

4 Description of the Proposed Scheme

4.1 Introduction

This chapter describes the proposed scheme for which Wicklow County Council (WCC), funded by the OPW, is seeking consent in Arklow town. Specifically, this section describes the design, operation and decommissioning elements of the proposed scheme whilst the construction aspects are described separately in **Chapter 5, Construction Strategy**.

Reference should be had to the full set of planning drawings accompanying the application for approval. A summary set of drawings in A3 format are included in **Appendix 4.1** and **Appendix 4.2**. Refer to **Appendix 4.1** for the relevant flood relief works drawings. Refer to **Appendix 4.2** for the relevant landscape design and public realm drawings.

This chapter has been structured to describe the following:

- The design of the proposed scheme;
- The detailed description of the proposed scheme.
- Associated aspects of the proposed scheme of relevance including benefits of the scheme and
- Separate consents required;
- The operation and maintenance of the proposed scheme; and
- The decommissioning of the proposed scheme.

4.2 Location of Proposed Scheme

The town of Arklow is located approximately 63km south of Dublin, 23km south of Wicklow and 66km north of Wexford. Arklow is the southern most major town within County Wicklow and is served by the M11 National Primary Route.

Arklow is situated at the mouth of the Avoca River within the Avoca Catchment. The catchment is located within the jurisdiction of Wicklow County Council and extends from north of the Sally Gap to just south of Arklow and is bounded by the Wicklow Mountains to the west. The surrounding catchments consist of the Liffey and Dargle to the north, the Vartry to the east and the Slaney to the south and west.

The location of Arklow showing the catchment boundary of the Avoca River is shown in **Figure 4.1** overleaf.

The site location plan is presented in Drawing no: **1001 (Appendix 4.1)** (full set of scheme drawings provided therein.)

A description of the existing site and surrounds (of the proposed scheme) is provided in **Section 2.5 of Chapter 2 Background and Need for the Scheme**.

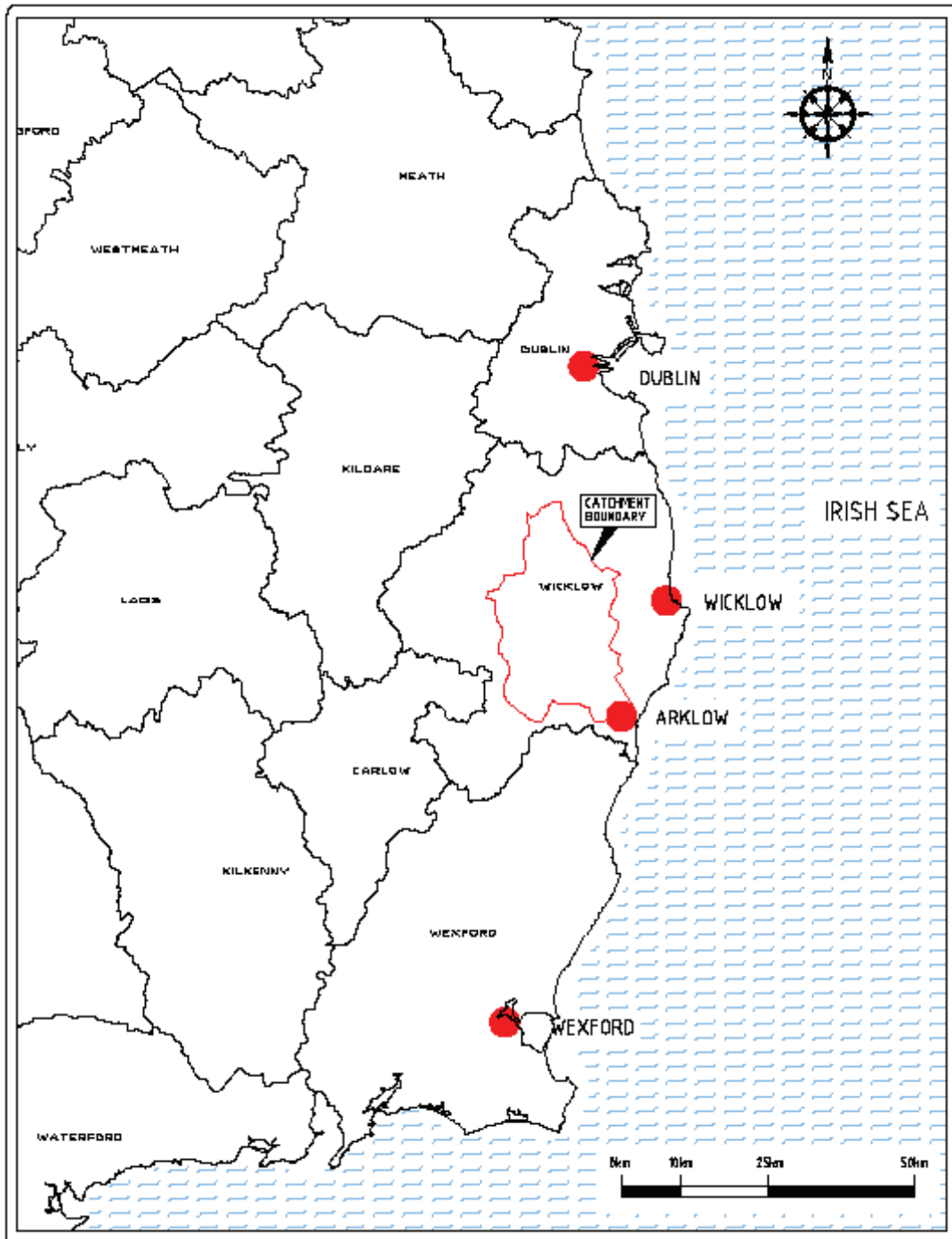


Figure 4.1: Location Plan

An aerial image of Arklow is shown in **Figure 4.2** below.



Figure 4.2: Aerial Image of Arklow © Google Earth

The overall scheme will cover an area of approximately 18.35ha. This includes areas for the permanent works, temporary and enabling works, working areas, contractors site offices and compounds and areas for the management of surplus dredged material.

4.3 Design of the Proposed Scheme

4.3.1 Overview

As outlined in **Section 2.4** of **Chapter 2**, *Background and Need for the Proposed Scheme*, the objectives of the proposed scheme are as follows:

- To provide flood relief measures along the Avoca River and estuary to alleviate flooding for all events up to the 1% Annual Exceedance Probability fluvial flood event and 0.5% Annual Exceedance Probability coastal flood event.

- To protect residential and non-residential properties from flooding and consequent damage.
- To protect infrastructural utility services from flood damage.
- To improve the health and safety of the population living in high flood risk areas through direct protection from flooding and through reduction in stress and anxiety.
- To reduce disruption and disturbance caused by flood events such as evacuations and traffic diversions.
- To reduce the risk of environmental pollution due to flood events such as runoff of hydrocarbons from flooded areas.
- To provide the basis for the appropriate maintenance of the Avoca River to manage future flood risk.
- To facilitate improved public realm amenities along the Avoca River.

The proposed flood relief works are summarised below in Table 4.1 along with references to the associated drawings. The overall works have been divided into 5no. work packages (WP) based on the nature of the works and the sequence of activities.

Table 4.1: Summary of Proposed Flood Relief Works and Drawing List

Description	Dwg No	Drawing Title
General	1001	Site Location plan
	1002	Overall Scheme Layout (including Site Boundary)
	1060	Water Safety Measures
	1065	Overall Site Extent (including Temporary Working Areas)
	1066	Location of Site Notices
<u>Work Package 1</u> <u>Arklow Bridge Works:</u> Underpinning of Bridge Piers, lowering the floor of Arklow Bridge by approximately 1m, scour protection and remedial works to bridge (As described in Section 4.4.2);	1003	Channel Works - Overall Layout
	1004	Arklow Bridge - Existing Layout, Plan, Elevation and Sections
	1005	Arklow Bridge - Proposed Layout, Plan, Elevation and Sections
	1006	Arklow Bridge - Grouting Works
	1007	Arklow Bridge - Underpinning Option 1
	1008	Arklow Bridge - Underpinning Option 2
	1009	Arklow Bridge - Underpinning Option 3
	1010	Arklow Bridge - Underpinning Option 4
	1003	Channel Works - Overall Layout

Description	Dwg No	Drawing Title
<p><u>Work Package 2</u> <u>River Dredging Works</u></p> <p>Channel capacity improvement works comprising dredging of the river channel from 320m upstream of Arklow Bridge to 520m downstream of Arklow Bridge (As described in Section 4.4.3);</p>	1011	Channel Dredging Works - Channel Cross Sections, Sheet 1
	1012	Channel Dredging Works - Channel Cross Sections, Sheet 2
	1013	Channel Dredging Works - Channel Cross Sections, Sheet 3
	1014	Channel Dredging Works - Channel Cross Sections, Sheet 4
	1015	Channel Dredging Works - Channel Cross Sections, Sheet 5
	1016	Channel Dredging Works - Channel Cross Sections, Sheet 6
	1017	Channel Dredging Works - Channel Cross Sections, Sheet 7
	1018	Channel Dredging Works - Channel Cross Sections, Sheet 8
	1019	Channel Dredging Works - Longitudinal Section
	1020	Channel Dredging Works - Details
<p><u>Work Package 3</u> <u>Debris and Gravel Traps</u></p> <p>to accommodate the collection and regular removal of large floating debris and sediments at a single controlled location (As described in Section 4.4.4).</p>	1003	Channel Works - Overall Layout
	1021	Channel Works – Debris Trap
	1022	Channel Works – Gravel Trap
	1023	Overall Layout of Ramp to Debris Trap - Plan & Section
<p><u>Work Package 4</u> <u>Flood Defences – South Bank</u></p> <p>Flood defence walls and drainage along South Bank including local alterations to the river channel along River Walk (upstream of Arklow Bridge) and South Quay (downstream of Arklow Bridge) (As described in Section 4.4.5), including:</p> <ul style="list-style-type: none"> ○ Flood defence reinforced concrete/sheet-piled wall 	1031	Flood Defence Walls & Embankments Key Plan
	1036	South Bank - U/S of Arklow Bridge - Layout Plan
	1037	South Bank - U/S of Arklow Bridge - Elevation
	1038	South Bank - U/S of Arklow Bridge - Sections - Sheet 1
	1039	South Bank - U/S of Arklow Bridge - Sections - Sheet 2
	1040	South Bank - D/S of Arklow Bridge - Layout Plan - Sheet 1
	1041	South Bank - D/S of Arklow Bridge - Layout Plan - Sheet 2

Description	Dwg No	Drawing Title
<ul style="list-style-type: none"> to be constructed upstream of Arklow Bridge on the south bank (River Walk); ○ Flood defence reinforced concrete/sheet-piled wall to be constructed downstream of Arklow Bridge on the south bank (South Quay / the Dock); ○ Stormwater drains and pumping stations on the south bank upstream and downstream of Arklow Bridge and adjoining streets; ○ Wastewater sewer upstream and downstream of Arklow Bridge; and ○ Installation of demountable flood barriers at a number of locations around the Dock on the south bank. 	1042	South Bank - D/S of Arklow Bridge - Layout Plan - Sheet 3
	1043	South Bank - D/S of Arklow Bridge - Elevation - Sheet 1
	1044	South Bank - D/S of Arklow Bridge - Elevation - Sheet 2
	1045	South Bank - D/S of Arklow Bridge - Elevation - Sheet 3
	1046	South Bank - D/S of Arklow Bridge - Sections - Sheet 1
	1047	South Bank - D/S of Arklow Bridge - Sections - Sheet 2
	1048	South Bank - D/S of Arklow Bridge - Sections - Sheet 3
	1049	South Bank - D/S of Arklow Bridge - Sections - Sheet 4
	1051	Stormwater (SW) Overall Layout Plan & Key Plan
	1053	SW South Bank - U/S of Arklow Bridge - Layout & Long Sections
	1054	SW South Bank - D/S of Arklow Bridge - Layout & Long Sections
	1055	SW South Bank – Harbour Area - Layout & Long Sections
	1056	Pumping Station No. 1 - GA, Plan and Sections
	1057	Pumping Station No. 2 - GA, Plan and Sections
1058	Pumping Station No. 3 - GA, Plan and Sections	
<p><u>Work Package 5</u> <u>Flood defences – North Bank</u></p> <p>Flood defence earthen embankment and sheet-piled wall with concrete cap to be constructed upstream of Arklow Bridge on the north bank (east of Arklow Marsh); (As described in Section 4.4.6)</p>	1031	Flood Defence Walls & Embankments Key Plan
	1032	North Bank - U/S of Arklow Bridge - Layout Plan - Sheet 1
	1033	North Bank - U/S of Arklow Bridge - Layout Plan - Sheet 2
	1034	North Bank - U/S of Arklow Bridge - Elevation
	1035	North Bank - U/S of Arklow Bridge - Sections

Description	Dwg No	Drawing Title
Utility Service Diversions	1061	Existing Utility Services - Layout Plan and Proposed Diversions
	1062	Proposed Relocation of Utility Services - Arklow Marsh

These drawings, illustrating the proposed flood relief works, are available in **Appendix 4.1** (full set of flood relief drawings provided therein).

The landscape design and public realm is described in **Section 4.4.7** below and the associated drawings are included as **Appendix 4.2**.

The proposed landscape design and public realm are summarised below in Table 4.2 along with references to the associated drawings. These works will be carried out at the end of WP4 once the flood defences have been completed.

Table 4.2: Summary of Proposed Landscape Design and Public Realm and Drawing List

Description	Drawing No.
Landscape Design and Public Realm on south bank, U/S of Arklow Bridge along River Walk	300
Landscape Design and Public Realm on south bank, immediately upstream and downstream of Arklow Bridge	301
Landscape Design and Public Realm on south bank, along South Quay, D/S of Arklow Bridge	302
Landscape Design and Public Realm on south bank, along South Quay towards the Dock, D/S of Arklow Bridge	303
Landscape Design on north bank, U/S of Arklow Bridge, west of Ferrybank along southern part of Arklow Marsh	304
Landscape Design, U/S of Arklow Bridge, west of Ferrybank at Arklow Marsh	305
Landscape Design, U/S of Arklow Bridge, west of Ferrybank along northern part of Arklow Marsh, near Dublin Road	306

4.3.2 Scheme Design

The flood relief design 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).

The estimated flood extent resulting from the combination of the 1% AEP (1 in 100) fluvial event and the 0.5% AEP (1 in 200) coastal event for the current situation is shown in **Figure 4.3** below.

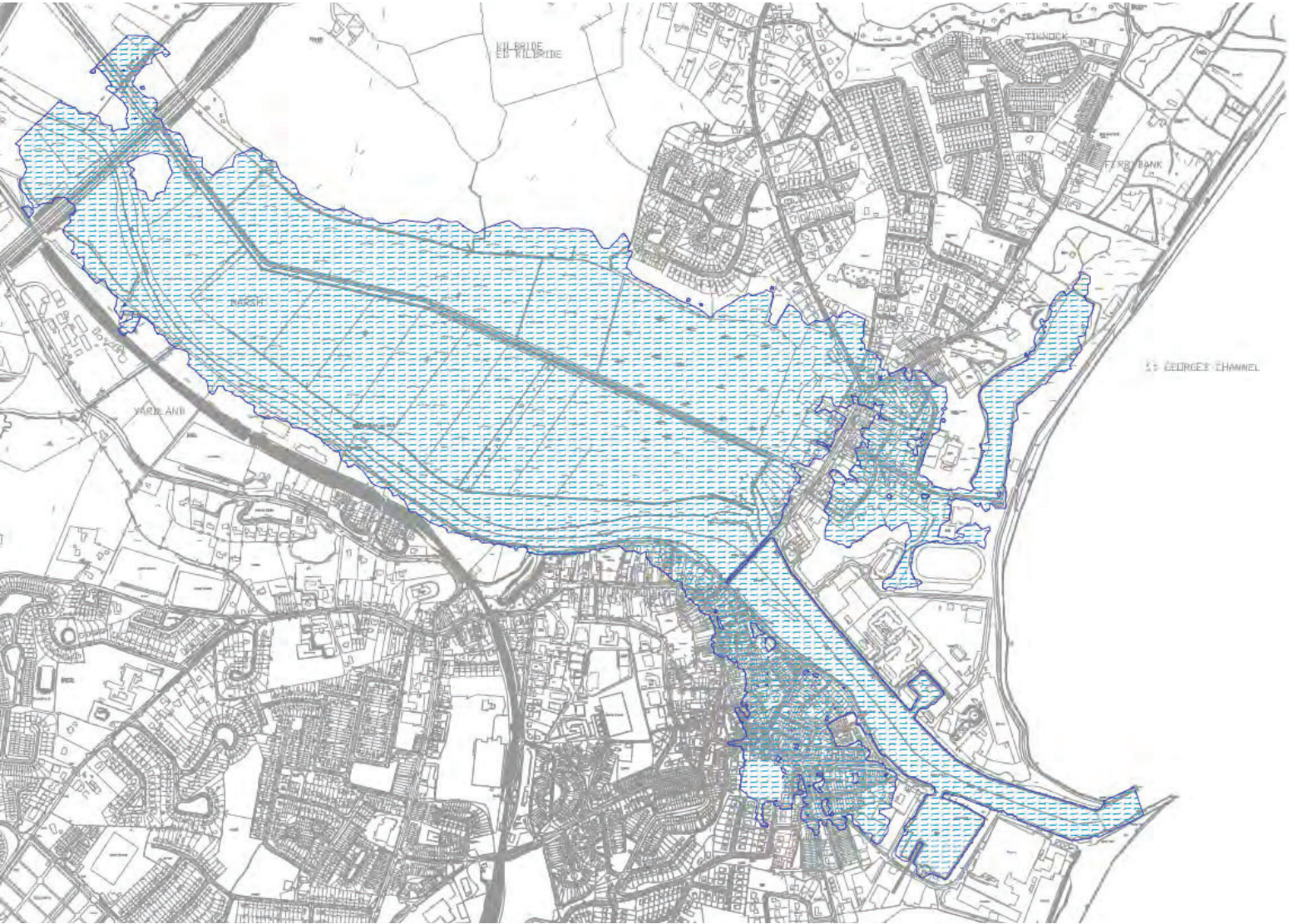


Figure 4.3 Existing Combined 1% AEP Fluvial and 0.5% AEP Coastal Flood Extent

The landscape design and public realm is described in **Section 4.4.7**.

4.3.3 Freeboard

Freeboard is an allowance in the design height of flood defence walls and embankments to account for uncertainties in the scheme design in the areas of hydrology (flow estimation and probability), hydraulic modelling (roughness of the river channel, afflux through bridge, etc.) and tidal and wave action. This standard is in line with the OPW national standard for constructing flood defence schemes in Ireland. An allowance for freeboard as described above has been incorporated into the design. In addition, 200mm has been added to the freeboard for embankments to allow for settlement.

4.3.4 Resilience of the Proposed Scheme to Climate Change

In the design of any flood relief scheme (FRS), it is important that flood mitigation measures are considered in the context of a long-term strategy which is flexible and adaptive to changes in climate and their potential impact on flood risk.

The recommended allowance for potential mid-range future climate change for fluvial flooding is a 20% increase in flood flow magnitude regardless of the return period. This is the general guidance adopted for both Ireland (OPW) and the UK (DEFRA 2006, EA 2011).

The recommended allowance for potential mid-range future climate change for coastal flooding is a 550mm mean sea level rise to the year 2100, which accounts for a 500mm increase in mean sea level and 50mm increase for Isostatic land movement adjustment.

To allow for future climate change adaptability, the hard flood defences (flood defence walls and embankment) have been designed to facilitate future increases in their heights without imposing a significant impact on environmental and landscape features.

4.4 Detailed Description of Proposed Scheme

4.4.1 Overview

The proposed flood relief works will be located in Arklow Town north and south of the Avoca River and in Arklow Town Marsh. 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.

The proposed flood relief works, summarised in Table 4.1, above which also provides references to the associated drawings, are described below.

Reference should be had to the full set of planning drawings accompanying the application for approval. A summary set of drawings in A3 format are included in **Appendix 4.1** and **Appendix 4.2**. These drawings, illustrating the proposed flood relief works, are available in **Appendix 4.1** (full set of flood relief drawings provided therein).

To the south of the Avoca River, works will take place from just west of St Marys (also referred to as Main Street) car park along River Walk, at Arklow Bridge (a protected structure: RPS A26), along South Quay and around Arklow Dock. 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 and in the Avoca River. Ancillary associated works will take place on adjacent roads.

The proposed works are located in the townlands of Arklow, Tinahask Lower, Marsh, Ferrybank and Tiknock.

An overview of the layout of the proposed flood relief works is shown in **Figure 4.4** overleaf. The overall scheme layout and overall site extent of the proposed development is detailed in **Drawing Nos. 1001, 1002 and 1065** in **Appendix 4.1**.

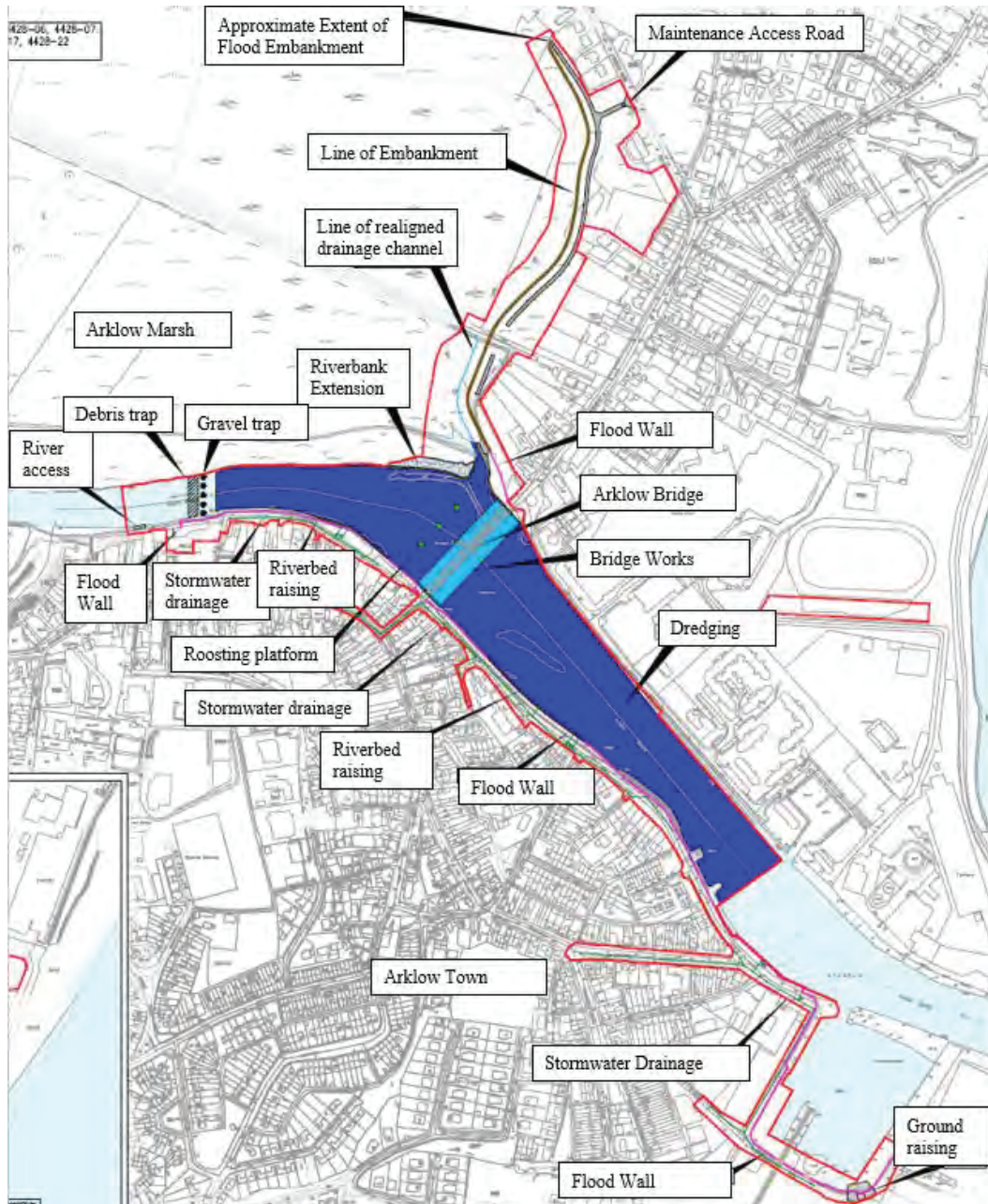


Figure 4.4: Overall Layout of Proposed Flood Relief Works (Not to scale. Extracted from Figure 1002)

Overall, the proposed development 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 (refer to **Section 4.4.2** below for details);

- 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 (refer to **Section 4.4.3** below for details);
- Extension into the river channel by circa 12m along an approximate 75m length of the northern river bank upstream of Arklow Bridge (refer to **Section 4.4.3** below for details);
- Installation of 3 no roosting platforms for birds upstream of Arklow Bridge (refer to **Section 4.4.3** below for details);
- Construction of debris and gravel traps and a permanent river access ramp on the south bank for their maintenance (refer to **Section 4.4.4** below for details);
- Flood defences on the south bank of the Avoca River (refer to **Section 4.4.5**) 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.
- 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. (Refer to **Section 4.4.7 below**). The proposed landscape design and public realm are summarised above in Table 4.2 along with references to the associated drawings. These drawings, illustrating the proposed landscape design and public realm, are available in **Appendix 4.2**.

- 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.

As noted in **Section 2.6 of Chapter 2 Background and Need for the Scheme**, the proposed FRS has an extensive physical overlap along the south side of the Avoca River with the permitted Arklow WwTP Project. The elements, which overlap, are the underpinning works at the two southernmost arches of Arklow Bridge and works to construct the sheet piled foundations for the flood defence walls and a portion of the interceptor sewer along parts of River Walk and South Quay. The planning application for the proposed FRS includes the elements, referred to above, which overlap with the WwTP. The overlap with the WwTP is described in further detail below.

4.4.2 Arklow Bridge Underpinning, Remedial Works and Scour Protection (WP1)

These works which are referred to in some sections of the EIAR as “*Work Package 1 (WP1)*” will include bridge underpinning of the bridge piers and southern abutment, remedial works to the older masonry parts of the bridge and lowering the floor of Arklow Bridge by approximately 1m, including removal of the existing scour protection slab and replacement with a new scour protection for the new river bed. Arklow Bridge is a protected structure (RPS A26).

The significance of the protected structure status of the Bridge is addressed in **Chapter 11 Archaeology, Architecture and Cultural Heritage**.

The overall layout of all channel works is shown on **Drawing No 1003** and the proposed bridge works are shown on **Drawing Nos 1004 to 1010** inclusive in **Appendix 4.1**. These works are described further below.

Arklow bridge is a nineteen arch masonry bridge with a 152 metre span, dating from c.1755. The width of the bridge was increased on the upstream side in the 1960s through the construction of a reinforced concrete deck alongside the older bridge and supported on piles.

Figure 4.5 below shows the downstream elevation of Arklow Bridge indicating the arches from south bank (left) to north bank (right) and numbered 1 to 19.

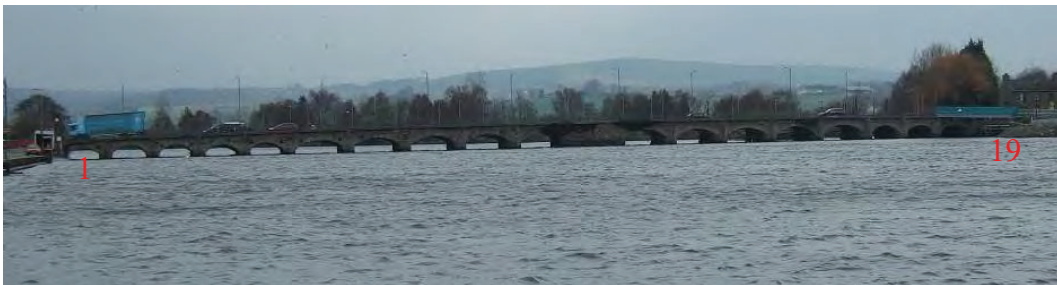


Figure 4.5: Arklow Bridge Downstream Elevation

Remedial works were carried out to the masonry bridge in recent years through grouting of the deck and piers and the application of shotcrete (gunite) to the faces of the arches and piers. Some of this gunite is in poor condition (see **Figure 4.6** below) and requires repair.



Figure 4.6: Examples of Gunite Areas Requiring Repair

There is evidence of vegetation growing on the masonry in places (see **Figure 4.7** below).



Figure 4.7: Vegetation Growing on Bridge

Some of the masonry needs repair (see **Figure 4.8** below).



Figure 4.8: Examples of Masonry Requiring Repair

There is an existing scour protection slab at riverbed level at the bridge. See **Figure 4.9** below. Bathymetry surveys have indicated that there is evidence of significant scour at the downstream edge of this slab.



Figure 4.9: Existing Scour Protection Slab

The existing bridge layout plan, elevation and sections are presented on **Drawing No 1004** in **Appendix 4.1**. The numbered arches are shown in the elevation on **Drawing No 1004**.

The limited available flow area through the arches is a significant cause of flooding upstream of Arklow Bridge. Currently, the flood level for the design flood event upstream of the bridge is 0.83m above the downstream flood level.

With the proposed flood defence walls and embankment in place, the upstream flood level would increase by approximately 0.2m. with no other interventions. The proposed works aim to improve the flow capacity through the arches without disrupting the structural integrity of the bridge. The design proposes to reduce the floor of the bridge by 1.0m. This, together with the proposed dredging of the channel, is estimated to reduce the upstream flood level by 0.54m. Hence, the height of the flood defence walls and embankments required upstream of Arklow Bridge will be 0.54m lower than without the proposed works on the bridge.

The proposed layout plan, elevation and sections are presented on **Drawing No 1005** in **Appendix 4.1**.

The lowering of the floor of Arklow bridge will require the underpinning of the southern bridge abutment and the bridge piers from Arch 1 to 18. Arch 1 will be reinstated at its current level to accommodate an interceptor sewer forming part of Arklow WwTP while Arch 19 will not be altered due to the services passing through this arch. An earlier historic apron to prevent scour is still existent in many places which takes the form of large interlocking stones. This will be lost when the riverbed is lowered in Arches 2 through to 18. Arch 1 will be reinstated to its current state reusing any existing stones which can be recovered in adequate condition i.e. largely undamaged. Any stones recovered in arches 2 to 18 will be incorporated into the proposed concrete scour slab. Arch 19 is to be retained as is, with its original interlocking stones retained.

The underpinning of Arklow Bridge will involve a number of steps including both temporary and permanent works. Refer to **Chapter 5, Construction Strategy** for a description of the temporary construction works required. The permanent works will comprise a combination of some or all of the following works:

- i. Grouting of the bridge superstructure, piers and pier foundations from the bridge deck, to stabilise the structure and improve the bearing capacity of the underlying formation (refer to Drawing (**Dwg. No. 1006**)).
- ii. Grouting under and around the bridge piers from riverbed level, to augment the grouting carried out from deck level and to control ground water and support the sides of excavations at the bridge piers (refer to **Dwg. No. 1006**).
- iii. Previous studies have been carried out on the lateral capacity and the load bearing capacity of Arklow Bridge. These studies found that the bridge was in a structurally sound condition, able to withstand lateral forces from a 100-year fluvial flood event in the absence of a flood relief scheme and safely carry the expected traffic loads. The detailed design of the underpinning will take account of bridge lateral stability under flood flow conditions, as well as overall structural stability, in the context of reduced flood levels upstream reducing the lateral forces, reduced bridge floor level, new pier foundations taken to suitable formation levels and all available ground investigation data. The improved flood conditions, robust design and proposed construction methodology as set out in Chapter 5 – Construction Strategy will ensure that the structural integrity of Arklow Bridge is enhanced.

- iv. Underpinning of the southern abutment and piers, by one of four underpinning methods: 1) concrete underpinning carried out from riverbed level; 2) micro-piling from riverbed level with top of the micro-piles encased in a reinforced concrete ring beam; 3) mini-piling from bridge deck level; and/or 4) reinforced concrete wall and beam around the perimeter of the pier. The exact method of the underpinning will be influenced by the actual formation conditions found at each pier.
- v. The four underpinning options have been considered in **Chapter 5 Construction Strategy** and presented in **Dwg. Nos. 1007-1010**.
- vi. Demolition of the existing concrete scour protection slab and lowering of the floor of the bridge and the riverbed immediately upstream and downstream of the bridge (refer to **Dwg. Nos. 1007-1010**).
- vii. Construction of a new concrete scour protection slab (400mm thick) from 10m upstream to 15m downstream of the bridge and beneath the arches of the bridge, to a level of approximately 1m below the existing riverbed level, and the placement of riprap along the upstream and downstream edges of the scour protection slab (refer to **Dwg. Nos. 1007-1010**).

Proposed remedial works to the masonry of the historic part of Arklow Bridge will include repairs to the previously applied gunite to the soffits of the arches, repairs to the masonry of the older sections of Arklow Bridge, reseating of any loose stones, removal of the vegetation growing on the bridge, and raking out and repointing defective masonry joints and cracks with an appropriate mortar. Deeply embedded roots will be drilled and injected with a suitable herbicide, where to remove them would prove destructive to the integrity of the masonry. Further details are included in the Conservation Engineering report included in **Appendix 11.8**.

Bat tubes will be permanently installed on the upstream side of the three southernmost and three northernmost arches of the bridge (refer to **Drawing No 1005**). Further details on mitigation for bats including bat tube specifications and other fauna are provided in **Chapter 10 Biodiversity**.

In addition, nesting boxes for the Red-listed species Grey wagtail and for Pied wagtail will be provided in alternate arches of Arklow Bridge, on ledges above high-water level in the existing concrete structure on the upstream side of the bridge, in order to provide nesting habitat for these species that feed extensively along the river channel.

4.4.3 Channel Dredging (WP2)

To improve the conveyance through Arklow Bridge, in conjunction with the lowering of the floor of the bridge, river dredging is proposed over an 850m length of the Avoca River, less the river bed lowering carried out as part of WP1. The dredging will extend to within 2m of the existing riverbanks or proposed river walls, as applicable.

These works, which are referred to in some sections of the EIAR as “*Work Package 2*”(WP2), will comprise dredging of the river channel from 10m upstream to 320m upstream of Arklow Bridge (as far as the junction of River Lane and River Walk) and from 25m downstream to 520m downstream of Arklow Bridge (as far as the junction of South Quay and Harbour Road). The dredging will include the removal of in-river sandbanks and vegetated islands upstream of Arklow Bridge.

The proposed channel dredging works are shown on **Drawing Nos. 1003 and 1011 to 1020** inclusive in **Appendix 4.1**.

These works are described further below.

The general depth of dredging will typically vary from approximately 1.2m at the channel edge to zero. Dredging at a number of high points will extend to 2.6m. The average depth of dredging will be 0.4m. **Figure 4.10** (extracted from **Drawing Nos. 1003**) below illustrates the channel dredging area upstream and downstream of Arklow Bridge.

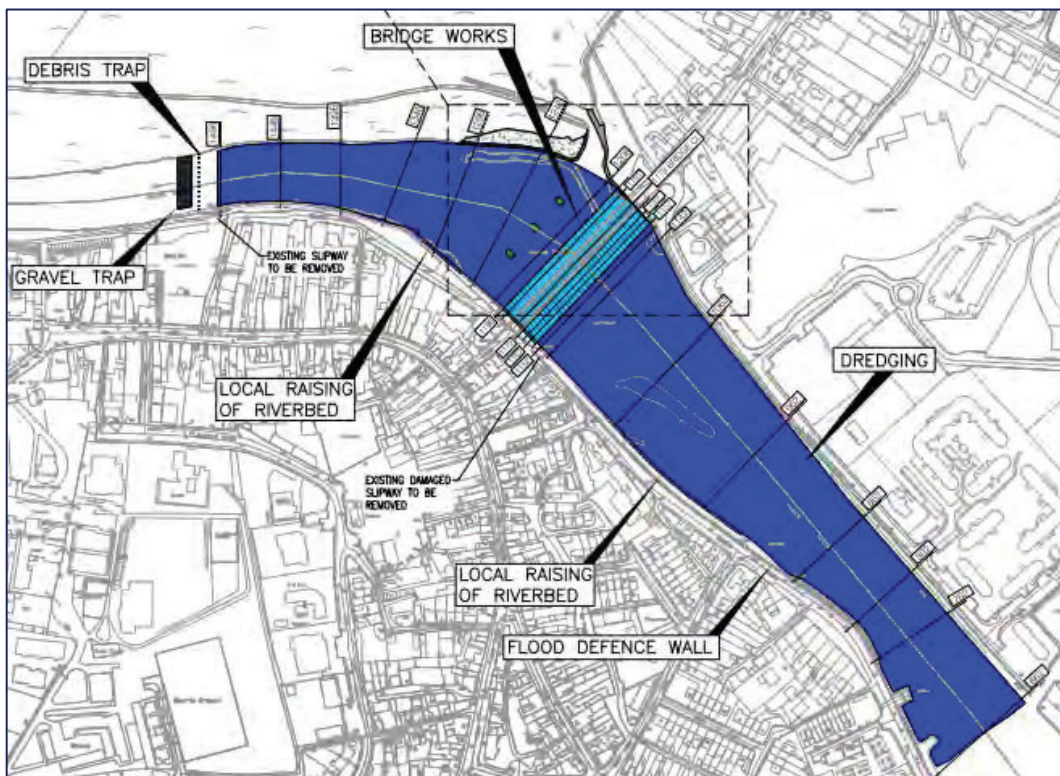


Figure 4.10: Extent of River Channel Dredging shown blue (Not to scale. extracted from **Drawing No. 1003**)

Typical cross-sections showing the existing and proposed bed levels are shown in **Figures 4.11 and 4.12** below.

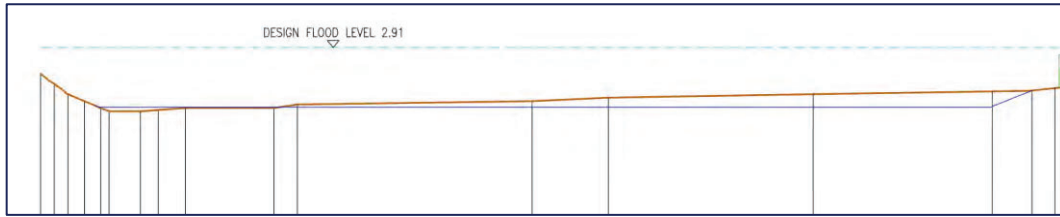


Figure 4.11: Typical Channel Cross-section Showing Dredging (upstream of Arklow Bridge). The brown line is the existing bed level and the blue line is the proposed bed level. Not to scale. Refer to Drawing No. 1019.

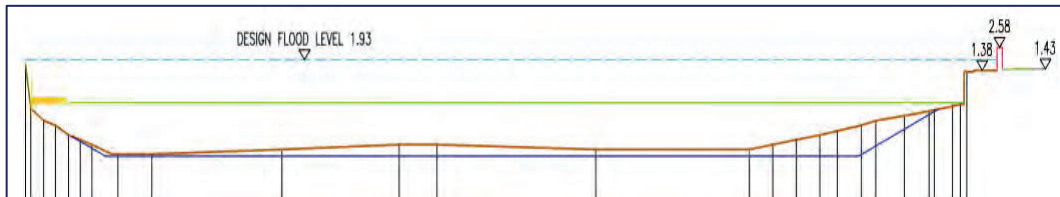


Figure 4.12: Typical Channel Cross-section Showing Dredging (downstream of Arklow Bridge). The brown line is the existing bed level and the blue line is the proposed bed level. Not to scale. Refer to Drawing No. 1019.

The existing and proposed bed levels along the channel centreline can be seen in **Drawing No. 1019** in **Appendix 4.1**.

The existing bed material is described in the geotechnical investigations as typically comprising sandy, silty, fine to coarse gravels. The edges to the dredged areas at each side of the river channel will be protected from erosion through the use of geotextile membrane and rip-rap to the details shown on **Drawing No. 1020** in **Appendix 4.1**.

The existing quay wall to be retained on South Quay will be protected through the placing of rip-rap along its base (refer to **Drawing No. 1017**).

There are a number of sandbanks which are used by birds for roosting in the river upstream of Arklow Bridge (see **Figure 4.13**). These impede flow through the bridge and have been removed on occasion previously.



Figure 4.13: Sandbanks Upstream of Arklow Bridge

Refer also to **Figure 12.5.1** in **Appendix 12.1** of **Chapter 12** *Landscape and Visual* which shows an image of the river channel, looking upstream of the Arklow Bridge, and the sandbanks.

The proposed river dredging will remove these sandbanks. It is proposed to replace the habitat provided by these sandbanks through the use of three manmade roosting platforms (floating islands) (8m x 5m each). These will be low platforms with timber edges and finished in a layer of gravel and will provide roosting areas for birds at all tides. These will be anchored to the bed of the river, upstream of Arklow Bridge, with concrete anchor blocks and chains. See example in **Figure 4.14** below and refer to **Drawing No 1003** of **Appendix 4.1**.

Refer also to **Drawing No 301** of **Appendix 4.2** for landscape details. Refer also to **Figures 12.5.2** and **12.7.2** photomontages (which show the proposed roosting platforms) of **Appendix 12.1** of **Chapter 12** *Landscape and Visual*.



Figure 4.14: Example of Floating Raft for Birds.

There are small islands in the river with tree and scrub vegetation close to the northern arches of the bridge (see **Figure 4.15** below). These will be removed during the river dredging to ensure that flood flows can effectively flow through these arches (refer to **Drawing No 1003**).



Figure 4.15: Vegetated Islands Upstream of Arklow Bridge

As mitigation, the northern bank, upstream of Arklow Bridge, will be extended into the river channel for a length of c.75m and up to 12.0m in width. The realigned river bank will be formed using rip rap at the river bed level and inert dredge material and soil contained in geotextile sacks will be placed within the new river bank to match the levels of the existing river bank. The extended river bank will be landscaped with mixed native woodland trees. Refer to **Drawing Nos 301 and 304 of Appendix 4.2** for landscape details. Refer also to **Figures 12.7.1** (existing view) and **12.7.2** (proposed view) of **Appendix 12.1 of Chapter 12 Landscape and Visual**.

See also **Figure 4.16** (extracted from **Drawing No 1003**) below for locations of proposed roosting platforms and the river bank extension.

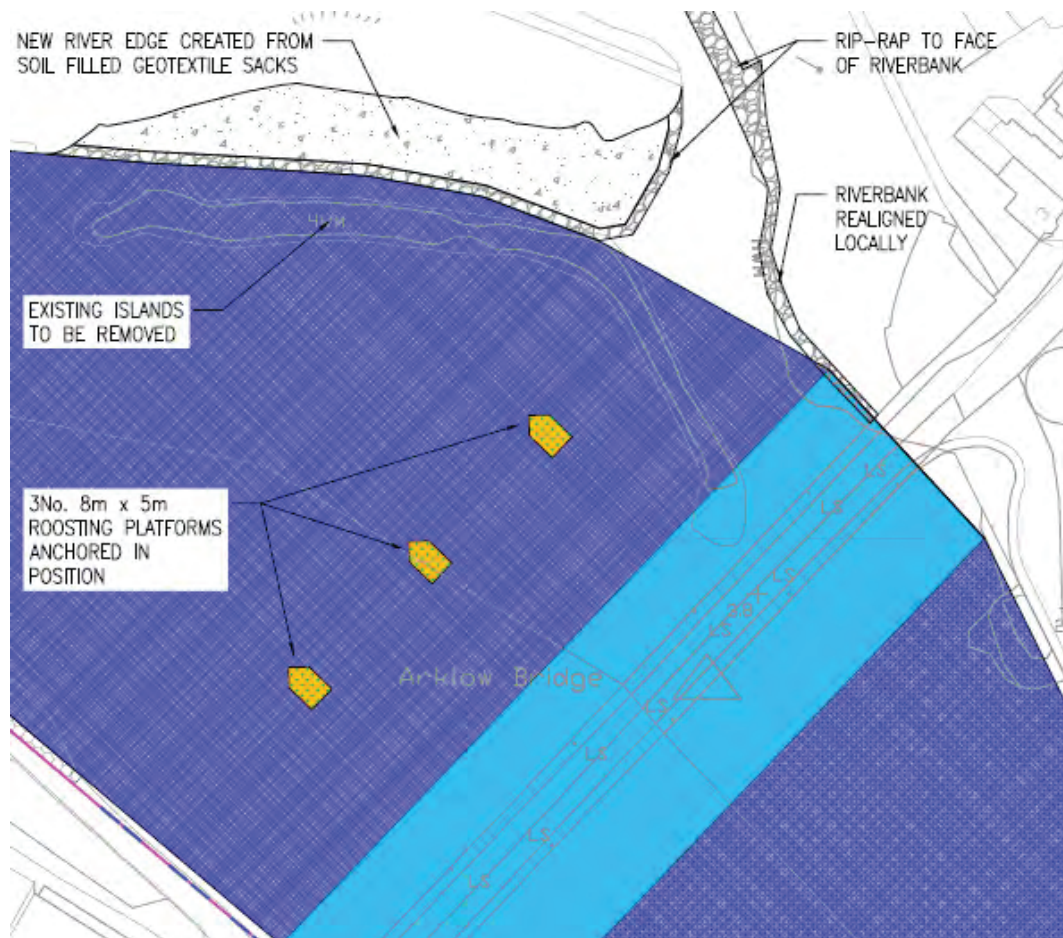


Figure 4.16: Extension of North Bank and Roosting Platforms Upstream of Arklow Bridge (extracted from **Drawing No. 1003**) Not to scale.

The riverbed on the south bank will be raised locally adjacent to the proposed flood defence walls to provide a refuge for birds and other fauna who may use the river banks (refer to **Drawing Nos. 1003, 1013 and 1016**).

Riverside trees and shrubs along the north bank, for the extent of the dredging upstream of Arklow Bridge, will be trimmed back so that they will not interfere with the design flood flow. Refer to **Section 4.4.7** for landscaping details.

Existing moorings in the river channel will be removed temporarily and replaced following the completion of the dredging works.

The construction methodology for excavating and removing the dredge material is described in **Chapter 5 Construction Strategy**.

4.4.4 Debris Trap and Gravel Trap (WP3)

These works, which are referred to in some sections of the EIAR as “*Work Package 3*” (WP3), will include a debris trap to be constructed upstream of Arklow Bridge, to accommodate the collection and regular removal of large floating debris (fallen trees, etc.), and a gravel trap to be constructed upstream of Arklow Bridge, to accommodate the collection and regular removal of sediments from the river at a single controlled location. A permanent river access ramp for maintenance of the traps will also be constructed and annual maintenance of the debris trap and gravel trap will be carried out by using a temporary in-river haul road. The proposed debris and gravel traps are shown on **Drawing Nos 1021 to 1023** inclusive in **Appendix 4.1**. These works are described further below.

Refer also to **Figures 12.1.1 and 12.2.1** (existing views) and **12.2.2 and 12.1.2** (proposed views) of **Appendix 12.1** of **Chapter 12 Landscape and Visual** which show photomontage views in the vicinity of the debris trap. **Drawing No 300** of **Appendix 4.2** also shows the permanent river access ramp for maintenance and public realm design along River Walk in the vicinity of the debris and gravel traps.

4.4.4.1 Proposed Debris Trap

The purpose of the debris trap is to trap large floating debris, such as fallen trees and branches and to prevent debris build up at Arklow Bridge and resulting restrictions on flood conveyance capacity through the arches of the bridge. Such restrictions would result in an increase in flood levels upstream of Arklow Bridge.

The proposed location of debris trap is approximately 342m upstream of Arklow Bridge, see **Figures 4.17 and 4.18** below.

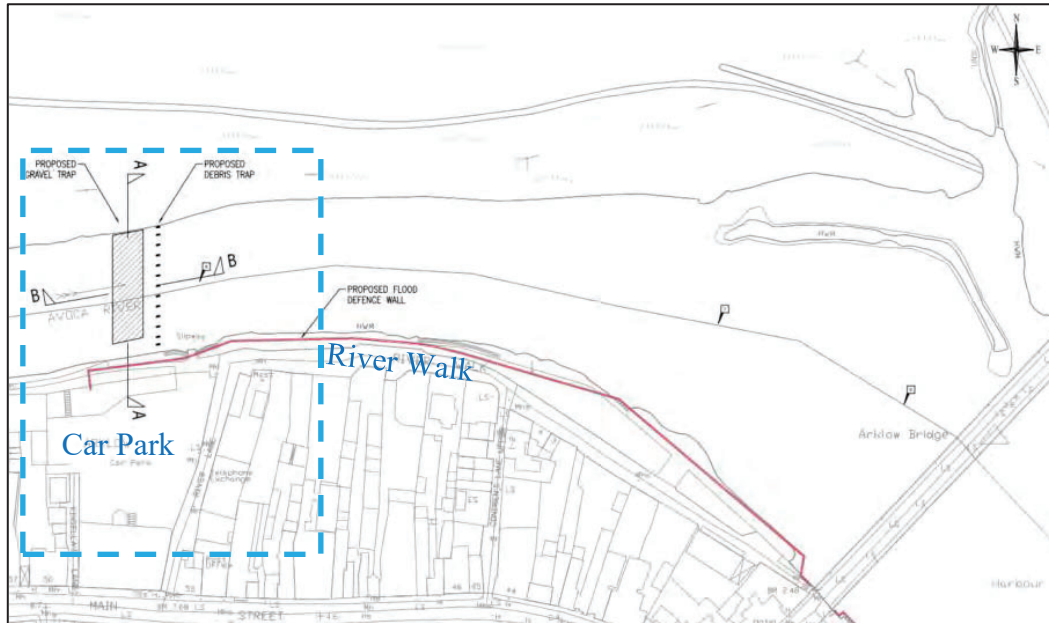


Figure 4.17: Location of Debris Trap and Gravel Trap Not to scale.

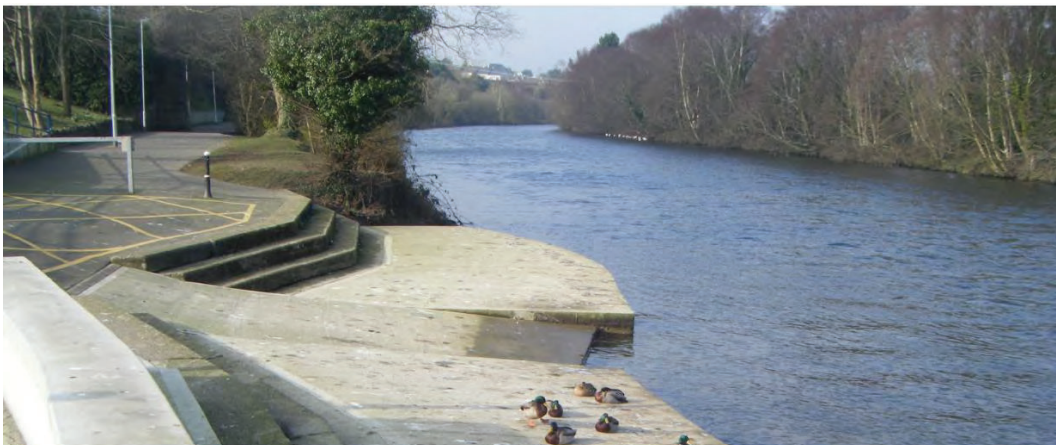


Figure 4.18: Debris Trap and Gravel Trap Location

The debris trap will involve the construction of 13 reinforced concrete oval-shaped columns measuring 1.6m long by 0.6m wide across the river channel at 4.0m centres (3.4m spacing) to allow collection of debris upstream of the bridge. The site allows for flows to bypass the trap through the marsh on the northern bank in the event that the debris trap becomes seriously blinded with debris. A bat tube will be inserted at the top of each concrete column. Refer to **Drawing No 1021** in **Appendix 4.1**. Further details on mitigation for bats including bat tube specifications are provided in **Chapter 10 Biodiversity**.

An example of a debris trap is shown in **Figure 4.19** below. Refer also to **Figures 12.1.1** and **12.2.1** (existing views) and **12.2.2** and **12.1.2** (proposed views) of **Appendix 12.1** of **Chapter 12 Landscape and Visual** which show photomontage views in the vicinity of the debris trap.



Figure 4.19: Example of Debris Trap

4.4.4.2 Proposed Gravel Trap

The purpose of the gravel trap is to collect sediment deposits which move downstream from the upstream reaches of the Avoca River. The movement will mostly be conveyed during extreme flow conditions and with the floating debris. The proposed location of the gravel trap is immediately upstream of the debris trap with approximately a 5m corridor between the two to allow access for maintenance machinery in the future (refer to **Figures 4.17 and 4.18** above for location).

Construction of the gravel trap will involve the excavation of a trench 12m wide by up to 1.0m deep in the riverbed for the full width of the river channel upstream of the debris trap. **Figure 4.20** below illustrates the gravel trap cross-section.

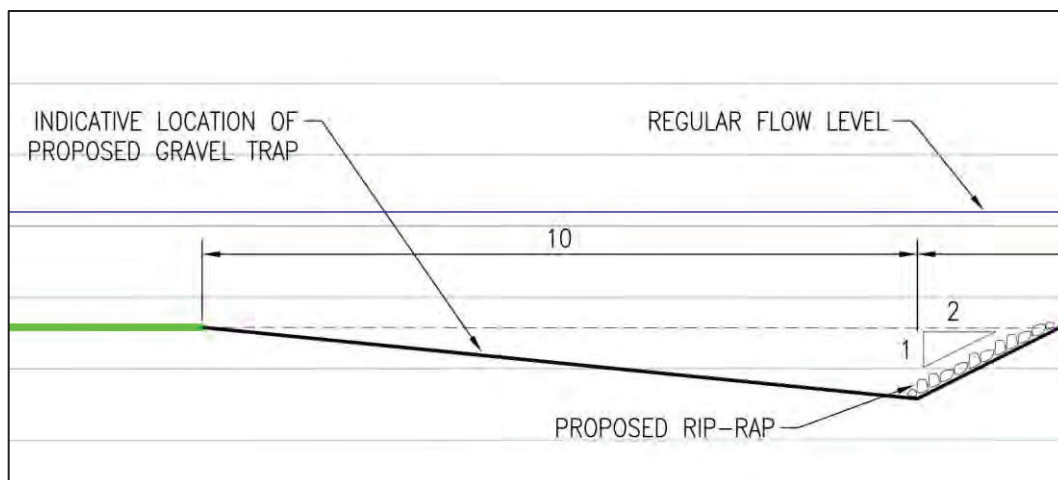


Figure 4.20: Gravel Trap Cross-section. Not to scale.

Refer to **Drawing No. 1022** in **Appendix 4.1**.

4.4.4.3 Maintenance Access

Access to the debris and gravel traps will be required to remove debris and gravel periodically.

The river access will be along the route of the existing footpath in the vicinity of the Main Street carpark on the south bank of the river, into the river via a new ramp and then along the riverbed on a temporary access track to the location of the gravel and debris traps – see **Figure 4.21** below. Refer also to Refer to

Drawing No 1023 in Appendix 4.1. **Drawing No 300** of Appendix 4.2 also shows the permanent river access ramp for maintenance and public realm design along River Walk in the vicinity of the debris and gravel traps.

The existing footpath will be demolished and replaced with a surfaced road suitable for the heavy machinery to be used for the maintenance work. The permanent access ramp will be constructed from reinforced concrete and extend from the access road to the river edge. Scour protection utilising riprap will be provided to the riverbank immediately upstream and downstream of the ramp. The access route from the ramp towards the debris and gravel trap will be formed from existing riverbed material, typically comprising gravels and sands, as needed when maintenance is to be carried out and removed on the completion of the maintenance. The flow from existing outfalls will be maintained across the access route.

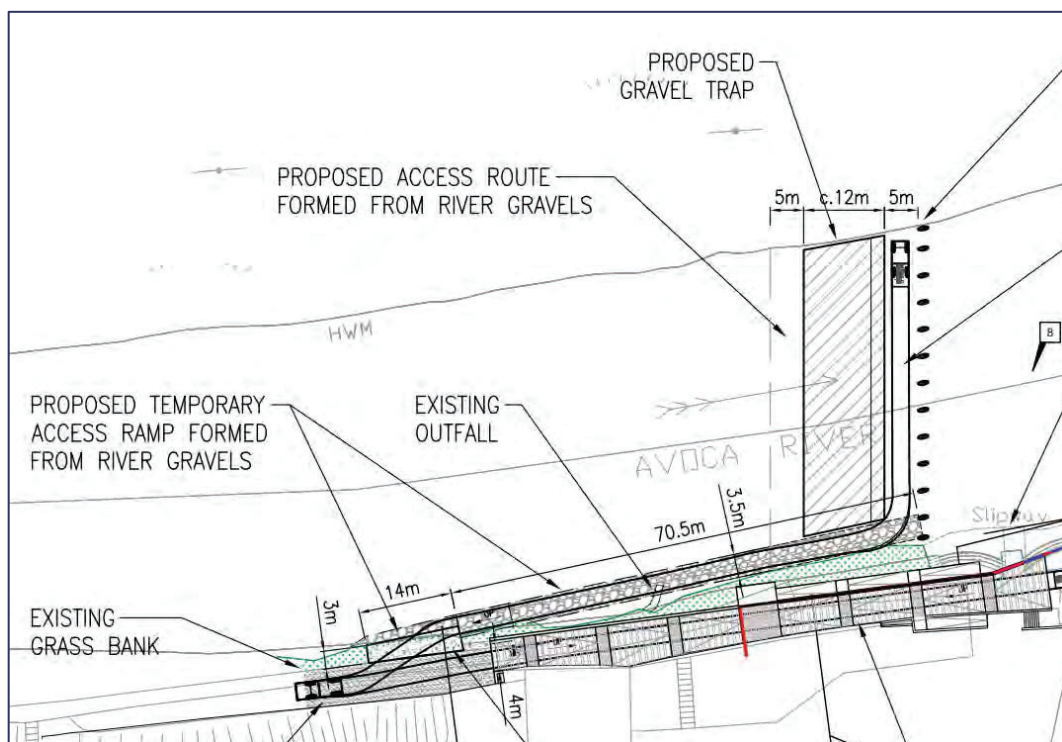


Figure 4.21: River Access Ramp to Debris and Gravel Trap. Not to scale.

4.4.5 Flood Defence Walls and Drainage along the South Bank (WP4)

The existing setting is described in section 4.4.7.2 below.

The proposed works which are referred to in some sections of the EIAR as “*Work Package 4*” (WP4) will include flood defence walls and drainage along the south bank of the Avoca River including local alterations to the river channel along River Walk (upstream of Arklow Bridge) and South Quay (downstream of Arklow Bridge) 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);
- 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;
- 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, lighting, parking spaces and seating.
- Provision of new public realm at River Walk and South Quay including parking spaces, footpaths, amenity/viewing area, lighting, planters and floating pontoon. Provision of additional urban space extending approximately 6m into the river on South Quay immediately south of the Arklow Bridge for a length of approximately 260m. Provision of additional urban space extending between approximately 0m and 6m into the river on River Walk for a length of approximately 100m.
- Stormwater drainage network and 3 no. pumping stations along River Walk, South Quay, the Dock and adjoining streets;
- Interceptor sewer for WwTP Project; and.
- Water safety measures.

The proposed flood walls, drainage infrastructure and water safety measures along the south bank are shown on **Drawing Nos 1031, 1036 to 1049** inclusive (flood defence walls), **1051 to 1058** inclusive (stormwater drainage) and 1060 (water safety measures) in **Appendix 4.1**. These works are described further below.

Extensive Public Realm Works are also proposed along the south bank are described in detail in **Section 4.4.7** below. Associated drawings are included in **Appendix 4.2**. Photomontages are presented in **Appendix 12.1** of **Chapter 12 Landscape and Visual**.

4.4.5.1 Upstream of Arklow Bridge on River Walk (south bank of the Avoca River)

Flood defence walls will be constructed upstream of Arklow Bridge on the river's southern bank along River Walk. As the ground levels along River Walk are relatively very low, the proposed flood defence walls will typically be 1.05m to 2.15m higher than the current footpath and road levels at River Walk. However, as discussed in **Section 4.4.7** below, the landscaping and public realm has been

designed to maintain the important visual and amenity relationship between River Walk and the river corridor and also to enhance the built environment of River Walk in a manner that will facilitate the ongoing amenity value and catalyse future regeneration of the rear of properties.

The proposed flood walls and drainage along the south bank upstream of Arklow Bridge are shown on **Drawing Nos 1031, 1036 to 1039 inclusive, 1051, 1053 and 1056** in **Appendix 4.1**.

Currently there are riverside footpaths and low walls along the riverbank with grass areas and public seating. See **Figures 4.22 and 4.23** below. The proposed works will require demolition of the existing road surface, footpaths, kerbs, river access and quay wall in places to accommodate the new construction. It will also require the demolition of the existing river access at the junction of River Lane and River Walk.

The works will extend upstream of Arklow Bridge, along River Walk, for 325m. The construction of a stormwater drainage system and one pumping station and a section of the WwTP interceptor sewer will be carried out in parallel with the wall construction.

Diversion of overhead electricity cables will also be required in this area with the relocation of lighting standards to the line of the new wall and the placing of the cables in underground ducts. Refer to **Drawing No. 1061** and see **Chapter 17, Material Assets**, for further detail.



Figure 4.22: Existing River Walk Footpath and Wall



Figure 4.23: Existing River Walk Green Area

The top of the proposed flood defence walls will vary from approximately 1.05m to 2.15m above the existing road level, based on the design flood level and an allowance for freeboard.

The section of flood defence wall, between Arklow Bridge at Chainage (Ch) 325 and Condren's Lane Upper at Ch 180, will be constructed with sheet piles with a reinforced concrete wall on top. This section of flood defence wall will be constructed in the riverbed, outside (wet side) the existing quay wall.

Refer to **Drawing No. 1036** and also Sections I-I and J-J shown on **Drawing No 1039** in **Appendix 4.1**. This will facilitate the provision of additional urban space extending between approximately 0 and 6m into the river on River Walk for a length of approximately 260m (Refer to **Section 4.4.7** below for further details on the public realm design).

The remainder of the flood defence wall, from Condren's Lane Upper to Main Street carpark (Ch 000), will be a reinforced concrete retaining wall and will be constructed inside (dry side) the existing quay wall. Refer to **Drawing No. 1036**, Section F-F shown on **Drawing No 1038** and Section H-H shown on **Drawing No 1039** in **Appendix 4.1**.

All walls will have either an in-situ or a precast concrete finish on both sides (river and land).

As part of WP2, the riverbed will be raised locally adjacent to a section of the proposed flood defence wall (c. Ch 170-260) to provide a refuge for birds and other fauna who may use the river banks (Refer to Section I-I shown on **Drawing No 1039** in **Appendix 4.1**. Bat tubes will be incorporated into the flood wall (between Ch 240-290) as shown on **Drawing No. 1036** and detailed on **Drawing No. 1039**. Further details on mitigation for fauna including bat tube specifications are provided in **Chapter 10 Biodiversity**.

Glass panels will be incorporated within the flood defence wall at a number of key locations as shown on **Drawing No. 1036** in **Appendix 4.1** and on **Drawing Nos 300-301** in **Appendix 4.2**. This includes glass panels at the junction of River Walk and River Lane (Ch 060), the seating area along River Walk (Ch 105) and the elevated terraces upstream of Arklow Bridge (Ch 290-Ch 310). These,

together with the elevated viewing platforms and outer walkways will enhance visual connectivity either side of the wall and to the river.

The landscape design and public realm is described in further detail in **Section 4.4.7** below and the associated drawings (**300** and **301**) are included as **Appendix 4.2**. Refer also to the photomontages shown **Appendix 12.1: View 1 (Figure 12.1.2)**, **View 2 (Figure 12.2.2)**, **View 3 (Figure 12.3.2)**, **View 4 (Figure 12.4.2)**, **View 5 (Figure 12.5.2)** and **View 6 (Figure 12.6.2)** which show the proposed flood defence walls and landscape design and public realm upstream of Arklow Bridge.

In summary, public realm features including a pedestrian walkway along the riverside, seating areas and traffic calming measures will be installed along River Walk. A raised pedestrian area will be constructed adjacent to the flood defence wall resulting in a wall height of 1.15m wall above the pedestrian area. Refer to **Drawing Nos 300-301** in **Appendix 4.2**.

A riverside footpath will be constructed from Condren's Lane Upper (Ch 180) to the upstream extent (Ch 000) to allow pedestrian interaction with the Avoca River. This will be partly formed by a boardwalk supported on piles. Hand railing will be installed on the walkway adjacent to the Avoca River. Refer to **Drawing No. 1036** and also to Section G-G shown on **Drawing No 1038** in **Appendix 4.1**. Refer also to **Drawing Nos 300-301** in **Appendix 4.2**.

A floating pontoon (Ch 100) will be constructed adjacent to the boardwalk as shown on **Drawing No. 1036**, to facilitate river-based activities such as rowing or kayaking This will be accessed from the riverside footpath by a ramp.

Diversions of existing utilities will be required as shown on **Drawing No. 1061**.

4.4.5.2 Downstream of Arklow Bridge on South Quay (South of the Avoca River)

South Quay runs along the south bank of the Avoca River from Arklow Bridge to the Dock. There are a variety of existing flood defences along the river edge comprising low walls, open quay and wave wall as seen below in **Figures 4.24 to 4.29** below.



Figure 4.24: Existing Low Wall on South Quay, downstream of Arklow Bridge



Figure 4.25: Existing Open Quay on South Quay, downstream of Arklow Bridge



Figure 4.26: Existing Wall by Slipway (Tyrells slipway) on South Quay



Figure 4.27: Existing Wave Wall Downstream of Slipway (Tyrells slipway) on South Quay



Figure 4.28: Open Quay by Seafarer’s Memorial Garden on South Quay



Figure 4.29: Low Wall by the Dock (Arklow Harbour area)

Downstream of the bridge, the works will extend for 1150m along South Quay from Arklow Bridge to Arklow Harbour (Dock). It will include a storm water drainage system, two pumping stations and a section of the WwTP interceptor sewer. The proposed flood defence walls and drainage along the south bank downstream of Arklow Bridge are shown on **Drawing Nos. 1031, 1040 to 1049** inclusive, **1051, 1054 to 1055** inclusive and **1057 to 1058** inclusive in **Appendix 4.1**.

The works will include the demolition of some existing walls and the 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 on South Quay and on the western and southern sides of the Dock. The works will also include modifications to approximately 20m of existing wall downstream of Arklow Bridge and the demolition of a disused slipway (referred to as Coal Quay) immediately south of Arklow Bridge.

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.

Arklow Bridge to Tyrells Slipway

Widening of South Quay, downstream of Arklow Bridge, was driven by the need to install underground drainage infrastructure along South Quay without disrupting existing utilities or unnecessarily disrupting access. The solution was to sheet pile the southern edge of the river to construct the drainage under the river bed and to backfill the drainage zone so as to widen the South Quay. This additional width, of up to 6.0m for a length of approximately 260m, affords greater flexibility in how the new wider South Quay is finished and utilised as described in **Section 4.4.7** below.

The section of flood defence wall along South Quay, from Arklow Bridge (Ch 000) to the existing Tyrells slipway (Ch 440), will be constructed using sheet piles with a reinforced concrete wall constructed on top of the sheet piles. This will involve the demolition of the existing quay wall along two short lengths to accommodate the new sheetpiled wall crossing the existing wall. The existing quay wall will be retained with some upgrades on the transition phase to the sheet piled walls sections. The section of flood defence wall from the bridge to approximately Ch 310 on South Quay will be constructed c. 5m out into the river channel, outside (wet side) the existing quay wall.

Refer to **Drawing No. 1040** and **1041** and also from Sections M-M to P-P shown on **Drawing Nos 1046** and **1047** in **Appendix 4.1**. This will provide space for construction of the WwTP interceptor sewer as well as providing additional width along South Quay for the construction of underground surface water drainage, new footpaths, roadways and public realm works.

The proposed flood defence walls and drainage along the south bank downstream of Arklow Bridge are shown on **Drawing Nos 1031, 1040 to 1049** inclusive, **1051, 1054 to 1055** inclusive and **1057 to 1058** inclusive in **Appendix 4.1**.

The section of flood defence wall beyond South Green from approximately Ch 310 to Ch 410 will be constructed c. 2.5m inside the existing stone quay wall after which it will be constructed along the line of the existing quay wall. This area along South Quay is referred to as the “pinch point” in the river channel. Refer to **Drawing No. 1041** and also Section Q-Q as shown on **Drawing No 1047** in **Appendix 4.1**.

The existing quay wall will be retained at the “pinch point” along South Quay. The wall will be repaired, joints raked out and repointed and missing stones replaced. The methodology set out in the Conservation Engineering Report for the repair of masonry stonework, included as **Appendix 11.8**, will be followed. This section of quay will be protected by the placing of rip-rap along its base (refer to **Drawing No. 1047**).

The rip-rap will also provide a refuge for birds and other fauna who may use the river bank. Bat tubes will be incorporated into the flood wall at a number of locations between approx. Ch 80-420 as shown on **Drawing Nos. 1040** and **1041**. Further details on mitigation for fauna including bat tube specifications are provided in **Chapter 10 Biodiversity**.

Existing mooring posts located along the extent of the proposed new wall on South Quay will be removed and replaced along the section of existing quay wall to be retained (refer to **Drawing No. 1047**).

At the former Tyrells Yard, a slipway to the river is being retained respecting its heritage value (Ch 440). Refer to **Drawing No 1041** in **Appendix 4.1**. A permanent flood defence wall with glass panel is proposed at this location..

The top of the proposed flood defence and quay wall, from the Arklow Bridge to just downstream of the Tyrells slipway, will typically be at 1.15m above pavement level.

Just downstream of Tyrells slipway, the existing flood defence wall will be demolished to facilitate river access during construction and rebuilt to a new height. Refer to **Drawing No. 1041** and Section R-R as shown on **Drawing No 1047** in **Appendix 4.1**.

Diversion of overhead electricity cables will be required in this area with the relocation of lighting standards to the line of the new wall and the placing of the cables in underground ducts. Underground services will also require diversion to accommodate the new stormwater sewers. Refer to **Drawing No. 1061** and see **Chapter 17, Material Assets**, for further detail.

Further downstream (approx. Ch 450), the existing seawall will be maintained as a flood defence wall to the green area (approx. 550) called the Seafarers Memorial Garden by Harbour Road.

A 1.15m high flood defence wall will be constructed along the Seafarers Memorial Garden by Harbour Road tying into the existing wall upstream and the existing low wall downstream (approx. 550 to Ch 620). The typical height of proposed wall will be approximately 1.15m along this section. Refer to **Drawing No. 1041** and Section S-S as shown on **Drawing No 1048** in **Appendix 4.1**.

A low flood defence wall will be constructed around the Dock area extending along the western and southern sides of the dock and tying into existing kerbs at the south east corner of the Dock. Refer to **Drawing No. 1042** and Sections T-T and U-U as shown on **Drawing No 1048** in **Appendix 4.1**. Demolition of the road surface and the existing fence around the Dock will be required to accommodate the flood defence wall. A new fence will be installed on top of the flood defence wall to replace the existing fence. Ramps over this low wall will be provided at two locations (Ch 660 at Section T-T and Ch 770) and to allow vehicular traffic access to and from the quay side at the western side of the Dock. Local ground raising at Ch 1000 would also be required to allow vehicular access to the eastern side of the Dock as shown on **Drawing No 1042**.

Flood barriers will be installed in two locations in the Dock area as shown on **Drawing No 1042**. Two 8m wide demountable flood barriers will be provided to allow access to the shipyard and to the public slipway (approx. Ch 920 and 950). It is proposed that these will be normally closed with access arrangements being agreed with industrial and organisational stakeholders requiring access. An example of a demountable flood barrier is shown in **Figure 4.30** below.



Figure 4.30: Example of Demountable Flood Barrier

All walls will be in-situ or precast concrete finish on both sides (river and land).

Public realm features including a pedestrian walkway along the riverside, seating areas and traffic calming measures will be installed along this stretch of river, as described in **Section 4.4.7** below. The landscape design and public realm drawings (301-304) are included as **Appendix 4.2**.

4.4.5.3 Surface Water Drainage

A surface water drainage network and three pumping stations will be constructed on the dry side of the flood defence walls along River Walk, Main Street, South Quay, and the Dock to prevent flooding occurring from rainwater run-off from hardstanding areas in the flood zone when gravity discharge is prevented by high water levels in the river. 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. See **Drawing No. 1061** and **Chapter 17, *Material Assets***, for further detail. Non-return valves (NRVs) will be fitted to the discharge pipes to ensure that the river flows cannot back up into the drainage network. The pumps will discharge to the river through a separate outfall.

In total, six NRVs are required at the pump stations outlet points. Duckbill valves will be fitted at the discharge points in the Avoca River. Concrete headwalls will be constructed to protect the valves from debris.

The proposed stormwater drainage is shown on **Drawing Nos. 1051 to 1058** inclusive in **Appendix 4.1**.

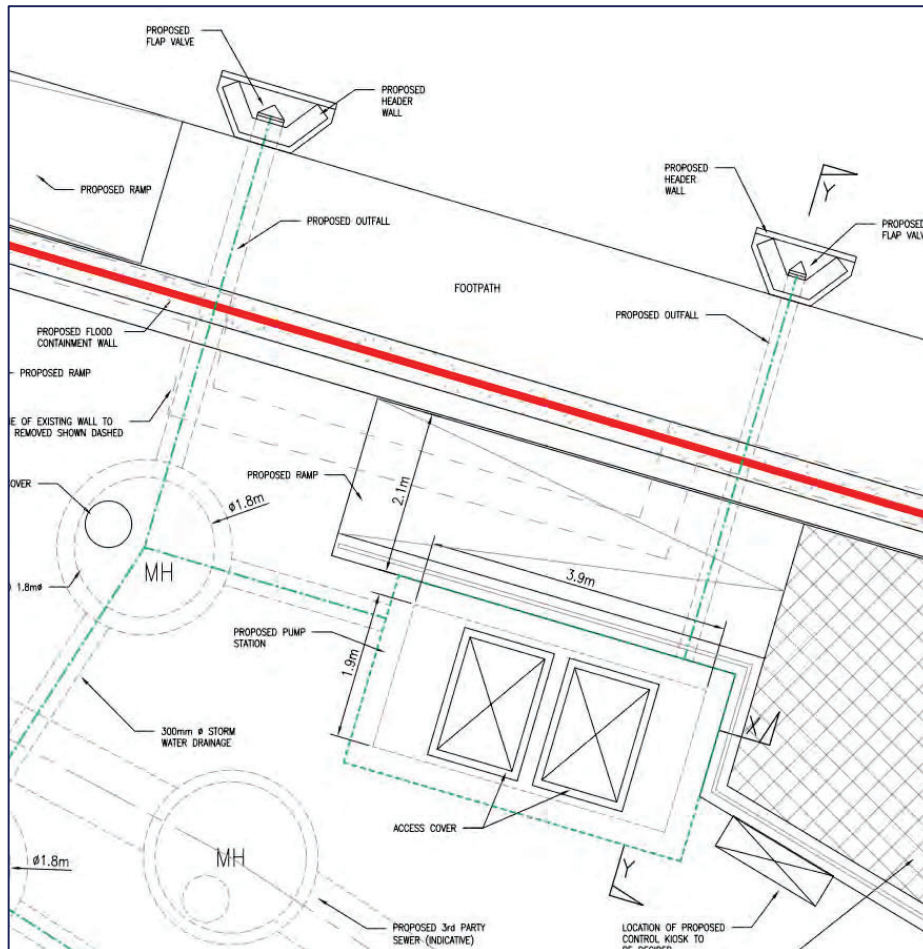


Figure 4.31: Typical pump station layout plan along River Walk. Not to scale.

4.4.5.4 Wastewater Sewer

As noted in **Section 2.6** of **Chapter 2 Background and Need for the Scheme**, the proposed FRS has an extensive physical overlap along the south side of the Avoca River with the permitted Arklow WwTP Project. 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, from the upstream extent of the FRS along River Walk as far downstream as Ch 287m on South Quay. The sewer diameter within the FRS area will vary from 450mm to 1200mm. The indicative location of the sewer that is included in the FRS is shown on **Drawing Nos. 1053 to 1054** in **Appendix 4.1**. Should the construction of the FRS proceed in advance of the WwTP, this section of interceptor sewer will be constructed as part of the FRS works.

4.4.5.5 Water Safety Measures

Lifebuoys will be installed at approximately 100m centres along River Walk and South Quay. Four rescue points in the form of access ladders will be installed between Arklow Bridge and the Dock. These can be seen on **Drawing No. 1060**.

4.4.6 Flood Defence Wall and Embankment along the North Bank (WP5)

These works which are referred to in some sections of the EIAR as “*Work Package 5*” will include flood defences on the north bank of the Avoca River comprising 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.

The locations for the proposed flood defence works are shown in **Figures 4.32 to 4.34** below.



Figure 4.32: Location of Proposed Sheet-piled Wall Looking East



Figure 4.33: Location of Proposed Embankment Looking North



Figure 4.34: Location of Northern End of Proposed Embankment

The proposed flood wall and embankment on the north bank are shown on **Drawing Nos 1031 to 1035** inclusive in **Appendix 4.1**. These works are described further below.

A flood defence earthen embankment will be constructed running north-south to the rear of the properties between the eastern side of Arklow Marsh and Ferrybank. It will be approximately 545m long. The embankment will be constructed with side slopes of 1 vertical:2 horizontal with a 2.5m wide flat crest at the top of the embankment to facilitate routine inspection and maintenance. Part of the embankment material will be sourced from the channel dredged material (see **Section 4.4.3**). The top level of the embankment will vary from approximately 3.0m above existing ground level at its southern end and taper to existing ground level at its northern end and is a maximum of approximately 4m high based on the design flood level including an allowance for freeboard and settlement. The width of the embankment will vary from a maximum of approximately 18.5m wide at its widest point to approximately 4.5m wide at the narrowest point at the northern end of the embankment.

The embankment will be planted with a suitable grass. (Refer to the sections presented in **Drawing No 1035**).

A permanent 4.0m wide maintenance access track will be constructed along the toe of the dry side of the embankment to facilitate future inspection and maintenance. It will be accessed via a short track leading from the Dublin Road just north of the filling station (**Drawing No 1033**). A permanent timber post and rail fence will be erected along the access track. The area between the maintenance track and the property boundaries to the east will be planted with a variety of native woodland, shrubs and grass species. The landscaping design is discussed in **Section 4.4.7** below and presented in **Drawing Nos 304-306** in **Appendix 4.2**.

Figure 4.35 below illustrated a typical cross-section along the flood defence earth embankment.

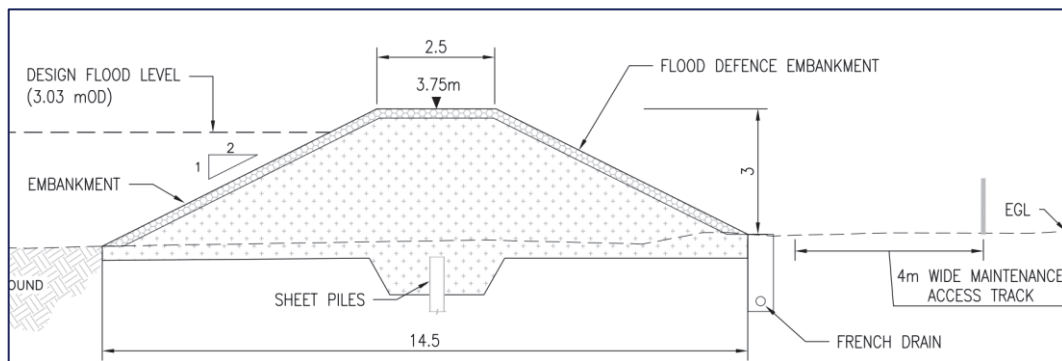


Figure 4.35: Typical cross-section along flood defence earth embankment. Not to scale.

The earth embankment will terminate behind the properties to the north-west of Arklow Bridge.

A sheet-piled flood defence wall (approximately 60m long) with a concrete capping will be constructed along the property boundary from the end of the embankment and tie into the northern abutment of Arklow Bridge. Refer also to **Figure 12.7.2** of **Appendix 12.1** which shows a photomontage view of the proposed flood defence wall and embankment taken from Arklow Bridge looking northwards.

A land drain will be constructed along the toe of the embankment and the wall on the dry side.

The existing channel running from the canal to the Avoca River, seen in **Figure 4.36** below, will be realigned/diverted westwards to provide sufficient space for the embankment and wall. After completion of the infrastructural works, this section of river bank, where the channel joins the Avoca River, will be re-formed with rip-rap at the river bed and with the earth embankment grading upwards to the flood defence wall.



Figure 4.36: Location of Channel to be Diverted in the Marsh

Overhead and underground electricity lines and a disused above-ground pipeline will be diverted as shown in **Drawing No.1062**.

4.4.7 Landscape Design and Public Realm

4.4.7.1 Introduction

The Arklow FRS is an essential infrastructural project that will provide long term security for Arklow town and its people.

The primary component of the project as discussed in the previous sections above requires the establishment of a flood defence wall along the southern side of the Avoca River for c. 325m along River Walk upstream of Arklow Bridge and tying into the town carpark and c. 700m of South Quay downstream of the bridge and tying into the existing environment around Arklow Harbour. In addition, on the northern side of the Avoca River, the flood defence level needs to extend northwards from the Avoca River in the form of a new embankment between the Arklow Town Marsh and the rear of properties at Ferrybank.

The existing river embankments and quay walls must be altered in order to provide an appropriate flood defence level. In parallel with the civil engineering project, a landscape and public realm design has been developed. The objective of the landscape and public realm design is to ensure the effective integration of the infrastructural elements with the townscape and river setting in a manner that seeks to ensure the river frontage in its new form can contribute positively to the townscape and range of amenities on offer.

4.4.7.2 Existing Setting

River Walk

River Walk on the south bank of the Avoca River leads upstream from the Arklow Bridge and along the riverside to the back of the urban core of Arklow town. It is a public amenity along the southern side of the river that also provides vehicular access from Main Street via River Lane and Condren's Land Upper to the rear of properties along Main Street as well as to a small number of properties that face River Walk and the river. River Walk is low lying and varies in width from c. 12m to c. 25m with the river edge comprising a concrete walkway and low wall and the balance providing vehicular access and parking together with a small area of grass (as shown on View 2 - **Figure 12.2.1** and View 3 - **Figure 12.3.1** in **Appendix 12.1**). Close to the bridge, a mixed use café and residential building fronts onto River Walk and small areas of outdoor seating are available for customers along the river edge (as shown on View 4 - **Figure 12.4.1** in **Appendix 12.1**). While the built fabric along the southern side of River Walk is generally of low architectural merit and there are a small number of trees, it is the river and the heavily wooded north bank that contributes most to making River Walk an attractive place within the town.

Further upstream the town carpark is located along the southern side of River Walk and a steep grass bank separates the carpark from the riverside amenity walkway. At this point, the walkway becomes pedestrian only and the character of River Walk becomes more rural and riverine with mature mixed woodland defining both sides of the river corridor (as shown on View 1 - **Figure 12.1.1** in **Appendix 12.1**).

View 5, **Figure 12.5.1**, (**Appendix 12.1**) is from Bridge Street approaching River Walk and provides an open and attractive view to the north bank and upstream of the Avoca River and of River Walk. The vehicular character of River Walk is apparent and the rear boundary walls of the properties are just out of view. A narrow pedestrian ramp leads from Bridge Street to the concrete walkway along the river bank.

View 6, **Figure 12.6.1**, (**Appendix 12.1**) is from the Arklow Bridge looking upstream toward River Walk and illustrates the existing low level of the river edge and the mixed quality and usage of River Walk for both pedestrian and vehicular use. Ornamental planting define the pedestrian ramp connection to Bridge Street and occasional trees of varying maturity and species are apparent

further upstream along River Walk. As the view is taken close to low tide, the gravel beds used by roosting birds are visible within the river channel.

As the ground levels along River Walk are so low, the height of flood defences required is typically c. 2.0m above the level of River Walk. The objective of the landscape and public realm design is to maintain the important visual and amenity relationship between River Walk and the river corridor and also to enhance the built environment of River Walk in a manner that will facilitate the ongoing amenity value and catalyse future regeneration of the rear of properties.

South Quay

South Quay leads downstream from Arklow Bridge and also has an open aspect to the Avoca River and North Quays. The built environment is substantially different from River Walk, comprising mostly two storey apartment buildings, and terraced and semi-detached dwellings, before turning into Arklow Harbour (also referred to in this EIAR as Dock). South Quay varies considerably in width from less than 10.0m to over 30m.

Typically, it comprises a wide carriageway with informal on-street parking and localised areas of landscaping on either the built or the quay side. For most of its length, there are either no footpaths or relatively short sections of narrow footpaths.

South Quay wall along the river edge varies in quality and integrity and includes sections that have been compromised by the placement of modern drainage infrastructure and sections that are relatively intact. At the bend in the river or pinch point, the large granite capping stones can be seen along the top of the quay wall and flush with the adjoining grass. The original stone quay wall in this location remains intact. Additionally, there are six old granite mooring posts set in the quay at this location however only the top portion of these stone elements are visible above ground level.

South Quay incorporates an attractive green area with street trees, the old Tyrell slipway and the Seafarer's Memorial Garden amenity space, before continuing into Arklow Harbour. South Quay is a popular walking route and continues around the harbour area to connect to South Pier and South Beach.

The upstream section of South Quay, from the Arklow Bridge to South Green, has a low concrete plinth wall to prevent accidental driving off the quayside (**Figure 4.24**).

View 8, **Figure 12.8.1**, (**Appendix 12.1**), is from the Arklow Bridge looking downstream toward South Quay and illustrates the existing low level of the river edge and the mixed quality and usage of South Quay and the diversity of building types and ages on the Quay. The narrow width of South Quay approaching Arklow Bridge is clearly visible and elements of the existing drainage infrastructure can be seen along the outside of the quay wall.

Beyond South Green, the road is separated from the quay by green space and there is no physical barrier (**Figure 4.25**).

View 9, **Figure 12.9.1, (Appendix 12.1)** is from South Quay near South Green where the cappings of the original quay wall can be seen forming the quay edge and the historic granite mooring posts are located in the grass verge. Young street trees are set within the quayside grass verge at regular spacings and are mostly *Acer platanoides* (Norway Maple) and category C2. The carriageway is wide and there are no footpath on either side of the road. Wide grass verges and extended driveways form the residential side of the roadway.

View 10, **Figure 12.10.1, (Appendix 12.1)** is from South Quay at the Tyrell slipway and illustrates South Quay becoming narrower towards the slipway and the presence of the original boatyard rail lines set in the roadway and leading to the slipway. An existing low flood defence wall is located either side of the slipway and demountable barriers are in place at the head of the slipway.

The Seafarer's Memorial Garden has an open quayside (**Figure 4.28**) and from here to the Arklow Harbour there is a low concrete wall along the river edge that is sufficiently high to deal with the designed flood defence level (**Figure 4.27**) but will need to be extended into and around Arklow Harbour.

View 11, **Figure 12.11.1, (Appendix 12.1)** is from South Quay at the Seafarer's Memorial Garden. The amenity has evolved over time with the help of the local community and is an important memorial to those members of the Arklow community who served and were lost at sea. While the amenity has been maintained, it is in part suffering lack of investment and upkeep. It is also located beside an exceptionally wide double road junction that cuts it off from the residential side of the quays. Trees include the Norway Maple at regular spacings along the kerb side as well as a number of ornamental Coryline within the space.

The required flood defence level reduces with distance downstream, however a wall will be required, typically no higher than a conventional restraint wall, or 1.15m, from Arklow Bridge to the Seafarer's Memorial Garden.

Arklow Bridge

The Arklow Bridge (Protected Structure, RPS A26), is a 19 arch stone bridge spanning 150m, and was constructed in the middle of the 18th century to provide connection between Arklow Main Street and Ferrybank on the northern side of the river.

While the upstream side of the bridge has been extended and heavily modified with modern construction, the downstream face of the bridge is an important, distinctive and defining structure of the Arklow townscape. The first arch, on the southern side of the river, joins the quay walls at River Walk and South Quay. Design and detailing of the interface between the bridge structure and the new quay walls was critical to ensure the integrity of the bridge. The Landscape and Public Realm design has been developed iteratively in collaboration with project teams for the Arklow WwTP and the FRS so as to ensure the new infrastructure does not obscure the important downstream elevation of the bridge and that none of the infrastructural components clutter or detract from the character of the bridge.

North Bank and the Arklow Town Marsh

The northern riverbank, upstream of Arklow Bridge, is characterised by mature mixed woodland and leads to the Arklow Town Marsh proposed Natural Heritage Area (pNHA, Site Code 001931) and extends c. 500m north of the river. Ground levels within the marsh are low but rise gently to the north and east. Ferrybank is an established settlement area along the Dublin Road and defines the eastern and north eastern edges of the marsh.

The designed flood defence level is such that levels along the eastern edge of the marsh must be raised in order to protect the Ferrybank area.

View 7, **Figure 12.7.1** in **Appendix 12.1**, is from the Arklow Bridge looking upstream towards the north bank and Arklow Town Marsh and illustrates the existing riverine character and mixed woodland setting of the river corridor. The view is taken close to low tide and the gravel can be seen just below the water in the foreground together with the row of in channel bushes and vegetation towards the north bank.

The works area along the north bank and Arklow Town marsh will include two site compounds (SC1 and SC3). The proposed development includes the establishment of additional landscaping in these areas.

SC1 will be established at Ferrybank, west of the Dublin Road and Brigg's Lane. The site currently comprises areas of field and grassland adjoining the eastern edge of the Arklow Town Marsh and includes an area of hard standing to the rear of the filling station. There is a terrace of 7 two-storey private dwellings along the western side of Ferrybank that back onto the proposed site compound area and have shared vehicular access via Brigg's Lane. There are hedgerows and scrub along many of the field boundaries. Tree Group G3 is noted in the Tree Survey Report (**Appendix 12.2**), as an area of dense unmanaged scrub woodland, impenetrable for detailed tree inspection, and comprising mostly early and semi-mature *Salix spp.*, *Acer pseudoplatanus*, *Alnus glutinosa* and scrub natural regeneration growing on wetland fringe and category C2. Five individual trees are noted, including T105 *Salix fragilis* category U, and T106 and T107 *Acer pseudoplatanus* category U, T108 *Pinus sylvestris* category B2 and T115 *Alnus glutinosa* category C2, together with a row of four early mature *Acer pseudoplatanus*, a mature *Salix spp.* and a mature *Tilia spp.*

SC3 will be established at a vacant site at the southern end of Ferrybank, upstream but adjacent to Arklow Bridge, and directly opposite the roundabout leading to North Quay. The site is derelict, with the previous dwelling demolished, and presenting areas of rubble and scrub vegetation leading to the adjoining northern river bank. The Arklow Town Marsh and associated drainage channels are immediately west of this site, and overhead electricity poles can be seen towards the rear of the site and beyond. A mixed tree group G6 is noted in the Tree Survey Report to the immediate north comprising *Salix spp.*, *Betula pendula*, *Acer pseudoplatanus*, *Fraxinus excelsior*, and *Malus domestica* probably associated with the garden of the demolished dwelling. They are category C2. Willow bushes in poor condition, category C2, are noted along the adjoining river bank. Tree Group G7 is noted west of the compound area immediately beyond existing drainage channel, forming the downstream end of the riparian tree line

along the north bank, and comprising *Salix spp.*, *Betula pendula*, and *Alnus glutinosa* category B2 and C2.

4.4.7.3 Overview of the Landscape and Public Realm Design

The proposed development will by its nature give rise to substantial physical changes that will be most noticeable to the public along the southern side of the river at River Walk and along South Quay.

The proposed embankment between the Arklow Town Marsh and Ferrybank will for the most part be less evident to the general public by virtue of it being in a much less accessible location.

The objective of the landscape design and public realm is to integrate the necessary infrastructure with River Walk and South Quay in a manner that re-invents the public amenity value of the river edge for the town and its people.

A new continuous riverside promenade will extend for over 1.0km from upstream of the town carpark along River Walk and South Quay to the Arklow Harbour. The promenade will be exclusively for pedestrians and will typically be a minimum of 3.0m in width but incorporating a series of wider terraces, green spaces and viewing platforms. The promenade will tie into the existing riverine River Walk upstream of the carpark and will tie in with the existing environment at Arklow Harbour.

The proposed public realm promenade, terraces, new tree planting and landscaping along the south bank are illustrated on **Drawing Nos 300 to 303** in **Appendix 4.2**. Photomontages are presented in **Appendix 12.1** of **Chapter 12 Landscape and Visual**.

Drawing Nos 300 to 306 in **Appendix 4.2** also provide details on the planting types and species proposed in addition to the identification of trees to be retained within the planning boundary both along the south and north banks.

4.4.7.4 River Walk

River Walk will comprise two distinct parts, including the pedestrian area to the rear of the carpark and the combined pedestrian and vehicular area between the carpark and Arklow Bridge.

Upstream of carpark to River Lane

River Walk, between the carpark and the river, will be ramped up and down to a maximum height of c. 1.35m above the existing walkway level over a distance of c. 85m (Refer to **Drawing No 300** in **Appendix 4.2**). The new ramps will be the full width of the existing walkway and will be at a gradient of 1:20 so as to be fully accessible to all users. At the mid-point, or high point, a viewing platform c. 6m x 8m, will be incorporated into the walkway cantilevered over the river and connecting via a new pathway directly to the carpark. A second set of ramps, c. 1.8m wide, will lead from the viewing platform along the outer side of the flood wall providing pedestrian access to a new terrace area and floating pontoon at the river edge and continuing c. 175m downstream along the river side of the new

wall. The flood defence wall along the downstream set of ramps will be 1.15m higher than the ramp surface, whereas upstream of the viewing platform, the ramps will incorporate a 1.15m high metal and timber railing along the river edge. The existing carpark steps at the corner of River Lane and River Walk will be modified to incorporate ramped access onto the new ramped River Walk as well as stepped access as at present.

Trees on the river bank and on the embankment between River Walk and the carpark will have to be felled including trees T14, T15, T16, T17 T22, T23 and T24 as shown in **Drawing No 300** in **Appendix 4.2**. Refer also to **Appendix 12.2 Tree Survey report** for further details on existing trees).

The planting proposed along River Walk as shown on **Drawing No 300** includes semi-mature tree species *Acer platanoides* 'Columnare' (Norway Maple), *Betula pendula* (Birch), *Crataegus laevigata* 'Paul's Scarlet' (Hawthorn), *Pinus sylvestris* (Scot's Pine), *Prunus avium* 'Plena' (Double flowered Wild Cherry) and ornamental shrubs and perennials, amenity grass.

The photomontage (View 1) presented in **Figure 12.1.2** of **Appendix 12.1** is from River Walk upstream of the carpark. It shows the proposed development with the main intervention being the introduction of the ramped River Walk pathway and associated floor defence wall along the river edge leading to a cantilevered viewing platform at the high point and the removal of the existing river bank trees. Additionally, the debris trap columns are readily visible traversing the river and the permanent ramp access for maintenance is visible in the foreground.

At the junction of River Lane and River Walk, the existing footpath and road levels need to be maintained to allow access. At this junction, the flood relief wall will be up to 1.85m in height. The wall will incorporate three 3.0m long panels of glazing with the glass extending from c. 600mm above footpath level to the top level of the wall so as to permit direct visibility to the river corridor and onto the new riverside terrace and pontoon on the river side of the wall. The junction at this location will be paved as a raised table, with the pedestrian promenade clearly defined from the shared vehicular area and presenting a strongly pedestrian environment.

The photomontage (View 2) presented in **Figure 12.2.2** of **Appendix 12.1**, is from the junction of River Walk and River Lane adjacent to the town carpark and looking upstream along the Avoca River. It shows the proposed development including the flood defence wall at c. 1.85m above River Walk and leading to the newly ramped section of River Walk beyond and the cantilevered viewing platform at the high point. The flood defence wall will be at its highest at this location however it will incorporate the three glass panels so as to permit visibility to the river corridor and also to the proposed new terrace area, walkway and floating mooring platform. Whereas the current junction of River Walk and River Lane is primarily a vehicular carriageway, the proposed development will transform the junction to one of high pedestrian amenity with stronger and more direct connections along River Walk and to the town carpark.

River Lane to Arklow Bridge

River Walk, from River Lane to the Arklow Bridge, is substantially wider and is used by pedestrians and for local vehicular access. The flood defence wall will typically be c.1.6m higher than the existing ground level. The proposed development however includes a promenade along the wall that will be elevated by c. 500mm so that the wall will be 1.15m high above the promenade.

The 500mm level difference between roadway and promenade will be formed using a combination of low landscaped embankments, planters and retaining walls with steps and short ramps at a number of locations to facilitate easy access from the road to the promenade. The elevation of the new promenade along the river edge will ensure that pedestrians can comfortably see over the wall to the river corridor. The promenade will be separated from the roadway at the lower level by a new landscaped embankment and accessed via gentle ramps and short flights of steps to ensure full accessibility. At key locations along the promenade, the wall will incorporate glazed sections for the full height of the wall so as to reinforce the relationship to the river and seating will be provided along the promenade. Refer to **Drawing Nos 300 and 301 in Appendix 4.2.**

Existing trees T1 to T11 inclusive, all category C2, will need to be felled in order to facilitate construction of the flood defence walls, underground WwTP interceptor sewer and other civil works (as shown in **Drawing Nos 300 - 301 in Appendix 4.2.** Refer also to **Appendix 12.2 Tree Survey report** for further details on existing trees).

The photomontage (View 3) presented in **Figure 12.3.2 of Appendix 12.1**, is from River Walk near Condren's Lane Upper looking downstream. It shows the proposed development including the flood defence wall at typically c. 1.15m above the proposed promenade and terrace level, with some sections following the profile of the outer pedestrian ramp as it rises to meet the elevated viewing platform cantilevered over the wall and river. The carriageway level remains at its existing level however the promenade and terraces are elevated and separated from the carriageway by low planters that will also serve as permanent seating. The promenade and terraces are distinctly pedestrian in character, with high quality paving and bespoke precast polished concrete panels to finish the wall. Dual lighting provides for the pedestrian spaces and carriageway and comprises LED luminaries with high cut-off so as to minimise any light spill to the river corridor. Parking spaces are defined along the carriageway and new tree planting will be provided to enhance to overall character of River Walk and to further reinforce the elevated promenade as a pedestrian only zone. The proposed planting schedule is presented in **Drawing Nos 300 - 301 in Appendix 4.2.**

Between Condren's Lane Upper and Arklow Bridge, the elevated promenade will widen at a bend in the river, from c. 3.0m to as much as 9.0m. The construction of the sheet pile walls in the river at this location will enable the provision of additional urban space between approximately 0m and 6m into the river on River Walk for a length of approximately 100m.

The promenade will incorporate a series of paved terraces, seat-level planters and landscaping, as well as providing both stepped and ramped access to a second viewing platform cantilevered over the flood wall and river. In the vicinity of the

terraces, the flood defence wall will incorporate sections of glazing to provide visual connection with the river for those sitting on the terraces.

The lower level of this portion of River Walk, between the promenade and buildings, will be upgraded as a shared surface and will include designated parking spaces, additional landscaping, as well as short flights of steps and ramps leading to the promenade and terraces.

The raised terraces will be a seat level relative to the lower level thereby providing permanent seating directly opposite the café and public house. The lower level and terrace levels will become a strong pedestrian amenity space with high quality paving, permanent seating, landscaping, trees and spill out space for the businesses along River Walk.

The photomontage (View 4) presented in **Figure 12.4.2** of **Appendix 12.1** is from River Walk approaching the Arklow Bridge and opposite the existing café. It shows the proposed development including the new flood defence wall constructed further into the river channel. The new wall alignment facilitates a substantial increase in pedestrian and amenity space along the river front. The widened River Walk will become an attractive and high-quality riverfront space that is a destination along the overall promenade and will support existing businesses at River Walk and catalyse further regeneration. The flood wall is only 1.15m above the elevated terrace level permitting direct visibility of the river corridor and yet incorporates three sections of glazing so as to ensure visual connection for those seated on the terraces.

View 5, **Figure 12.5.2 (Appendix 12.1)**, is from Bridge Street approaching River Walk looking upstream. Again, it shows the proposed development including the new flood defence wall constructed further into the river channel and facilitating the establishment of a substantial new public space along the river front. The new terrace areas are contiguous with the overall proposed river front promenade and are elevated so that the flood defence wall is only 1.15m high and facilitates views over the wall to the river corridor. Additionally, sections of glazing are incorporated into the wall so as to ensure visual connections with the river for those seated on the terraces. The terraces also include raised and flush planters with new tree planting and ground cover to further enhance the amenity value of the public space. The proposed planting schedule is presented in **Drawing No 301** in **Appendix 4.2**.

It is intended that the entire width of River Walk at this location, with only limited private vehicular access, becomes a strongly pedestrian amenity space with high quality paving, permanent seating, landscaping, trees and spill out space for the businesses along River Walk. The elevated promenade level will facilitate a fully accessible link to Bridge Street so that the promenade will continue seamlessly cross Bridge Street and onto South Quay.

View 6, **Figure 12.6.2 (Appendix 12.1)**, shows the proposed development including new alignment and height of the river edge defined by the new concrete faced wall, with the additional parapet height above the elevated River Walk promenade expressed as a high quality concrete finish with a precast concrete capping and sections of glazing at each of the main terrace areas. The parapet wall

leads to the elevated cantilevered viewing platform at the bend in the river further upstream. New tree planting is visible along River Walk.

The scale and extent of the flood defence infrastructure is more readily apparent when viewed from the river channel. It is noted that View 6 was photographed close to low tide and presents the worst case scenario and the wall be less prominent at higher tide levels.

Rip rap will be placed along the river edge where hydrological requirements permit so as to soften the visual appearance of the bottom of the wall where it joins the water and this rip-rap will also serve as a refuge to fauna using the river. The use of different concrete finishes will also assist in reducing the vertical scale of the wall.

4.4.7.5 South Quay

The proposed development will extend c.1,150m along South Quay downstream of Arklow Bridge. Along South Quay, the majority of the existing roadway and quayside will be reconfigured and upgraded to provide a continuous promenade walkway along the river side, revised road and parking arrangements, raised table junctions with side streets, new street lighting and landscaped verges.

The proposed development, designed in collaboration with the Arklow WwTP team, presents an opportunity to rationalise the use of space and enhance public amenity along South Quay. The first c. 260m of downstream of Arklow Bridge will be widened by up to 6.0m to facilitate laying of new underground drainage infrastructure. This additional width together with reallocation of quayside space further downstream, permits the establishment of a continuous promenade along the entire length of South Quay from Arklow Bridge to Arklow Harbour. The promenade will typically be 3.0m in width however at various locations, including vehicular junctions, green spaces and the Seafarer's Memorial Garden, will be up to 6.0 and 9.0m wide. Dedicated parking spaces will be provided on one or two sides of the road depending on location and raised table junctions will present a stronger pedestrian environment and moderate vehicular movement.

The landscape design and public realm along South Quay is shown on **Drawing Nos 301 to 303 in Appendix 4.2.**

Construction will require removal of all of the existing street trees at South Green and the Seafarer's Memorial Garden at the outset, however the revised South Quay proposals include planting of new street trees along much of the riverfront promenade and also along section of the residential side of the new street. New tree planting in be provided in dedicated tree pits so as to ensure their vitality and also to provide a sense of separation between people using the promenade and vehicular traffic.

Tree removal along both sides of the road and at the Seafarer's Memorial Gardens will including T32 to T72 and G8 (primarily *Acer platanoides* and with occasional *Crataegus monogyna*, *Prunus spp.*, *Tilia cordata*, *Sorbus aucuparia*, *Acer pseudoplatanus* and all category C2, and 5 No. Cordyline category C2 at Seafarer's Memorial Garden. Refer to **Appendix 12.2 Tree Survey report** for further details on existing trees).

Planting proposed along South Quay as shown on **Drawing Nos 301-303** in **Appendix 4.2** includes semi-mature tree species: *Acer platanoides* 'Columnare' (Norway Maple), *Ulmus* "Lobei" (Elm), *Prunus avium* 'Plena' (Double flowered Wild Cherry), ornamental shrubs and perennials and amenity grass.

The cross section of the new South Quay includes designated on-street parking alternately on one or both sides of the road, with some sections of potential parking given over to increased amenity space in the form of grass verges and new tree planting.

Near South Green, the flood relief wall alignment will switch from being within the river to being on the existing south quay. At the bend in the river or pinch point, the new wall will be constructed c.2.5m back from the original stone quay wall so that the original stonework and cappings can be retained and restored along this section. The six granite mooring posts currently located in the grass verge will be lifted and re-set along the outside (river side) of the flood relief wall, adjacent to the existing quay wall.

The green space at South Green will be integrated with the promenade to maximise amenity value, with the roadway being realigned closer to the residential properties on the opposite site of South Quay. At the Tyrell slipway, a raised table will be incorporated across the full width of South Quay and the location of the line of the original rail tracks will be demarcated in the new paving. Full height glass sections will be provided along the slipway and the existing interpretive panels will be upgraded and installed at the slipway. Similarly, at the Seafarer's Memorial Gardens, the public realm and soft landscaping will be upgraded and integrated with the new promenade and the interpretive panels, anchor and seating will continue to be a local point of interest and amenity.

The flood defence level required downstream of Arklow Bridge along South Quay is lower than upstream at River Walk. As such, the height of the wall will be 1.15m and the relationship between South Quay and the river will be maintained. Additionally, the top of the wall will be chamfered so that the inner edge of the wall is typically 900mm high and the top surface will slope upwards to the 1.15m height on the river side. This cross section will present that wall height along the quay as lower than a simple 1.15m high cross section and the chamfered surface will provide a perch for adults and an elbow rest for children to spend time enjoying the river.

View 8, **Figure 12.8.2 (Appendix 12.1)**, is from the Arklow Bridge looking downstream toward South Quay and shows the proposed development including the new alignment of the river edge defined by the new concrete faced wall, with the additional parapet height required for flood defence above the level of South Quay expressed as a high-quality concrete finish with a precast concrete capping. New tree planting is clearly visible as a continuous feature along South Quay that will define the new promenade located immediately behind the parapet wall.

As with View 6 of River Walk, the scale and extent of the flood defence infrastructure is more readily apparent when viewed from the river channel. Rip

rap will also be placed along the river edge where hydrological requirements permit so as to soften the visual appearance of the bottom of the wall where it joins the water. The same approach to using different concrete finishes as at River Walk will also assist in reducing the vertical scale of the wall.

View 9, **Figure 12.9.2 (Appendix 12.1)**, shows the proposed development from South Quay near South Green and includes the provision of a new promenade along the river front and the establishment of the parapet section of the flood defence wall up to a height of 1.15m above promenade. New tree planting will be located in the new grass verge between the promenade and the carriageway provide a distinctly pedestrian amenity that is segregated from the carriageway. The parapet will be clad in polished precast concrete panels and profiled cappings such that the inner edge of the parapet is c. 900mm high and rising to 1.15m at the outer edge. The original stone quay wall and cappings, together with the relocated granite mooring posts, will be visible over the flood relief wall along the river edge.

The proposed development will represent a substantial change in the appearance of South Quay however the provision of a dedicated high-quality tree-lined public promenade with inherent flood defence will ultimately result in landscape and visual effects that are moderate and positive.

View 10, **Figure 12.10.2**, is from South Quay at the Tyrell slipway and shows the proposed development including the provision of a new promenade along the river front, the establishment of the parapet section of the flood defence wall up to a height of 1.15m above promenade and reconfiguration of the carriageway so as to provide continuous pedestrian facilities and landscaped verges along both sides of South Quay. The carriageway at the slipway will be paved and the original boatyard rail lines retained and expressed in the paving and the line of the rails will also be expressed in the paving pattern across the promenade to the head of the slipway. Glazing panels will be incorporated within the parapet wall along the head of the slipway so to preserve the historical connection between the former boatyard and the slipway and river. Interpretive panels will be installed along the parapet wall to provide historical information about the boatyard.

View 11, **Figure 12.11.2 (Appendix 12.1)** at the Sea Farer's Memorial Garden, shows the proposed development including the continuation of the proposed promenade along South Quay leading to and connecting with the memorial garden. The carriageway and adjoining junction are rationalised and paved as a raised table so as to reduce vehicular dominance and speed and provide a more pedestrian friendly environment. The memorial garden will be repaved using a similar high quality paving material to the promenade and seating, the anchor and interpretive panel will be refurbished or replaced as appropriate. New trees consistent with those of the overall promenade will be planted in the adjacent landscape spaces and the flood defence parapet will be extended along the memorial facing the river channel.

4.4.7.6 Arklow Bridge

The southernmost arch, the first arch, of Arklow Bridge is located close to the buildings on South Quay with only a narrow quayside roadway. The challenge of

introducing drainage infrastructure along the southern bank and through the first arch, together with widening the South Quay, was resolved through an iterative design process to incorporate the infrastructural requirements while maintaining the physical and visual integrity of the bridge.

The proposed solution retains the alignment of the south bank quay wall for c. 10m and 3m upstream and downstream of the bridge. This section of quay wall receives the bridge and its southern piers and will be clad in a simple and contemporary polished concrete panel material that does not try to compete or blend with the bridge but allows the historic bridge to be clearly distinguished and showcased from any later adjoining interventions. Importantly, the solution also allows the full length of the elevation of the 19 arch bridge to remain visible from both sides.

4.4.7.7 North Bank and the Arklow Town Marsh

The tie in of the proposed Arklow Town Marsh embankment at the Arklow Bridge will include a short section of sheet piled and concrete faced wall. The top of the wall will be c. 1.2m above road level however the bottom of the wall will extend downwards into the riverbank and could be up to 3.0m high above the existing river bank level. In order to reduce the visual presence of this piece of infrastructure when viewed from Arklow Bridge and River Walk, it is proposed to reinforce/reform the river bank along the base of the new wall and to tie it into the main embankment so that only the top 0.6m of wall remains visible. Low level planting will be provided along the new riverbank and will integrate the top section of wall upon establishment.

The landscape design/public realm drawings (**Appendix 4.2**) provide details on the planting types and species proposed in addition to the identification of trees to be retained within the planning boundary.

Vegetation to be removed includes the existing trees associated with Site Compounds 1 and 3 as described in **Section 4.4.7.2** above but also includes sections of Rhododendron bushes on either side of the pathway to Shelton Abbey and stripping the footprint of the proposed embankment through the marsh to a depth of c. 1.0m.

Irish Native species rich grass and wildflower mixture is proposed along the river side of the new floodwall on north bank (SC3) and along the length of the embankment (Refer to **Dwg 304, 305 and 306** in **Appendix 4.2**).

Native Woodland planting (Area No 2) is proposed along the east side of the embankment and in SC1 (Refer to **Dwg 304, 305 and 306** in **Appendix 4.2**)) and will consist of: *Alnus glutinosa* (Black Alder), *Salix spp.* (Willow) and *Betula pubescens* (Downy Birch), *Prunus spinosa* (Blackthorn), *Crataegus monogyna* (Hawthorn) and *Viburnum opulus* (Guelder Rose).

As noted in **Section 4.4.3** above, the northern bank, upstream of Arklow Bridge, will be extended into the river channel for a length of c.75m and up to 12.0m in width. The realigned river bank will be formed using rip rap at the river bed level and inert dredge material and earth will be placed on top to match the levels of the

existing river bank. The extended river bank will be landscaped with mixed native woodland trees. This area is referred to as Area No 1 on **Dwg 304 (Appendix 4.2)** and will consist of: *Alnus glutinosa* (Black Alder), *Salix aurita*, *Salix cinerea oleifolia*, *Salix caprea*, *Salix petrandra* (Willow) and *Betula pubescens* (Downy Birch).

View 7, **Figure 12.7.2 in Appendix 12.1**, is taken from the Arklow Bridge looking upstream towards the north bank and Arklow Town Marsh. It shows the proposed development including the removal of the in channel vegetation, extension of the north bank into the river, modifications to the north bank adjoining the Arklow Bridge and one of the three floating roosting platforms.

4.4.7.8 Materials

The proposed infrastructural works at Arklow town will provide security for the town and its people. Through further multi-disciplinary design and the selection of materials, the overall development will ensure that the river frontage remains and is enhanced as an important amenity space of the town.

High quality paving materials are proposed to establish the promenade along the river front and will include natural stone aggregate paving flags in a range of colours and sizes to provide texture, colour and warmth. The wall will be clad in polished precast concrete panels with exposed aggregates selected to complement the paving and to present an integrated river edge promenade. Glazed panels will be incorporated at key locations within the wall to reinforce connectivity with the river. New trees will be planted in dedicated tree pits to ensure their vitality and to soften the quayside and enhance the overall amenity. Low planters and ground level planting will incorporate a range of plant species suitable to the coastal environment and will add further texture, colour and amenity.

Handrails at steps and ramps will be of high quality stainless steel uprights with stainless steel ropes and hardwood top rails similar to those on Arklow Bridge and lighting will be provided using lamp standards and two luminaires with one lighting the pedestrian space and the other lighting the road space.

4.4.7.9 Wall Finishes

The floor defence wall infrastructure will be built using sheet piling which will be encased in concrete and with a concrete beam cast along the top. The concrete beam will finish nominally at existing quay level.

The section of wall above the concrete beam and completing the flood defence level, will be formed using in-situ concrete. In order for the promenade to present as an attractive and high-quality amenity, and for the quayside as seen from the Arklow Bridge and North Quays to present as an integral part of an historic and contemporary port town, the final finish of the quay walls is important.

A hierarchy of finishes is proposed with the higher quality and finer finish along the pedestrian side and the more robust and heavier finish along the river side. The inner faces of the promenade wall are to be clad in polished precast concrete panels with exposed aggregate selected to provide colour and texture and to

complement the paving along the promenade and River Walk terraces. Panel edges will incorporate a shadow gaps to provide a sense of scale and modulation. The capping of the wall will also be precast and finished to be the same high quality and will incorporate a 45° chamfer on the inner side so that the vertical surface is kept c. 300mm lower than the effective wall height.

The riverside faces will include three distinct sections, including the low-level sheet piling which will be faced with either precast or in-situ concrete panels with vertical joints at up to 1.5m centres expressed as shadow gaps. Above this, the concrete upper panel will cover the concrete beam and the wall above and will be a finer finish and most likely in-situ concrete incorporating shadow gap recessed joints at c. 4.0m spacing so as to establish a horizontal band above the lower concrete casing. The third and top level will be the outer face of the wall capping which will be the same material as used on the promenade side and will incorporate a deeper shadow gap to as to reinforce the horizontal line.

In this manner, the new wall infrastructure will be broken down both vertically and horizontally in order to provide a sense of scale and modulation. The higher quality finishes and materials will be utilised where pedestrians have immediate access to the wall and where quality finishes will contribute most to the sense of place and amenity value. The more robust and heavier materials will be utilised on the river side where the expansive nature of the river corridor can absorb such finishes.

4.4.8 Land Requirements

The lands required to construct the proposed development are in the ownership of WCC and other landowners. The lands not in the ownership of WCC will be acquired pursuant to the following legislation:

- Form of Compulsory Purchase Order under Section 76 of, and the Third Schedule to, the housing Act, 1966, as extended by Section 10 of the Local Government (No.2) Act, 1960 and amended by the Planning and Development Act, 2000, as amended.
- Local Government (No.2) Act, 1960.
- Section 10 of the Local Government Ireland Act, 1898, as amended by Section 213 of the Planning and Development Act, 2000, as amended, as applied by Section 93 of the Water Services Act, 2007.

The Compulsory Purchase Order (CPO) includes, under the CPO Schedule, the extent of the following:

- Lands to be acquired (purchased),
- Permanent wayleaves,
- Permanent rights of ways,
- Temporary working areas.

The land requirements identified in the CPO are necessary to construct, operate and maintain the proposed development. The CPO drawings and schedules clearly identify the land plots required to construct the FRS including ownership/ reputed ownership/ occupiers and the associated area (size) necessary to facilitate the proposed development.

4.5 Separate Consents

4.5.1 Overview

This section provides an overview of the relevant consents, licences, authorisations and permits that will be required in addition to the consent for the proposed development from An Bord Pleanála (Refer to Section 1.3 of **Chapter 1 Introduction** for further information on the planning process).

4.5.2 Foreshore Licence/ Lease

Under the provisions of the Foreshore Act 1933 to 2014, as amended, a lease or licence must be obtained from the Minister for Housing, Planning and Local Government for development works on the State-owned foreshore.

A lease is generally issued for a development that requires exclusive occupation of the foreshore whilst a licence is generally issued for a development that does not require exclusive occupation of the foreshore.

A foreshore consent application will therefore be required for specific elements of the proposed development on the foreshore, including the following:

- The underpinning of Arklow Bridge
- Scour protection works.
- River dredging works.
- Debris trap and gravel trap including maintenance access ramp and tracks.
- Extension of River Walk and South Quay into river channel.
- Extension of north river bank upstream of Arklow Bridge

A foreshore consent application will also be required to accommodate the temporary works for the construction of the proposed scheme. This will include:

- access/egress points to the river in connection with the bridge works, the dredging works, the construction of the debris and gravel traps and the sheetpiled walls along the south bank;
- working areas in the Avoca River to construct the bridge works, the debris and gravel traps, storm water drainage network and sheet pile walls.

4.5.3 Other Licences/ Consents Required

Any other relevant consents, authorisations and /or licences required for the proposed development are described in detail as appropriate in **Chapter 7 – 19**. A

summary of likely requirements (please note the list below is non-exhaustive) is provided below:

- Derogation licence from National Parks and Wildlife Service of the Department of Housing, Local Government and Heritage (in accordance with Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No 477 of 2011) to undertake construction works that may disturb individual bat roosts and their breeding and resting places (Refer to **Chapter 10, Biodiversity** for further information).
- Licence for archaeological excavation from the National Monuments Service of the Department of Housing, Local Government and Heritage (Under Section 26 of the National Monuments Act 1930 to 2014) for any intrusive works that would require archaeological excavation and/ or monitoring.
- Licence to use a detection device from the National Monuments Service (under Section 3 (5) of the National Monuments Act 1987) for the deployment of metal detectors during any archaeological activities.
- Licence for a dive survey from the National Monuments Service (under Section 3 (5) of the National Monuments Act 1987) for any underwater archaeological activities.
- Section 50 Consent from the Office of Public Works (in accordance with the Arterial Drainage Act 1945 and 1995 and The European Communities (Assessment and Management of Flood Risks) Regulations 2010 and 2015) to undertake any works to Arklow Bridge that may impact on flood risk;
- Relevant waste permits from the EPA (in accordance with the Waste Management Acts 1996 to 2011) to ensure compliance during the removal, transfer and disposal of dredge spoil; and

4.6 Operation of the Proposed Scheme

4.6.1 Overview

This section describes the likely operational and maintenance activities of relevance of the proposed FRS.

4.6.2 Maintenance and Monitoring

4.6.2.1 Requirements

Over time, natural processes will change some aspects of the proposed development as follows:

- vegetation will continue to grow along the river banks below the design flood level;

- floating debris including trees and branches will be carried down river during flood events;
- hydrogeomorphological processes in the Avoca River will continue and result in the continuing transport of sediment down river;
- sediment resulting from surface water runoff will settle in the pump sumps and drains;
- wear and tear on the electrical and mechanical components of the pumping station.

Consequently, regular maintenance activities 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 (as described in **Section 4.4.3**);
- 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 (as described in **Section 4.4.3**);
- 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, debris trap piers and on Arklow Bridge.
- Nest boxes on Arklow Bridge.

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

4.6.2.2 Stormwater Drainage System

The stormwater pumps will be electrically operated with provision for connection to a mobile generator as a back-up option. Use of the pumping stations will be very infrequent, averaging less than once in five years and as such, emissions will be insignificant.

The stormwater pumping stations will require routine and non-routine maintenance of all mechanical, electrical and control equipment.

Typically, six-monthly inspections will be carried out to ensure all equipment is functioning as intended and in particular, that pumps are operating properly. There will be no waste expected from these maintenance events.

A telemetry system will monitor the pumping stations and inform operators through an alarm system of any faults such as power failure, pump failure or excess water levels. These alarms will require immediate attention.

All non-return valves will require routine maintenance to ensure that any debris is removed from them and that they can operate effectively.

4.6.2.3 Debris and Gravel Trap Maintenance

Maintenance of the debris and gravel traps will typically be carried out at times of low river flow and ideally during the summer months (May-September inclusive) except in the case of emergency. A permanent ramp will be constructed on the southern (right) riverbank approximately 50m upstream of the traps as part of the scheme. A tracked excavator will form a temporary ramp from adjacent riverbed gravels to extend the permanent ramp into the river. The excavator will travel on the riverbed close to and parallel to the riverbank until it reaches the location of the traps. The excavator will then form a causeway across the river to the northern bank, utilising gravels from the gravel trap and/or from the riverbed in the vicinity of the causeway. The top of the causeway will be approximately 300mm below water level. A mechanical grab and a dump truck will then be utilised to remove debris from the debris trap. On completion, the excavator with a dump truck will remove the causeway and any excess gravel in the gravel trap. The temporary ramp will also be removed.

Maintenance will typically be on an “as needs” basis as the quantities of gravel and floating debris will be determined by flows in the river. For the purposes of the EIAR, annual maintenance will be assessed as being carried out on both traps. The volume of material to be removed at any one time is not expected to exceed 350m³. This material will be removed to a suitable soil recovery facility. Refer to **Chapter 15, Resource and Waste Management** for further information.

4.6.2.4 Channel Maintenance

The altered channel profile and the provision of a gravel trap upstream of Arklow Bridge will reduce significantly the level of maintenance required for the river channel. It is expected however that there will be some level of sediment settling along the channel related to the flood scheme. Some dredging of the channel will

be required from time to time. This will follow a similar methodology as the capital dredging as described in **Section 5.5.2 of Chapter 5 Construction Strategy** and will be dependent on where deposition occurs. This is estimated that maintenance dredging will be required every ten years but will be based on periodic surveys of the riverbed levels.

4.6.2.5 Riverbank Maintenance

Removal of branches and vegetation impacting on flood flows in the river will be carried out to improve the conveyance capacity of the river channel. This will be carried out annually, typically in Autumn prior to the winter flood season and over the stretch of river upstream of Arklow Bridge as far as the gravel and debris traps. Vegetation growing on Arklow Bridge will be removed as necessary as per the recommendations detailed in the Conservation Engineering report included in **Appendix 11.8**.

4.6.2.6 Landscape and Public Realm Maintenance

There will be periodic inspection of paved areas, footpaths, roads, street furniture, etc. Maintenance will be provided in response to such inspections e.g. cracks in footpaths, potholes in asphalt surfaces, failure of pavements and paving slabs, etc.

4.7 Decommissioning of the Proposed Scheme

Wicklow County Council considers Arklow FRS 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.