

Cork County Council
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Cork Harbour Main Drainage Scheme

Environmental Impact Statement

Proposed Waste Water Treatment Plant at Shanbally, Co. Cork

Volume I - Non Technical Summary



February 2008

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Volume I - Non Technical Summary

Preamble

The Cork Harbour Main Drainage Scheme WWTP (also referred to as the Cork Lower Harbour Sewerage Scheme) is a scheme for the provision of collection systems and waste water treatment facilities in the Cork Lower Harbour area.

This Environmental Impact Statement (EIS) forms part of the documentation in support of an application for planning permission for the provision of a waste water treatment plant (WWTP) to treat the waste water generated from Cork Lower Harbour and its environs.

The document is structured as follows:-

- A Non-Technical Summary - A summary of each of the sections of the main report highlighting the principal features.
- Introduction - An outline of the background to the development and the terms of reference for the EIS.
- Description of the Project - A detailed description including the background, alternatives examined, layout and design, construction and operation of the proposed development.

A comprehensive description of the existing environment of the site and the surrounding area, an assessment of the likely significant direct and indirect impacts which will result from the proposed development and a description of possible measures to ameliorate or mitigate the likely environmental impacts of the proposed development are provided regarding each of the following topics:

- Human Beings
- Terrestrial and Marine Ecology
- Water Quality
- Soils, Geology and Hydrogeology
- Material Assets
- Air Quality, Odour and Climate
- Noise and Vibration
- Cultural Heritage
- Landscape and Visual Assessment
- Interactions of the Foregoing

1 Introduction

Cork County Council proposes to construct a new urban WWTP, which will form an integral part of the Cork Harbour Main Drainage Scheme. Currently, waste water from population centres in the drainage scheme is generally not treated and is discharged directly to the Lower Harbour.

The provision of a WWTP (which provides secondary treatment) for Cork Lower Harbour is a requirement under European and National law. The *Urban Waste Water Treatment Regulations, 2001* (S.I. No. 254 of 2001) as amended, require sanitary authorities to provide treatment plants which offer secondary treatment or equivalent treatment by specified dates according to the population load entering the collection system. Upgrading of the sanitary services infrastructure has been set as an objective of the *Cork County Development Plan 2003* and *Carrigaline Electoral Area Local Area Plan 2005* (revised in 2007). The Water Services Investment Programme (WSIP) is the driving force behind water infrastructure. The Cork County 2007-2009 WSIP identifies Cork Lower Harbour Sewerage Scheme as one of the projects identified for investment during this period.

The objective of the scheme is to upgrade the existing drainage network in order to cater for the future needs of the area. The proposed WWTP will be constructed on a design/build/operate basis and therefore no specifics regarding the detailed design of the development are available at this stage. Other works associated with this development include pipelines, pumping stations and a marine crossing.

An EIS is required in support of the application for planning permission for the proposed WWTP. The primary objective of the EIS is to identify baseline environmental and socio-economic conditions in the project area, predict potential beneficial and/or adverse effects of the project, and develop appropriate mitigating actions where necessary.

This Non-Technical Summary provides a summary of information detailed in the EIS under the following headings:

- Description of the Development
- Receiving Environment:
 - Human Beings
 - Ecology (Terrestrial and Marine)
 - Water Quality
 - Soils, Geology and Hydrogeology
 - Material Assets
 - Air Quality, Odour and Climate
 - Noise and Vibration
 - Cultural Heritage
 - Landscape and Visual Assessment

2 Description of the Development

(i) Introduction

The Cork Harbour Main Drainage Scheme involves upgrading the existing sewerage system of Cork Lower Harbour and environs together with the provision of a WWTP with secondary treatment. Under the proposed scheme it is expected that waste water and storm water collection will be separated as far as possible. This will be affected by laying new separate storm water collection sewers in some areas and introducing storm overflow chambers in the combined sewers in other areas.

(ii) Existing Public Sewerage Scheme

Currently, the waste water from the population centres within the Cork Harbour Main Drainage Scheme (namely Carrigaline, Ringaskiddy, Shanbally, Coolmore, Cobh, Monkstown/Passage West and Crosshaven) is not generally treated and is discharged directly to the Lower Harbour via the following schemes:-

- Carrigaline Collection System
- Ringaskiddy & Shanbally Collection System
- Crosshaven Collection System (discharging to the Carrigaline Collection Scheme)
- Passage West / Monkstown Collection System
- Cobh Collection System

(iii) Consideration of Alternatives

Alternative treatment options, plant designs and outfall locations were evaluated on engineering, economic and environmental criteria.

Alternative Waste Water Treatment Schemes

An Option Study was carried out for 10 different scheme configurations comprising treatment plants and conveyance systems for the Cork Harbour Main Drainage Scheme. Nineteen sites were considered for the location of WWTPs for the various options. These sites were evaluated based on a number of criteria including availability of sufficient site area, ecological considerations, proximity to human beings, elevation, distance from the treated effluent outfall point, access to the site, the *Sludge Management Plan for County Cork* (2000), capital costs and operating and maintenance costs.

Schemes considered and evaluated comprised of single treatment plants, and combinations of two, three and four treatment plants at different locations serving different proportions of the catchment. On the basis of an initial evaluation of the ten schemes identified, only two of the ten were considered with sufficient potential to warrant detailed evaluation.

Alternative WWTP Locations

The preliminary assessment revealed two options to be the most favourable based on the assessment criteria:-

Option 2: A single WWTP at Carrigaline. Sewage from Cobh would be pumped across the Harbour to Monkstown, from where the combined Passage West, Cobh and Monkstown flows would be pumped to the WWTP. Waste water from Crosshaven and Carrigaline would be pumped via the existing rising mains to the WWTP. The treated effluent would be pumped to the existing Ringaskiddy outfall. The only marine work required would be at Cobh to Monkstown marine crossing.

Option 3: Two WWTPs (Carrigaline and Marino) would be provided, with no marine crossings required. However, a new outfall would be required at Marino.

Detailed Flora and Fauna, Noise and Archaeological surveys were carried out and reported for both of these short-listed sites (“Shanbally” and “Marino”) in order to identify the more favourable site in terms of environmental impact. On the basis of these surveys and assessments, the “Shanbally” site was identified as the preferred location for the proposed WWTP. Option 2 was therefore selected as the preferred configuration, which involves a single WWTP at Carrigaline, a marine crossing between Cobh and Monkstown with the treated effluent discharged via the existing IDA marine outfall from Ringaskiddy.

(iv) Proposed Site

The proposed site is a greenfield site located approximately 11km south of Cork City and 2.24km west of Ringaskiddy in the townland of Shanbally (refer to Figure 1.1 *Site Location - Regional* and Figure 1.2 *Site Location – Local*).

The proposed site consists of portions of two large agricultural fields located on sloping ground and currently used for pasture. The site is zoned for Utility and Infrastructure development by the *Carrigaline Electoral Area Local Area Plan, 2005* and adopted amendments (January 2007). The site has an area of approximately 7.36 hectares and is located between two overhead high voltage power lines to the north and south of the site.

With the exception of a small Bord Gáis substation, which adjoins the south-west corner of the site, the site is bordered on all sides by adjoining agricultural fields. A large ESB substation is situated circa 160 metres west of the site and a sports field is located circa 80 metres to the northeast of the site. There are proposals to construct a branch of the National Primary Route N28 to by-pass the villages of Shanbally and Ringaskiddy on lands immediately north of the site.

There are no existing site services. Access to the site will be provided via an existing access road to the Bord Gáis substation currently bordering the site.

(v) Characteristics of the Development

The proposed development consists principally of the construction of a large sized urban WWTP to serve the population centres of Cork Lower Harbour and its’ environs. The proposed WWTP is an essential element of the Cork Harbour Main Drainage Scheme. Associated works, which will be carried out as part of the proposed development, include:

- Widening and upgrading of the site access road (sections of)
- Marine crossing
- New waste water pumping stations
- The laying of rising mains, surface water sewers and gravity waste water sewers to direct the waste water to the new treatment plant
- New WWTP

A layout plan, showing the scope of the Cork Harbour Main Drainage Scheme is shown in *Figure 1.3 Associated Development Works*.

The treated waste water will be discharged to Cork Lower Harbour via the existing IDA marine outfall. This marine location has not been designated as a “sensitive” or “less sensitive” area by the Department of the Environment in accordance with the terms of the *EC Directive on Urban Waste Water Treatment (91/271/EEC)*. Therefore, nutrient removal (i.e. nitrogen and phosphorus) is not required at present. The proposed WWTP will be designed to allow easy retrofitting of nutrient removal facilities at a later stage should it be required in the future.

The fields on which the proposed WWTP is to be constructed are traversed by overhead high voltage electrical cables. However, by providing sufficient clearance from these power lines a suitable area is available between the power lines and is considered adequate for the construction of the proposed development (including facilities for organic-material removal, retrofitting of nutrient removal facilities, sludge treatment and appropriate landscaping measures).

The proposed WWTP will be designed and constructed on a design/ build/operate basis. No specific details are available on the WWTP at this stage; however its design and the quality of the treated waste water must meet the standards as required by the relevant EU Directives. For the purpose of providing an indication of the type of plant and site layout, this is provided in the *Volume II* of the EIS on the treatment processes considered most likely to be employed. This is based on experience of other plants of this scale and on current developments in technology. A worst case design is used for the assessment of impacts throughout the EIS.

(vi) Overview of Treatment Processes

A number of different process options suitable for large WWTPs are available. The principal elements of a treatment plant of the type and scale proposed include preliminary, primary and secondary treatment of the waste water stream with further provision for treatment of surplus sludge arising from the primary and biological stages of the treatment process. The various unit processes likely to be incorporated in any design are as follows:

- Storm Water Handling and Disposal
- Inlet Pumping
- Preliminary Treatment, including Screening and Grit/Grease Removal
- Primary Treatment
- Secondary Treatment
- Sludge Treatment
- Sludge Storage
- Sludge Reuse

Storm Water Handling & Disposal

The variation in flows reaching the WWTP can be dealt with in one of two ways. The simplest option is to design the entire WWTP to accommodate flows of 6 times the Dry Weather Flow (DWF). However, this results in operational difficulties and much larger tankage. Alternatively, the main treatment stages could be designed to accommodate only flows up to 3DWF, with flows in excess of this being overflowed upstream to a storage tank where it would be allowed to settle. The settled and screened storm water would then discharge to the main outfall pipeline downstream of the WWTP.

Preliminary Treatment

It is intended to provide septicity control in the form of chemical addition at critical pumping stations and locations in the collection/conveyance system. Septicity control at the WWTP is also required to address the risk of residual septicity in the waste water. Preliminary treatment will consist of screening and grit removal. Preliminary treatment facilities will be incorporated within a building with air extraction to an odour control system.

Screening may include coarse and/or fine screening equipment, which is usually mechanically operated and is used to intercept floating and suspended debris from the inlet waste water stream. Screening to 6mm will be provided on the incoming waste water. A variety of different types of screens are commercially available which would satisfy these requirements.

A number of methods exist for washing, dewatering and transporting the screenings. Washing and dewatering is essential in order to improve the unpleasant nature of the material and to minimise the volume of material for further treatment and disposal. Modern systems are fully enclosed and the final product is deposited in sealed bags to be transported off-site to landfill in enclosed skips.

The objective of grit removal is to protect pumps and other mechanical equipment from damage and excessive wear in the subsequent stages of treatment. Available methods for grit removal in urban WWTPs include constant flow velocity settlement channels, detritus tanks, vortex grit separators and aerated grit traps. The grit will be stored in a covered container prior to disposal off site to a licensed landfill.

The structures designed to accommodate the preliminary treatment stages would normally consist of a system of concrete channels, which can be either below or above ground level. These channels/structures are to be located within a building to reduce noise and odour emissions.

Primary Treatment

Primary settlement of the waste water stream is often used to reduce the loading to the secondary biological treatment stage. The units used in primary treatment are commonly known as primary sedimentation tanks, primary settlement tanks or primary clarifiers.

The primary settlement tanks may comprise two circular tanks. Alternatively, the tanks may be a rectangular structure with internal dividing walls. The tanks will be completely covered to contain odours.

Secondary (Biological) Treatment

The secondary treatment stage will involve the biological degradation of the organic content of the waste water by encouraging the growth of suitable micro-organisms within a particular process. The micro-organisms consume the organic content of the waste water and biomass or sludge is produced. The growth of micro-organisms in the structure can be encouraged on fixed media or as a suspended biomass within the waste water body.

A wide range of biological treatment systems are available. The treatment of domestic type waste water is well understood and all of the available systems can be designed to treat the waste water to the required standards. The essential elements common to most of the systems noted above include process structures/tanks, aeration devices, pumps, mixers, monitoring equipment, pipelines and access facilities.

Process structures can be constructed from steel or concrete. The size and height of the structures will depend on the type of process. Regardless of the process, all tanks/process structures will be restricted to a maximum height of 12m above the current ground level. Secondary treatment systems may require separate final settlement tanks or settlement can be achieved within the main process tanks.

Sludge Treatment

The main objective of sludge treatment is to produce a product with optimum reusable potential. The *Sludge Management Plan for County Cork* divides the County into five regions, namely regions 18 to 22, for the purposes of municipal waste water sludge treatment. The Ringaskiddy area is proposed as the most suitable location for the treatment hub-centre for Region 19 (*Sludge Management Plan for County Cork*, 2000). Region 19 consists primarily of the towns/villages included within the Cork Harbour Main Drainage Scheme i.e. Cobh, Passage West, Monkstown, Ringaskiddy, Crosshaven and Carrigaline but the region also includes Whitegate, Aghada and Minane Bridge. The Lower harbour towns will be served by the proposed new WWTP and therefore will not generate sludges locally. It is proposed that the sludge from the septic tank serving Minane Bridge which has a design population equivalent of 100PE be transported to the proposed to the Cork Harbour WWTP.

Although it is recommended that sludges from Whitegate and Aghada be diverted to Midleton hub centre for treatment, they may also be transported to the proposed WWTP site and as such sludge reception facilities to cater for all three locations will be incorporated in the design of the proposed plant. Sludge delivered to the site will be unloaded at the sludge reception facility. The mechanism by which the sludge is handled and discharged will be designed so as not to cause an odour nuisance.

The proposed development will include for the handling, treatment and disposal of sludges produced on site. The elements of the sludge handling and treatment facilities may include:

- Storage tanks
- Process tanks (pasteurisation and digestion)
- Thickening/ dewatering facilities
- Drying facilities
- Energy recovery facilities
- Gas storage tanks / gas flare
- Odour control plant

Sludge Storage

Sludge storage facilities will be provided on site. The number of tanks and the location of the tanks within the site will depend on the proposed treatment processes. All sludge holding tanks will be covered and the headspaces of same will be vented to an odour treatment facility. The capacity of the sludge storage facilities will allow for a buffer period to cater for short-term delays in the removal of the sludge off-site.

Sludge Disposal

The proposed development includes for the transportation of sludge off-site and the reuse at sites yet to be identified. It is generally expected that the sludge will be recycled to agricultural lands (nutrient recovery). However, it is possible that the sludge may be used in energy recovery systems or other reusable applications. The use of sludge in agricultural lands will be carried out in accordance with established codes of practice and will adhere to statutory regulations concerning this practice. Any off-site storage facilities that may be required for the management of sludge during the winter months will be subject to separate planning permissions.

The volume of sludge transported off-site will depend upon the dry solids content of the final product. For example at maximum design loading if the sludge is dewatered to approx. 20% dry solids (DS), this will require approximately two to three truck loads leaving the site each day. If the sludge is dried the truck loads leaving the site will reduce to approx. two per week.

(vii) Buildings

The WWTP will include buildings to house a number of elements, which may include the following:

- Administration Offices
- Canteen and Sanitation Facilities
- Laboratory
- Workshop
- Electrical Control Panels
- Inlet Works
- Sludge Thickening and Dewatering Facilities
- Sludge Treatment System
- Aeration Equipment (if applicable)
- Odour Control Equipment

The number of buildings and the facilities accommodated in each will depend upon the final process design selection. However the Contractor will be restricted in terms of building heights. All buildings within the site will be restricted to a building height of at least 10m above the current ground level (12m above existing ground level for tanks/process structures). In addition the overall plan area occupied by buildings will not exceed 3,100m².

The following represents a typical arrangement of buildings.

Preliminary Treatment Building: Housing inlet screens, grit removal plant, pre-aeration tanks and odour control facilities.

Main Administration Building: Housing office, laboratory facilities, control panels and stores.

Secondary Treatment Building: Housing sludge thickening equipment, blowers, control panels, stores and workshops.

Sludge Treatment Building: Housing sludge dewatering equipment, sludge drying equipment, energy recovery systems, control panels, odour control facilities, stores and workshop.

(viii) Instrumentation Control & Automation

The proposed WWTP will incorporate process control and monitoring equipment.

Information from the plant instrumentation will be automatically tracked and logged together with any relevant faults, actions and alarms. In the event of alarms occurring when the system is unmanned, an automatic call-out facility to relevant personnel will be activated.

(ix) Treated Effluent Discharge

The treated effluent from the WWTP will be discharged directly in to the nearby IDA sewer, which gravitates to the Ringaskiddy outfall.

Outfall Location

The existing outfalls and proposed outfall are identified in Figure 1.4 *Location of Existing Outfalls and Proposed Outfall*. It is intended to utilise an existing IDA outfall for the proposed development. This currently discharges untreated municipal waste water from Carrigaline and Crosshaven and also discharges treated industrial effluent from the Ringaskiddy area into Cork Lower Harbour. The existing marine outfall extends eastwards terminating at the Dognose Bank on the eastern side of the mouth of Cork Harbour.

(x) Construction of WWTP

The construction phase for the WWTP will extend over a two-year period. However, the timing for the commissioning of the WWTP will depend upon the completion of other associated works, such as construction of the pumping stations, drainage network, etc.

The construction works associated with this development will involve normal construction activities such as excavation, filling, lifting, pumping, pipelaying, concrete works, mechanical installation, etc. Other more specialised techniques may include piling and marine works. Blasting is not envisaged for this development.

Site accommodations including offices, stores, workshops, canteens, etc. will be located within the boundary of the site. Likewise, parking facilities for construction vehicles and private transportation will be located within the development site. Temporary site fencing will be erected and maintained to secure the site during the construction phase.

A Construction Environmental Management Plan (CEMP) will be drawn up for all construction activities to be carried out on site. This management plan will address activities likely to affect all aspects of the environment e.g. noise, dust, traffic, run-off, spillages, effluents etc. and will include environmental protection measures such as monitoring, protection barriers, operational procedures and contingency measures.

(xi) Commissioning of WWTP

It is expected that the WWTP will be put into operation immediately on completion of construction of the plant and other waste water conveyance systems. It is expected that mechanical, electrical and process commissioning will extend for approximately twelve weeks after the start-up of the plant. The full capacity of the plant may not be utilised for some years as the design capacity is to the year 2030.

(xii) Operation of WWTP

The WWTP will be operational 24 hr/day, 365 day/year. It is not anticipated that the plant will be staffed 24 hrs/day. Automatic control of the plant will be undertaken by a computerised control system, with key information and alarms relayed to the relevant Cork County Council office. When the site is unmanned, any critical alarms of the plant will activate an automatic call-out system. Normal working hours will typically be within 8.00am – 6.00pm Monday to Friday, with visits to the plant on Saturday and Sunday, as required.

Sufficient, suitably qualified staff will be employed to operate the WWTP. Of these it is expected that a site technician and general operative would normally be based on site, with others providing regular part-time input to the scheme.

Locally directed on-site lighting will be provided for access and maintenance purposes. Lighting will be provided on the access roads and other locations only as required for safety reasons.

Safety measures at the WWTP site will provide for the requirements of all plant personnel and will limit access to the site by unauthorised personnel.

An Operation Environmental Management Plan (OEMP) and Maintenance Manual will be produced for the site.

(xiii) Waste Water Monitoring

The Fifth Schedule of the *Urban Waste Water Treatment Regulations, 2001 (S.I. Nr. 254 of 2001)* stipulates the monitoring requirements for plants 50,000 P.E. or over. These requirements will be met at the WWTP. It is likely that additional monitoring will be conducted by the appointed Contractor to ensure effective process control.

In advance of the WWTP becoming operational the Council will arrange pre application discussions with the Environmental Protection Agency (EPA) for a Waste Water Discharge Licence under the *Waste Water Discharge (Authorisation) Regulations 2007 (S.I. No. 684 of 2007)*. These regulations apply specifically to the discharge itself and storm water overflows.

(xiv) Ancillary Developments

The collection system is another element of the scheme and will convey the effluent from population centres such as Cobh, Passage West (including Glenbrook), Monkstown, Ringaskiddy (including Shanbally and Coolmore), Carrigaline (including Crosshaven) to the proposed WWTP. The main elements of the proposed conveyance system include rising mains, pumping stations, gravity sewers and a marine pipeline crossing. Construction or erection of pumping stations, holding tanks or outfall facilities for waste water or storm water will require separate planning approval (*Part 8, Planning and Development Regulations, 2001*).

Access to the WWTP site will be from the existing access road to the Bord Gáis substation bordering the south western perimeter of the proposed site. This access road is connected to a minor road (locally known as Cogan's Road) to the west, which currently connects to the National Primary Route to Ringaskiddy (N28). Upgrading of the existing access road will be required in order to cater effectively with vehicles/traffic associated with the proposed development.

3 Receiving Environment

(i) Human Beings

It is proposed to construct a WWTP at a greenfield site in the townland of Shanbally, which is approximately 11 km south of Cork City. The proposed development will also involve the upgrading of the collection system. The provision of a WWTP is environmentally sustainable compared to the existing scenario; where at present, the Lower Harbour area has no WWTP and waste water from the area is untreated and discharged directly into the Lower Harbour. The discharge of untreated effluent into the marine environment is not a desirable situation due to the high levels of bacteria and micro-organisms in untreated effluent, many of which can cause illness.

The existing drainage infrastructure within the Lower Harbour area is comprised of sewers, culverts, manholes, pumping stations, overflows and outfalls. Some of these facilities have been in existence for more than 50 years and in some cases are no longer adequate for their intended purpose due to structural damage, excessive infiltration and lack of capacity.

Of principal concern is that human beings should experience no significant environmental impacts that would diminish their quality of life as a result of the construction and operation of the proposed development. The closest existing residential development is located 261m to the east of the WWTP site, along the minor road L6470 and planning permission has been granted for a site approximately 134m to the east of the proposed WWTP site.

The proposed development will result in the permanent loss of agricultural and reclaimed land and is not considered a significant impact. Nuisance impacts associated with construction such as noise, dust and vibration will occur, however, these will be restricted to daylight hours (on average 08.00-18.00 hrs) and will cease following completion of the construction phase. A Construction Environmental Management Plan (CEMP) will be drawn up for all construction activities to be carried out on site. This CEMP will address activities likely to affect aspects of the environment e.g. noise, dust, odour, traffic, run-off, spillages, effluents etc. and will include environmental protection measures such as monitoring, protection barriers, operational procedures and contingency measures.

Noise and vibration impacts associated with the construction of the WWTP will be negligible. The construction of the collection system will generally cause only slight short-term negative impacts. Significant noise impacts may be experienced during excavation works for the pipeline, however this will be temporary. Following the implementation of dust abatement measures, impacts on air quality will not be significant.

Employment opportunities will be created in the short-term and it is anticipated that there will be an increase in revenue for the local communities due to purchasing of raw materials and plant hire during the construction phase of the project, resulting in a positive impact on the economy of the area.

The construction of a marine crossing may have moderate-significant negative impacts on river traffic and recreational water sports, however, these will be temporary and a schedule and method of works will be drawn up in consultation with the Department of Agriculture, Fisheries and Food (DAFF) and other relevant bodies and stakeholders, including the Port Authority and Cross River Ferries Ltd.

The operation of the WWTP is not anticipated to have significant negative impacts on human beings following the implementation of mitigation measures proposed. During the operation of the proposed development, positive impacts will include improved water quality in Cork Lower Harbour which in turn will positively benefit health and safety, enhance and facilitate the potential for increased residential and commercial development, recreational development and economic activity in the environs of the Lower Harbour.

(ii) Terrestrial and Marine Ecology

Ecofact Environmental Services Ltd. was commissioned by MMP to conduct a flora and fauna survey of the WWTP site and collection system. The survey comprised a desktop study and walkover of the site. Impacts arising from the construction and operation of the development on flora, habitats and fauna are described and mitigation measures proposed where appropriate.

The WWTP site comprises agricultural grassland and hedgerow habitats and construction of the WWTP will result in the permanent loss of agricultural land and small sections of hedgerow which will be of imperceptible significance. Hedgerow clearance will not occur during the period March 1st – August 31st to protect nesting birds, unless authorisation is received from the National Parks and Wildlife Service (NPWS).

Construction of the sections of the collection system will involve works adjacent to the Cork Harbour Special Protection Area (SPA) for birds, Owenboy River Natural Heritage Area (pNHA) and Monkstown Creek pNHA. However, construction of the proposed collection system will predominantly occur alongside existing roads. Three of the proposed pumping stations will be constructed on artificial surfaces, which are not of ecological value. The fourth pumping station will be constructed along the upper shore at West Beach Cobh, which is a habitat of high local ecological importance.

There is potential for direct negative impacts on sections of the SPA and NHAs. Excavation works are likely to deter birds from feeding in the affected areas due to physical intrusion and elevated noise, however, fauna are currently accustomed to a degree of elevated noise due to traffic. The extent of construction areas adjacent to the SPA/pNHAs is relatively limited and the degree of disturbance will be reduced as far as possible. Reinstatement of habitats along the pipeline footprint will ensure that such impacts are short-term in nature only. Potential impacts such as increased sedimentation and contaminated run-off will be avoided with careful site management and appropriate timing of the proposed works. It is anticipated that the placement of a pipeline across the River Lee west channel will not change the ecology of the wider environment in this area, as this area is currently subjected to variable conditions and daily disturbance by the ferry.

Protected terrestrial mammals that occur within the study area include badgers, bats, otters, hedgehogs, pygmy shrews, and Irish hares. A number of protected marine mammal species also use Cork Harbour. However, the proposed development is not predicted to have a significant impact on any mammal species following the implementation of mitigation measures.

According to the EPA, water quality in Cork Harbour is classed as 'intermediate' but has recovered somewhat since the cessation of untreated sewage discharges into the Lee Estuary and Lough Mahon as part of a previous phase of the Cork Main Drainage Scheme (2005). The current project aims to bring similar benefits to the Lower Harbour area. High nutrient levels in the harbour have been linked to the occurrence of algal blooms in which certain species of phytoplankton reach very high densities, release toxins and contaminate shellfish. Algal mat growths, indicative of pollution, were recorded on some mudflats in the current survey adjacent to untreated sewage outfalls.

The operation of the proposed development will enhance water quality in Cork Harbour due to interception of current raw sewage outfalls at various shores, secondary treatment of same, and release of treated effluent to an existing outfall in an area where dispersion rates would ensure lower concentrations of potentially harmful substances. It is expected that improved water quality will lead to an increase in the diversity of organisms as well as reducing the incidence of algal blooms and shellfish poisoning. Furthermore, the overall conservation value of Cork Harbour is expected to improve as a result of the scheme.

(iii) Water Quality

Cork Harbour is the second largest natural harbour in the world and the second largest port in Ireland. The harbour is used extensively for recreational activities. Within the Lower Harbour area there are a number of protected conservation areas namely, Cork Harbour SPA and the Great Island Channel SAC. Two nationally important designated sites are also present, Monkstown Creek pNHA and Owenboy River pNHA.

Currently, untreated waste water is discharged directly into the Lower Harbour area. The provision of a WWTP and upgraded collection system will improve water quality in the Lower Harbour area.

The west passage of the River Lee is designated a sensitive water under the *Urban Waste Water Treatment (UWWT) Regulations 2001*, however, the Lower Harbour area is not designated as a sensitive water under the *UWWT Regulations*. There are no designated bathing areas within the study area and Cork Lower Harbour is not designated as a sensitive water under the *Quality of Shellfish Waters Regulations, 2006 (S.I. 268 of 2006)*.

According to the EPA, water quality in the Lower Harbour area is classed as 'intermediate' and water quality within Cork Harbour has exhibited an improvement over the last two years, due, in part, to the operation of Carrigrenan WWTP in 2005. At present, waste water from the Lower Harbour catchment area is discharged untreated into the Lower Harbour. It is proposed to treat the effluent at a WWTP in the townland of Shanbally and the treated effluent will then be discharged at the existing Ringaskiddy IDA outfall. This will result in a reduction in the number of outfall points in Cork Lower Harbour to a single outfall point and the discharge of treated effluent, as compared to the existing scenario where untreated effluent is discharged at multiple outfalls throughout the Lower Harbour area.

A hydrodynamic study conducted by University College Cork (UCC) modelled the flow rates and loadings of effluent from the Lower Harbour catchment area for 2010 for treated and untreated effluent. Concentrations of bacterial (faecal coliforms, *E. coli* and intestinal enterococci) and viral (*Norovirus*) determinants were modelled in addition to nutrient levels (organic nitrogen, ammonia and nitrate) in the untreated and treated effluent.

Compared to the existing scenario, the hydrodynamic modelling study showed that there will be significant reductions in the levels of faecal coliforms, *E. coli*, intestinal enterococci and *Norovirus*. The concentrations of each of three species of nitrogen (organic nitrogen, ammonia and nitrate) in the harbour was found to decrease following treatment of the effluent, with the exception of organic nitrogen concentrations at Fountainstown, Myrtleville, Roches Point and upstream of the IDA outfall. These slight increases in organic nitrogen are due to the discharge of all treated effluent through a single outfall, compared to the present scenario where there are numerous outfall points.

No significant negative impacts on water quality are anticipated during the construction of the WWTP and collection system following the implementation of all mitigation measures. During the operational phase, there is a potential for overflows to occur. The emergency overflow design will be refined at detailed design stage to the extent that they will meet all accepted industry design parameters and will not have a significant impact on water quality. All pumping stations and associated overflows will be designed in accordance with the Department of the Environment, Heritage and Local Government guidelines including the guideline document issued entitled *Procedures and Criteria in relation to Storm Water Overflows*. An automated control operating system will be put in place to ensure that if a downstream pumping station fails to operate, the upstream pumping station will cease pumping.

Provision of continuous monitoring and sampling of waste water flow entering and leaving the site will be provided and a waste water discharge licence will be required from the EPA for the Cork Lower Harbour WWTP.

As a result of the WWTP and upgraded collection system, water quality in Cork Lower Harbour is expected to improve within the Lower Harbour area, which will have significant positive impacts on the towns, villages, population and economy of the Lower Harbour catchment area.

(iv) Soils & Geology

The proposed development site is characterised by gently rolling topography. Bedrock at the WWTP site consists of grey mudstone and fine grained limestone rock. The area is located within a known karstic limestone region and there are possible karst features present at the site. There are no known features of important geological heritage interest that may be impacted on by the proposed development.

There are no springs or areas of standing water at the proposed site. The geophysical survey carried out at the WWTP site in November 2007 (following a wet summer) suggests an absence of groundwater 10-15m below ground level. The bedrock hydrogeology is of local importance and extreme vulnerability. The geophysical assessment suggests a well drained overburden (approximately 20m deep; 8m in the SE corner) which is consistent with the site walkover/visual assessment. Where possible all suitable topsoil removed during construction works will be reused in landscaping throughout the site. In view of the minor land-take required for the proposed WWTP, the soils which are likely to be affected by the development represent a minor resource in a local context. In a regional context, this soil resource is less significant as such soils occur in abundance over the South Cork region.

Development works proposed for the site will not radically change the existing topography in a local or regional context. It is intended that the slope afforded by the existing topography of the site and its surrounds will be used to the advantage of the WWTP design, as the requirement for pumping will be minimised.

Material excavated during site development will be relocated or removed from site and it is not anticipated that these activities will have any adverse impacts on geology or groundwater in the area.

The main environmental threat to soils and hydrogeology is the potential for spillage of contaminants during the construction phase. The potential for spillages and the possibility for materials to enter the groundwater will be mitigated by proper construction management practice on site.

On effective implementation of the mitigation strategy, the potential for impacts will be lessened and it is considered that there will be no significant residual negative impacts on the soils or geological/hydrogeological environment.

(v) Material Assets

The material assets in proximity to the proposed WWTP site and collection system include the towns and villages of Carrigaline, Shanbally, Ringaskiddy, Monkstown, Raffeen, Passage West and Cobh. Recreational facilities in the wider area include golf clubs, sports grounds, marinas and beaches.

Road infrastructure in the area surrounding the development site includes the N28 National Primary Route to the north; the R613 to the south; the R611 to the west and a number of minor roads to the east and west of the proposed site.

The public utility of most relevance to this EIS is the existing drainage network. The existing network for the Cork Lower Harbour area, which is primarily combined (waste water and storm water), can be divided into the following sewerage networks: Cobh and environs; Monkstown/Passage West; Carrigaline; Ringaskiddy and Crosshaven.

The site of the WWTP is a green-field site, used for agriculture at present. The lands surrounding the site are predominantly agricultural and form part of the metropolitan green belt between Cork City and Carrigaline. Natural amenities in the area include Cork Harbour, Currabinny Woods and the Owenboy River. Natural heritage within the area includes Cork Harbour SPA, Monkstown Creek pNHA, Owenboy River pNHA.

Immediately outside the boundary of the WWTP site there are two recorded archaeological features (Recorded Monuments and Places or RMPs). Both are enclosures and likely to be ringforts. A total of 27 archaeological/architectural constraints were identified in relation to the pipelines and pumping stations.

The construction of the WWTP and ancillary works will have short-term negative impacts on the surrounding towns and villages in terms of increased noise, dust and construction traffic. However, these impacts will cease on completion of construction. Foreshore and in-stream works may have temporary moderate-significant negative impacts on the Lower Harbour in terms of recreation and river traffic. A detailed CEMP will be developed for all construction activities to be carried out on the site of the WWTP and on the sites required for the laying of pipelines, sewers, marine crossing and pumping stations. This management plan will address activities likely to affect aspects of the environment e.g. noise, dust, odour, traffic, run-off, spillages, effluents etc. and will include environmental protection measures such as monitoring, protection barriers, operational procedures and contingency measures. In order to mitigate for any negative impacts during the construction of the marine crossing, a schedule and method of works will be agreed with the DAFF and other relevant bodies and stakeholders, including the Port Authority, local fishing interests (commercial and angling) and Cross River Ferries Ltd.

At present there are many waste water outfalls to the receiving waters at locations used for recreational purposes. The construction of the proposed WWTP and associated collection system will eliminate these outfalls resulting in a positive impact on water quality and recreation, thus enhancing the value of Cork Lower Harbour as a natural amenity and also its conservation status.

(vi) Air, Odour and Climatic Factors

Air

A baseline ambient air quality survey was carried out in the vicinity of the proposed Cork Lower Harbour. Currently the air quality is average to good, with air quality parameters and baseline odour pollutants for traffic, industrial and residential derived pollution below the relevant Irish and European Union limits. The main source of air pollution in the area is from motor vehicle exhausts, construction and industrial activities, and associated suburban emissions. There is the risk that emissions from dust could result in air quality impacts in the vicinity of the proposed WWTP site location. Dust extraction and abatement will be applied to the dust generation equipment as necessary and it is anticipated that no associated impacts will occur as a result of construction of the proposed development.

Odour

Existing background odour is dominated by the influence of the rural environment and to a lesser degree the coastal location. Odour dispersion modelling (AERMOD Prime) was used to perform an impact assessment of the proposed WWTP specimen design and five major pumping stations to be located in Raffeen, West Beach, Monkstown, Church Road (existing) and Carrigaloe. Minor pumping stations were not assessed as it was anticipated that impacts predicted for the major pumping stations would be greater than that for minor pumping stations.

At the WWTP, odour sources considered most offensive will be effectively contained and ventilated to an odour control system and therefore the overall risk of any resident/industrial neighbours detecting odour will be negligible since the major odour sources contributing to the remaining odour plume are considered low risk in term of odour. These sources include the aeration tankage, secondary settlement tankage and storm water tankage. All pumping station (both minor and major) will incorporate the use of an odour management system (e.g. good design in terms of odour, tight fitting covers etc.) to ensure no fugitive release of odours from each pumping station. In addition, each pumping station will be regularly visited so as to ensure efficient operation of the odour management system.

In keeping with current recommended odour impact criteria in this country, no odour impact will be perceived by sensitive receptors in the vicinity of the proposed WWTP and pumping stations following the installation of proposed odour management, minimisation and mitigation protocols.

Climate

The climate in the region is typical of the Irish climate, which is temperate maritime. The proposed development will not have a significant impact on the local or national climate.

(vii) Noise and Vibration

The environmental noise impact of the proposed Cork Lower Harbour Drainage Scheme and WWTP has been assessed both during the construction and operational phases of the development.

The existing daytime noise environment in the vicinity of the proposed WWTP site was found to be relatively quiet, with steady underlying background noise levels. The noise environment is determined by distant traffic noise, agricultural machinery, with a contribution from aircraft noise. At night-time the mean ambient noise level is reduced, with a steady underlying background noise component.

The future realignment of the N28 will alter the noise environment at the site of the WWTP but it is not expected to alter the steady underlying component of background noise at the WWTP site, as this is due to distant noise sources.

At the sites of the proposed major pumping stations at Raffeen, Monkstown, West Beach Cobh, and Carrigaloe, the noise environment is determined mainly by local traffic.

During the construction phase of the proposed WWTP the resulting noise levels at the nearest existing houses to the east and north will be very low, and comfortably within the standard construction noise criterion set by the National Roads Authority (NRA) for construction noise. The noise impact will be negligible.

During construction of the major pumping stations the highest noise levels will be experienced at the houses closest to the Monkstown and West Beach sites. Subject to appropriate mitigation, it is expected that the NRA criterion will be achievable at these locations and the resulting adverse impact will be slight.

The proposed scheme will involve extensive excavation works for laying new sewer lines. When these works are in progress adjacent to houses along the routes, noise may exceed the NRA construction noise criterion temporarily. In general however, construction noise levels at houses along the sewer routes will be typically less than the NRA criterion, with minimal impact.

When the treatment plant is operational, and provided it is designed to the specified noise criteria, noise emissions at the nearest existing houses to the east, will experience no adverse noise impacts. At the lands zoned residential, 134m to the east of the site, the noise impact will be negligible.

Airborne noise emission from the pumping stations will be negligible. However, where a pumping station is located close to a residence, there is a small risk of structure borne vibration being transmitted into the residence, and being audible indoors. This will be avoided through incorporation of suitable vibration isolation as appropriate.

The WWTP will be designed such that the operational noise level due to the continuously operating WWTP plant and processes will be below the EPA criterion at a distance of 20m from the plant boundaries.

The pumping stations will be designed such that the operational noise level is less than the EPA criterion at a distance of 5m from the pumping stations.

Construction noise aspects will be managed in accordance with the British Standard (BS) 5228 *Noise and vibration control on construction and open sites*.

(viii) Cultural Heritage

On-shore Assessment

Twenty-seven cultural heritage constraints have been identified as part of this study. Some are archaeological monuments, protected structures or both. One new archaeological monument, a lime kiln was noted during the study. The town of Cobh was allocated a cultural heritage number due to its importance within the study area. The cultural heritage features highlight the importance of this locality from prehistory to the present day.

The landscape is rich in cultural heritage elements from the earliest times to the present. Perhaps the most important of those is that of Cobh Town itself. Due to its historic past and its protected structures (which are seen as individual elements) it was decided that in the case of this study it should be seen as a cohesive entity.

Most of the proposed development is underground pipe work, so while it is predicted to be visible when construction is taking place, in the long term, the visual impact will not be permanent. Major pumping stations will have a visual impact, particularly the one proposed for West Beach Cobh. This will be designed sensitively with its central location borne in mind, among all the historic structures. The other stations might also be suitably screened and their construction either/or archaeologically test trenched or monitored.

A number of archaeological sites are located in the region however no archaeological sites are situated within the proposed development site. A ring-fort structure is located north of the site. There are two enclosures to the east of the site, namely a D-shaped enclosure adjacent to the proposed site boundary and a circular enclosure to the east of the site.

There are no documented occurrences of any archaeologically significant items or sites on the proposed development site. However, it is possible that artefacts of interest may be unearthed during the construction works. The loss of such artefacts would be a significant impact. However, the site is considered to have a negligible potential for such finds.

Ground disturbance works associated with the construction of the proposed WWTP may have an impact on the western portion of the D-shaped enclosure, adjacent to the site boundary. Archaeological testing works at the WWTP site by a fully qualified archaeologist are recommended, to reduce potential impacts. Archaeological monitoring of green-field locations and where pipeline comes close to the Zone of Archaeological Potential of archaeological monuments is recommended with regular archaeological inspections of roadway routes.

Off-Shore Assessment

An underwater and intertidal archaeological survey of two pipeline impact corridors was undertaken. The underwater assessment was undertaken along the works corridor identified for the proposed marine pipeline, crossing between Monkstown and Cobh (River Lee Estuary), and the inter-tidal survey was carried out across the route of the proposed foreshore pipeline at Carrigaline (north side of Owenboy River).

Systematic visual inspection of the sub-tidal seabed and intertidal / foreshore areas surrounding the proposed impacts did not reveal any material or features of archaeological significance. It is recommended that archaeological monitoring of riverbed / seabed disturbances during construction be undertaken, with the proviso to resolve fully any archaeological material observed at that point. In addition, it is recommended that direct impacts to the site of the Royal Victoria Baths be avoided, preserving the *in situ* masonry foundations.

(ix) Landscape and Visual Assessment

The proposed Cork Lower Harbour WWTP site is located at Shanbally, Co. Cork and covers an area of approximately 7.36 hectares. The site is situated on a south facing hillside. The site is currently pasture land and is located within two large fields bound by tall hawthorn hedgerows.

The surrounding agricultural landscape is heavily influenced by the pharmaceutical complexes in the Ringaskiddy and Lough Beg area, and by the infrastructure and residential developments in close proximity to the site. This mixture of industrial development, agricultural land and housing, including the eastern fringes of Carrigaline, comprise the overall character of the area. The site remains fundamentally rural in character but heavily influenced by the urban and industrial developments and can be described as a Rural Fringe Landscape.

During construction the overall disruption will contribute to short-term and temporary moderate negative impacts on both views and character of the site. The greatest impacts will be associated with the appearance of bare soil over a large area until the construction is finished.

On completion there will be long-term and permanent impacts resulting from noticeable changes in the views and character of the landscape. There are several scenic routes and designated scenic landscapes in the vicinity. Of these only the following will be impacted:

- 1) Views from the 'Scenic Landscape' surrounding the Owenboy River Valley; and
- 2) Views from the Scenic Route A-56 (Road between Carrigaline and Crosshaven).

In general, the proposed site is set low enough in the landscape that it will be only partially visible through existing vegetation in adjoining fields and hedgerows giving rise to slight to moderate negative visual impacts.

In addition to the WWTP at Shanbally there will be major pumping stations located at Monkstown, Carrigaloe, Raffeen and Cobh and the continued use of the existing pumping station at Church Road. There will also be minor pumping stations at various locations within the serviced area. Minor pumping stations are expected to be submersible type stations with only a kiosk located above ground.

The design of the major pumping-stations will reflect the local urban landscape in Monkstown and Carrigaloe resulting in neutral to slight visual impacts. The pumping station at Raffeen will intrude upon but not obscure previously open views across Monkstown Creek resulting in moderate negative visual impacts. The pumping station in West Beach, Cobh would have a significant negative visual impact on views from West Beach to the harbour, however the impact will be mitigated by careful design of the building and public open space to reflect and respect the scale, massing, proportions, design and materials of existing neighbouring structures and reflect the character of the area and streetscape.

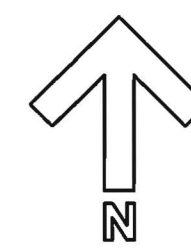
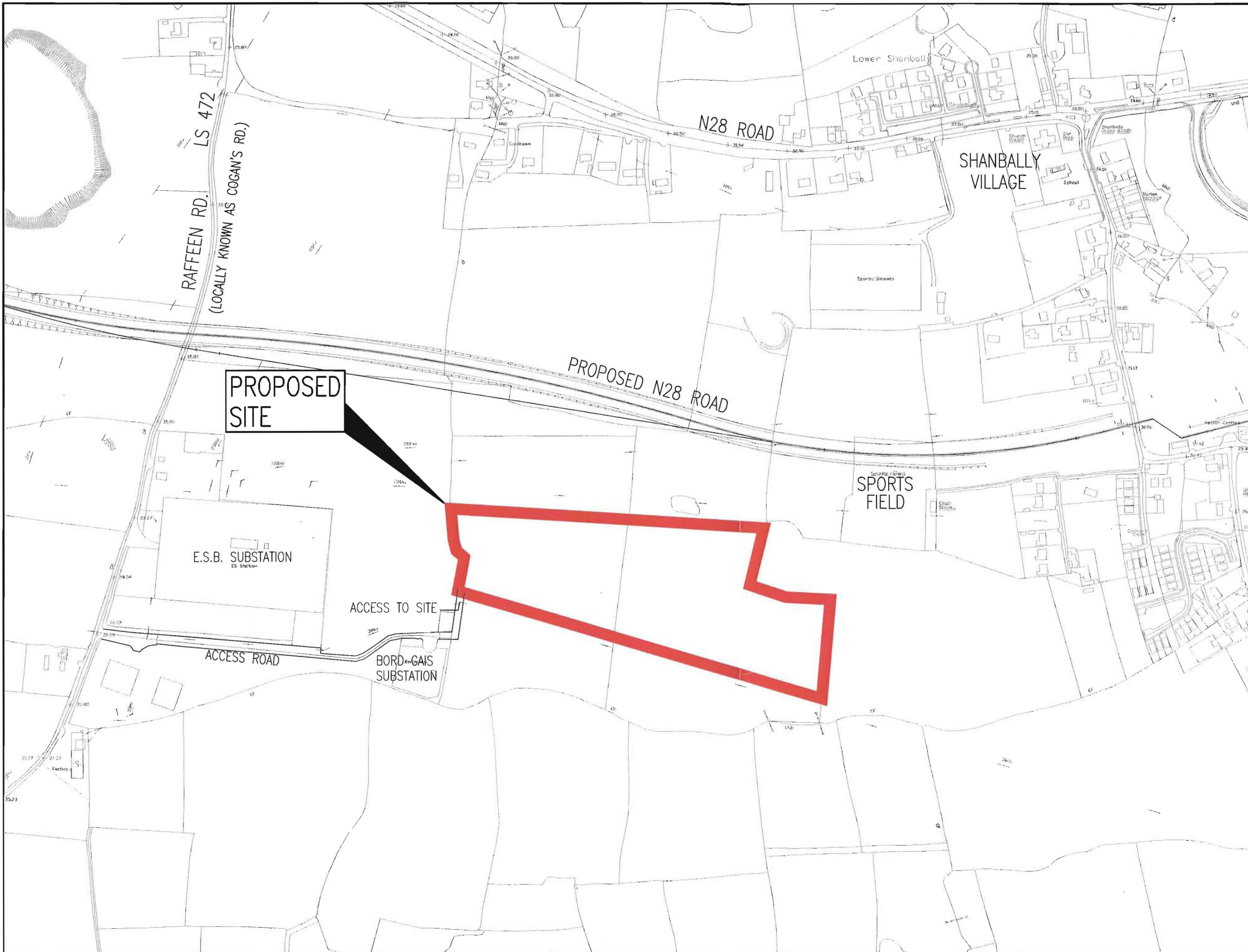
Landscape mitigation measures for the WWTP will require the planting of substantial belts of native woodland to the site boundaries. After 7 – 10 years the mitigation screen planting will have reached heights of 10-12m providing screening of the site from virtually all angles. The selection of native woodland species will be in keeping with woodlands at Monkstown Creek and Currabinny and cause neutral impact to the rural fringe landscape character.



LEGEND
 PROPOSED SITE ———

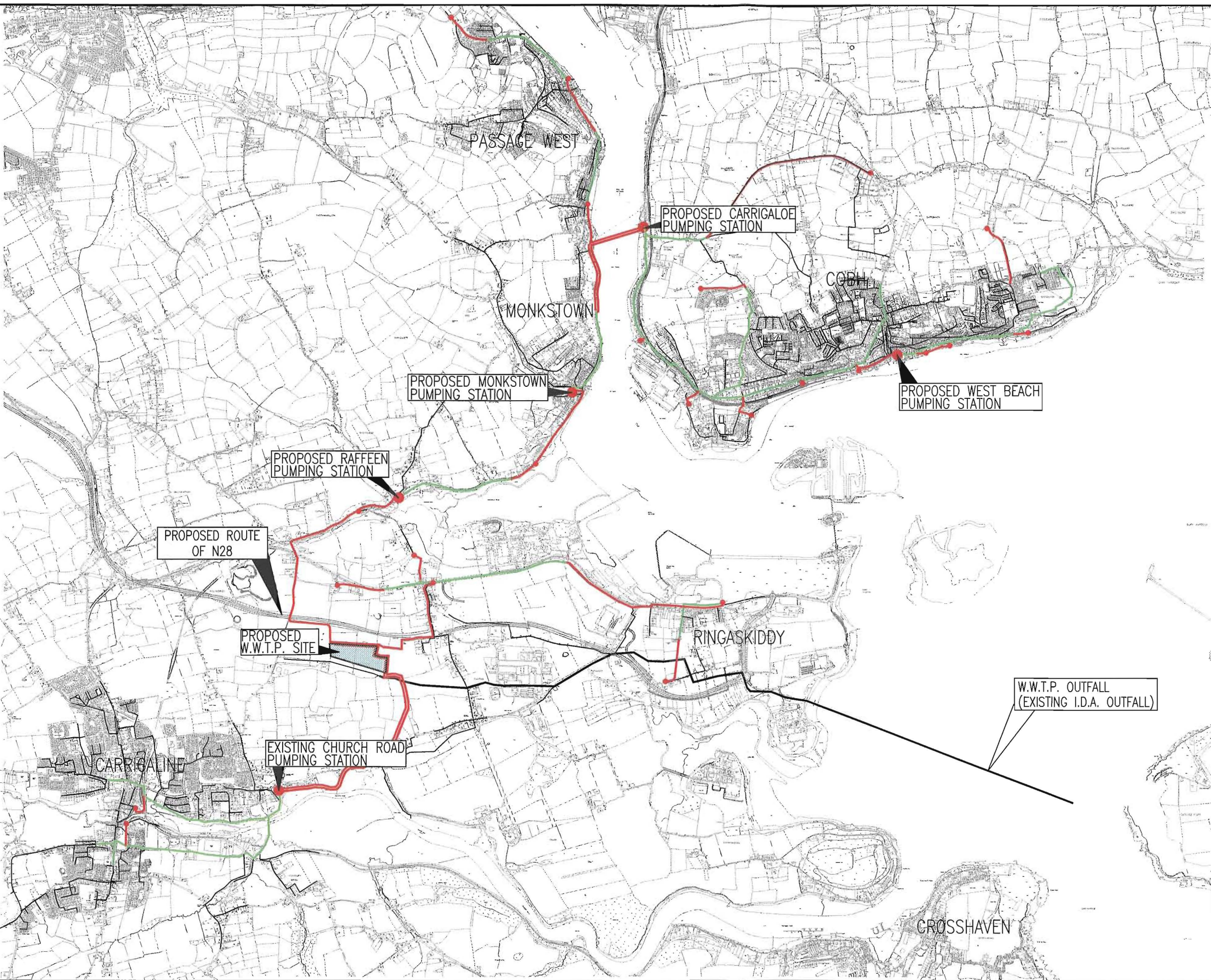
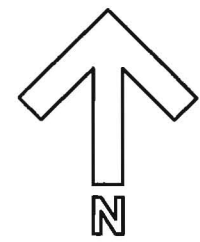
SOURCE: ORDNANCE SURVEY DISCOVERY SERIES OS 1806 & OS 1606

FIGURE 1.1 SITE LOCATION – REGIONAL SCALE 1:50,000



LEGEND

PROPOSED SITE



LEGEND

- EXISTING SEWERS
- PROPOSED RISING MAIN
- PROPOSED GRAVITY SEWER
- PUMPING STATION
- MAJOR PUMPING STATION

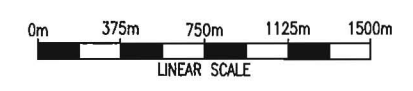
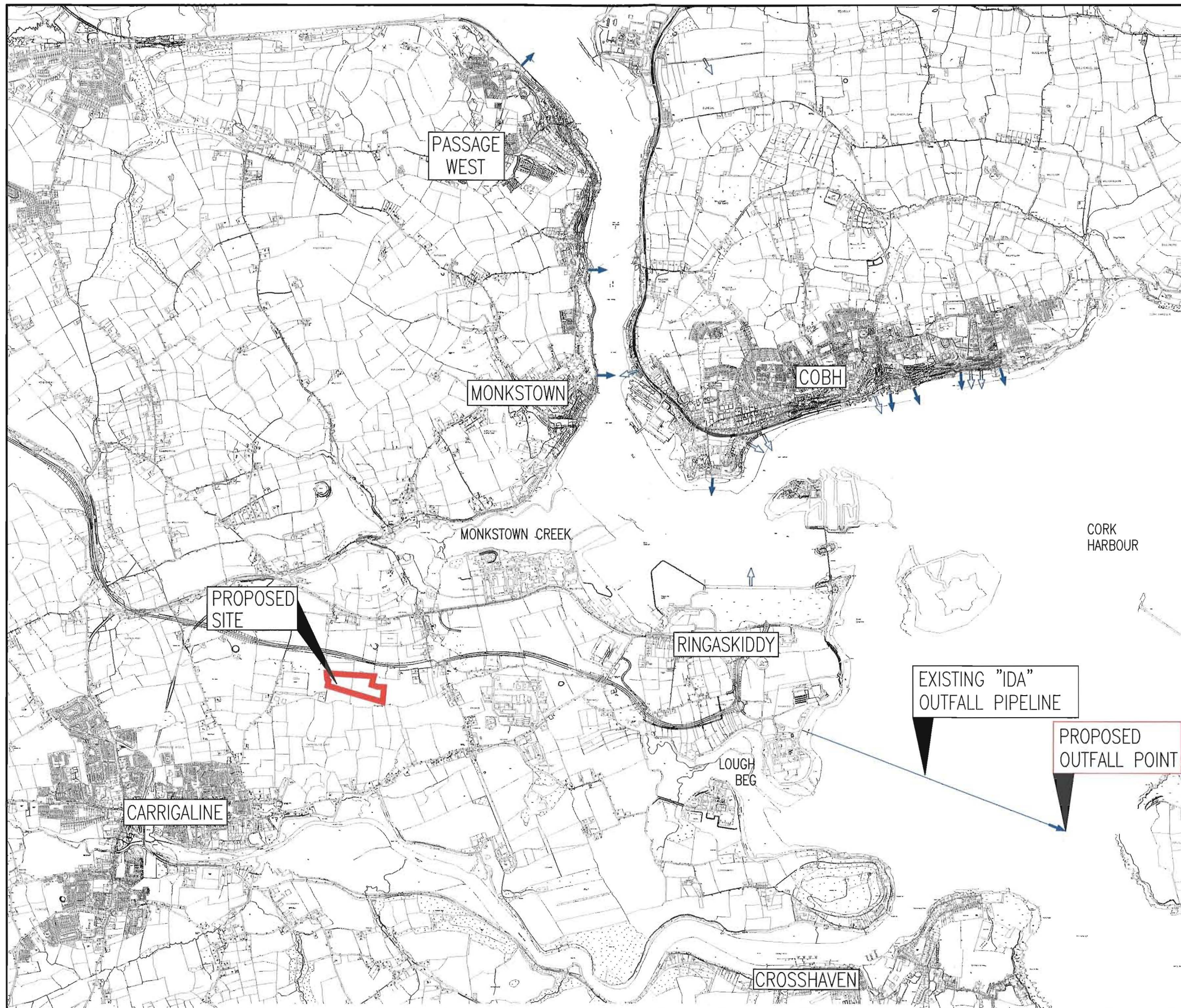


FIGURE 1.3 ASSOCIATED DEVELOPMENT WORKS



LEGEND

- PROPOSED SITE
- MAJOR OUTFALL
- MINOR OUTFALL