated with construction activities. In order to mitigate against air quality effects at receptors during the Construction Phase, Best Practice Measures will be adopted. These measures will include techniques such as those outlined in the IAQM's (2014a) Guidance on the Assessment of Dust from Demolition and Construction. The appointed contractor(s) will be required to produce an Air Quality and Dust Management Plan as part of their CEMP, including Best Practice Measures to control dust and, in particular, measures to prevent dust nuisance. The principal objective of the Air Quality and Dust Management Plan will be to ensure that dust emissions do not cause significant nuisance at receptors near the Proposed Project. The Air Quality and Dust Management Plan will include measures such as enclosure of material stockpiles, hard surfacing of heavily used areas, and covering of vehicles carrying spoil. Measures specific to maintaining AQS are presented in the following sections. 	Construction Phase
AQ3	14.8	All elements of the Proposed Project	<p><u>Site Planning</u></p> <ul style="list-style-type: none"> The design of the construction programme, the location and layout of the proposed temporary construction compounds and the storage of materials will be carefully planned to ensure that air quality impacts are minimised. The following is a summary of the main mitigation measures which will be employed in order to minimise emissions from the activity and the associated impacts of such emissions: <ul style="list-style-type: none"> Activities with potential for significant emissions will be located as far as possible from the nearest residential receptors; The areas of the proposed WwTP and Abbotstown pumping station sites which vehicles will be travelling on 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>will be hard-surfaced, thus significantly reducing the potential for dust emissions from the vehicles;</p> <ul style="list-style-type: none"> Proposed temporary construction compound areas will have hard standing areas to minimise dust generation from windblow; In order to minimise the potential for wind-generated emissions from material storage bays, these bays will be oriented away from the dominant wind direction; A training programme will be implemented for all contract staff to ensure that the objectives of the CEMP and the Air Quality and Dust Management Plan are fully understood; Fixed and mobile water sprays will be used to control dust emissions from material stockpiles and road and yard surfaces as necessary in dry and/or windy weather; A daily inspection programme will be formulated and implemented in order to ensure that dust control measures are being operated and managed effectively; and A dust deposition monitoring programme will be implemented during the Construction Phase in order to verify the continued compliance with relevant standards and limits. 	
AQ4	14.8	All land based elements of the Proposed Project	<p><u>Construction Traffic</u></p> <ul style="list-style-type: none"> Construction Phase traffic should be managed to ensure that air quality impacts associated with such traffic are minimised. In particular, the following will be observed: <ul style="list-style-type: none"> All vehicles will switch off engines when not active; Effective vehicle cleaning and specific wheel-washing will be undertaken on leaving site, and damping down of haul routes, where there is potential for carrying dust or mud off the Proposed Project site, will be in place; All loads entering and leaving Proposed Project sites will be covered; On-road vehicles must comply with set emission standards; Movement of construction traffic around Proposed Project sites will be minimised; Maximum speed limits of 5mph on unsurfaced haul routes and work areas, and 10mph on surfaced haul routes and work areas, will be enforced; and Haul routes will be inspected for integrity and the surfaces maintained to minimise the potential for dust emissions. 	Construction Phase
AQ5	14.8	All elements of the Proposed Project	<p><u>Site Activities</u></p> <ul style="list-style-type: none"> Site activities will be managed to ensure that dust impacts are minimised. Control measures include the following: <ul style="list-style-type: none"> All dust control equipment will be maintained in good condition and maintenance activities will be recorded; Water will be used as dust suppressant where applicable; Double handling of material will be avoided wherever reasonably practicable; Loaded bins and skips will be covered or enclosed; Drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment will be minimised, and fine water sprays will be used on such equipment, wherever appropriate; 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<ul style="list-style-type: none"> Mixing of cement, grout and other similar materials will take place in enclosed areas remote from Proposed Project site boundaries and potential receptors; Slopes on stockpiles will be no steeper than the natural angle of repose of the material and a smooth profile will be maintained; Stockpiles will be located away from sensitive receptors as far as practicable; Bulk cement and other fine powder materials will be delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overflowing during delivery; and Any runoff water from dust suppression activities will be disposed of in accordance with the legal requirements. 	
AQ6	14.8	Proposed Odour Control Units, Proposed WwTP, Proposed Abbotstown pumping station	<ul style="list-style-type: none"> Odour abatement systems will be designed to ensure that the odour emissions do not reach a level that could cause odour nuisance at or outside the Proposed Project site boundary. A list of abatement system options with proven effectiveness in the treatment of odours for the proposed WwTP and proposed Abbotstown pumping station is presented in Appendix A14.6 together with discussion of likely options for this facility. While the facility will not be formally regulated by the EPA, the same rigorous controls that would be applied by the EPA if an EPA Licence were in place, and which would be considered best practice, will be implemented at the facility. In particular, the performance of the Odour Control Units will be monitored during a comprehensive Process Proving Phase at commissioning and at regular intervals throughout the lifetime of the facility. Continuous monitors will be installed which monitor key elements of performance for the abatement systems, such as H₂S levels in the exit gases. Independent performance checks will be carried out by an ISO17025 accredited testing laboratory at quarterly intervals during the first two years of operation to verify the effectiveness of control measures and ongoing compliance with the required performance standards. The most important factor that allows for verification of performance, and acts as a check on the effectiveness of the procedures and controls in place, is the odour emission rate from the abatement systems at the facility, which has been determined from the dispersion model to not cause odour nuisance at the site boundary. This level has been determined in the assessment reported here. During operation, measurements on the odour level in the outlets from the abatement systems will be carried out to ensure that the performance of the odour abatement systems meets the design specifications and ensures that odour is not detectable at nuisance levels beyond the site boundary. 	Operational Phase

24.13 Noise and Vibration

Table 24.11: Noise and Vibration Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
NV1	15.7.1	All elements of the Proposed Project	<p>Noise and Vibration Management Plan</p> <ul style="list-style-type: none"> Prior to the commencement of any works, the appointed contractor(s) will prepare an NVMP. The NVMP will be developed as part of the overall Outline Construction and Environmental Management Plan developed by the appointed contractor(s) and approved by Irish Water. The NVMP will detail how the appointed contractor(s) will comply with the noise criteria set out in this EIAR and will deal specifically with construction activities in a strategic manner to remove or reduce significant noise and vibration impacts associated with the Construction Phase works. The NVMP will detail the provision and installation of localised acoustic screens, the best practice noise measures that the appointed contractor(s) will be required to adhere to for construction activities and the noise and vibration monitoring programme that the appointed contractor(s) will be required to undertake during the construction works. The NVMP will specifically address the following required mitigation measures as discussed in the report above. 	Construction Phase
NV2	15.7.1	Proposed orbital sewer route and outfall pipeline route (land based section)	<p>Open Trench Works</p> <ul style="list-style-type: none"> A standard construction site hoarding of 2.4m height will be used for open trench tunnelling works at the Premier Business Park, the former bank building at Collinstown Cross, Collinstown Cross Industrial Park, Emsworth House and the Educate Together National School as detailed in Tale 15.23 of Chapter 15 Noise and Vibration in Volume 3 part A of this EIAR. The Saturday noise criteria of 65dB LAeq,1hr will be adhered to for the open trench tunnelling works by ensuring that the noisier elements of the open trench works (excavation with rock-breaking and backfilling) are not carried out on Saturdays when works are within 60m of any NSR. 	Construction Phase
NV3	15.7.1	Proposed orbital sewer route, outfall pipeline route (land based section and marine section)	<p>Microtunnelling Works</p> <ul style="list-style-type: none"> A site hoarding of 2.4m height will be erected around the boundary of all proposed temporary construction compounds before the main noise generating works commence. Localised acoustic screens of 2.4m height shall be used within the proposed temporary construction compound for the TBM works at Clonshaugh Road, opposite St. Michael's House and at the R124 Road. The stationary noise generating plant shall be positioned in the proposed temporary construction compound as far away as possible from the nearest NSRs (R19, R21 and R31). The screens will be placed adjacent to the stationary noise generating plant on the dwelling house side of the works. The appointed contractor(s) shall prepare a detailed MS regarding the likely groundborne noise and vibration levels that will be generated as a result of the microtunnelling works once the specific details of the proposed plant items and construction methodologies are known. The appointed contractor(s), in liaison with Irish Water, shall determine an agreeable mitigation approach with the residents at the Cappagh Road cottage (R8), the house on Clonshaugh Road (R19) and the house on Golf 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>Links Road (R35) once the detailed construction methodology and phasing is determined and the MSs are available. This may include measures such as stopping works at night-time or providing for temporary re-housing for the residents during works.</p> <ul style="list-style-type: none"> The occupiers of these properties shall also receive prior warning, written and verbal, of the microtunnelling activities proposed by the appointed contractor(s). A structural integrity survey of the house at the Golf Links Road (R35) shall be completed before and after microtunnelling works are completed and will be shared with the property owner. The survey shall be completed by a certified structural engineer, and tell-tale crack monitors shall be used on any building faults identified during the initial survey. Vibration monitoring shall also be carried out at the house while microtunnelling works are within a minimum of 30m of the property boundaries. The Educate Together National School (R29) on the R107 Malahide Road shall receive prior warning, written and verbal, of the microtunnelling activities proposed and the potential impacts that the occupiers of the building may experience. The appointed contractor(s) shall investigate if the microtunnelling works can be completed during the holiday term when there are no occupants of the school building. 	
NV4	15.7.1	Proposed orbital sewer route	<p><u>Construction Works at Connolly Hospital</u></p> <ul style="list-style-type: none"> Before any construction works commence at Connolly Hospital the appointed contractor(s) will be required to set up a dedicated contact, in agreement with Irish Water, to communicate with the HSE Estates Department at Connolly Hospital. The appointed contractor(s) will be required to provide detailed MSs prior to any works commencing at Connolly Hospital which will show how the required standards will be met during the works. Once the precise equipment proposed to be used for the microtunnelling works is known by the appointed contractor(s), the specific noise and vibration impacts associated with the microtunnelling works shall be presented in detailed MSs and discussed directly with Connolly Hospital as part of the overall management strategy. Preliminary discussions with the HSE Estates Department indicated that this was a reasonable and agreeable approach and was also the approach that they had undertaken at the hospital for previous construction works. The MSs shall detail the permitted hours of work and the number of plant items that can operate simultaneously for microtunnelling works once within specified distances from the Hospital buildings. The appointed contractor(s) shall conduct attended and unattended noise and vibration monitoring at Connolly Hospital with the number of monitoring locations to be agreed with the HSE Estates Department. This monitoring data shall be used to assess compliance with the proposed criteria for all the construction works to be carried out near Connolly Hospital. The data shall also be used to assist the appointed contractor(s) to schedule work times and the intensity of plant items that will be permitted to operate simultaneously in close proximity to the Hospital buildings. All proposed temporary construction compounds shall have a 2.4m high site hoarding around their perimeter. In addition, the proposed temporary minor construction compound near the West Wing of Connolly Hospital will locate all stationary noise generating plant along the most north-westerly section of the compound as far away from the hospital buildings as possible. There will be local acoustic screens of 4m height positioned adjacent to all stationary noise generating plant on the hospital side of the plant items. 	Construction Phase
NV5	15.7.1	All elements of the Proposed	<ul style="list-style-type: none"> The construction works will be managed through the use of construction noise limits as detailed in Section Error! Reference source not found. of this Chapter which the appointed contractor(s) will work within. Best 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
		Project	<p>practice control measures, including choice of plant, scheduling of works on-site, provision of temporary acoustic screening, on-site noise monitoring and other measures, will be employed in order to ensure noise limits are not exceeded.</p> <ul style="list-style-type: none"> Best practice noise management procedures for the control of noise and vibration from construction activities as presented in BS 5228 will be followed. 	
NV6	15.7.1	All elements of the Proposed Project	<p><u>On-Site Work Practices</u></p> <ul style="list-style-type: none"> Avoid unnecessary revving of engines and switch off equipment when not required; Keep internal haul routes well maintained and avoid steep gradients; Use rubber linings in chutes and dumpers to reduce impact noise; Minimise drop height of materials; Start-up plant and vehicles sequentially rather than all together; Site equipment should be located away from noise sensitive areas, as much as is feasible; Regular and effective maintenance by trained personnel should be carried out to reduce noise and/or vibration from plant and machinery; and Limit noisy construction works to 07:00 to 19:00 weekdays with Saturday working from 08:00 to 16:30 unless otherwise agreed with the Local Authority. Relatively quiet construction activities could be carried out outside these hours, subject to controls in place. The TBM works which will be carried out outside of these hours will generate low impact noise levels, and the built-in mitigation measures will ensure that the relevant noise criteria are met for the TBM works outside normal working hours. 	Construction Phase
NV7	15.7.1	All elements of the Proposed Project	<p><u>Selection of Quiet Plant</u></p> <ul style="list-style-type: none"> In accordance with best practicable means, plant and activities to be employed on the Proposed Project will be reviewed to ensure that they are the quietest available for the required purpose. 	Construction Phase
NV8	15.7.1	All elements of the Proposed Project	<p><u>Acoustic Screens and Barriers</u></p> <ul style="list-style-type: none"> Acoustic screens will need to be erected in certain locations for some of the Construction Phase works as discussed above. These screens shall be carefully positioned to be as effective as possible. In general, the screen shall have no gaps or openings in the joins of the barrier material and the screen material shall have a minimum mass per unit area of 7kg/m². The minimum height of the screen shall typically be such that no part of the noise source will be visible from the receiving point. This may not always be possible, and therefore the minimum recommended height of the acoustic screen is prescribed at 2.4m. Localised screens of 2.4m and 4m height are required at various locations as described above, and these screens shall be placed as close as possible to the noise source to maximise their effectiveness. 	Construction Phase
NV9	15.7.1	All elements of the Proposed Project	<p><u>Noise Control</u></p> <ul style="list-style-type: none"> Noise reducing technologies, such as attenuators or enclosures, shall be used where practicable: <ul style="list-style-type: none"> Ensure that noise control measures are maintained as per the manufacturers requirements; Minimise the number of vehicles/heavy plant on the Proposed Project sites at any one time; Maintain vehicles in good order and employ the principles of preventive maintenance; 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<ul style="list-style-type: none"> Ensure that noisy vehicles are parked as far as possible from noise sensitive areas; Ensure that drivers are aware of the potential for noise to cause annoyance/disturbance to local residents and they shall show due regard to this, particularly when entering and leaving the Proposed Project (e.g. no unnecessary horn blowing); and Consider the use of alternative varieties of reversing alarm with reduced noise output, such as ambient noise sensing alarms with variable volume or directional modulated alarms – these must be evaluated on a case-by-case basis and regard must be had to any health and safety issues that may arise. 	
NV10	15.7.1	All elements of the Proposed Project	<p><u>Communications</u></p> <ul style="list-style-type: none"> A dedicated contact shall be appointed by the appointed contractor(s), in agreement with Irish Water, for all communications in relation to noise and vibration for the duration of the Proposed Project construction works and any queries, complaints or other formal correspondence regarding noise and vibration. The appointed contractor(s) shall ensure good communication and engagement with local residents and stakeholders and will notify them before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works. Any complaints relating to Construction Phase noise and vibration for the Proposed Project from local residents or other stakeholders shall be recorded, immediately addressed and notified to Irish Water. A record of how the complaint was addressed, the follow-up actions and outcome shall be maintained. 	Construction Phase
NV11	15.7.1	All elements of the Proposed Project	<p><u>Monitoring</u></p> <ul style="list-style-type: none"> Continuous unattended noise and vibration monitoring shall be carried out at the sensitive receptor locations including Connolly Hospital and the Golf Links Road house during the TBM construction works and any other works with the potential to impact these locations. The number of monitoring units required at each location shall be agreed by the appointed contractor(s) with Irish Water. The monitoring equipment shall be set up to show a live display of the measurement levels and also provide remote access to the real-time data. The system shall allow a text message or email alert for exceedance of any limit values or threshold values. The unattended noise and vibration monitoring shall be supported by attended measurements completed on a regular basis. The attended noise measurements shall be completed at least monthly and weekly for the most sensitive works. Noise monitoring shall be carried out for LAeq, LA90 and LMax noise parameters over 15-minute and 1-hour measurement intervals. Vibration monitoring shall be carried out for the vibration parameter PPV in mm/sec over 1-hour measurement intervals. On-site noise and vibration monitoring during the actual works will be a key part in the mitigation programme for the proposed works. As discussed above, monitoring of the noise and vibration levels at NSR locations for comparison with the limits during the different construction works will be critical, and the live measurement results will be used by the appointed Construction Manager to assist the scheduling of works to ensure that the noise and vibration emissions from the various works are kept within the limits. 	Construction Phase
NV12	15.7.1	All elements of the Proposed	<p><u>Noise Audits</u></p> <ul style="list-style-type: none"> Noise audits shall be carried out by a suitably qualified auditor, appointed by Irish Water in advance, at routine 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
		Project	intervals to ensure that the mitigation measures discussed above are being correctly implemented at the various construction sites, including operating hours, use of local screens, siting of plant items, scheduling of works, communications with stakeholders and noise control measures.	

24.14 Archaeological, Architectural and Cultural Heritage

Table 24.12: Archaeological, Architectural and Cultural Heritage Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
AC1	16.6.1	All land based elements of the Proposed Project	<p><u>General Measures</u></p> <ul style="list-style-type: none"> In order to identify any additional features of archaeological significance, which may survive outside of the areas subject to detailed investigation, a programme of archaeological test trenching will be carried out along the proposed orbital sewer route. This will be undertaken by an archaeologist under licence to the Department of Culture, Heritage and the Gaeltacht (DoCHG). Testing will provide information on the nature and extent of the remains within the Proposed Project, enabling the compilation of a programme of works to ensure the sites are fully preserved by record. This work will be carried out in full consultation with the National Monuments Service (NMS) of the DoCHG. In order to identify any additional features within the proposed WwTP site, archaeological testing (12% of the lands made available) will be carried out on the site prior to construction. This will be undertaken by an archaeologist under licence to the NMS of the DoCHG. (Please note that all recommendations are subject to approval by the NMS of the DoCHG. 	Construction Phase
AC2	16.6.1	All land based elements of the Proposed Project	<p><u>Recorded Archaeological Heritage Sites</u></p> <ul style="list-style-type: none"> The Proposed Project will potentially directly impact AH 11, AH 31, AH 33, AH 34, AH 38, AH 39, AH 41, AH 42, AH 44 and AH 45. Whilst it is recognised that preservation in situ is best practice, the Proposed Project cannot avoid these sites. As such, a programme of archaeological test trenching will be carried out at each site prior to construction. This will be carried out by an archaeologist under licence to the DoCHG. Testing will provide information on the nature and extent of the remains within the Proposed Project construction corridor, enabling the compilation of a programme of works to ensure the sites are fully preserved by record. This work will be carried out in full consultation with the NMS of the DoCHG. 	Construction Phase
AC3	16.6.1	Proposed outfall pipeline route (marine section) dredged section.	<p><u>Recorded Shipwrecks</u></p> <ul style="list-style-type: none"> All dredging will be monitored by a specialist underwater archaeologist under licence to the NMS of the DoCHG. Should any archaeological remains be identified, further mitigation, such as preservation by record, will be required. 	Construction Phase
AC4	16.6.1	All land based elements of the Proposed Project	<p><u>Areas of Archaeological Potential (AAP)</u></p> <ul style="list-style-type: none"> The Proposed Project will potentially directly impact AAP 2, AAP 3, AAP 5, AAP 6, AAP 8, AAP 10, AAP 12, AAP 16, AAP 17 and AAP 19. A programme of archaeological test trenching will be carried out within each area prior to construction. This includes a more detailed assessment of AAP 12. This will be carried out by an archaeologist under licence to the DoCHG. Testing will provide information on the nature and extent of any archaeological remains within the Proposed Project construction corridor, enabling the compilation of a programme of works to ensure the sites are fully preserved by record, in a manner deemed appropriate in agreement with the NMS of the DoCHG. The Proposed Project will potentially directly impact watercourses designated as AAP 7, AAP 8, AAP 9 and AAP 21. An underwater/wade survey will be carried out in these areas prior to construction. This will be carried out by 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>an archaeologist under licence to the DoCHG.</p> <ul style="list-style-type: none"> The surveys will provide information on the nature and extent of any archaeological remains within the Proposed Project, enabling the compilation of a programme of works to ensure the sites are fully preserved by record, in a manner deemed appropriate in agreement with the NMS of the DoCHG. 	
AC5	16.6.1	All land based elements of the Proposed Project	<p><u>Townland Boundaries (TBs)</u></p> <ul style="list-style-type: none"> A written and photographic TB survey will be carried out at the following locations: TB 4, TB 5, TB 9, TB 11, TB 16 and TB 20. This work will be carried out by a suitably qualified archaeologist. A written and photographic TB survey, to include archaeological testing, will be carried out at the following locations: TB 3, TB 6, TB 10, TB 12, TB 13, TB 14, TB 18, TB 19, TB 21, TB 22, TB 23 and TB 24. This will be carried out by an archaeologist under licence to the DoCHG. 	Construction Phase
AC6	16.6.1	Proposed WwTP	<p><u>Designed Landscapes (DL)</u></p> <ul style="list-style-type: none"> A full photographic landscape record will be made of the areas of Springhill Demesne (DL 4) that will be indirectly impacted upon by the proposed WwTP. This will be carried out by a suitably qualified archaeologist or historical buildings specialist. 	Operational Phase
AC7	16.6.1	Proposed WwTP	<p><u>Unrecorded Built Heritage (UBH) Sites</u></p> <ul style="list-style-type: none"> A full photographic landscape record will be made of Middletown Lower House (UBH 10), which will be indirectly impacted upon by the proposed WwTP. This will be carried out by a suitably qualified archaeologist or historical buildings specialist. 	Operational Phase

24.15 Hydrology and Hydrogeology

Table 24.13: Hydrology and Hydrogeology Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
HY1	17.5.1	Proposed WwTP/ Abbotstown pumping station	<p><u>Surface Water Drainage – Embedded Mitigation</u></p> <ul style="list-style-type: none"> The drainage systems will be designed in accordance with the <i>Flood Risk Management Guidelines</i> (DoEHLG and OPW 2009). Surface drainage from the proposed WwTP and the proposed Abbotstown pumping station will be attenuated to greenfield runoff rates and will make allowance for climate change. As a result of the Site Selection Process, the proposed WwTP and proposed Abbotstown pumping station sites have been selected in Flood Zone C – low risk areas. 	Construction Phase
HY2	17.5.2	All elements of the Proposed Project	<p><u>Prevention of Pollution – Embedded Mitigation</u></p> <ul style="list-style-type: none"> All pipelines, tanks, storage containers and pump sumps will be designed to be watertight. The pipeline will be designed and constructed to minimise the possibility of any leaks, and concrete sewer will not be used. Reinforced concrete structures will be designed to be water retaining, and the use of bunds around any chemicals and oil storage areas will reduce the risk of any leaks or accidental spillages. 	Construction Phase/ Operational Phase
HY3	17.5.3	All land based elements of the Proposed Project	<p><u>Culverting – Embedded Mitigation</u></p> <ul style="list-style-type: none"> Mitigation has been embedded in the choice of method for the culverting and crossing of rivers and streams. The main watercourse crossings will be completed using trenchless techniques. Details of the crossings are listed in Table 17.8 of Chapter 17 Hydrology and Hydrogeology in Volume 3 Part A of this EIAR. The use of trenchless technology for water crossings will ensure that the proposed orbital sewer route and outfall pipeline route (land based section) will be constructed below the river, stream or ditch bed levels. The appointed contractor(s) will locate proposed temporary construction compounds and launch pits in Flood Zone C – low risk areas for both the proposed orbital sewer route and the proposed outfall pipeline route (land based section). 	Construction Phase
HY4	17.5.4	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> Microtunnelling techniques will be used for the proposed outfall pipeline route (marine section) from the open fields immediately west of the R106 Coast Road to approximately 600m offshore, terminating below mean low water level. The microtunnelled section will be of 1.8m to 2.0m internal diameter, constructed at depths ranging between 15m and 20m below ground level (in the bedrock) using a microtunnelling machine, with pipe sections installed as the tunnelling machine progresses. An embedded mitigation by avoidance approach has been adopted in the tunnel design and route to eliminate any potential impacts on the Baldoyle Estuary SAC and the golf club irrigation wells on the Portmarnock Peninsula. The proposed outfall pipeline route (marine section) will be constructed in a manner that will remove the pathway between the hazard and the receptor. The proposed outfall pipeline route (marine section) will be tunnelled in bedrock beneath Baldoyle Estuary and Portmarnock Peninsula and will emerge below the low tide level on the eastern side of the Peninsula. The stiff boulder clay in the overburden will act as a barrier between the groundwater in the rock and in the shallow groundwater in the dune sands from which the irrigation wells abstract. This methodology will ensure that the tunnelled section of the proposed outfall pipeline route (marine section) 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>will have no hydraulic connection with the groundwater from the irrigation wells abstract.</p> <ul style="list-style-type: none"> The tunnel section will require drive/receptor shafts onshore, in the open field immediately west of the R106 Coast Road and in the open space adjacent to the public car park off the Golf Links Road, immediately north of Portmarnock Golf Club. The tunnelled pipeline will be grouted to eliminate the possibility of a preferential flow path in the annulus outside the pipe. 	
HY5	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> All temporary construction compounds, storage areas and launch pits (for trenchless techniques) will be located within Flood Zone C – low risk 	Construction Phase
HY6	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Immediate removal/disposal of surplus material off-site will be implemented. 	Construction Phase
HY7	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Drainage within soil bunds will be provided to reduce the influence upon the surface runoff pathways of flood water. 	Construction Phase
HY8	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Direct discharge of surface water from any temporary impervious area to the nearby watercourse without proper attenuation will be avoided. 	Construction Phase
HY9	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Temporary attenuation ponds will be provided if the stream to which surface water from the construction area is discharged has limited capacity. 	Construction Phase
HY10	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The shafts/construction fronts for any trenchless techniques will be located beyond the floodplain of the summer peak flood of an appropriate return period (i.e. 1 in 20 years). (For 10% risk over a two-year construction period, the required return interval for construction period flood is approximately 20 years, as per <i>Flood and Reservoir Safety</i> (Institute of Civil Engineers UK 2015)). 	Construction Phase
HY11	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The surface water runoff at the construction sites will be managed to prevent flow of silt-laden surface water flowing into adjoining surface watercourses. To achieve this, the appointed contractor(s) must comply with the CIRIA publication Control of water pollution from linear construction projects. <i>Technical Guidance (C648)</i> (CIRIA 2006). 	Construction Phase
HY12	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> For the construction on any watercourse crossings, a detailed PCP, Sediment and Erosion Control Plan (SECP), ERP and MSs will be drafted and will have regard to relevant pollution prevention guidelines. All works in or adjacent to watercourses will comply with the EPA, Inland Fisheries Ireland and OPW requirements. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
HY13	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Direct disposal of water from excavations and from temporary groundwater dewatering to the nearby watercourse will not be allowed, as these could both impact on water quality of the watercourse and increase flood risk. Any discharge of such water, after proper treating/de-silting will be discussed and agreed with the landowner, and if necessary, discharge consent will be acquired from the concerned authority (EPA, Inland Fisheries Ireland, etc.) prior to the commencement of work. 	Construction Phase
HY14	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> On-site fuel storage and refuelling of plant and vehicles will be undertaken on impermeable and bunded areas and away from any rivers or other watercourses. 	Construction Phase
HY15	17.7.1	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The appointed contractor(s) will inspect and monitor the water quality of surface waters near any works, particularly in relation to increased silt levels. This monitoring process will form part of the CEMP for the Construction Phase. 	Construction Phase
HY16	17.7.2	Proposed WwTP	<ul style="list-style-type: none"> Best practice for the handling of all chemicals, etc., will be used for the proposed WwTP and will mitigate the risk of surface water and groundwater pollution during the Operational Phase. 	Operational Phase
HY17	17.7.3	All elements of the Proposed Project	<ul style="list-style-type: none"> All potential harmful substances will be stored in accordance with the manufacturer's guidelines regarding safe and secure buildings/compounds. 	Construction Phase
HY18	17.7.3	All elements of the Proposed Project	<ul style="list-style-type: none"> The appointed contractor(s) will ensure that adequate means to absorb or contain any spillages of these chemicals are available at all times. 	Construction Phase
HY19	17.7.3	Proposed outfall pipeline route (marine section) microtunnelled section	<ul style="list-style-type: none"> The excavation of the tunnel drive/receptor shaft at the FCC public car park in Portmarnock will extend to about 20m in depth and will go through the shallow aquifer. This shaft will be excavated using piling techniques which will hydraulically seal off the shaft from the water bearing sands/gravels and will not involve any dewatering or pumping which could interfere with the existing groundwater flow regime and the irrigation wells' performance. 	Construction Phase
HY20	17.7.4	All land based elements of the Proposed Project	<ul style="list-style-type: none"> In order to prevent the development of preferential flow paths along the pipeline trench, remedial measures will be incorporated that will include the installation of puddle clay or other impermeable barrier at intervals along the proposed pipeline routes, particularly either side of a watercourse. 	Operational Phase
HY21	17.7.4	Proposed outfall pipeline route (marine section) microtunnelled section	<ul style="list-style-type: none"> The tunnelled section of the proposed outfall pipeline route (marine section) will be grouted to eliminate the possibility of a preferential flow path in the annulus outside the pipe. 	Operational Phase

24.16 Soils and Geology

Table 24.14: Soils and Geology Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
SG1	18.7.2	All elements of the Proposed Project	<ul style="list-style-type: none"> SOIL CONST 1 – Regulatory Compliance: The adopted construction techniques will comply with the requirements of statutory bodies (BCARS/Health Service Executive Inspections/Irish Water inspections and compliance with Employers Requirements), and construction will be completed in accordance with the CEMP. 	Construction Phase
SG2	18.7.2	All land based elements of the Proposed Project	SOIL CONST 2 – Ground Contamination: Good housekeeping (e.g. daily site clean-ups and use of disposal bins) will be carried out on the sites during construction, and the proper use, storage and disposal of all substances and their containers will help prevent soil contamination. For all activities involving the use of potential pollutants or hazardous materials, there will be a requirement to ensure that material such as concrete, fuels, lubricants and hydraulic fluids will be carefully handled and stored to avoid spillages. Potential pollutants shall also be adequately secured against vandalism and will be provided with proper containment according to codes of best practice. Any spillages will be immediately contained and contaminated soil removed from the site and disposed of in a licenced waste facility.	Construction Phase
SG3	18.7.2	All land based elements of the Proposed Project	SOIL CONST 3 – Ground Contamination: Excavations in made ground will be monitored by an appropriately qualified person to ensure that any hotspots of contamination encountered are identified, segregated and disposed of appropriately. Any identified hotspots shall be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage. Care will be taken to ensure that the hotspot does not cross-contaminate clean soils elsewhere throughout the sites.	Construction Phase
SG4	18.7.2	All land based elements of the Proposed Project	<p>SOIL CONST 4 – Ground Contamination: Potential soil and water pollution will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel washers and dust suppression on site roads, and regular plant maintenance. CIRIA provides guidance on the control and management of water pollution from construction sites in their publication <i>Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors</i> (Masters-Williams et al. 2001), and this shall be reflected in the CEMP. A contingency plan for pollution emergencies will also be developed by the appointed contractor(s) prior to the commencement of works and regularly updated, which would identify the actions to be taken in the event of a pollution incident. The CIRIA document recommends that a contingency plan for pollution emergencies will address the following:</p> <ul style="list-style-type: none"> Containment measures; Emergency discharge routes; List of appropriate equipment and clean-up materials; Maintenance schedule for equipment; Details of trained staff, location, and provision for 24-hour cover; Details of staff responsibilities; Notification procedures to inform the relevant environmental protection authority; Audit and review schedule; Telephone numbers of statutory water undertakers and local water company; and 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<ul style="list-style-type: none"> List of specialist pollution clean-up companies and their telephone numbers. 	
SG5	18.7.2	All land based elements of the Proposed Project	SOIL CONST 5 – Excavation Support: Excavations shall be kept to a minimum, using shoring or trench boxes where appropriate. For more extensive excavations, a temporary works designer shall be appointed to design excavation support measures in accordance with all relevant guidelines and standards.	Construction Phase
SG6	18.7.2	All elements of the Proposed Project	SOIL CONST 6 – Material Reuse: All excavated material will, where possible, be reused as construction fill. The appointed contractor(s) will ensure acceptability of the material for reuse for the Proposed Project with appropriate handling, processing and segregation of the material. This material would have to be shown to be suitable for such use and subject to appropriate control and testing according to the Earthworks Specification(s). These excavated soil materials will be stockpiled using an appropriate method to minimise the impacts of weathering. Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff. Any surplus suitable material excavated that is not required elsewhere for the Proposed Project shall be used for other projects where possible.	Construction Phase
SG7	18.7.2	All land based elements of the Proposed Project	SOIL CONST 7 – Traffic: Earthworks haulage will be along agreed predetermined routes along existing national, regional and local routes. Where compaction occurs due to truck movements and other construction activities on unfinished surfaces, remediation works will be undertaken to reinstate the ground to its original condition. Where practicable, compaction of any soil or subsoil which is to remain in situ along the sites will be avoided.	Construction Phase
SG8	18.7.2	All land based elements of the Proposed Project	SOIL CONST 8 – Surface Drainage: Earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe runoff and prevent ponding and flooding. Runoff will be controlled through erosion and sediment control structures appropriate to minimise the water impacts in outfall areas. Care will be taken to ensure that the bank surfaces are stable to minimise erosion.	Construction Phase
SG9	18.7.2	All land based elements of the Proposed Project	SOIL CONST 9 – Movement Monitoring: Ground settlement, horizontal movement and vibration monitoring will be implemented during construction activities to ensure that the construction does not exceed the design limitations.	Construction Phase
SG10	18.7.2	All land based elements of the Proposed Project	SOIL CONST 10 – Ground Settlement Control: Ground settlements will be controlled through the selection of a foundation type and method of construction which are suitable for the particular ground conditions.	Construction Phase
SG11	18.7.2	Proposed outfall pipeline route (marine section) dredged section	SOIL CONST 11 – Dredging Works: Best practice guidelines such as those outlined in BS6349-5 .- Maritime works – Part 5: Code of practice for dredging and land reclamation (2016) will be adhered to as a minimum for any dredging exercises to be carried out. Measures to minimise disruption to the seabed and mobilisation of sediments will be applied. Seabed conditions to be taken into account when selecting the method of dredging.	Construction Phase

24.17 Agronomy

Table 24.15: Agronomy Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
AG1	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Mitigation measures have been designed to address specific issues raised by landowners. Appendix A19.1 in Volume 3 Part B of this EIAR details proposed mitigation measures for each of the 26 agricultural holdings. The appointed contractor(s) will develop a CEMP for the Proposed Project which will include all mitigation measures. Individual landowners shall be given maximum notice in advance of construction works so they can arrange their farming activities on lands held adjacent to the Proposed Project construction sites to minimise the potential impacts to their overall farming operations. The Construction Phase works and maintenance during the Operational Phase shall be undertaken in a competent manner in accordance with the Outline CEMP during suitable weather and in as timely a manner as possible which will limit damage to soil. 	Construction Phase
AG2	19.6	Proposed orbital sewer route, NFS diversion sewer and outfall pipeline route (marine section)	<ul style="list-style-type: none"> The temporary loss of land by means of the proposed 20m wayleave along the proposed orbital sewer route, NFS diversion sewer and outfall pipeline route (land based section) will be mitigated by compensation to the landowner. 	Construction Phase
AG3	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> During planning for the Construction Phase, discussions with landowners will centre on queries in relation to the proposed construction works. Particular items to be discussed and agreed in advance of any works commencing shall include: <ul style="list-style-type: none"> Particular access requirements for livestock and vehicles to ensure suitable access will be maintained throughout the duration of the works; Fencing requirements, to ensure the appropriate temporary fencing and gates will be used during construction in addition to the fencing type used for permanent reinstatement post-construction; Presence of any existing drainage, to ensure connections will be maintained, or temporary solutions will be implemented, during construction works and that appropriate permanent solutions will be in place on completion of the works; Services, water to troughs, etc.; and Landowner Liaison Officers (LLOs) have been appointed by Irish Water as part of this current planning phase, and will remain in place throughout construction, reinstatement and handover to address any queries that landowners and stakeholders may have throughout the Proposed Project. 	Construction Phase
AG4	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The LLOs are Irish Water's principal point of contact with landowners and will be the interface between Irish Water and the appointed contractor(s). It will be the responsibility of the LLOs to ensure that channels of communication between the landowners and all aspects of works' progress are maintained at all times; and landowners are kept fully informed of issues raised. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
AG5	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Condition surveys including a route survey, setting out and a photo record of condition will be carried out prior to construction commencing as per Section 4.1.7 in the Outline CEMP. 	Construction Phase
AG6	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> A pre-entry agreement will be agreed with each landowner. This will outline each landowner's particular requirements and will include a notice of intention to commence work within any private lands and will be given to landowners 28 days in advance of works commencing as per Section 7.3.6 of the Outline CEMP. 	Construction Phase
AG7	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The proposed construction corridor will be prepared in advance of construction commencing and this will include the installation of temporary fencing, access gates and signage as per Section 7.3.9 of the Outline CEMP. 	Construction Phase
AG8	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Soil stripping will be carried out as per Section 7.3.10 of the Outline CEMP. 	Construction Phase
AG9	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Haul road construction will take place within the proposed construction corridor as per Section 7.3.11 of the Outline CEMP. 	Construction Phase
AG10	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Hedgerows will be managed as per Section 7.3.12 of the Outline CEMP. 	Construction Phase
AG11	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Haulage of pipe lengths and stringing along the proposed construction corridor will be carried out as per Section 7.3.13 of the Outline CEMP. 	Construction Phase
AG12	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Trench excavation will be carried out as per Section 7.3.14 of the Outline CEMP. 	Construction Phase
AG13	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Pipes will be installed by laying the pipe in the trench and tie-ins and installing granular material as surround to pipe to 300mm above crown as per Section 7.3.15 of the Outline CEMP. 	Construction Phase
AG14	19.6	All land based elements of the	<ul style="list-style-type: none"> The pipe will be pressure tested as per Section 7.3.16 of the Outline CEMP. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
		Proposed Project		
AG15	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The pipe trench will be backfilled and valve chambers will be installed as per Section 7.3.17 of the Outline CEMP. 	Construction Phase
AG16	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Reinstatement of ground contours, topsoil, fencing, hedgerows will be carried out as per Section 7.3.18 of the Outline CEMP. 	Construction Phase
AG17	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Commissioning of the pipeline will be carried out as per Section 7.3.19 of the Outline CEMP. 	Construction Phase
AG18	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Noise mitigation measures will be put in place by the appointed contractor(s) as described in Chapter 15 Noise and Vibration in Volume 3 Part A. 	Construction Phase/ Operational Phase
AG19	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The appointed contractor(s) will employ measures to prevent the spread of dust and mud onto adjoining lands. These measures are described in Chapter 14 Air Quality, Odour and Climate in Volume 3 Part A of this EIAR. 	Construction Phase
AG20	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Construction activities will be confined to the proposed construction corridor (40m). The wayleave area will be fenced off (with a stock-proof fence) during the Construction Phase. The type of fencing will be agreed in consultation with landowners. Temporary access points will be provided to allow landowners to cross the temporary wayleave. The proposed pipeline routes will be buried and, where possible, will be routed as close to field boundaries as practicable to minimise sub-division of land parcels. Permanent land-take and temporary loss of production will be financially compensated. All agricultural lands will be reinstated to pre-construction conditions. All reinstatement works will be weather dependent to reduce impacts on land after completion of reinstatement of the working area. Reinstatement works will only be carried out during periods of appropriate weather conditions. 	Construction Phase
AG21	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Liaison meetings with landowners will be held to agree the extent of existing land drainage systems that will be impacted by the Construction Phase and to agree the nature and extent of replacement drains required. A detailed record of the locations of land drains intercepted during the Construction Phase will be kept. An Agricultural Liaison Officer will be on-site to monitor the stripping and storing of topsoil and will record land details. This process will also be followed during reinstatement works. 	Construction Phase
AG22	19.6	All land based elements of the	<ul style="list-style-type: none"> Disease protocols and farm biosecurity measures to protect and prevent the spread of pests and diseases will be adhered to. The appointed contractor(s) will comply with the Department of Agriculture, Food and the 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
		Proposed Project	<p>Marine's regulations in relation to crops and livestock diseases.</p> <ul style="list-style-type: none"> All construction equipment will arrive on-site clean, free of weeds, soil and debris. Biosecurity measures will be implemented to minimise the spread of soilborne diseases and weeds during the construction of the proposed pipeline routes. The risk associated with the spread of soilborne diseases and the implications this could have on the intensive horticultural and potato enterprises located throughout the study area will be accounted for. The construction of the proposed pipeline routes will be on a phased basis between the proposed orbital sewer route to the west of the proposed WwTP site and the proposed outfall pipeline route (land based section) to the east of the proposed WwTP site. It will be necessary for a full clean down of all equipment used by the appointed contractor(s), machinery, vehicles and footwear before entering farm premises. Biosecurity measures will be implemented to minimise the spread of soilborne diseases and weeds during the Construction Phase of the Proposed Project. All agricultural lands will be reinstated after the Construction Phase of the Proposed Project. 	
AG23	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> Any shelter that is removed will be reinstated. Sapling plants will be planted to match existing species. 	Construction Phase
AG24	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> The areas where fuel tanks are located will be bunded with impervious material. Fuel deliveries and refuelling will be strictly controlled and will only take place in designated areas. An emergency plan will be drawn up to deal with fuel spillages. 	Construction Phase
AG25	19.6	All land based elements of the Proposed Project	<ul style="list-style-type: none"> By siting the proposed pipeline routes as close as possible to existing farm boundaries, the impact on farming infrastructure will be minimised. Consultation between the landowners and the appointed contractor(s) during the Construction Phase will take place and will ensure that appropriate measures are taken to minimise disruption to farming operations. Landowners will be liaised with to enable Proposed Project activities to occur in conjunction with farming operations, and landowners will be consulted on specific access arrangements and stock movement. 	Construction Phase

24.18 Waste

Table 24.16: Waste Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
W1	20.6	All elements of the Proposed Project	<ul style="list-style-type: none"> 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. 	Construction Phase/ Operational Phase
W2	20.6.1	All elements of the Proposed Project	<p>Waste Management Plan</p> <ul style="list-style-type: none"> 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 Waste Management Plan (WMP) for the Proposed Project as part of their contractual responsibilities. At the Construction Phase, a Construction and Demolition 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. 	Construction Phase
W3	20.6.1	Proposed outfall pipeline route (land based section)	<ul style="list-style-type: none"> 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 in Chapter 20 Waste in Volume 3 Part A of this EIAR. 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 practices in relation to the stockpile management and materials storage shall be in accordance with the relevant CIRIA guidance document. 	Construction Phase
W4	20.6.1	Proposed outfall pipeline route	<ul style="list-style-type: none"> The majority of the proposed orbital sewer route will be constructed by conventional open cut methods. Trench boxes, as shown in Diagram 20.2 in Chapter 20 Waste in Volume 3 Part A of this EIAR, will be used for deep 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
		(land based section)	excavations to avoid the necessity for battering or sloping of the sides of the trench.	
W5	20.6.1	Proposed outfall pipeline route (land based section)	<ul style="list-style-type: none"> 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 <i>Engineering Specialist Report for Crossings</i> (Jacobs Tobin 2017). The proposed methodology for the trenchless crossings is a microtunnelling pipe jacking technique. 	Construction Phase
W6	20.6.1	Proposed Abbotstown pumping station	<ul style="list-style-type: none"> 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. 	Construction Phase
W7	20.6.1	Proposed Abbotstown pumping station	<ul style="list-style-type: none"> 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. 	Construction Phase
W8	20.6.1	Proposed Abbotstown pumping station	<ul style="list-style-type: none"> 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. 	Construction Phase
W9	20.6.1	Proposed WwTP	<ul style="list-style-type: none"> 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. 	Construction Phase
W10	20.6.1	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> 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 Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			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.	
W11	20.6.1	Proposed outfall pipeline route (marine section)	<ul style="list-style-type: none"> 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. 	Construction Phase
W12	20.6.1	Proposed outfall pipeline route (marine section) dredged section	<ul style="list-style-type: none"> 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). The pipe will then be floated into place and sunk into the trench, with the previously stored material replaced around and over the pipe. 	Construction Phase
W13	20.6.1	All elements of the Proposed Project	<p>Disposal</p> <ul style="list-style-type: none"> 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 <i>EMRWMP 2015-2021</i> (EMWRO 2015). It is not envisaged that hazardous waste will be encountered, but any hazardous materials would be treated in accordance with the <i>National Hazardous Waste Management Plan 2014-2020</i> (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. 	Construction Phase
W14	20.6.2	Proposed WwTP	<ul style="list-style-type: none"> 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. 	Operational Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
W15	20.6.2	All elements of the Proposed Project	<ul style="list-style-type: none"> On the basis that it cannot be reused or recycled, excess material shall be disposed of in accordance with Section 20.6.1 of Chapter 20 Waste in Volume 3 Part A of this EIAR. Screening material and grit shall be disposed of at appropriately licensed facilities. 	Operational Phase

24.19 Material Assets

Table 24.17: Material Assets Mitigation Measures

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
MA1	21.2.6	Proposed pipeline routes	<p><u>Gas Transmission Infrastructure</u></p> <ul style="list-style-type: none"> The preliminary design of the proposed pipeline routes takes account of the requirement to cross these assets without interfering with them during the Construction Phase or the Operational Phase. The proposed pipeline routes will be designed with a vertical separation distance of 2m to 3m from the crown of the proposed pipeline route to the underside of the gas transmission pipeline at these locations. Crossings will be carried out by means of trenchless techniques to minimise disruption to the services. 	Construction Phase
MA2	21.2.6	Proposed pipeline routes	<p><u>Power Transmission Infrastructure</u></p> <ul style="list-style-type: none"> The proposed pipeline routes have been designed, where possible, to avoid overhead lines (OHLs) and their support structures, and the design is such that the proposed pipeline routes will be at a deeper level and will pass beneath the electricity infrastructure. OHLs shall be protected in accordance with the <i>Code of Practice for Avoiding Danger from Overhead Electricity Lines</i> (ESB Networks 2008). Should any equipment or machinery be required to pass underneath the OHL, a passageway through barriers will be created which ensures safe clearance distances. The 38kV power lines crossing the proposed WwTP will have to be diverted prior to works commencing at this site to avoid any disruption. An application has been made to ESB Networks for connection to the National Grid and diversion of the power line. This will be followed up at detailed design stage. 	Construction Phase
MA3	21.2.6	Proposed outfall pipeline route (land based section)	<p><u>Rail Infrastructure</u></p> <ul style="list-style-type: none"> The proposed outfall pipeline route (land based section) crosses the Dublin-Belfast rail line. The Proposed Project team has had discussions with Irish Rail who have indicated that the proposed crossing point and details are acceptable in principle, subject to the following requirements being met with respect to any crossing of the Dublin-Belfast rail line: <ul style="list-style-type: none"> Crossings shall be a minimum of 4.7m from the crown of the pipe to track bed level; Crossings shall be perpendicular where possible; If two (or more) crossings are required, they shall be in a single conduit or there should be a separation between them (of the order of 5m); Crossings shall not be at track joint positions; Crossings shall take account of stanchion locations for OHLs associated with DART trains running on this line; and A survey of track position and level will be required. The current design of the crossing meets with the requirements of Irish Rail, and incorporates a trenchless crossing and a minimum distance of 4.7m from the crown of the proposed outfall pipeline route (land based section) to the rail track level. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
MA4	21.2.6	Proposed orbital sewer route	<p><u>Metro Crossings</u></p> <ul style="list-style-type: none"> TII advised that they have no difficulty with the proposed orbital sewer route crossing under the proposed Metro Link or Metro West lines. A depth of 3m below the track is sufficient to mitigate potential impacts and must be included in the final design. The actual construction methodology for this crossing will be dependent on the actual construction timeframes for the respective projects. However, the preliminary design of the proposed orbital sewer route is such that a trenchless method for crossing will be suitable and implemented, should the Metro infrastructure be in place prior to construction of the Proposed Project. Conventional open cut methods will be suitable at the crossing point should the timeframes of both projects permit. 	Construction Phase
MA5	21.2.6	Proposed pipeline routes	<p><u>Motorways, National Primary Roads and Other Roads</u></p> <ul style="list-style-type: none"> The proposed pipeline routes will require crossings of road infrastructure. Previous discussions with TII (formerly the National Roads Authority) confirmed that a formal application to the TII for permission to construct the proposed pipeline routes beneath national roads or motorways, in accordance with Section 53 of the Roads Act, 1993, will be required prior to seeking permission from An Bord Pleanála for planning consent. TII also confirmed that all crossings must be achieved by trenchless techniques such as tunnelling or directional drilling. Designs for crossings will take into account the road drainage and fibre optic infrastructure, and will mitigate any potential impact on this existing infrastructure. Exact details of each crossing is not required at this time. However, prior to construction, individual designs will be submitted by the appointed contractor(s) for each crossing to the TII for agreement. A meeting was held in June 2017 with TII, at which TII advised that a letter of support would be provided but that that these documents would not be signed/sealed until planning permission has been granted. Formal applications to TII have been made for the crossings of the N2 National Road and M1 Motorway as requested and in accordance with Section 53 of the Roads Act, 1993. 	Construction Phase
MA6	21.2.6	Proposed pipeline routes	<p><u>Water Supply Infrastructure</u></p> <ul style="list-style-type: none"> Following discussions with FCC water operations and DCC water operations, who operated the water supply infrastructure prior to handover to Irish Water, it was confirmed that the major water assets had been identified. FCC and DCC, and now subsequently Irish Water, advised that they do not have any objections in principle and that they would have no issue with the proposed pipeline routes passing beneath their infrastructure. However, normal good practice must be followed. The proposed orbital sewer route shall go beneath water mains with the following constraints: <ul style="list-style-type: none"> Vertical separation to be a minimum of 500mm; Horizontal separation to be 6m; and At crossings, there shall be no joints over joints. The preliminary design of the proposed pipeline routes has taken into account these requirements at all crossing points of water supply infrastructure. However, normal good practice must be followed. 	Construction Phase
MA7	21.2.6	Proposed outfall pipeline route (marine section)	<p><u>Communications Infrastructure</u></p> <ul style="list-style-type: none"> A required crossing of the proposed outfall pipeline route (marine section) with the Hibernia Atlantic Ltd. Dublin to Southport submarine cable has been identified as illustrated in Error! Reference source not found. 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<ul style="list-style-type: none"> Discussions with Hibernia Atlantic Ltd. indicate that there is no requirement for planned maintenance to this cable. Currently, only maintenance to repair damage to the cable is expected to be carried out, if necessary. It was advised that there are significant cost implications if the cable is out of service as the company must lease capacity from other providers to provide a service to their customers. Hibernia Atlantic Ltd. have indicated that the risks shall be mitigated by providing an engineering solution to protect the subsea cable during the construction of the proposed outfall pipeline route (marine section). The exact nature of the crossing will be subject to detailed design and approval by Hibernia Atlantic Ltd. prior to the start of construction. However, the outline technical proposal and principles which shall be adhered to for the crossing are detailed below. The cable location shall be confirmed by the appointed contractor(s) with assistance from the asset owner (Hibernia Atlantic Ltd) by means of inducing a detectable frequency and experienced divers using a probe. The appointed contractor(s) will uncover and mark the cable to mitigate the risk of accidental damage. In order to construct the section of the proposed outfall pipeline route (marine section) that will have to cross the subsea cable, the subsea cable shall be protected by means of a cable protection system, at which point it will be supported to allow the excavation beneath the cable and installation of the proposed outfall pipeline route (marine section) beneath the cable. Further information on this crossing method is included in the Outline CEMP. The exact details of this technical proposal are subject to site investigation, detailed design and agreement with the asset owner (Hibernia Atlantic Ltd). It is also likely that Hibernia Atlantic Ltd. will have some supervisory presence during the works adjacent to the subsea cable. 	
MA8	21.2.6	Proposed orbital sewer route	<p>Connolly Hospital</p> <ul style="list-style-type: none"> Following discussions with representatives from Connolly Hospital regarding the proposed orbital sewer route passing through their lands, it was indicated that maintaining access for emergency vehicles throughout the Construction Phase is the most significant issue. In order to ensure that vehicle access is maintained, the Proposed Project will be constructed using trenchless techniques at this location. This will reduce the impact on the lands and ensure emergency vehicle access is maintained to the hospital at all times. Other issues of concern raised by representatives from Connolly Hospital included potential impacts of the Proposed Project on future potential development. This was mitigated through the realignment of the pipeline and the use of a narrower proposed construction corridor width through the hospital lands, and dust and noise management which is covered in Chapters 14 Air Quality, Odour and Climate and Chapter 15 Noise and Vibration in Volume 3 Part A respectively. 	Construction Phase
MA9	21.2.6	All land based elements of the Proposed Project	<p>Significant Watercourses</p> <ul style="list-style-type: none"> Inland Fisheries Ireland indicated at a meeting that, in the first instance, all crossings of watercourses shall be undertaken using trenchless techniques where practicable. However, should this prove unworkable then each watercourse crossing technique must be agreed in advance with Inland Fisheries Ireland and shall be designed and planned to take place during a time that will minimise impacts on the aquatic environment and fish populations. The proposed NFS diversion sewer will be constructed using trenchless techniques and will be routed under the Mayne River. The proposed access road to the proposed WwTP will, however, require a crossing of the Mayne River. This will be achieved by installing a single box culvert in the Mayne River, ensuring that there will be 	Construction Phase

Mitigation No.	EIAR Section Reference	Location	Description of Mitigation Measure / Environmental Commitments	Stage of Impact i.e. Construction Phase / Operational Phase
			<p>minimal disruption to the Mayne River.</p> <ul style="list-style-type: none"> An application for consent under Section 50 of the Arterial Drainage Act, 1945 is required for this crossing, and this is currently being progressed through Irish Water. 	
MA10	21.2.6	Proposed pipeline routes	<p><u>Land Drainage</u></p> <ul style="list-style-type: none"> The proposed pipeline routes will cross agricultural lands, many of which will contain land drainage. There is no readily available mapping of such drainage. These drains will be identified during the Construction Phase by the appointed contractor(s). Affected land drains will be redirected in a manner that maintains existing land drainage, and these drains shall be reinstated appropriately. Any drains intercepted will be marked and mapped to allow for proper reinstatement of these drains at completion. Appropriate construction monitoring, including Agricultural Liaison Officers, will be employed during the Construction Phase. 	Construction Phase
MA11	21.2.6	Proposed outfall pipeline route (marine section)	<p><u>Baldoyle Bay and Portmarnock Beach</u></p> <ul style="list-style-type: none"> The proposed outfall pipeline route (marine section) will be tunnelled from a launch compound (proposed temporary construction compound no. 10) east of Baldoyle Bay to a reception shaft (proposed temporary construction compound no. 9) on the west of Baldoyle Bay. The proposed outfall pipeline route (marine section) will also be tunnelled to a subsea interface east of Portmarnock Beach. The implementation of trenchless techniques mitigates the impact the proposed outfall pipeline route (marine section) would otherwise have on these assets. The Proposed Project team undertook extensive consultation and detailed consideration of the proposed outfall pipeline route (marine section) to ensure that the impact on Portmarnock Golf Club and public amenities were minimised. Following discussions with Portmarnock Golf Club, the proposed outfall pipeline route (marine section) was located in a manner which will minimise intrusion on the golf course. The appointed contractor(s) shall be required to liaise with Portmarnock Golf Club before and during construction works. The public amenities, such as the existing car park and public walkway to the beach, have been considered through the design process also. The majority of the carpark will be kept operational through the Construction Phase and the walkway to the beach will remain open. 	Construction Phase
MA12	21.3.5	All elements of the Proposed Project	<ul style="list-style-type: none"> Consideration will be given to the sustainable sourcing of all materials. Materials arising from the excavation of the open cut and trenchless methods will be reused where possible. This, and the methodologies chosen at design stage, will result in a decrease in the amount of imported material, in turn reducing the impact of traffic on the surrounding roads and resulting in less demand on non-renewable sources such as quarries. Bentonite used for the tunnelling process will be recycled within a closed system during tunnelling, thereby minimising the quantity required. Other mitigation measures which will be employed in relation to raw materials are outlined below: <ul style="list-style-type: none"> Design will be optimised to minimise the requirements for raw materials; Materials will be reused where possible (such as excavated rock); Raw materials will be sourced locally where possible; and Raw materials will be managed in accordance with the Outline CEMP for construction. 	Construction Phase

24.20 Difficulties Encountered in Compiling Required Information

There were no difficulties encountered in compiling required information for this Chapter.