

Greater Dublin Drainage Project Addendum

**Environmental Impact Assessment Report Addendum:
Volume 3A Part B of 6**

**Appendix A11.3 - Written Response to Biodiversity (Terrestrial and
Freshwater Aquatic) Queries at the 2019 Oral Hearing**

Uisce Éireann

October 2023

An Bord Pleanála Oral Hearing

Irish Water

Greater Dublin Drainage

Response to Questions raised by the following:

NPWS; &

- 1. NPWS - Compound 10 Reinstatement**
- 2. Fingal County Council (Statement 26th March) Point 2 -
Natura Impact Statement – Schedule of Mitigation**
- 3. Ballymun Wildlife Group – Biodiversity Report**

Statement by James McCrory (27th March 2019)

**GDD Oral Hearing
Response to Questions**

Compound 10

Fingal County Council (FCC) suggested in their submission that Irish Water's response submitted in January 2019 is not sufficiently strong in terms of confirming re-instatement of compound 10.

For the avoidance of any doubt, Irish Water is happy to confirm to the Inspector that they will implement habitat management measures at Compound 10 during reinstatement of the site for the purpose of biodiversity gain. Measures will be put in place to reinstate the site of Compound 10 so that it can be managed positively by FCC for dune habitat in the long term. The underlying hydrogeological conditions at the site will be investigated and will inform the reinstatement of the site which will be done in consultation with FCC.

Irish Water will implement short term measures during construction and testing phase of the project, and hand the site back to Fingal County Council at operational phase. It is intended that Fingal County Council will maintain the site thereafter and implement any management measures to be contained in the Plan.

As the entity with responsibility for future management of the site, it will be a matter for Fingal County Council to identify its long term objective(s) for the site, how it will function and what role it will perform in light of the policies and objectives contained in FCC's Biodiversity Action Plan and County Development Plan for the Fingal administrative area and any relevant Local Area Plan relating to it.

Natura Impact Statement – Schedule of Mitigation

Section 7 of the Natura Impact Statement (NIS) sets out the mitigation measures required to ensure that the Proposed Project does not impact on the integrity of the European Sites in light of the assessment provided in Section 6 of the NIS. This information is reproduced in Table 1 overleaf to provide clarity on the mitigation measures that are specific to each European Site and their qualifying interests. Section 7 of the NIS also refers to the implementation of measures from the outline Construction & Environmental Management Plan (CEMP) and Surface Water Management Plan (SWMP) (see Volume 2 Part B Appendices to the EIAR). In the interest of clarity, the measures in these two documents specific to each European Site and their qualifying interests have also been included in Table 1.

In addition to the measures outlined in Table 1, the overall implementation of the relevant measures set out in Section 4.2 of the CEMP and Section 2 of the SWMP apply to the European Sites (the relevant extracts from these documents are reproduced in Appendix A to this statement). These measures relate to the prevention of run-off/contamination entering the surface water and marine environments.

As stated in paragraph 33 of my submission on the Habitats Directive appraisal on day one of the hearing, with the implementation of the prescribed mitigation measures the project will not adversely affect the integrity of any European site, either individually or in combination with other plans and projects and no reasonable scientific doubt remains as to the absence of such effects.

**GDD Oral Hearing
Response to Questions**

Table 1: Schedule of Mitigation Required for European Sites

European Site	Qualifying Interest	Mitigation Measure (Construction)	Mitigation Measure (Operation)
Baldoyle Bay SPA (site code: 004016)	Light-bellied brent goose, Shelduck and Golden plover	<ul style="list-style-type: none"> • A 2.4m high hoarding will be used for the duration of the construction works at both microtunnelling compounds (no. 9 & 10). • Tunnelling compound construction cannot proceed without the installation of hoarding around the entire perimeter of each compound and any associated access track. • To avoid disturbance to wintering birds, the hoarding can only be erected and uninstalled between April and August under supervision by a professional ecologist. 	No mitigation measures required.
Ireland's Eye SPA (site code: 004117)	Guillemot, Razorbill	<p>Due to the potential for adverse impacts on site integrity during the time period that auks are leaving the Ireland's Eye breeding colony, it will be necessary to put in place a vessel management plan (see Appendix F of the NIS).It stipulates that:</p> <ul style="list-style-type: none"> • all vessels associated with the project do not unnecessarily approach, and never cross the boundary of and stray into Ireland's Eye SPA when working on the project, unless there is a risk to human safety in not doing so; and • in the months of July and August, a ornithological observer will monitor and observe the distribution of flightless, rafting auks on the water that are attempting to leave the colony at the end of the breeding season, and have sufficient authority to instruct vessels to reposition if auks are travelling towards the vessels. 	No mitigation measures required.
Baldoyle Bay SAC (site code 000119)	Annex I habitats	Construction of tunnel underneath Baldoyle Bay SAC, using trenchless techniques to avoid protected habitats. The stiff boulder clay in the overburden will act as a barrier between the groundwater in the rock and groundwater in the dune sands.	The implementation and maintenance of the SUDS systems at the WWtP and Abbotstown Pumping Station to ensure proper functioning during the operation of the project.
	Saltmarsh (<i>Salicornia</i> and other annuals colonising mud and sand; Mediterranean salt meadows <i>Juncetalia maritima</i> (MSM); and Atlantic salt meadows <i>Glaucopuccinellietalia maritimae</i> (ASM))	<p>The following mitigation measures will be implemented to ensure no runoff of pollutants and suspended sediment loads from construction compounds enters the estuary:</p> <ul style="list-style-type: none"> • No discharges to estuary under any circumstances. • Implementation of measures prescribed in the Construction Environmental Management Plan and the Surface Water Management Plan including: <ul style="list-style-type: none"> ○ Control of Sediment Solids; 	

**GDD Oral Hearing
Response to Questions**

		<ul style="list-style-type: none"> ○ Fuels and chemicals will be stored in an appropriately bunded area/with double skinned tanks; ○ All surface water runoff from construction compounds will be intercepted and directed to treatment system for the removal of pollutants prior to discharge; ○ Trenchless crossings of watercourses; and ○ sediment monitoring. <p>A full list of the measures are outlined in the relevant extracts from the CEMP and the Surface Water Management Plan (both documents are included in Volume 2 Part B Appendices) included in Appendix A below.</p> <ul style="list-style-type: none"> ● Continual monitoring and management of drill mud pressures during drilling activities shall occur. 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. 	
<p>Rockabill to Dalkey Island cSAC (site code: 003000)</p>	<p>Intertidal reef community complex</p>	<p>The following mitigation methods will be employed in order to prevent impacts arising from the increase in suspended sediments on the Annex 1 reef habitat:</p> <ul style="list-style-type: none"> ● Dredging discharges from the hopper will be restricted to flooding tides only. ● Monitoring of plume during dredging operations: ● The turbidity will be monitored using a buoy mounted turbidity meter telemetered 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 Ireland's Eye northern coastline. 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. ● No discharge or waste to sea under any circumstances. 	<p>Discharge in compliance with waste water discharge licence to be granted by the EPA under the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I No. 684 of 2007).</p>

**GDD Oral Hearing
Response to Questions**

		<ul style="list-style-type: none">• Implementation of the following mitigation measures prescribed in the CEMP including strict adherence to MARPOL guidelines and auditing of CEMP:<ul style="list-style-type: none">○ All on board waste discharge, from dredgers, pipeline survey vessels, maintenance vessels and marine rigs, will follow the guidelines from Annex V of the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL) for domestic waste discharges to the environment.○ Solid and chemical waste will be treated on board and recycling will take place wherever practicable. No waste is to be disposed of at sea. Bilge water will be treated in accordance with MARPOL standards. All waste discharges will be monitored and recorded as per vessel procedures.○ Any hazardous wastes will be in sealed, labelled drums and stored in lockable chemical cabinets. A record will be kept of the type and quantities of waste arising on each vessel.○ Ballast tanks will be separated from any hydrocarbon storage areas on board the vessels and no potentially contaminated drain systems will be routed to the ballast tanks. De-ballasting shall be undertaken offshore in accordance with International Marine Organisation (IMO) guidelines and away from sensitive environmental areas to prevent introducing marine organisms from outside the project location.○ Project vessels and rigs will be equipped with oil-water separation systems in accordance with MARPOL requirements.○ Any spills on deck will be contained and controlled using absorbing materials. This will be collected in dedicated drums to avoid contamination of deck run-off water. Vessels or rigs without a sewage treatment system will have a suitable holding tank; waste water will then be brought back to shore for treatment by a licensed contractor.○ All chemicals used on board the project vessels or rigs will be handled in compliance with the relevant Safety Instructions, including Control of Substances Hazardous to Health (COSHH) Handling of Hazardous Materials. For each chemical, a Material Safety Data Sheet will be available, as well as an assessment of the hazards associated with the chemical (to personnel, for storage, for emergency response). These will be available at the various places where the chemical is used, and centralised with the Safety Officer on board.○ Chemicals will be stored in compliance with the handling instruction, including separation of incompatible chemicals, provision of adequate firefighting, spill containment and other safety facilities. The only bulk storage on board vessels will	
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**GDD Oral Hearing
Response to Questions**

		<p style="text-align: center;">be the fuel; all other chemicals will be stored in drums or smaller containers and will be suitably banded to contain any leaks or spills.</p>	
<p>Rockabill to Dalkey Island cSAC (site code: 003000)</p>	<p>Harbour porpoise</p>	<p>Mitigation will be undertaken during piling and dredging works to ensure no noise impact to marine mammals (including Harbour Porpoises) within the vicinity of the works. This will include marine mammal observers 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:</p> <ul style="list-style-type: none"> • Following appropriate guidelines from the regulatory authorities, the National Parks & Wildlife Service (2014), the following measures are proposed to remove the risk of direct injury to marine mammals in the area of operations: A trained and experienced Marine Mammal Observer (MMO) will be put in place during piling, dredging, 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. • 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 (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 20-40 minutes. <ul style="list-style-type: none"> ○ 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 (<50 m) works area should be reported to the National Parks and Wildlife Service. 	<p>No mitigation measures required.</p>

**GDD Oral Hearing
Response to Questions**

		<ul style="list-style-type: none"> • 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 1000m for piling activities. • The MMO will keep a record of the monitoring using “MMO form location and effort (coastal works)” available from the National Parks & Wildlife Service (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 PAM system will be dictated by the frequency with the ultra high frequency used by porpoises likely to be limited to within 500m of the PAM system. 	
Lambay Island cSAC (site code: 000204)	Grey Seal, Harbour Seal	See above mitigation measures for marine mammals listed above for Rockabill to Dalkey Island SAC.	No mitigation measures required.

GDD Oral Hearing Response to Questions

Ballymun Biodiversity Plan

Ballymun Biodiversity Plan

In response to the Ballymun Wildlife Group Report on Biodiversity present at the abandoned lands adjacent to the north and west of Northpoint, Ballymun prepared by Michael Keating ('the Keating Report'), I would like to take the opportunity to clarify a number of things to the Inspector.

This area is northwest of Junction 4 of the M50 (M50/R108 junction), and is shown on Planning Drawing No. 32102902-2005 (1:2,500 PROJECT ROUTE MAP - Sheet 5 of 14) available at:

https://www.gddapplication.ie/planning-sites/greater-dublin-drainage/docs/planning-documents/gdd-planning-drawings/32102902-2005_P01%20Project%20Route%20Map%20-%20Sheet%205%20of%2014.pdf

Diversity of species

Reference is made to the presence of a number of ecological features of this site in the Biodiversity appraisal contained in Volume 3 of the EIAR for the Proposed Project:

- an array of emergent, floating and submerged aquatic plants;
- drainage ditches being breeding sites for common frog;
- a diverse invertebrate fauna evidenced again by the array of insect larvae;
- adult damsel and dragonflies;
- notable for the presence of stickleback, tadpoles and birds;
- Common pipistrette, Soprano pipistrelle and Leisler's bat species;

Ballymun Biodiversity Action Plan

Lands identified in the Ballymun Biodiversity Action Plan relate to an area south of the M50 corridor and south of Ikea, more than 500m south of the pipeline wayleave of the Proposed Project.

This site is clearly identified in Sheet No. 14 '*Green Infrastructure Map 1*' of the Fingal County Development Plan 2017-2023. This site is known as Silloge Nature Development Area ('Silloge NDA'). NDAs have been identified in the Development Plan to provide opportunities for habitat improvement.

Information omitted or not referred to in the Ecological Assessment

The suite of ecological surveys conducted at this location, which include habitat, bird, bat, ground mammal, smooth newt and freshwater flora and fauna surveys are set out at Section 11.2.3 of the EIAR, were conducted in accordance with published guidelines and carried out in the relevant seasons across a number of years between 2012 and 2017. Any ecological survey is a snapshot of what is recorded at the survey site at the particular time of survey. Many surveys have a particular focus on a particular species and so will not take account of other species present. The suite of surveys undertaken for the Proposed Project focussed on the habitats within the construction corridor of the Proposed Project, in order to identify and properly assess potential effects. They informed a comprehensive ecological baseline to be established in order to allow a robust biodiversity appraisal of the Proposed Project.

The effect of the proposed project on Silloge NDA is discussed in paragraph 3 of Section 11.4.1 of Chapter 11 of the EIAR. The proposed orbital sewer pipeline will be constructed through this area by a combination of surface trench and directional drill. The temporary effects of construction will not undermine the long term potential of the Silloge NDA to deliver habitat improvement.

GDD Oral Hearing Response to Questions

The report states that objective N18 (and I take this to refer to Objective NH18 of the Fingal Development Plan as listed in Table 11.2 of the EIAR) is contravened because significant ecological effects occur on an ecological buffer zone. I can confirm that the Ecological Buffer Zones identified on Sheet No. 15 '*Green Infrastructure Map 2*' of the Fingal County Development Plan 2017-2023 do not include the area at Silloge. As such, the Plan Objective cannot be contravened.

The report asks whether, in relation to Plan objective NH23, the Nanakin River has been included in this assessment? I can confirm that it has, and direct effects have been avoided in the design of the project. Drawing Number 32102902-SWMP-2(3/6) (Figure 2 Outline Surface Water Management Plan – Proposed Orbital Sewer Route [Sheet 3 of 4]) shows a trenchless crossing of this watercourse. For this reason also, the project does not offend Plan objective NH24 to protect rivers, streams and other watercourses and maintain them in an open state.

Plan objective NH25 is not applicable, as stated in Table 11.2 of the EIAR.

Account has been taken of Objective NH27 by Irish Water committing to protecting trees to be retained in accordance with BS 5837:2012, and re-planting of native species hedgerows removed during construction phase along the route of the orbital sewer and outfall pipeline.

Protected Species Licensing

Smooth newt surveying was conducted under terms of a licence issued by NPWS, and the licence was operative until June in the year of survey. NPWS has not expressed any dissatisfaction with the survey method employed or results of survey and have requested an up to date pre-construction survey to also include this site, in the event that permission is granted.

The badger survey results supplied to An Bord Pleanála and NPWS have recorded badger activity in this area. As agreed with NPWS, a pre-construction badger survey will be undertaken in advance of a disturbance licence application to take account of any badger constraints that may arise in between the survey conducted to inform the Biodiversity appraisal and construction of the project in the event that permission is granted.

Appendix A

**Extract Section 4.2 (page 25 - 34) of the outline Construction
Environmental Management Plan**

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Extract Section 2. Surface Water Management Measures

Appropriately sized close boarded fencing shall be erected along the temporary working area adjacent to the enterprise to provide visual screening and to reduce noise levels. To help in the reduction of noise levels both topsoil and subsoil shall be stored, separately, on the northern side of the working corridor. The height of the topsoil bund will be dictated by the optimum height for storing topsoil. However, particular attention will be given to increasing the height of the subsoil bund as appropriate to assist in mitigating noise impacts in this area.

- **Noise and vibration – marine environment**

During construction activities that create significant acoustic signatures marine mammal observers and a high frequency hydrophone system will be used to establish an operational safe zone around the site. Operations will not commence if sensitive receptors (pinnipeds and cetaceans) are observed within this perimeter. Distances and the timing of these operations will be based on standard international practice at the time of the operation, in agreement with NPWS. This may also require advice from specialist NGO groups such as the IWDG; the timing of these operations may need to be adjusted in consultation.

Operational strategies, including soft starts, will also be established in advance of the operation.

Other mitigation measures are included in Chapter 24 Summary of Mitigation Measures of the EIAR.

Surface water

The surface water runoff during construction activities will be managed to prevent flow of silt-laden surface water flowing into watercourses in accordance with the Outline Surface Water Management Plan, which is attached as Appendix 3.

Surface Water runoff during the operational phase of the project will be managed and controlled to limit discharges from the site to pre-development green field runoff rates and prevent pollution of watercourses through the implementation of on-site Sustainable Urban Drainage Systems (SuDS) including swales, filter drains, underground attenuation tanks and rainwater harvesting, in accordance with the outline Surface Water Management Plan. All SuDS systems will be designed in accordance with the SuDS Manual, CIRIA C753, 2015

Terrestrial based construction activities

Flood Prevention

The Proposed Development will be designed in accordance with the report entitled 'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' and the Flood Risk Assessment carried out for the project.

All flood vulnerable infrastructure (i.e. the Wastewater Treatment Plant and Pumping Station) are located within Flood Zone C – low risk.

Similarly, all construction site compounds, storage areas and launch pits (for trenchless technologies) will be located, where possible, within Flood Zone C – low risk. The shafts/construction fronts for any trenchless technologies will be located beyond the floodplain of the summer peak flood of an appropriate return period (1 in 20 years).

The proposed landscaping berm to the north of the treatment plant will be confined to the area outside the Flood Zones A and B.

The proposed access to the treatment plant from the R139 will be constructed over the Mayne River. The existing culverting arrangements at this location will be replaced with a new culvert which will be sized in accordance with the OPW's Section 50 consents so as not to cause an afflux (i.e. backing up of the river increasing the water level) thereby ensuring that there is no change to the existing flooding regime of the Mayne River.

In areas which are liable to flooding, the following measures are to be taken to reduce the potential impact of the works in the event of a flood:

- Immediate removal/disposal of surplus material off site;
- Provision of drainage within soil bunds to reduce the influence upon the surface runoff pathways of flood water;
- Avoidance of direct discharge of surface water from any temporary impervious area to the nearby watercourse without proper attenuation;
- Provision of temporary attenuation ponds if the stream to which surface water from the construction area is due to discharge to has limited capacity.
- The Office of Public Works (OPW) will be contacted for all issues related to watercourse flooding.

Particular care will be taken in siting the tunnelling compound at the Coast Road and in constructing the pipeline at Maynestown to ensure that there is no impact on the flood protection arrangements at the rear of the Myne Road cottages.

Wastewater Treatment Plant

Rainfall run-off from building roofs, road surfaces and other impermeable areas within the area of the proposed development will be conveyed in a new drainage system, incorporating a treatment train comprising of sustainable drainage systems (SuDS) with attenuation systems in place to limit discharges from the site to the green field site flow rate. The surface water treatment train approach follows guidance from the Greater Dublin Strategic Drainage Study (Glossary, Volume 3, Environmental Management) and SuDS Manual (C753) (CIRIA, 2015).

Surface water runoff will be attenuated on site at the Wastewater Treatment Plant using a combination of rainwater harvesting (from roofs of buildings), swales, filter drains and

underground attenuation tanks prior to discharge to the Cuckoo Stream, which bounds the northern edge of the site.

An oil/fuel separator will be provided prior to the connection to the attenuation tank to capture pollutants in run-off on roads and parking areas within the site.

Surface water runoff from the proposed access road from the R139 will be attenuated using swales and infiltration drains prior to discharge to the Mayne River. An oil/fuel separator will be provided prior to discharge to the Mayne River to capture pollutants in run-off from the access road.

Abbotstown Pumping Station

Rainfall run-off from building roof, road surfaces and other impermeable areas within the area of the proposed development will be conveyed in a new drainage system, incorporating a treatment train comprising of sustainable drainage systems (SuDS) with attenuation systems in place to limit discharges from the site to the green field site flow rate. The surface water treatment train approach follows guidance from the Greater Dublin Strategic Drainage Study (Glossary, Volume 3, Environmental Management) and SuDS Manual (C753) (CIRIA, 2015)

Surface water runoff will be attenuated on site at Abbotstown Pumping Station using a combination of rainwater harvesting (from roofs of buildings), swales, filter drains prior to discharge to the existing water course to the south of the site, which is a tributary of the Tolka River.

An oil/fuel separator will be provided prior to discharge to the water course to capture pollutants in run-off from the site.

Regional Biosolids Storage Facility (RBSF)

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

Surface water runoff will be attenuated on site at the RBSF using a combination of rainwater harvesting (from roofs of buildings), swales, filter drains and underground attenuation tanks prior to discharge to the existing attenuation area within the site.

An oil/fuel separator will be provided prior to the connection to the existing attenuation area to capture pollutants in run-off on roads and parking areas within the site

Site Compounds

Site compounds will be provided with SuDS storage and soak away systems designed to BRE Digest 365, for any storm water running directly off any impermeable areas of the compounds. Storage compounds will have stoned areas for the clean storage of materials.

Control measures will be put in place for the site compounds as follows:

- They will be set back from waterbodies, and outside of any ecologically sensitive areas.
- The impermeable area within compounds will be minimised to limit surface water runoff.
- Any watercourses that occur in areas of land that will be used for site compound/storage facilities will be fenced off at a minimum distance of 5 m from the watercourse. In addition, measures will be implemented to ensure that silt laden or contaminated surface water runoff from the compounds does not discharge directly to the watercourse.
- Storage of fuels, other hydrocarbons and other chemicals within the construction compounds will not be permitted within 50m of a waterbody. Each site compound will be provided with a variety of drainage containment systems to cater for containment of chemical spills, storm water run-off and foul flows from the site during construction.
- All surface water runoff will be intercepted and directed to treatment systems for the removal of pollutants prior to discharge.
- All compounds will have security to deter vandalism, theft and unauthorised access.
- Surface and storm water will be put through a settling/sedimentation tank, dewatering bags or similar silt retention process before discharge to the local water course.
- Once structures have roofs and down pipes installed, storm water will be discharged into a SuDS based drainage system to prevent run-off and control discharge from the site

Water Course Crossings

For construction of any watercourse crossings, detailed Pollution Control Plan, Emergency Response Plan and Method Statements will be drafted in agreement with Inland Fisheries Ireland (IFI) and other relevant authorities, and having regard to relevant pollution prevention guidelines in particular the IFI document “Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters”. All works in or adjacent to watercourses will comply with the EPA, IFA and OPW requirements.

Water course crossings shall be constructed using tunnelling techniques which will require shafts to be excavated on either side of the crossing. Such shafts shall be located a minimum of 20m from a watercourse.

To protect against the potential pollution of water courses from these construction activities the mitigation measures outlined in the EIAR and the Outline Surface Water Management Plan shall be implemented in full.

- **Marine based construction activities**

All onboard waste discharge, from dredgers, pipeline survey vessels, maintenance vessels and marine rigs, will follow the guidelines from Annex V of the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL) for domestic waste discharges to the environment. Solid and chemical waste will be treated on board and recycling will take place wherever practicable. No waste is to be disposed of at sea. Bilge water will be treated in accordance with MARPOL standards. All waste discharges will be monitored and recorded as per vessel procedures.

Any hazardous wastes will be in sealed, labelled drums and stored in lockable chemical cabinets. A record will be kept of the type and quantities of waste arising on each vessel.

Ballast tanks will be separated from any hydrocarbon storage areas on board the vessels and no potentially contaminated drain systems will be routed to the ballast tanks. De-ballasting shall be undertaken offshore in accordance with International Marine Organisation (IMO) guidelines and away from sensitive environmental areas to prevent introducing marine organisms from outside the project location.

Project vessels and rigs will be equipped with oil-water separation systems in accordance with MARPOL requirements.

Any spills on deck will be contained and controlled using absorbing materials. This will be collected in dedicated drums to avoid contamination of deck run-off water. Vessels or rigs without a sewage treatment system will have a suitable holding tank; waste water will then be brought back to shore for treatment by a licensed contractor.

All chemicals used onboard the project vessels or rigs will be handled in compliance with the relevant Safety Instructions, including Control of Substances Hazardous to Health (COSHH) Handling of Hazardous Materials.

For each chemical, a Material Safety Data Sheet will be available, as well as an assessment of the hazards associated with the chemical (to personnel, for storage, for emergency response). These will be available at the various places where the chemical is used, and centralised with the Safety Officer on board.

Chemicals will be stored in compliance with the handling instruction, including separation of incompatible chemicals, provision of adequate firefighting, spill containment and other safety facilities. The only bulk storage on board vessels will be the fuel; all other chemicals will be stored in drums or smaller containers and will be suitably banded to contain any leaks or spills.

The construction management of the project will be undertaken in accordance with the commitments made in the EIAR to minimise as far as possible the risk of soil, groundwater and surface water contamination.

Sediment Control – Monitoring

Where it is proposed to carry out work adjacent to or across a water course or other water body a water quality monitoring programme will be required at the pre-construction and construction stage.

The monitoring of all aspects of sediment control will be carried out by the Contractor as the responsible party. The responsibilities of the Employer will be discharged by the Employer's Site Representative Team.

Pre-Construction Monitoring

Pre-construction water quality monitoring will be undertaken once a week for a 6-month period, prior to the commencement of the construction works. Samples will be taken for total suspended solids (TSS), turbidity, pH, temperature, dissolved oxygen (DO) and hydrocarbons up and downstream of the proposed working areas and/or crossing points, to build upon the baseline monitoring carried out at the EIAR stage and in order to further establish the baseline water quality conditions prior to construction. Samples for turbidity, pH, DO and temperature will be taken in situ; samples for TSS and hydrocarbons will be sent to an accredited laboratory for analysis.

Construction Monitoring

During construction, the Contractor will monitor the levels of TSS, turbidity, pH, temperature, DO and hydrocarbons at the same locations up and down stream of the works once a week for the duration of the following works:

- Site clearance works, earthworks movements and stockpiling;
- Excavations including those associated with the provision of drainage works; and
- Construction works within and adjacent to watercourses.

The construction monitoring results will be compared with those results established in pre-construction monitoring. In the event of an elevation above pre-construction levels an investigation will be undertaken by the Contractor and remediation measure will be put in place.

In addition, daily visual inspections of the surface drainage and sediment control measures and the watercourses will be undertaken by the Contractor. Indicators that water pollution may have occurred include the following:

- Change in water colour;
- Change in water transparency;
- Increases in the level of silt in the water;
- Oily sheen to water surface;

- Floating detritus; or Scums and foams.

These inspections shall be recorded. In the event that such indicators are observed, works will cease, sampling will be immediately undertaken as described for the weekly monitoring and an investigation of the potential cause will be undertaken by the Contractor.

Where the works are identified as the source causing the exceedance the following will apply:

- Irish Water, the NPWS and IFI.
- Works capable of generating sediment and all discharges shall be stopped immediately.
- The contractor will be required to take immediate action to implement measures to ensure that such discharges do not re-occur.

The above monitoring will alert the Contractor to any detrimental effects that particular construction activities may be having on water quality in order that appropriate remedial action can be taken as quickly as possible; and allow the Contractor to demonstrate the success of the mitigation measures employed in maintaining any sediment release within the 'trigger' value established.

Groundwater

Preliminary site investigation works indicate that groundwater will be encountered at levels of less than 3.0m below ground level at most locations within the works. Direct disposal to the nearby watercourse of arisings from excavations and from groundwater dewatering activities will not be allowed as these could impact both on water quality of the watercourse and increased 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, Fisheries etc.) prior to the commencement of work.

Potential impacts on the Baldoyle estuary SAC and the Portmarnock Golf Club irrigation wells will be avoided. The outfall pipeline will be constructed in a manner that will eliminate the pathway between the hazard and the receptor.

The excavation of the tunnel drive shaft at the Fingal County Council public car park in Portmarnock will extend to circa 20 metres in depth and will go through the shallow aquifer. As a mitigation measure this shaft will be excavated using piling techniques and will not involve any dewatering or pumping which could interfere with the irrigation wells' performance. The shaft will be hydraulically sealed from the water bearing sands/gravels.

The outfall pipeline will be tunnelled in bedrock beneath the Baldoyle Estuary and Portmarnock Peninsula. The stiff boulder clay in the overburden will act as a barrier between the groundwater in the rock and the groundwater in the dune sands.

The outfall pipeline in the tunnel will be grouted to eliminate the possibility of a preferential flow path in the annulus outside the pipe.

Regardless of these mitigation measures, the outfall pipeline will not incorporate any abstraction of groundwater or discharge to groundwater.

Groundwater monitoring shall take place at Sillogue Golf Course and at Portmarnock Golf Course prior to construction, during construction and post construction to ensure no adverse impacts on groundwater quality.

- **Portmarnock Golf Club**

The Outfall Pipeline is routed in close proximity to a number of golf courses in the Portmarnock peninsula. In the course of the public consultation process Portmarnock Golf Club sought assurance that the shallow groundwater wells they use to meet the irrigation requirements of the golf club during the summer months would not be affected by the construction of the proposed outfall pipeline route (marine section). The principal concerns related to disturbance of the groundwater regime either causing a dewatering effect or causing an ingress of saline water thereby compromising water quality.

Potential effects on the irrigation wells of Portmarnock Golf Club have been mitigated by avoidance in the design of the proposed outfall pipeline route (marine section).

- This pipeline will be tunnelled in bedrock beneath Baldoyle Estuary and Portmarnock Peninsula. The stiff boulder clay in the overburden will act as a barrier between the groundwater in the rock and in the groundwater in the dune sands from which the irrigation wells draw their water.
- The pipeline will be grouted to prevent the possibility of preferential flow pathways. As there will be no abstraction or discharge along the line of the pipe there will be no alteration to the flow regime or quality.
- The drive shaft at Portmarnock will be constructed using piling or caisson construction techniques to avoid the necessity to dewater.

It is important to the golf course operators that the sources of irrigation are not affected by the works for the Outfall Pipeline. For this reason, it has been agreed with the golf club operators that monitoring of the irrigation sources is undertaken in advance of construction, during construction and for a period post construction. These requirements will be included within the Contractors CEMP.

In the unlikely event that the works will compromise the ground water supply a temporary supply of potable water will be made available in the construction compound adjacent to the golf course.

Ecology

Extensive mitigation measures are proposed to minimise potential for the construction of the GDD project to impact on terrestrial and marine ecology. These are summarised hereunder, however the full schedule is included in the relevant sections of the EIAR.

• **Marine Ecology**

In order to mitigate noise and vibration during the Marine Outfall construction, the duration of dredging operations will be minimised.

Due to the trenchless construction method proposed beneath Baldoyle SAC, the impact to the marine ecology in the sensitive inshore areas during construction will be minimal, although there is a minor risk of an air or bentonite break-out.

There will be no discharges of untreated water to the estuary.

Operations will be managed with bunded storage areas and sediment settlement areas.

Air breakout to the surface will be mitigated through management of pressures.

In the event of a large air breakout in the Baldoyle estuary, the area affected will be assessed and if required, the natural recovery of the depression will be aided to accelerate its reinstatement. This is usually done by back filling scoured areas with the surrounding surface sediments if safe or appropriate to do so.

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 breakout occur the volume is minimised.

A contingency management plan shall be prepared by the Contractor. If survey and monitoring procedures indicate that a break out has occurred, the drilling contractor shall cease pumping and implement the processes detailed in their contingency plan. Regulatory agencies shall immediately be notified regarding a suitable course of action.

The risk of breakout is likely to occur when:

- Shallow – passing through weak and saturated soils with little inherent strength
- Shallow – passing through heavy granular material where bore stability may be difficult to control
- Deep – If heavy fractured rock causes bore instability and a pre-existing pathway exists to allow drilling fluid to escape to the environment.

The primary means of mitigation is through the use of appropriate drilling mud formulation and management for the conditions. For shallow sections, especially where these are unavoidable at the beginning and end of the bore, the emphasis is on appropriate drilling

practices for the overburden. Steel casings can also be installed along the alignment from the surface.

For breakouts at depth, the emphasis on environmental mitigation is focused upon containment, control and cleanup. Beyond improving the drilling mud formulation and or drilling processes, which is often sufficient, the leakage path can be sealed with a special lost circulation material. These materials are introduced as slugs into the drill pipe and pumped onto the bore to clog the pathway. Containment measures include the installation of interception devices (e.g., silt fence, staked straw bales, sediment curtains, collection sumps).

In the event of a bentonite break-out, then the site will be monitored for chemical and macro-invertebrate communities to ensure no residual impacts. This may include both benthic and water quality measurements.

There will be monitoring of suspended solids plumes during dredging operations. Tidal restrictions may be necessary at peak plume events

If piling in a caisson for connection with dredging is required, a detailed noise and vibration plan will be prepared. Seasonal factors will be considered.

Potential noise impacts during dredging and Marine Diffuser construction phases of the work will be monitored and NPWS guidelines (DoAHG, 2014) followed to minimise the impact of construction to sensitive receptors (i.e. pinnipeds and cetaceans).

Passive acoustic monitoring will be undertaken and marine mammal observers used to establish a safe zone.

Disturbance of inter-tidal and sub-tidal 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 water courses and the estuary.

Dredging works will involve disposing of dredged material to a barge, depositing and stockpiling parallel to the pipeline trench within the 250m corridor. 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 restricted to flooding tides if a plume is detected >50 mg/l above background on the Ireland's Eye northern coastline.

- **Invasive species**

All plant and equipment employed on the construction site (e.g. excavators, footwear, etc.) will be thoroughly cleaned down 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

2. Surface Water Management Measures

2.1 Embedded Mitigation

Note that the design of various project components has considered the potential impacts and mitigation has been embedded in the design.

2.1.1 Surface Water Drainage

Objective SW04 of the Fingal Development Plan 2017-2023 requires:

“the use of sustainable drainage systems (SuDS) to minimise and limit the extent of hard surfacing and paving and require the use of sustainable drainage techniques where appropriate, for new development or for extensions to existing developments, in order to reduce the potential impact of existing and predicted flooding risks”.

The drainage systems will be designed in accordance with the report entitled ‘The Planning System and FRM Guidelines for Planning Authorities (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.

2.1.2 Prevention of Pollution

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. 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.

2.1.3 Culverting

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 2.1. and presented on Figure 1. The use of trenchless technology for water crossings will ensure that the proposed orbital sewer route shall be constructed below the river, stream or ditch bed levels. The appointed contractor(s) will locate 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.

Table 2.1: River and Stream Crossings

Crossing No.	Description	Pipeline Route	Proposed Methodology/ Machinery
Watercourse Crossing 1	Tributary of Tolka River	Orbital Sewer Route (Blanchardstown – Clonshagh)	Trenchless/ Tunnel
Watercourse Crossing 2	Santry River	Orbital Sewer Route (Blanchardstown – Clonshagh)	Trenchless/ Tunnel
Watercourse Crossing 3	Mayne River	Orbital Sewer Route (Blanchardstown – Clonshagh)	Trenchless/ Tunnel
Watercourse Crossing 4	Cuckoo Stream	Outfall Pipeline Route (Land Based Section)	Trenchless/ Tunnel
Watercourse Crossing 5	Mayne River	NFS Diversion Sewer	Trenchless/ Tunnel
Watercourse Crossing 6	Tributary of Mayne River	Outfall Pipeline (Land Based Section)	Trenchless/ Tunnel

2.1.4 Proposed Outfall Pipeline Route (Marine Section) – Microtunnelling

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 750m offshore terminating below the low tide level. The microtunnel section is envisaged as 2.0m internal diameter, constructed at depths ranging between 15m and 20m below ground level 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 sewer 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 will have no hydraulic connection with the groundwater from the irrigation wells abstract.

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 microtunnelling compound area will be approximately 200m x 100m in size. At the compounds the launch / reception shafts will be constructed, tunnelling equipment located and tunnel materials will be stored temporarily.

The tunnelled pipeline will be grouted to eliminate the possibility of a preferential flow path in the annulus outside the pipe.

It is possible that the microtunnelling machine will be recovered via a 10m cofferdam structure. The cofferdam will be constructed from a jack up platform, using an interlocking sheet pile methodology. The interlocking sheet piles will be driven from the jack up platform to create the cofferdam structure using vibratory hammers, impact hammers or using a hydraulic method of installation. All access will be from the seaward side. Alternatively, the microtunnelling machine will be recovered via a pre-excavated trench filled with granular material (excavated from elsewhere along the pipeline trench) without the necessity to construct a cofferdam.

2.2 Construction Phase Measures

2.2.1 General Measures

A number of measures will be implemented in order to manage surface water in and around construction works and prevent impact to surface waters as a result of construction activity. The appointed contractor(s) will be required to develop a Surface Water Management Plan, which will form part of the overall Construction Environmental Management Plan. The measures outlined below will be included at a minimum in the Surface Water Management Plan.

An Ecological Clerk of Works (ECoW) will be appointed by Irish Water or its agents to monitor and regularly inspect the implementation of all ecological mitigation contained in the 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.

The key risks to surface water associated with the Proposed Project are:

- Impacts associated with increases in suspended solids being released into waterbodies;
- Impacts associated with pollution of waterbodies by other substances;
- Spreading of invasive species; and

- Increases in flooding.

The following measures are required in order to limit / prevent those listed impacts.

Control of Suspended Solids

The reduction and prevention of suspended solid pollution will be required during all elements of the Project works including:

- During site preparation and clearance works (cut / fill operations);
- Where trenchless operations are undertaken;
- Where the culvert system is constructed along with the new access road to the new WwTP;
- Where site access roads are constructed;
- Where new WwTP and Abbotstown Pumping Station construction works are undertaken;
- Where works are undertaken in marine areas; and
- Where satellite construction compounds are temporarily installed.

The appointed contractor(s) will develop a Sediment Control Plan (SCP), which will form part of the CEMP (the principles of which are detailed in this document and the Outline CEMP included in the EIAR), in advance of any construction activities commencing for the Proposed Project;

The appointed contractor(s) will inspect and monitor the water quality of surface waters in the vicinity of any works, paying particular attention to suspended solids and turbidity levels. This monitoring will form part of the CEMP for the works.

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 i.e. the Tolka River (or waters with fisheries potential i.e. the Santry, Mayne and Cuckoo stream) as a consequence of construction works shall not exceed 25 mg/l¹ nor result in the deposition of silts or any element of aquatic flora and fauna (as per IFI (2016) Guidelines). 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 will be identified within the works area and the appropriate mitigation measures will be undertaken by the appointed contractor(s) to ensure contaminated water from the sites 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 i.e. the WwTP and Abbotstown Pumping Station are to be located in Flood Zone C i.e. low risk. Similarly, all construction site 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 form appropriate mitigation:

- 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 for their installation shall be agreed with IFI prior to construction;
- A sediment mat / silt trap or similar will be located immediately downstream of the works within and adjacent to the minor watercourses. These should be inspected daily, maintained and cleaned regularly during the

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. <http://www.irishstatutebook.ie/eli/1988/si/293/made/en/print>

course of site works. Diversion of water to and from temporary diversion channels should only take place during the period of March to September or as agreed with the IFI;

- Topsoil stripping in proximity to any watercourses will be undertaken in dry weather conditions and all stockpiles will be located greater 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, e.g. by use of hydroseeding (larger areas), replacement of turves (smaller areas) etc. 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;
- Run-off velocities and erosive energy will be minimised by maximising the lengths of flow paths for precipitation run-off, 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 or polyethylene lining to prevent channel erosion;
- 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 soil, aggregates, chemicals, etc.;
- Heavy vehicular movements will be restricted adjacent to watercourse and tidal areas in order to avoid inputs;
- Run-off 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 run-off 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 breakdown 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;
- Where works are to be carried out such as the crossing of drainage ditches, the works area shall be isolated from surface water using a sufficiently large flume or other suitable containment methods. Water within the contained area contaminated with suspended solids or other potential pollutants shall not be released directly to the drainage ditch. It shall be pumped to a suitable sediment control structure (e.g. sediment control pond) to allow sediment removal before it re-enters the drainage ditch;
- Small check dams will be constructed in the cut-off watercourse to trap any sediment, and a sediment trap will be provided immediately downstream of the diversion to the existing watercourse.
- 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 run off.

Stockpiling

The following measures will be put in place by the appointed contractor(s) with regard to stockpiling of material:

- Temporary stockpiles will be located away from drains and watercourses. Stockpiles will not be located within 10m of a non-sensitive watercourse or within 50m of a sensitive watercourse;
- Management of stockpiles to prevent siltation of watercourse systems through runoff during rainstorms will be required with the final measures to be determined by the appointed contractor(s), including the following:

- Allowing the establishment of vegetation on the exposed soil;
- Providing silt fences or straw barriers at the toe of the stockpile to mitigate runoff during rain events;
- Surrounding stockpiles with cut-off ditches to contain runoff;
- Directing any rainwater runoff to the site drainage system and to the settlement pond (or other) treatment systems;
- Providing bunds or another form of diversion to keep runoff from entering the stockpile area.

Pollution with Other Substances

Where the construction works are close to a watercourse, and at all watercourse crossings, the following best practice guidelines shall be followed:

- 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 current best practice (Enterprise Ireland BPGCS005);
- 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;
- Waste oils and hydraulic fluids shall be collected in leak-proof containers and removed from the site for disposal or re-cycling;
- All pumps using fuel or containing oil shall be locally and securely bunded and shall not be located within 20m of a watercourse or drainage ditch; and
- Prior to any instream works, the appointed contractor(s) will ensure that all construction equipment is mechanically sound to avoid leaks of oil, fuel, hydraulic fluids and grease.

A detailed CEMP will be established prior to construction. 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.

Use of Concrete

Concrete will be required as part of works undertaken to construct the new 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 Project for the culvert and bridge structures 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 state. 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:

- When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of 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 (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters;
- Placing of concrete in or 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 on site to prevent pollution of all surface watercourses;
- 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 means of one of the construction stage settlement facilities) or alternatively disposed of as waste to a licensed facility

Invasive Species

No invasive species were found during freshwater surveys within the route corridor, however invasive species records are known from the wider catchments of the Tolka and Santry. 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:

- All plant and equipment employed on the proposed construction site (e.g. excavator, footwear, etc.) 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 (OPW) Environmental Standard Operating Procedures (2011) and IFI Biosecurity Protocols (IFI, 2010). 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 and Santry Rivers. All staff working on the 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, and, Information and Guidance Document on Japanese knotweed (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.

Flood Prevention

The Proposed Project will be designed in accordance with the report entitled 'The Planning System and FRM Guidelines for Planning Authorities' (OPW 2009) and the Flood Risk Assessment carried out for the project.

All flood vulnerable infrastructure, i.e. the WwTP and Abbotstown Pumping Station, are located in Flood Zone C i.e. low risk. Similarly, all construction site compounds, storage areas and launch pits (for trenchless technologies) will be located, where possible, within Flood Zone C – low risk. The proposed landscaping berm to the north of the treatment plant will be confined to the area outside the Flood Zones A and B. The proposed access to the treatment plant will be constructed over the Mayne River. The existing culverting arrangements will be replaced ensuring the existing flooding regime will not be altered as a result.

In areas which are liable to flooding, the following measures are to be taken to reduce the potential impact of the works in the event of a flood:

- Immediate removal / disposal of surplus material off site;
- Provision of drainage within soil bunds to reduce the influence upon the surface runoff pathways of flood water;
- Avoidance of direct discharge of surface water from any temporary impervious area to the nearby watercourse without proper attenuation;
- Provision of temporary attenuation ponds if the stream to which surface water from the construction area is due to discharge to has limited capacity; and
- The Office of Public Works (OPW) will be contacted for all issues related to watercourse flooding.

Trenchless construction techniques will be used for the installation of the outfall pipeline under Baldoyle Estuary. The appointed contractor(s) will locate construction compounds and launch pits in Flood Zone C – low risk areas for both the orbital sewer and outfall pipeline. The appointed contractor(s) will ensure that construction compounds located within the allowable wayleave are not within Flood Zones A and B. The areas at risk are predominantly located at the significant watercourse crossings and these compounds are to be sited in Flood Zone C.

The shafts / construction fronts for any trenchless technologies will be located beyond the floodplain of the summer peak flood of an appropriate return period (1 in 20 years).

Environmental Incidents and Accidents

- 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 oil booms, soakage pads, etc.);
- 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 project as appropriate;
- Safe handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the project and an emergency response plan 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 removed from the site and properly disposed of, and

- There shall be no discharge of un-attenuated water to the adjacent marine environment.

2.2.2 Construction Compounds and Main Sites

A number of proposed temporary construction compounds (including those at the proposed WwTP and Abbotstown pumping station sites) are proposed. Site compounds will be provided with SuDS storage and soak away systems designed to BRE Digest 365, for any storm water running directly off any impermeable areas of the compounds. Storage compounds will have stoned areas for the clean storage of materials. The following mitigation will apply together with suspended solids pollution measures outlined previously:

- 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;
- Any watercourses that occur in areas of land that will be used for site compound / storage facilities will be fenced off at a minimum distance of 5m from the watercourse. In addition, measures will be implemented to ensure that silt laden or contaminated surface water runoff from the compounds does not discharge directly to the watercourse;
- The impermeable area within compounds will be minimised to limit surface water runoff;
- Each site compound will be provided with a variety of drainage containment systems to cater for containment of chemical spills, storm water runoff and foul flows from the site during construction;
- All surface water runoff will be intercepted and directed to treatment system for the removal of pollutants prior to discharge. Surface water and storm water will be put through a sedimentation tank, dewatering bags or similar silt retention process;
- Once structures have roofs and down pipes installed, storm water will be discharged into a SuDS based drainage system to prevent runoff and control discharge from the site;
- 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 WwTP site and other locations deemed appropriate,
- Invasive species biosecurity measures will be installed at the entrance to the WwTP site, the Abbotstown Pumping Station site and all satellite compounds. This will adhere to the IFI Biosecurity Protocol (2010); and
- Foul drainage from site offices and other construction facilities will be disposed of through the provision of a direct connection to a local sewer (WwTP) or be serviced by means of a waste water storage tank (other site compounds), which will be emptied by means of a suction tanker and the waste water shall be disposed of to a licensed facility.

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 stream 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 benefitting instream flora and fauna.

WwTP and Abbotstown Pumping Station

The surface water drainage system of the WwTP and Abbotstown pumping station and access roads will be designed to incorporate SuDS principles, with attenuation systems in place to limit discharges from the site to the green field site flow rate.

The proposed WwTP is located in the Mayne River catchment. The land parcel is bounded by the Cuckoo Stream (a tributary of the Mayne River) immediately to the north. The Mayne River is located approximately 400m to the south of the land parcel. Access to the site is intended from the R139 Road on a left-turn only basis. This will involve crossing the Mayne River. The topography of the proposed WwTP site suggests that surface waters will generally flow towards the Cuckoo Stream.

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 stream 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 benefitting instream flora and fauna.

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 WwTP 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.

The topography of the proposed Abbotstown pumping station site is such that surface waters will generally flow towards the Tolka River. Access to the site shall be through the grounds of the National Sports Campus (NSC) and Ballycoolin Road. Culverts or bridge crossings will not be required to facilitate either the construction of the pumping station or the access road. Surface water runoff will be attenuated on site at the Abbotstown pumping station through means of a filter drain system prior to discharge to the existing water courses to the south of the site.

Construction of Culvert System

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 (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 instream activity.

There is one culvert system proposed as part of this Project. This culvert system will be located on the access road to the new WwTP at Clonshaugh, and will cross the Mayne river. The following mitigation is proposed and is in line with IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters, in particular Section 6 – River and Stream Permanent Crossing Structures. During the construction phase the appointed contractor(s) shall ensure that:

- Instream works shall be undertaken during the period 1st July to 30th September as required by IFI Guidance (2016) to avoid accidental damage or siltation of spawning beds, and unless otherwise specified by IFI during consultations in advance of works. This shall include preparatory work in the vicinity of all watercourses and all river bank works;
- Where bank protection works may be required (i.e. upstream and downstream of new structures, to ensure no undercutting or destabilisation of either the structure or riparian bank areas occurs) large enough boulders shall be selected by the appointed contractor(s) and strategically positioned, to ensure they cannot be undercut;
- If rock armour is required, the height to which this is built shall take account of the riparian zone, and if relevant, where protection of bird species is required, 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 appointed contractor(s) shall ensure that 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. The culvert will be bottomless and pre-cast. Bridge foundation will be designed and positioned at least 2.5m from the river bank so as not to impact riparian habitats. The use of these structures will maintain the natural stream channel characteristics and have the least impact on habitat.

2.2.3 Proposed Orbital Sewer and Outfall Pipeline (Land Based) Routes

For construction of any watercourse crossings, detailed Pollution Control Plans, Emergency Response Plans and Method Statements will be drafted in agreement with IFI and other relevant authorities, and having regard to relevant pollution prevention guidelines, in particular the IFI document 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters' (IFI, 2016). All works in or adjacent to watercourses will comply with the EPA, IFI and OPW requirements.

Surface Water Management Along the Route

Surface water management measures will be installed along the pipeline route in order to manage run-off 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 run-off from the stockpiles of top soils 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 pipeline route at regular intervals as required as construction progresses, and shall be sized based on calculations of hourly run-off volumes based on a 1 in 10 year rainfall event. These settlement ponds will collect surface waters flowing over the wayleave and in the toe-drains. The routes will be split into 19 separate sections for the purposes of surface water management. Table 2.2 provides detail of the volumes of attenuation to be provided at each section along the proposed route, as well as outfall information. Please refer to Figure 2 for proposed temporary outfall locations.

Table 2.2: Surface Water Attenuation Details for proposed orbital sewer and outfall pipeline (land based) routes

Section	Length (m)	Area (m ²)	Post-Attenuation Outfall To	Volume of Temporary Storage Required m ³ [1 in 10 year (1 hour)]
Proposed Orbital Sewer				
1	300	12,000	Ditch	135
2	425	17,000	Internal Road	192
3	425	17,000	Road	192
N/A	850	N/A	Pipe in roadway in Premier Business Park	N/A
4	850	34,000	Ditch	384
5	800	32,000	Ditch	361
6	550	22,000	Road R122	248
7	2,100	84,000	Santry River	948
8	450	18,000	Santry River	203
9	1,475	59,000	Mayne River	666
10	925	37,000	Mayne River	417
11	650	26,000	Ditch Before M1	293
12	625	25,000	Clonshaugh Road	282
Proposed Outfall Pipeline (Land Based)				
13	1,850	74,000	Malahide Road	835
14	1,500	60,000	Watercourse – tributary of Mayne River	677
15	550	22,000	Road R124	248
16	200	8,000	Ditch	90
17	450	18,000	Watercourse – tributary of Mayne River	203
18	550	22,000	Ditch	248
19	300	12,000	Ditch	135

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 (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.

Trenchless Crossing of Watercourses

Proposed trenchless crossings of watercourses are shown in Table 2.1 and on Figure 1. 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 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, Emergency Response Plan and Method Statements will be drafted in agreement with IFI and other relevant authorities.

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 are outlined below.

- 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 tunnelling, 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 satellite 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;
- Refuelling of plant and vehicles shall be done on impermeable and bunded areas, and away from any watercourses;
- Upon completion of works at each stream crossing the site shall be cleaned and any waste disposed of to a suitably licenced 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 in the vicinity of 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 chemical and macro-invertebrates to ensure no residual impacts following clean-up operations. This monitoring will form part of the CEMP for the works.

2.2.4 Proposed Outfall Pipeline (Marine Based)

Please refer to Section 2.1.4 for a discussion on microtunnelling as embedded mitigation for this section of the Proposed Project.

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 water courses and the estuary.

The potential for an accidental release of bentonite will be minimised by closely monitoring its use during all works. 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 chemical and macroinvertebrate communities to ensure no residual impacts. This may include both benthic and water quality measurements.

In order to prevent impacts arising from increased suspended sediments in the Rockabill to Dalkey SAC the turbidity will be monitored using a buoy mounted turbidity meter telemetered 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 total suspended solids (TSS) up to 40mg/l (the natural standard deviation for the year) above a daily background will be permitted off Ireland's Eye northern coastline. 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.

A vessel management plan will be put in place to ensure that the Ireland's Eye SPA boundary is not unnecessarily approached or crossed by construction vessels working on the marine diffuser or subsea pipeline.

All on board waste discharge, from dredgers, pipeline survey vessels, maintenance vessels and marine rigs, will follow the guidelines from Annex V of the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL) for domestic waste discharges to the environment. Solid and Chemical Waste will be treated onboard and recycling will take place wherever practicable. No waste is to be disposed of at sea. Bilge water will be treated in accordance with MARPOL standards. All waste discharge will be monitored & recorded as per vessel procedures.

Any hazardous wastes will be sealed in labelled drums and stored in lockable chemical cabinets. A record will be kept on the type and quantities of waste arising on each vessel.

Ballast tanks will be separated from any hydrocarbon storage areas on board the vessels and no potentially contaminated drain systems will be routed to the ballast tanks. De-ballasting shall be undertaken offshore in accordance with International Marine Organisation (IMO) Guidelines and away from sensitive environmental areas to prevent introducing marine organisms from outside the Proposed Project location.

Project vessels and rigs will be equipped with oil-water separation systems in accordance with MARPOL requirements.

Any spills on deck will be contained and controlled using absorbing materials. This will be collected in dedicated drums to avoid contamination of deck runoff water. Vessels or rigs without a sewage treatment system will have a suitable holding tank, wastewater will then be brought back to shore for treatment by a licensed contractor.

All chemicals used onboard the Proposed Project vessels or rigs will be handled in compliance with the relevant Safety Instructions, including Control of Substances Hazardous to Health (COSHH) Handling of Hazardous Materials

For each chemical, a Safety Data Sheet (SDS) will be available, as well as an assessment of the hazards associated with the chemical (to personnel, for storage, for emergency response). These will be available at the various places where the chemical is used, and centralised with the Safety Officer on board.

Chemicals will be stored in compliance with the handling instruction, including separation of incompatible chemicals, provision of adequate firefighting, spill containment and other safety facilities. The only bulk storage on board vessels will be the fuel; all other chemicals will be stored in drums or smaller containers and will be suitably banded to contain any leaks or spills.

The Outline CEMP for the Proposed Project will take account of the recommendations of this document to minimise as far as possible the risk of soil, groundwater and surface water contamination.

3. References

- CIRIA (2001). Control of Water Pollution from Construction Sites. CIRIA Technical guidance C532
- CIRIA (2006). Control of Water Pollution from Linear Construction Projects. CIRIA Technical guidance C648
- Fingal County Council (2017). Fingal Development Plan 2017-2023
- Goldman, S. J., Jackson, K., and Bursztynsky, T. A. (1986). Erosion and Sediment Control Handbook
- Inland Fisheries Ireland (IFI) (2016). Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters
- Office of Public Works (2009). The Planning System and FRM Guidelines for Planning Authorities
- Transport Infrastructure Ireland (TII, formerly NRA) (2005). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes
- Transport Infrastructure Ireland (TII, formerly NRA) (2008). Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads
- Transport Infrastructure Ireland (TII, formerly NRA) (2013). Specification for Road Works Series 800 – Road Pavements – Unbound and Cement Bound Mixtures