Arklow Flood Relief Scheme

Environmental Impact Assessment Report

Volume 1 | Non-Technical Summary

2021

OPW Oifig na nOibreacha Poiblí Office of Public Works

WICKLOW
ENDLESS OPPORTUNITIES

ARUP

Preface

This Environmental Impact Assessment Report (EIAR) for the proposed Arklow Flood Relief Scheme consists of three volumes, of which this is the first. The third volume of the EIAR is made up of three books:

- **Volume 1 Non-Technical Summary (NTS)**
- Volume 2 EIAR (Main Text)
- Volume 3 Appendices
    - Volume 3 Appendices (Book 1 of 3)
    - Volume 3 Appendices (Book 2 of 3)
    - Volume 3 Appendices (Book 3 of 3)

Contents

1 Introduction

1.1 Introduction

Wicklow County Council (WCC), funded by the Office of Public Works (OPW), proposes to undertake engineering works along the Avoca River and surrounds to mitigate the risk of flooding in the Arklow town area in County Wicklow. The proposed development is collectively referred to as the Arklow Flood Relief Scheme.

The proposed flood relief scheme (FRS) is being undertaken for the purpose of preventing the periodic flooding of lands and properties in the Arklow area. The proposed scheme will involve the construction of flood defence walls and an embankment, as well as conveyance improvements in the Avoca River; including deepening of the river channel, the introduction of new debris and gravel traps and improvement works to Arklow Bridge. Public realm improvements will be carried out along River Walk and South Quay on the south bank of the river. Future maintenance of the Arklow Flood Relief Scheme will also be carried out.

An overview of the design objectives and proposed solution for the Arklow Flood Relief Scheme is included in **Figure 1.1.**

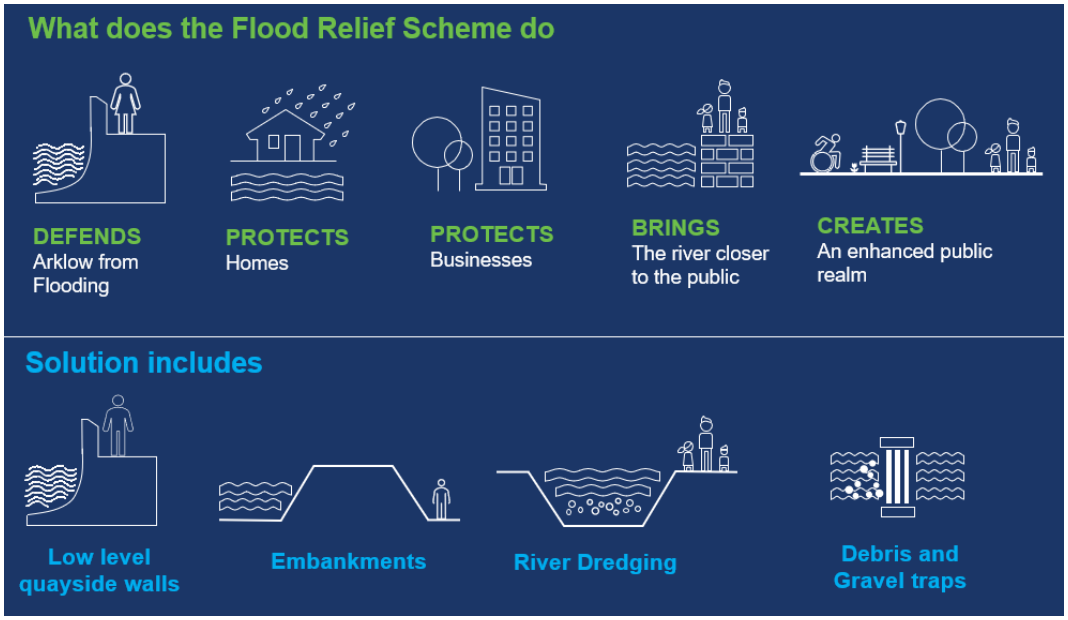

Figure 1.1 Overview of the Design Objectives and Proposed Solution

The location of the proposed scheme is outlined in **Figures 1.2** and **1.3**.

1.2 What is a Non-Technical Summary?

This is the Non-Technical Summary of the Environmental Impact Assessment Report (EIAR) for the Arklow Flood Relief Scheme, hereafter referred to as the 'proposed scheme.' The terms *proposed development* and *proposed scheme* are used interchangeably in this EIAR.

This document summarises, in non-technical language, the EIAR; including the likely significant effects identified, the mitigation and monitoring measures proposed as well as any residual effects arising from the proposed development that have been identified.

The EIAR has been prepared to accompany the planning application for consent for the proposed scheme to An Bord Pleanála.

For the purpose of the environmental impact assessment (EIA), Wicklow County Council is the 'developer/applicant' for the proposed scheme and An Bord Pleanála is the 'competent authority' that will undertake the EIA and decide whether to grant consent for the proposed scheme.

A number of other relevant documents, including a Natura Impact Statement (NIS) and Compulsory Purchase Order (CPO) documentation have also been prepared. A Foreshore Consent application to the Department of Housing Local Government and Heritage is also being submitted.

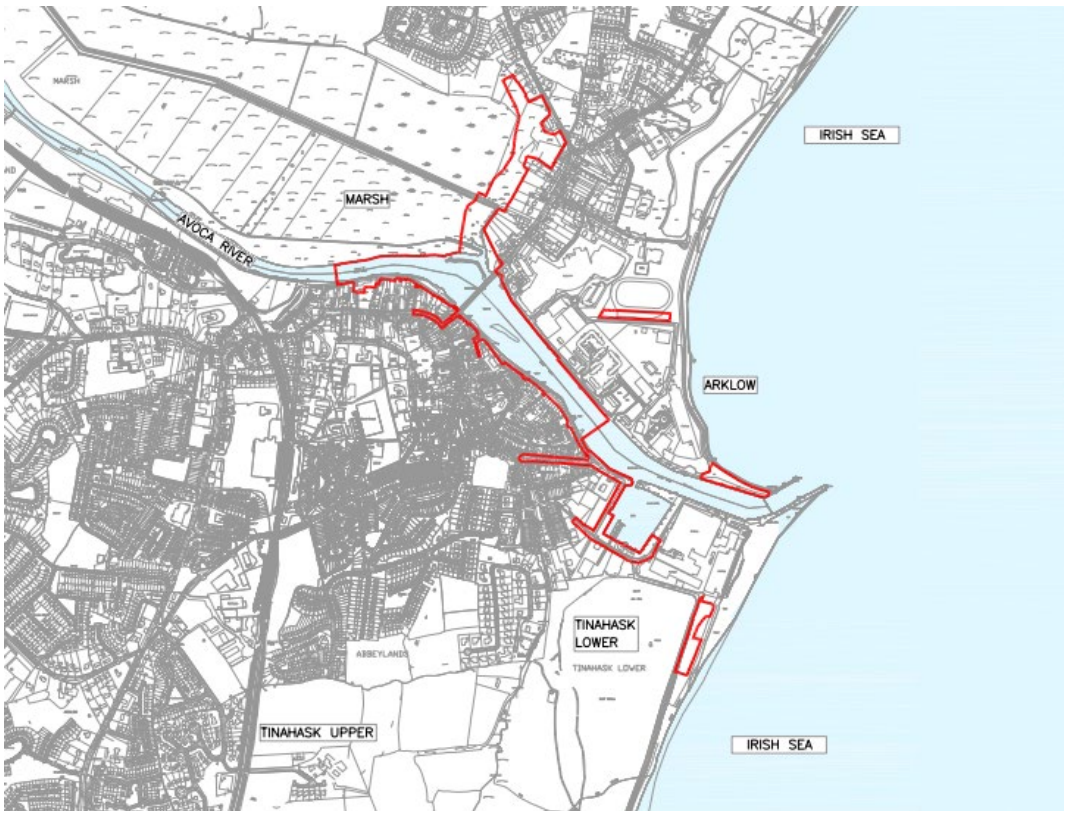

Figure 1.2 Location of the Proposed Scheme (showing planning boundary)

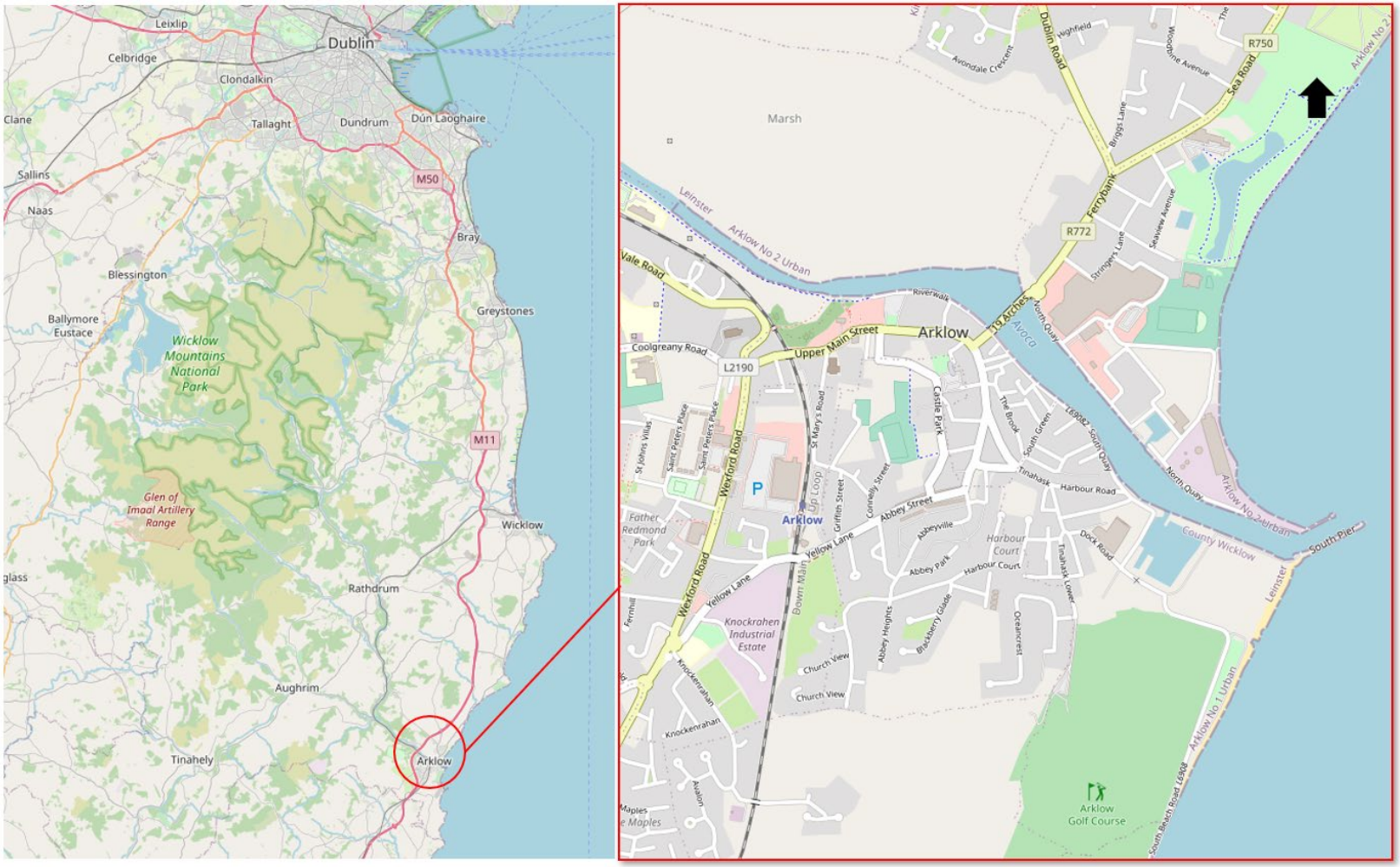

Figure 1.3 Location of the Proposed Scheme

2 Need for the Scheme

2.1 Need for the Proposed Development

The town of Arklow has, for many years, experienced recurring flooding problems that have caused widespread damage to public and private property. The largest flood event recorded was in August 1986 resulting from extreme meteorological conditions commonly referred to as "Hurricane Charlie". Further recent flooding events occurred in December 1989, November 2000, February 2002 and in October 2004, October 2005, January 2010, January 2013 and December 2015.

The following areas are considered the most at risk of flooding in Arklow:

- Upstream (west) of Arklow Bridge along the south bank of the Avoca River is a promenade (River Walk) which includes residential and commercial properties, car parking, green space and public amenity facilities. This is connected to Main Street by Bridge Street and Condren's Lane Upper. This is a low-lying urban area built on the narrow floodplain and is affected primarily by fluvial (river) flooding.
- Downstream (east) of the Arklow Bridge (along the South and part of the North Quays, towards the Dock/Harbour area) is prone to tidal flooding. The South Quay area is predominantly residential in character whilst Arklow Dock in the Harbour area caters for fishing, cargo vessels and pleasure craft. This area experiences periodic flooding from significant tidal events. This flooding is more frequent but less extreme than fluvial flooding events and generally coincides with spring tides.
- The Ferrybank area, located north of the Avoca River, which is predominantly residential in character, is impacted by fluvial rather than tidal flooding. Flooding on Ferrybank is directly related to the flooding capacity of the river plain. Flooding occurs in Ferrybank when floodwater exits the Arklow Town Marsh.

Arklow is at risk from recurring and, having regard to current climate change predictions, potentially worsening flood events in the future. Without intervention to address fluvial and tidal flooding, Arklow faces the continued onset of a range of issues associated with flooding including:

- Damage to residential and non-residential properties, commercial buildings, agricultural lands infrastructure and utility assets
- Large financial costs relating to loss of earnings, damage repair, as well as indirect costs such as evacuation, temporary accommodation, increased travel and shopping costs and the cost of emergency services.
- Increased liabilities and premium costs for insurance in areas at risk of flooding.

- Health and safety risks associated with extreme flooding, such as increased risk of drowning or flood related injuries, and increased potential for infectious diseases (e.g. through contaminated flood water). Increased risk of flooding can also result in significant anxiety and stress for affected populations.
- The risk of recurrent flooding in Arklow influences the type and extent of development which is permitted in areas vulnerable to flood events. As the proposed FRS seeks to reduce the risk of flooding in Arklow, there is potential for increased development opportunities in the area.

Thus, there are a number of justifications surrounding the need for the proposed scheme. Arklow is at risk from recurring, and, potentially worsening flood events in the future. The existing flood risk in Arklow has health and safety, as well as financial implications for all those who live and work in the area.

Further, the existing flood risk in Arklow continues to influence the nature, scale and extent of development in the area. There is, as such, an evident and imperative need for the proposed Flood Relief Scheme in Arklow.

3 Alternatives

The development of the proposed scheme required an extensive assessment of different options for flood relief. The process required coordinated collaboration between engineering and environmental issues and consultation with the public and other stakeholders. The design process progressed through a number of stages/ assessments including:

- Assessment of Do-Nothing Alternative;
- Screening Assessment of Flood Alleviation Measures including Options Screening Workshop;
- Multi-Criteria Assessment including Environmental comparison of reasonable alternatives;
- Selection of Preferred Option following MCA; and
- Further Development of the Preferred Scheme.

Following on from the feedback received from public consultations, stakeholders and further studies, the scheme was further developed to respond to the sensitive receptors identified and mitigate effects to include:

- The finalisation of the location of the embankment at the Marsh and the design of flood walls north and south of the river.
- The location of the debris trap and gravel trap has been finalised and is now located adjacent to the junction of River Walk and River Lane.
- The development of Public Realm design has ensured the effective integration of the project with the townscape and river setting. The public realm design seeks to ensure the value of the river frontage in its new form can contribute positively to the townscape on offer while minimising adverse effects on the area. A new riverside promenade will extend for over 1.0km from upstream of the town carpark along River Walk and South Quay to Arklow Harbour. This includes the provision of a new amenity/ viewing area, floating pontoon, ramps, footpaths, parking, lighting, planters and seating.
- A range of initiatives for ecological enhancement have been incorporated into the design of the proposed FRS.
- The likely construction methodology and construction programme have been developed. This has allowed the construction sites and a number of offsite construction compounds to be identified.
- The proposal for downstream widening (removal of the pinch-point) at South Quay is no longer part of the scheme.
- The Arklow Wastewater Treatment Plant (WwTP) project was granted planning permission in 2019 and a Memorandum of Understanding regarding the overlapping construction elements of the proposed FRS and WwTP has been agreed between Irish Water and the Office of Public Works (OPW).

4 Description of Proposed Scheme

4.1 Objectives of the Proposed Scheme

The primary objectives of the proposed scheme are to deliver a viable, cost-effective, and sustainable flood relief scheme that:

- Mitigates the recurring flood events in Arklow, and subsequent damage to public and private property; and
- Provides flood relief measures along the Avoca River to alleviate future fluvial and coastal flood events.

4.2 Design of Proposed Scheme

4.2.1 Overview

The design of the proposed Arklow Flood Relief Scheme caters for the 1% Annual Exceedance Probability (AEP) fluvial flood event (also known as the 1 in 100-year fluvial flood event) and the 0.5% AEP coastal flood event (also known as the 1 in 200-year coastal flood event).

4.2.2 Scheme Location

The scheme will be located in Arklow Town; north and south of the Avoca River in the townlands of Arklow, Tinahask Lower, Marsh, Ferrybank and Ticknock (Refer to **Figure 1.2**).

To the south of the Avoca River, works will take place from just west of St. Mary's (Main Street) Car Park along River Walk, to Arklow Bridge (a protected structure: RPS A26), along South Quay and around Arklow Dock in the Harbour area. Associated ancillary works will take place on adjacent streets.

To the north of the Avoca River, works will take place along the eastern side of Arklow Town Marsh adjacent to the Avoca River and to the rear of properties fronting onto Ferrybank and the Dublin Road.

Works will take place at Arklow Bridge (a protected structure: RPS A26), and in the Avoca River.

4.2.3 Overview of the Scheme

Overall, the proposed scheme comprises measures to facilitate a significant increase in the conveyance capacity of the Avoca River; including lowering the floor of Arklow Bridge, local channel alterations, channel deepening and the introduction of a debris trap and a gravel trap, the construction of direct flood defences, (i.e. flood walls and an embankment) for the Ferrybank, River Walk/Main Street and South Quay and Harbour (Dock) areas of Arklow and a drainage system to cater for stormwater run-off. An overview of the layout of the proposed flood relief works is shown in **Figure 4.1** overleaf.

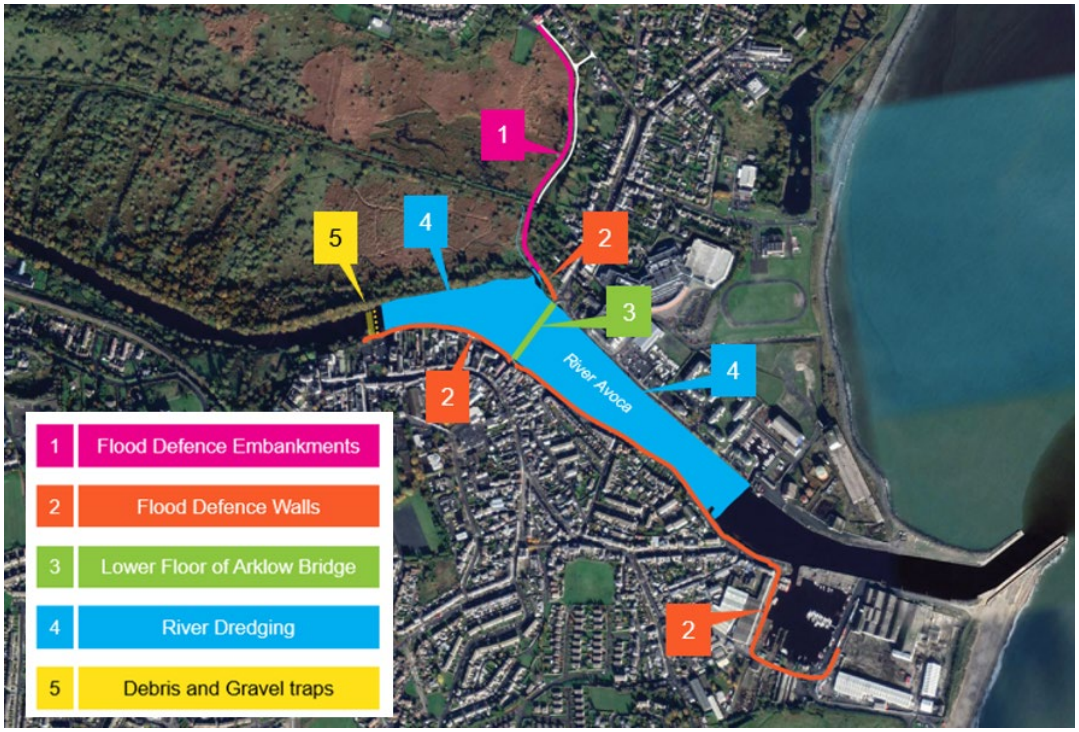

Figure 4.1: Overall Layout of Proposed Flood Relief Works

Overall, the proposed development (refer to **Figure 4.3**) will comprise of the following elements:

- Works at Arklow Bridge, a protected structure (RPS A26), including the underpinning of the piers and southern abutment, removal of existing concrete scour slab and lowering the floor of Arklow Bridge by approximately 1m, construction of new concrete scour slab and remedial works to bridge masonry;
- River dredging works to improve channel capacity, comprising dredging of the river channel from approximately 320m upstream of Arklow Bridge to approximately 520m downstream of Arklow Bridge, including removal of in-river sandbanks and vegetated islands north of Arklow Bridge and trimming of vegetation along the north bank between the debris trap and Arklow Bridge that lies within the river channel and below the design flood level);
- Extension into the river channel by circa 12m along an approximate 75m length of the northern river bank upstream of Arklow Bridge;
- Installation of 3 no roosting platforms for birds upstream of Arklow Bridge;
- Construction of debris and gravel traps and a permanent river access ramp on the south bank for their maintenance (Refer to **Figure 4.2**);
- Flood defences on the south bank of the Avoca River including:
    - Demolition of existing walls and river access and provision of approximately 325m of flood defence concrete finish wall founded on sheet piles and concrete foundations, with intermittent glass panels, upstream of Arklow Bridge on River Walk from just west of St Mary's (Main Street) car park;

  - Demolition of some existing walls and river access provision of approximately 655m of flood defence concrete finish wall founded on sheet piles and concrete foundations, with a glass panel at the former Tyrells yard slipway, and modifications to approximately 20m of existing wall downstream of Arklow Bridge, on South Quay and on the western and southern sides of the Dock in the Arklow Harbour area);
  - Construction of stormwater drainage system including 3no. pumping stations along the south bank and adjoining streets; and
  - At the Dock, in the Harbour area, installation of demountable flood barriers at two locations to allow access to the shipyard and the public slipway, which will normally be maintained in a closed position.
  - Water safety measures including lifebuoys and river access ladders.
- Flood Defences on the north bank of the Avoca River including approximately 545m flood defence earthen embankment with adjoining maintenance track in Arklow Town Marsh close to its eastern boundary and approximately 60m sheet-piled wall with concrete cap to be constructed upstream of Arklow Bridge's north western abutment, and realignment and reforming/reinforcing both banks of the existing channel where it enters the Avoca River to the west of the Avoca Bridge. Permanent access road from Dublin Road to maintenance track.
- Removal of existing public realm at River Walk and South Quay, including demolition of the river access at the junction of River Lane and River Walk, and a disused slipway (referred to as Coal Quay) on South Quay, existing footpaths, street and decorative lighting, parking spaces and seating.
- Provision of new public realm at River Walk and South Quay, including parking spaces, footpaths, amenity/viewing area, public lighting, planters and floating pontoon.
- Provision of additional urban space approximately 6m into the river on South Quay immediately south of the Arklow Bridge for a length of approximately 260m and provision of additional urban space extending between approximately 0m and 6m into the river on River Walk for a length of approximately 100m.
- The proposed works include road reconstruction, road regrading, traffic calming measures, provision of a section of interconnector sewer for the Arklow Wastewater Treatment Plant (WwTP) for Irish Water, diversion of utilities, including electricity cables in Arklow Marsh, tree felling, tree trimming, tree planting, landscaping, local riverbed raising, installation of roosting platforms upstream of Arklow Bridge and all associated and ancillary works.
- Temporary works including establishing six site compounds: northeast edge of Arklow Town Marsh, on lands between the running track and Mill Road, on land between the river and the roundabout located at the junction of Arklow Bridge, Ferrybank and North Quay, on part of St Marys (Main Street) car park, on lands between the eastern end of North Quay and North Pier, and on lands between Arklow Golf Club and South Beach. River access will take

place at North Quay, South Quay, River Walk and north-west of Arklow Bridge. These site compounds will operate over the duration of the works and will facilitate the construction of the scheme and archaeological examination and stockpiling of excavated and dredged material.

Figure 4.2 Photomontage Showing Proposed Debris Trap

4.2.4 Arklow Wastewater Treatment Plant

Irish Water was granted planning consent for the Arklow Wastewater Treatment Plant (WwTP) project in 2019. The WwTP will mitigate the current practice of discharging raw effluent to the Irish Sea.

The WwTP will physically overlap with the Arklow Flood Relief Scheme along the south side of the Avoca River. Depending on the final construction programme for both projects, the construction works for both may occur in parallel or sequentially. It has been important to ensure that any works included as part of the proposed flood relief scheme would be compatible with the design of the WwTP Project. A Memorandum of Understanding regarding the overlapping construction elements of the proposed FRS and WwTP has been agreed with Irish Water and the Office of Public Works (OPW).

The elements which overlap include the section of the interceptor sewer along River Walk and part of South Quay. This section of interceptor sewer is included in the planning application for the proposed FRS. It extends for approximately 660m along River Walk and along South Quay. Should the construction of the flood relief scheme proceed in advance of the WwTP, this section of interceptor sewer will be constructed as part of the flood relief scheme works.

A1

FROM OS MAPS 4427-10, 4427-15, 4428-06, 4428-07.
4428-11, 4428-12, 4428-16, 4428-17, 4428-22
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APPROXIMATE EXTENT OF FLOOD EMBANKMENT

MAINTENANCE ACCESS ROAD

LINE OF EMBANKMENT

LINE OF REALIGNED DRAINAGE CHANNEL

ARKLOW MARSH

RIVERBANK EXTENSION

GRAVEL TRAP

DEBRIS TRAP

FLOOD WALL

RIVER ACCESS

AVOCA RIVER

ARKLOW BRIDGE

BRIDGE WORKS

FLOOD WALL

STORMWATER DRAINAGE

RIVERBED RAISING

IRISH SEA

DREDGING

ROOSTING PLATFORMS

STORMWATER DRAINAGE

RIVERBED RAISING

FLOOD WALL

ARKLOW TOWN

STORMWATER DRAINAGE

FLOOD WALL

GROUND RAISING

GROUND RAISING

N
W E
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GENERAL NOTES

1. DO NOT SCALE OFF DRAWING
2. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS
3. DRAWING IS FOR INFORMATION PURPOSES ONLY, NOT FOR CONSTRUCTION

LEGEND

- SITE BOUNDARY
- DEEPENING OF BRIDGE FLOOR
- U/S & D/S DREDGE
- LINE OF FLOOD DEFENCE
- LINE OF EMBANKMENT
- EXISTING FLOOD DEFENCE WALL
- REALIGNED DRAINAGE CHANNEL
- STORMWATER DRAINAGE
- DEBRIS TRAP
- GRAVEL TRAP
- MAINTENANCE ACCESS TRACK
- PROPOSED RIVERBANK EXTENSION
- PROPOSED RIP-RAP
- LOCAL RAISING OF RIVERBED
- PROPOSED ROOSTING PLATFORM
- GROUND RAISING

Rev	Date	Description	By	Chk	App
P4	27.04.21	ISSUE FOR PLANNING	LT	KBS	KT
P3	11.03.21	ISSUE FOR PLANNING	LT	KBS	KT
P2	18.05.20	ISSUE FOR INFORMATION	LT	KBS	KT
P1	10.09.18	ISSUE FOR INFORMATION	NM	SH	KT

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CLIENT
WICKLOW COUNTY COUNCIL

PROJECT
ARKLOW FLOOD RELIEF SCHEME

DRAWING TITLE
OVERALL SCHEME LAYOUT PLAN

STATUS
FOR PLANNING

Date: 02.07.18	Scale: 1:2500	Drawn: NM	Chk: KT	App: KT
Project No: PH00886/01	Drg. No: 1002			Rev: P4

4.3 Operation of the Proposed Scheme

Regular maintenance activities during the operation of the scheme will be required for the following elements of the Scheme:

- riverbank vegetation will be trimmed back so that it does not lie within the design flood flow.
- gravel and debris traps will be inspected annually, and any gravel deposition or debris will be removed.
- the river channel will be inspected regularly, and maintenance dredging carried out at any locations of deposition, estimated at ten-year cycles.
- the stormwater drains will be inspected and cleaned as required.
- the stormwater pumping stations and non-return valves will be inspected annually and maintained as required to ensure that they remain in proper working order.

In addition, regular inspection will be carried out on all other elements of the Scheme including:

- Demountable flood defence barriers.
- Flood defence walls including glass panels.
- Flood defence embankment.
- Bridge piers and abutments.
- Scour protection slab.
- Public Realm.
- Water safety equipment.
- Roosting platforms for birds upstream of Arklow Bridge.
- Bat tubes in the flood defence walls and on Arklow Bridge.
- Nest boxes on Arklow Bridge.

Maintenance and repair will be carried out on the above listed items as necessary.

4.4 Decommissioning of the Proposed Scheme

Wicklow County Council considers Arklow Flood Relief Scheme to be a key strategic asset in the protection of Arklow Town from flooding and it will have a minimum 50-year design life. As such, it is anticipated that the proposed development will be maintained by Wicklow County Council in the long term. It is not envisaged that the elements of the FRS will be decommissioned in the foreseeable future, as they are necessary for the long-term protection of the town.

5 Construction Strategy

5.1 Overview of Construction

The construction of the scheme is estimated to occur over 5 years with anticipated commencement in 2022 and completion in 2026. The construction programme is divided into work packages (WP) as follows:

- **Enabling Works**: Archaeological testing and resolution in the Avoca River and Arklow Marsh. Diversion of electricity cables in Arklow Marsh.
- **WP 1:** Lowering the floor of Arklow Bridge including bridge underpinning, bridge remedial works and scour protection works.
- **WP 2:** Channel dredging upstream and downstream of Arklow Bridge.
- **WP 3:** Construction of debris and gravel traps with associated maintenance access ramp.
- **WP 4:** Construction of flood defence walls along River Walk, South Quay and around the dock on the south (right) bank, upstream and downstream of Arklow Bridge and construction of drainage works which will extend into adjoining streets. Public realm and landscape features including footpaths, terraces, planters, lighting and seating will be constructed in these areas.
- **WP 5:** Construction of flood defence earth embankment and flood defence wall on north (left) bank along the eastern side of Arklow Town marsh including diversion of drainage channel. Landscaping will be carried out on the river side of the flood defence wall and dry side of earth embankment.

Enabling works for the proposed development will include the establishment of a number of working areas, as well as the construction of temporary site access and construction compounds. Utilities and services will be temporarily relocated in affected locations.

River access will be established for a number of working areas. These accesses will support the Arklow Bridge works, construction of the debris and gravel traps, channel dredging (upstream and downstream of Arklow Bridge) and construction of flood defence walls along River Walk and South Quay. Temporary in-channel access roads and bunds will be constructed to support these instream works.

Work Package 1 consists of the underpinning of the southern abutment and the piers of Arklow Bridge. Upon completion, the floor of the bridge will be lower by 1m and a new scour protection concrete slab will be constructed at the new river bed level. Remedial works will be carried out to the masonry stonework of the historic bridge. The works will be carried out over three years with the in-channel works restricted to the months of May to September inclusive. Bat tubes and bird nest boxes will also be installed under the bridge deck.

During **Work Package 2**, temporary haul roads will be constructed along the Northern and southern bank upstream and downstream of Arklow Bridge. Excavation will be carried out utilising draglines and hydraulic excavators. Dump

trucks will be used to carry the excavated material to designated sites depending on the category of material and its final use.

Upon completion, an extension of the northern riverbank adjacent to the realigned channel will also be constructed to enhance the riverside habitat. Three roosting platforms will also be installed approximately 35m upstream of Arklow Bridge.

For **Work Package 3**, the debris trap will be constructed on an engineered foundation which will be piled for support. A reinforced concrete foundation slab will be constructed which will be followed by the concrete piers. Bat tubes will be installed on the downstream face of the debris trap piers. The gravel trap will be constructed by forming a trough in the bed of the river.

Work Package 4 consists of flood defence walls, stormwater drainage works, interceptor sewer works, public realm and landscape works. A temporary causeway will be constructed for 120m upstream of Arklow Bridge and 300m downstream of Arklow Bridge. It will serve the construction of the sheet piled wall in-channel and associated interceptor sewer for the Arklow WwTP project. A concrete cap will be placed along the top of sheet piled walls upon completion. Reinforced concrete walls will be constructed on the riverbank and quay side. Walls will incorporate glass panels at key locations to provide views of the river. Some walls located along South Quay will be retained with minor improvement works required such as sealing any drainage openings through the walls.

Storm-water drainage works will be constructed using open cut methods. Once excavated and dewatered, the drainage pipes will be laid on engineered material and backfilled. Pump-stations will also be constructed at three locations situated along River Walk (one) and South Quay (two) respectively. These will include underground wet well / dry wells and kiosk which will host the motor starter and control systems.

The part of the interceptor sewer for the Arklow WwTP project which will runs along River Walk and South Quay will be constructed using open cut methods.

Upon completion of the flood defence works, hard and soft landscaping will be carried out. Hard landscaping will be installed along the flood defence walls in the form of kerbs, roads and pathways with concrete and gravel finishes and appropriate marking and parking facilities. Raised terraces will be provided for public amenity and to provide views over the river. Soft landscaping will be constructed in the form of placing of soil, levelling and planting. Sections of the river bank along River Walk and South quay will be raised to provide a resting area and refuge for animal life.

Work Package 5 will include construction of an earth embankment, sheet piled flood defence wall and maintenance track along the northern bank adjacent to Arklow Marsh. The sheet pile wall will be constructed along the riverbank and a pre-cast concrete cap will be placed along the top of wall upon completion. Earth embankment will be constructed with select engineered material. This will confine flooding within the Marsh and direct flows towards the Avoca River and thus protect residential properties along Ferrybank and Dublin Road from flood risk. Suitable landscaping will be constructed upon completion of the earth embankment in the Marsh.

In support of the above Work Packages, six construction compounds have been identified and are considered to be capable of accommodating the construction of the proposed development. See **Figure 5.1** below for locations of site compounds and river accesses.

Figure 5.1 Site Compounds and River Access Locations (not to scale)

5.2 Management

During the construction of the scheme, coordination with other projects in Arklow Town will be required. Arklow Wastewater Treatment Plant Project (WwTP) has been identified to share common working areas with Arklow Flood Relief Scheme (FRS). Only one contractor will be in possession of the common working site at a time. To minimise in-combination effects of both projects, a memorandum of understanding (MOU) agreement has been signed by both project promoters to ensure coordination of both projects during the construction period of Arklow Flood Relief scheme.

A Construction Environmental Management Plan (CEMP) and schedule of mitigation measures has been prepared to define the minimum standards required of the contractor(s). For each Work Package, the contractor will be required to integrate these measures into a Detailed Construction Environmental Management Plan following appointment (prior to commencement of any construction activities).

Further, a detailed construction traffic management plan(s) will be prepared by the contractor(s) in advance of any works taking place on site and submitted to Wicklow County Council for approval. Traffic flows and scheduling will be appropriately planned to ensure traffic to and from the site is managed efficiently and effectively in accordance with the relevant legislative requirements.

A c. 2.4 m high site boundary in the form of hoarding or fencing will be established around each of the compounds and construction sites before significant construction activity commences. The contractor(s) will liaise with third party service providers such as ESB and Irish Water for temporary connectivity of services at construction compounds. Construction lighting will be required at working areas, along exterior hoarding at footpaths for public safety and where public lighting has been relocated to facilitate construction work.

Construction lighting will be provided at locations for the storage of material.

The core construction working hours for the proposed development will be:

- 7am – 7pm: Monday to Friday; and
- 8am – 2pm: Saturday

Exception to the above will be when grouting, piling and remedial works to the bridge superstructure are being carried out during Work Package 1. These works will be carried out between 21:00 and 7:00 the next day in order to minimise disruption to traffic crossing Arklow Bridge. Works within the river and in particular dredging works in Work Package 2 will utilise low and / or high tides depending on the contractor's plant for maximum productivity. Removal of surplus material off-site by road and regular deliveries to site will generally be confined to daytime but outside of peak traffic hours i.e. 10am to 4pm. Any construction outside of the construction core working hours will be agreed in advance with Wicklow County Council.

6 Planning and Policy

The review of strategic, statutory and non-statutory plans demonstrates that there is a supportive and consistent policy framework in place for the proposed scheme.

6.1 EU Directives and Policy Guidance

The EU 'Floods Directive' requires member states to assess if all watercourses and coastlines are at risk from flooding, to map the flood extent, assets and humans at risk in these areas and to take adequate and co-ordinated measures to reduce this flood risk. The design of the proposed scheme is a direct and coordinated measure proposed in line with the requirements of the Floods Directive.

The Water Framework Directive is responsible for the protection of all waters including rivers, lakes, estuaries, coastal waters and groundwater, and their dependent wildlife and habitats. The proposed scheme is consistent with the EU Water Framework Directive in that measures to protect/enhance all waters have been incorporated into the design and construction of the scheme.

The EU Strategy on Adaptation to Climate Change is an integral part of the European Green Deal which sets out the pathway to adapt to the unavoidable impacts of climate change and become climate resilient by 2050. The proposed scheme provides protective infrastructure which allows for future climate change adaptability, ensuring climate resilience and compliance with the EU Strategy on Adaptation to Climate Change.

6.2 National Policy Guidance

The National Flood Policy and the Arterial Drainage (Amendment) Act 1995 permit the OPW to implement localised flood relief schemes. The proposed scheme is consistent with the National Flood Policy as the OPW would reduce exposure to flood risk and provide appropriate flood protection and mitigation for the most vulnerable areas of Arklow Town.

The proposed development is in accordance with the objectives of Project Ireland 2040: National Planning Framework by providing physical infrastructure that would mitigate flood risk for the residents and businesses therefore improving quality of life and wellbeing in Arklow Town. Further, in the National Development Plan, the Government is committed to delivering further capital works/flood relief schemes to minimise the impacts of river and coastal flooding on society through the roll-out of 29 Flood Risk Management Plans, including a flood relief scheme to Arklow town.

The Government published a draft of Ireland's first national framework for managing marine activities, National Marine Planning Framework in November 2019, which is due to be published in Q2 2021. The Framework is Ireland's first plan for more sustainable, effective management of marine activities and will inform the Government's objectives and priorities.

The proposed scheme is consistent with the above policy as it will provide protective infrastructure which allows for future climate change adaptability, ensuring climate resilience and will also provide flood defence infrastructure which will allow increased development opportunities in the Arklow town area.

The proposed scheme is in compliance with the Climate Action Plan 2019 and Climate Action and Low Carbon Development Bill 2020 and it will improve the following aspects: tangible and intangible flood damages, financial loss, extensive community disruption, health and safety issues and development restrictions..

The National Development Plan 2018 – 2027 was published in conjunction with the National Planning Framework in February 2018. The National Development Plan is the national plan setting out investment priorities to guide national, regional and local planning and investment decisions. The proposed scheme is consistent with the objectives of the National Development Plan through the fulfilment of a flood relief scheme to Arklow town which will minimise the impacts of river and coastal flooding in the area.

Under the National Climate Change Adaptation Framework, the OPW has produced the Flood Risk Management Climate Change Sectoral Adaptation Plan. This plan identifies 21 adaptation actions needed to ensure effective and sustainable management of flood risk into the future. The proposed scheme is in accordance with this Plan as it has been designed having due regard to climate change projections. The proposed Arklow FRS is in accordance with the Flood Risk Management Climate Change Sectoral Adaptation Plan as it has been designed having due regard to climate change projections. To allow for future climate change adaptability, the hard flood defences (flood defence walls and embankment) of the proposed Arklow FRS have been designed to facilitate future increases in their heights without imposing a significant impact on environmental and landscape features. The proposed scheme also aligns with the Programme for Government 2020: Our Shared Future as it will provide necessary infrastructure to protect against flooding.

6.3 Regional Policy Guidance

The Regional Planning Guidelines for the Greater Dublin Area 2010-2022 effectively implement the National Spatial Strategy, whilst providing more detail and establishing a regional development and spatial framework that can be used to strengthen local authority development plans and other planning strategies at county, city and local level. The proposed scheme complies with the strategic objectives and recommendations of the Regional Planning Guidelines regarding the need for investment in resilient infrastructure and flood protection in order to support the delivery of the economic and settlement strategies. Arklow is a key growth town in the GDA, and investment in its infrastructure is critical to realise the overall strategy for development in the region. The proposed scheme will therefore facilitate the expansion and growth envisioned in the Regional Planning Guidelines.

The proposed scheme is compliant with the Regional Spatial and Economic Strategy for the Eastern and Midlands Region 2019-2031 in that Wicklow County Council, in conjunction with the OPW, propose to implement flood relief measures to reduce the risk of flooding in Arklow. Measures to protect environmentally sensitive sites and habitats such as the Avoca river itself and the Arklow Town Marsh pNHA have been incorporated into the design and construction of the scheme.

The Wicklow County Development Plan 2016-2022 recognises the importance of rivers and identifies that flooding and flood risk is an issue for the county and Arklow Town. The proposed scheme is consistent with the County Development Plan as it would mitigate against flood risk for the residents and businesses in Arklow Town and therefore support economic growth, protecting the quality of the natural environment and ensuring the provision of necessary infrastructure.

This Wicklow County Council Climate Change Adaptation Strategy forms part of the National Adaptation Framework (NAF) which was published in response to the provisions of the Climate Action and Low Carbon Development Act 2015. The proposed scheme is considered to be compliant with the objectives outlined in the Adaptation Strategy by increasing the resilience of the infrastructure in Arklow town and integrating climate considerations into planning and design including protection from future flood events.

6.4 Local Policy Guidance

The Arklow and Environs Local Area Plan 2018 – 2024 is the land use framework for guiding future development in the settlement that provides for and controls the physical, economic and social development of the settlement in the interests of overall common good and in compliance with environmental controls. The proposed scheme aligns with both the infrastructure and waterfront strategies for Arklow. The overall infrastructure strategy for Arklow, as outlined in the LAP, sets out the council's intention to "assist the Office of Public Works through the implementation of measures capable of managing and mitigating against the consequences of flooding."

The delivery of the proposed flood relief scheme will significantly improve the impacts of recurrent flooding events which have caused widespread damage to public and private property in Arklow and will deliver increased resilience for potentially worsening flood events in the future. Without intervention, Arklow faces the continued onset of a range of issues associated with flooding including flood damages, extensive community disruption and health and safety issues. Further, the existing flood risk in Arklow continues to influence the nature, scale and extent of development in the area. The delivery of the proposed flood relief scheme will assist the council to facilitate existing and future sustainable economic development of the area and associated activity.

The proposed scheme is consistent with the overall development strategy of the Arklow Town and Environs LAP as it would provide the necessary infrastructure capable of managing and mitigating against the consequences of flooding, and that it will facilitate future development at the waterfront that is currently hindered by the recurring flooding issues in the area.

The public realm improvements proposed as part of the FRS along River Walk and South Quay will considerably improve the quality of the public realm and will greatly enhance the overall appearance and recreational utility of the area.

The key benefit of the proposed flood relief scheme will be to provide much needed flood protection to existing homes and businesses in Arklow town. This positive benefit will also extend to future developments and new infrastructure in Arklow town. Conservation engineering solutions have been incorporated throughout the design process, including the design of the quay walls and the works to Arklow bridge etc to ensure the unique maritime heritage of Arklow is respected and enhanced. Measures to protect environmentally sensitive sites and habitats such as the Avoca river itself and the Arklow Town Marsh pNHA have been incorporated into the design and construction of the scheme.

While it is acknowledged that, following construction of the proposed scheme, access to the Avoca River may be restricted at certain locations such as the public slip at the Dock, any removal or restriction of access to the river was considered integral to the design and implementation of the flood relief scheme.

7 Traffic and Transport

This assessment describes the likely significant effects on traffic and transport associated with the construction and operation of the proposed development. The assessment has concentrated on construction as it is envisaged that likely significant effects during this phase will be greatest.

The surrounding street network in Arklow town is generally single carriageway streets with many supporting on-street parking and is typical of a central urban area. The assessment has focused on impacts within Arklow town centre and on the streets accessing the Avoca River and the various site compounds proposed to support the proposed development. Traffic counts were carried out in September 2020 on the surrounding street networks to establish baseline traffic conditions and were amended to reflect the potential impact the Level 2 COVID -19 restrictions which were in place at the time may have had on baseline traffic flows.

The busiest routes recorded during traffic counts include Ferrybank and Main Street, with lower traffic flows using the remaining streets particularly on the south side of the Avoca River. The northern section of the quays is relatively busy due to the Bridgewater Shopping Centre.

The construction of the proposed development as noted in Section 5 above can be divided into five primary Work Packages. The volume of additional traffic generation during construction has been based on the level of construction traffic activity associated with each stage of the works (i.e. deliveries on site, the removal of material from the site etc.) as well as staff activity.

The distribution of traffic has been based on the following:

- All construction deliveries to and excavated material from Site Compound SC1, SC2, SC3 and SC5 and works to the north of the Avoca River will access and egress these work areas from Junction 20 on the M11 Motorway.
- All construction deliveries to and excavated material from Site Compound SC4 and SC6 and work areas to the south of the Arklow Bridge, will access and egress the works area from Junction 21 on the M11 Motorway.
- The internal movement of construction vehicles will be permitted between the work areas and the individual site compounds.

In terms of traffic generation the combined Work Packages 2 and 5 are expected to generate the greatest increase in traffic and will result in the temporary increase in traffic of approximately 670 passenger car units per day with peak hour traffic increases of approximately 75 passenger car units expected during both the morning and evening peak periods.

The construction of the proposed scheme is expected to increase traffic flows on the wider road network (i.e. Ferrybank, Abbey Street, Arklow Bridge, Main Street) by less than 5% during the peak hour periods, and by less than 3% on an all-day basis.

The two quays (North Quay and South Quay along with South Green and Tinahask Road) which will be used as key access routes to the construction work sites are expected to have increases of between 10% -18% during the peak hour periods, and between 5% and 10% on an all-day basis. These larger increases are due to the low baseline traffic flows and these streets will remain within capacity during the construction phase of the proposed scheme.

In terms of impact the proposed construction works at a wider network level will have a temporary slight negative effect on traffic conditions in Arklow, as traffic increases on the primary road/street network (i.e. Ferrybank, Arklow Bridge and Main Street) are all 5% or less during the peak hour periods. At the individual river access points the effect, while still temporary, will be slightly more significant but acceptable considering the low traffic flows on the receiving environment in the vicinity of the construction works.

Work Package 1 requires night time lane closures across the Arklow Bridge and although the projected increase in traffic will be less than the combined traffic generation associated with Work Package 2 and Work Package 5 together, the traffic management measures required (i.e. one-way night time shuttle for traffic) to accommodate the works will have also have a slight negative impact when operational at night resulting in delays to traffic wishing to cross the bridge.

The key mitigation measures to be adopted during construction include:

- The preparation of a Construction Traffic Management Plan;
- The preparation of a Communications Management Plan to accompany the overall Construction Management Plan;
- The preparation of a Construction Mobility Management Plan; and
- The preparation of individual traffic management plans to support the delivery of each Work Package.

The construction of the proposed scheme will result in a slight increase in traffic congestion within the town, particularly when construction works are taking place on Arklow Bridge. These effects will be temporary in nature and following the completion of the construction works will have no residual effects. During all construction stages, the individual working areas will result in some restrictions and inconvenience to the movement of people and traffic. These restrictions will be temporary in nature and particularly felt in the immediate vicinity of the proposed working areas.

During the operation of the proposed scheme the projected increases in traffic flows will be very small, with only occasional service traffic expected. The annual removal of material from debris trap will have a temporary and short-term impact on traffic movement in the operational phase but impacts will be significantly less than those stated in construction impact assessment. The proposed maintenance dredging of the river channel which is proposed approximately every 10 years will result in temporary and short-term effects on traffic movement. These effects will similarly be less than those stated in construction impact assessment.

Should the construction of the Arklow Flood Relief Scheme coincide with the construction of the Arklow Wastewater Treatment, there will be a greater increase in traffic in Arklow resulting in a temporary slight increase in traffic congestion along the primary road network. It expected that at North Quay, South Quay, South Green and Tinahask Road that the impacts on traffic delays and queuing will be greatest should the two construction projects be carried out in tandem, however these temporary impacts will be over a shorter duration. There is the potential should these projects be carried out simultaneously that co-ordinated traffic management plans will need to be prepared and agreed with Wicklow County Council.

8 Air Quality

The likely significant effects of the proposed development on ambient air quality was assessed.

Dust emissions are likely to arise from the following activities – demolition, earthworks, construction and trackout. During the construction phase of the proposed development dust is considered to be of a potentially *high risk* for earthworks and trackout and a *medium risk* for demolition and construction.

The TII guidelines state that increases in Annual Average Daily Traffic (AADT) flows of less than 5% and 10% during the operational and construction phases respectively are unlikely to result in significant air quality effects. The traffic assessment carried out for the proposed development concluded that the predicted traffic increases in both construction and operation would not exceed the thresholds mentioned above and therefore no further assessment was required.

A range of mitigation measures are proposed for the construction phase of the proposed development. The measures cover; site management, site maintenance, onsite operations, machinery and dust monitoring at the construction site boundary and nearest sensitive receptors.

No significant adverse residual negative effects on air quality are envisaged during the construction or operation of the proposed development

The likely significant effects of the proposed development on odour was assessed. There is potential for odour from the dredging activities during the construction phase. The highest impact on the nearest receptors as a result of dredged material storage is at Ferrybank and North Quay. Some of the dredged material will be reused for embankment construction. A moderate temporary negative impact is predicted at Ferrybank and North Quay. For other locations the impact is deemed not significant.

There are mitigation measures proposed to reduce adverse impacts from odour caused by the proposed scheme including covering transport vehicles to prevent escape of materials and onsite monitoring.

Two odour specialists will be present onsite to monitor odour during the excavation of dredged material for each dredging phase, upstream and downstream, and across the channel profile.

Following the implementation of mitigation and monitoring measures, moderate temporary negative impacts are predicted during the construction phase at Ferrybank and North Quay. No significant adverse residual negative effects on odour are predicted during the operation of the proposed scheme.

9 Noise and Vibration

An assessment of the noise and vibration effects arising from the proposed development on the existing environment was carried out. The baseline noise environment was determined by conducting surveys at sensitive locations near the proposed development. The results of these surveys indicate that baseline noise levels are dominated by passing traffic on the local road network.

The noise and vibration assessment examined the multiple work packages during construction of the proposed development including construction activities at Arklow Bridge (WP1), channel dredging (WP2), debris and gravel trap construction (WP3), flood defence walls, drainage and public realm on south bank (WP4) and flood defence wall and embankment construction on north bank (WP5).

A noise assessment of the construction phase impacts has shown that compliance with noise limit values can be achieved at the nearest sensitive receptors to the proposed works for Work Package (WP) 1 daytime and WP2 with slight, temporary to short-term negative effects predicted. For WP1, the night-time noise limits may be exceeded at the nearest receptor. This will result in a slight to moderate, short-term negative effect.

For WP3, WP4 and WP5, noise limits have the potential to be exceeded at the nearest sensitive receptors. This will result in temporary to short term, slight to moderate and negative effects.

Sheet piling proposed in the river channel along South Quay, River Walk and Ferrybank is a potential source of vibration. The closest structures will be the buildings along South Quay and River Walk. For structurally sound structures, a screening assessment has demonstrated that at distances of more than 8m, predicted results comply with the acceptable limits. Vibration from sheet piling and rotary coring at Arklow Bridge is also a potential source of vibration. Given the current traffic volumes crossing Arklow Bridge, vibration effects from these construction phases are not predicted to be significant.

During construction, the contractor will take specific noise abatement measures and comply with the recommendations set out in appropriate codes of practice. The implementation of the mitigation measures will assist in reducing the impact on nearby sensitive receptors. In addition, the contractor will be required to carry out continuous noise and vibration monitoring at a number of sensitive receptors closest to the proposed development works during the construction phase. Detailed method statements will be submitted by the contractor to Wicklow County Council addressing the likely noise and vibration levels that will be generated.

Residual short-term, slight to moderate negative impacts are predicted during the construction phase of the proposed scheme.
During the operational phase, the noise effects from the pumping stations are not expected to have any significant effects to nearby receptors. The impact of the maintenance phase is not considered significant.

10 Biodiversity

An assessment of the potential effects of the construction and operation of the proposed Arklow Flood Relief Scheme (FRS) development on terrestrial and aquatic biodiversity has been carried out.

To establish the current baseline terrestrial and aquatic biodiversity within the planning boundary and adjacent areas, a series of site visits and specialist surveys were carried out specifically for the Arklow FRS development. The baseline was also informed by surveys jointly commissioned for the FRS development and the Arklow Wastewater Treatment Plant (WwTP) project. The surveys included terrestrial ecology and habitat surveys, invasive plant species surveys, bird surveys, bat surveys and aquatic ecology surveys. Other sources of information used to inform the baseline included information held by the National Biodiversity Data Centre (NBDC), Inland Fisheries Ireland, Bat Conservation Ireland, BirdWatch Ireland and the National Parks and Wildlife Service.

Aspects of the proposed development of relevance with regard potential impact to terrestrial and aquatic biodiversity include proposed activities and works within the Avoca River channel at Arklow town, along the south bank (upstream and downstream of Arklow Bridge), along the north bank (upstream of Arklow Bridge and within Arklow Town Marsh proposed Natural Heritage Area (pNHA), and the temporary works required at site compounds during the construction.

Bird surveys undertaken in the area identified a total of 22 waterbird species. Of the species recorded, gulls were the most numerous waterbirds. These gull species were predominately observed using the gravel banks that are exposed before the mid ebbing tide upstream of the Arklow Bridge. The species recorded included Herring Gull, Black-headed Gull, Greater Black-backed and Lesser Black-backed Gull. House Sparrow, Starling, Magpie and Wood Pigeon were recorded as present along River Walk and South Bank, and as breeding in the general area. Grey Wagtail and Pied Wagtail were consistently present along the Avoca River banks and feeding on exposed gravels. Other species using the gravel bank that include Cormorant, Mute swan, Mallard, Heron and feral geese are present in the estuary. Other areas important to resident bird species include vegetated islands on the northern side of the river upstream of the bridge. Dredging operations proposed for the development will result in the removal of the gravel banks and vegetated islands. As these habitats, in particular the gravel banks, are not well represented in the Arklow area, the loss of the habitats would result in significant changes to bird behaviour in the area. To mitigate the effect of this loss in-river, it is proposed to install three roosting platforms in the river channel upstream of Arklow Bridge while along River Walk and South Bank, local riverbed raising will be created as habitat/refuge areas to mitigate direct and indirect effects of the river dredging works on birds. The impact of the removal of trees during construction on bird foraging, roosting and nesting will be also mitigated through the tree/landscape planting, while nesting boxes will be installed at Arklow Bridge for the Red-listed species Grey wagtail and for Pied wagtail.

While common seal, a Habitats Directive Annex II listed species, has been reported in the Avoca, the area does not represent an important foraging area and is highly unlikely to support significant number of individuals; consequently, it is possible to rule out the potential for significant effects.

Otter which is a Habitats Directive Annex II species has been recorded along the river bank in the study area. While the construction activities may act to deter otter from foraging in the immediate area, any disturbance will be temporary and short lived and will not result in significant effects.

Bat species recorded within the development area include Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat and Daubenton's Bat. A bat roost at Arklow Bridge will be subjected to disturbance and disruption and may be temporarily lost during the work carried out or permanently lost. A derogation licence for the works has been granted. Mitigation for impacts to bats includes the provision of bat tubes and boxes and the creation of ecological and biodiversity corridors to replace vegetation that will be removed during construction.

Despite the negative impacts on the Avoca River from the acid mine drainage and the release of untreated wastewater, the river and estuary continue to support a diverse fish population. Species present include the Habitats Directive Annex II listed species Atlantic Salmon, River Lamprey and Sea Lamprey. Species such as Lamprey, Salmon, Seatrout evolved over geological time to migrate through estuaries on their way to spawning grounds and as many estuaries are naturally high in turbidity, these species evolved mechanisms to deal with high suspended sediment loads; despite these mechanisms there remains potential that dredging activity may result in effects to Lamprey and Salmon. In order to further reduce any potential effect of the dredging on migrating fish species *e.g.* Lamprey and Salmon, dredging shall not be carried out between October to April.

Along with the EIAR, a Natura Impact Statement (NIS) has been prepared, in line with the requirements of the European Union (EU) Habitats Directive to evaluate the potential for the proposed development to impact on the conservation features within or away from designated European sites (*i.e.* evaluate potential for *in situ* and *ex situ* impacts respectively). The NIS demonstrated that, given the location of the proposed development relative to the Qualifying Interests (QIs) of SACs, *in situ* or *ex situ* effects would not occur. Similarly, *in situ* effects to Special of Conservation Interest (SCIs) of SPAs would not occur. In contrast however, in the absence of mitigation, there is potential for significant effects to SCI species occurring in the development area (*i.e.* potential for *ex situ* impacts). The source of potential *ex situ* impact is the uncontrolled discharge of run off and sediments, and chemicals and pollutants (*e.g.* construction plant equipment fuels, oils, greases, hydraulic fluids) to nearby habitats within the Arklow Marsh pNHA and river areas that are likely to be used by the SCI species, affecting the availability of food items targeted by the foraging SCI birds. However, any potential *ex situ* impacts to SCI species due to discharges will be avoided with the implementation of project mitigations measures and general construction practices.

With the implementation of mitigation measures and standard construction practices the residual effects on biodiversity has been assessed as not significant during construction and operation.

11 Archaeology, Architectural and Cultural Heritage

An assessment of the potential effects of the construction and operation of the proposed scheme on archaeological, architectural and cultural heritage has been carried out.

There has been research and surveys carried out which have provided a greater understanding of the historic landscape character and the historic processes that have formed the present street and river scape of Arklow. This knowledge and a collaborative approach have led to the development of a scheme wide design that has minimised the effect of the proposed works on recorded archaeological monuments and the local maritime historic character where possible. The proposed scheme has been designed so as to limit the effect on cultural heritage assets where possible.

The risk of bridge collapse during the underpinning of Arklow Bridge is considered 'highly unlikely'. A detailed assessment of the stability and overall condition of Arklow Bridge has been undertaken and is described in the EIAR. The construction phase of the proposed development will be carried out in accordance with best practise construction methodologies, all relevant health and safety guidance and legislation, as well as the provisions of the Construction Environmental and Management Plan (CEMP). By undertaking the structural and remedial maintenance work which is an integral part of this scheme, the bridge will be protected against storm surges and flood events in the future which is essential for its long-term stability.

Measures undertaken along south quay will preserve the remaining sections of the quay wall in situ while creating a new seamless defence system incorporated into a newly envisaged public realm design, providing a quayside amenity space reflecting the historic and industrialised nature of the area (See, for example- proposed treatment of Tyrells Yard slip in **Figure 11.1**). These preventative measures will be highly effective in protecting this area and structures along the southern bank from future flooding.

Extensive mitigation proposals in relation to archaeological, architectural and cultural heritage are proposed in the Environmental Impact Assessment Report. These include the following:

- A Project Archaeologist will be appointed to manage the archaeological and heritage aspect of the scheme and develop an advance contract led strategy during the preconstruction and construction stage of the project.
- Extensive suite of archaeological management mitigation measures during Work Packages 1-5 including examination of dredge material at site compounds.
- Advance archaeological contract to resolve archaeology including underwater archaeology in the river, Arklow Bridge and archaeological resolution at Arklow town marsh.

Mitigation measures shall be undertaken as directed by the Minister of Culture, Heritage and the Gaeltacht in compliance with national policy guidelines and statutory provisions for the protection of archaeology, architectural heritage and cultural heritage.

It is anticipated that after mitigation measures have been applied to direct impacts that there will be no significant residual archaeological, architectural and cultural heritage impacts. With excavation and planned recording, preservation by record will be achieved throughout the proposed flood relief works at the pre-construction and construction stage of the development.

Wicklow County Council and the OPW will make provision to allow for and to fund any necessary archaeological investigation, monitoring and architectural heritage inspection and conservation work that may be required during the construction phases of the flood relief scheme.

Adequate financial provision will be made available for post-excavation work, the conservation of artefacts and if the results warrant it, the publication of archaeological excavation and architectural heritage survey results.

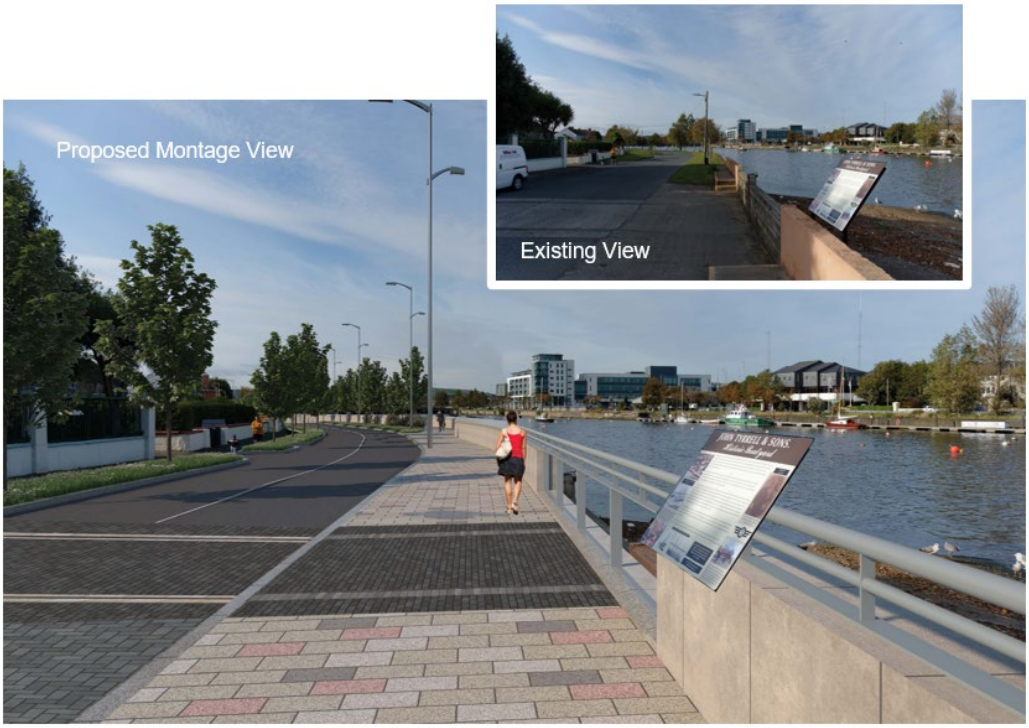

Figure 11.1 Photomontage showing proposed treatment of Tyrells Yard Slip with glass panel

12 Landscape and Visual Impact

This assessment considers the proposed landscape and visual effects from the proposed scheme. The Arklow FRS is designed to protect Arklow town from potential flooding risk from the Avoca River. Flood risk arises from fluvial flooding as well as from coastal flooding as the Avoca River is tidal.

The nature of the Arklow FRS is that the extent of the project is determined by the extent of low ground levels along the Avoca River within the town. The project area therefore includes River Walk from St. Mary's (Main Street) carpark to Arklow Bridge, South Quay from Arklow Bridge to Arklow Harbour and the northern riverbank upstream of Arklow Bridge and continuing northwards along the eastern edge of the Arklow Town Marsh. Within this area, the river channel itself and the Arklow Bridge are also included.

The FRS needs to ensure that the perimeter of the project area is enclosed at a sufficiently high level to accommodate the highest water level or flood level anticipated. The flood defence level varies along the river corridor typically being higher upstream of the Arklow Bridge and lower on the downstream side. In addition, the clear opening through the Arklow Bridge needs to be sufficient to allow projected volumes of water pass through.

The project therefore requires the construction of physical defences such as walls or embankments to establish a continuous defence level as well as dredging of the riverbed and lowering the riverbed level beneath the Arklow Bridge. A debris trap and a gravel trap are also required upstream of the Arklow Bridge so as to prevent debris and gravel build ups upstream of the Arklow Bridge that would reduce flow rates through the bridge arches.

The Landscape/Townscape and Visual Impact Assessment considers the existing site area and the landscape and visual context of the town and identifies the nature and scale of potential impacts of each aspect of the proposed development during construction and in operation.

The Arklow FRS has been designed in conjunction with the permitted Arklow WwTP project as the two projects overlap along South Quay, River Walk and at Arklow Bridge. The Arklow FRS project includes the common construction elements for both projects so as to facilitate either project being implemented in advance of the other while avoiding any doubling up of construction work and disruption.

The Arklow FRS requires significant civil engineering works within the river channel, along the riverbanks and quays and at the Arklow Bridge. Such works will give rise to substantial disruption and changes along the river corridor and river edges and will necessitate removal of many of the existing trees along the river banks at River Walk and along South Quay in particular.

At River Walk, a new wall typically 1.2m high above the proposed promenade required along the riverbank. At South Quay, a new quay wall is to be built c. 6.0m out from the existing quay wall and incorporating a 1.2m high wall along the river edge.

This is to accommodate the drainage infrastructure associated with the permitted Arklow WwTP project as well as additional drainage infrastructure being provided as part of the Arklow FRS project.

At South Green, the flood wall will switch from being within the river to being a 1.2m high wall on the existing south quay. This will continue as far as the Seafarer's Memorial Garden. As South Quay turns into Arklow Harbour, the defence level required reduces to c.450mm above ground level and a low wall of this height will continue around the western and southern sides of the harbour area.

On the northern side of the river upstream of Arklow Bridge, a relatively short length of flood wall is required leading from the end of Arklow Bridge in towards the Arklow Town Marsh. This will be c. 1.2 above bridge level but will extend down to water level in the river. Beyond the wall, an earth embankment will be constructed along the eastern side of the Arklow Town Marsh and behind the private dwellings at Ferrybank. This will be up to 4.0m in height above the existing marsh level and reducing as it continues northwards for c. 600m at which point the existing ground level is higher than the flood level.

At the Arklow Bridge, lowering the riverbed level will require substantial underpinning works to the bridge piers and construction of a new scour protection slab at the lower level under the bridge. Works to the bridge will also include stabilisation, repair and restoration works.

As part of the Arklow FRS design process, and integrated public realm and landscape design was developed so as to identify opportunities in parallel with the civil engineering works to create high quality amenity spaces and pedestrian facilities that would mitigate the necessary physical changes. A promenade will be developed along the full length of River Walk and South Quay. At River Walk, the promenade will be elevated above road level so that the flood wall is typically only 1.2m high above the promenade and the pedestrian promenade is separated from vehicular space. Approaching the Arklow Bridge, the promenade widens to become a series of terraces incorporating planter and providing outdoor seating space. The adjacent roadway will be rationalised and developed as a shared street. As series of steps and ramps provide access to two elevated viewing platforms and an additional pedestrian route along the river side of the flood wall. Sections of glass panels are incorporated within the wall at key spaces to increase the visual connection with the river amenity.

The promenade continues downstream of Arklow Bridge and connects the green space at South Green, the Tyrell slipway and the Seafarer's Memorial Garden. South Quay will benefit from substantial widening of the quay between the Arklow Bridge and South Green, as well as redevelopment of the streetscape to a more pedestrian friendly environment that at present. New tree planting along South Quay will be more extensive than at present and will provide an attractive landscaped character to South Quay.

High quality paving and other materials will be used throughout the public realm works. The flood wall is to be finished on the quayside using a polished pre-cast concrete panel and capping system providing a robust yet attractive appearance along the entire length of the promenade.

Construction work by its nature is temporary or short term, and there will be significant townscape and visual disruption during the overall construction period as working compounds are established, operated and decommissioned at different locations throughout the project area and substantial civil engineering works are progressed.

Following construction of the civil engineering elements, the public realm and landscaping proposals will be implemented. While the combined works will result in substantial changes along the river corridor, the finished works will also provide a new high-quality amenity that extends along the river corridor for the full extent of the town. The new public realm and landscaping will provide attractive amenities and outdoor spaces to walking, outdoor dining and passive recreation and will include substantial tree planting and landscape ensures an attractive environment for the people of the town and its visitors.

It is predicted that the overall landscape/townscape and visual effect will be perceived initially as moderate to significant and adverse, however, the establishment of a new high quality public space and facilities will ultimately result in moderate and positive landscape/townscape and visual effects.

Figure 12.1 illustrates the proposed public realm works at South Quay.

Figure 12.1 Proposed Public Realm Works at South Quay looking eastwards

13 Land and Soil

An assessment of the potential effects of the construction and operation of the proposed Arklow FRS on land and soils (including hydrogeology) has been carried out.

The study area for this land and soils assessment extends 500 m outside the proposed development boundary. The baseline conditions on a regional scale are also considered, where relevant to the scheme. An environmental baseline was established from publicly available information, site walkovers and site investigation.

The geology of the scheme is predominately comprised of the grey and black slates and shale with occasional sandstones of the Kilmacrea Formation. The dark blue-grey slates and phyllite of the Maulin Foundation are also present.

The study area is largely underlain by urban soils or made ground and river alluvium. Boulder Clay is expected to be encountered across the footprint of the proposed development. Localised areas of contaminated land have been identified as present in the sediments on the riverbed of the Avoca River and on land within the planning boundary.

Bedrock aquifer in the scheme area is classified as a Locally Important Aquifer which is moderately productive only in Local Zones. A gravel aquifer with limited potential for abstraction is recorded within part of the scheme planning boundary.

The potential impacts were assessed using specialist guidance and methods prepared by Transport Infrastructure Ireland, Institute of Geologists of Ireland and others.

The potential significant impacts on the groundwater, geology, and soils assessed of the proposed scheme are:

- Compression of substrata;
- Potential impact on surrounding ground;
- Trafficability of soils;
- Loss of geology and soils;
- Potential impact of dewatering (in-river dewatering; terrestrial dewatering);
- Potential impact on locally important bedrock and/or gravel aquifer;
- Encountering known or unknown existing contamination; and,
- Accidental leaks and spills

Indirect impacts potentially arising from potential impacts on groundwater are also considered, including potential to cause changes in the surface water level in the Avoca River and potential effects to water-users undertaking groundwater abstraction in the vicinity of the scheme.

Mitigation measures will include the implementation of the Construction Environmental Management Plan (CEMP) during the construction phase.

The CEMP will cover all potentially polluting activities and include an emergency response procedure. All excavated material will be either re-used in construction on site or at third-party sites, or disposed of at a suitable licensed facility. Temporary storage of materials will take place at designated site compounds. Compounds have been designed with measures in place to adequately contain the materials and minimise risks to the surrounding land and soils.

The significance of the potential impacts ranges from imperceptible to Moderate/Slight during construction. The significance of the potential impacts associated with maintenance in the operational phase are imperceptible.

Implementation of mitigation measures accounting for each of these potential impacts as well as proposed monitoring during the operational phase, will lower the potential impact effects to imperceptible or slight.

The impact assessment determined that the operational phase of the proposed development would have an overall neutral long-term impact on the land and soils.

14 Water

This section describes the likely significant impacts of the proposed FRS on surface water.

The hydrological study area comprises all surface water features that could potentially impact on and/or could potentially be impacted by the proposed scheme. These include the Avoca River and Estuary, the Irish Sea and Arklow Town Marsh proposed Natural Heritage Area (pNHA) (site code 001931) – refer to **Chapter 10**, *Biodiversity***,** for further information on the status of the pNHA.

The surface water assessment has considered the likely impacts of the proposed scheme on surface water quality and surface watercourses in proximity to the proposed scheme during construction and operation. The assessment also considers the impact of flooding from the river and from coastal waters on the adjacent lands.

A desktop review was undertaken of available information from the EPA, Inland Fisheries Ireland and other sources. The Avoca River/Estuary falls under 'Transitional Waters'. The surface water quality of the Avoca River within the study area was found to have a Q value of 2-3 which is classed as 'moderately polluted' and was determined as 'unsatisfactory' condition by the EPA. The overall WFD status of the Avoca River within the study area is deemed to be 'Poor'.

Drainage catchment topography has been used to establish drainage characteristics within the study area. The baseline data has been used to establish flood routes, levels and storage areas within the study area. A detailed hydraulic modelling exercise of the scheme area was carried out to determine the flooding impacts. This information was then used to identify the likely significant impacts that the proposed scheme may have on the hydrological regime and flooding in the study area. The desktop study of the baseline was developed using hydrological analysis of the study area.

Likely negative impacts on hydrology, drainage, flood risk and water quality during construction and operation of the proposed scheme were assessed. A summary of the likely negative impacts are as follows:

- A small rise in river levels upstream of Arklow Bridge is predicted due to construction of in-channel access roads, temporary bunds for working areas, temporary causeway and permanent encroachment in the Avoca River. This could potentially have a slight temporary negative impact on flood risk.
- An earth embankment will also be constructed along the eastern boundary of Arklow Town Marsh adjacent to Ferrybank, and Dublin Road residential properties. This will confine flooding within the Marsh and direct flows towards the Avoca River. Flood defence walls are proposed along the south bank within River walk, South Quay and Arklow Dock. These activities could potentially have a slight negative temporary impact on water quality.

- The construction activities associated with the enabling works including the diversion of utilities and services, temporary stock piling, archaeological testing, dewatering etc could potentially have a slight temporary negative impact on the hydrology and flooding regime.
- Site drainage including surface runoff from site compounds, working areas and sediment plume development during dredging, dewatering of working areas, earthworks, release of bentonite slurries, concrete washings, wheel washing, and temporary stockpiles could potentially have a moderate negative impact on water quality.
- Contaminated dredged material from the Avoca river will be transported to a designated site compound for testing before disposal. This activity could potentially have a moderate negative impact on water quality.

The significance of the potential negative impacts listed above range from slight to moderate temporary during construction.

The significance of the potential negative impacts during operations range are imperceptible long-term.

Positive impacts of the proposed flood relief scheme include:

- The proposed flood defence walls and embankment will prevent flood waters flowing through properties and roads and washing contaminants into the river. This will improve the Avoca River water quality and is thus considered a moderate long-term positive impact.
- The proposed in-channel flood relief measures will result in a more uniform flow from upstream to downstream along the river channel and through Arklow Bridge. This will improve the flow regime towards the Avoca Estuary. In summary, the proposed scheme will result in a moderate long-term positive impact on the hydrological regime.
- The permanent works associated with the gravel trap will have a positive impact on fluvial flood risk by reducing the quantity of gravels that will be carried downstream and reduce the conveyance capacity through Arklow Bridge and therefore there will be an overall moderate long-term positive impact on reduction in flood risk upstream of Arklow Bridge.
- The permanent works associated with the debris trap will reduce the risk of flooding upstream of Arklow Bridge by reducing the risk of blockage of the bridge by floating debris and therefore there will be a moderate long-term positive impact.
- The proposed scheme will provide protection from the 1% AEP fluvial flood event and the 0.5% coastal flood event. This will result in a significant long-term positive impact due to reduction in tangible and intangible flood damages and financial loss, extensive community disruption, health and safety issues associated with flooding and development restrictions.
- The lowering of the floor of Arklow Bridge at the commencement of the construction works will offset the increase in river levels from the works and mitigate any increased flood risk.

Mitigation measures include silt management and pollution prevention measures during construction and operation. This will also include standard best practice measures which are outlined in the Construction and Environmental Management Plan for the proposed scheme and will ensure that no significant negative impacts will result during construction.

In summary, with the implementation of the mitigation and monitoring measures, the residual impacts will be imperceptible to slight temporary negative impacts during the construction. During operation, the proposed scheme will reduce flood risk to Arklow Town and thus will have a significant long term positive impact. Maintenance of the gravel trap and channel will be carried out when required which will have an imperceptible brief negative impact on water quality.

15 Resource and Waste Management

An assessment of the likely significant effects of the proposed scheme in relation to resource and waste management was undertaken. A desk study was carried out including a legislation and policy review and a review of current practice for waste management in Ireland. A description is provided of waste generation during the site clearance and demolition, excavation, construction and operational phases of the proposed scheme.

Minor site clearance and demolition will be undertaken as part of the enabling works for the proposed scheme. Surplus materials will be generated as a result of the demolition works to facilitate the proposed scheme. This material will be predominantly comprised of concrete and tarmac.

Land based excavated material will be generated as part of the construction works will generally consist of made ground, topsoil and subsoil. Topsoil, soil, rock and naturally occurring material excavated in the course of construction activities will be reused within the proposed scheme where feasible, subject to further testing to determine if materials meet the specific engineering standards for their proposed end-use. Where surplus materials are generated which cannot be reused within the scheme or other construction works these will be waste and will be delivered to recovery and disposal facilities authorised in accordance with the relevant legislation. Case studies of a number of waste facilities were undertaken to determine their feasibility and capacity for recovery and disposal of demolition and excavation material from the proposed scheme. Waste from the proposed scheme will be transported by authorised waste collectors.

Dredging of the river channel will take place along the Avoca River as part of the proposed scheme to improve the conveyance through Arklow Bridge. Dredged (excavated) river bed material will be generated as a result- some of which will be reused on site and the remaining material will be removed from site. A small portion of this estuarine material was classified during previous site investigations as hazardous and non-hazardous contaminated material. This material will be managed and disposed of only at authorised facilities which can accept hazardous and non-hazardous materials.

It is the responsibility of the contractor to ensure all material which is reused on site as a by-product complies with the relevant legislation. Material that meets TII Specifications and complies with Article 27 of the European Communities (Waste Directive) Regulations, 2011 and EPA guidelines will be suitable for beneficial reuse off site as a construction material. Off-site construction reuse options include quarry infilling, site restoration, coastal protection schemes and flood relief schemes or offshore for reclamation or coastal protection schemes with works below the high-water mark.

For material which is not a by-product, this will be classified as waste and testing will be undertaken to determine if it is suitable for delivery for recycling/soil recovery to recovery facilities. It is reasonable to anticipate there will be sufficient available capacity to accept any suitable material from the proposed scheme.

Where excavated material is not a by-product and does not meet the test criteria for recycling or reuse it will be delivered to authorised disposal facilities, including inert landfill facilities. There is currently limited capacity for non-hazardous and hazardous excavated soils in Ireland, and this may continue into the future. If required, this material may be exported to authorised facilities which have capacity.

The proposed scheme will also yield construction waste such as surplus concrete and unusable or damaged pipe segments which may arise on site. This general construction waste will be reused within the proposed scheme or at other construction sites in so far as reasonably practicable. The contractor will ensure that the appropriate waste authorisation is in place for all facilities that the material is delivered to.

During operation of the proposed scheme, minor quantities of maintenance waste will be generated. Both the debris trap and the gravel trap will require routine maintenance from time to time. This will be done on an 'as needs' basis as quantities of gravel and floating debris will be determined by flows in the river. The quantity of material to be removed at any one time is not expected to be significant. Where a reuse opportunity is identified for this material and following testing to ensure it is suitable for its proposed end use, it will be transported offsite for reuse as a by-product on other sites.

Mitigation measures will be implemented to minimise the effect of waste on the environment, reduce the quantity of waste sent for final disposal and to promote sustainable waste management practices. Management of waste and surplus excavation material will be at the discretion of the contractor who will be required to conform to relevant statutory requirements and the mitigation commitments made in the EIA Report.

Following implementation of the mitigation measures the residual effects of the proposed scheme on the capacity of waste management facilities and waste industry trends in Ireland will be as follows:

- The residual effect of site clearance and demolition waste on the capacity of waste management facilities and waste industry trends in Ireland is expected to be slight, negative and short-term.
- The residual effect of land based excavation waste on the capacity of waste management facilities and waste industry trends in Ireland is expected to be slight, negative and short-term.
- The residual effect of excavation waste from the riverbed on the capacity of waste management facilities and waste industry trends in Ireland is expected to be slight, negative and short-term.
- The residual effect of general construction waste on the capacity of waste management facilities and waste industry trends in Ireland is expected to be imperceptible and short term.
- The residual effect of operational waste on the capacity of waste management facilities and waste industry trends in Ireland is expected to be imperceptible and long term.

16 Population and Human Health

This assessment considers the likely significant effects associated with the construction and operation of the proposed development on population and human health. Population aspects of relevance to this assessment include population subsets, community facilities and economic activity, amenity use of the river, public realm works and pedestrian, cyclist and traffic movement. Human health aspects are primarily considered through an assessment of the environmental pathways by which health may be affected (i.e. the determinants of health) such as air, noise, water or soil. These aspects are covered in detail in the specialist chapters within the Environmental Impact Assessment Report.

Impacts from the proposed scheme due to construction works will involve some traffic disruption and modified pedestrian access, elevated traffic levels due to works heavy goods vehicles, potential noise and visual impacts, and loss of moorings/berths and some river access and use.

Having regard to the predicted traffic impacts outlined in Section 7, the residual impact on journey amenity and community severance will be slight. The likely significant effect on human health associated with construction traffic is negligible, given the defined duration of the construction phase and the extensive mitigation measures proposed. The construction traffic movement in the Main Street has the potential to impact on business access and have an economic impact, but this will not be significant. The operational traffic will have an imperceptible effect on journey amenity and community severance.

Most tourism and amenity activity in the town itself occurs along the riverside and at the maritime museum. The bridge works will involve short-term slight noise impacts which will impact on the general amenity of people staying nearby or moving across, or in the vicinity, of the bridge. By commencing the works to the flood defence walls in the autumn months of 2024 at River Walk, the impact on tourism and amenity is likely to be lower as people are more likely to congregate in the warmer summer months. The summer timing of in-channel works is intended to accommodate fish movement at other times. However, these dredging works will have an impact on general amenity due to visual effects, slight residual noise effects, and on amenity.

During the river dredging, the pontoon located in the North Quay side of the Avoca River, will effectively be rendered inaccessible from the water as dredging will be ongoing during this period. Any boats using the existing berths at the pontoon will be required to relocate in order to facilitate the river dredging. Similarly, the existing floating mooring facilities within the Avoca River will be removed to facilitate the dredge works and any boats using these will also be required to relocate for the duration of the river dredging. These moorings have been temporarily removed previously for dredging of the river. A negative effect on both the mooring facilities and the berths is therefore identified during construction. However, as the berths and moorings will only be rendered inaccessible during the river dredging works, these effects are considered to be significant negative and temporary in nature. All mooring and berth facilities will be reinstated following completion of construction.

Upstream of Arklow Bridge, the river access (steps/slipway) along River Walk will be demolished during the construction period to facilitate WP4. A pontoon will be installed at this location during the operational phase of the proposed scheme.

Downstream of Arklow Bridge, the existing Coal Quay slip, which is currently disused and is in a state of disrepair, will be demolished to facilitate the proposed scheme. The existing public slip (Tyrells Yard) along South Quay, while maintained, will be rendered inaccessible to facilitate the proposed scheme. At present, access to the river at this slip is currently only partly maintained due to the presence of a wooden demountable barrier. Glass panelling will be installed in the walls at this location to preserve the maritime heritage of the slip.

The existing slipway and set-down pontoon at Arklow Dock will be temporarily inaccessible during the construction phase to facilitate the construction of flood walls around the Dock area. A demountable flood barrier will be installed at the slipway in the construction phase, to facilitate the proposed scheme and will remain in place during operation. Access arrangements will be put in place to allow interested parties to gain access to the slipway during operation, as required. The existing pedestrian access to the 'set-down' pontoon at Arklow Harbour will also be restricted. The proposed scheme is therefore likely to result in an overall slight to significant residual negative effect on river access for amenity purposes during both construction and operation.

Residential amenity during the construction phase is most likely to be impacted by traffic movements and noise. There is predicted to be slight-moderate daytime noise exceedances at some residential locations for embankment works. Local drainage works are proposed at Main Street and Bridge Street, Brookfield Gardens, Harbour Road and Dock Road. Access to residents will be maintained, but the works are likely to have a slight-moderate negative effect on residential amenity and businesses in the vicinity, along with some temporary loss of parking.

Some of the estuarine material which will be excavated from the Avoca river during the dredging will require archaeological examination at the site compounds. The examination of odorous dredged material will occur at locations away from residential properties and amenities. Therefore, the impact on general amenity from odour is expected to be imperceptible. Excavations in the river can have the potential to attract pests in the area, therefore, a Pest Control Plan (PCP) has been prepared which details how to control rodents during the construction phase of the proposed scheme. The background concentrations of air pollutants are well below the air quality standard limits determined for the protection of human health. No likely significant effects are predicted on air quality during construction or operation.

The implementation of mitigation measures for noise and vibration effects during construction will assist in reducing the impact at the nearest sensitive receptors for which noise limit exceedances are expected during day-time. There will be no significant impact from noise and vibration effects during operation. No effects on human health from noise or vibration are therefore identified.

Public realm improvements commencing at apartment River Walk will provide for a more attractive riverscape and consequently enhanced public engagement with the river. The overall effects of these works will be a significant positive impact by greatly enhancing the amenity value of the south riverside which will encourage more social activity in the form of strolling and walking by both visitors and locals. **Figure 12.1** illustrates one example of enhanced amenity value at River Walk.

Figure 12.1 Enhanced Amenity Value at River Walk

Flooding increases the risk of waterborne diseases and potentially increases the risk of vermin borne diseases. The proposed scheme will therefore reduce the risks of disease associated with flood events.

The key benefit of the proposed flood relief scheme will be to provide much needed flood protection to existing homes and businesses in Arklow town. This positive benefit will also extend to future developments and new infrastructure in Arklow town. One of the key benefits of the proposed scheme is the avoidance of physical and material damage to both residences and commercial businesses, including lost trade in respect of the latter. Approximately 100 commercial properties have been estimated to benefit from the scheme. The reduction in flood risk could potentially encourage new residential development. While it is acknowledged that, following construction of the proposed scheme, access to the Avoca River may be restricted at the locations outlined above, any removal or restriction of access to the river was considered integral to the design and implementation of the flood relief scheme. The scheme will have a long-term significant positive residual impact both for residents, local amenities, tourism, economic activities, improved safety, and human health.

17 Material Assets

The likely significant effects on material assets from the construction and operation of the proposed scheme have been assessed. Specifically, material assets were considered in the form of:

- Land and property ownership;
- Electricity and lighting;
- Telecommunications and gas;
- Water supply, foul and surface water drainage infrastructure.

A desk study, site visits and site-specific investigations were undertaken to provide the data to compile the description of the existing material assets.

The proposed scheme will require land-take to accommodate construction activities and to accommodate control and maintenance of flood relief measures, during the operational phase. Where land is acquired from private landowners, moderate negative effects on property ownership are identified during both construction and operation.

The proposed scheme also requires the removal of a section of a disused above-ground pipeline from the former IFI site. The section of disused pipeline within the FRS planning boundary will be removed and not reinstated to facilitate the construction of the embankment. Whilst it is acknowledged that this pipe is currently disused and hasn't been operational for a number of years, a permanent significant negative effect on this material asset is identified during both construction and operation.

During the river dredging, the pontoon located in the North Quay side of the Avoca River, will effectively be rendered inaccessible from the water as dredging will be ongoing during this period. Any boats using the existing berths at the pontoon will be required to relocate in order to facilitate the river dredging. Similarly, the existing floating mooring facilities within the Avoca River will be removed to facilitate the dredge works and any boats using these will also be required to relocate for the duration of the river dredging. These moorings have been temporarily removed previously for dredging of the river. A negative effect on both the mooring facilities and the berths is therefore identified during construction. However, as the berths and moorings will only be rendered inaccessible during the river dredging works, these effects are considered to be significant negative and temporary in nature. All mooring and berth facilities will be reinstated following completion of construction.

Upstream of Arklow Bridge, the river access (steps/slipway) along River Walk will be demolished during the construction period to facilitate WP4. A pontoon will be installed at this location during the operational phase of the proposed scheme.

Downstream of Arklow Bridge, the existing Coal Quay slip, which is currently disused and is in a state of disrepair, will be demolished to facilitate the proposed scheme. The existing public slip (Tyrells Yard) along South Quay, while

maintained, will be rendered inaccessible to facilitate the proposed scheme. At present, access to the river at this slip is currently only partly maintained due to the presence of a wooden demountable barrier. Glass panelling will be installed in the walls at this location to preserve the maritime heritage of the slip.

The existing slipway and set-down pontoon at Arklow Dock will be temporarily inaccessible during the construction phase to facilitate the construction of flood walls around the Dock area. A demountable flood barrier will be installed at the slipway to facilitate the operation of the proposed scheme. Access arrangements will be put in place to allow interested parties to gain access to the slipway during operation, as required. The existing pedestrian access to the 'set-down' pontoon at Arklow Harbour will also be restricted.

The construction phase of the proposed scheme is therefore expected to result in residual temporary negative effects on those material assets associated with river access. During the operational phase, effects on those material assets associated with river access range from slight to moderate permanent negative- in that the slips will be maintained (with the exception of Coal Quay Slip), but access will be restricted either permanently or temporarily.

The proposed scheme will require repositioning of electricity cables along River Walk, South Quay and Arklow Marsh, which will cause a permanent, but not-significant effect on electricity infrastructure. All diversions will occur during the construction phase but remain in place throughout operation.

The public and decorative lighting along River Walk and South Quay will be removed during construction. A slight negative but temporary effect is therefore anticipated on these lighting features during the construction phase of the proposed scheme. Construction lighting will generally be provided by tower mounted floodlights, which will be positioned to minimise spillage of light from the site. No likely significant effects on lighting are anticipated as a result of the provision of temporary construction lighting.

A surface water drainage network and pumping stations will be constructed on the dry side of the flood defence walls. This will require the demolition of the road surfaces in these areas. In addition, some diversions of existing underground ducts and drains will be required to provide a route for the stormwater pipework. A temporary slight negative effect on drainage infrastructure is therefore identified during construction. This new network will remain in place throughout the operational phase of the proposed scheme. A permanent, positive operational effect is therefore identified.

The existing drainage channel in Arklow Marsh will be permanently realigned to the west of the proposed embankment to facilitate the construction of the embankment and flood wall.

The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing utilities and services during the construction phase unless this has been agreed in advance with the relevant service provider. All construction activities in the vicinity of existing services and utilities will be carried out in ongoing consultation with the relevant service provider and undertaken in compliance with any requirements or guidelines they may have.

18 Major Accidents and Natural Disasters

This section presents an assessment of the likely significant negative effects on the environment arising from the vulnerability of the proposed scheme to risks of major accidents and/or natural disasters.

The site-specific risk assessment identifies and quantifies risks due to the proposed scheme, focusing on unplanned, but possible and plausible events occurring during the construction and operation of the proposed scheme.

An examination of all plausible risks associated with the proposed development was undertaken.

The scenario with the highest risk score in terms of a major accident and/or natural disaster during the construction of the proposed scheme was identified as being 'Arklow Bridge Collapse'. The outcome of the assessment identified that this event is 'very unlikely' to occur and will have 'serious' consequences should it do so, representing a 'low risk scenario'. Further, given the current traffic volumes crossing Arklow Bridge, vibration effects from the construction phase are not predicted to be significant. Nevertheless, the appointed contractor's proposed method and sequence of working will also be important in maintaining the overall stability of the bridge and the appropriate stipulations will be incorporated into all tender and construction documents to make sure this process is adhered to.

The scenarios with the highest risk score in terms of a major accident and/or natural disaster during the operation of the proposed scheme were identified as being 'Fire in Arklow Marsh'. This assessment identified this event as 'very unlikely' to occur and will have 'limited' consequences should it do so, representing a 'low risk scenario.' No mitigation measures are required.

In summary, the risk of a major accident and/or disaster occurring during either the construction or operational phases of the proposed development is considered low. Therefore, significant adverse effects on the environment arising from the vulnerability of the proposed scheme to risks of major accidents and/or disasters are unlikely to occur.

19 Climate

The climate assessment considers the likely significant effects associated with the design, construction, and operation of the proposed development on climate.

The potential effects of emissions of carbon due to the construction, operation and maintenance of the proposed development are considered in the context of Ireland's national climate change obligations.

The assessment of carbon emissions was carried out in order to determine the likely greenhouse gas emissions (CO_2 equivalent) predicted due to the construction phase of the proposed development, relative to Ireland's projected baseline for 2025 (the predicted final year of construction), as reported by the Environmental Protection Agency. This assessment focuses on the embodied carbon of the material used during the construction phase and compares this to the Environmental Protection Agency's projected greenhouse gas emissions for both the Emission Trading Scheme sector and total emissions for 2025.

The carbon emissions associated with the construction of the proposed development is estimated to be 0.008% of the projected total Emission Trading Scheme Sector CO_2 equivalent emissions (with additional measures) in 2025. The carbon emissions of the construction of the proposed development is estimated to be 0.03% of the projected total CO_2 equivalent (with additional measures) emissions from Ireland in 2025. On this basis, the effects to climate are considered slight, negative and long-term. As improvements in sustainability and recycling measures are progressed throughout the construction industry it is expected that the embodied carbon calculated as part of this assessment can be taken as a worst case, as with time this figure will improve.

As no significant adverse effects are predicted to occur during the construction or operation of the proposed development, no mitigation measures are required.

In relation to climate, over the lifespan of the proposed development, no significant effects are predicted.

20 Cumulative Impacts and Interaction of Effects

This assessment consists of:

- an assessment of the likely significant effects of the proposed scheme on the environment resulting from the cumulation of effects with other existing and/or approved projects, and;
- an assessment of the interaction/inter-relationship of likely significant effects between environmental factors.

Cumulative effects are changes to the environment that are caused by activities/projects in combination with other activities/projects. They can arise from the interaction between all of the different existing and approved projects in the same area in combination with this proposed development. The cumulative impact assessment considers the potential for likely significant effects to arise due to in-combination effects between the proposed scheme and other existing or approved projects.

A review was initially carried out to identify other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular importance likely to be affected or the use of natural resources. A number of projects were initially screened by the environmental specialists to determine if there was potential for likely significant direct or indirect cumulative effects. Projects which were screened in were then examined in further detail. The main project where the potential for likely significant direct or indirect cumulative effects was identified was the Arklow Wastewater Treatment Plant (WwTP) because the WwTP will physically overlap with the Arklow FRS along the south side of the Avoca River.

From the outset, it was identified that there was potential for likely significant cumulative effects between the two projects and it was important to ensure that any works included as part of the proposed flood relief scheme would be compatible with the design of the WwTP Project. The Arklow FRS project has therefore been designed in conjunction with the permitted Arklow WwTP project as the two projects overlap along South Quay, River Walk and at Arklow Bridge. The Arklow FRS project includes the common construction elements for both projects so as to facilitate either project being implemented in advance of the other while avoiding any doubling up of construction work and disruption. Further, a Memorandum of Understanding regarding the overlapping construction elements of the proposed FRS and WwTP has been agreed with Irish Water and the Office of Public Works (OPW).

Potential likely significant direct and indirect cumulative impacts have been considered individually and in combination in the EIAR. During the construction phase, construction traffic, dust, noise and impact on residential amenity are the main areas where there is the potential for negative cumulative impacts between the projects. However, these will be of short duration and are not expected to be significant. There will be a significant positive long-term cumulative effect to

population and human health predicted as result of in-combination improvements to water quality and works to the public realm arising from the WwTP and FRS.

The assessment of interactive effects considers the potential for likely significant effects to arise as a result of the interaction between the various environmental factorss such as:

- The interaction of construction related impacts on air, water, noise, habitats and human beings; and
- The interaction of construction related impacts on material assets and human beings.

The assessment has considered likely significant interactive effects that may arise during both construction and operation of the proposed scheme. The interactions between environmental factors have already been considered and assessed within the individual chapters of the EIAR. There have been numerous discussions and communications between the environmental specialists, the design team and stakeholders throughout the design process which helped to identify and minimise the potential for significant interaction of impacts. Measures to minimise impacts have been incorporated into the design and are also included in all of the assessments and the residual impacts have been assessed.

21 Next Steps

Figure 21.1 illustrates the next steps in the planning process.

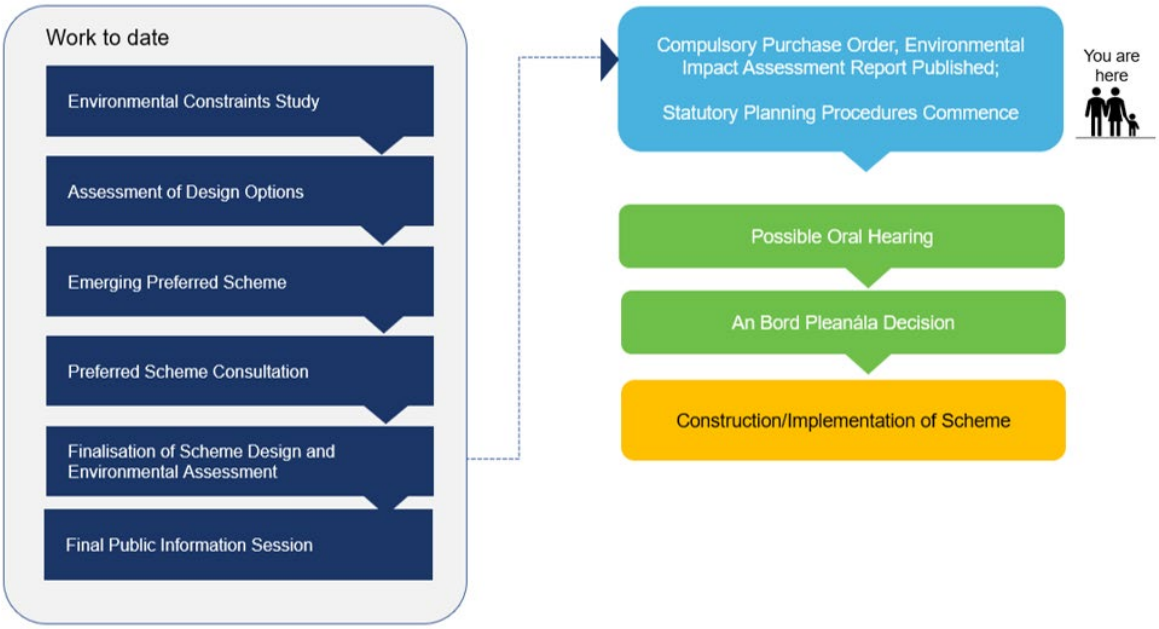

Figure 21.1 Next Steps