Wicklow County Council and the Office of Public Works

# Arklow Flood Relief Scheme

## Response to Submissions relating to Planning & Environmental Matters (ABP ref 301368-21 & 310377-21)

D5246

Issue | 12 January 2022



Job number D5246

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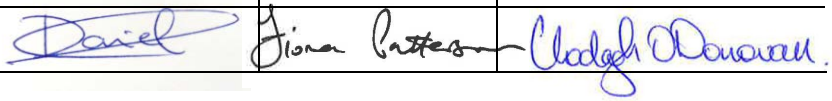
| | | Signature |  | | |
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# Contents

## Appendices

# 1 Introduction

On 31st May 2021, an application was made by Wicklow County Council (WCC) for approval from An Bord Pleanála (ABP) pursuant to Section 226 of the Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001 (as amended) for the proposed Arklow Flood Relief Scheme development. 22no submissions were received by the Board in relation to this application. The ABP Case Number is ABP-310368-21.

On the same date, an application was also made by WCC for approval from ABP regarding Wicklow County Council Compulsory Purchase (Arklow Flood Relief Scheme) No. 2 Order 2021. 8no. objections were received by the Board against the above compulsory purchase order. Some of the issues contained within the 8no. objections related to planning and development and environmental matters. The ABP Case Number is ABP-310377-21.

On 2nd December 2021, a request was made by ABP to WCC to make observations in relation to the submissions received by ABP for ABP-310368-21 (Section 226 Planning and Development application). The submission in response to this request must be received by the Board not later than 5.30pm on 13th January 2022.

This report has been prepared by Arup on behalf of Wicklow County Council and the Office of Public Works in response to the request received from ABP on 2nd December 2021 and consists of observations made in relation to the submissions received by ABP for ABP-310368-21 (Section 226 Planning and Development application).

This report prepared by Arup also consists of observations (relating to planning and development and environmental matters only) made in relation to the objections received by ABP for the above Compulsory Purchase Order ABP-310377-21 (CPO).

# 2 Methodology

This report consists of:

- observations made in relation to the submissions received by ABP for the above Section 226 Planning and Development application (ABP-310368-21) and;
- observations (relating to planning and development and environmental matters only) made in relation to the objections received by ABP for the above Compulsory Purchase Order (ABP-310377-21).

The report is divided into a number of topics which relate to the various issues/concerns observed in the submissions for ABP-310368-21 and objections for ABP-310377-21. Some of those topics are further divided into sub-topics. Each of the sub-topics include a brief summary of the issue and a response.

Section 3 (*Scheme Developments*) of this report provides details on scheme design changes now proposed in response to the submissions/objections. Section 20 (*Schedule of Additional Environmental Commitments*) of this report provides a list of the additional environmental commitments that are now proposed in response to the submissions/objections in addition to those proposed in the EIAR and NIS.

All of the submissions made in relation to the Section 226 Planning and Development application (ABP-310368-21) are listed below in **Table 2.1** and are referenced where necessary in this report as S1, S2 etc. For example, S1 relates to the Health Service Executive (HSE) submission.

All of the objections made in relation to the compulsory purchase order ABP-310377-21 are listed below in **Table 2.2**. A response to the planning and development and environmental observations within those objections only are included in this report and are referenced where necessary throughout this report as CPO1, CPO2 etc. For example, CPO1 relates to the Patrick and Patricia Ivory objection.

**Table 2.1: List of submissions received for Case No ABP-310368-21 (S226 Planning and Development application)**

| Reference | Submissions received for Case No ABP-310368-21 (S226) |
|---|---|
| S1 | Health Service Executive |
| S2 | Development Application Unit (DAU) (1) |
| S3 | Development Application Unit (DAU) (2) |
| S4 | Jennifer Whitmore TD |
| S5 | Transport Infrastructure Ireland (TII) |

| Reference | Submissions received for Case No ABP-310368-21 (S226) |
|---|---|
| S6 | Geological Survey Ireland |
| S7 | Inland Fisheries Ireland |
| S8 | Arklow Rowing Club |
| S9 | An Taisce |
| S10 | Steven Matthews TD |
| S11 | Arklow Marine Services |
| S12 | Deirdre Burke and Others |
| S13 | Peir Leonard |
| S14 | Con Nyhan |
| S15 | Save Maritime Arklow Group |
| S16 | Jonathan O'Toole |
| S17 | Arklow Sea Scout Centre |
| S18 | Arklow Marina Limited |
| S19 | Cornelius Young and Others |
| S20 | Elizabeth and Nicola Kenny |
| S21 | Christine McElheron |
| S22 | Irish Water |

**Table 2.2: List of objections received for Case No ABP-310377-21 (CPO)**

| Reference | CPO Objections received for Case No ABP-310377-21 (CPO) |
|---|---|
| CPO 1 | Patrick and Patricia Ivory |
| CPO 2 | Roadstone Limited |

| Reference | CPO Objections received for Case No ABP-310377-21 (CPO) |
|---|---|
| CPO 3 | Graeme McWilliams and Crag Digital Avoca Ltd |
| CPO 4 | Elizabeth and Nicola Kenny |
| CPO 5 | Christine McElheron |
| CPO 6 | Michael Kavanagh Arklow Slipway Ltd |
| CPO 7 | Estate of Malachy McDaniel Stone |
| CPO 8 | Proinseas O Brionn |

# 3 Scheme Developments

A number of changes are now proposed to the design of the proposed scheme in response to the submissions received for the Section 226 Planning and Development application (ABP-310368-21) and the objections received by ABP for the Compulsory Purchase Order ABP-310377-21. These changes are listed below. These changes have also been taken into account in the observations to the submissions/objections addressed in the relevant sections below.

## 3.1 Glass Panels

As per the plans and particulars included in the planning application submitted (ABP-310368-21), glass panels were proposed at the following locations along the south bank of the Avoca River at a number of key locations as shown on Drawing Nos. 1036 and 1041 in Appendix 4.1 (*Scheme Drawings*) and on Drawing Nos 300-302 in Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR:

- One 8.0m long glass panel at junction of River Lane and River Walk at approximately Ch. 060 (8.0m total) upstream of Arklow Bridge.
- Two 3.0m long glass panels at the seating area along River Walk at approximately Ch. 105 (6.0m total) upstream of Arklow Bridge.
- Three 6.0m long glass panels at the seating area along River Walk upstream of the bridge at approximately Ch 280-310 (18.0m total) upstream of Arklow Bridge.
- One 8.0m long glass panel along former Tyrrell's Yard slipway at approximately Ch 440 (8.0m total) downstream of Arklow Bridge.

In total, 40.0m of glazing was proposed as per the plans and particulars included in the planning application (ABP-310368-21).

In response to the submissions/objections received by ABP, it is now proposed to include an additional 30.0m of glazing at the following locations listed below. Drawing Nos 1036-1042 and 1046 of Appendix 4.1 (*Scheme Drawings*) and Drawing Nos 301-302 of Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR have been revised to reflect these changes and are included in **Appendix A** of this report.

- Addition of two 6.0m long glass panels just downstream of Arklow Bridge on South Quay at approximately Ch 020 (12.0m total), as shown on revised Scheme Drawing No 1040 and revised Landscape Design and Public Realm Drawing No 301 in **Appendix A** of this report. This will open up views of the bridge downstream.
- Addition of three 6.0m long glass panels along South Quay at approximately Chainage 370 (18.0m total), as shown on revised Scheme Drawing No 1041 and revised Landscape Design and Public Realm Drawing No 302 in **Appendix A** of this report.

In total 70.0m length of glazing is now proposed on the south bank of the Avoca River (i.e. 32m upstream of the bridge and 38m downstream of the bridge). This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

## 3.2 Access to River at Dock

As per the plans and particulars included in the planning application submitted (ABP-310368-21), at the Dock, in the Harbour area, it was proposed to install an 8.0m long demountable flood barrier at the public slipway (approx. Ch 950) as shown on Drawing No 1042 of Appendix 4.1 (*Scheme Drawings*) of the EIAR. It was proposed that this would be **normally closed** with access arrangements being agreed with stakeholders requiring access. It is shown on Drawing No 1042 as "*Maintained Closed*".

In response to the submissions/objections received by ABP, it is now proposed that the 8.0m long demountable flood barrier at the public slipway (approx. Ch 950) will be **normally open** to facilitate regular access for users of the public slipway. A memorandum of understanding will be agreed between WCC and OPW regarding maintenance and closing of the flood barrier during flood events.

Drawing Nos 1042 and 1045 of Appendix 4.1 of the EIAR have been revised to reflect this change and are included in **Appendix A** of this report. The barrier is now shown on Drawing No 1042 as "*Maintained Open*".

This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

## 3.3 Change to parking layout along South Quay

To better provide for parking for residents at 1-4 South Quay and in response to Submission S19, it is proposed to reduce the extent of footpath widening in front of the houses and provide a dedicated area for parking in front of 1-4 South Quay. The revised street layout has now been revised as shown on Drawing No 303 of Appendix 4.2 (*Landscape Design and Public Realm Drawings*) and on Drawing No 1041 (approx. Ch 510) of Appendix 4.1 (*Scheme Drawings*) of the EIAR which are now included in **Appendix A** of this report). This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

## 3.4 CPO

The EIAR references effects in Chapter 16 (*Population and Human Health*) and 17 (*Material Assets*) at the lands associated with *Land Parcel No 100 Presbyterian Church.*

After the EIAR was printed but prior to submission to ABP, *Land Parcel No 100 Presbyterian Church* was omitted from the CPO submission to ABP.

The adverse residual effect during operation identified at this land parcel as noted in Section 16.7.2.1 of Chapter 16 of the EIAR from a loss of amenity/ community use therefore no longer applies. Similarly, the likely significant effects associated with Land Parcel 100 as noted in Appendix 17.1 (*Land Take Assessment*) of the EIAR do not apply.

A proposed alteration to the CPO is being submitted for consideration of An Bord Pleanála to amend Plot 125 from permanent to temporary acquisition during construction. The subsequent change in effects on Material Assets are addressed in Section 16 of this report.

A proposed alteration to the CPO is being submitted for consideration of An Bord Pleanála to amend Plot 124d from permanent to temporary acquisition during construction. The subsequent change in effects on Material Assets are addressed in Section 16 of this report.

# 4 Justification for the Design of the Proposed Scheme and Alternatives Considered

## 4.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to proposed design of the flood defences. The concerns raised in these submissions/objections relate to the following:

- Objection to the extent and scale of solid concrete flood defence walls. Justification for 1.2m high walls. Objection to loss of views of river from the south bank footpath – walls should be lowered. Concern on the design flood level chosen. Reduce the height of the walls along South Quay and increase dredging
- Integrated approach for surface water management in the entire catchment area of the Avoca River. Natural flood plains and wetlands of the Avoca River, upstream of Arklow town should be protected from development. Buffer zones and SUDS features as outlined in the IFI Document "Planning for Watercourses in the Urban Environment"
- Congestion of ground works including pump station no 1 west of bridge is excessive. Alternative locations should be considered for pump station
- More detail required on the maintenance of floating roosting platforms over time
- Objection to the siting of the proposed debris trap and gravel trap at chosen location. Objection to the annual maintenance of debris trap requiring river access at south bank and consequent maintenance construction impacts. Detailed design should be provided and agreed in respect of the Debris and Gravel traps to be constructed. Location of Debris and Gravel traps will prevent use by small craft water activities
- Requested extension of dredging of harbour/river from pier head to the bridge, sheet piling of both sides of N&S Quays, possible provision of larger roads i.e., N&S Quays being widened
- Concern that the works on the north bank will worsen flooding impacts on South Quay
- Design of embankment, fencing and access, alternative design options considered
- Cumulative impacts of the FRS & WWTP works taking place at the same time would be excessive – phasing agreement needed between WWTP & FRS.

## 4.2 Response

### 4.2.1 Scheme Design

The design of the Scheme is described in Chapter 4 (*Description of the Proposed Scheme*) of the EIAR. In summary, the heights and extents of the flood defence walls and embankments have been determined by detailed hydrological and hydraulic analysis to alleviate flooding for all events up to the 1% Annual Exceedance Probability (AEP) (1 in 100) for fluvial (river) flood events and the 0.5% Annual Exceedance Probability (1 in 200) coastal flood events along the Avoca River and estuary through Arklow Town.

The height of the proposed flood defence walls along South Quay and River Walk is typically 1150mm above the proposed finished ground level on the land side of the wall. This height is determined by either the design flood height plus an allowance for freeboard or by a standard safeguarding height where there is a significant drop on the river side of the wall. Freeboard is provided to allow for uncertainties in the design calculations of the flood relief scheme and is in fact a margin of safety. Uncertainties relate to the hydrological assessment, tide levels, surge, wave action and hydraulic modelling parameters such as the afflux at Arklow Bridge, roughness of the bridge arches, roughness of the river bed after dredging works and sedimentation on the river bed after the dredging works). The design resulted in the inclusion of an allowance for freeboard of 300mm upstream of Arklow Bridge along Riverwalk and 600mm downstream of the bridge along South Quay where new flood defence walls are proposed. The design of the capping of the wall will result in the height of the internal face of the wall being 900mm, enhancing the visual aspect of the wall.

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. This is discussed further in Section 8 below.

The proposed dredging in the estuary and in particular, the lowering of the floor of Arklow Bridge, have been designed to reduce the design flood level due to fluvial flooding upstream of Arklow Bridge. The lower the floor of the bridge, the greater the conveyance capacity through the bridge and the lower the design flood level upstream of the bridge, resulting in a lower wall height. Various combinations of bridge floor levels and wall heights were modelled, and the optimum combination selected on the basis of the diminishing benefit of reducing the floor level of the bridge more than 1m. Refer to Chapter 3 (*Alternatives Considered*) of the EIAR for further details.

Downstream of Arklow Bridge, the dominant source of flooding is coastal in nature. As such, the design flood height is dictated by a combination of extreme tides, surge and wave heights. Further dredging will not impact on the design flood levels and heights of flood defence walls.

The purpose of the debris trap is to capture large floating debris and prevent it being caught in the arches of Arklow Bridge.

The design is based on 13no concrete piers crossing the river channel with typically a 3.4m wide space between adjacent piers. Overall, there will be 12no breaks between adjacent piers. It is very unlikely that all twelve would be blocked at any one time based on observations at Arklow Bridge over the years. The maintenance plan for the debris trap is to remove such debris if such an event occurs.

Refer to the proposed maintenance and monitoring during scheme operation which is set out in Section 4.6.2 of Chapter 4 (*Description of the Proposed Scheme*) for further details.

Stormwater drainage has been provided along the dry (land) side of the flood defence walls along Riverwalk and South Quay. Typically, stormwater will drain by gravity to the river. When levels in the river prevent gravity drainage, stormwater will overflow to adjacent pumping stations and be pumped to the river. The locations of outfalls and pumping stations have been determined by lengths of drains and gradients as well as ensuring there is access for routine maintenance of the pumping stations.

The EIAR has taken into account all aspects of the construction and operation of the entire scheme as proposed. Refer to the relevant chapters of the EIAR and the sections in this report for specific details.

### 4.2.2 Surface Water Management

Natural Water Retention Measures (NWRM), also known as Natural Flood Management, involve techniques that aim to work with natural hydrological and morphological processes, features and characteristics to manage the sources and pathways of flood waters. These techniques include the restoration, enhancement and alteration of natural features and characteristics, but exclude traditional flood defence engineering that works against or disrupts these natural processes. They typically require cooperation of landowners in the upper parts of a catchment and take a longer time to implement.

Studies have shown that NWRM can be effective at reducing flooding in small catchments for frequent floods, that is, in catchments less than 10km$^2$ and for floods up to a 10% AEP (1 in 10) chance of occurring in any given year. NWRM are also more effective in catchments with more gradual gradients rather than steeply sloping catchments. The Avoca catchment is approximately 652km$^2$ and is considered to be a relatively steep catchment with small areas of natural flood plains. The design standard in relation to fluvial flooding for the Arklow FRS is the 1% AEP (1 in 100).

It was considered therefore that NWRM would not be appropriate to provide the required level of protection to address the existing flood risk in Arklow. In addition, NWRM have no impact on coastal flooding. This was considered at the screening assessment of flood alleviation measures described in Section 3.3 of the EIAR.

Further catchment details can be found in Chapter 14 (*Water*) of the EIAR.

Surface water management policies such as sustainable urban drainage systems (SUDs) and development on flood plains are included in Wicklow County Council Planning Policies. These can be effective in reducing the future flood risk in Arklow but will not have an impact on the existing flood risk.

### 4.2.3 Riparian Corridor

The provision of a riparian corridor along both sides of watercourses is beneficial in terms of biodiversity and continuity of ecosystems. It can be achieved more readily in new developments than in existing established developments.

In Arklow, the requirement for flood defence walls along the south bank of the Avoca on Riverwalk and South Quay presents challenges in relation to the competing interests i.e., move the line of the wall farther from the existing river bank, thereby allowing space for a dedicated riparian corridor with an increase in visual impact of walls on riverside properties and also moving traffic closer to riverside properties. In the design of the Scheme, a balance was sought between these competing interests.

Along Riverwalk, a riverside path is proposed on the river side of the flood defence wall at approximately existing riverbank levels. Also, it is proposed to provide a raised area over a length of 105m extent adjacent to the river bank as a refuge area for aquatic animals. On South Quay, this proposal is replicated over a length of 165m. Refer to Sections 4.4.3, 4.4.5 and 4.4.7 of Chapter 4 (*Description of the Proposed Scheme*) of the EIAR for further details.

### 4.2.4 Appearance and Maintenance of Floating Roosting Platforms

Section 4.4.3 of Chapter 4 (*Description of Proposed Scheme*) of the EIAR describes the proposed 3no. roosting platforms in terms of their purpose and configuration. These man-made roosting platforms (floating islands) will be approximately 8m x 5m each. They will be low platforms with edges and finished in a layer of gravel and will provide roosting areas for birds at all stages of the tide. They will be constructed from suitable buoyant materials or a composite of materials and they will be anchored to the bed of the river with concrete anchor blocks and chains. See example in **Figure 4.14** of Chapter 4 of the EIAR and refer to **Drawing No 1003** of **Appendix 4.1** of the EIAR.

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 a visual representation of the proposed roosting platforms) of **Appendix 12.1** of Chapter 12 (*Landscape and Visual)* of the EIAR.

It is expected that routine inspection will be carried out to check for damage, wear and tear to the installations. Routine maintenance would involve removing debris caught on the platforms. It is envisaged that repairs will be required rarely and will be dependent on the final design of the platforms and the materials selected. All inspection, maintenance and repair will eb carried out at times when minimum disturbance will be caused to birds.

### 4.2.5 Location of the Proposed Debris Trap and Gravel Trap

The design basis for the gravel trap and debris trap is set out in Section 4.4.4 of Chapter 4 (*Description of the Proposed Scheme*) of the EIAR. The alternative locations considered are described in Sections 3.4.6 and 3.5.3 of Chapter 3 (*Alternatives Considered*) of the EIAR. The aspects considered in determining the optimum locations for the gravel and debris traps are listed below:

Functionality:

- Upstream of Arklow Bridge to reduce risk of blockage at bridge.
- Suitable pathway required for out-of-bank flow if flow through debris trap is impeded.
- Gravel trap to be immediately upstream of debris trap as velocities will be reduced at this location.
- Increase in flood levels due to blockage of debris trap should not increase risk of flooding upstream of debris trap.

Access for construction and maintenance:

- ease of access utilising existing road infrastructure.
- minimise disturbance to natural habitats.
- combine access for both traps.

Coordination with other proposed flood defence measures:

- Upstream of proposed flood defence wall on Riverwalk.
- Upstream of proposed dredged area.

Visual impact:

- Ensure piers for debris trap have least possible impact.

Following consideration of these factors including specialist hydrogeomorphology studies, a location in the vicinity of St. Mary's Carpark was considered to be the optimum location when all of the above criteria are considered. The gravel trap will be underwater and so will not be visible. The piers for the debris trap will be a slender oblong shape in plan and the top of the piers (3.35mOD) will be at approximately the same height as the adjacent flood defence wall (varies 3.32mOD to 4.50mOD) on Riverwalk. Access for maintenance is required and would be via Riverwalk and a temporary track from the river bank to the location of the gravel and debris traps. Scheme Maintenance is detailed in Section 4.6.2 of Chapter 4 (*Description of the Proposed Scheme*). A full assessment of the landscape and visual effects of the debris and gravel trap has been provided for in Chapter 12 (*Landscape and Visual)* of the EIAR and a visual representation is provided at Figure 12.1.2 of Appendix 12.1 *Photomontages* of the EIAR. This is discussed further below in Section 8 of this report.

### 4.2.6 Increased Harbour Works

The proposed FRS has by necessity to focus on providing flood protection for Arklow Town to the required design standard. Any proposals to carry out works in Arklow Harbour for other reasons are outside the scope of this project.

### 4.2.7 Cumulative Impacts of Flood Management Measures

All of the flood risk management measures proposed for the Arklow FRS were considered together in order to ensure that the overall benefits in terms of flood protection were fully assessed. This included heights of flood defence walls and embankments in all locations, reduction in flood levels through lowering the floor of Arklow Bridge and associated river channel dredging and stormwater drainage systems on the land side of the flood defence walls and embankments. Hydraulic modelling of the fluvial and coastal flooding processes ensured that any interactions between the various measures are fully considered and taken into account in the scheme design. The stormwater drainage systems will allow gravity drainage through the flood defence walls and embankment when water levels allow . The stormwater drainage system along the south bank will incorporate pumping stations to manage stormwater when flood levels prevent gravity flows to the river. The French drain at the land side of the embankment on the north bank of the Avoca will allow the area to drain by natural soakage into the ground when gravity flow is not possible. This will typically be for a relatively short period of time i.e., less than 24 hours.

### 4.2.8 Design of Embankment at Arklow Marsh

Embankments are preferred to walls for flood defence purposes where space permits as they are more ecologically suitable, have a lower carbon footprint and have a more acceptable visual appearance. As such an embankment was selected as the form of flood defence to be utilised along the eastern and northern sides of Arklow Marsh on the north bank of the Avoca River. This is described further in Chapter 4 (*Description of the Proposed Scheme*) of the EIAR. The proposed levels for the top of the embankment are based on the design flood heights with an allowance for freeboard and for settlement. The heights of the embankment are shown on drawing no. 88601-1034 with sections through the embankment shown on drawing no. 88601-1035. It should be noted that existing ground levels vary sharply throughout the marsh and along the footprint of the proposed embankment as well as across the embankment from the wet side to the dry side. The embankment height will vary from zero at Chainage 0m , where it ties into the existing ground at its western end, to approximately 2.2m high at Chainage 100m.

Note that the levels of the Dublin Road where it runs parallel to the line of the embankment varies from approximately 6.5mOD (Ch. 0) to 2.0mOD (Ch.100) over this extent and is at approximately 5.0mOD at Chainage 50m i.e., it falls about 3.0m from Ch.50 to Ch.100.

Section A-A in drawing No. 88601-1035 is located at Ch.57 approximately and shows the top of embankment level of 3.75mOD with a height of 1m, indicating an approximate ground level of 2.75mOD.

Drawing no. 88601-1033 shows a post and rail fence 5m. from the edge of the embankment on the dry side and a minimum of approximately 4m from the rear boundaries of the four properties located south-east of the Presbyterian Church on the Dublin Road. No works are proposed to the boundaries of these properties and the post and rail fence is considered to be adequate for the purposes of the FRS.

A 4m wide maintenance track is proposed to run along the majority of the embankment as alternative access is restricted by Arklow Marsh to the south and west of the embankment and residential and commercial properties to the north and east. As such, the access track will be the only means to have access for routine inspection and maintenance and possible repair. The access track will be suitable for use for heavy plant and machinery. The top of the embankment will allow pedestrian access for maintenance staff as well as for light machinery along the length to the embankment and allow the wet side of the embankment to be inspected and maintained.

### 4.2.9 Cumulative Impacts of Arklow Flood Relief Scheme and Arklow WWTP

Section 5.2.3 in Chapter 5 (*Construction Strategy*) of the EIAR discusses the interaction with the Arklow Wastewater treatment Plant (WWTP). These are discussed further in Section 5.5 of the EIAR. With all construction projects, there are risks associated with the delivery of these projects which impact on the project programme.

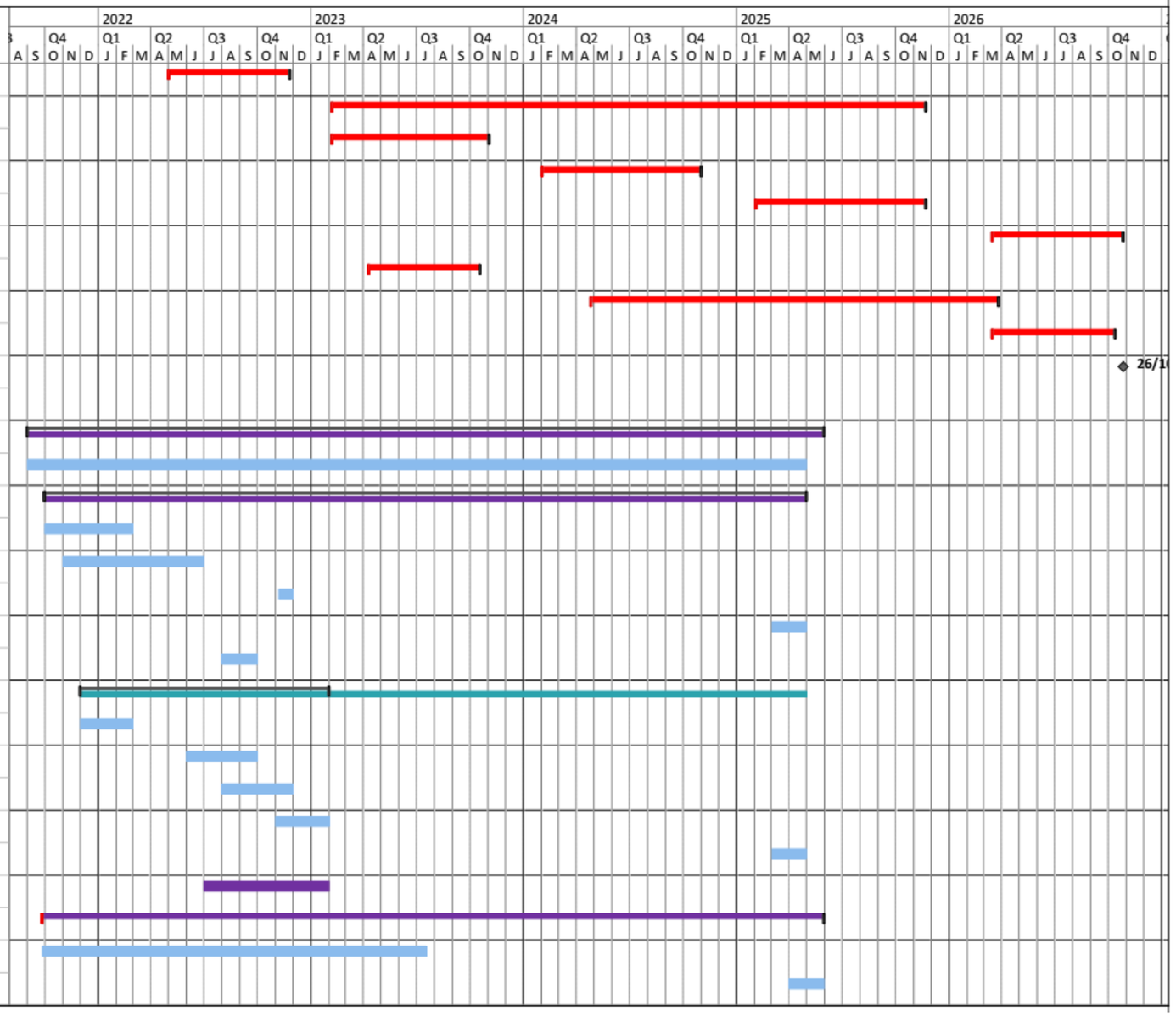
These can relate to obtaining statutory consents (planning, foreshore, etc.), procurement of consultants and contractors, and construction of the project amongst other things. At the time of preparation of the EIAR, the latest information with respect to the programmes for the flood relief scheme (FRS) and the WWTP were examined, and the likely cumulative impacts considered in each of the relevant sections of the EIAR. In the preparation of this response, the latest programmes were examined. The two programmes are shown together in Figure 2.1 overleaf.

At this stage, the FRS is at the Statutory Consent/Planning Stage and the WWTP is at Construction Stage. The main comments with respect to the two programmes as they now exist are:

- Access for the Work Package 1-Phase 1 works and Work Package 3 works on Riverwalk for the FRS will have to be coordinated for a number of months, until July 2023, with the WWTP Contractor.
- The estimated duration of the Work package 4 works for the FRS will be reduced by approximately four months as the majority of the instream works for the sheetpiled wall will have been completed by the WWTP Contractor in advance.

Figure 2.1 - FRS and WWTP Programmes

| ID | Task Name | Start | Finish |
|---|---|---|---|
| 1 | **Enabling Works** | **02/05/22** | **25/11/22** |
| 5 | **Work Package 1 - Arklow Bridge** | **06/02/23** | **21/11/25** |
| 6 | **Bridge Underpinning (Phase 1-south side)** | **06/02/23** | **02/11/23** |
| 17 | **Bridge Underpinning (Phase 2 Centre)** | **02/02/24** | **31/10/24** |
| 28 | **Bridge Underpinning (Phase 3-north side)** | **03/02/25** | **21/11/25** |
| 39 | **Work Package 2 - Dredging Works** | **16/03/26** | **26/10/26** |
| 47 | **Work Package 3 - Debris & Gravel Traps** | **10/04/23** | **17/10/23** |
| 52 | **Work Package 4 - Flood Defences (South Bank** | **26/04/24** | **26/03/26** |
| 59 | **Work Package 5 - Flood Defences (North Bank** | **16/03/26** | **12/10/26** |
| 64 | **Completion of Scheme** | 26/10/26 | 26/10/26 |
| 65 | | | |
| 66 | **Arklow WWTP** | **01/09/21** | **30/05/25** |
| 67 | WWTP Site | 01/09/21 | 30/04/25 |
| 68 | **North Quay** | **01/10/21** | **30/04/25** |
| 69 | SI & Service Diversions | 01/10/21 | 28/02/22 |
| 70 | Shafts | 01/11/21 | 30/06/22 |
| 71 | Tunnelling inluding shaft conversion to MI | 07/11/22 | 30/11/22 |
| 72 | Cross-connections | 03/03/25 | 30/04/25 |
| 73 | River Crossing | 01/08/22 | 30/09/22 |
| 74 | **South Quay** | **01/12/21** | **31/01/23** |
| 75 | SI & Service Diversions | 01/12/21 | 28/02/22 |
| 76 | Shafts | 01/06/22 | 30/09/22 |
| 77 | Sheet Piled Wall | 01/08/22 | 30/11/22 |
| 78 | Tunnelling inluding shaft conversion to MI | 01/11/22 | 31/01/23 |
| 79 | Cross connections | 03/03/25 | 30/04/25 |
| 80 | Bridge Works | 01/07/22 | 31/01/23 |
| 81 | **Riverwalk** | **27/09/21** | **30/05/25** |
| 82 | Open Cut Pipelines | 27/09/21 | 17/07/23 |
| 83 | Cross connections | 01/04/25 | 30/05/25 |



## 4.3 Conclusion

Overall, the scheme design is based on achieving a balance between the various aspects including technical, environmental, social and economic. The issues raised in the submissions and observations in relation to the design of the proposed scheme and alternatives considered have been fully considered, and having considered those issues, the conclusions of the impact appraisals remain as set out in the EIAR.

# 5 Construction Compound Locations, Alternatives Considered, Water Quality

## 5.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to the location of the construction compounds and the construction strategy. The concerns raised in these submissions /objections relate to the following:

- Justification for the location of each of the compounds.
- SC1 – site layout
- SC6 – site layout
- Objection to closing River Walk for 6 months – full loss of public access is not acceptable
- Detailed site-specific Construction Environmental Management Plan (CEMP)
- Construction should be subject to Invasive Species Management Plan and Construction and By Products Waste Management Plan
- Detailed method statements for the construction works,
- Construction phase concerns – working hours, traffic management, worker parking issues

Inland Fisheries Ireland, Irish Water and others raised concerns in relation to fisheries, water quality and construction.

- Construction of the temporary haul road should be with accumulated exposed gravels or otherwise suitable imported materials rather than using existing inert material from within the designated site works boundary.
- No tracking of plant/machinery in the live channel.
- Pile driving mitigation to reduce impacts on aquatic biota.
- River Water Quality Monitoring.
- Ensure that groundwater sources are protected so as to avoid deterioration in quality arising from proposed development. Ensure that there will be no negative impact to any of the IW drinking water sources which may be in proximity to the proposed development.
- Qualified Environmental Clerk of Works to oversee, monitor and report on all measures to protect aquatic environment.
- Collaboration of WWTP and FRS teams on management plans including environmental plans prior to the implementation and commencement of the works to minimise disruption to the aquatic environment.

## 5.2 Response

### 5.2.1 Site Compounds

Construction site compounds (SC) will be required for the duration of the construction works to accommodate offices, welfare facilities and storage for the various construction contracts required to deliver the proposed development. Other requirements were identified as the scheme developed, such as access to the construction work locations, access from the road network, access to the river and adequate space to archaeologically survey and inspect material dredged from the bed of the Avoca River.

Descriptions of the proposed site compounds are set out in section 5.3.2 of Chapter 5 (Construction Strategy) of the EIAR including the works proposed to develop them for their proposed uses and their reinstatement at the end of construction. Potential locations of the construction site compounds were carefully assessed in the development of the scheme and as much as possible, suitable locations were identified based on getting a balance in the distances to work areas and proximity to residential development. The preference was to use greenfield rather than brownfield sites and to use lands in the control of Wicklow County Council (WCC) rather than private property. As such, three of the six were in greenfield locations and four of the six sites selected were deemed to be in the control of WCC. These sites were considered to have lesser impact on adjacent residential properties, resulted in lesser impacts on private property and urban realm while addressing the scheme requirements.

Indicative site layouts have now been prepared for SC1 and SC6 and are included in **Appendix B** of this report as Drawing No. 88601-1081. In particular, the layouts indicate areas to be used for the archaeological monitoring of the dredged material. The layout for SC6 indicates how the Moore's Horsetail found at South Beach will be protected. It also shows that the locations where Clary Sage has been discovered will not be impacted. Refer also to Section 10 below in this document for further details on the protection of these plant species.

Drawing No. 88601-1081 in **Appendix B** of this report also indicates the sightlines available at SC6 to demonstrate safe egress from the site.

The EIAR has taken into account all aspects of the construction of the entire scheme as proposed including likely significant impacts of the site compounds themselves. Mitigation measures have been applied as necessary. Refer to the relevant chapters of the EIAR and the sections in this report for specific details.

### 5.2.2 Restrictions to Access on River Walk

Access for the general public to Riverwalk will be restricted during the construction of the Arklow FRS. This is to ensure the safety of the public by cordoning off the construction sites and temporary access roads. These restrictions will occur when:

- access is required for the phase 1 works on the upstream face of Arklow Bridge,

- access is required to the works area for the gravel trap and debris trap.
- access is required to and construction is in progress on the flood defence walls, drainage works and public realm works along Riverwalk.

Access will be provided at all times to properties along Riverwalk though at times it may be delayed, depending on the operations underway at that time. See also the following section 5.2.3.

### 5.2.3 Construction and Environmental Management Plan

A Construction and Environmental Management Plan (CEMP) has been prepared for the Arklow FRS and has been included as Appendix 5.1 of the EIAR. The CEMP requires contractors to engage with stakeholders and the wider community, in particular people who will be directly impacted by the proposed works. A Communications Plan will be prepared and put in place to ensure proper liaison and communication takes place with all stakeholders including statutory bodies, property owners and others directly impacted by the works and other contractors working on the FRS and the Arklow WWTP. The contractors will be required to have a dedicated member of their staff responsible for liaison and communications as well as an Environmental Manager to liaise with respect to environmental matters.

The CEMP includes an Invasive Alien Species Management Plan, a Soil Management Plan, a Construction and By-product Waste Management Plan and a Pest Control Plan. These will be developed by contractors to reflect their own operations and works prior to the commencement of site operations.

The CEMP also requires contractors to prepare detailed construction method statements for their various activities. These will address topics such as:

- Traffic and Transportation including a Construction Traffic Management Plan, liaison with the WWTP contractor where necessary, parking requirements, wheel washing, monitoring of impacts on traffic, etc.
- Air Quality and Climate including control of dust.
- Odour
- Noise and Vibration
- Biodiversity
- Archaeology, Architectural and Cultural Heritage
- Landscape and Visual
- Land and Soils
- Water

The contractors' CEMPs and method statements must take account of the mitigation measures set out in the EIAR and summarised in Chapter 21 of the EIAR. They must also coordinate their plans and activities with contractors employed by Irish Water to construct the Arklow WWTP. This will include minimising any impacts to the aquatic environment.

Piling activities along South Quay and River Walk have the potential to impact on aquatic animals.

It should be noted that these works are also included in the scope of the WWTP works and as such, may be carried out by others under the Irish Water consent for the WWTP. If the Arklow FRS contractor is carrying out these works a vibrating piling rig rather than a piling hammer will be utilised.

As mentioned above, the contractors will be required to employ an Environmental Manager to monitor and report on the implementation of the measures set out in the CEMP as well as any other environmental issues requiring attention. WCC, as developer, will also employ specialist environmental staff to monitor and report on the contractors' operations.

Section 4.2.2 of the CEMP states that the Employers Representative (ER) will be responsible for monitoring compliance with the CEMP. The ER team will include specialists with appropriate skills and experience as required to monitor site procedures and construction on behalf of the Employer (WCC), i.e. competent experts in construction, biodiversity, architecture, archaeology and heritage, noise, vibration, dust, waste, land, soils, contamination and/or water. In order to help fulfil their duties, the ER will carry out an audit of the CEMP at regular intervals to ensure that the Contractor is complying with the environmental provisions of the Contract.

A suitably qualified Environmental Clerk of Works will be appointed to oversee and monitor all measures taken to protect the aquatic environment as stated in Sections 21.2.4 and 21.2.8 of Chapter 21 (Summary of Mitigation, Monitoring and Residual Effects).

In response to the submissions/objections received, the Environmental Clerk of Works (ECOW) will also be available to monitor all other measures intended to protect the environment and will form part of the site supervision team.

In relation to an Environmental Monitoring Committee, it is noted that this has been conditioned by ABP for other flood relief scheme such as Bray (River Dargle).

### 5.2.4 Water Quality

As described above, the CEMP requires contractors to take account of and manage any risks to surface water and groundwater quality. The EIAR sets out extensive measures to protect water quality and to mitigate the risks of adverse impacts to water quality. These are summarised in Chapter 21 of the EIAR.

A water monitoring programme is to be implemented in advance of instream works commencing to establish a baseline of the river water quality.

As outlined in Section 5.5.2.5 of the EIAR, river water quality monitoring will be carried out for a period of twelve months in advance of the commencement of the instream works to establish a baseline for water quality. The EIAR outlines that the parameters to be monitored are suspended solids, dissolved oxygen, temperature, pH, turbidity and BOD.

To address the comment made by Inland Fisheries Ireland regarding water monitoring, the proposed suite of parameters to be monitored will also include heavy metals analysis.

To clarify, in order to establish the water quality baseline and to have a reasonable and defined starting point for comparison purposes, it is proposed to undertake quarterly monitoring at three sampling points during the twelve months prior to the commencement of the instream works. The sampling points are as follows:

- one sampling point located immediately upstream of the FRS instream works area;
- one located at the Arklow Bridge;
- one located downstream of the FRS instream works area.

Thereafter, during the construction works, monitoring will continue to ensure that there is no unacceptable impact on water quality. As such, monitoring will be undertaken at these same sampling points as follows;

- immediately before instream works commence;
- immediately after the first day of instream works; and
- monthly thereafter while instream works are in progress (typically during the period from May to September inclusive)

In addition, continuous monitoring of dissolved oxygen and temperature will be undertaken while instream works are in progress.

The above proposals have been included in the Schedule of Additional Environmental Commitments in Section 20 below.

Mitigation measures include the use of haul roads for plant working in the Avoca River, allowing adequate recovery periods during dredging works to allow water to clear, use of clean gravel and stone for construction of temporary access ramps, berms, haul roads, etc.

There are no public water drinking water sources within or adjacent to the scheme area.

## 5.3 Conclusion

The issues raised in the submissions and observations in relation to the construction site compounds, water quality and environmental protection and management have been fully considered. Based on the requirements of the CEMP and the various mitigation measures set in the EIAR and summarised in Chapter 21 of the EIAR, having considered those issues, the conclusions of the impact appraisal remain as set out in the EIAR.

# 6 Glass panels

## 6.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to glass panels. The concerns raised in these submissions/objections relate to the following:

- Objection to the minimal provision of glass flood panels in place of solid concrete walls, walls not acceptable on visual impact grounds. Increase the % of glass panels to retain the views of the river, river setting, Arklow Marsh and the Bridge.

## 6.2 Response

### 6.2.1 Use of Glass Panels

Glass walls have been used as part of flood defence walls in a number of locations in Ireland with varying success. Selective use can enhance a view and mitigate impacts caused by long lengths of high concrete walls. There are negative aspects to the use of glass walls. These include:

- Increased capital costs
- Increased routine maintenance requirements to keep the glass clean
- Vulnerability to vandalism including graffiti and damage

Vandalism and anti-social behaviour are often associated with public walkways including riverside paths and boardwalks.

In the Clonmel FRS, glass panels were used in the parapet of a bridge over a bypass channel. The bridge was completed in 2012 and was reportedly vandalised within days of its completion. Further damage was again caused in 2016 and there have been numerous reports of further damage since then. Currently, 27 out of the 42 panels are damaged.


**Figure 6.1: Photos of Damaged Glass Panels – Clonmel FRS**

Replacement of glass panels in a flood defence wall can take time as well as cost a significant amount of money. There is a clear increase in flood risk while repairs to damaged panels is being implemented.

### 6.2.2 Existing Situation

As per the plans and particulars included in the planning application submitted (ABP-310368-21), glass panels were proposed at the following locations along the south bank of the Avoca River at a number of key locations as shown on Drawing Nos. 1036 and 1041 in Appendix 4.1 (*Scheme Drawings*) and on Drawing Nos 300-302 in Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR:

- One 8.0m long glass panel at junction of River Lane and River Walk at approximately Ch. 060 (8.0m total) upstream of Arklow Bridge.
- Two 3.0m long glass panels at the seating area along River Walk at approximately Ch. 105 (6.0m total) upstream of Arklow Bridge.
- Three 6.0m long glass panels at the seating area along River Walk upstream of the bridge at approximately Ch 280-310 (18.0m total) upstream of Arklow Bridge.
- One 8.0m long glass panel along former Tyrrell's Yard slipway at approximately Ch 440 (8.0m total) downstream of Arklow Bridge.

In total, 40.0m of glazing was proposed as per the plans and particulars included in the planning application (ABP-310368-21).

### 6.2.3 Proposed Changes

In response to the submissions/objections received by ABP, it is now proposed to include an additional 30.0m of glazing at the following locations listed below. Drawing Nos 1036-1042 and 1046 of Appendix 4.1 (*Scheme Drawings*) and Drawing Nos 301-302 of Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR have been revised to reflect these changes and are included in **Appendix A** of this report.

- Addition of two 6.0m long glass panels just downstream of Arklow Bridge on South Quay at approximately Ch 020 (12.0m total), as shown on revised Scheme Drawing No 1040 and revised Landscape Design and Public Realm Drawing No 301 in **Appendix A** of this report. This will open up views of the bridge downstream.
- Addition of three 6.0m long glass panels along South Quay at approximately Chainage 370 (18.0m total), as shown on revised Scheme Drawing No 1041 and revised Landscape Design and Public Realm Drawing No 302 in **Appendix A** of this report.

In total 70.0m length of glazing is now proposed on the south bank of the Avoca River (i.e. 32m upstream of the bridge and 38m downstream of the bridge). This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

The justification of the scheme design including flood defence walls is addressed in Section 4 above. As noted in Section 4.2.1 above, the height of the proposed flood defence walls along South Quay and River Walk is typically 1150mm above the proposed finished ground level on the land side of the wall.

The provision of the additional sections of glass panels as proposed above will provide for improved visual connectivity to the river and Arklow Bridge from the seating areas located on South Quay immediately downstream of the bridge and at change approximate 370 on South Quay. While the provision of the additional glass panels will not change the overall assessment of landscape and effects, their provision will have positive effects in terms of improving the overall experience of the riverside public realm and in ensuring an overall positive effect from the proposed development into the medium and longer-term. Landscape and visual impacts are addressed further in Section 8 below.

## 6.3 Conclusion

The issues raised in the submissions and observations in relation to glass panels have been fully considered, and having considered those issues, the conclusions of the impact appraisals remain as set out in the EIAR.

# 7 Inadequate River Access/Removal of Slipways/ Emergency Access

## 7.1 Existing River Access

There are existing slipways at four locations along Riverwalk and South Quay. In addition, the footpath at Riverwalk allows direct access to the Avoca River. The proposed flood relief scheme (FRS) for Arklow will result in changes to the existing access as described below. These changes are described in Chapter 4 (Description of the Proposed Scheme) in the EIAR and shown on the accompanying drawings in Appendix 4.1 of Volume 3 of the EIAR.

## 7.2 Riverwalk (slip/steps)

### 7.2.1 Existing Situation

The slip at this location is suitable for small manually transportable craft – kayaks, etc. The slip itself is narrow and short and would not be suitable to launch a trailer-mounted boat.

**Figure 7.1: Riverwalk Slip**

### 7.2.2 Proposals in the FRS Planning Application

The current proposal is to demolish this slip and replace it with a floating pontoon (Ch 100) as shown in Figure 7.2 (extracted from Drawing No 300 Landscape Design and Public Realm, Appendix 4.2 of EIAR) and included in Drawing 1036 in Appendix 4.1 (**Appendix A** of this report). The floating pontoon 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. This ramp will also lead from the viewing platform along the outer side of the flood wall providing pedestrian access to the new terrace area and floating pontoon.

This will improve river access and make it safer with the pontoon level always close to water level. Steps along the path to the pontoon provide another location to access the river. As noted in Section 4.4.7.4 of Chapter 4 (*Description of the Proposed Scheme*) of the EIAR,

Section 16.4.3 of Chapter 16 (*Population and Human Health*) notes that once operational, the new floating pontoon will result in a positive effect on amenity at this location.


**Figure 7.2: Proposed Pontoon at Riverwalk**

### 7.2.3 Proposed Changes

No change to the design is proposed at this location. In general, it is preferred to have fixed defences in place as a passive defence rather than demountable barriers which require actions to be taken to ensure the barriers are in place in advance of a flood event. There is also an increased maintenance requirement to ensure demountable barriers are not damaged when being removed and replaced.

## 7.3 West End of South Quay

### 7.3.1 Existing Situation

The slip (referred to in EIAR as Coal Quay) is effectively derelict and cannot be used at present, as can be seen in Figure 7.3 below.

Section 16.3.1 of Chapter 16 (*Population and Human Health*) notes that this slip is in considerable disrepair and access to the river via this slipway is unsafe given its structural condition. This slip is also discussed in terms of heritage value in Section 15 of this report below.


**Figure 7.3: Slip at West End of South Quay**

### 7.3.2 Proposals in the FRS Planning Application

It is proposed to demolish this slip with the new flood defence wall cutting off access to the river at this location.

Section 16.4.2 of Chapter 16 (*Population and Human Health*) notes that as the slip is currently in disrepair and not extensively used by the public, a "*permanent , slight, negative effect on amenity is identified as a result of the loss of this river access*".

Section 17.7.2 of Chapter 17 (*Material Assets*) notes that: "*The Coal Quay slipway will be removed. However, it should be noted that this slip is currently in disrepair and is not extensively used by the public. A permanent slight, negative significant residual effect on this material asset is therefore identified*".

Section 11.4.4.3 of Chapter 14 (*Archaeological, Architectural and Cultural Heritage*) of the EIAR notes that "*The ruined, concrete slipway at Coal Quay (AH4) will be removed as a result of the proposed scheme, this will result in a Negative, Moderate and Permanent impact*".

Refer also to Appendix 11.3 (*Architecture and Cultural Heritage Inventory*) of the EIAR. Mitigation proposed in Appendix 11.3 states "*Photographic and descriptive record will take place prior to the removal of the structure. Archaeological monitoring will take place during the removal process.*"

### 7.3.3 Proposed Changes

No change to the design is proposed at this location as there is no effective slip in place at present.

## 7.4 Tyrells Slip - South Quay

### 7.4.1 Existing Situation

This slip is in use. A wooden demountable flood barrier is located at the top of the slip. The barrier is frequently left in an open position. It is suitable for small manually transportable craft – kayaks, etc., but can also be used to launch trailer-mounted boats at suitable tide levels. See Figure 7.4.

Section 16.3.1.2 of Chapter 16 (*Population and Human Health*) of the EIAR notes that the wooden demountable had "*to be installed as storm surges regularly came up the river and inundated the road (Harbour master pers comm.)*" (Figure 16.8 of EIAR). Section 16.3.1.2 notes that "*this slipway is generally open between May-September and tends to be used as a spill over launch point for the rowing club/others when the public slip at the Dock is busy (Harbour master pers comm.*)". Section 16.3.1.2 notes that "*there are no other publicly accessible points to the river along South Quay (aside from directly off the quayside/quay wall*)".

**Figure 7.4: Tyrells Slip, South Quay**

### 7.4.2 Proposals in FRS Planning Application

Tyrells slip is to be retained but a fixed glass wall is to be included at this location as part of the flood defence wall  so that it will not be available for river access. See Figure 7.5 (extracted from View 10, Figure 12.10.2 of Chapter 12 of the EIAR).

Section 4.4.7.5 (South Quay) of Chapter 4 (*Description of Proposed Scheme*) notes that at the Tyrell slipway, a raised table will be incorporated across the full width of South Quay. The carriageway at Tyrells 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.

Section 16.4.3.1 of Chapter 16 (*Population and Human Health*) of the EIAR notes that a permanent moderate negative effect on rivers users is identified at Tyrells slip, although it notes that continuous access to the river via this slipway is not currently maintained due to the presence of the demountable barrier .

Section 17.4.2 of Chapter 17 (*Material Assets*) notes that: "*The existing slipway at South Quay (Tyrells Yard) while maintained during the operational phase, will be rendered inaccessible. It should be noted however that currently, access to the river via this slipway is not fully maintained due to the demountable barrier currently in place at this location. As such, a permanent moderate negative effect on this material asset is identified*."

Section 11.4.4.3 of Chapter 14 (*Archaeological, Architectural and Cultural Heritage*) of the EIAR notes that "*The slipway (AH5) associated with the Tyrrell's boatyard and ship tracks will be retained in situ….The existing rail tracks in the roadway will remain insitu and the carriageway paved with setts. New paving along the proposed promenade will continue across the top of the slipway and the line of the rail tracks will be demarcated in the new paving. The slip way will be retained insitu, however, as a result of flood defence measures there will be no direct access to the feature. As such, even though there is no direct physical impact on the structure, there is a loss of function resulting in a Negative, Significant and Permanent impact.*"

Refer also to Appendix 11.3 (*Architecture and Cultural Heritage Inventory*) of the EIAR.

Mitigation proposed in Section 11.5.4.6 of Chapter 14 Appendix 11.3 states "*The historic slip known as Tyrrell's slip and boat tracks (AH5) will be recorded by means of photography and written description prior to commencement of works so a full record of the feature is present prior to any interventions. All works in the vicinity of the historic slip will be archaeologically monitored*"

**Figure 7.5: Proposed Glass Wall at Tyrells Slip**

### 7.4.3 Proposed Changes

No change to the design is proposed at this location. In general, it is preferred to have fixed defences in place as a passive defence rather than demountable barriers which require actions to be taken to ensure the barriers are in place in advance of a flood event. There is also an increased maintenance requirement to ensure demountable barriers are not damaged when being removed and replaced. Note also the proposed change at the Dock slip as described in Section 7.5.3 below.

## 7.5 The Dock

### 7.5.1 Existing Situation

The Dock slip is located at Arklow Dock and is the most used slip. It is used by Arklow Rowing Club and Arklow Sea Scouts, among others. It is suitable for small manually transportable craft – kayaks, etc., and to launch trailer-mounted boats. See Figure 7.6.

**Figure 7.6: Slip at The Dock, South Quay**

### 7.5.2 Proposals in FRS Planning Application

The current proposal is to be retain this slip with an 8.0m demountable barrier kept in the closed position except when required. See Figure 7.7 below. Also refer to Drawing No 1042 (approx. Ch 950) of Appendix 4.1 (*Scheme Drawings*) of the EIAR. It was proposed that this would be **normally closed** with access arrangements being agreed with stakeholders requiring access. It is shown on Drawing No 1042 as "*Maintained Closed*".

Section 17.7.2 of Chapter 17 (*Material Assets*) notes that "*a permanent slight negative residual effect*" on this material asset is identified.

Section 16.4.3 of Chapter 16 (*Population and Human Health*) of the EIAR notes that *"Arrangements will be put in place for interested parties to gain access to the slipway during operation, as required. A significant, permanent negative effect on access for recreational amenity on the river is identified during the operational phase. This is attributed to the lack of alternative public vehicular access to the river elsewhere on the south bank noting also that this slip is used on a near daily basis*".


**Figure 7.7: Current Proposals for Slip at The Dock, South Quay**

### 7.5.3 Proposed Changes

In response to the submissions/objections received by ABP, it is now proposed to change the design this location so that the 8.0m demountable barrier is generally left open and only closed when there is a risk of a flood defence. This is contrary to the general policy for demountable barriers at gaps in flood defences as, in general, there is a lower flood risk when demountable barriers are in place. However, due to the level of activity at this slip and the need to obtain access outside of business hours, it is considered that keeping this slip generally open is a reasonable compromise. It must be emphasised that this can only be proposed in parallel with a policy for managing the demountable flood barrier at this location and a reliable flood forecasting/warning system.

A memorandum of understanding will be agreed between WCC and OPW regarding maintenance and closing of the flood barrier during flood events.

Drawing Nos 1042 and 1045 of Appendix 4.1 of the EIAR have been revised to reflect this change and are included in **Appendix A** of this report. The barrier is now shown on Drawing No 1042 as "*Maintained Open*". This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

The impacts of the proposed changes have been reviewed in the context of material assets and amenity. The material asset impact during operational phase associated with the access to the slipway was previously recorded in the EIAR as "*permanent slight negative residual effect*" and has now changed to not significant residual negative effect.

The impact on recreational amenity during operational phase was previously recorded in the EIAR as "*significant, permanent negative effect on access for recreational amenity on the river* . This has now changed to "*slight, permanent negative effect*"

## 7.6 Riverwalk (path)

### 7.6.1 Existing Situation

There is currently a path along the riverbank at Riverwalk which can provide direct access to the river. See Figure 7.8.

**Figure 7.8: Footpath at Riverwalk**

### 7.6.2 Proposals in FRS Planning Application

A flood defence wall is to be constructed along the roadside line of the footpath. A new walkway will be provided on the river side of the flood defence wall at approximately the same level as the existing footpath with access to be provided from the dry side of the wall by means of ramped paths. See Figures 7.9 and 7.10.

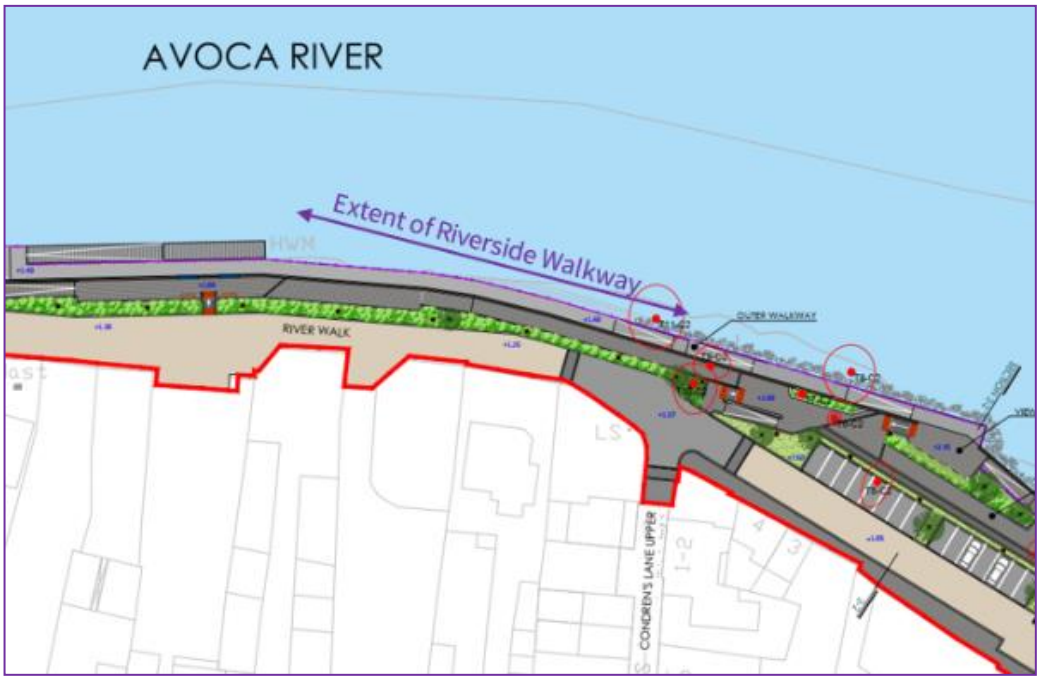



**Figure 7.9: Extent of Riverside Walkway**

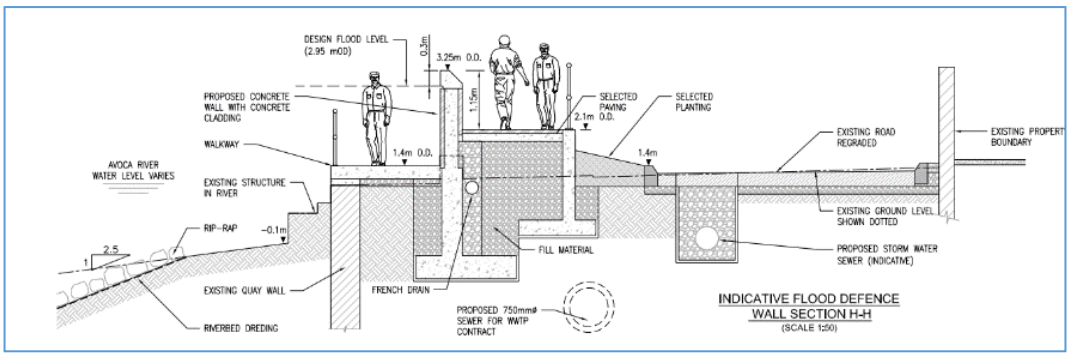



**Figure 7.10: Section Through Riverside Walkway**

### 7.6.3 Proposed Changes

No change to the design is proposed at this location. In general, balance will be provided between high level walkways on the dry side of the proposed flood defence walls and riverside walkways on the wet side of the walls.

## 7.7 Emergency Access

### 7.7.1 Existing Situation

There is currently an unguarded quayside and riverbank along the full extent of Riverwalk and South Quay. A number of lifebuoys are positioned along the river edge. See Figure 7.11.

**Figure 7.11: Photos of River Edge at South Quay and Riverwalk**

### 7.7.2 Proposals in FRS Planning Application

The FRS proposals provide for flood defence walls to be constructed along the river edge in these areas. The walls will be typically 1.15m high to provide an adequate level of guarding. It is recognised that measures will be required in order to access the river and to provide lifebuoys. The water safety proposals are shown in Drawing No. 88601-1060 (Water Safety Features) in Appendix 4.1 in Volume 3 of the EIAR. This drawing shows 10no. lifebuoys to be positioned along the river edge from the Dock at South Quay to the western end of the proposed flood defence wall on Riverwalk.

Access to the river by means of ladders will be provided at 4no. locations along South Quay. Along Riverwalk, the riverside footpath, described in section 7.6.2 above, allows adequate access to the edge of the river.

### 7.7.3 Proposed Changes

No change to the design is proposed to the emergency access. The proposed measures were discussed with the Water Safety Officer and considered to be adequate for the purposes of water safety.

## 7.8 Conclusion

The issues raised in the submissions and observations in relation to river access, removal of slipways and water safety have been fully considered.

Two currently available slipways are to be removed but a much-improved facility is proposed in place of one. A third available slipway at the Dock will be retained with agreement to change the proposed arrangements for the flood barriers as set out in section 7.5.3 above. Having considered those issues and making the proposed change at the operation of the flood barriers at the slip at the Dock, the negative effects of the scheme as set out in the EIAR are reduced.

# 8 Public Realm Design, Landscaping Proposals and Landscape/ Visual Impacts

## 8.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to the public realm design, landscape proposals and landscape and visual impacts. The concerns raised in these submissions/objections relate to the following:

- Concerns over the LIVA assessment of impacts on the south bank
- Visual connection to the river needs to be retained. Effort should be made in a design to maintain affinity & connectivity to a river for existing communities. Objection to loss of views of river from the south bank footpath. Loss of existing physical and visual relationship to the river is not justified by FRS. Loss of views toward bridge walking east along Riverwalk trail due to ground level increases. Sufficient consideration of maintaining access and visual connectivity to the river, especially along South Quay. Installation of additional glass panels at various locations
- The proposed development raises levels along the river to a point which is considered unjustified. Objection to "doubling up of concrete wall and pedestrian barrier along river walk"
- Absence of visual impact assessment of debris trap and gravel trap. An alternative location of the Debris trap would reduce visual impact.
- More detail required on the visual appearance of the floating roosting platforms in the river
- Loss of amenity along South Quay. Justification for the public realm design. Why do the public realm drawings exclude most of Arklow Dock and adjoining quays? Concern that the scheme will negatively impact on the waterfront as a key recreational and tourism amenity, that the public realm design does not integrate the project within the townscape and river setting
- Justification for the public realm design along south quay including the location of the road and removal of grassed areas in front of the homes. Road along south quay should not come any closer to existing properties. Retention of grass strip instead of footpath along South Quay.
- Objection to loss of public pocket park on the south bank at River walk – alternatives should be considered. Additional seating areas. Increase public realm and amenity improvements at the bend in the river – create pocket parks and stop off points along riverside walk along the South Quay
- Objection to tree removal on south bank. Retention of trees where possible and the proposed tree planting design to emphasise the pocket parks and stop off points along the river. "Green wall" for planting opportunities. Proposed trees restrict views of oncoming traffic at the south quay junction with R772.

- Recommendation to use native flowering tree species for landscaping. There appears to be very little green planting incorporated into the design of the public realm. Public Realm should incorporate green infrastructure for people, amenity and ecology and surface water mitigation.
- Need for public realm signage to be provided along South Quay riverside to explain the history of the area, locations of attractions in Arklow, walking routes etc
- Inclusion of Nature Based Solutions and SUDS in the Design of the Public Realm. Extensive green planting and landscaping to assist the collection of surface water should be integrated at every opportunity

## 8.2 Response

### 8.2.1 Landscape and Public Realm Design

Section 4.4.7 of Chapter 4 (*Description of Proposed Scheme*) describes the proposed landscape design and public realm. Section 4.4.7.1 notes that 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, the landscape and public realm design has been developed 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.

Section 4.4.7.2 of Chapter 4 describes the existing setting which has been carefully considered during the development of the landscape and public realm design. Section 4.4.7.3 of Chapter 4 acknowledges that 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*".

Section 4.4.7.3 also notes that the objective of the landscape design and public realm has been 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.

Overall, 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 development involves minimal works in the vicinity of Arklow Dock – primarily in terms of the provision / tie-in of a c.500 to 750mm high flood protection wall / demountable barriers.

No significant impact arises on the existing townscape or visual setting and no specific mitigation measures are required at that location.

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 of the EIAR (updated in **Appendix A** of this report). Photomontages are presented in Appendix 12.1 of Chapter 12 *Landscape and Visual*. Drawing Nos 300 to 306 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.

#### 8.2.1.1 River Walk

Section 4.4.7.4 (River Walk) of Chapter 4 (*Description of the Proposed Scheme*) describes why and how the existing ground levels have been changed so as to integrate with the flood defence walls. Although the height of flood defences at River Walk are typically circa 2.0m above the existing ground level, the design of the footpath along the river and the public realm has ensured that open viewing of the river and bridge is facilitated along the proposed flood protection wall, the top of which is generally set at c.1.15m above the level of those using these public areas. For example, 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 A a**nd Figure 12.1.2 of Appendix 12.1 Photomontages). 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.

The scheme also incorporates sections of glass panels, high-quality paving, seating, tree planting, as well as a diverse range of other planting of shrubs, bulbs, ornamental grass and traditional grass areas – all of which will improve the accessibility and usability of the riverside amenity.

One of the submissions query why there is a "*doubling up of the concrete wall and pedestrian barrier*" along River walk. The public realm design at this location incorporates the flood wall and a cantilevered viewing platform outside of the flood wall in order to enhance the amenity and visual connectivity with the river. Section 4.4.7.4 of Chapter 4 of the EIAR notes that 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.

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.

Section 4.4.7.4 notes that 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.

Section 4.4.7.4 of Ch 4 of the EIAR also notes that 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 at this location. 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**.

Further details on the public realm design to Arklow Bridge are also provided in Section 4.4.7.4 of Chapter 4 of the EIAR.

Thus, by modifying the existing ground levels and creating viewing platforms, glazing, ramps and terraces etc, the landscape design and public realm has integrated the necessary infrastructure with River Walk a in a manner that re-invents the public amenity value of the river edge for the town and its people.

### 8.2.1.2 South Quay

Section 4.4.7.4 (South Quay) of Chapter 4 (*Description of the Proposed Scheme*) describes the landscape and public realm design along 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.

Section 4.4.7.4 (South Quay) of Chapter 4 notes that 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.

As noted in Section 6 above of this report, two 6.0m long glass panels just downstream of Arklow Bridge on South Quay at approximately Ch 020 (12.0m total) have now been included in response to the submissions/objections, as shown on revised Scheme Drawing No 1040 and revised Landscape Design and Public Realm Drawing No 301 in **Appendix A** of this report. This will open up views of the bridge downstream. Furthermore, three 6.0m long glass panels have also been included along South Quay at approximately Chainage 370 (18.0m total), as shown on revised Scheme Drawing No 1041 and revised Landscape Design and Public Realm Drawing No 302 in **Appendix A** of this report. This will further enhance the amenity and visual connectivity with the river.

The provision of the additional sections of glass panels will provide for improved visual connectivity to the river and Arklow Bridge from the seating areas located on South Quay immediately downstream of the bridge and at change approximate 370 on South Quay. While the provision of the additional glass panels will not change the overall assessment of landscape and effects, their provision will have positive effects in terms of improving the overall experience of the riverside public realm and in ensuring an overall positive effect from the proposed development into the medium and longer-term.

Section 4.4.7.4 (South Quay) of Chapter 4 notes that 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 will 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.

Further details on the tree species and in particular native species proposed are included in Section 10.9 below.

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.

Section 4.4.7.4 (South Quay) of Chapter 4 notes that 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.

Section 4.4.7.4 (South Quay) of Chapter 4 notes that 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.

In conclusion, the landscape and public realm design has integrated 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.

### 8.2.2 Concerns over the LVIA assessment on the South Bank

The EIAR submitted with the application includes a detailed and thorough landscape and visual assessment provided at Chapter 12 of the EIAR.

Details of the Landscape and Public Realm Design proposals are provided in Appendix 4.2 of the EIAR (updated in **Appendix A** of this report); and visual representations of the proposed development are demonstrated in the Photomontages at Appendix 12.1 of the EIAR. A Tree Survey Report is provided at Appendix 12.2 of the EIAR.

The landscape and visual impact assessment (Chapter 12 of the EIAR) provides a detailed section by section description of the receiving environment, with the use of reference images, at Section 12.3.1 and an overview of the landscape planning context at Section 12.3.2. Specific aspects of landscape and visual significance and sensitively are detailed at Section 12.3.3. The key characteristics of the proposed development likely to be of landscape and visual importance are outlined on a section by section basis at Section 12.4. Likely significant effects of a do-nothing scenario (Section 12.5.1) are provided are as are section by section assessments of effects during construction (Section 12.5.2) and operation (Section 12.5.3) of the proposed development. Measures required for the mitigation of significant adverse construction and operation stage impacts are detailed on a section by section basis at Section 12.6 of the chapter. The chapter also includes for monitoring requirements (Section 12.6.3) and for likely cumulative (Section 12.7) and Residual Effects – including a description of the Photomontages (Section 12.8).

The landscape and visual chapter appropriately and correctly assesses that a significant impact will arise from the construction of the proposed scheme (Section 12.5.2.5). Likewise, the assessment acknowledges the significant change that the proposed development will bring to the south bank of the river, (Section 12.5.3.5). However, the chapter also assesses the benefits for a townscape that is secured from flooding and balanced against the new public spaces and amenity provisions. Therefore, initially negative effects will become positive over time as the proposed scheme, which provides for river edge walkways, seating terraces, elevated viewing platforms and the provision of a high quality continuous promenade with new tree planting and landscaping, contributes positively to the public amenity of the area and to the potential for reinventing the public realm and spaces on the south bank of the river.

### 8.2.3 Visual impacts on South Quay and Justification for Public Realm Design along South Quay

It is acknowledged and assessed as such in the Landscape and Visual Impact Assessment (Chapter 12 of the EIAR), that the proposed development will give rise to significant effects and physical changes on the south bank of the river. However, in designing the proposed development and in developing proposed mitigation measures, consideration for maintaining access and visual connectivity to the river, and of enhancing the public realm, wherever possible, have always been key principles of the design of the proposed development and of the public realm (See also Section 8.2.1 above).

It is clear that consideration of these aspects was a key aspect of the alternatives considered – both under Flood Defences – South Bank (Sections 3.5.4.2 and 3.5.4.3 of Chapter 3 of the EIAR) and under Public Realm Alternatives Considered (Section 3.5.4 of Chapter 3 of the EIAR). In these considerations, retaining sections of the historic quay wall, maximising the amenity value along the river and maintaining views of the river and bridge were to the forefront of the selected development.

As a result, the public realm design provides for a fully accessible continuous and high-quality river walk amenity / promenade connecting a series of public riverside spaces. Locating the footpath alongside the proposed wall, which is generally limited to c.1.15m in height over the footpath, allows for the optimum opportunity for viewing the river, historic sections of quay walls, the bridge and the general townscape / landscape. Sheltered seating areas are provided along River Walk and South Quay. As set out in Section 3.1 and Section 6 of this report, sections of glass panels – including additional sections – are provided for enhanced viewing of the river and bridge – including at the former Tyrrell's Yard Slipway on South Quay. Physical access to the river is discussed in Section 7 of this report.

The provision of the additional sections of glass panels will provide for improved visual connectivity to the river and Arklow Bridge from the seating areas located on South Quay immediately downstream of the bridge and at change approximate 370 on South Quay. While the provision of the additional glass panels will not change the overall assessment of landscape and effects, their provision will have positive effects in terms of improving the overall experience of the riverside public realm and in ensuring an overall positive effect from the proposed development into the medium and longer-term.

The scheme also incorporates high-quality paving, seating, tree planting, as well as a diverse range of other planting of shrubs, bulbs, ornamental grass and traditional grass areas – all of which will improve the accessibility and usability of the riverside amenity. Refer to Appendix 4.2 (Landscape and Public Realm Drawings) of the EIAR (updated version in **Appendix A** of this report) and Appendix 14.1 (photomontages) for further details of the public realm design.

Consideration was given to retaining the grass areas in front of the houses on South Quay (Ch. 300-410), and to retaining a grass area along the flood defence wall (Section 3.5.4 of Chapter 3 of EIAR). However, doing so would have necessitated locating the road closer to the river, which would significantly compromise the area, layout and quality of the public promenade and riverside space at this location. The proposed design permits the establishment of a continuous promenade along the entire length of South Quay from Arklow Bridge to Arklow Harbour.

Therefore, in balance, the proposed development is considered to be the preferred approach, minimising disruption and maximising the public gain in terms of securing flood protection and providing a high quality of public realm and connection to the river and its environs.

### 8.2.4 Removal of Trees on South Bank

The following concerns were highlighted in the submissions/objections:

- Objection to tree removal on south bank. Retention of trees where possible and the proposed tree planting design to emphasise the pocket parks and stop off points along the river. "Green wall" for planting opportunities. Proposed trees restrict views of oncoming traffic at the south quay junction with R772.
- Recommendation to use native flowering tree species for landscaping. There appears to be very little green planting incorporated into the design of the public realm. Public Realm should incorporate green infrastructure for people, amenity and ecology and surface water mitigation.

As noted in the response under Section 10.9 of this report, it is necessary to remove 61No. trees for the provision of the proposed development on the south bank of the river. All but one of these trees are of lower Category C or Category U quality. One tree is Category B (moderate) quality and none are of Category A (high) quality (refer to the Landscape Design and Public Realm Drawings 300-303 in Appendix 4.2 of the EIAR, Tree Survey Report in EIAR Appendix 12.2 and response under Section 10.9 of this report). It is also noted that 46No. of the 61 trees are also scheduled for removal under the permitted Arklow Wastewater Treatment Plant Project (ABP ref.: PA27.302556).

The proposed development provides for the planting of 69No. advanced and semi-mature trees along the full length of the scheme on the south bank. The location of the trees have been selected to avoid conflict with sightlines and traffic at crossings / junctions. As further noted in the response under Section 10.9 of this report, proposed tree planting has been selected having regard to the species of trees removed and to the nature of local exposed and built environment. Nevertheless, proposed tree planting schedules on the Landscape Design and Public Realm Drawings 300-303 (**Appendix A**) have been updated to provide for a greater percentage of native species, including Mountain Ash. This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

As set out on Landscape Design and Public Realm Drawings 300-306, on the south bank the scheme provides for an appropriate and integrated high quality public realm, which is fully accessible and retains open views of the river, bridge and townscape. The scheme incorporates sections of glass panels, high-quality paving, seating, tree planting, as well as a diverse range of planting of shrubs, bulbs, ornamental grass and traditional grass areas. On the north bank the scheme provides for extensive areas of locally appropriate native woodland, regeneration areas and areas of diverse grassland.

### 8.2.5 Need for Public Realm signage along South Quay

One of the submissions highlighted the need for public realm signage to be provided along South Quay riverside to explain the history of the area, locations of attractions in Arklow, walking routes etc.

It is recommended in consultation with interested stakeholders, local heritage groups and the Maritime Museum of Arklow to provide a newly developed heritage trail that provides information at points of industrial heritage and maritime interest along the quays. This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

### 8.2.6 Negative impact on the waterfront as a key recreational and tourism amenity and public realm design does not integrate the project within the townscape and river setting

There was a concern that the scheme will negatively impact on the waterfront as a key recreational and tourism amenity, that the public realm design does not integrate the project within the townscape and river setting.

The public realm was designed to provide for a fully accessible continuous and high quality river walk amenity overlooking the river and estuary, Arklow Bridge and the adjoining townscape / landscape. Refer to the Response in Section 8.2.1 above also. Access to the river and proposed pontoon facilities will be provided from the proposed riverside viewing terraces, at the location of the existing riverside amenity west of Arklow Bridge and at the Dock (Refer to Section 7 of this report for further details on access to the river).

Although the height of flood defences at River Walk are typically circa 2.0m above the existing ground level, the design of the footpath along the river and the public realm has ensured that open viewing of the river and bridge is facilitated along the proposed flood protection wall, the top of which is generally set at c.1.15m above the level of those using these public areas. The scheme also incorporates sections of glass panels, high-quality paving, seating, tree planting, as well as a diverse range of other planting of shrubs, bulbs, ornamental grass and traditional grass areas – all of which will improve the accessibility and usability of the riverside amenity. These amenity improvements have ensured that the important visual and amenity relationship between the River Walk and the River corridor is maintained.

The Landscape and Visual Impact Assessment (Chapter 12 of the EIAR) assesses the significant impact that will arise from the construction of the proposed scheme (section 12.5.2.5). Likewise, the assessment acknowledges the significant change that the proposed development will bring to the south bank of the river, (section 12.5.3.5), however, also assesses the benefits for a townscape that is secured from flooding and balanced against the new public space and amenity provisions. Therefore, initially negative effects will become positive over time as the proposed scheme, including river edge walkways, terraces, elevated viewing platforms and the continuous promenade with new tree planting and landscaping, contribute positively to reinventing the public realm and spaces on the south bank of the river. Refer to the Response in Section 8.2.1 above also.

### 8.2.7 Loss of views toward bridge walking east along Riverwalk

One of the submissions/objections related to the loss of views toward bridge walking east along Riverwalk trail due to ground level increases. The submission/objection claimed that the proposed development raises levels along the river to a point which is considered unjustified.

The proposed scheme provides for positive viewing of Arklow Bridge. As noted in the submission, levels are raised – however, this is necessary to provide for ease of access to and along the walkway and to allow for open viewing of the river, bridge and townscape over the proposed wall. Raising of the ground allows for the top of the proposed wall to generally be no more that c.1.15m higher than the adjoining walkway. In addition, the proposed development incorporates sections of glass panels specifically to allow for views of the river and bridge from seating / stopping areas on the walkway. As set out in Section 3.1 of this response additional sections of glass panels are also provided in response to the submissions provided. Refer to the Response in Section 8.2.1 above also.

### 8.2.8 Visual appearance of Debris and Gravel Traps

One of the concerns highlighted in the submissions/objections was that there was an absence of visual impact assessment of debris trap and gravel trap and that an alternative location of the Debris trap would reduce visual impact.

As noted in Section 4.2.1 above of this report, the purpose of the debris trap is to capture large floating debris and prevent it being caught in the arches of Arklow Bridge. The preferred location of the proposed debris trap and gravel trap is discussed in Section 4.2.5 above of this report. As noted in Section 4.2.5 above, the gravel trap will be underwater and so will not be visible. The piers for the debris trap will be a slender oblong shape in plan and the top of the piers (3.35mOD) will be at approximately the same height as the adjacent flood defence wall (varies 3.32mOD to 4.50mOD) on Riverwalk.

A full assessment of the landscape and visual effects of the debris and gravel trap has been provided for in Chapter 12 (*Landscape and Visual*) of the EIAR and a visual representation is provided at Figure 12.1.2 of Appendix 12.1 Photomontages of the EIAR. An assessment of effects during construction, including effects on views, is set out under Section 12.5.2.4 Debris and Gravel Trap, while an assessment of effects during operation is provided under Section 12.5.3.4 of Chapter 12 of the EIAR. The assessment of alternatives, including alternatives location for a debris and gravel trap, is set out under Chapter 3 of the EIAR and is discussed further in Section 4.2.5 of this report.

## 8.3 Conclusion

The issues raised in the submissions and observations in relation to the public realm, landscape proposals and landscape/visual impacts have been fully considered, and having considered those issues, the conclusions of the impact appraisals remain as set out in the EIAR.

# 9 Traffic and Transport and Parking

## 9.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to traffic and transport and parking proposed. The concerns raised in these submissions/objections relate to the following:

- South Quay should be single lane northbound from Harbour Road to Arklow Bridge
- If South Quay remains open to traffic, the junction with R772 needs traffic lights. Traffic lights and pedestrian/cyclist crossings required at the junction of the R772/South Quay.
- Concern over increased traffic speeds on the South Quay arising from the road works
- Concerns around the construction traffic between South Green and Bridge St turning right when they reach bridge street (R772).
- No construction related traffic should use Arklow Bridge. No construction related traffic between the north and south side construction compounds should be permitted in order to minimise and mitigate traffic impacts on the bridge during construction phase
- On road car parking along South Quay needs to be reviewed such that business owners and residents have access
- Parking on both sides of South Quay opposite Fogerty's Terrace should be reduced to single sided only
- Concern over significant traffic impacts during construction
- Vehicular trips for construction workers along Main Street should be reduced
- No alternative parking offered to replace the parking spaces temporarily lost at St Mary's car park and along River Walk

## 9.2 Response

### 9.2.1 South Quay – Parking Provision (East)

The section of South Quay between Harbour Road and The Docks currently provides parking in an unstructured manner as there are no pedestrian facilities provided along this section of roadway. The proposed public realm enhancement works (as presented in Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR and as revised in **Appendix A** of this report) offers significant improvement in footpath provision and crossing facilities and the delivery of these improvements requires widening of the footpaths in the vicinity of Harbour Road and Rockview Terrace.

These improvement works do reduce the availability of parking in the immediate vicinity of these two junctions however there are in total 22 parking bays proposed for this section of South Quay which is greater than the current demand for parking in this area.

### 9.2.2 South Quay – Parking Provision (West)

The public realm enhancement plan (as presented in Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR and as revised in **Appendix A** of this report) for the section of South Quay east of South Green has maintained the number of existing parking bays to ensure residents of the area are provided with sufficient parking and to also cater for any additional parking demand generated by businesses on South Quay particularly those close to Arklow Bridge as drivers will no longer be permitted to park along the narrow one-way section.

### 9.2.3 No. 1-4 South Quay – Parking

The current Public Realm Enhancement Plan for the South Quay (Drawing No 303 of Appendix 4.2 of the EIAR) does include the widening of the existing footpath opposite No's 1 to 4 on South Quay along with a narrowing of the road carriageway and the replacement of the existing grass verge on the seaward side of the road with a wider footpath, the existing trees are to be retained along this section of roadway. The current proposed layout can be seen in the figure below.


There was no proposal to limit on-street parking along this section of roadway and residents will be permitted to continue parking outside their homes between No's 1 and 4 South Quay. However, to better provide for this parking and in response to Submission S19, it is proposed to reduce the extent of footpath widening in front of the houses and provide a dedicated area for parking in front of 1-4 South Quay. The revised street layout can be seen in the figure below.

Drawing No 303 of Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR has been revised and is included in **Appendix A** of this report). This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.


## 9.2.4 South Quay – One-Way Traffic

It is preferrable to provide two-way roadways in urban areas as it results in lower traffic speeds, a safer environment for pedestrians and cyclists and it provides more convenient access to local properties. (*Reference Section 3.4.1 Vehicle Permeability; Design Manual for Urban Roads and Streets page 53*).

The extension of the one-way system on South Quay is not considered necessary nor beneficial for the proposed FRS as it would potentially result in longer overall journeys for local residents, increase traffic flows on neighbouring streets such as Lower Main Street, South Green, Harbour Road, Bridge Street, etc. and potentially result in higher traffic speeds along the South Quay. There is sufficient width available along the majority of the South Quay to provide the required enhancement in public realm and retain two-way traffic.

The removal of one lane of traffic on South Quay, as suggested in a number of submissions, does not provided sufficient space to provide for both a two-way cycle facility and a landside linear park. The currently proposed two-way road will cater for cyclists in a low flow-low speed environment and will be an attractive environment.

As stated previously the introduction of a one-way traffic route along the entire length of South Quay will require all residents north of South Green having to use Bridge Street, Lower Main Street to access Abbey Street and all destinations south of Arklow, this level of restriction will add to journey times for local residents and potentially increase delays along Lower Main Street.

This matter is best dealt with by the Transport Water and Emergency Services Section of Wicklow County Council who are carrying out a Transportation Study of the wider Arklow Area in conjunction with Arklow Municipal District. The proposed FRS will not prejudice the alteration of this area to one way at a future date, assuming it can be shown (as part of the Transportation Study) to have a benefit.

### 9.2.5 South Quay – Traffic Speeds

The public realm enhancement works (as presented in Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR and as revised in **Appendix A** of this report) include the narrowing of the existing road carriageway, the provision of dedicated pedestrian footpaths, the provision of new trees and the installation of traffic calming features at each of the junctions along the route. The combined effect of all these measures will enhance safety for all road users and ensure traffic speeds are kept to safe levels.

### 9.2.6 South Quay- Provision of Footpaths

The proposed works along South Quay include the provision of a new footpath along the existing property boundary wall to the south of the roadway. The provision of footpaths running adjacent to property walls (including drive-ways) is a standard provision in a suburban context. The provision of this new footpath will not result in any safety implications and there is clear visibility between drivers exiting the properties and pedestrians on the footpath. In addition, the provision of new footpaths will remove the need for pedestrians having to walk on the existing roadway or along the grass verge and this new footpath will be a positive addition to Arklow and support increased active travel in the town.

### 9.2.7 South Quay- Project Impact during Construction

The projected increases in traffic within the study area are as described in the Section 7.7.2.1 of Chapter 7 (*Traffic and Transport)* of the EIAR with an additional 23 vehicles expected to be generated by the proposed works during the peak hours along the one-way section of South Quay. This converts to approximately 1 construction related vehicle every 3 minutes which is a relatively small change in traffic flow along a key route directly serving the construction works. As stated in the Section 7.10.1 of Chapter 7 of the EIAR, this level of increase in traffic is expected to result in a slight negative impact on traffic congestion in Arklow.

South Quay needs to be used by construction related heavy goods vehicles to access the proposed works on South Quay as it provides direct access to the works areas. Construction traffic impacts have been addressed in Chapter 7 (*Traffic and Transport)* of the EIAR.

### 9.2.8 Construction Traffic Management

The Environmental Impact Assessment Report has acknowledged the need for traffic management plans to deliver the construction works associated with the individual Work Packages including those along the South Quay.

Section 7.8.1.1 of Chapter 7 of the EIAR presents the construction traffic management plan requirements. These requirements have also been transposed into Section 6.3 of the Construction Environmental Management Plan (CEMP) contained in Appendix 5.1 of the EIAR.

### 9.2.9 Access to Properties

The Construction Traffic Management Plan will ensure access to individual properties is maintained during the course of the works and has included plans to minimise the impact on residents and businesses. During the construction stage, these plans will be further developed and communicated to local businesses and residents. However, it is recognised that the proposed construction works will result in some delays and queuing which is typical with the delivery of majority civil infrastructure in an urban setting.

### 9.2.10 Arklow Bridge – Traffic Management

The Environmental Impact Assessment Report had regard to the operation of Arklow Bridge as part of the assessment of the proposed FRS and a set of mitigation measures (Section 7.8.1.4 of Chapter 7 of the EIAR) have been recommended in terms of managing the impact on residents and business in Arklow during construction. The mitigation measures included the following:

- No scheduled lane closures should commence before 21:00 and all lane closures should be lifted by 07:00 in the morning;
- The length of lane closures and the required working area needs to be kept as small as possible to reduce the length of the shuttle system.

It is important to note that the proposed mitigation measures in terms of restricting work on Arklow Bridge will only be in place during Work Package 1. During Work Package 2 and 5 when peak construction traffic generation is expected both lanes of Arklow Bridge will be available to general traffic as well as any construction related traffic that needs to cross the bridge.

Arklow Bridge is the only river crossing in Arklow and it will be important that construction traffic is permitted to cross the bridge during the course of the construction project as it is likely that some construction vehicles will need to travel internally in Arklow between the different Construction Compounds and River Access Points.

However, as stated in Section 7.2.4 of Chapter 7 of the EIAR, externally generated deliveries (those outside of Arklow) will be directed to use the appropriate Motorway junction to avoid having to use the Arklow Bridge.

### 9.2.11 Construction Traffic – Internal Movements

The construction traffic management plan has committed to ensuring deliveries destinated to the southside of Arklow use the Junction 21 on the M11 Motorway and deliveries destinated to the northside of Arklow use Junction 20 on the M11 Motorway. This will ensure the number of construction delivery vehicles needing to cross the Arklow Bridge can be managed and minimised.

The traffic management plan has allowed for some flexibility in terms of traffic movements generated internally within Arklow as the alternative route using the M11 motorway results in a significant detour as illustrated in the figure below.

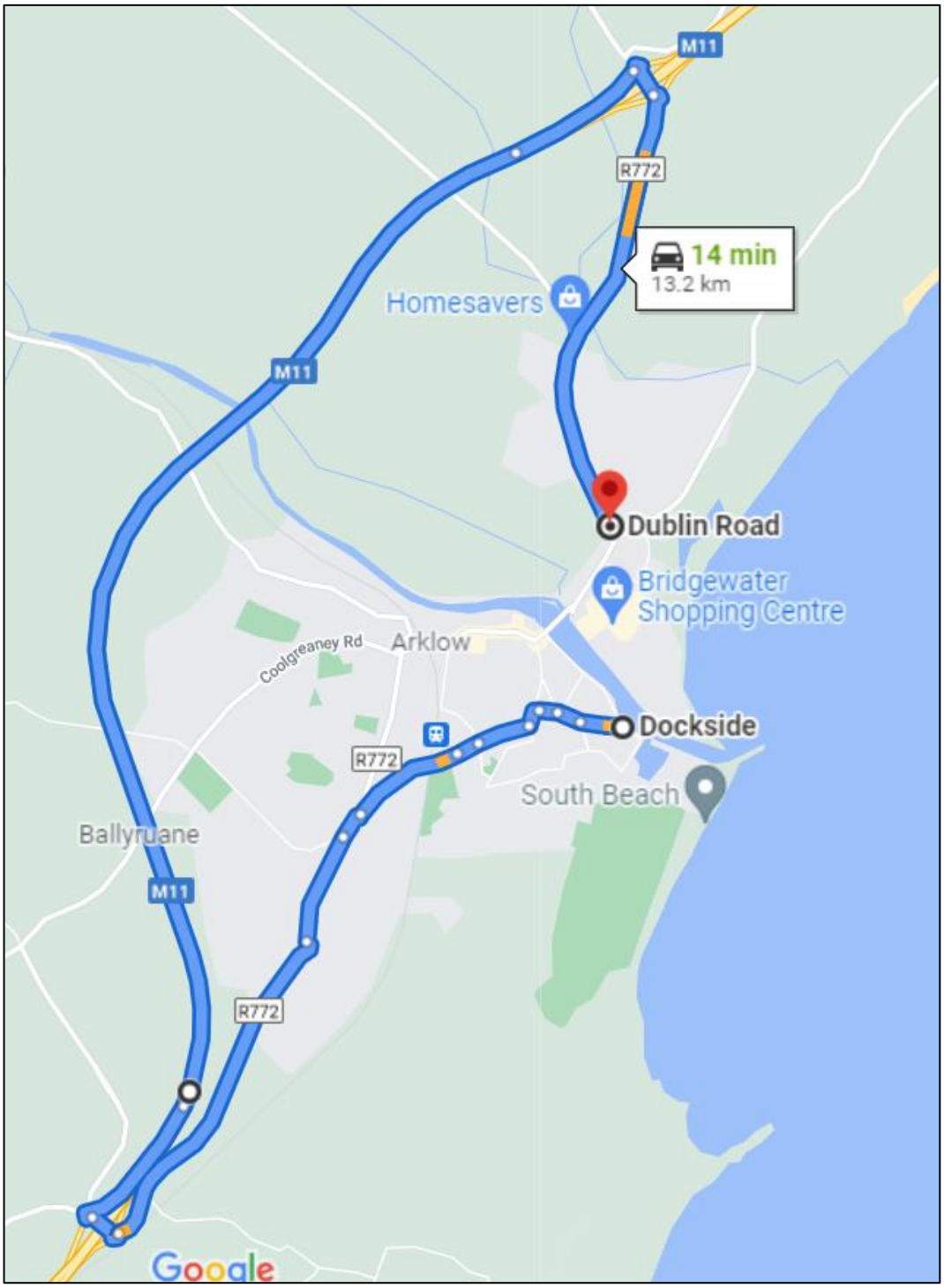



**Figure 9.1: Alternative traffic route around Arklow via M11**

For example, a staff member working at RA8 during Work Package 2 needs to pick up some site equipment such as generator at site compound SC1. If this staff member was not permitted to use the Arklow Bridge to carry out this trip they would have to travel approximately 13 kilometres via the Motorway instead of the 1 kilometre trip in Arklow.

This level of diversion does not make practical nor environmental sense. In addition, the scale of internal trips is not expected to be significant, and these internalised trips have been included for in the assessment of the proposed development.

### 9.2.12 Pedestrian Crossing – Arklow Bridge

The current public realm enhancement plan (as presented in Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR and as revised in **Appendix A** of this report) for the South Quay and River Walk include significant enhancements to the pedestrian amenities in the town. The current plans retain the existing informal pedestrian crossing between the South Quay and River Walk. It is not necessary to upgrade this pedestrian crossing to facilitate the proposed FRS.

However, it is possible to upgrade this pedestrian crossing in the future to a formal crossing should the recently commissioned Arklow Town Transport Study recommend its future provision. The proposed FRS will not prejudice the introduction of a pedestrian crossing at a future date, assuming it can be shown (as part of the Transportation Study) to have a benefit.

### 9.2.13 Traffic Signals at the Junction of South Quay/ Arklow Bridge

The current public realm enhancement plan for the South Quay and River Walk do not include the provision of traffic signals at the junction of South Quay/ Arklow Bridge and maintains the existing give-way junction. The proposed design has maintained the existing traffic management controls to ensure that traffic on Arklow Bridge has priority over traffic on the South Quay and to ensure South Quay does not become an attractive through route and maintains its primary residential nature. It is not necessary to upgrade this junction to facilitate the proposed FRS.

However, it is possible to upgrade the junction in the future to a fully signalised junction should the recently commissioned Arklow Transport Study recommend this change. The proposed FRS will not prejudice the upgrade of this junction at a future date, assuming it can be shown (as part of the Transportation Study) to have a benefit.

The proposed junction design incorporated into the public realm enhancement plan retains the give-way controlled and the planting in the area has allowed sufficient visibility from the stop line.

One of submissions shows the required visibility in advance of the pedestrian dropped kerbs and states that it has been impacted by a proposed new tree. This is not correct. The correct visibility is noted in Figure 9.2 below and the tree is well positioned out of any required sightline.

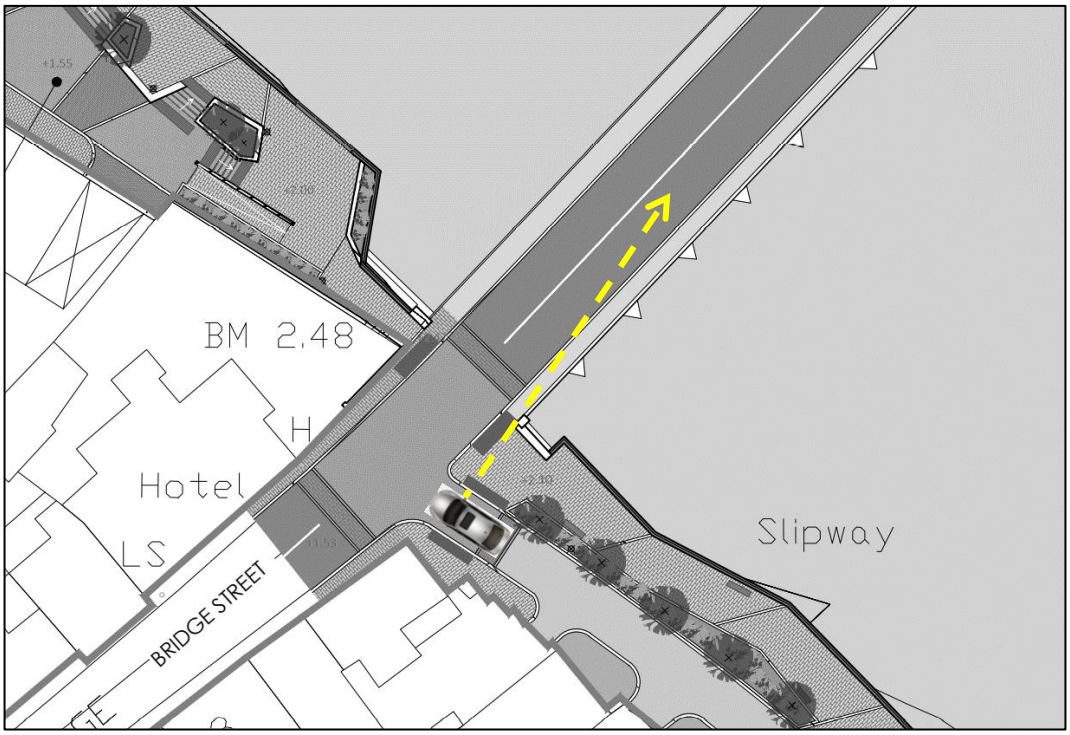



**Figure 9.2: Visibility in advance of pedestrian dropped kerbs**

### 9.2.14 River Walk Approach to Arklow Bridge

The public realm enhancement plans include the retention of the existing pathway connecting Arklow Bridge with River Walk. The proposed walkway is 2.0 metres in width and is less than the more generous provision provided along the remainder of the scheme. However, it is sufficiently wide to cater for the projected volume of pedestrians over a very short distance.

### 9.2.15 River Walk – Retention of On-street Parking

The public realm enhancement plan (as presented in Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR and as revised in **Appendix A** of this report) includes for the retention of on-street parking along River Walk to ensure the businesses in the area are provided with similar accessibility to the current arrangements. It is noted that other parts of the same submission (S15) raised concern regarding the temporary loss of parking, however the proposed development has endeavoured to maintain the existing level of parking in the permanent situation as much as possible to ensure continued access by businesses and residents.

### 9.2.16 Access to Site Compound No. 2

Site Compound No.2 will be accessed from the public road network with traffic using the North Quay to access the compound. The North Quay is a busy road providing access to the Bridgewater Shopping Centre (as noted in Section 7.3.4 of Chapter 7 of the EIAR) and other retail and commercial premises.

The access route from Ferrybank is sufficiently wide to cater for two-way traffic and there are pedestrian facilities along one side of the access route. The assessment of potential impact along North Quay is projected at a 5% increase over the day with a larger increase (+18%) expected in the morning peak period due to the lower baseline traffic flows. The Bridgewater Shopping Centre and neighbouring Aldi store are the big traffic generators in the area and they are busier throughout the day compared to the morning peak hence the bigger relative change in the morning peak period based on a similar increase in peak hour traffic as with the construction works. As noted in the EIAR, the traffic generated by the proposed development will have a slight increase in traffic congestion within the town and these effects will be temporary in nature and following the completion of the works will have no residual effects (Section 7.10.1 of Chapter 7 of the EIAR). Other concerns relating to Site Compound 2 are also addressed in Section 5.2.1 above and 17.2.6 below. The EIAR has taken into account all aspects of the construction of the entire scheme as proposed including likely significant impacts of the site compounds themselves. Mitigation measures have been applied as necessary. Refer to the relevant chapters of the EIAR and the sections in this report for specific details

### 9.2.17 St Mary's Car Park – Site Compound No. 4

The proposed Site Compound No.4 does not propose to remove any part of St Mary's Park where the bandstand is located. The delivery of the site compound does remove car parking for a temporary period after which the parking spaces will be re-instated. Site Compound No.4 will not be used to store dredged material and neither RA 4, 5 or 6 will be used to excavated dredged material (See Section 7.4.4.1 and Figure 7.10 of Chapter 7 of the EIAR). The traffic management plan had identified that access through St Mary's Car Park should be limited to only essential works along this section of the river and it was deemed that St Mary's Car Park and its associated access routes were the best available to serve the required works in this area notwithstanding the temporary loss of parking in the car park.

In terms of construction staff using St Mary's Car Park, this will not be permitted and any construction staff will be required to park within the proposed FRS compounds. The number of staff associated with Site Compound No. 4 is relatively small and can be catered for with the proposed FRS compound or within the associated work areas along the river ensuring no further loss of parking in St Mary's Car Park.

It is acknowledged that further car parking will be temporarily removed along River Walk as well to assist in the delivery of the proposed construction works in this area. Visitors to Arklow who need to drive can use some of the other publicly available parking in the town such as Arklow Main Street Car Park, Station Road Car Park and on-street spaces (i.e. Main Street, St Mary's Road, etc..). It is worth noting that the loss of parking is temporary and will be re-instated following completion of the works. Other concerns relating to Site Compound 4 are also addressed in Section 5.2.1 above and 15.2.3 below. The EIAR has taken into account all aspects of the construction of the entire scheme as proposed including likely significant impacts of the site compounds themselves.

Mitigation measures have been applied as necessary. Refer to the relevant chapters of the EIAR and the sections in this report for specific details

### 9.2.18 Access to Site Compound 6

Site Compound 6 will be used to serve construction works to the south of the Avoca River and will be used to store dredged material and other construction related activities. The entrance to the compound is proposed to be south of the existing South Beach parking area and will be provided with sightlines at a minimum of 23 metres (Reference The Design Manual for Urban Roads and Streets, Department of Transport, Tourism and Sport, Section 4.4.4 Forward Visibility). The 23 metre requirement is based on the current posted advisory speed limit on the external access road (25 kph) and reflects the prevailing speeds due to the presence of a number of tight bends along the external roadway. The layout of SC6 including entrance location and sightlines is presented in **Appendix B** of this report.

To ensure the safe operation of the proposed entrance junction additional safety measures such as signage, speed bumps will be considered in the detailed design of the junction.

Other concerns relating to Site Compound 6 are also addressed in Section 5.2.1 above, 10.2 and 15.2.3 below. The EIAR has taken into account all aspects of the construction of the entire scheme as proposed including likely significant impacts of the site compounds themselves. Mitigation measures have been applied as necessary. Refer to the relevant chapters of the EIAR and the sections in this report for specific details

### 9.2.19 Access to River Access 7

Access is required to Arklow Bridge from both banks of the river both upstream and downstream. River Access 7 is necessary to carry out the works safely under Work Package 1 and suitable traffic management will be put in place to ensure safe operations. It should be noted that River Access 7 will only be in operation for approximately 6 months to facilitate the construction of in-channel access roads as part of Work Package 1. The EIAR has taken into account all aspects of the construction of the entire scheme as proposed including the river access points. Mitigation measures have been applied as necessary. Refer to the relevant chapters of the EIAR and the sections in this report for specific details

### 9.2.20 Baseline Traffic Flows

As part of the traffic and transport assessment included for in the Environmental Impact Assessment Report, it was necessary to carry out traffic counts to understand baseline traffic conditions on the surrounding road network, see Section 7.2.2 of Chapter 7 (*Traffic and Transport*) of the EIAR. These traffic counts were carried out in Sept 2020 when the country was under COVID-19 restrictions like it is still to this day (Jan 2022). The EIAR team were mindful that traffic flows reduced during COVID-19 due to the restrictions.

Therefore, the recorded traffic counts were increased to reflect the potential impacts the Level 2 COVID-19 restrictions had on traffic flows. As noted in Section 7.2.2 of Chapter 7 of the EIAR, the rate of increases was based on traffic count data gathered by Transport Infrastructure on the M11 Motorway. This data was used as it was the best available data to allow a comparison between pre and during COVID-19 conditions. Generally, traffic flow patterns on the national road network reflect traffic flow patterns in an urban setting, i.e. there are peaks in traffic during the morning and evening, and generally traffic is reduced on Saturdays and Sundays). Of course there are always exceptions around sporting events, tourist destinations, shopping centres etc. but for the purpose of this assessment, the use of recorded traffic flow data and increasing these flows to represent the potential impact associated with COVID-19 provides a robust basis to carry out the transport assessment.

It is worth noting that the assessment has also included for the continued growth in traffic up to the assessment year 2026 based on Transport Infrastructure Ireland's growth rates for Wicklow based on the assumption that after the pandemic finishes, traffic patterns will return to their pre-COVID conditions and continue to grow into the future, see Section 7.2.3 of Chapter 7 of the EIAR. However, it is yet unknown how the impact of working from home and on-line shopping will have on longer term traffic growth rates, but to ensure a robust assessment the assessment included for the continued growth in traffic.

### 9.2.21 Distribution of Construction Staff Traffic

There are a number of key routes into the study area from key external destinations and they include Ferrybank, Main Street and Abbey Street. The route along Main Street provides access to Coolgreenay Road, Vale Road and Wexford Road and sizable residential catchment of Arklow. In addition, the route along Main Street provides access to Junction 21 on the M11 Motorway and any staff arriving from the south of Arklow is likely to use this junction, travel along the Wexford Road and Main Street to access Site Compounds located to the north of Arklow River (i.e. SC1, SC2, SC3, SC5).

The traffic and transportation assessment has acknowledged the likely increase in construction staff traffic using Main Street as there are no proposals to limit construction traffic access to Arklow Bridge as it would not be possible to enforce and there is no requirement to mitigate as the projected scale of traffic increases is low and is likely to only have a slight negative impact on traffic congestion in Arklow.

### 9.2.22 Construction Staff – Parking

In terms of staff parking, this will be provided at the various site compounds depending on which work package is been delivered. Construction staff will then be transported to the individual works areas in shared transport vehicles (mini-vans) this will ensure only a limited number of parking spaces are required at each works area.

### 9.2.23 Projected Construction Traffic Impact

The Traffic and Transport Assessment (Chapter 7) included as part of the Environmental Impact Assessment Report clearly demonstrates that the proposed development will have a slight increase in traffic congestion within the town and these effects will be temporary in nature and following the completion of the works will have no residual effects (Section 7.10.1 of Chapter 7 of the EIAR). The submitted assessment does not claim that congestion does not currently exist in Arklow. To contrary, it acknowledges its existence in Section 7.6.1 of Chapter 7 of the EIAR.

The construction traffic management plan further acknowledges the volume of traffic using Arklow Bridge on a daily basis and the plan includes restrictive access to working areas to minimise impacts on prevailing traffic conditions in Arklow.

The EIAR has taken into account all aspects of the construction of the entire scheme as proposed including the impacts associated with construction traffic themselves. Mitigation measures have been applied as necessary. Refer to the relevant chapters of the EIAR and the sections in this report for specific details.

## 9.3 Conclusion

The issues raised in the submissions and observations in relation to traffic, transport and parking have been fully considered, and having considered those issues, the conclusions of the Traffic and Transportation impact appraisal remain as set out in the EIAR.

# 10 Biodiversity

## 10.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to biodiversity proposed. The concerns raised in these submissions/objections relate to the following:

- Flora Protection Species
- Otter Survey
- Bats
- Birds
- Invasive Species
- Fisheries, Water Quality and Construction
- Debris Trap Hazard to Fauna
- Trees, Landscaping and Native Species

## 10.2 Flora Protection Species

### 10.2.1 Issues

The submissions raised concerns in relation to the following species at South Beach (SC6):

- Clary Sage *Salvia verbenaca*
- Moore's Horsetail *Equisetum moorei*

Save Maritime Arklow Group (S15) noted that:

- *Arklow Coastcare commissioned an herbarium to be produced for the beach and its green area which found there are over 100 plants growing here including a rare plant Wild Clary, (Salvia verbenaca)… Possible negative impact on this rare species are not addressed in the EIAR*".

The Department of Housing, Local Government and Heritage provided a response via the Development Applications Unit (DAU) (S2) noted that:

- "*the EIAR includes mitigation measures for Moore's Horsetail Equisetum moorei on South Beach SC6. This is the area destined for the storage of material dredged from the river. It is acknowledged that this material may have high chlorine levels*".
- "*the additional survey for this species proposed for 2021 has ascertained that this species is present and that the mitigation measures outlined in the documentation must be implemented*".

- "*there has been a recent finding of Clary sage Salvia verbenaca at the same site. This plant is listed as rare in the Irish Red Data List for Vascular Plants (RL10). This must be taken into account also and the storage site moved elsewhere if necessary".*

## 10.2.2 Response

### 10.2.2.1 Save Maritime Arklow Group (S15)

The sources of possible impact to *Salvia verbenaca* include runoff from dredge material and dust from operating vehicles/ machinery, dredge loading/ unloading operations *etc*. The impact mechanisms are also relevant to *Equisetum moorei.* Section 10.2.2.2 below highlights the mitigation that will be implemented to ensure significant impacts are avoided.

### 10.2.2.2 Development Applications Unit (DAU) (S2)

As outlined in Section 5.3.2 of Chapter 5 (*Construction Strategy*) of the EIAR, SC6 will be situated in the green area along South Beach Road. A 2.4m high security fence and gates will be erected around the site SC6. Section 5.3.2 of Chapter 5 of the EIAR notes that the northern section of SC6 will accommodate site offices and welfare facilities during WP2 and WP4 (See Table 5.2 of Chapter 5 of the EIAR). Section 5.3.2 of Chapter 5 of the EIAR also notes that the southern section of compound will be used for the archaeological examination of inert dredged estuarine material (sands and gravels) for WP2.

As noted in Section 5.5.2.3 of Chapter 5 of the EIAR, some of the dredged material sampled downstream of Arklow Bridge had natural slightly elevated chloride concentrations, likely due to saline intrusion given the tidal influence on this section of river. Temporary stockpiling of this material is likely to allow natural reduction in chloride concentrations sufficiently so this material could be deemed to be inert (subject to verification testing). This material will be temporarily stockpiled at SC1 and SC5, not SC6. Table 5.2 of Chapter 5 of the EIAR confirms that only inert estuarine material (sands and gravels) will be archaeologically examined at the southern section of SC6 prior to removal offsite.

The public carpark is located to the north of SC6. The use of the public carpark is not required for the proposed works and is therefore not included in the planning boundary. The carpark will be maintained for public use for the duration of works. A 5m wide access road will lead from the northern section of SC6 to the southern section within SC6. Access to SC6 will be at the northwest corner of the compound.

In 2007 a plant known as *Equisetum moorei* (Moore's Horsetail) was reported in a shallow depression in the eastern section of SC6 (Curtis and Wilson 2007[1]). Section 10.3.2 (Site Visits and Surveys) of Chapter 10 (*Biodiversity*) of the EIAR details an *Equisetum moorei* survey undertaken at SC6 in 2020 by AQUAFACT.

[1] Curtis, T. and Wilson, F. 2007. Wicklow Rare/Threatened and Scarce Plant Survey 2007. *Equisetum x moorei*. National Parks and Wildlife Service.

The findings of the survey are described in Section 10.3.3.3 of Chapter 10 of the EIAR. While the 2020 survey revisited the location where *Equisetum moorei* was previously recorded by Curtis and Wilson, the 2020 survey did not record the species in the area. The 2020 survey report is presented in full in Appendix 10.1 of the EIAR. This 2020 survey report recommended that a site visit would also be carried out mid May 2021. Following the December 2020 survey report and prior to submission of the planning application to ABP, the planning boundary of works area SC6 was reduced to avoid directly impacting on the area where *Equisetum x moorei* was recorded in 2007.

WCC commissioned a survey of *Equisetum moorei* at SC6 in summer 2021. The survey was conducted by Faith Wilson and Dr Tom Curtis. The full survey report is included in **Appendix C** of this report. The survey identified a remnant population of Moore's horsetail in the shallow depression to east of the proposed access road between the northern and southern sections of SC6.

The layout of the SC6 has now been revised to take into account the findings of the 2021 *Equisetum moorei* survey and is presented in **Appendix B** of this report. This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

It is observed that the majority of the *Equisetum moorei* population is located outside of the planning boundary however a small section is located within the planning boundary to the east of the access road (see **Appendix B**). A 2.4m high hoarding will be installed around the area of the *Equisetum moorei* population.

Section 5.4.3 of Chapter 5 (*Construction Strategy*) of the EIAR describes the site preparation and enabling works for the site compounds (including SC6). Archaeological examination of inert dredge material at SC6 will be carried out in the southern half of the site compound. A 5m buffer zone will be created between the inert dredge material archaeological examination working area in the south and the *Equisetum moorei* habitat to the north through the construction of a low bund and fence (See **Appendix B**).

Topsoil will be stripped in the grassed area required for dredge material archaeological examination working area and access road and stockpiled on site for reuse during reinstatement following completion of the works. A suitable geotextile membrane will be placed over the ground and suitable hardcore material will be placed over the geotextile to form a working surface for the archaeological metal detecting of the dredged material. A low bund, comprising precast concrete traffic barriers or similar, will be constructed around the perimeter of the site to retain the dredged material. The bund will prevent any runoff from the dredged material flowing into the habitat of *Equisetum moorei* indirectly impacting the area.

During the 2021 survey, a population of Wild clary, *Salvia verbenaca* was also discovered within the public carpark area and surrounds (refer to **Appendix C**). The revised layout of SC6 has taken into account the findings of the Clary Sage *Salvia verbenaca* during the 2021 survey and is presented in **Appendix B**.

It is observed that the majority of this population is located outside of the planning boundary within the existing car park to the north of SC6 however a small number of plants are located in the north west corner of the planning boundary of SC6. The site compound entrance has been moved southwards so as to avoid direct impact on these plants within the planning boundary. As shown in **Appendix B**, a 2.5m hoarding will also be installed between the site entrance and these plants within the planning boundary of SC6 and along the perimeter of the existing carpark.

Given the significant distance of the *Salvia verbenaca* population from the south section of the compound, the species will not be affected by runoff from the dredge material.

As outlined in Section 8.6.1 and 8.6.2 of Chapter 8 (Air Quality and Odours) of the EIAR, at SC6 (as at all construction compounds), a suite of dust control measures will be implemented to minimise potential dust impacts to sensitive receptors including Equisetum moorei and Salvia verbenaca (e.g. from operating vehicles/ machinery, dredge loading/ unloading operations etc.). The installation of the hoarding at the site entrance and the works area, will minimise dust deposition on the plants species. In addition, during construction phase activities, dust levels will be monitored monthly, using dust deposition gauges.

#### 10.2.2.3 Impact conclusions

Mitigation that will be implemented to ensure likely significant impacts to *Salvia verbenaca* and *Equisetum moorei* are avoided include the creation of a buffer zone around the dredge material examination working area though the construction of a low bund and fence, dust control measures and the installation of the hoarding fence between works area and site entrance, and the plant species.

## 10.3 Otter

### 10.3.1 Issues

An Taisce (S9) raised concerns in relation to an otter survey. These concerns relate to the following:

- No dedicated otter survey undertaken. Recommended that otter specific survey be carried out, and that those findings be made available to the relevant authority prior to any planning decision. The resting places and holts which currently exist should be identified and mitigated for prior to planning approval, in addition to a pre-commencement survey to determine if any new holts or resting places have been established which may need a derogation.

### 10.3.2 Response

Section 10.3.6 (Otter Surveys) of Chapter 10 (*Biodiversity*) of the EIAR provides details of the otter surveys which were carried out as part of the walkover surveys. Section 10.4.10.3 (Otter) of Chapter 10 provides the results of those surveys. Section 10.5.4.1-2 of Chapter 10 present the impact assessment on otters.

Mitigation measures specifically proposed for otters are detailed in Section 10.6.6 of Chapter 10 of the EIAR. This includes the requirement for an otter survey to be carried out prior to commencement of works and if otter resting places/holts are found, a derogation licence shall be applied for from NPWS and any further mitigation measures required by the derogation licence shall be implemented.

To meet the recommendation made by An Taisce (S9) for a dedicated otter survey, Triturus Environmental Ltd. were commissioned by WCC in November 2021, to undertake a baseline otter (*Lutra lutra*) survey of the Avoca River estuary and connecting habitats in the vicinity of Arklow. The recommendations and key findings of the survey are summarised below while the full survey report is included below in **Appendix D** of this report.

The baseline otter survey identified the most important areas for otters along the Avoca River and connecting habitats relative to the proposed FRS scheme. This was based on an assessments of otter sign distribution and human-related disturbance, in addition to observations on general aquatic and fisheries habitats. The distribution of these otter signs (*i.e.*, holts (otter dens), spraints (otter droppings), couches (places where otters regularly rest above ground), prints and other signs) acted as an indicator regarding areas of channel and aquatic habitat used by otters, inclusive of potential breeding and resting areas (*i.e.*, holts and couches). The data collated facilitated the recommendation of otter specific mitigation measures for the proposed flood relief works.

The survey recorded a total of n=21 otter signs across approximately 9.8km of linear estuarine, riverine and coastal habitat (see Figure 4.1 of the otter report in **Appendix D** of this report and replicated in **Figure 10.1** below). This equated to an average of 0.46 otter signs per kilometre of linear habitat, a relatively low occurrence rate based on other Irish otter surveys close to urban centres (Triturus data). Otter signs were distributed throughout the survey area. The highest concentration of signs (such as prints, latrines (place where otter consistently depositing excrement) and spraint) were present along the north bank, upstream of Arklow Bridge, where more natural, lower-disturbance habitat was present. The Avoca would also provide the best quality foraging habitat within the vicinity of Arklow town. The otter report notes that that the lack of otter signs in an area of habitat does not imply the absence of otter, rather habitat less appropriate to otter marking.

No active or inactive holts were identified during this survey (November 2021). This is reflective of poor holting opportunities along the heavily modified Avoca River, where retaining walls are commonplace. Whilst the mature woodland located along the north bank of the Avoca River and adjoining Arklow Town Marsh does provide good quality otter habitat that is regularly used, no holts were recorded in the current survey. Considering the regular otter activity, it is likely that a breeding area is located upstream of the survey area.

Of particular note is the identification of an otter resting area (*i.e.*, couch) immediately upstream of Arklow Bridge on the north bank within the FRS area (see Figure 4.2 of the otter report in **Appendix D** of this report and replicated in **Figure 10.2** below, adjacent to the proposed flood wall installation on the north bank. Otters, along with their breeding and resting places, are protected under provisions of the Irish Wildlife Acts 1976-2021. Therefore, as works will likely disturb this otter resting area (given the close proximity), a derogation licence will be sought from the NPWS in advance of any works in this area and any requirements of the derogation licence will be complied with. This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

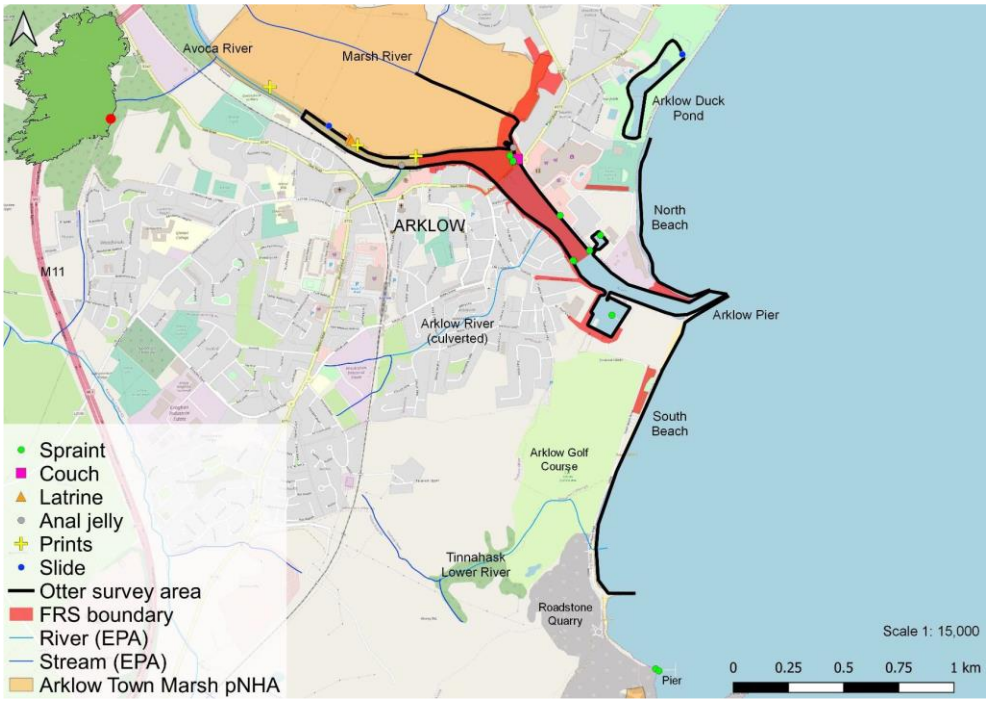



**Figure 10.1: Overview of the n=21 otter signs recorded.**

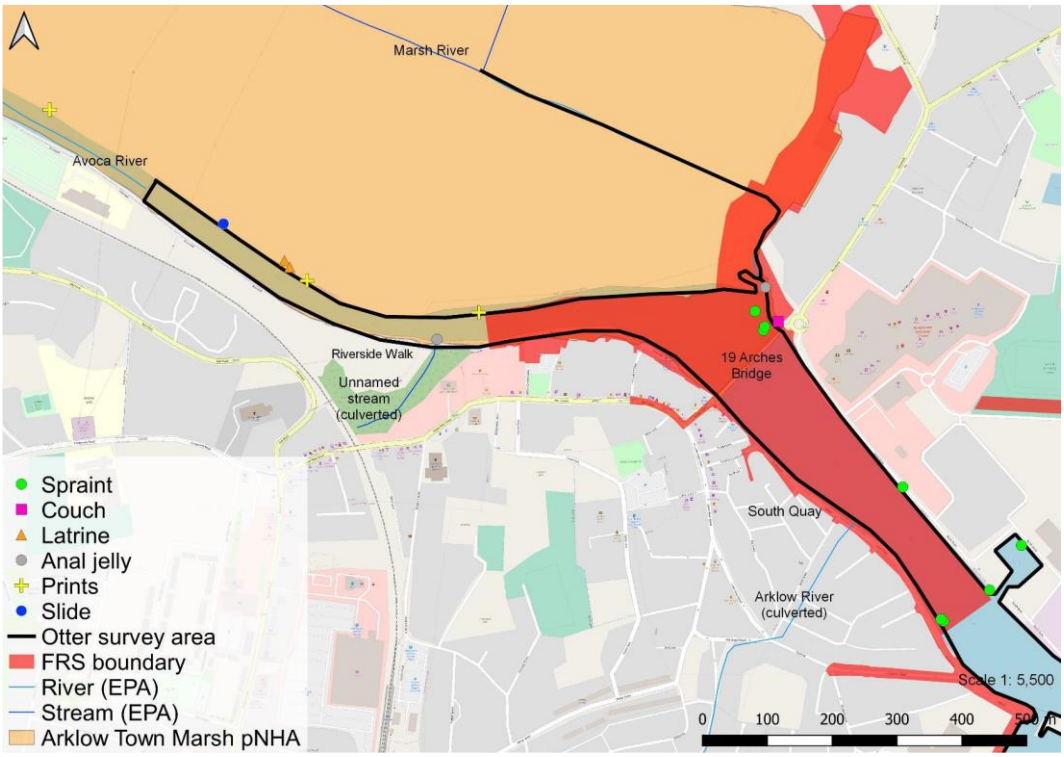



**Figure 10.2: Overview of the otter signs recorded in the Arklow FRS survey area (upper extent)**

# 10.4 Bats

## 10.4.1 Issues

The Department of Housing, Local Government and Heritage provided a response regarding bats via the Development Applications Unit (DAU) (S2). These concerns relate to the following:

- The Department note that a bat derogation licence was required for destruction of the bat roost at Arklow Bridge.
- The Department note that work on Arklow Bridge is scheduled to take place at night, under floodlights. The Department note that "*this will prevent feed and roosting in the vicinity during the construction phase*". The Department note that "*in the operational phase, there will be increased lighting along the river banks, especially on the south bank*". The Department note that" *mitigation is proposed for this but there will still be loss of feeding habitat caused by it*".
- The Department note that "*the whole process of a FRS is to canalise the river and to speed up the passage of water through the town*". The Department note that Daubentons bat feed in wide sweeps close to the surface of smooth waters in rivers and lake and concerns are raised with regard the impact of faster flowing water in a narrower river on foraging.

- The Department note that all instream work will take place during the bat breeding season and that breeding Daubenton females are "*more likely to use the lower reaches of rivers during the breeding season than the males so any impact on foraging is likely to have a disproportionate effect on them*".
- The Department note that "*most reviews done on bat mitigation show poor uptake of bat boxes or bat tubes"*. The Department recommends" *additional monitoring of bat species, over and above the two year period mentioned in the EIAR. An annual survey for a minimum of 5 years, focusing on occupancy of the bat tubes (usage and species determination) as well as the presence of foraging bats within the development site is recommended. The results of these surveys should be sent annually to the National Parks and Wildlife Service (NPWS)"*.
- The Department also recommends the following:
    - *"The use of native flowering tree species for landscaping.*
    - *Planting between streetlights and the river as an additional buffer to prevent light spillage onto the water*
    - *The full implementation of the mitigation measures on lighting which are contained in the documents*
    - *The lighting on Arklow Bridge should only be for traffic safety and there should be no amenity lighting of the stonework in order to maintain dark conditions for roosting bats and birds".*

### 10.4.2 Response

Section 5.5.1 (WP1) of Chapter 5 (*Construction Strategy*) of the EIAR provides details on the bridge underpinning, bridge remedial works and scour protection required at Arklow Bridge. The disturbance arising from these works will impact on the Daubenton's bat roost located on the western side of the southern end of the bridge. A derogation licence to disturb this roost has been issued and all of the mitigation measures detailed in Appendix 10.3 of Chapter 10 (*Biodiversity*) of the EIAR (and repeated in Section 10.6.5 of Chapter 10 of the EIAR) will be complied.

Instream works are required for some of the work packages, especially WP1 (Arklow Bridge), WP2 (Dredging) and WP3 (Debris Trap and Gravel Trap). The timing of the instream works have been chosen so as to minimise impacts on fisheries (instream works will run from May to September).

Section 10.3.5 (Bat Surveys) of Chapter 10 of the EIAR lists the bat surveys that were carried out between 2016 and 2017 for both the Arklow FRS development and the Arklow WwTP project. This section also details the surveys undertaken in 2020 to inform the application to NPWS for a bat derogation licence required for the proposed works at Arklow Bridge. The full details of the survey are presented in Appendix 10.2 of the EIAR while the bat derogation licence and application are provided in Appendix 10.3 of the EIAR.

Section 10.6.5 of Chapter 10 of the EIAR details the mitigation measures proposed as part of the application for the derogation license that will be implemented during construction to meet the requirements for protection of the bats availing of Arklow Bridge.

Mitigation includes the installation of bat boxes and bat tubes in the arches of Arklow Bridge, in the flood walls and in the columns of the debris trap.

Section 10.6.5 also notes that the lighting will be designed in consultation with the licenced bat expert, using emerging lighting technologies and having regard to best practice. Other mitigation detailed in Section 10.6.5 includes the examination of all mature trees and bat boxes along River Walk with roost potential prior to removal. All mitigation listed in Section 10.6.5 of Chapter 10 of the EIAR will be implemented.

As outlined in Section 10.6.9 (Enhancement work) of Chapter 10 (*Biodiversity*), landscape planting will be undertaken to address the loss of terrestrial habitat to accommodate the FRS. As part of this mitigation, it is intended that the tree and grassland planting will be fulfil the mitigation function for habitat loss for bat species. The north bank and marsh area is an area of obvious biodiversity opportunity. Native grass and tree planting has been proposed in this location. Details of the proposed landscaping is provided in Appendix 4.2 of the EIAR (Landscape Design and Public Realm). Refer also to Section 10.9 below of this report also in relation to trees landscaping and native species.

In response to the Departments' request regarding the minimisation of lighting impacts on bats, WCC commit to choosing of luminaires along the Public Realm on South Bank that follow Bat Conservation Trust (BCT) guidelines (BCT, 2018[2]). This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below

- All luminaires used should lack UV/IR elements to reduce impact.
- LED luminaires should be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum (<2700 Kelvins should be used to reduce the blue light component of the LED spectrum).
- Luminaires should have a peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
- Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible. Bollard lighting should be considered for pedestrian and greenway areas, if deemed necessary.
- Only luminaires with an upward light ratio of 0% and with good optical control should be used.

[2] Bat Conservation Trust Guidance Note 08/18 Bats and artificial lighting in the UK.

- Luminaires should be mounted on the horizontal, i.e. no upward tilt.
- As a last resort, accessories such as baffles, hoods or louvres should be used to reduce light spill and direct it only to where it is needed.
- Where lighting is required, it is important to ensure the no light trespass occurs along adjacent to habitats. In areas where there are habitats, consideration for a shorter light post to reduce light trespass should be considered in order to achieve lighting levels of 0.1 LUX or less in bat habitats.
- Where lighting is required, it is important to ensure that there are continuous dark corridors. Greater spacing between lighting posts should be considered.
- Where lighting is required and light trespass on important bat habitat is inevitable, adequate mitigation measures are required to reduce the impact (e.g. screening) on order to reduce lighting levels to 0.1 LUX.
- Investigate the potential of "Part-Time" lighting schemes and/or "Dimming Illuminance" lighting schemes.

The Arklow FRS will not result in the significant narrowing of the Avoca River and as bats are active mainly in later Spring/Summer/early Autumn months, velocities in the river will not be subjected to flood events that give rise to significantly higher flow rates in the river. Consequently, it can be concluded that significant impact to Daubenton's bat foraging will not occur.

The Departments recommendation " *additional monitoring of bat species, over and above the two year period mentioned in the EIAR. An annual survey for a minimum of 5 years, focusing on occupancy of the bat tubes (usage and species determination) as well as the presence of foraging bats within the development site is recommended. The results of these surveys should be sent annually to the National Parks and Wildlife Service (NPWS)"* will be complied with. This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

In Section 12.6.2.2 of Chapter 12 (*Landscape and Visual*) of the EIAR it is outlined that existing lighting which illuminates the stonework on Arklow Bridge will be reinstated upon completion of the bridge works. In response to the Departments submission, the existing lighting will not be reinstated and no amenity lighting of the stonework will be installed so as to maintain dark conditions for roosting bats and birds. This change has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

## 10.5 Birds

Several submissions (e.g., S4, S12, S13, S15 *etc.*) raised concerns in relation to the potential impact to birds following the loss of areas used for roosting, resting, and foraging. The concerns are addressed in Section 10.9 below in terms of landscaping which includes measures to mitigate for loss of area.

Also, there are a number of sandbanks which are used by birds for roosting in the river upstream of Arklow Bridge these impede flow through the bridge and have been removed on occasion previously. 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*. Refer also to Section 4.2.4 above.

There are small islands in the river with tree and scrub vegetation close to the northern arches of the bridge (see **Figure 4.15** of Chapter 4 of the EIAR). These will be removed during the river dredging to ensure that flood flows can effectively flow through these arches (refer to **Drawing No 1003** of Appendix 4.1 of the EIAR).

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.*

It is also noted that 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).**

## 10.6 Invasive Species

### 10.6.1 Issues

A number of submissions raised concerns in relation to invasive species. These concerns relate to the following:

- Whilst no invasive species have been identified at the proposed work site areas extreme care must be taken that those currently upstream do not find a foothold.

### 10.6.2 Response

Section 10.3.2 (Site Visits and Surveys) of Chapter 10 (*Biodiversity*) of the EIAR lists the walkover and species surveys that were undertaken for the Arklow FRS and Arklow WwTP.

In Chapter 10 of the EIAR, a table of the habitat types (including invasive species) identified during these walkover surveys is presented in Section 10.4.5.1 (Overview), while detailed findings of the surveys are outlined in Section 10.4.5.2 through Sections 10.4.5.6. Section 10.4.5.8 (Invasive Alien Plant Species) summaries with the survey findings with respect to invasive species. This section also details the records of invasive plant species in the area held by the National Biodiversity Data Centre.

In Section 10.3.3.1 of Chapter 10 of the EIAR it is noted that activities for the construction of the FRS will be undertaken in the vicinity of invasive plant species. As described in Section 10.6.2.5 of Chapter 10 of the EIAR, there is a risk that construction (and potentially operational maintenance works) could potentially disturb stands of invasive plants and/or soils contaminated with invasive plant material. The invasive plant species which have been identified in the proposed works areas include Butterfly-bush (*Buddleia davidii*) and Rhododendron (*Rhododendron ponticum*). Outside of the planning boundary along the Avoca River, Himalayan balsam (*Impatiens glandulifera*) and Japanese Knotweed (*Fallopia japonica*) have both been previously recorded.

A strategy to manage and prevent the spread of the invasive plants is outlined in the Invasive Alien Plant Species Management Plan of the Arklow FRS Construction Environmental Management Plan (CEMP) which is presented in in Appendix 5.1 of the EIAR. The management plan includes specific mitigation measures regarding the eradication and biosecurity procedures to protect the habitats and fauna. The management plan also details the careful application of herbicide to treat these species.

## 10.7 Fisheries, Water Quality & Construction Aspects

Inland Fisheries Ireland, Irish Water and others raised concerns in relation to fisheries, water quality and construction. These concerns are addressed in Section 5 above. Refer also to Section 4.2.3.

## 10.8 Debris Trap Hazard to Fauna

### 10.8.1 Issue

Submission S12 commented that debris traps are being removed from rivers as they are hazardous to wildlife.

### 10.8.2 Response

A description of the debris trap proposed for the scheme is provided in Section 4.4.4 (Debris Trap and Gravel Trap) in Chapter 4 (*Description of the Proposed Scheme*) of the EIAR. The debris trap which will be located approximately 340m upstream of Arklow Bridge is designed to catch floating debris that could otherwise be caught in Arklow Bridge, causing blockage of water flow through the bridge. It will comprise 13 reinforced concrete columns extending from the north to the south bank of the river. The spacing between the columns is 3.4m.

Given the design of the trap with 3.4 spacings between the columns, the structure does not pose a significant hazard to avifauna transiting the site as individuals will be able to manoeuvrer easily between the structure columns. The spacing between the columns will also allow the free movement of fauna through the river with the structures posing no impediment to faunal movement. Bat tubes will be incorporated in the concrete columns to create roosting sites for bats (Refer to Drawing Nos 1021 of Appendix 4.1 of the EIAR). It should be also noted that the columns themselves will present resting/ roosting perches for birds.

## 10.9 Trees, Landscaping, Native Species

### 10.9.1 Removal of Trees

A number of submissions raised points in relation to the removal of trees – especially on the south bank of the river.

#### 10.9.1.1 Response

It is accepted and assessed in Chapter 12 (*Landscape and Visual*) of the EIAR and indicated on BSM Drawings 300-306 of Appendix 4.2 of the EIAR that trees are to be removed for the construction of the proposed scheme. The proposed development also provides for planting of new trees as indicated on BSM Drawings 300-306 in replacement of those removed.

In total 61no. trees are to be removed along the south bank of the river and it is proposed to replant 69no. replacement trees.

It is also noted that since lodging the planning application, An Bord Pleanála has granted permission for the Arklow Wastewater Treatment Plant (WwTP) Project (ABP ref.: Case reference: PA27.302556). The Arklow WwTP Project already includes for the removal of 46 of the 61no. trees identified for removal in the subject application. Trees identified for removal in the Arklow WwTP Project are indicated on Drawings C-IS-701 to 708 submitted with that application.

These drawings are available at: https://www.arklowwastewater.ie/planning-sites/arklow-wastewater/docs/planning-documents/Planning-Drawings.pdf.

For ease of reference, we also provide the following summary of proposals in relation to the removal / replanting of trees.

**Tree Removal / Replacement Proposals: South of River (BSM Drawings 300 – 303)**

| Tree Condition Category | U (Poor Condition / Recommended for Removal) | C (Fair Condition) | B(Moderate Condition) | A (Good Condition) |
|---|---|---|---|---|
| South Bank: West of Bridge (BSM Drawings 300 / 301) | | | | |

| Tree Condition Category | U (Poor Condition / Recommended for Removal) | C (Fair Condition) | B(Moderate Condition) | A (Good Condition) |
|---|---|---|---|---|
| Tree Nos. | T14 | T1*; T2*; T3*; T4*; T5*, T6*, T8*, T9*, T10*, T11* T15, T16, T17, T23*, T24* | T22* | None |
| South Bank: East of Bridge (BSM Drawings 301 / 302 / 303) | | | | |
| | None | G8 (5no.); T33-T52* (20no.); T54-T59 (6no.);<br>T60-T72* (13no.) | None | None |
| | 1 No. | 59 No. (* = 45no.) | 1 No.* | 0 |

* Approval for removal of these trees (46No.) has also been confirmed under the permission for the Arklow Wastewater Treatment Plant (WwTP) Project (ABP Ref.: PA27.302556 – refer to Drawings C-IS-701 to 708).

The Proposed Development includes for removal of trees and the EIAR assess the effect of removing 61No. trees on the south side of the river (*17No. west of the bridge and 44No. east of the bridge*). It is noted that the removal of 46No. of these trees (*13No. west of the bridge and 33No. east of the bridge*) has been previously approved under the permitted Arklow Wastewater Treatment Plant Project.

Therefore, on the south bank of the river , the Proposed Development includes for removal of only 15No. trees additional to the WWTP namely T14; T15; T16 & T17 west of the bridge, (i.e. T14; T15; T16 & T17 west of the bridge, and T54-T59 (6No.) and G8 (5No.) east of the bridge). One of these trees (T14) is in poor condition and recommended for removal irrespective of the Proposed Development. The remaining 14 trees are of Category C in fair/poor or fair condition and many are young trees. At least two of the five trees within G8 (horse chestnut and maple) are heavily comprised by the ESB services and required ongoing reduction and pruning to avoid conflicts.

The Proposed Development provides for the planting of 69No. new trees on the south bank of the river – 23No. west of the bridge and 46No. east of the bridge (as per BSM Drawings 300 / 301 / 302 / 303).

Proposed tree planting is distributed along the full length of South Quay from the bridge east to the harbour – this includes for tree planting along sections where trees are currently not provided such as at in front of 1 – 5 South Quay; 1 – 6 Brookville Court, South Quay; Brookville Gardens, South Quay; and 1 – 7 Fogarty's Terrace South Quay.

All proposed trees are being planted at advanced or semi-mature sizes (i.e. 16-18cm and 20-25cm girth).

**Tree Removal / Replacement Proposals: North of River (BSM Drawings 304 – 306)**

| Tree Category | U (Poor Condition / Recommended for Removal) | C (Fair Condition) | B(Moderate Condition) | A (Good Condition) |
|---|---|---|---|---|
| North Bank: West of Bridge (BSM Drawings 304 / 305 / 306) | | | | |
| Tree Nos. | T106; T107 + 3 SM Willows | T105; T109; T115 + 2 SM Willows plus c,5700 sqm of tree / scrub planting | T108; | None |
| | 1 No. | 9 No. + c.5,700 sqm | 1 No. | 0 |

Therefore, 11No. trees and c.5,700 sqm of other plantings are to be removed on the north bank of the river all west of the bridge.

The Proposed Development provides for the planting of c.1.37ha of Proposed Native Woodland (as per Areas 1 and 2 on BSM Drawings 304 / 305 / 306). This planting is being provided in mitigation of planting removed, for visual screening and integration of the embankment structure, for habitat creation and mitigation and to support our national policy for 'No Net Loss' as outlined in the National Biodiversity Action Plan 2017-2021 (as set out in Chapter 10 of EIAR).

### 10.9.2 Use of Native Species

The Department of Housing, Local Government and Heritage via the Development Applications Unit (DAU) (S2) raised points in relation to the use of native species.

#### 10.9.2.1 Response

For the most part, planting proposals as detailed on the Landscape Design and Public Realm Drawings 300-306 (Appendix 4.2 of EIAR) comprise native species. This is especially the case on the north bank of the river where extensive areas (c. 1.37 hectares) of Native Woodland Planting are proposed.

On the south bank the proposed planting of new trees incorporates native species (Birch and Scot's Pine) and non-native but locally appropriate species. The selection of these species is based on the species of tree being removed, the often exposed nature of the environment and the appropriateness of the species for that environment.

Nevertheless, in response to the submissions/objections received, the tree planting proposals on the south bank have been reviewed and it is now proposed to include additional native species along River Walk and South Quay. Therefore, the following Planting Schedules on BSM Drawings 300-306 are have been revised and included in **Appendix A** of this report and are updated as follows:

Additions in red. Deletions in ~~strikethrough~~

PROPOSED RIVER WALK AND PUBLIC PLAZA TREES SPECIES

(*16-18 cm STD and 20-25 cm STD*)

Acer platanoides 'Columnare' (Norway Maple)

Alnus glutinosa (Alder)

Betula pendula (Birch)

~~Crataegus laevigata 'Paul's Scarlet' (Hawthorn)~~

Pinus sylvestris (Scot's Pine)

Prunus avium 'Plena' (Double flowered Wild Cherry)

Sorbus aucuparia (Mountain Ash)

PROPOSED SOUTH QUAY TREES SPECIES

(16-18 cm STD and 20-25 cm STD)

Acer platanoides 'Columnare' (Norway Maple)

Alnus glutinosa (Alder)

~~Ulmus 'Lobel' (Elm DED resistant)~~

Pinus sylvestris (Scot's Pine)

Prunus avium 'Plena' (Wild Cherry)

Sorbus aucuparia (Mountain Ash)

The above changes has been included in the Schedule of Additional Environmental Commitments in Section 20 below.

## 10.10 Conclusion

Concerns were raised with regard potential impact on the *Equisetum moorei* which has been reported at SC6 and *Salvia verbenaca* which has been recorded outside of SC6 at the carpark facilities to the north. A 5m buffer zone will be created between the working area and the *Equisetum moorei* habitat through the construction of a low bund and fence that will prevent any runoff from the dredged material flowing into the habitat of *Equisetum moorei* indirectly impacting the area.

Given the significant distance of the *Salvia verbenaca* population from the south section of the compound, the species will not be affected by the dredge material or runoff. Dust control measures and monitoring will be implemented to minimise potential dust impacts from operations to sensitive receptors including *Equisetum moorei* and *Salvia verbenaca*.

A dedicated otter survey was undertaken in 2021 and identified an otter resting area (*i.e.*, couch) immediately upstream of Arklow Bridge on the north bank adjacent to a proposed flood wall installation. A derogation licence will be required from the NPWS in advance of any works in this area. Any requirements of the derogation licence will be complied with.

WCC commit to implementing all bat-related mitigation measures presented in the EIAR. This includes measures for the installation of bat boxes and bat tubes, the design of lighting in consultation with the licenced bat expert, and the examination of all mature trees and bat boxes along River Walk with roost potential prior to removal, landscaping to fulfil the mitigation function for habitat loss for bat species.

In addition to the bat-related mitigation measure presented in the EIAR, WCC commit to choosing of luminaires along the Public Realm on South Bank that follow BCT guidelines to minimise impact to bats. WCC also commit to implement NPWS recommendations on annual monitoring of bats and no installation of amenity lighting of the stonework of Arklow Bridge to maintain dark conditions for roosting bats and birds.

WCC will implement the measures to manage and prevent the spread of the invasive plants that is outlined in the Invasive Alien Plant Species Management Plan of the Arklow FRS CEMP.

The debris trap located approximately upstream of Arklow Bridge comprise 13 reinforced concrete columns extending from the north to the south bank of the river, with 3.4m spacings between the columns. Given the design of the trap, the structure does not pose a significant hazard to fauna.

The issues raised in the submissions and observations in relation to biodiversity have been fully considered, and having considered those issues, the conclusions of the Biodiversity impact appraisal remain as set out in the EIAR.

# 11 Liaison Officer/Environmental Clerk of Works/Environmental Monitoring Committee

## 11.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to environmental monitoring, liaison officer or environmental clerk of works. The items raised in these submissions are:

- Implementation of a Community Liaison process for dealing with concerns of impacted community with regard to noise, odour, traffic etc
- Environmental Clerk of Works
- Environmental monitoring committee

## 11.2 Response

As mentioned in Section 5, the contractors will be required to employ an Environmental Manager to monitor and report on the implementation of the measures set out in the CEMP as well as any other environmental issues requiring attention. WCC, as developer, will also employ specialist environmental staff to monitor and report on the contractors' operations.

Section 4.2.2 of the CEMP states that the Employers Representative (ER) will be responsible for monitoring compliance with the CEMP. The ER team will include specialists with appropriate skills and experience as required to monitor site procedures and construction on behalf of the Employer (WCC), i.e. competent experts in construction, biodiversity, architecture, archaeology and heritage, noise, vibration, dust, waste, land, soils, contamination and/or water. In order to help fulfil their duties, the ER will carry out an audit of the CEMP at regular intervals to ensure that the Contractor is complying with the environmental provisions of the Contract.

A suitably qualified Environmental Clerk of Works will be appointed to oversee and monitor all measures taken to protect the aquatic environment as stated in Sections 21.2.4 and 21.2.8 of Chapter 21 (Summary of Mitigation, Monitoring and Residual Effects).

In response to the submissions/objections received, the Environmental Clerk of Works (ECOW) will also be available to monitor all other measures intended to protect the environment and will form part of the site supervision team.

In relation to an Environmental Monitoring Committee, it is noted that this has been conditioned by ABP for other flood relief scheme such as Bray (River Dargle).

As outlined in the CEMP (Section 4.3.1 of Appendix 5.1 of the EIAR), a communications plan will be established by the Contractor to provide a two-way mechanism for members of the public to communicate with a designated member of the Contractor's staff. The plan will include details of a contact name and number for any complaints that may arise during such works. Where communications are related to environmental issues the Contractor's Environmental Manager will be informed and engaged with, as appropriate.

## 11.3 Conclusion

The issues raised in the submissions and observations in relation to environmental monitoring, liaison officer or environmental clerk of works have been fully considered, and having considered those issues, the conclusions of the impact appraisals remain as set out in the EIAR.

# 12 Air Quality and Odours

## 12.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to air quality and odours. The items raised in these submissions are:

- Odour impacts at residential properties due to dredge material storage;
- Dust impacts at residential properties during the construction phase.

## 12.2 Response

### 12.2.1 Odour Impacts

A number of submissions [3] raise concerns in relation to the potential for odour impacts at residential properties due to the storage of dredge material. The potential impact rating of a moderate temporary negative is queried and it is claimed that no effective mitigation is proposed. It is suggested that SC1 be relocated to SC5. It is also claimed that the conclusion that no significant cumulative odour impacts will arise during the construction of the Arklow WWTP and the proposed development is incorrect.

The moderate temporary negative rating is based on the application of the following using Institute of Air Quality Management (IAQM) Guidance on the assessment of odour for planning, 2018 guidance (Table 8.11 in Chapter 8 (*Air Quality and Odour)* of the EIAR)):

- Source odour potential is considered medium as the odour compounds are moderately odorous (refer to Table 8.2 in Chapter 8 of the EIAR for the definition of moderately offensive odour);
- Pathway (transport effectiveness) is considered highly effective as receptors are located adjacent to the source;
- Odour exposure is a medium risk based on Table 8.12 in Chapter 8 of the EIAR.

On this basis, a moderate negative impact is concluded. The duration is temporary as it is projected to last for less than 1 year (EPA guidance). As noted in Section 8.5.2 of Chapter 8 of the EIAR, the work packages (WPs) will be undertaken at the same time so will not last for a duration of over 5 years as is contended.

[3] S16, S17, S20

As outlined in Section 8.6.3.1 of Chapter 8 of the EIAR, two odour specialists will be present onsite to monitor odour during the excavation of estuarine material from the river (also referred to as dredge material in some sections of the EIAR) during work packages (WP) 1-3, upstream and downstream, and across the channel profile. The odour assessors will alternate so that not one assessor will be continually onsite so that odour fatigue is avoided.

During WP1 and WP3, the following procedure will be observed:

- Estuarine excavated material that is too odorous for archaeological examination at SC1 will be transported directly offsite, as SC5 and SC6 will not be operational at that stage.

During WP2 the following procedures will be observed:

- Hazardous and non-hazardous contaminated material that is deemed too odorous (odour rating of 3 or more, see Section 8.6.1 of Chapter 8 of the EIAR) for stockpiling at SC2 will be transported directly offsite.
- Inert material that is too odorous for SC1 will be transported to SC6.
- Material with a slightly elevated chloride concentration that is too odorous for SC1 will be transported to SC5.

The assessment of odour will follow the guidance as set out in the EPA's Odour Emissions Guidance Note AG9. In addition, as outlined in Section 8.6.1.1 of Chapter 8 of the EIAR, vehicles leaving sites will be covered to prevent the escape of material and odour during transport. This measure is requested in one submission[4]. These mitigation measures are considered effective and robust. In addition, as outlined in Section 8.6.1.1 of Chapter 8 of the EIAR, a Communications Management Plan that includes community engagement will be developed and implemented before work commences on site. The name and contact details of person(s) accountable for air quality and dust issues will be displayed on the site boundary. This may be the environment manager/engineer or the site manager.

In relation to the potential for cumulative odour impacts, no significant odour effects are anticipated during the construction of the Arklow Wastewater Treatment Plant (WwTP), therefore, no significant cumulative effects are predicted should both schemes be constructed concurrently. Nonetheless, WCC has an Memorandum of Understanding (MoU) in place with the promoters of the Arklow WwTP project (Appendix 2.1(*Memorandum of Understanding*) of the EIAR) and communication with stakeholders and the local community will be coordinated with this project, as required (refer to Section 4.3.1 of the Construction Environmental Management Plan (CEMP) in Appendix 5.1 of the EIAR).

[4] S15

### 12.2.2 Dust Impacts

Two submissions [5] raise concerns in relation to dust impacts during the construction phase. The submission states that assurances are required that mitigation measures are correctly implemented, and that construction will stop if dust limits are exceeded. It requests that residents are involved in decisions on the location of dust monitors and in discussions with contractors working on adjacent construction sites.

As stated in Section 8.6.1.1 of Chapter 8 (*Air Quality and Odour)* of the EIAR, a Communications Management Plan that includes community engagement will be developed and implemented before work commences on site. The name and contact details of person(s) accountable for air quality and dust issues will be displayed on the site boundary. This may be the environment manager/engineer or the site manager. A complaints register will form part of the communications strategy and all complaints will be handled in an efficient manner.

As outlined in Section 4.3.1 of the CEMP (Appendix 5.1 of the EIAR), communication with the local community, WCC and other relevant stakeholders, including third-party projects and between Contractors delivering different Work Packages shall be undertaken at an appropriate level and frequency throughout construction.

The Contractor will be legally obliged to implement the mitigation measures outlined in the EIAR. Dust deposition monitoring will confirm the effectiveness of the mitigation. As outlined in Section 8.6.1.1 of Chapter 8 of the EIAR, the location of dust deposition monitoring will be determined in consultation with Wicklow County Council (WCC).

In addition, in response to the submissions and objections, it is now proposed to consult with the local community in determining the location of the dust monitors, this proposal is included in the updated schedule of environmental commitments in Section 20 below.

## 12.3 Conclusion

Chapter 8 (*Air Quality and Odour)* of the EIAR provides a detailed impact assessment of the potential air quality and odour impacts. Significant mitigation measures and monitoring proposals are included to minimise any offsite effects. It is proposed to include the local community in the determination of dust monitoring locations in conjunction with WCC.

The issues raised in the submissions and observations in relation to air quality and odours have been fully considered, and having considered those issues, the conclusions of the air quality and odour impact appraisal remain as set out in the EIAR.

[5] S15, S20

# 13 Noise & Vibration

## 13.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to noise and vibration. The items raised in these submissions are:

- Construction noise management plan, structural surveys and communications plan;
- Noise and vibration impacts during the construction phase;
- Impacts due to nighttime works;
- Insufficient mitigation and monitoring proposed;
- Cumulative effects with the concurrent construction of the Arklow WwTP and the proposed development.

## 13.2 Response

A number of submissions[6] raise concerns in relation to potential noise and vibration impacts during the construction phase.

### 13.2.1 Construction noise management plan, structural surveys and communications plan

The HSE (S1) recommends the following commitments:

- The development of a specific construction noise management plan to mitigate excessive construction noise in advance of the commencement of construction. A contingency plan of remedial action be agreed, prior to the commencement of construction works, should noise/vibration monitoring show levels to be in excess of agreed noise limits.
- That structural surveys be completed prior to the commencement of the construction works to fully determine the significance of the proposed impact and to establish if appropriate mitigation can be achieved.
- The implementation of a community liaison process for dealing with the concerns of the impacted community with regard to noise, odour, traffic etc.

Noise and vibration mitigation measures are included in the CEMP which is appended to the EIAR (Appendix 5.1). However, in response to the above submission, it is also now proposed that a specific construction noise management plan be prepared by the contractor, this proposal is included in the updated schedule of environmental commitments in Section 20 below.

[6] S1, S13, S15, S16 and S20

As outlined in Section 9.6.1.1 of Chapter 9 (*Noise and Vibration*) of the EIAR, where considered necessary, structural surveys will be undertaken at sensitive receptors in close proximity to the works to establish their condition and tolerance for vibration impacts. In addition, as outlined in Section 9.6.2.1 of Section 9 of the EIAR, the Main Contractor(s) shall be required to carry out continuous noise and vibration monitoring at the three closest sensitive receptors to the proposed development works during the construction phase. Environmental noise monitoring will be undertaken only by suitably trained and experienced staff. In the unlikely event of vibration limits being exceeded, works will cease, and alternative construction methods will be used.

As outlined in the CEMP (Section 4.3.1 of Appendix 5.1 of the EIAR), a communications plan will be established by the Contractor to provide a two-way mechanism for members of the public to communicate with a designated member of the Contractor's staff. The plan will include details of a contact name and number for any complaints that may arise during such works. Where communications are related to environmental issues the Contractor's Environmental Manager will be informed and engaged with, as appropriate.

### 13.2.2 Noise and vibration impacts during the construction phase

The accuracy of the measurement of the distance from the nearest property on the Dublin Road to the proposed embankment works is queried. Table 9.23 of Chapter 9 of the EIAR states the approximate distance from the works to the property as 30m, this is the distance to the property façade not to the property boundary.

Predictions of noise levels during the construction phase assume that only partial screening can be achieved, as a worst-case. As outlined in Section 9.6.1.1 of Chapter 9 of the EIAR, a c. 2.4m hoarding of density of at least 7kg/$m^2$ shall be provided around all construction works. This will have the effect of full screening at the majority of locations. In addition, worst-case assumptions have been included on the types of plant to be used in the construction phase, for example, sheet piling. Predictions of noise levels during the construction phase are made at the nearest sensitive receptors so as to determine a maximum likely noise level. The change in noise level is assessed and rated in accordance with DMRB LA 111 Noise and Vibration and the duration rating is in accordance with EPA guidance, refer to Section 9.2.6.3 of Chapter 9 of the EIAR.

Baseline monitoring was completed over a period of 30 minutes during daytime and night-time. The purpose of the monitoring is to determine the baseline noise conditions, it is irrelevant for the assessment that noise from construction works will be generated for longer periods.

### 13.2.3 Impacts due to night-time works

As outlined in Section 9.2.5.6 of Chapter 9 of the EIAR, night-time works may be required during Work Package 1, for both bridge grouting, and Option 3 (micro piling from bridge).

It is anticipated that there will be other times due to exceptional circumstances that construction works will be necessary outside of the standard hours. This will be agreed in advance with Wicklow County Council (WCC) and communicated to local residents with an estimation of the timing and duration. An assessment of the potential noise impact of bridge grouting is included in Table 9.15 of Chapter 9 of the EIAR. A worst-case impact rating of slight to moderate is predicted.

### 13.2.4 Insufficient mitigation and monitoring proposed

It is contended that there is a lack of detail on mitigation and therefore resultant impacts are not credible. Section 9.6.1.1 of Chapter 9 (*Noise and Vibration*) of the EIAR, provides detailed mitigation measures which will be implemented during the construction phase. The mitigation measures have been developed in accordance with relevant guidance. In addition, specific night-time measures are proposed to reduce potential impacts further.

As outlined in Section 9.6.2.1 of Chapter 9 of the EIAR, the Main Contractor(s) shall be required to carry out continuous noise and vibration monitoring at the three closest sensitive receptors to the proposed development works during the construction phase. Noise and vibration levels will be compared to the limit values outlined in Table 9.4 and Table 9.7 of Chapter 9 of the EIAR.

As outlined in Section 4.3.1 of the CEMP (Appendix 5.1 of the EIAR), the Contractor will put in place a Communications Plan which will provide a two-way mechanism for members of the public to communicate with a designated member of the Contractor's staff. The public communications strategy will include procedures to inform members of the community directly affected by the construction phase on schedules for any activity of a particularly disruptive nature which is likely to impinge on their property such as blasting, demolition, road closures and diversions, pile driving and any mitigating actions that are being taken (shielding, restriction on work hours, etc.) to minimise such disruption.

Details of a contact name and number for any complaints that may arise during such works. A complaints register will form part of the communications strategy and all complaints will be handled in an efficient manner. The register will have prescribed methodologies for documenting and actioning complaints received from the community and other relevant stakeholders.

### 13.2.5 Cumulative effects with the concurrent construction of the Arklow WwTP and the proposed development

It is contended that further clarification on the impacts associated with the cumulative construction of the Arklow WwTP and the proposed development is required. It is stated that the assessment is limited to a short statement on the fact that only limited works can take place concurrently. However, a calculation of worst-case cumulative noise impacts is provided in Section 9.8.3 of Chapter 9 (*Noise and Vibration*) of the EIAR, should the works occur simultaneously, the overall predicted impact would not be greater than the impact of the FRS works (71dBLAeq, 1 hr).

It should also be noted that, as outlined in Section 4.3.1 of the CEMP (Appendix 5.1 of the EIAR), communication with the local community, WCC and other relevant stakeholders, including third-party projects and between Contractors delivering different Work Packages shall be undertaken at an appropriate level and frequency throughout construction.

## 13.3 Conclusion

Chapter 9 (*Noise and Vibration*) of the EIAR provides a detailed impact assessment of the potential noise and vibration impacts due to the proposed development. Significant mitigation measures and monitoring proposals are included to minimise any offsite effects. It is proposed that the Contractor prepare a Construction Noise Management Plan in advance of the commencement of construction in response to the submission from the HSE.

The issues raised in the submissions and observations in relation to noise and vibration have been fully considered, and having considered those issues, the conclusions of the noise and vibration impact appraisal remain as set out in the EIAR.

# 14 Population & Human Health

## 14.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to population and human health. The items raised in these submissions are:

- Concern regarding health and safety implications of the scheme during construction and operation
- Los of views of the river and connection of river will be detrimental to the health/wellbeing of locals
- Human health concerns during construction such as loss of electricity whilst electricity cables are being moved.
- Absence of baseline health status of community
- Concern on impacts on elderly people due to changes in the environment
- Concerns with rodents arising from works
- Concerns on human health from odour impacts, contaminated dredging
- Concerns around human health impacts from Dust, noise and vibration. Impacts on vulnerable people from vibration
- Health and safety concerns due to traffic volumes and noise
- FRS is a health threat to the locals with detrimental and devastating impacts on quality of life
- Negative impact on location communities mental and physical health.
- Loss of green space along South Quay will impact on wellness and mental health

## 14.2 Response

### 14.2.1 Concern regarding health and safety implications of the scheme during construction and operation

Health and Safety implications during the construction of the proposed scheme is extensively detailed in the Construction Environmental Management Plan as detailed in the EIAR. The use of appropriate construction methods and ongoing risk assessments will ensure minimal risks to health and safety during the construction phase.

The operational phase by reducing the risk of flooding, and thereby the health risks associated with flooding as detailed in Chapter 16 (*Population and Human Health*) of the EIAR will reduce the risks to human health as opposed to the do nothing scenario.

### 14.2.2 Human health concerns during construction such as loss of electricity whilst electricity cables are being moved.

As outlined in the Construction Environmental Management Plan, the risk of loss of electricity is minimised. No human health adverse health effects anticipated as a result.

### 14.2.3 Absence of baseline health status of community

This issue was extensively dealt with in Chapter 16 of the EIAR. As outlined there it is not possible to establish the baseline health status of every individual or the community. Even if it were possible, it would be a fruitless task as it is constantly changing and someone who may be vulnerable today may not be the time that the scheme is constructed or is operational. Other individuals who may not be vulnerable today may become so. The only sensible approach is to assume that vulnerable individuals are everywhere which is the approach that was taken in Chapter 16 of the EIAR.

### 14.2.4 Concern on impacts on elderly people due to changes in the environment

As outlined in Section 16.2.6.3 of Chapter 16 of the EIAR, consideration was given to the most vulnerable in the community. As outlined in Section 16.2.7 of Chapter 16 of the EIAR, a standards based approach has been used in the assessment, particularly in regard to health protection. Health based standards including air quality and noise standards are designed to protect the vulnerable including the elderly. The impacts on Human Health are described in Section 16.4.2.2 of Chapter 16 of the EIAR. Likely significant effects on human health are not predicted. A worst case residual short-term, slight to moderate noise negative impact rating is predicted during the construction phase of the proposed development. Therefore, we can be confident during the construction phase that there will be no negative human health impacts on the elderly due to changes in the environment.

The elderly like all human beings will benefit in the operational phase with a reduced risk of flooding and all the human health risks that that brings. Overall, the predicted effect on human health of the proposed scheme, including for the elderly, will be positive.

### 14.2.5 Concerns with rodents arising from works

As outlined in the Construction Environmental Management Plan there is an extensive rodent control plan which will be put in place. It is important to realise that while earthmoving may expose rodents, these were there anyway, will immediately seek cover. Nothing about the project will increase the number of rodents. There is no food source for example. Indeed, it is likely that with the rodent control plan in place there will be if anything reduction in rodent numbers.

### 14.2.6 Concerns on human health from odour impacts, contaminated dredging

As mentioned in section 16.2.3 of Chapter 16 of the EIAR the do nothing scenario is associated with odour issues. The generation and dispersion of odorous emissions have been assessed due to the nature of the dredged material and the scale of the dredging operation during the construction phase of the proposed development. This assessment considers the potential for likely significant odour effects during its handling and archaeological examination (Refer to Chapter 8 (*Air Quality and Odours*) of the EIAR.

The existing sewerage system in Arklow discharges untreated wastewater from homes and business to the Avoca River. It has been reported that this existing practice gives rise to a negative odour emanating from the Avoca River[7,8].The sailing, rowing clubs and the marina have each reported odour problems along the Avoca River. As noted in **Section 1.3.4** of **Chapter 1**, *Introduction*, the Arklow Wastewater Treatment Plant (WwTP) project received planning consent in 2019. The proposed WwTP will mitigate the current practice of discharging raw effluent to the Avoca River. The odour baseline has been considered in Chapter 8 of the EIAR for two scenarios: without the WwTP in operation and with the WwTP in operation.

As discussed in Section 5.2.2 of **Chapter 5** *Construction Strategy* of the EIAR, some of the excavated estuarine/dredge material (arising during WP1, WP2 and WP3) will need to be transported to site compounds for archaeological examination. The impacts arising from this process are addressed in Chapter 8 (*Air Quality and Odours*) of the EIAR.

Vehicles leaving sites will be covered to prevent escape of materials and odour during transport. Onsite monitoring will be undertaken, discussed further in Section 12 above of this report. No Human Health Impacts are predicted as a result of this and long-term beneficial effects for odour are predicted in the operational phase

### 14.2.7 Concerns around human health impacts from Dust, noise and vibration. Impacts on vulnerable people from vibration

The potential effects of dust have been extensively assessed in Chapter 8 (*Air Quality and Odour*) of the EIAR. No Air Quality Standard will be exceeded and therefore we can be confident that there will be no adverse effect on human health.

The potential effects of noise and vibration have been extensively assessed in Chapter 9 (*Noise and Vibration*) of the EIAR.

[7]http://wicklownews.net/2017/05/not-all-sunshine-in-arklow/
[8] https://www.independent.ie/regionals/wicklowpeople/news/residents-fume-at-stinking-river-30470608.html

As outlined in section 16.3.2.6 of Chapter 16 of the EIAR no adverse human health impacts are predicted and as health based standards are designed to protect the vulnerable we can be confident that there will be no adverse effects even on the vulnerable.

### 14.2.8 Health and safety concerns due to traffic volumes and noise

The potential effects of traffic have been extensively assessed in Chapter 7 (*Traffic and Transport*) of the EIAR. The potential effects of noise from traffic have also been assessed in Chapter 9 of the EIAR.

As outlined in section 16.3.2.6 of Chapter 16 of the EIAR, while some annoyance is possible with some traffic delays during the construction phase, annoyance is not in itself a significant human health effect. As is further outlined in that section no adverse human health impacts are predicted from traffic changes.

### 14.2.9 FRS is a health threat to the locals with detrimental and devastating impacts on quality of life

As outlined in Chapter 16 of the EIAR, the do nothing scenario is associated with very significant risks to physical and mental health. The overall human health impact of the proposed scheme is overwhelmingly positive.

### 14.2.10 Negative impact on location communities mental and physical health.

As it is outlined in Chapter 16 of the EIAR, mild annoyance is possible during the construction phase. This will be limited by mitigation measures outlined in the EIAR.

There are significant potential negative effects on mental and physical health in the do nothing scenario. The potential for recurrence of flooding with damage to property and health is a threat to both psychological and physical health. The operational phase of the project is assessed as overwhelmingly positive in terms of human health.

### 14.2.11 Loss of green space along South Quay will impact on wellness and mental health

As outlined in Chapter 16 of the EIAR, some negative effects during the construction phase are predicted, these are relatively minor. Section 8 of this report outlines the benefits of the public realm design.

In the operational phase, the prevention of flooding, with the potential devastating effects of that on wellness and mental health, will lead to a hugely positive effect on wellness and mental health.

## 14.1 Conclusion

The issues raised in the submissions and observations in relation to Population and Human Health have been fully considered, and having considered those issues, the conclusions of the Population and Human Health impact appraisal remain as set out in the EIAR.

# 15 Archaeological, Architectural and Cultural Heritage

## 15.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to archaeological heritage.

The items raised in these submissions are the:

- Recognition of and Protection Measures for Arklow's Cultural Heritage – including tangible cultural heritage features such as historic slipways, access to slipways, bollards (mooring stones, posts) and the visual connection of the historic town with the river.
- Location of compounds and acknowledgement of the test excavation results at SC1, and the archaeological significance at SC4.
- Requirement of where works have to occur under specific method statements, that these statements will be submitted to the relevant authorities for their agreement.
- Timing of archaeological investigations along the proposed line of the embankment (Ferrybank and Marsh area).
- Potential to promote heritage information through signage associated with the public realm works.
- Recommendation by the National Monuments Service that the relevant Mitigation Measures as detailed in Chapter 11 (*Archaeological, Architectural and Cultural Heritage*) of the EIAR are carried out in full.

## 15.2 Response

### 15.2.1 Introduction

A number of submissions while not mentioning archaeology or cultural heritage specifically are concerned with the sense of place and the connectivity of Arklow Town and the Avoca River. While this relationship is discussed in the Landscape and Visual Chapter and the public realm design proposals, it is thought that it would be useful to articulate the historical significance of the development of the town and the relationship of the maritime heritage and the river and how this has been considered within the proposed design for the scheme.

Chapter 11 of the EIAR addresses and assesses the likely significant impacts on archaeological, architectural and cultural heritage.

The Public Realm design has been developed in collaboration with project teams for the Arklow Waste Water Treatment Plant (WwTP) so as to ensure the new infrastructure maintains views to important architectural heritage elements such as Arklow bridge and that none of the infrastructural components clutter or detract from the character of the historic town.

The works will form a modern solution to flooding at Arklow and help protect dwellings and structures located along South Quay. There is also the opportunity to create a coherent structure that is reflective of the past industrial and shipping heritage while functional from a flood relief perspective and re-invents the public amenity value of the river edge for Arklow town and its people. Public realm amenities are detailed in, Chapter 12 (*Landscape and Visual*) of the EIAR. In response to observations made in submissions additional glass panelling is now proposed at the following locations:

- Addition of two 6.0m long glass panels just downstream of Arklow Bridge on South Quay at approximately Ch 020 (12.0m total), as shown on revised Scheme Drawing No 1040 and revised Landscape Design and Public Realm Drawing No 301 in **Appendix A** of this report. This will open up views of the bridge downstream.
- Addition of three 6.0m long glass panels along South Quay at approximately Chainage 370 (18.0m total), as shown on revised Scheme Drawing No 1041 and revised Landscape Design and Public Realm Drawing No 302 in **Appendix A** of this report.

### 15.2.2 Recognition of and Protection Measures for Arklow's Cultural Heritage

As acknowledged and described in the submissions in relation to archaeology and cultural heritage, Arklow has a rich maritime history and tradition. This tradition is detailed within Section 11.3 of Chapter 11 of the EIAR, and in Appendix 11.6 (*Underwater Archaeological Impact Assessment, Avoca River, Arklow Flood Relief Scheme Licence No. 17D0078*) of the EIAR.

Baseline Conditions where the vison for Arklow as described in the Local area Plan (2018-2024) forms the focus for the assessment:

*To recognise, protect and strengthen the unique character, built heritage, seaside location, maritime history and natural environment of the area, ensuring that this heritage can continue to contribute positively to the overall quality of life, biodiversity, recreation and tourism role of the settlement.*

The Avoca River played a vital role in the historical development of Arklow's seafaring economy and maritime culture, providing a transport conduit for the import and export of minerals to service upstream mining activities around Avoca. By the late 19$^{th}$ century Arklow was a thriving port town with its own fishing and shipbuilding industry (Section 11.3.6 of Chapter 11 of the EIAR). The underwater archaeology assessment report describes this environment in detail (Appendix 11.6 of the EIAR).

Arklow's coastal location has greatly influenced its socio-economic development and is an important element in the sense of identity and culture within the town. To this end, quay walls were constructed to guarantee ease of export. Sections of these walls along with slip ways are located within the scheme and represent an important phase in the town's industrial development. Section 11.3.10 of Chapter 11 of the EIAR describes the architectural heritage elements of the town and features of cultural heritage while Section 11.5.3.5 of Chapter 11 and Appendix 11.3 (*Architecture and Cultural Heritage Inventory*) of the EIAR provide information on mitigation prior to construction for the South Wall and Mooring Posts.

Boatbuilding in Arklow is historically connected with names such as Tracey, Canterbury and the Tyrrell family. A slipway and boat rails across the road are the only physical heritage reminders of the Tyrrell boatyard (detailed in AH5 of Appendix 11.3 of the EIAR). Access to this slipway has formed the focus to several submissions. As part of the scheme, this slipway and rails are to be retained in situ, however, as a result of flood defence measures there will be no direct access to the feature. As such, even though there is no direct physical impact on the structure, there is a loss of function. This impact is detailed in Section 11.4.4.3 of Chapter 11 and Appendix 11.3 of the EIAR. Section 11.5.4.6 of Chapter 11 of the EIAR describes the mitigation measures that will be put in place, this includes glass panels to be inserted into the flood defence walling across the slip way so the structure can be viewed. This historic slip will be recorded by means of photography and a written description prior to the commencement of the works so there is a full up to date record of the feature prior to any interventions. All work in the vicinity of the historic slip will be archaeologically monitored.

In Section 11.4.6 of Chapter 11 of the EIAR it is acknowledged that the public slipway at the Dock will be preserved insitu and will be protected from flooding by using a demountable flood barrier. In response to observations, it has been agreed that the slip will remain open to facilitate regular access for users of the public slipway. A memorandum of understanding will be agreed between WCC and OPW regarding maintenance and closing of the flood barrier during flood events.

Submission 19 (S19) is concerned that the proposed scheme will alter the appearance of the historic area of the town and that bollards which provide a tangible connection with the town's shipping past need to be considered. These mooring posts/stones have been discussed and photographed throughout Chapter 11 and associated appendices of the EIAR. Existing mooring posts/stones (AH7 of Appendix 11.3 of the EIAR) located along the South Quay will be removed prior to the construction works and replaced along the section of existing quay wall to be retained. These present as small, granite circular blocks, painted white. They are set back approximately 2m from the quay side in the grass verge. They will be repositioned reasserting their integral relationship to the quay wall where possible, maintaining the authenticity and integrity of the mooring stones with the original quay wall.

### 15.2.3 Location of Compounds

The location of site compounds and river access have been assessed within Section 11.3.15 of Chapter 11 of the EIAR from an archaeological, architectural heritage and cultural heritage viewpoint.

The CPO submission 8 (CPO 8) suggests that the findings of an archaeological assessment report in relation Site Compound 1 were not taken into account. However, this report is presented in full in Appendix 11.9(*Proposed Flood Relief Works, Arklow, Co. Wicklow. Arklow Test Excavations, Licence Reference 20E0675*) of the EIAR and the findings are referred to in Section 11.3.15 of Chapter 11 of the EIAR, and have informed the mitigation measures as suggested in the EIAR.

Advance archaeological test excavation has taken place (Appendix 11.9 of the EIAR) at SC1, SC3, SC6. There are no anticipated excavation works at compounds SC2, SC4 and SC5 and therefore no archaeological mitigation works are required (Section 11.5.4.1 of Chapter 11 of the EIAR).

Compound SC4 along with all other compound locations are discussed from an archaeological and cultural heritage aspect within Section 11.3.15 of Chapter 11 of the EIAR. SC4 (Figures 11.33-11.37 of the EIAR) is located within the zone of archaeological potential for Arklow Town and adjacent to the site of a graveyard (RMP WI04-029007), the site is currently a carpark and it is not anticipated that excavation works will be required as the existing tarmac surface will be used within the site compound. Equally, the location of the carpark will not curtail access to other heritage features within the town.

At SC1, as noted in Chapter 11 of the EIAR, given the archaeological findings, it is proposed to topsoil strip the area proposed for the compound as an archaeological exercise. Should archaeological features be detected these shall be excavated by a team of archaeologists.

Excavation at SC1 will take place once the utilities have been diverted. The archaeological works will take place in advance of any construction works associated with WP5 and site preparations for SC1. Within the construction programme, a suitable amount of time will be allowed for the archaeological excavation to take place.

### 15.2.4 Timing of Archaeological Works Along the Proposed Embankment

Works for this element of the FRS are discussed in Section 11.4.1 of Chapter 11 of the EIAR, and the area (Marsh, Ticknock and Ferrybanks townlands) is described as an area of archaeological potential (AAP1) in Appendix 11.2 (*Archaeological Inventory*) of the EIAR. The southern extent of the embankment proposals extends into the zone of archaeological potential for Arklow town (WI040-029). Specifically, a recorded monument (a church and graveyard (site of) WI040-02904, now occupied by houses and gardens) is located to the east of the embankment.

Section 3.1.1 Site Investigations of Submission 16 (S16) suggests that archaeological investigations have the potential to delay or alter the design and that site investigations should have taken place as part of this application. However, in order to carry out these works, existing overhead electricity powerlines and underground cabling will have to be diverted, so earthmoving activities can take place in a safe environment. This diversion will have to take place in advance of any other works occurring in this area. Figure 11 in Appendix 11.5 (*Archaeological Impact Assessment Report, Arklow Town Marsh and Ferrybank Licence No. 18E0263*)of the EIAR as referred to in the submission shows the constraints associated with carrying out test excavation in this area.

Once the utilities have been diverted, archaeological inspection and test excavation of the line of the embankment and associated permanent works will take place (Sections 11.4.1 and 11.5.3.1 of Chapter 11 of the EIAR). The archaeological works will take place in advance of any construction works associated with WP5. Within the construction programme, a suitable amount of time will be allowed for the archaeological investigation to take place (Section 11.5.4.2 of Chapter 11 of the EIAR).

By carrying out these investigations in a timely manner as detailed above, should any subsurface archaeological stratigraphy, material, feature be encountered, an appropriate ameliorative strategy approved by the authorities will be implemented. This will entail licensed archaeological excavation in full or part of any identified archaeological remains (preservation by record) or preservation insitu (by design).

### 15.2.5 Method Statements

The issue of all archaeological and architectural heritage method statements will be controlled by the Project Archaeologist appointed to the scheme and will be circulated to the relevant stakeholders and statutory authorities (Section 11.5.1 of Chapter 11 of the EIAR). This will include the Inland Fisheries Ireland (IFI) (S7) who have requested that they should be provided with relevant method statements (such as the removal of vegetation from Arklow Bridge) for their agreement.

## 15.3 Conclusion

Chapter 11 of the EIAR addresses and assesses the likely significant impacts on archaeological, architectural and cultural heritage.

Archaeological monitoring and test excavation including commissioned dive and wade surveys (Appendices 11.5-11.9 of the EIAR) have taken place to inform the decision-making process and to provide greater certainty as to the below ground and riverine potential throughout the scheme.

Cultural heritage assets that contribute to the maritime character of Arklow have been identified and assessed within the EIAR (Sections 11.3, 11.3.6, 11.3.10, 11.3.13, 11.4 and 11.5.4.6 of Chapter 11 and Appendix 11.3 of the EIAR).

There is potential to have a significant, positive and permanent impact on the setting and understanding of the historic maritime significance of Arklow along the new quay side through improved access, upgrading of public realm works and heritage signage.

In consultation with interested stakeholders, local heritage groups and the Maritime Museum of Arklow it is proposed to provide a newly developed heritage trail that provides information at points of industrial heritage and maritime interest along the quays. There is also an opportunity to promote Cultural Heritage Institutions of Arklow Town such as the Maritime Museum of Arklow.

All archaeological, architectural heritage and cultural heritage issues will be resolved to the satisfaction of the Project Archaeologist, Department of Housing, Local Government and Heritage (DHLGH) and the NMI. The licensed archaeologist will have provision to inspect all excavation to natural soil level and to temporarily halt the excavation work, if and as necessary. They will be given provision to ensure the temporary protection of any features of archaeological importance identified.

The National Monuments Service of DHLGH recommend in their submission (S3) that the relevant Mitigation Measures as detailed in Section 11.5 of Chapter 11 of the EIAR are carried out in full. This will take place.

The issues raised in the submissions and observations in relation to inadequate Archaeological, Architectural and Cultural Heritage have been fully considered, and having considered those issues, the conclusions of the Archaeological, Architectural and Cultural Heritage impact appraisal remain as set out in the EIAR.

# 16 Material Assets

## 16.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to material assets. The items raised in these submissions are:

- Arklow marina – the loss of existing floating mooring and berths at the pontoon on North Quay, required for the dredging will have serious financial implications for the business – who will meet the costs of the removal of river pontoons, storage of same and reinstatement costs and loss of revenue to Arklow Marina during the works
- Disagree with impact ratings of land and property ownership
- CPO of land on a permanent basis.

## 16.2 Response

The effect of the proposed scheme on Arklow Marina is described in 16.4.2.1 (the assessment of effects during construction on River Amenity). It is further addressed in S17.4.1.1, the assessment of effects during construction on land and property ownership including the berths at the pontoon. The residual effects are addressed in S17.7.1.1. During construction associated with WP2, waterside access will be unavailable to the berths at the river pontoon at North Quay. It is not proposed to undertake works at the riverside pontoon or remove the pontoon during the works. The Marina located in the dock at North Quay will maintain full access and will be unaffected. Regarding lack of engagement, we enclose earlier correspondence with Mr O'Toole in **Appendix E** or this report.

The EIAR has sought to address transparently the impact of the scheme on property ownership. Table 17.1 describes the significance criteria used and the likely significant effects are included in Appendix 17.1 (*Land-Take Assessment (CPO)*) of the EIAR.

- A proposed alteration to the CPO is being submitted for consideration of An Bord Pleanála to amend Plot 125 from permanent to temporary acquisition during construction. This would result in a change in a reduced likely significant effect at that location. In Appendix 17.1 of the EAIR, the effect is currently described as follows:

  *This CPO represents acquisition of land belonging to the listed landowners to facilitate the development of SC6. A permanent moderate negative effect on property ownership is therefore identified during both the construction and operational phase of the proposed development.*

  It is anticipated that a temporary moderate negative effect on property ownership would be identified during the construction phase of the proposed development if the CPO at this plot is amended to temporary acquisition during construction.

- A proposed alteration to the CPO is being submitted for consideration of An Bord Pleanála to amend Plot 124d from permanent to temporary acquisition during construction. This would result in a similar neutral effect identified previously in Appendix 17.1 of the EIAR.

## 16.3 Conclusion

The issues raised in the submissions and observations in relation to Material Assets have been fully considered, and having considered those issues and the scheme developments proposed, a reduced impact on Material Assets results compared to the impact appraisal in the EIAR.

# 17 Contravention of County Development Plan/Arklow and Environs Local Area Plan 2018-2024

## 17.1 Overview

One of the S226 submissions made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to the County Development plan and the Arklow and Environs Local Area Plan and are individually addressed below.

## 17.2 Response

### 17.2.1 Arklow and Environs LAP - Objective CZ11

Section 6.3.1 of S15 raises concerns in relation to the Objective CZ11, Cell 11.

***Chapter 11- CZ11 Cell 11 Arklow Environs***

*This cell comprises the coastal area within the settlement boundary of 'Arklow Town and Environs'. There are long sandy beaches along most of this cell, with the central harbour area the location of intensive residential and industrial development and the southern end marked by Arklow Rock. The area around Arklow Rock – Askinnity, to the south, is a designated pNHA.*

***Objective CZ11***

1. *To enhance the visual, recreational and natural amenities of the Arklow coastal area, in accordance with the policies and objectives set out in the Arklow Town and Environs Local Area Plan.*
2. *To facilitate the development and enhancement of visitor and recreational facilities along the coastal area, particularly walking routes, car parking areas, signage, changing / toilet facilities and water based clubs.*
3. *To support and facilitate the development of marine and shipping activity in Arklow, particularly the recreational use of the existing harbour / marina and the development of a roll on-roll off port at the existing Roadstone jetty.*

WCC is satisfied that the design of the scheme does not conflict with the Coastal Zone objectives for Cell 11 set out in the CDP; the scheme has been designed in full cognisance of these objectives and in particular, the scheme provides for:

- Improvement of the visual amenities of the area by the provision of improved public realm areas which include seating and glazed panels, landscaping and tree planting in various areas highlighted along with other items in Chapter 12 – Landscape and Visual, shown in the EIAR Vol3 Appendix 1 - Photomontages and Drawings 6545_301_Rev03.pdf, 6545_302_Rev03.pdf, and 6545_303_Rev03.pdf

- Improvement of the recreational and visitor amenities of the area by the provision of improved public realm areas, including terraced areas, raised walkways, landscaping, a viewing platform as well as outer walkways continuing to Riverwalk and a pontoon for recreational activities. See Drawings 6545_301_Rev03.pdf, 6545_302_Rev03.pdf, and 6545_303_Rev03.pdf
- Improvement of the natural amenities of the area by the provision of an extension of the North River bank to provide additional habitat areas, bat boxes, considerable native woodland planting areas, three floating roost platforms, and other items highlighted in Chapter 10 (Biodiversity) of the EIAR

The development of marine and shipping activities by improved recreational access with a purpose built pontoon at River Walk, and dredging the river will improve the draught available to vessels as discussed in the EIAR Chapter 4 Description of Proposed Scheme.

### 17.2.2 Arklow and Environs LAP - 8.3.5 Open Space (OS)

Section 6.3.2 of S15 raises concerns in relation to 8.3.5 Open Space (OS).

The text quoted in Section 8.3.5 relates to the different types / categories of open space identified / zoned in development plans

***8.3.5 Open Space***

*The delivery of new sports and other outdoor community facilities and spaces is dependent on adequate 'open space' being reserved and developed. 'Open space' can take many forms but for the purpose of this plan is generally considered to be space designated for such use in Local Area Plans, Town Plans or Action Area Plans or land reserved or set out for active and passive uses and visual amenity purposes as part of new development of housing or commercial development. Open space can take a number of forms, with some use types overlapping:*

1. *Private open space – open space owned and / or dedicated to use of single individuals or small groups for example private gardens, terraces, yards, balconies or shared private spaces in apartment developments;*
2. *Residential Open Space - the open space generally provided in housing developments that is public in the sense that there are no barriers to access, but its function is to provide for use principally by the residents of that development. For land use zoning purposes, as such spaces form an integral part of any residential zone, such space will normally be zoned 'RE – Existing Residential'.*
3. *(Active) Open Space – space provided or designated for uses such as sports grounds, playing fields, hard surfaced courts, parks and walkways, playgrounds etc; (for the purpose of land use zoning, two forms of such open space is designated - 'active open space' which is that space used / proposed for organised sports such as playing fields, courts etc whereas 'open space' is used to denote those existing / planned spaces that are intended for more casual usage such as parks and playgrounds)*

4. *Passive Open Space – these are lands that are not designated for 'active' use and generally are undeveloped natural areas such as flood plains, buffers zones along rivers, areas of natural biodiversity, where the general objective is to maintain the lands in their current undisturbed state;*
5. *An emerging new form of open space is the use of land for allotments, etc…*

With respect to the parts of the scheme that are located in the OS2 zone, this is the definition of OS2 in the Arklow LAP:

*OS2: OPEN SPACE To protect and enhance existing open, undeveloped lands. To protect, enhance and manage existing open, undeveloped lands that comprise flood plains, buffer zones along EU and nationally protected sites (Natura 2000 sites, NHAs etc), watercourses and rivers, steep banks, green breaks between built up areas, green corridors and areas of natural biodiversity.*

The 'use' table in the Arklow LAP states:

*Open space (OS2) zoned land are uses that protect and enhance the function of these areas as flood plains, buffer zones along watercourses and rivers, green breaks between built up areas, green corridors and areas of natural biodiversity. As these open lands are not identified or deemed necessary for development for recreational purposes, other uses that are deemed compatible with proper planning and sustainable development may be open for consideration where they do not undermine the purpose of this zoning.*

It should be noted that this makes allowance for developments that are not strictly 'open space' developments but are developments that do not 'undermine' the role of these areas as *'flood plains, buffer zones along watercourses and rivers, green breaks between built up areas, green corridors and areas of natural biodiversity*'.

It should further be noted that the majority of the land zoned OS2 along the area affected by the Scheme west of the Bridge on the south side of the river (see extract from zoning map below OS2 in green) is actually already public road or footpath, paved and not suitable as "green breaks between built up areas, green corridors and areas of natural biodiversity".

The area affected by the Scheme to the East of the Bridge is not zoned OS2.


Therefore, it seems that some of the proposed flood prevention and urban realm improvement works are located on 'unzoned' lands and therefore any 'curtailment' that might be inferred/suggested by objectors by the OS2 designation adjoining won't actually be applicable on the unzoned lands.

It is suggested that the scheme conflicts with the 'open space' designation on the South Quay. There is no open space identified / zoned along the south quay east of the bridge. There are some areas identified / zoned as OS1 and OS2 on the south river walk to the west of the bridge.

The objectives relating to 'open space' set out in the CDP are only relevant where land is so zoned; therefore these objectives are not relevant to the south quay area east of the bridge, where no land is zoned for 'open space' use. There are no lands zoned 'buffer zone' (i.e. passive open space OS2) on the south quay east of the bridge; therefore the OS2 objectives do not apply.

It is suggested that as the lands on the south quay are zoned 'RE' that Objective CD44 is relevant and provides protection to any existing green spaces in this area. This may not be correct as it is not clear that all / any open areas in this area are in situ as a result of being purposefully designed, set out and designated as part of a housing development for the sole use of residents in this area; residences in this area have developed on an ad hoc basis over the years, with existing green spaces appearing to comprise grass verges between the road edge and the house / quay walls. These do not appear to be spaces that were designed and dedicated as open spaces on foot of a residential development and therefore Objective CD44 would not apply.

With respect to the area west of the bridge, full cognisance has been taken of the zoning designations which include OS1 and OS2 areas and in particular, at this location to scheme provides for improved public realm design close to the bridge (see Drawing 6545_301_Rev03.pdf) that includes terraced areas raised walkways, landscaping, tree planting, a viewing platform as well as outer walkways continuing to Riverwalk (Also see Appendix 12.1 (*Photomontages*) of the EIAR).

### 17.2.3 Community Development

Section 6.3.3 of the Submission S15 refers to Community Development

Objective CD2 relates to the plan making process and therefore has no relevance to this process. WCC is satisfied that the consultation process has been robust and has provided the community with significant opportunities for engagement.

*"CD2 During the local plan making process for towns and villages, to seek to facilitate community development and socially inclusive communities, through proper land use zoning and transportation planning, phasing and the setting out of high standards of design in both streets and buildings*"

### 17.2.4 County Development Plan - Chapter 9 Ports, Harbours, Marinas and Aviation Objectives

Section 6.3.4 of the Submission S15 refers to Chapter 9 Ports, Harbours, Marinas and Aviation Objectives (County Development Plan).

The County Development Plan states:

*"TR39 To promote and facilitate through appropriate transport planning and land-use zoning the expansion or development of recreational facilities and marinas at Bray, Greystones, Wicklow and Arklow harbours".*

WCC is satisfied that the design of the scheme does not conflict with the objective TR39 as set out in the CDP; the scheme has been designed in full cognisance of these objectives and in particular, the scheme provides for:

- Improvement of the recreational amenities of the area by the provision of purpose built pontoon and dredging the river will improve the draught available to vessels. Coupled with improved public realm areas, including terraced areas, raised walkways, landscaping, a viewing platform as well as an outer walkway The proposed continuous promenade will now allow vulnerable road users travel (adjacent to the river) from the River Walk to Arklow Dock. See Drawings 6545_301_Rev03.pdf, 6545_302_Rev03.pdf, and 6545_303_Rev03.pdf also discussed in the Chapter 4 (*Description of Proposed Scheme*) of the EIAR .
- The development of marine and shipping activities by proposing to construct a purpose built pontoon for recreational purposes. Upon consultation with Arklow Rowing Club and Sea Scouts the proposed demountable flood defence in Arklow Dock is now to be "maintain open" to facilitate the recreational users.

  In addition, the scheme proposes to dredge a section of the Avoca River which will greatly improve the existing issue of a low draught, as discussed and welcomed by Arklow Sailing Club.

### 17.2.5 County Development Plan - Objectives FL6/FL7

Section 6.3.6 of the Submission S15 refers to FL6/FL7 Objectives.

Wicklow County Council is satisfied that the design of the scheme does not conflict with the objectives FL6 and FL7 of the CDP; the scheme has been designed in full cognisance of these objectives and in particular, the scheme does not include significant new areas of hard surfacing. There are significant areas of existing hard surfacing in and around the Avoca River, including both roads / footpaths and hard surfaced areas on the quays and harbour areas reflecting their commercial maritime function and needs for the loading / unlading for goods. These areas have been in situ for many decades.

The scheme as designed provides for some small areas of new hard surfacing at South Quay which are necessary in order to meet the scheme goals of constructing a Flood Relief Defence while maintaining the existing quay wall, thus realigning other items like footpaths, Road etc and there is no better alternative design available to meet the scheme goals. All proposed hard surfaced areas are proposed to be constructed using materials in keeping with the area and a revised drainage design (including pumping stations) is proposed to be integrated into these areas. To compensate for the small additional areas of hard surfacing, a new area of soft landscape are proposed on South Quay at the bridge and other soft landscaped areas are being maintained as requested by the public. In addition, the scheme includes substantial proposals for public realm improvements and 'greening' in existing and proposed hard surfaced areas, including new planting, seating etc as shown on drawing 6545_301_Rev03.pdf, 6545_302_Rev03.pdf, and 6545_303_Rev03.pdf

With respect to the concerns raised regarding fluvial flooding and drainage on the south quay, the scheme provides residents the (OPW) standard level of defence (i.e. 1% AEP Fluvial and 0.5% AEP Coastal event). A Pluvial flood event is one which occurs during high rainfall events, when there is significant run-off from hardstand areas.

The Flood Relief Scheme proposes new storm drainage (see 88601-1051 and Section 4.4.5.3 of Chapter 4 of the EIAR) and 3 pumping stations constructed on the dry side of the wall with Non Return Valves to defend against a pluvial event.

### 17.2.6 Arklow and Environs LAP - Open Space designation at Running Track (Site Compound 2)

It is suggested that the scheme conflicts with the Open Space designation at the running track.

This is not correct as Site Compound No2 is to be established on the grass area on Mill Road and adjacent to the Running Track (not on the track), alternatives on the northside of the Avoca River were difficult to identify.

This temporary compound is adjacent to a very large area of Open Space. This area will be re-instated once the Scheme is completed.


### 17.2.7 Arklow and Environs LAP - Objectives HT3 and HT4 re Heritage

Section 6.4.2 of the Submission S15 refers to objectives HT3 and HT4 of the LAP re Heritage.

WCC is satisfied that the design of the scheme does not conflict with the objectives HT3 and HT4 of the Arklow LAP; the scheme has been designed in full cognisance of these objectives and in particular, the scheme does not:

- impact negatively on properties of heritage value or on their development potential (see Chapter 11 of the EIAR)
- adversely impact on the existing Riverside Trail (River Walk) and in fact enhances same extending the existing route by the outer walkway over the river linking to the into the large public realm area west of Arklow bridge which contains glazed panels and a viewpoint, and onward along South Quay to the Fish Dock.
- adversely affect views of the river because the raised walkways and outer walk walkway over the river the viewpoint
- remove without compensatory measures an existing swimming / bathing point, the proposal contains steps to the river at the existing location for swimming also a purposely built pontoon. (see 6545_301_Rev03.pdf).
- remove without compensatory measures existing trees and open spaces, as discussed in Chapter 12 Landscape and Visual, (see Appendix 12.2 (*Tree Survey Report*) of the EIAR) and Section 10.9 of this Response document
- adversely impact on the character of St. Mary's Park and in fact the Scheme enhances it by improving the footpaths from the park along River Walk and South Quay to the Fish Dock

### 17.2.8 Arklow and Environs LAP - Objective HT7 re Marine Heritage

Section 6.4.3 of the Submission S15 refers to objectives HT7 re marine heritage.

HT7 in the Arklow LAP states: *To facilitate the development of initiatives to highlight Arklow's maritime heritage in the public realm*

WCC is satisfied that the design of the scheme does not conflict with the objective HT7 of the Arklow LAP; the scheme has been designed in full cognisance of these objectives and in particular, the scheme:

- Flood Design level requires a barrier of this height 1.150m
- Areas where initiatives to highlight Arklow's maritime heritage would be in Flood Zone A, thus the implementation of the Scheme would improve opportunities to carry out development.
- Access to the historic slip known as Tyrrell's slip is being removed (a former launch for ships). However, to promote the heritage of the location, the slip and its historic boat rails will remain in place and a section of glass wall and signage will be constructed at the location. Existing mooring posts/stones (AH7 of Appendix 11.3 of the EIAR) located along the South Quay will be removed prior to the construction works and replaced along the section of existing quay wall to be retained. These measures are described in Section 15.2.2 of this submission document.
- Glazing is only used in high trafficked areas due to issues with vandalism and budget issues however additional glazing has been suggested (in this submission) which is all located on South quay
- Where possible trees were retained however in locations where removal is required trees will be replaced with native species

### 17.2.9 Arklow and Environs LAP - Objectives CD1 and HT8

Section 6.4.4 of the Submission S15 refers to Objectives CD1 and HT8 of the Arklow Environs LAP

CD1 States: *To facilitate and encourage a series of high quality open spaces throughout the town, preferably as part of a larger linked green network that is available to all ages and accessible to everyone, including people with mobility impairments.*

HT8 States: *To facilitate the development and enhancement of green infrastructure resources, including access to, connectivity between areas of interest and linkages between green spaces including the coast, where feasible within Arklow and environs settlement boundary (see Map No. 10.1).*

Wicklow County Council is satisfied that the design of the scheme does not conflict with the objectives CD1 and HT8. Currently there is no access for vulnerable road users along South Quay as they are required to share the road. The Scheme will enhance access along here by installing high quality landscaping and continuous footpaths on South Quay to link the Fish Dock with the River Walk.

### 17.2.10 Arklow and Environs LAP - RE Zoning

Section 6.4.8 of the Submission S15 suggests the Scheme does not comply with the "RE" zoning as set out in the LAP.

The land use zoning objective "RE" on page 53 of the LAP states: *to protect, provide and improve residential amenities of existing residential areas*

Wicklow County Council is satisfied that nothing in the Scheme prevents the development of the RE zone in accordance with the zoning objective stated. In fact the Scheme, by protecting the lands in the waterfront zone from flooding opens up the possibility of improving the residential area of the South Quay, and also the lands in the lower area behind the waterfront area.

### 17.2.11 Arklow and Environs LAP - TR6

Section 6.4.9 of the Submission S15 suggests the Scheme needs to be re-designed to align with objective TR6 of the LAP.

TR6 states: *To promote and encourage the recreational use of coastline, rivers and lakes and the development of 'blueways'18 subject to normal environmental protection and management criteria. Where such recreational uses involve the development of structures or facilities, the Planning Authority will ensure that the proposals will respect the natural amenity and character of the area, listed views and prospects onto and from the area in question. Where possible, such structures should be set back an appropriate distance from the actual amenity itself and should not adversely affect the unique sustainable quality of these resources.*

The submission S15 discusses concerns about the quality of design and suggests additional landscaping.

The Scheme includes for high quality design of the Urban Realm including high quality landscaping and footpaths along River Walk and South Quay. It includes for replacement river access at St Mary's Car park and for water access at the Fish Dock. It includes for glass panels (and this response has suggested additional glass panels) to ensure views of the river are retained.

### 17.2.12 Arklow and Environs LAP - Waterfront Strategy Objectives

Section 6.4.10 of the Submission S15 suggests the Scheme is contrary to Arklow's Waterfront Strategy objectives as set out in the LAP.

The land use zoning objective "WZ" on page 53 of the LAP states: *to provide for the development and improvement of the waterfront zone, to facilitate the continuation of the existing employment, maritime and port uses and to promote and provide for residential and mixed- use development.*

This does not refer to the South Quay area as inferred from the submission but rather to the Docks area. Wicklow County Council is satisfied that nothing in the Scheme prevents the development of the waterfront zone in accordance with the objective stated.

In fact, the Scheme, by protecting the lands in the waterfront zone from flooding, opens up the possibility of re-development of the South Quay and Dock Area, and also the lands in the lower area behind the waterfront area.

## 17.3 Conclusion

WCC is satisfied that the design of the scheme does not conflict with the objectives and zoning of the County Development Plan and Arklow and Environs Local Area Plan.

# 18 Adequacy of Site Notices and Drawings and Non-Compliance with Planning and Development Regulations

## 18.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to planning and development. The items raised in these submissions are:

- Adequacy of Site notices and non-compliance with Planning and Development Regulations
- Adequacy of Drawings and non-compliance with Planning and Development Regulations

## 18.2 Response

### 18.2.1 Site Notices

In Submission No 16 (S16), Mr O Toole has commented that 7 of the 14 site notices were not in accordance with Article 19 of the Planning and Development Act. Article 19 of the Planning and Development Regulations 2001(as amended) provides that:

*"19.*

*(1) A site notice erected or fixed on any land or structure in accordance with article 17(1)(b) shall be—*

*(a) in the form set out at Form No. 1 of Schedule 3, or a form substantially to the like effect,*

*(b) subject to sub-article (4), inscribed or printed in indelible ink on a white background, affixed on rigid, durable material and secured against damage from bad weather and other causes, and*

*(c) subject to sub-article (2), securely erected or fixed in a conspicuous position on or near the main entrance to the land or structure concerned from a public road, or where there is more than one entrance from public roads, on or near all such entrances, or on any other part of the land or structure adjoining a public road, so as to be easily visible and legible by persons using the public road, and shall not be obscured or concealed at any time.*

*(2) Where the land or structure to which a planning application relates does not adjoin a public road, a site notice shall be erected or fixed in a conspicuous position on the land or structure so as to be easily visible and legible by persons outside the land or structure, and shall not be obscured or concealed at any time".*

However ;

(a) Part 4, Chapter 1 of the Planning and Development Regulations 2001 as amended ('the Regulations) applies to planning applications made to planning authorities under section 34 of the Planning and Development Act 2000 (P & D Act) which includes planning applications accompanied by an EIAR in accordance with section 172 of the Act and applications for development referred to in Article 137(1)(a) of the Regulations.

Accordingly, the requirements of Article 17 to 23 of the Regulations have no application to the proposed development, which is a provided local authority development in partnership with the Office of Public Works. The application submitted by Wicklow County Council to the Board for approval is made pursuant to the provisions of section 175 and section 226 of the Act as amended.

(b) Part 8 of the Regulations which set out the requirements for specified development carried out on behalf of or in partnership with a local authority do not apply by reason that section 179(6)(d) of the P & D Act as amended provides that section 179 does not apply to development in respect of which an EIAR is required by section 175 or under any other enactment.

(c) As the application for approval of the proposed development is made under section 175, Wicklow County Council is required to comply with the requirements of subsection (4) of section 175 by;

(i) causing an EIAR to be prepared in respect of the proposed development (s.175(1)

(ii) by applying to the Board for approval (s.175(3) and

(iii) by publishing in one or more newspapers in the area in which the proposed development is to be carried out a notice indicating the nature and location of the proposed development and stating all other matters required to be stated in the notice (s.175(4)

(iv) by sending a copy of the application and the EIAR to the prescribed authorities together with a notice stating that submissions or observations may be made in writing during the relevant period to the Board in relation to the likely effects on the environment of the proposed development and the implications of the proposed development for proper planning and sustainable development in the area concerned if carried out.

(d) Part 10 Chapter 4 of the Regulations applies to local authority development. There is no requirement in Part 10 for site notices. A local authority is required by Article 118 to provide the plans and particulars for the proposed development.

This is a general requirement which Wicklow County Council has done and as no request for further information has been made by the Board, the plans and particulars must be deemed adequate and sufficient.

On the basis that Part 4 of the Regulations do not apply and the aforementioned statutory and regulatory requirements have been satisfied and, the application before the Board for the approval of the proposed development complies with the requirement of the Planning and Development Regulations 2001(as amended) and the Regulations and is, therefore, valid.

### 18.2.2 Scheme Drawings

The drawings submitted with the EIAR are listed below together with their scale when printed at the stated sheet size. The scales are considered to be appropriate to the overall extent of the development with a drawing at 1:10,560 considered necessary to locate the proposed development within the general Arklow area and a scale of 1:2,500 being needed to fit the entire area for the development on an A1 size drawing. Layouts of the proposed development are provided at scales of 1:500 while details are typically provided at scales ranging from 1:50 to 1:200.

Channel cross-section drawings indicate the existing and proposed bed levels to Ordnance Datum. Levels are also shown on the elevations and sections of all proposed walls and embankments indicating existing features and the proposed development. Levels are shown for depths of proposed stormwater sewers and pumping stations.

All existing ground levels have been derived from topographical surveys.

It is considered that the scheme drawings along with the descriptions in the EIAR provide a clear description of the proposed works and provide sufficient detail to allow the proposals to be understood and considered.

Article 23 of the Planning and Development Regulations 2000, as amended, is not applicable to developments requiring an EIAR and carried out by a Local Authority.

| Drawing Number | Drawing Title | Scale | Sheet |
|---|---|---|---|
| 88601-1001 | Site Location Map | 1:10560 | A1 |
| 88601-1002 | Overall Scheme Layout Plan | 1:2500 | A1 |
| 88601-1003 | Channel Works - Overall Layout | 1:2500 | A1 |
| 88601-1004 | Arklow Bridge - Existing Layout - Plan, Elevation & Sections | 1:250 1:50 | A1 |
| 88601-1005 | Arklow Bridge - Proposed Layout - Plan, Elevation & Sections | 1:250 1:50 | A1 |
| 88601-1006 | Arklow Bridge - Grouting Works | 1:50 | A1 |
| 88601-1007 | Arklow Bridge - Underpinning Option 1 | 1:50 | A1 |
| 88601-1008 | Arklow Bridge - Underpinning Option 2 | 1:50 | A1 |
| 88601-1009 | Arklow Bridge - Underpinning Option 3 | 1:50 | A1 |
| 88601-1010 | Arklow Bridge - Underpinning Option 4 | 1:50 | A1 |
| 88601-1011 | Channel Dredging Works - Channel Cross Sections - Sheet 1 | 1:250 | A1 |
| 88601-1012 | Channel Dredging Works - Channel Cross Sections - Sheet 2 | 1:250 | A1 |
| 88601-1013 | Channel Dredging Works - Channel Cross Sections - Sheet 3 | 1:250 | A1 |
| 88601-1014 | Channel Dredging Works - Channel Cross Sections - Sheet 4 | 1:250 | A1 |
| 88601-1015 | Channel Dredging Works - Channel Cross Sections - Sheet 5 | 1:250 | A1 |
| 88601-1016 | Channel Dredging Works - Channel Cross Sections - Sheet 6 | 1:250 | A1 |
| 88601-1017 | Channel Dredging Works - Channel Cross Sections - Sheet 7 | 1:250 | A1 |
| 88601-1018 | Channel Dredging Works - Channel Cross Sections - Sheet 8 | 1:250 | A1 |
| 88601-1019 | Channel Dredging Works - Longitudinal Section | 1:250 | A1 |
| 88601-1020 | Channel Dredging Works - Typical Details | 1:25 | A1 |
| 88601-1021 | Channel Works - Debris Trap | 1:1000 1:100 | A1 |
| 88601-1022 | Channel Works - Gravel Trap | 1:1000 1:100 | A1 |
| 88601-1023 | Channel Works - River Access Ramp To Debris Trap Plan & Sections | 1:1000 1:100 | A1 |
| 88601-1031 | Flood Defence Walls & Embankments - Key Plan | 1:2500 | A1 |
| 88601-1032 | Flood Defence Walls & Embankments - North Bank Upstream of Arklow Bridge - Layout Plan Sheet 1 of 2 | 1:500 | A1 |
| 88601-1033 | Flood Defence Walls & Embankments - North Bank Upstream of Arklow Bridge - Layout Plan Sheet 2 of 2 | 1:500 | A1 |
| 88601-1034 | Flood Defence Walls & Embankments - North Bank Upstream of Arklow Bridge - Elevation | 1:500 | A1 |
| 88601-1035 | Flood Defence Walls & Embankments - North Bank Upstream of Arklow Bridge - Sections | 1:100 | A1 |
| 88601-1036 | Flood Defence Walls & Embankments - South Bank Upstream of Arklow Bridge - Layout Plan | 1:500 | A1 |
| 88601-1037 | Layout of Flood Defences - South Bank Upstream of Arklow Bridge - Elevation | 1:200 | A1 |
| 88601-1038 | Flood Defence Walls & Embankments - South Bank Upstream of Arklow Bridge - Sections Sheet 1 | 1:50 | A1 |
| 88601-1039 | Flood Defence Walls & Embankments - South Bank Upstream of Arklow Bridge - Sections Sheet 2 | 1:50 | A1 |
| 88601-1040 | Flood Defence Walls & Embankments - South Bank Downstream of Arklow Bridge - Layout Plan Sheet 1 | 1:500 | A1 |
| 88601-1041 | Flood Defence Walls & Embankments - South Bank Downstream of Arklow Bridge - Layout Plan Sheet 2 | 1:500 | A1 |
| 88601-1042 | Flood Defence Walls & Embankments - South Bank Downstream of Arklow Bridge - Layout Plan Sheet 3 | 1:500 | A1 |
| 88601-1043 | Elevation - South Bank Downstream of Arklow Bridge - Sheet 1 | 1:200 | A1 |
| 88601-1044 | Elevation - South Bank Downstream of Arklow Bridge - Sheet 2 | 1:200 | A1 |
| 88601-1045 | Elevation - South Bank Downstream of Arklow Bridge - Sheet 3 | 1:200 | A1 |
| 88601-1046 | Flood Defence Walls & Embankments - South Bank Downstream of Arklow Bridge - Sections 1 | 1:50 | A1 |
| 88601-1047 | Flood Defence Walls & Embankments - South Bank Downstream of Arklow Bridge - Sections 2 | 1:50 | A1 |
| 88601-1048 | Flood Defence Walls & Embankments - South Bank Downstream of Arklow Bridge - Sections 3 | 1:50 | A1 |
| 88601-1049 | Flood Defence Walls & Embankments - South Bank Downstream of Arklow Bridge - Sections 4 | 1:50 | A1 |
| 88601-1051 | Stormwater Drainage - Overall Layout Plan | 1:2500 | A1 |
| 88601-1053 | Stormwater Drainage - South Bank Upstream of Arklow Bridge - Layout & Longitudinal Sections | 1:1000 1:100 | A1 |
| 88601-1054 | Stormwater Drainage - South Bank Downstream of Arklow Bridge - Layout & Longitudinal Sections | 1:1000 1:100 | A1 |
| 88601-1055 | Stormwater Drainage - South Bank Harbour Area - Layout & Longitudinal Sections | 1:1000 1:100 | A1 |
| 88601-1056 | Stormwater Drainage - Pumping Station No.1 - GA, Plan & Sections | 1:50 | A1 |
| 88601-1057 | Stormwater Drainage - Pumping Station No.2 - GA, Plan & Sections | 1:50 | A1 |
| 88601-1058 | Stormwater Drainage - Pumping Station No.3 - GA, Plan & Sections | 1:50 | A1 |
| 88601-1060 | Water Safety Features | 1:1250 | A1 |
| 88601-1061 | Existing Utility Services - Layout Plan | 1:2500 | A1 |
| 88601-1062 | Relocated Utility Services - Arklow Marsh | 1:1000 | A1 |
| 88601-1065 | Overall Site Extent | nts | A1 |
| 88601-1066 | Locations of Site Notices | nts | A1 |
| 6445-300 | Landscape Design & Public Realm - Sheet 1 - South Bank, River Walk | 1:500 1:100 | A1 |
| 6445-301 | Landscape Design & Public Realm - Sheet 2 - South Bank, River Walk And South Quay | 1:500 1:100 | A1 |
| 6445-302 | Landscape Design & Public Realm - Sheet 3 - South Bank, South Quay | 1:500 1:100 | A1 |
| 6445-303 | Landscape Design & Public Realm - Sheet 4 - South Bank, South Quay And The Dock | 1:500 | A1 |
| 6445-304 | Landscape Design & Public Realm - Sheet 5 - North Bank, Ferrybank South | 1:500 | A1 |
| 6445-305 | Landscape Design & Public Realm - Sheet 6 - North Bank, Ferrybank North | 1:500 | A1 |
| 6445-306 | Landscape Design & Public Realm - Sheet 7 - North Bank, Dublin Road | 1:500 | A1 |

## 18.3 Conclusion

The site notices and scheme drawings are in compliance with the Planning and Development Regulations 2001, as amended.

# 19 Adequacy of Public Consultation

## 19.1 Overview

A number of the S226 submissions and CPO objections made to An Bord Pleanála (ABP) in respect of the proposed Arklow Flood Relief Scheme includes observations relevant to adequacy of public consultation.

### 19.1.1 Response

The following submissions/objections raised the point (adequacy of public consultation): S12 Deirdre Burke and Others, S15 Save Maritime Arklow Group, S20 Elizabeth and Nicola Kenny, CPO5 Christine McElheron and CPO9 Peir Leonard. Consultation with Arklow Marina is addressed in Section 16 above.

Section 1.6 of Chapter 1 (*Introduction*) of the EIAR submitted to an Bord Pleanála and available on Wicklow County Council's website notes the extensive Public Consultation, both Statutory and Non Statutory that has been engaged by Wicklow County Council since Scheme development started in 2007.

Furthermore, arising from the information sessions in March 2021, Wicklow County Council notified 177 separate email addresses that their concerns had been noted and of the intention to submit an application to An Bord Pleanála in order to direct them in towards taking part in this statutory consultation process.

## 19.2 Conclusion

This development of this Scheme, and the emerging solution has been communicated to the people of Arklow since 2007, and there has been significant effort made by the developer to inform the public, listen to the concerns and to refine the design to respond, prior to making the application to An Bord Pleanála in 2021.

# 20 Schedule of Additional Environmental Commitments

This section of this report provides a list of the additional environmental commitments that are now proposed in response to the submissions/objections in addition to those proposed in the EIAR and NIS.

| Stage (C/O) | Commitment |
|---|---|
| | **AMENDMENTS TO SCHEME DESIGN** |
| O | Addition of two 6.0m long glass panels just downstream of Arklow Bridge on South Quay at approximately Ch 020 (12.0m total), as shown on revised Scheme Drawing No 1040 and revised Landscape Design and Public Realm Drawing No 301 in Appendix A of this report. This will open up views of the bridge downstream.<br>Addition of three 6.0m long glass panels along South Quay at approximately Chainage 370 (18.0m total), as shown on revised Scheme Drawing No 1041 and revised Landscape Design and Public Realm Drawing No 302 in Appendix A of this report.<br>Drawing Nos 1036-1042 and 1046 of Appendix 4.1 (*Scheme Drawings*) and Drawing Nos 301-302 of Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR have been revised to reflect these changes and are included in Appendix A of this report |
| O | The 8.0m long demountable flood barrier at the public slipway (approx. Ch 950) will be normally open to facilitate regular access for users of the public slipway as shown on Scheme Drawing Nos 1042 and 1046 in Appendix A of this report. The barrier is now shown on Drawing No 1042 and 1045 as "*Maintained Open*".<br>A memorandum of understanding will be agreed between WCC and OPW regarding maintenance and closing of the flood barrier during flood events. |
| O | It is proposed to reduce the extent of footpath widening in front of the houses at 1-4 South Quay and provide a dedicated area for parking at this location. The revised street layout has now been revised as shown on Drawing No 303 of Appendix 4.2 (*Landscape Design and Public Realm Drawings*) and on Drawing No 1041 (approx. Ch 510) of Appendix 4.1 (*Scheme Drawings*) of the EIAR which are now included in Appendix A of this report). |
| O | The tree planting proposals on the south bank have been reviewed and it is now proposed to include additional native species along River Walk and South Quay. Therefore, the following Planting Schedules on the Landscape Design and Public Realm Drawings 300-306 are have been revised and included in Appendix A of this report and are updated as follows:<br>Additions in red. Deletions in ~~strikethrough~~<br><br>PROPOSED RIVER WALK AND PUBLIC PLAZA TREES SPECIES<br>(*16-18 cm STD and 20-25 cm STD*)<br>Acer platanoides 'Columnare' (Norway Maple)<br>Alnus glutinosa (Alder)<br>Betula pendula (Birch)<br>~~Crataegus laevigata 'Paul's Scarlet' (Hawthorn)~~<br>Pinus sylvestris (Scot's Pine)<br>Prunus avium 'Plena' (Double flowered Wild Cherry) |

| Stage (C/O) | Commitment |
|---|---|
| | Sorbus aucuparia (Mountain Ash)<br><br>PROPOSED SOUTH QUAY TREES SPECIES<br>(16-18 cm STD and 20-25 cm STD)<br>Acer platanoides 'Columnare' (Norway Maple)<br>Alnus glutinosa (Alder)<br>~~Ulmus 'Lobel' (Elm DED resistant)~~<br>Pinus sylvestris (Scot's Pine)<br>Prunus avium 'Plena' (Wild Cherry)<br>Sorbus aucuparia (Mountain Ash) |
| | **ADDITIONAL MITIGATION** |
| C | Water Quality<br>To address the comment made by Inland Fisheries Ireland regarding water monitoring, the proposed suite of parameters to be monitored will also include heavy metals analysis.<br>In order to establish the water quality baseline and to have a reasonable and defined starting point for comparison purposes, it is proposed to undertake quarterly monitoring at three sampling points during the twelve months prior to the commencement of the instream works. The sampling points are as follows:<br>• one sampling point located immediately upstream of the FRS instream works area;<br>• one located at the Arklow Bridge;<br>• one located downstream of the FRS instream works area.<br>Thereafter, during the construction works, monitoring will continue to ensure that there is no unacceptable impact on water quality. As such, monitoring will be undertaken at these same sampling points as follows;<br>• immediately before instream works commence;<br>• immediately after the first day of instream works; and<br>• monthly thereafter while instream works are in progress (typically during the period from May to September inclusive)<br>In addition, continuous monitoring of dissolved oxygen and temperature will be undertaken while instream works are in progress. |
| C&O | It is recommended in consultation with interested stakeholders, local heritage groups and the Maritime Museum of Arklow to provide a newly developed heritage trail that provides information at points of industrial heritage and maritime interest along the quays. |
| C | The layout of the SC6 has now been revised to take into account the findings of the 2021 Moore's Horsetail *(Equisetum moorei)* and Wild Clary *(Salvia verbenaca)* and is presented in Appendix B of this report. |
| C | As works will likely disturb the otter resting area (given the close proximity) along the north bank, a derogation licence will be sought from the NPWS in advance of any works in this area and any requirements of the derogation licence will be complied with. |
| C & O | Additional monitoring of bat species, over and above the two year period mentioned in the EIAR will be carried out. An annual survey for a minimum of 5 years, focusing on occupancy of the bat tubes (usage and species determination) as well as the presence of foraging bats within the development site will be completed. The results of these surveys should be sent annually to the National Parks and Wildlife Service (NPWS). |

| Stage (C/O) | Commitment |
|---|---|
| | WCC commit to choosing of luminaires along the Public Realm on South Bank that follow Bat Conservation Trust (BCT) guidelines (BCT, 2018[9]).<br>• All luminaires used should lack UV/IR elements to reduce impact.<br>• LED luminaires should be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.<br>• A warm white spectrum (<2700 Kelvins should be used to reduce the blue light component of the LED spectrum).<br>• Luminaires should have a peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.<br>• Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible. Bollard lighting should be considered for pedestrian and greenway areas, if deemed necessary.<br>• Only luminaires with an upward light ratio of 0% and with good optical control should be used.<br>• Luminaires should be mounted on the horizontal, i.e. no upward tilt.<br>• As a last resort, accessories such as baffles, hoods or louvres should be used to reduce light spill and direct it only to where it is needed.<br>• Where lighting is required, it is important to ensure the no light trespass occurs along adjacent to habitats. In areas where there are habitats, consideration for a shorter light post to reduce light trespass should be considered in order to achieve lighting levels of 0.1 LUX or less in bat habitats.<br>• Where lighting is required, it is important to ensure that there are continuous dark corridors. Greater spacing between lighting posts should be considered.<br>• Where lighting is required and light trespass on important bat habitat is inevitable, adequate mitigation measures are required to reduce the impact (e.g. screening) on order to reduce lighting levels to 0.1 LUX.<br>• Investigate the potential of "Part-Time" lighting schemes and/or "Dimming Illuminance" lighting schemes. |
| O | The lighting on Arklow Bridge shall only be for traffic safety and there shall be no amenity lighting of the stonework in order to maintain dark conditions for roosting bats and birds |
| C | A suitably qualified Environmental Clerk of Works shall be appointed to oversee and monitor all measures taken to protect the aquatic environment as stated in Sections 21.2.4 and 21.2.8 of Chapter 21 (*Summary of Mitigation, Monitoring and Residual Effects).*<br>The Environmental Clerk of Works (ECOW) will also be available to monitor all other measures intended to protect the environment and will form part of the ER team |
| C | It is proposed to consult with the local community in the determination of dust monitoring locations in conjunction with WCC. |
| C | The Contractor will prepare a Construction Noise Management Plan in advance of the commencement of construction. |

[9] Bat Conservation Trust Guidance Note 08/18 Bats and artificial lighting in the UK.

# Appendix A

Revised Drawings

# A1 Revised Drawings

The following drawings have been revised in response to the submissions/objections received and are included in this Appendix A:

- Drawing Nos 1036-1042, 1045-1046 of Appendix 4.1 (*Scheme Drawings*) of the EIAR
- Drawing Nos 300-306 of Appendix 4.2 (*Landscape Design and Public Realm Drawings*) of the EIAR

| **Revised Drawing No.** | **Source** |
|---|---|
| 1036 | Appendix 4.1 (*Scheme Drawings*) |
| 1040 | Appendix 4.1 (*Scheme Drawings*) |
| 1041 | Appendix 4.1 (*Scheme Drawings*) |
| 1042 | Appendix 4.1 (*Scheme Drawings*) |
| 1045 | Appendix 4.1 (*Scheme Drawings*) |
| 1046 | Appendix 4.1 (*Scheme Drawings*) |
| 300 | Appendix 4.2 (*Landscape Design and Public Realm Drawings*) |
| 301 | Appendix 4.2 (*Landscape Design and Public Realm Drawings*) |
| 302 | Appendix 4.2 (*Landscape Design and Public Realm Drawings*) |
| 303 | Appendix 4.2 (*Landscape Design and Public Realm Drawings*) |
| 304 | Appendix 4.2 (*Landscape Design and Public Realm Drawings*) |
| 305 | Appendix 4.2 (*Landscape Design and Public Realm Drawings*) |
| 306 | Appendix 4.2 (*Landscape Design and Public Realm Drawings*) |

A1

| DESIGN FLOOD LEVELS | |
|---|---|
| REFERENCE SITE | FLOOD LEVEL (mOD MALIN) |
| 1 | 1.82 |
| 2 | 1.95 |
| 3 | 1.93 |
| 4 | 2.13 |
| 5 | 2.28 |
| 6 | 2.77 |
| 7 | 2.87 |
| 8 | 3.02 |
| 9 | 3.18 |
| 10 | 3.27 |
| 11 | 2.97 |
| 12 | 3.03 |
| 13 | 3.03 |

GENERAL NOTES

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NOTES:

1. DO NOT SCALE OFF DRAWING.
2. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS.
3. DRAWING IS FOR INFORMATION PURPOSES ONLY, NOT FOR CONSTRUCTION.
4. MINIMUM STORM DRAIN MANHOLE DIAMETER 1.8m.
5. REFER TO PUBLIC REALM DRAWINGS FOR FOOTPATH AND ROAD PAVING DETAILS, WALL FINISHES AND LANDSCAPING.

LEGEND

EXISTING FLOOD DEFENCE WALL:
PROPOSED FLOOD DEFENCE WALL:
PROPOSED FLOOD GATE:
PROPOSED GLASS PANELS IN FLOOD DEFENCE WALL:
PROPOSED FLOOD DEFENCE EMBANKMENTS:
PROPOSED CHANNEL DIVERSION:
DESIGN FLOOD LEVEL REF.:
PROPOSED STORM DRAINAGE:
PROPOSED ACCESS RAMP:
PROPOSED GROUND RAISING:
PROPOSED RIP-RAP:
PROPOSED RIVERBED RAISING:
RELOCATED MOORING POSTS: MP
REMOVABLE BOLLARDS: RB
BAT TUBES: BT
ROAD DRAIN:

| Rev | Date | Description | By | Chk | App |
|---|---|---|---|---|---|
| P8 | 11.01.22 | GLASS PANELS ADDED D/S OF BRIDGE | LT | KBS | KT |
| P7 | 27.04.21 | ISSUE FOR PLANNING | LT | KBS | KT |
| P6 | 11.03.21 | ISSUE FOR PLANNING | LT | KBS | KT |
| P5 | 04.11.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P4 | 01.07.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P3 | 14.02.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P2 | 31.01.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P1 | 10.09.18 | ISSUE FOR INFORMATION | NM | SH | KT |


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PROJECT
ARKLOW FLOOD RELIEF SCHEME

DRAWING TITLE
FLOOD DEFENCE WALLS & EMBANKMENTS SOUTH BANK UPSTREAM OF ARKLOW BRIDGE LAYOUT PLAN

STATUS
FOR PLANNING

| Date: 13.03.18 | Scale: 1/500 | Drawn: NM | Chk: SH | App: KT |
|---|---|---|---|---|
| Project No: PH00886/01 | Drg. No: 1036 | | | Rev: P8 |

A1

CH 0

CH 100

CH 200

SHEET PILES TERMINATED AT EXISTING BED LEVEL SHOWN DOTTED

TIE INTO PIER AT BRIDGE PARAPET

PROPOSED GLASS PANELS FLOOD DEFENCE WALL

SHEET PILES TO GROUND LEVEL

PROPOSED BAT TUBES

PROPOSED RIVERBED RAISING

PROPOSED OUTFALL WITH FLAP VALVE FITTED

PROPOSED PUMPING STATION

PROPOSED OUTFALLS WITH FLAP VALVES FITTED

EXISTING CONTROL KIOSK & ESB PILLLAR TO BE RELOCATED

Harbour

Slipway

Car Park

Toilets

Playground

Tanks

HARBOUR

BANK HALL

LAFFIN'S LANE

MEADOW'S LANE

DOYLE'S LANE

CONDRENS LANE

ABBEY LANE

SOUTH GREEN

THE BROOK

MAIN STREET

LOWER

| DESIGN FLOOD LEVELS | |
|---|---|
| REFERENCE SITE | FLOOD LEVEL (mOD MALIN) |
| 1 | 1.82 |
| 2 | 1.95 |
| 3 | 1.93 |
| 4 | 2.13 |
| 5 | 2.28 |
| 6 | 2.77 |
| 7 | 2.87 |
| 8 | 3.02 |
| 9 | 3.18 |
| 10 | 3.27 |
| 11 | 2.97 |
| 12 | 3.03 |
| 13 | 3.03 |

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4. MINIMUM STORM DRAIN MANHOLE DIAMETER 1.8m.
5. REFER TO PUBLIC REALM DRAWINGS FOR FOOTPATH AND ROAD PAVING DETAILS, WALL FINISHES AND LANDSCAPING.

LEGEND

EXISTING FLOOD DEFENCE WALL:

PROPOSED FLOOD DEFENCE WALL:

PROPOSED FLOOD GATE:

PROPOSED GLASS PANELS IN FLOOD DEFENCE WALL:

PROPOSED FLOOD DEFENCE EMBANKMENTS:

PROPOSED CHANNEL DIVERSION:

DESIGN FLOOD LEVEL REF.: 5

PROPOSED STORM DRAINAGE: MH

PROPOSED ACCESS RAMP:

PROPOSED GROUND RAISING:

PROPOSED RIP-RAP:

PROPOSED RIVERBED RAISING:

RELOCATED MOORING POSTS: MP

REMOVABLE BOLLARDS: RB

BAT TUBES: BT

| Rev. | Date | Description | By | Chk | App |
|---|---|---|---|---|---|
| P7 | 11.01.22 | GLASS PANELS ADDED D/S OF BRIDGE | LT | KBS | KT |
| P6 | 11.03.21 | ISSUE FOR PLANNING | LT | KBS | KT |
| P5 | 04.11.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P4 | 01.07.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P3 | 14.02.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P2 | 31.01.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P1 | 10.09.18 | ISSUE FOR INFORMATION | NM | SH | KT |

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DRAWING TITLE
FLOOD DEFENCE WALLS & EMBANKMENTS SOUTH BANK DOWNSTREAM OF ARKLOW BRIDGE LAYOUT PLAN SHEET 1

STATUS
FOR PLANNING

| Date: 12.03.18 | Scale: 1/500 | Drawn: NM | Chk: SH | App: KT |
|---|---|---|---|---|
| Project No: PH00886/01 | Drg. No: 1040 | | | Rev: P7 |

A1

PROPOSED BAT TUBES

EXISTING MASONRY WALL TO BE PROTECTED, SEE DWG 1047 FOR DETAILS

6Nr. EXISTING MOORING POSTS TO BE RELOCATED TO HERE

PROPOSED GLASS PANELS WITHIN FLOOD DEFENCE WALL

PROPOSED RIP-RAP

CH 400

PROPOSED FLOOD DEFENCE WALL TO TIE INTO EXISTING WALL AT SLIPWAY

PROPOSED BAT TUBES

PROPOSED GLAZING WITHIN FLOOD DEFENCE WALL

EXISTING SLIPWAY TO BE RETAINED

EXISTING SECTION OF WALL TO BE DEMOLISHED TO GROUND LEVEL TO PROVIDE RIVER ACCESS AND REBUILT TO NEW HEIGHT SUBSEQUENTLY

CH 500

EXISTING CURVED CONCRETE SEAWALL TO BE RETAINED

PROPOSED FLOOD DEFENCE WALL TO TIE INTO EXISTING WALL

EXISTING CONTROL KIOSK & ESB PILLAR

PROPOSED OUTFALLS WITH FLAP VALVES FITTED

CH 600

PROPOSED PUMPING STATION

PROPOSED FLOOD DEFENCE WALL TO TIE INTO EXISTING WALL

EXISTING WALL TO BE RETAINED

PROPOSED ACCESS RAMP

TIE INTO EXISTING WALL

PROPOSED FLOOD DEFENCE WALL

| DESIGN FLOOD LEVELS | |
|---|---|
| REFERENCE SITE | FLOOD LEVEL (mOD MALIN) |
| 1 | 1.82 |
| 2 | 1.95 |
| 3 | 1.93 |
| 4 | 2.13 |
| 5 | 2.28 |
| 6 | 2.77 |
| 7 | 2.87 |
| 8 | 3.02 |
| 9 | 3.18 |
| 10 | 3.27 |
| 11 | 2.97 |
| 12 | 3.03 |
| 13 | 3.03 |

N W E S

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5. REFER TO PUBLIC REALM DRAWINGS FOR FOOTPATH AND ROAD PAVING DETAILS, WALL FINISHES AND LANDSCAPING.

LEGEND

- EXISTING FLOOD DEFENCE WALL:
- PROPOSED FLOOD DEFENCE WALL:
- PROPOSED FLOOD GATE:
- PROPOSED GLASS PANELS IN FLOOD DEFENCE WALL:
- PROPOSED FLOOD DEFENCE EMBANKMENTS:
- PROPOSED CHANNEL DIVERSION:
- DESIGN FLOOD LEVEL REF.:
- PROPOSED STORM DRAINAGE:
- PROPOSED ACCESS RAMP:
- PROPOSED GROUND RAISING:
- PROPOSED RIP-RAP:
- PROPOSED RIVERBED RAISING:
- RELOCATED MOORING POSTS: MP
- REMOVABLE BOLLARDS: RB
- BAT TUBES: BT

| Rev. | Date | Description | By | Chk | App |
|---|---|---|---|---|---|
| P8 | 11.01.22 | GLASS PANELS BETWEEN CH.350-400, & PARKING ON SOUTH QUAY ADDED | LT | KBS | KT |
| P7 | 27.04.21 | ISSUE FOR PLANNING | LT | KBS | KT |
| P6 | 11.03.21 | ISSUE FOR PLANNING | LT | KBS | KT |
| P5 | 04.11.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P4 | 01.07.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P3 | 14.02.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P2 | 31.01.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P1 | 10.09.18 | ISSUE FOR INFORMATION | NM | SH | KT |


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WICKLOW COUNTY COUNCIL

PROJECT
ARKLOW FLOOD RELIEF SCHEME

DRAWING TITLE
FLOOD DEFENCE WALLS & EMBANKMENTS SOUTH BANK DOWNSTREAM OF ARKLOW BRIDGE LAYOUT PLAN SHEET 2

STATUS
FOR PLANNING

| Date: 12.03.18 | Scale: 1/500 | Drawn: NM | Chk: SH | App: KT |
|---|---|---|---|---|
| Project No: PH00886/01 | Drg. No: 1041 | | | Rev: P8 |

A1

PROPOSED PUMPING STATION

EXISTING WALL TO BE RETAINED

PROPOSED SAFETY RAIL FIXED TO TOP OF EXISTING WALL

PROPOSED ACCESS RAMP

TIE INTO EXISTING WALL

PROPOSED OUTFALL WITH INLINE FLAP VALVE FITTED

EXISTING SERVICES TO BE RELOCATED

PROPOSED FLOOD DEFENCE WALL TO TIE INTO EXISTING WALL

PROPOSED SAFETY RAIL FIXED TO TOP OF PROPOSED WALL

PROPOSED FLOOD DEFENCE WALL

PROPOSED ACCESS RAMP

8m WIDE DEMOUNTABLE FLOOD BARRIER (GENERALLY MAINTAINED CLOSED)

8m WIDE DEMOUNTABLE FLOOD BARRIER (GENERALLY MAINTAINED OPEN)

TIE INTO EXISTING WALL

EXISTING WALL TO BE RETAINED

EXISTING WALL TO BE RETAINED

OPENING IN WALL TO BE BLOCKED UP, TO MATCH EXISTING

TIE INTO EXISTING WALL

TIE INTO EXISTING PLINTH/ KERB TO 2.40 M.O.D.

RAISE EXISTING PLINTH/ KERB TO 2.40 m.O.D.

SLOPE GROUND AT 1:20 FROM HIGH POINT IN ALL DIRECTIONS

CH 700

CH 800

CH 900

CH 1000

Area under construction

HARBOUR

AVOCA RIVER

DOCK

| DESIGN FLOOD LEVELS | |
|---|---|
| REFERENCE SITE | FLOOD LEVEL (mOD MALIN) |
| 1 | 1.82 |
| 2 | 1.95 |
| 3 | 1.93 |
| 4 | 2.13 |
| 5 | 2.28 |
| 6 | 2.77 |
| 7 | 2.87 |
| 8 | 3.02 |
| 9 | 3.18 |
| 10 | 3.27 |
| 11 | 2.97 |
| 12 | 3.03 |
| 13 | 3.03 |

N
W E
S

NOTES:

1. DO NOT SCALE OFF DRAWING
2. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS
3. DRAWING IS FOR INFORMATION PURPOSES ONLY, NOT FOR CONSTRUCTION
4. MINIMUM STORM DRAIN MANHOLE DIAMETER 1.8m.
5. REFER TO PUBLIC REALM DRAWINGS FOR FOOTPATH AND ROAD PAVING DETAILS, WALL FINISHES AND LANDSCAPING.

LEGEND

EXISTING FLOOD DEFENCE WALL:

PROPOSED FLOOD DEFENCE WALL:

PROPOSED FLOOD GATE:

PROPOSED GLASS PANELS IN FLOOD DEFENCE WALL:

PROPOSED FLOOD DEFENCE EMBANKMENTS:

PROPOSED CHANNEL DIVERSION:

DESIGN FLOOD LEVEL REF.:

PROPOSED STORM DRAINAGE: MH

PROPOSED ACCESS RAMP:

PROPOSED GROUND RAISING:

PROPOSED RIP-RAP:

PROPOSED RIVERBED RAISING:

RELOCATED MOORING POSTS: MP

REMOVABLE BOLLARDS: RB

BAT TUBES: BT

| Rev | Date | Description | By | Chk | App |
|---|---|---|---|---|---|
| P7 | 11.01.22 | FLOOD BARRIER NOTES REVISED | LT | KBS | KT |
| P6 | 11.03.21 | ISSUE FOR PLANNING | LT | KBS | KT |
| P5 | 04.11.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P4 | 01.07.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P3 | 14.02.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P2 | 31.01.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P1 | 10.09.18 | ISSUE FOR INFORMATION | NM | SH | KT |

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WICKLOW COUNTY COUNCIL

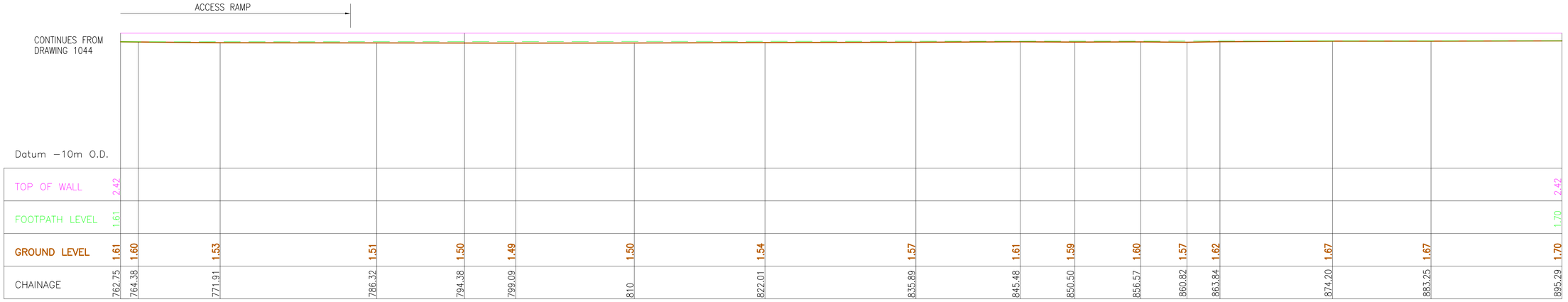
PROJECT
ARKLOW FLOOD RELIEF SCHEME

DRAWING TITLE
FLOOD DEFENCE WALLS & EMBANKMENTS SOUTH BANK DOWNSTREAM OF ARKLOW BRIDGE LAYOUT PLAN SHEET 3

STATUS
FOR PLANNING

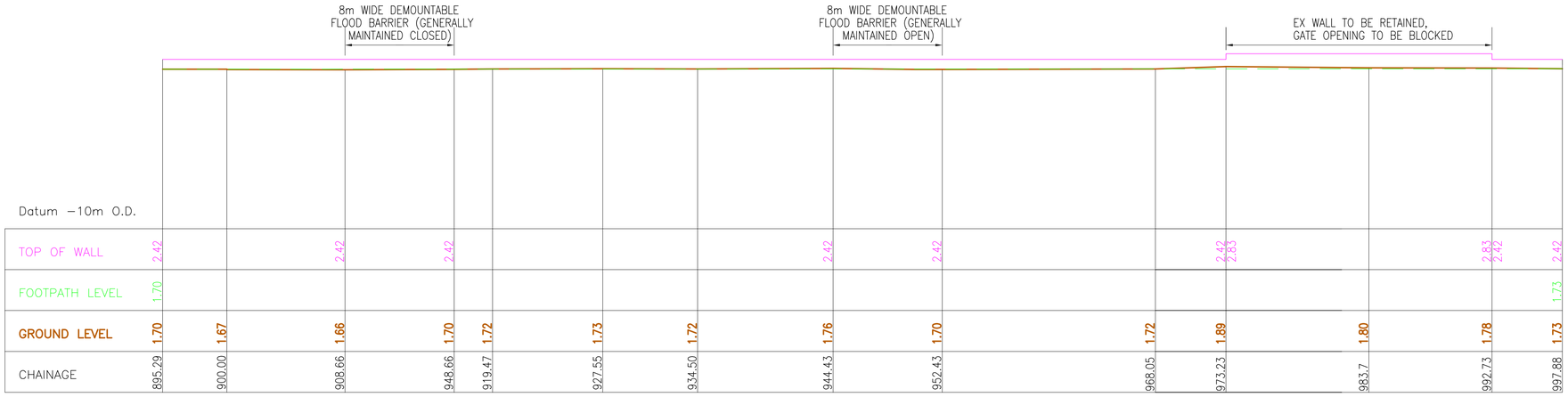
| Date: 12.03.18 | Scale: 1/500 | Drawn: NM | Chk: SH | App: KT |
|---|---|---|---|---|
| Project No: PH00886/01 | Drg. No: 1042 | | | Rev: P7 |

A1



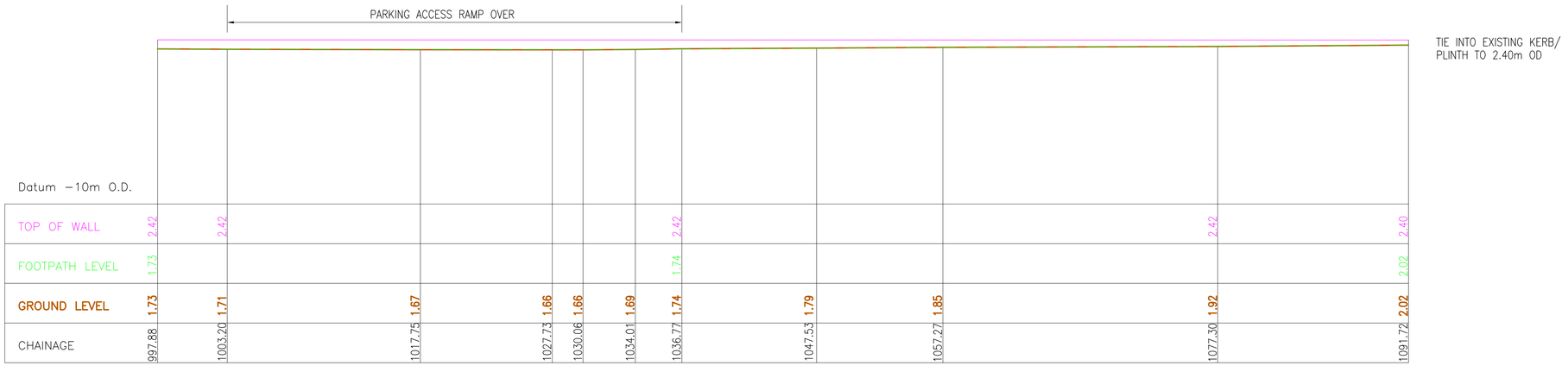

ELEVATION SOUTH BANK D/S OF ARKLOW BRIDGE

SCALE: VERT 1:200 / HORIZ 1:200




ELEVATION SOUTH BANK D/S OF ARKLOW BRIDGE

SCALE: VERT 1:200 / HORIZ 1:200




ELEVATION SOUTH BANK D/S OF ARKLOW BRIDGE

SCALE: VERT 1:200 / HORIZ 1:200



GENERAL NOTES

LEGEND

1. DO NOT SCALE OFF DRAWING
2. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS
3. DRAWING IS FOR INFORMATION PURPOSES ONLY, NOT FOR CONSTRUCTION
4. REFER TO PUBLIC REALM DRAWINGS FOR FOOTPATH AND ROAD PAVING DETAILS, WALL FINISHES AND LANDSCAPING.
5. PROPOSED FOOTPATH LEVEL SHOWN IS INDICATIVE.

LEGEND

EXISTING GROUND LEVEL:

PROPOSED FLOOD WALL:

PROPOSED GROUND LEVEL:

| Rev | Date | Description | By | Chk | App |
|---|---|---|---|---|---|
| P2 | 11.01.22 | FLOOD BARRIER NOTES REVISED | LT | KBS | KT |
| P1 | 11.03.21 | ISSUE FOR PLANNING | LT | KBS | KT |
| P0 | 19.06.18 | ISSUE FOR INFORMATION | NM | SH | KT |

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WICKLOW COUNTY COUNCIL

PROJECT
ARKLOW FLOOD RELIEF SCHEME

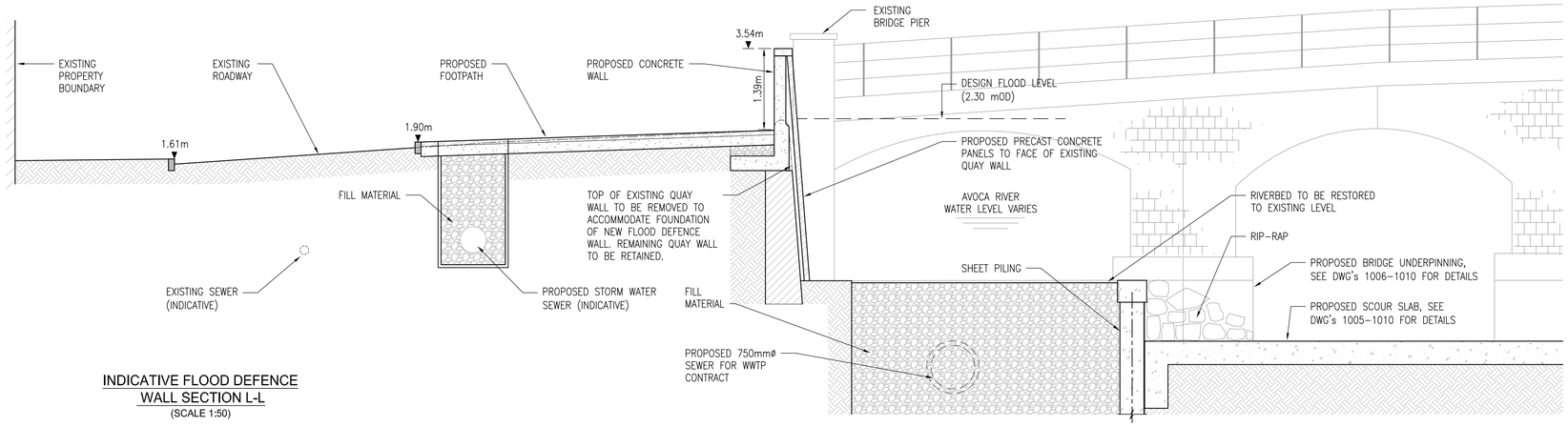
DRAWING TITLE
ELEVATION
SOUTH BANK DOWNSTREAM OF ARKLOW BRIDGE
SHEET 3

STATUS
FOR PLANNING

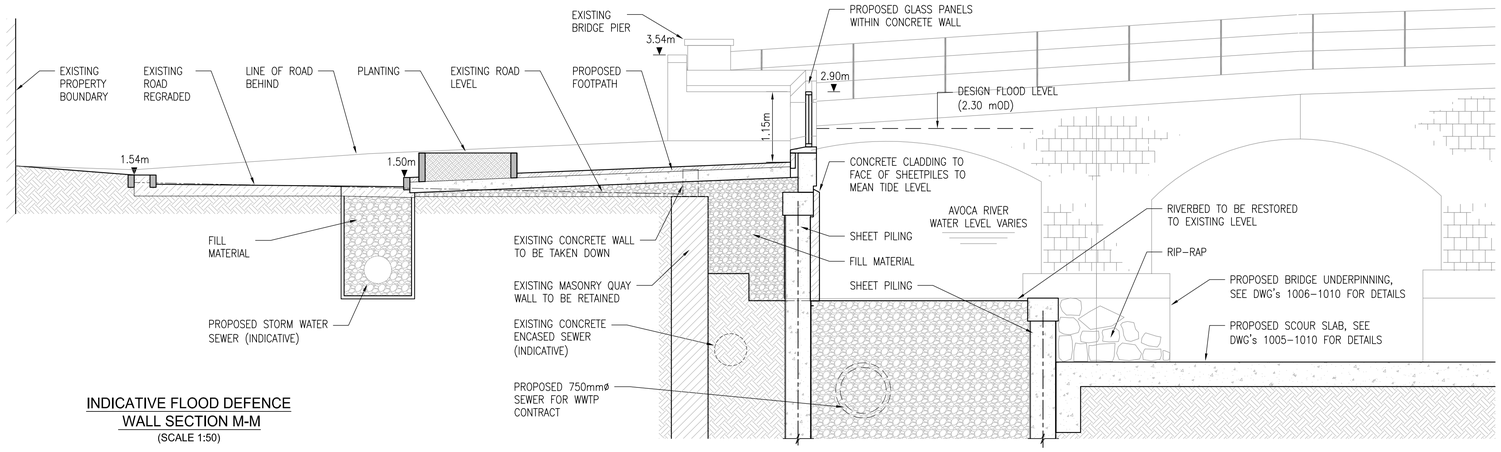
| Date: 19.06.18 | Scale: AS SHOWN | Drawn: NM | Chk: SH | App: KT |
|---|---|---|---|---|

| Project No: | Drg. No: | Rev. |
|---|---|---|
| PH00886/01 | 1045 | P2 |

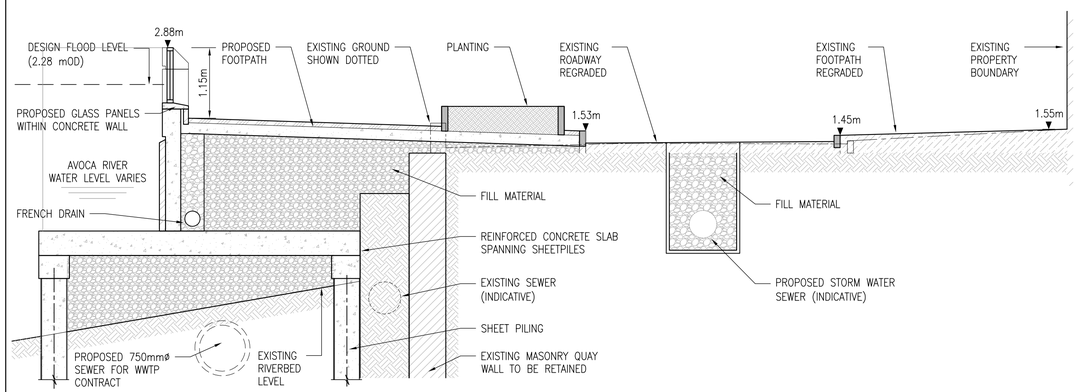
A1



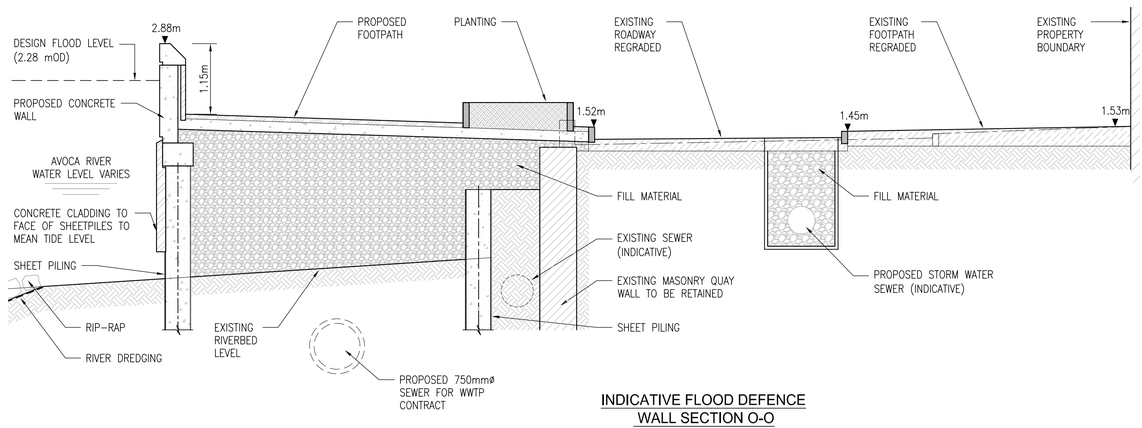

INDICATIVE FLOOD DEFENCE WALL SECTION L-L
(SCALE 1:50)




INDICATIVE FLOOD DEFENCE WALL SECTION M-M
(SCALE 1:50)




INDICATIVE FLOOD DEFENCE WALL SECTION N-N
(SCALE 1:50)




INDICATIVE FLOOD DEFENCE WALL SECTION O-O
(SCALE 1:50)

GENERAL NOTES

NOTES:

1. DO NOT SCALE OFF DRAWING
2. DRAWING TO BE READ IN CONJUNCTION WITH DRAWINGS 1031 & 1040
3. DRAWING IS FOR INFORMATION PURPOSES ONLY, NOT FOR CONSTRUCTION
4. REFER TO PUBLIC REALM DRAWINGS FOR FOOTPATH AND ROAD PAVING DETAILS, WALL FINISHES AND LANDSCAPING

LEGEND

DESIGN FLOOD LEVEL:

EXISTING GROUND:

EXISTING QUAY WALL:

PROPOSED ROAD LAYER WORKS:

PROPOSED FILL MATERIAL:

PROPOSED PEDESTRIAN AREA:

| Rev | Date | Description | By | Chk | App |
|---|---|---|---|---|---|
| P5 | 11.01.22 | GLASS PANELS ADDED TO SECTIONS M & N | LT | KBS | KT |
| P4 | 11.03.21 | ISSUE FOR PLANNING | LT | KBS | KT |
| P3 | 04.11.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P2 | 10.02.20 | ISSUE FOR INFORMATION | LT | KBS | KT |
| P1 | 10.09.18 | ISSUE FOR INFORMATION | NM | KT | KT |

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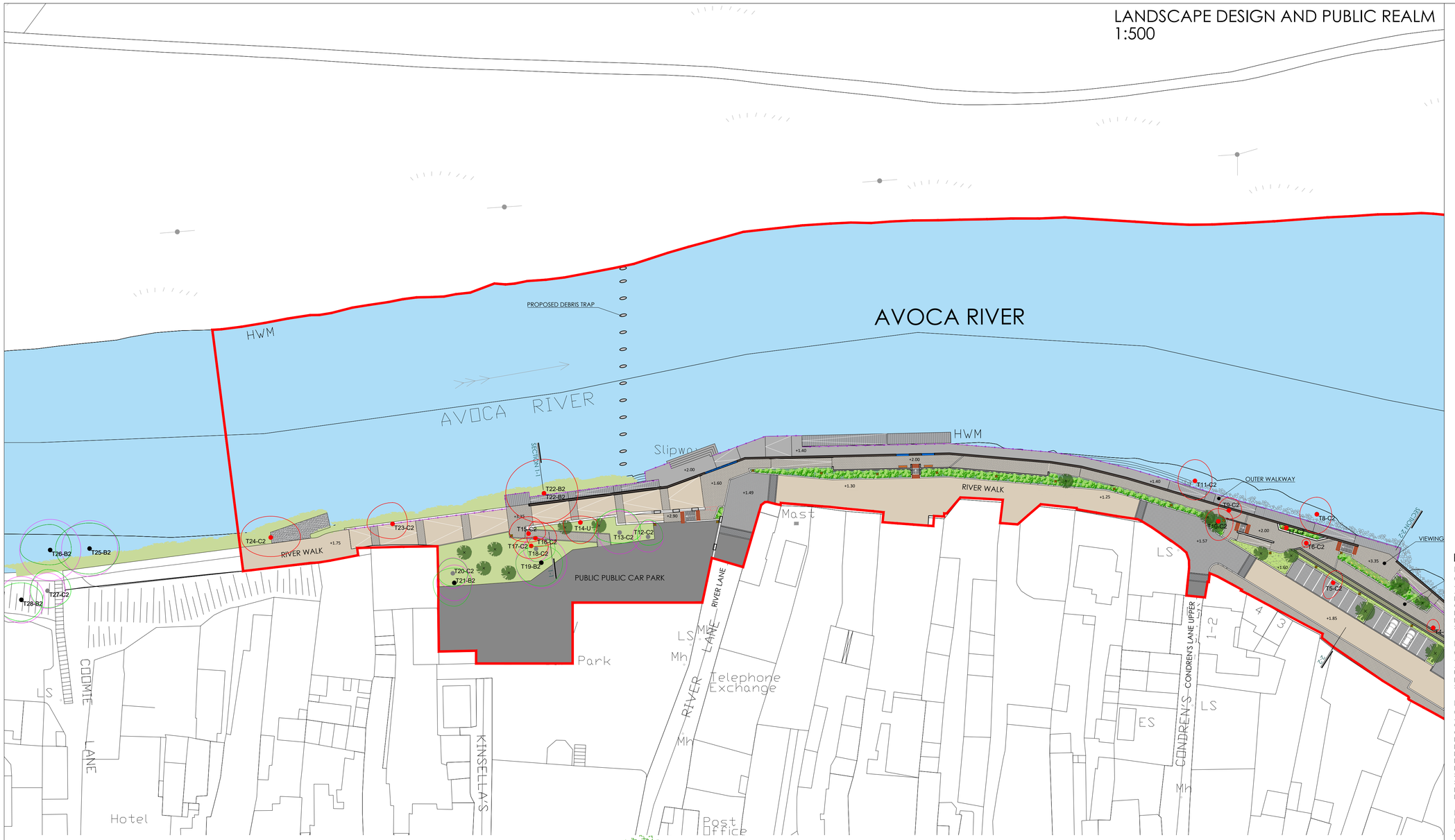
PROJECT
ARKLOW FLOOD RELIEF SCHEME

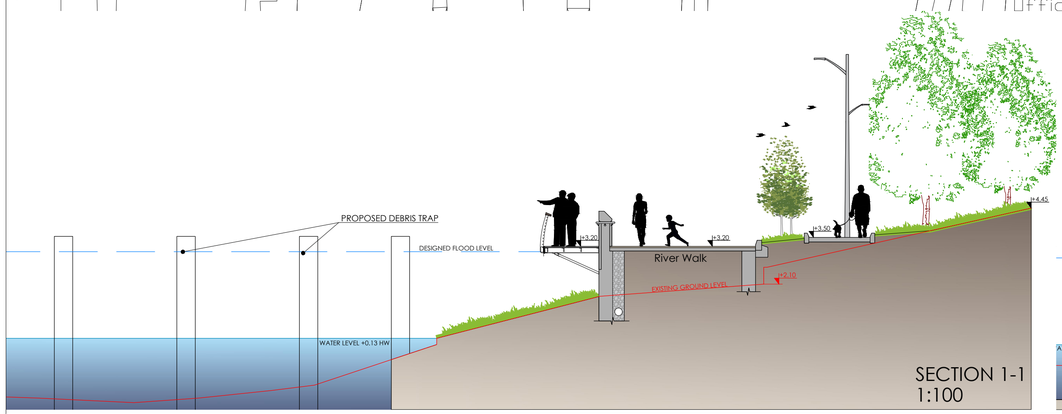
DRAWING TITLE
FLOOD DEFENCE WALLS & EMBANKMENTS SOUTH BANK DOWNSTREAM OF ARKLOW BRIDGE SECTIONS SHEET 1

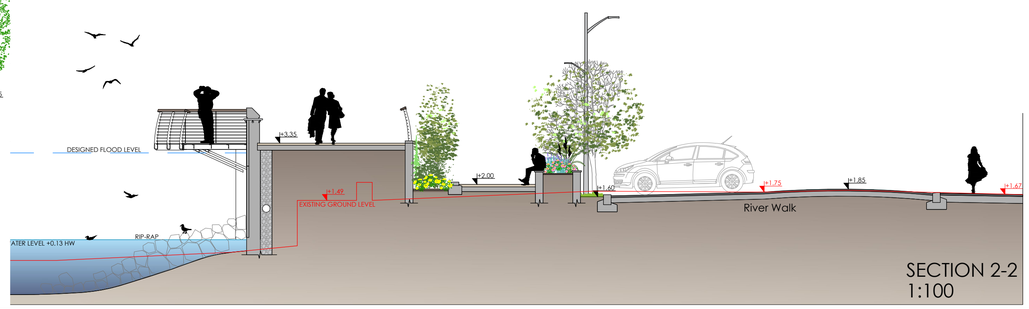
STATUS
FOR PLANNING

| Date: 20.04.18 | Scale: 1/50 | Drawn: NM | Chk: KT | App: KT |
|---|---|---|---|---|
| Project No: PH00886/01 | Drg. No: 1046 | | | Rev: P5 |

# LANDSCAPE DESIGN AND PUBLIC REALM
1:500




## LEGEND

PROPOSED SOFT LANDSCAPING

- Existing Trees Retained including RPA
- Existing Trees Removed
- Existing Tree Groups Removed
- Semi-mature Trees
- Mix of Native Woodland Planting
- Amenity Grass
- Amenity Grass with Bulbs
- Ornamental Grasses
- Irish Native Species Rich Grass and Wildflower Mixture
- Ornamental Shrubs and Perennials
- Climbers
- Roosting Platforms (Floating)

PROPOSED HARD LANDSCAPING

- Existing Paving/Surface Retained
- Tarmac Road Finish
- Buff Tarmac Finish
- Concrete to Footpaths and Stairs
- Tactile Paving
- Stone Finished Paving Flags 400 x 200 mm - mixed colours
- Stone Finished Paving Setts 200 x 100 mm - mixed colours
- Paved Raised Table Junction with 200 x 100mm Setts
- Boardwalk Decking
- Hardcore Gravel
- Rip-Rap
- Proposed Flood Defence Wall
- Proposed Glass Flood Panels
- Proposed LED Public Street Lighting
- Proposed LED Lighting under Handrail
- Indicative Location for Seating
- Existing Mooring Posts to be Relocated
- Relocated Mooring Posts
- +1.75 Proposed Landscape Levels (All Levels OD Malin)
- Planning Boundary

## PLANTING SCHEDULE

PROPOSED RIVER WALK AND PUBLIC PLAZA TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Betula pendula (Birch)
Crataegus laevigata 'Paul's Scarlet' (Hawthorn)
Pinus sylvestris (Scot's Pine)
Prunus avium 'Plena' (Double flowered Wild Cherry)
Sorbus aucuparia (Mountain Ash)

PROPOSED SOUTH QUAY TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Ulmus 'Lobel' (Elm DED resistant)
Prunus avium 'Plena' (Wild Cherry)
Sorbus aucuparia (Mountain Ash)

PROPOSED ORNAMENTAL SHRUBS SPECIES
*(1-2L, Container grown, planted at 3-5/sqm)*
Aucuba japonica 'Rozannie' (Japanese Laurel)
Caryopteris x clandonensis 'Kew Blue' (Bluebeard)
Choisya x dewitteana 'Aztec Pearl' (Mexican Orange)
Elaeagnus x ebbingei 'Gilt Edge' (Oleaster)
Hypericum 'Hidcote' (St. John's Wort)
Fuchsia riccartonii (Red Fuchsia)
Lavandula angustifolia 'Hidcote' (Lavender)
Lavandula stoechas (Lavender)
Salvia lavandulifolia (Spanish Sage)
Sarcococca hookeriana var. humilis (Sweetbox)
Rosa rugosa 'Agnes' (Shrub Rose)
Rosmarinus officinalis 'Prostratus' (Rosemary)

PROPOSED ORNAMENTAL GRASSES WITH POLLINATOR FRIENDLY FLOWERING PERENNIALS
*(1-2L, Container grown, planted at 5-7/sq.m.)*
Carex comans 'Frosted Curls' (New Zealand Hair Sage)
Carex morrowii 'Evergold' (Evergold Sedge)
Hakonechloa macra (Japanese Forest Grass)
Helenium 'Moerheim Beauty' (Sneezeweed)
Rudbeckia 'Goldsturm' (Black-Eyed Susan)
Sedum spectable 'Autumn Joy'
Salvia nemorosa 'Caradonna' (Salvia)
Stipa tenuifolium 'Pony Tails'(Mexican Feather Grass)
Miscanthus 'Morning Light' (Chinese Silver Grass)
Verbena bonariensis (Brazilian Vervain)

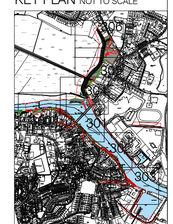
PROPOSED CLIMBERS
*(2L, Container grown, planted at 2/lin.m.)*
Jasminum officinale (Common Jasmine)
Lonicera periclymenum (Honeysuckle)
Parthenocissus tricuspidata (Boston Ivy)

PROPOSED NATIVE WOODLAND PLANTING AREA 1
*Transplants (60-90cm), Bareroot*
40% Alnus glutinosa (Black Alder)
40% Salix aurita, Salix cinerea oleifolia, Salix caprea, Salix pentrandra (Willow)
20% Betula pubescens (Downy Birch)

PROPOSED NATIVE WOODLAND PLANTING AREA 2
*Transplants (60-90cm), Bareroot*
20% Alnus glutinosa (Black Alder)
20% Betula pubescens (Downy Birch)
20% Salix spp. (Willow)
15% Prunus spinosa (Blackthorn)
15% Crataegus monogyna (Hawthorn)
10% Viburnum opulus (Guelder Rose)

IRISH NATIVE SPECIES RICH GRASS AND SEASIDE WILDFLOWER MIXTURE
80% Grass Seed Mixtures
20% Native Origin Irish Wildflower Seed Mixtures

KEY PLAN NOT TO SCALE



| Rev | Date | Drawn | Checked | Description | Notes |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 03 | 10.01.2022 | JV | JK | Minor Alterations to Planting Schedule | |
| 02 | 12.04.2021 | JV | JK | Issue For Information | |
| 01 | 09.03.2021 | JV | JK | Issue For Information | |





| | | | |
|---|---|---|---|
| Project | Arklow Flood Relief Scheme | Project No. | 6545 |
| Drg. | Landscape Design and Public Realm | Drawing No. 300 | Rev. 03 |
| Scales | 1:500 / 1:100 (A1) | Status: For Planning | Date: 10/01/2022 |
| | | | Drn. JV / Chd. JK / Passed |

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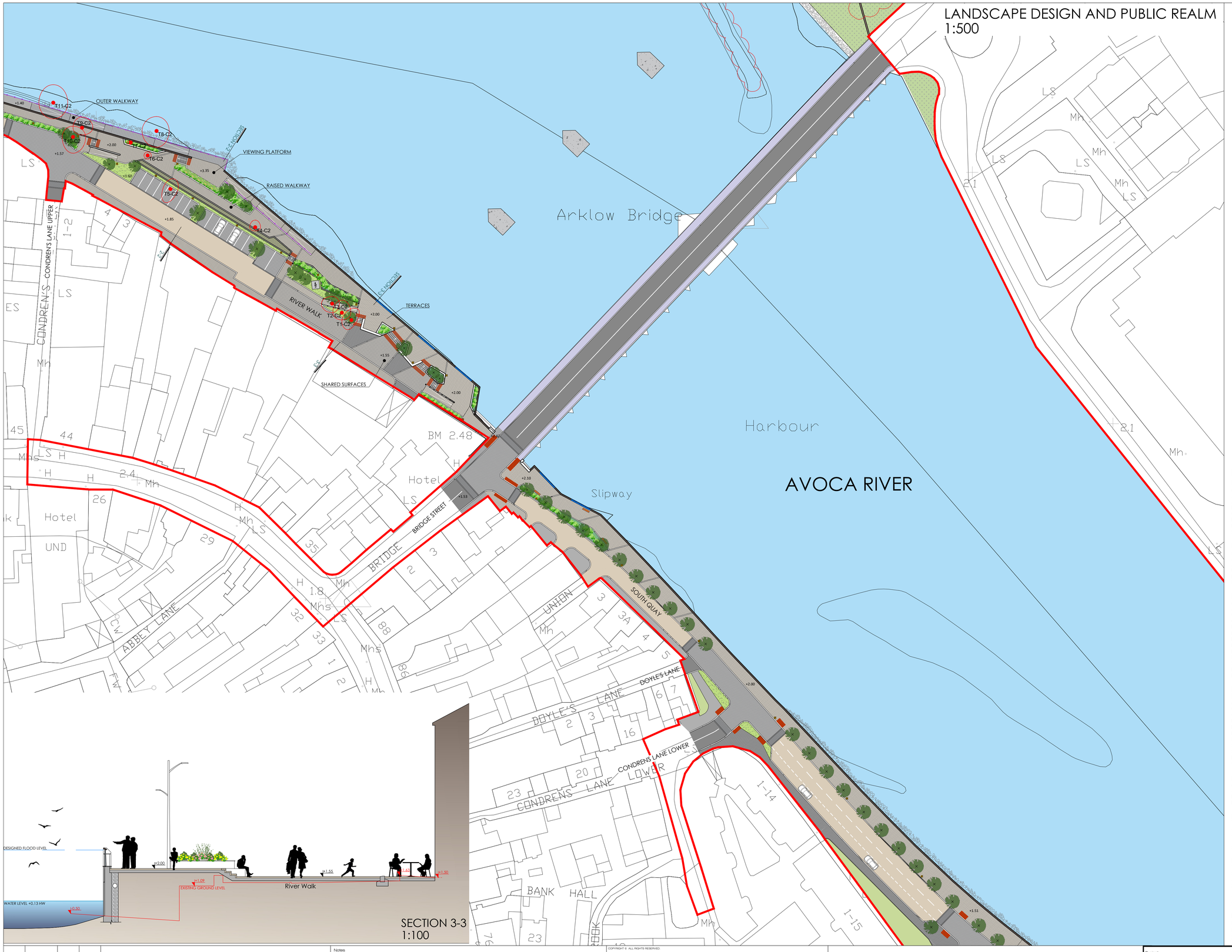
mail@bradyshipmanmartin.com
www.bradyshipmanmartin.com

BSM Est. 1968

# LANDSCAPE DESIGN AND PUBLIC REALM
1:500




## SECTION 3-3
1:100

## LEGEND

### PROPOSED SOFT LANDSCAPING
- Existing Trees Retained including RPA
- Existing Trees Removed
- Existing Tree Groups Removed
- Semi-mature Trees
- Mix of Native Woodland Planting
- Amenity Grass
- Amenity Grass with Bulbs
- Ornamental Grasses
- Irish Native Species Rich Grass and Wildflower Mixture
- Ornamental Shrubs and Perennials
- Climbers
- Roosting Platforms (Floating)

### PROPOSED HARD LANDSCAPING
- Existing Paving/Surface Retained
- Tarmac Road Finish
- Buff Tarmac Finish
- Concrete to Footpaths and Stairs
- Tactile Paving
- Stone Finished Paving Flags 400 x 200 mm - mixed colours
- Stone Finished Paving Setts 200 x 100 mm - mixed colours
- Paved Raised Table Junction with 200 x 100mm Setts
- Boardwalk Decking
- Hardcore Gravel
- Rip-Rap
- Proposed Flood Defence Wall
- Proposed Glass Flood Panels
- Proposed LED Public Street Lighting
- Proposed LED Lighting under Handrail
- Indicative Location for Seating
- Existing Mooring Posts to be Relocated
- Relocated Mooring Posts
- +1.75 Proposed Landscape Levels (All Levels OD Malin)
- Planning Boundary

## PLANTING SCHEDULE

### PROPOSED RIVER WALK AND PUBLIC PLAZA TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
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Alnus glutinosa (Alder)
Betula pendula (Birch)
Crataegus laevigata 'Paul's Scarlet' (Hawthorn)
Pinus sylvestris (Scot's Pine)
Prunus avium 'Plena' (Double flowered Wild Cherry)
Sorbus aucuparia (Mountain Ash)

### PROPOSED SOUTH QUAY TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Ulmus 'Lobel' (Elm DED resistant)
Prunus avium 'Plena' (Wild Cherry)
Sorbus aucuparia (Mountain Ash)

### PROPOSED ORNAMENTAL SHRUBS SPECIES
*(1-2L, Container grown, planted at 3-5/sqm)*
Aucuba japonica 'Rozannie' (Japanese Laurel)
Caryopteris x clandonensis 'Kew Blue' (Bluebeard)
Choisya x dewitteana 'Aztec Pearl' (Mexican Orange)
Elaeagnus x ebbingei 'Gilt Edge' (Oleaster)
Hypericum 'Hidcote' (St. John's Wort)
Fuchsia riccartonii (Red Fuchsia)
Lavandula angustifolia 'Hidcote' (Lavender)
Lavandula stoechas (Lavender)
Salvia lavandulifolia (Spanish Sage)
Sarcococca hookeriana var. humilis (Sweetbox)
Rosa rugosa 'Agnes' (Shrub Rose)
Rosmarinus officinalis 'Prostratus' (Rosemary)

### PROPOSED ORNAMENTAL GRASSES WITH POLLINATOR FRIENDLY FLOWERING PERENNIALS
*(1-2L, Container grown, planted at 5-7/sq.m.)*
Carex comans 'Frosted Curls' (New Zealand Hair Sage)
Carex morrowii 'Evergold' (Evergold Sedge)
Hakonechloa macra (Japanese Forest Grass)
Helenium 'Moerheim Beauty' (Sneezeweed)
Rudbeckia 'Goldsturm' (Black-Eyed Susan)
Sedum spectable 'Autumn Joy'
Salvia nemorosa 'Caradonna' (Salvia)
Stipa tenuifolium 'Pony Tails'(Mexican Feather Grass)
Miscanthus 'Morning Light' (Chinese Silver Grass)
Verbena bonariensis (Brazilian Vervain)

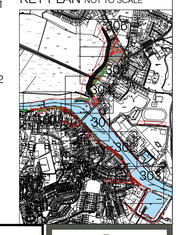
### PROPOSED CLIMBERS
*(2L, Container grown, planted at 2/lin.m.)*
Jasminum officinale (Common Jasmine)
Lonicera periclymenum (Honeysuckle)
Parthenocissus tricuspidata (Boston Ivy)

### PROPOSED NATIVE WOODLAND PLANTING AREA 1
*Transplants (60-90cm), Bareroot*
40% Alnus glutinosa (Black Alder)
40% Salix aurita, Salix cinerea oleifolia, Salix caprea, Salix petrandra (Willow)
20% Betula pubescens (Downy Birch)

### PROPOSED NATIVE WOODLAND PLANTING AREA 2
*Transplants (60-90cm), Bareroot*
20% Alnus glutinosa (Black Alder)
20% Betula pubescens (Downy Birch)
20% Salix spp. (Willow)
15% Prunus spinosa (Blackthorn)
15% Crataegus monogyna (Hawthorn)
10% Viburnum opulus (Guelder Rose)

### IRISH NATIVE SPECIES RICH GRASS AND SEASIDE WILDFLOWER MIXTURE
80% Grass Seed Mixtures
20% Native Origin Irish Wildflower Seed Mixtures

## KEY PLAN NOT TO SCALE



| Rev | Date | Drawn | Checked | Description |
|---|---|---|---|---|
| | | | | Notes |
| 04 | 10.01.2022 | JV | JK | Minor Alterations to Planting Schedule |
| 03 | 05.01.2022 | JV | JK | Issue For Information |
| 02 | 12.04.2021 | JV | JK | Issue For Information |
| 01 | 09.03.2021 | JV | JK | Issue For Information |



| | |
|---|---|
| Project | Arklow Flood Relief Scheme |
| Project No. | 6545 |
| Drg. | Landscape Design and Public Realm |
| Drawing No. | 301 |
| Rev. | 04 |
| Scales | 1:500 / 1:100 (A1) |
| Status | For Planning |
| Date | 10/01/2022 |
| Drn. | JV |
| Chd. | JK |
| Passed | |

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www.bradyshipmanmartin.com

BSM Est. 1968

# LANDSCAPE DESIGN AND PUBLIC REALM
1:500





SECTION 4-4
1:100

## LEGEND

PROPOSED SOFT LANDSCAPING

- Existing Trees Retained including RPA
- Existing Trees Removed
- Existing Tree Groups Removed
- Semi-mature Trees
- Mix of Native Woodland Planting
- Amenity Grass
- Amenity Grass with Bulbs
- Ornamental Grasses
- Irish Native Species Rich Grass and Wildflower Mixture
- Ornamental Shrubs and Perennials
- Climbers
- Roosting Platforms (Floating)

PROPOSED HARD LANDSCAPING

- Existing Paving/Surface Retained
- Tarmac Road Finish
- Buff Tarmac Finish
- Concrete to Footpaths and Stairs
- Tactile Paving
- Stone Finished Paving Flags 400 x 200 mm - mixed colours
- Stone Finished Paving Setts 200 x 100 mm - mixed colours
- Paved Raised Table Junction with 200 x 100mm Setts
- Boardwalk Decking
- Hardcore Gravel
- Rip-Rap
- Proposed Flood Defence Wall
- Proposed Glass Flood Panels
- Proposed LED Public Street Lighting
- Proposed LED Lighting under Handrail
- Indicative Location for Seating
- Existing Mooring Posts to be Relocated
- Relocated Mooring Posts
- +1.75 Proposed Landscape Levels (All Levels OD Malin)
- Planning Boundary

## PLANTING SCHEDULE

PROPOSED RIVER WALK AND PUBLIC PLAZA TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Betula pendula (Birch)
Crataegus laevigata 'Paul's Scarlet' (Hawthorn)
Pinus sylvestris (Scot's Pine)
Prunus avium 'Plena' (Double flowered Wild Cherry)
Sorbus aucuparia (Mountain Ash)

PROPOSED SOUTH QUAY TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Ulmus 'Lobel' (Elm DED resistant)
Prunus avium 'Plena' (Wild Cherry)
Sorbus aucuparia (Mountain Ash)

PROPOSED ORNAMENTAL SHRUBS SPECIES
*(1-2L, Container grown, planted at 3-5/sqm)*
Aucuba japonica 'Rozannie' (Japanese Laurel)
Caryopteris x clandonensis 'Kew Blue' (Bluebeard)
Choisya x dewitteana 'Aztec Pearl' (Mexican Orange)
Elaeagnus x ebbingei 'Gilt Edge' (Oleaster)
Hypericum 'Hidcote' (St. John's Wort)
Fuchsia riccartonii (Red Fuchsia)
Lavandula angustifolia 'Hidcote' (Lavender)
Lavandula stoechas (Lavender)
Salvia lavandulifolia (Spanish Sage)
Sarcococca hookeriana var. humilis (Sweetbox)
Rosa rugosa 'Agnes' (Shrub Rose)
Rosmarinus officinalis 'Prostratus' (Rosemary)

PROPOSED ORNAMENTAL GRASSES WITH
POLLINATOR FRIENDLY FLOWERING PERENNIALS
*(1-2L, Container grown, planted at 5-7/sq.m.)*
Carex comans 'Frosted Curls' (New Zealand Hair Sage)
Carex morrowii 'Evergold' (Evergold Sedge)
Hakonechloa macra (Japanese Forest Grass)
Helenium 'Moerheim Beauty' (Sneezeweed)
Rudbeckia 'Goldsturm' (Black-Eyed Susan)
Sedum spectable 'Autumn Joy'
Salvia nemorosa 'Caradonna' (Salvia)
Stipa tenuifolium 'Pony Tails'(Mexican Feather Grass)
Miscanthus 'Morning Light' (Chinese Silver Grass)
Verbena bonariensis (Brazilian Vervain)

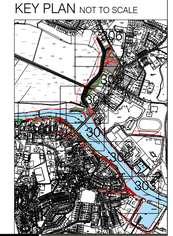
PROPOSED CLIMBERS
*(2L, Container grown, planted at 2/lin.m.)*
Jasminum officinale (Common Jasmine)
Lonicera periclymenum (Honeysuckle)
Parthenocissus tricuspidata (Boston Ivy)

PROPOSED NATIVE WOODLAND PLANTING AREA 1
*Transplants (60-90cm), Bareroot*
40% Alnus glutinosa (Black Alder)
40% Salix aurita, Salix cinerea oleifolia,
Salix caprea, Salix petrandra (Willow)
20% Betula pubescens (Downy Birch)

PROPOSED NATIVE WOODLAND PLANTING AREA 2
*Transplants (60-90cm), Bareroot*
20% Alnus glutinosa (Black Alder)
20% Betula pubescens (Downy Birch)
20% Salix spp. (Willow)
15% Prunus spinosa (Blackthorn)
15% Crataegus monogyna (Hawthorn)
10% Viburnum opulus (Guelder Rose)

IRISH NATIVE SPECIES RICH GRASS AND
SEASIDE WILDFLOWER MIXTURE
80% Grass Seed Mixtures
20% Native Origin Irish Wildflower Seed Mixtures

KEY PLAN NOT TO SCALE



| Rev | Date | Drawn | Checked | Description | Notes |
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| | | | | | |
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| | | | | | |
| 04 | 10.01.2022 | JV | JK | Minor Alterations to Planting Schedule | |
| 03 | 05.01.2022 | JV | JK | Issue For Information | |
| 02 | 12.04.2021 | JV | JK | Issue For Information | |
| 01 | 09.03.2021 | JV | JK | Issue For Information | |





Project: Arklow Flood Relief Scheme
Project No.: 6545
Drg.: Landscape Design and Public Realm
Drawing No.: 302
Rev.: 04
Scales: 1:500 / 1:100 (A1)
Status: For Planning
Date: 10/01/2022
Dm.: JV
Chd: JK
Passed

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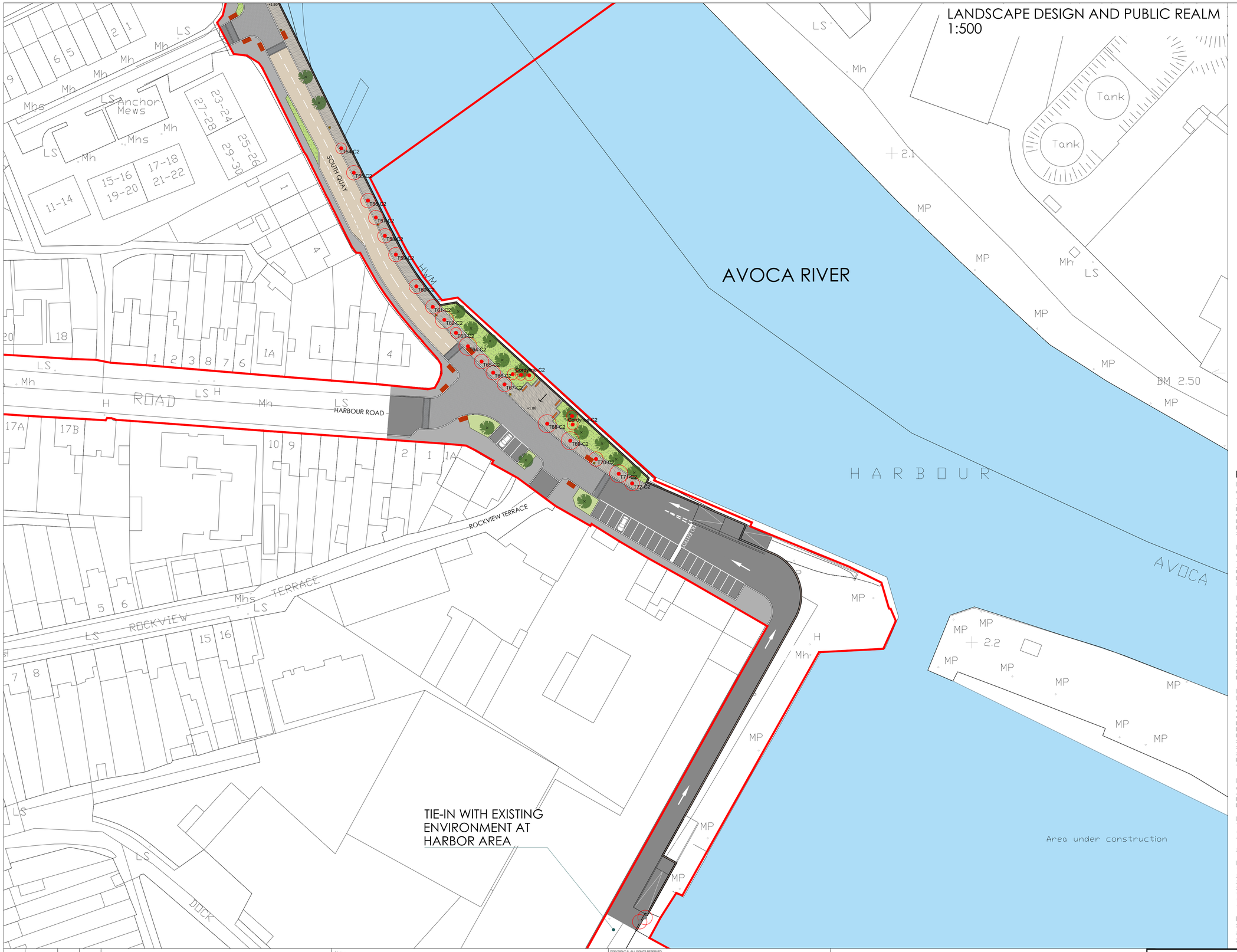
# LANDSCAPE DESIGN AND PUBLIC REALM
1:500




## LEGEND

PROPOSED SOFT LANDSCAPING

- Existing Trees Retained including RPA
- Existing Trees Removed
- Existing Tree Groups Removed
- Semi-mature Trees
- Mix of Native Woodland Planting
- Amenity Grass
- Amenity Grass with Bulbs
- Ornamental Grasses
- Irish Native Species Rich Grass and Wildflower Mixture
- Ornamental Shrubs and Perennials
- Climbers
- Roosting Platforms (Floating)

PROPOSED HARD LANDSCAPING

- Existing Paving/Surface Retained
- Tarmac Road Finish
- Buff Tarmac Finish
- Concrete to Footpaths and Stairs
- Tactile Paving
- Stone Finished Paving Flags 400 x 200 mm - mixed colours
- Stone Finished Paving Setts 200 x 100 mm - mixed colours
- Paved Raised Table Junction with 200 x 100mm Setts
- Boardwalk Decking
- Hardcore Gravel
- Rip-Rap
- Proposed Flood Defence Wall
- Proposed Glass Flood Panels
- Proposed LED Public Street Lighting
- Proposed LED Lighting under Handrail
- Indicative Location for Seating
- Existing Mooring Posts to be Relocated
- Relocated Mooring Posts
- +1.75 Proposed Landscape Levels (All Levels OD Malin)
- Planning Boundary

## PLANTING SCHEDULE

PROPOSED RIVER WALK AND PUBLIC PLAZA TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Betula pendula (Birch)
Crataegus laevigata 'Paul's Scarlet' (Hawthorn)
Pinus sylvestris (Scot's Pine)
Prunus avium 'Plena' (Double flowered Wild Cherry)
Sorbus aucuparia (Mountain Ash)

PROPOSED SOUTH QUAY TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Ulmus 'Lobel' (Elm DED resistant)
Prunus avium 'Plena' (Wild Cherry)
Sorbus aucuparia (Mountain Ash)

PROPOSED ORNAMENTAL SHRUBS SPECIES
*(1-2L, Container grown, planted at 3-5/sqm)*
Aucuba japonica 'Rozannie' (Japanese Laurel)
Caryopteris x clandonensis 'Kew Blue' (Bluebeard)
Choisya x dewitteana 'Aztec Pearl' (Mexican Orange)
Elaeagnus x ebbingei 'Gilt Edge' (Oleaster)
Hypericum 'Hidcote' (St. John's Wort)
Fuchsia riccartonii (Red Fuchsia)
Lavandula angustifolia 'Hidcote' (Lavender)
Lavandula stoechas (Lavender)
Salvia lavandulifolia (Spanish Sage)
Sarcococca hookeriana var. humilis (Sweetbox)
Rosa rugosa 'Agnes' (Shrub Rose)
Rosmarinus officinalis 'Prostratus' (Rosemary)

PROPOSED ORNAMENTAL GRASSES WITH POLLINATOR FRIENDLY FLOWERING PERENNIALS
*(1-2L, Container grown, planted at 5-7/sq.m.)*
Carex comans 'Frosted Curls' (New Zealand Hair Sage)
Carex morrowii 'Evergold' (Evergold Sedge)
Hakonechloa macra (Japanese Forest Grass)
Helenium 'Moerheim Beauty' (Sneezeweed)
Rudbeckia 'Goldsturm' (Black-Eyed Susan)
Sedum spectable 'Autumn Joy'
Salvia nemorosa 'Caradonna' (Salvia)
Stipa tenuifolium 'Pony Tails'(Mexican Feather Grass)
Miscanthus 'Morning Light' (Chinese Silver Grass)
Verbena bonariensis (Brazilian Vervain)

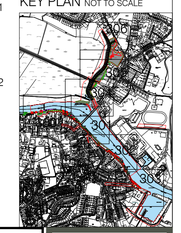
PROPOSED CLIMBERS
*(2L, Container grown, planted at 2/lin.m.)*
Jasminum officinale (Common Jasmine)
Lonicera periclymenum (Honeysuckle)
Parthenocissus tricuspidata (Boston Ivy)

PROPOSED NATIVE WOODLAND PLANTING AREA 1
*Transplants (60-90cm), Bareroot*
40% Alnus glutinosa (Black Alder)
40% Salix aurita, Salix cinerea oleifolia, Salix caprea, Salix petrandra (Willow)
20% Betula pubescens (Downy Birch)

PROPOSED NATIVE WOODLAND PLANTING AREA 2
*Transplants (60-90cm), Bareroot*
20% Alnus glutinosa (Black Alder)
20% Betula pubescens (Downy Birch)
20% Salix spp. (Willow)
15% Prunus spinosa (Blackthorn)
15% Crataegus monogyna (Hawthorn)
10% Viburnum opulus (Guelder Rose)

IRISH NATIVE SPECIES RICH GRASS AND SEASIDE WILDFLOWER MIXTURE
80% Grass Seed Mixtures
20% Native Origin Irish Wildflower Seed Mixtures

KEY PLAN NOT TO SCALE



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| 04 | 10.01.2022 | JV | JK | Minor Alterations to Planting Schedule | |
| 03 | 05.01.2022 | JV | JK | Issue For Information | |
| 02 | 12.04.2021 | JV | JK | Issue For Information | |
| 01 | 09.03.2021 | JV | JK | Issue For Information | |





Project: Arklow Flood Relief Scheme
Project No.: 6545
Drg.: Landscape Design and Public Realm
Drawing No.: 303
Rev.: 04
Scales: 1:500 (A1)
Status: For Planning
Date: 10/01/2022

Mountpleasant Business Centre, Ranelagh, Dublin D06 X7P8
Tel: +353(0)1 2081900
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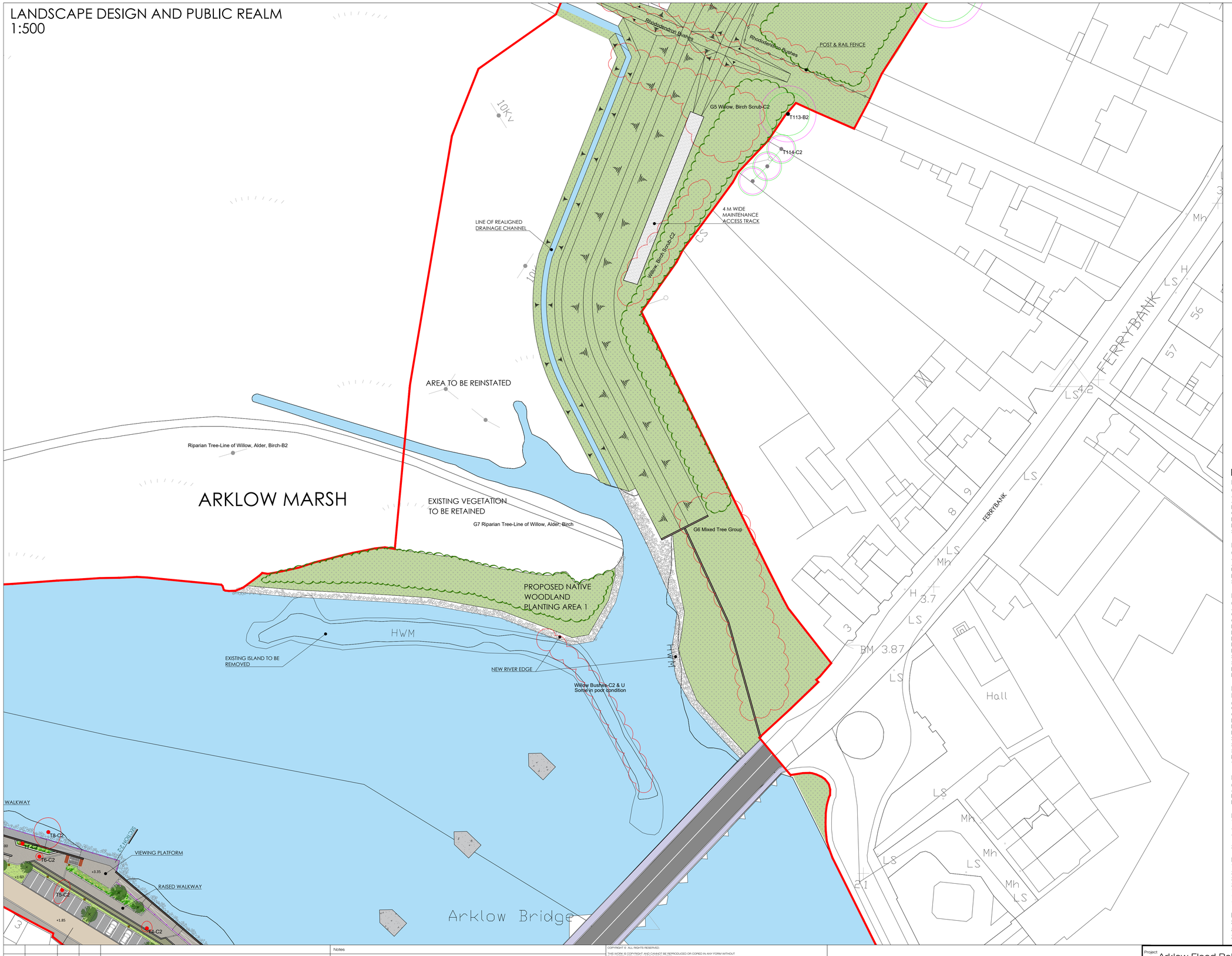
Drn.: JV | Chd.: JK | Passed:

BSM Est. 1968

# LANDSCAPE DESIGN AND PUBLIC REALM
1:500




## LEGEND

### PROPOSED SOFT LANDSCAPING

- Existing Trees Retained including RPA
- Existing Trees Removed
- Existing Tree Groups Removed
- Semi-mature Trees
- Mix of Native Woodland Planting
- Amenity Grass
- Amenity Grass with Bulbs
- Ornamental Grasses
- Irish Native Species Rich Grass and Wildflower Mixture
- Ornamental Shrubs and Perennials
- Climbers
- Roosting Platforms (Floating)

### PROPOSED HARD LANDSCAPING

- Existing Paving/Surface Retained
- Tarmac Road Finish
- Buff Tarmac Finish
- Concrete to Footpaths and Stairs
- Tactile Paving
- Stone Finished Paving Flags 400 x 200 mm - mixed colours
- Stone Finished Paving Setts 200 x 100 mm - mixed colours
- Paved Raised Table Junction with 200 x 100mm Setts
- Boardwalk Decking
- Hardcore Gravel
- Rip-Rap
- Proposed Flood Defence Wall
- Proposed Glass Flood Panels
- Proposed LED Public Street Lighting
- Proposed LED Lighting under Handrail
- Indicative Location for Seating
- Existing Mooring Posts to be Relocated
- Relocated Mooring Posts
- +1.75 Proposed Landscape Levels (All Levels OD Malin)
- Planning Boundary

## PLANTING SCHEDULE

### PROPOSED RIVER WALK AND PUBLIC PLAZA TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Betula pendula (Birch)
Crataegus laevigata 'Paul's Scarlet' (Hawthorn)
Pinus sylvestris (Scot's Pine)
Prunus avium 'Plena' (Double flowered Wild Cherry)
Sorbus aucuparia (Mountain Ash)

### PROPOSED SOUTH QUAY TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Ulmus 'Lobel' (Elm DED resistant)
Prunus avium 'Plena' (Wild Cherry)
Sorbus aucuparia (Mountain Ash)

### PROPOSED ORNAMENTAL SHRUBS SPECIES
*(1-2L, Container grown, planted at 3-5/sqm)*
Aucuba japonica 'Rozannie' (Japanese Laurel)
Caryopteris x clandonensis 'Kew Blue' (Bluebeard)
Choisya x dewitteana 'Aztec Pearl' (Mexican Orange)
Elaeagnus x ebbingei 'Gilt Edge' (Oleaster)
Hypericum 'Hidcote' (St. John's Wort)
Fuchsia riccartonii (Red Fuchsia)
Lavandula angustifolia 'Hidcote' (Lavender)
Lavandula stoechas (Lavender)
Salvia lavandulifolia (Spanish Sage)
Sarcococca hookeriana var. humilis (Sweetbox)
Rosa rugosa 'Agnes' (Shrub Rose)
Rosmarinus officinalis 'Prostratus' (Rosemary)

### PROPOSED ORNAMENTAL GRASSES WITH POLLINATOR FRIENDLY FLOWERING PERENNIALS
*(1-2L, Container grown, planted at 5-7/sq.m.)*
Carex comans 'Frosted Curls' (New Zealand Hair Sage)
Carex morrowii 'Evergold' (Evergold Sedge)
Hakonechloa macra (Japanese Forest Grass)
Helenium 'Moerheim Beauty' (Sneezeweed)
Rudbeckia 'Goldsturm' (Black-Eyed Susan)
Sedum spectable 'Autumn Joy'
Salvia nemorosa 'Caradonna' (Salvia)
Stipa tenuifolium 'Pony Tails'(Mexican Feather Grass)
Miscanthus 'Morning Light' (Chinese Silver Grass)
Verbena bonariensis (Brazilian Vervain)

### PROPOSED CLIMBERS
*(2L, Container grown, planted at 2/lin.m.)*
Jasminum officinale (Common Jasmine)
Lonicera periclymenum (Honeysuckle)
Parthenocissus tricuspidata (Boston Ivy)

### PROPOSED NATIVE WOODLAND PLANTING AREA 1
*Transplants (60-90cm), Bareroot*
40% Alnus glutinosa (Black Alder)
40% Salix aurita, Salix cinerea olefolia, Salix caprea, Salix petrandra (Willow)
20% Betula pubescens (Downy Birch)

### PROPOSED NATIVE WOODLAND PLANTING AREA 2
*Transplants (60-90cm), Bareroot*
20% Alnus glutinosa (Black Alder)
20% Betula pubescens (Downy Birch)
20% Salix spp. (Willow)
15% Prunus spinosa (Blackthorn)
15% Crataegus monogyna (Hawthorn)
10% Viburnum opulus (Guelder Rose)

### IRISH NATIVE SPECIES RICH GRASS AND SEASIDE WILDFLOWER MIXTURE
80% Grass Seed Mixtures
20% Native Origin Irish Wildflower Seed Mixtures

KEY PLAN NOT TO SCALE

| Rev | Date | Drawn | Checked | Description | Notes |
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| | | | | | |
| | | | | | |
| 04 | 10.01.2022 | JV | JK | Minor Alterations to Planting Schedule | |
| 03 | 28.04.2021 | JV | JK | Minor Alterations to The Northern Extent of Proposed Embankment | |
| 02 | 12.04.2021 | JV | JK | Issue For Information | |
| 01 | 09.03.2021 | JV | JK | Issue For Information | |





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|---|---|
| Project | Arklow Flood Relief Scheme |
| Project No. | 6545 |
| Drg. | Landscape Design and Public Realm |
| Drawing No. | 304 |
| Rev. | 04 |
| Scales | 1:500 (A1) |
| Status | For Planning |
| Date | 10/01/2022 |
| Drn. | JV |
| Chd. | JK |
| Passed | |


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# LANDSCAPE DESIGN AND PUBLIC REALM
1:500


## LEGEND

### PROPOSED SOFT LANDSCAPING
- Existing Trees Retained including RPA
- Existing Trees Removed
- Existing Tree Groups Removed
- Semi-mature Trees
- Mix of Native Woodland Planting
- Amenity Grass
- Amenity Grass with Bulbs
- Ornamental Grasses
- Irish Native Species Rich Grass and Wildflower Mixture
- Ornamental Shrubs and Perennials
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- Roosting Platforms (Floating)

### PROPOSED HARD LANDSCAPING
- Existing Paving/Surface Retained
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- Buff Tarmac Finish
- Concrete to Footpaths and Stairs
- Tactile Paving
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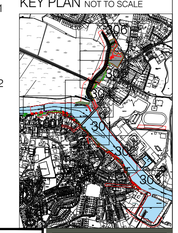

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| Project | Arklow Flood Relief Scheme |
| Project No. | 6545 |
| Drg. | Landscape Design and Public Realm |
| Drawing No. | 305 |
| Rev. | 04 |
| Scales | 1:500 (A1) |
| Status | For Planning |
| Date | 10/01/2022 |
| Drn. | JV |
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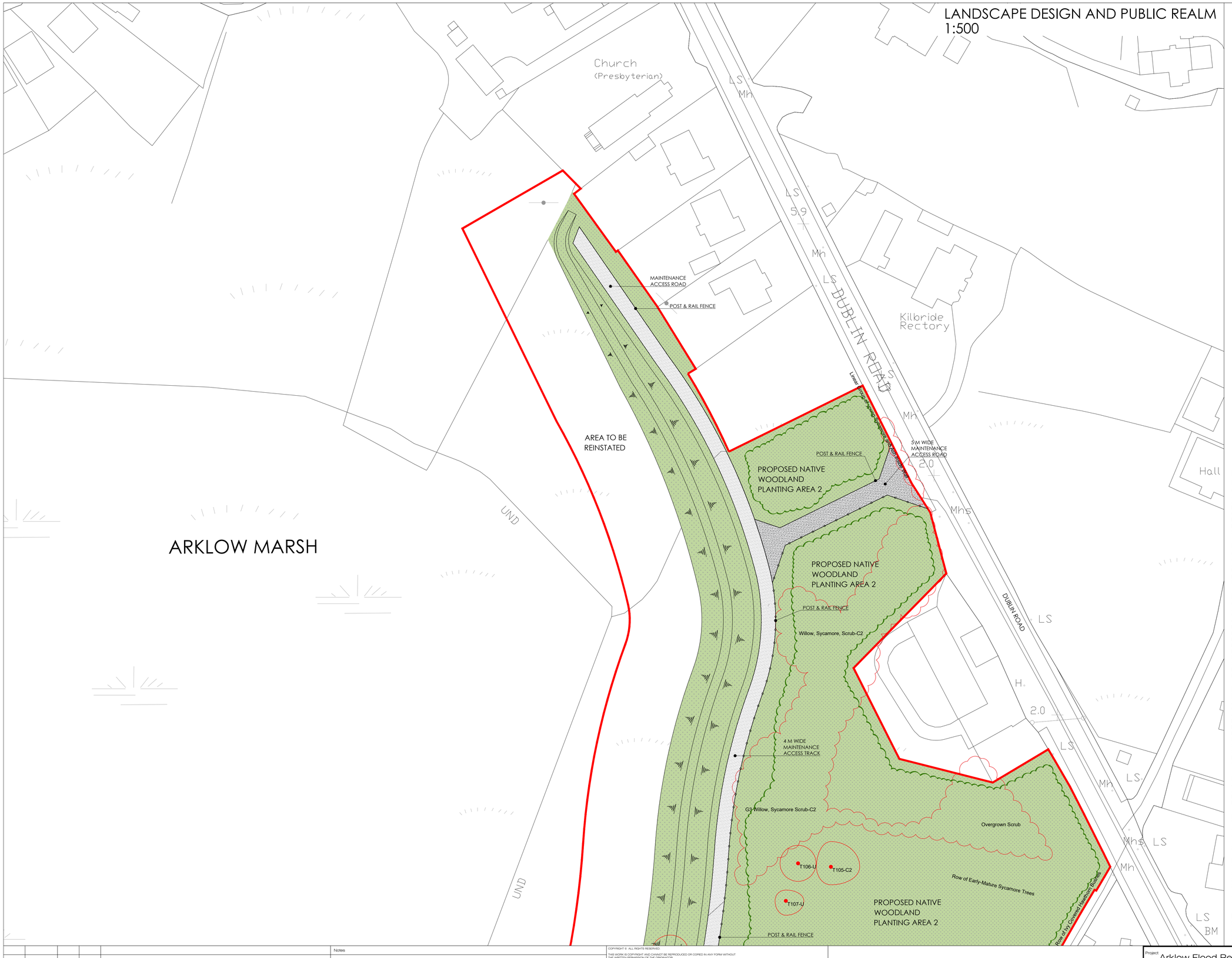


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PROPOSED SOFT LANDSCAPING

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Sorbus aucuparia (Mountain Ash)

PROPOSED SOUTH QUAY TREES SPECIES
*(16-18 cm STD and 20-25 cm STD)*
Acer platanoides 'Columnare' (Norway Maple)
Alnus glutinosa (Alder)
Ulmus 'Lobel' (Elm DED resistant)
Prunus avium 'Plena' (Wild Cherry)
Sorbus aucuparia (Mountain Ash)

PROPOSED ORNAMENTAL SHRUBS SPECIES
*(1-2L, Container grown, planted at 3-5/sqm)*
Aucuba japonica 'Rozannie' (Japanese Laurel)
Caryopteris x clandonensis 'Kew Blue' (Bluebeard)
Choisya x dewitteana 'Aztec Pearl' (Mexican Orange)
Elaeagnus x ebbingei 'Gilt Edge' (Oleaster)
Hypericum 'Hidcote' (St. John's Wort)
Fuchsia riccartonii (Red Fuchsia)
Lavandula angustifolia 'Hidcote' (Lavender)
Lavandula stoechas (Lavender)
Salvia lavandulifolia (Spanish Sage)
Sarcococca hookeriana var. humilis (Sweetbox)
Rosa rugosa 'Agnes' (Shrub Rose)
Rosmarinus officinalis 'Prostratus' (Rosemary)

PROPOSED ORNAMENTAL GRASSES WITH
POLLINATOR FRIENDLY FLOWERING PERENNIALS
*(1-2L, Container grown, planted at 5-7/sq.m.)*
Carex comans 'Frosted Curls' (New Zealand Hair Sage)
Carex morrowii 'Evergold' (Evergold Sedge)
Hakonechloa macra (Japanese Forest Grass)
Helenium 'Moerheim Beauty' (Sneezeweed)
Rudbeckia 'Goldsturm' (Black-Eyed Susan)
Sedum spectable 'Autumn Joy'
Salvia nemorosa 'Caradonna' (Salvia)
Stipa tenuifolium 'Pony Tails'(Mexican Feather Grass)
Miscanthus 'Morning Light' (Chinese Silver Grass)
Verbena bonariensis (Brazilian Vervain)

PROPOSED CLIMBERS
*(2L, Container grown, planted at 2/lin.m.)*
Jasminum officinale (Common Jasmine)
Lonicera periclymenum (Honeysuckle)
Parthenocissus tricuspidata (Boston Ivy)

PROPOSED NATIVE WOODLAND PLANTING AREA 1
*Transplants (60-90cm), Bareroot*
40% Alnus glutinosa (Black Alder)
40% Salix aurita, Salix cinerea oleifolia,
Salix caprea, Salix petrandra (Willow)
20% Betula pubescens (Downy Birch)

PROPOSED NATIVE WOODLAND PLANTING AREA 2
*Transplants (60-90cm), Bareroot*
20% Alnus glutinosa (Black Alder)
20% Betula pubescens (Downy Birch)
20% Salix spp. (Willow)
15% Prunus spinosa (Blackthorn)
15% Crataegus monogyna (Hawthorn)
10% Viburnum opulus (Guelder Rose)

IRISH NATIVE SPECIES RICH GRASS AND
SEASIDE WILDFLOWER MIXTURE
80% Grass Seed Mixtures
20% Native Origin Irish Wildflower Seed Mixtures

KEY PLAN NOT TO SCALE

| Rev | Date | Drawn | Checked | Description | Notes |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| 04 | 10.01.2022 | JV | JK | Minor Alterations to Planting Schedule | |
| 03 | 28.04.2021 | JV | JK | Minor Alterations to The Northern Extent of Proposed Embankment | |
| 02 | 12.04.2021 | JV | JK | Issue For Information | |
| 01 | 09.03.2021 | JV | JK | Issue For Information | |





Project: Arklow Flood Relief Scheme
Project No.: 6545
Drg.: Landscape Design and Public Realm
Drawing No.: 306
Rev.: 04
Scales: 1:500 (A1)
Status: For Planning
Date: 10/01/2022

Mountpleasant Business Centre, Ranelagh, Dublin D06 X7P8
Tel: +353(0)1 2081900
mail@bradyshipmanmartin.com
www.bradyshipmanmartin.com

Dm. JV | Chd. JK | Passed

BSM
Est. 1968

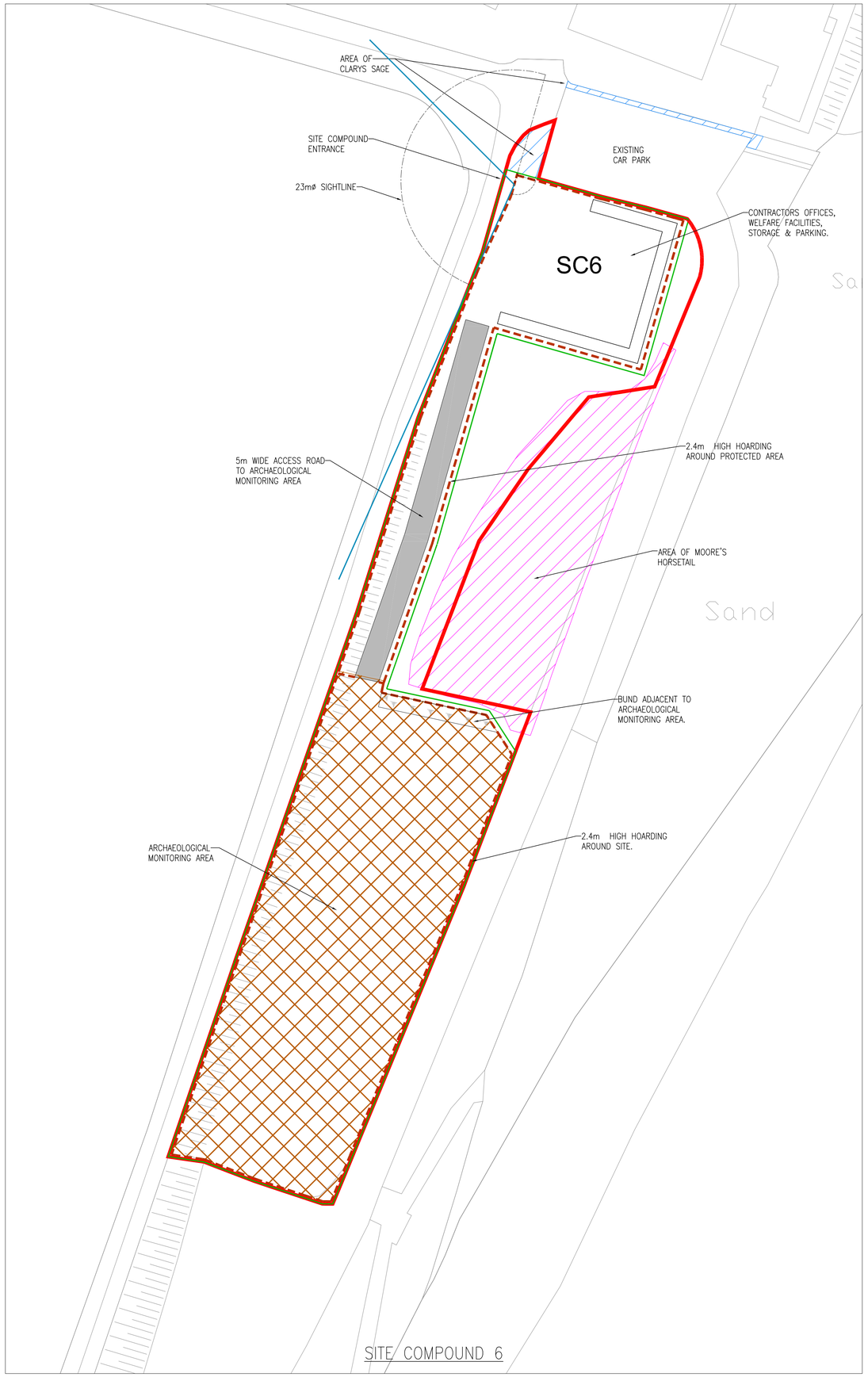
# Appendix B

Site Compound Layouts for SC1 and SC6

# B1 Site Compound Layouts for SC1 and SC6

A1


SITE COMPOUND 1




SITE COMPOUND 6

GENERAL NOTES

N
W E
S

NOTES:

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

LEGEND:

- SITE COMPOUND (SC)/ LAY-DOWN AREA.
- 2.4m HIGH HOARDING
- AREA OF MOORE'S HORSETAIL
- AREA OF CLARY SAGE
- ARCHAEOLOGICAL MONITORING AREA
- PLANNING BOUNDARY
- SIGHTLINES

| Rev | Date | Description | By | Chk | App |
|---|---|---|---|---|---|
| P0 | 11.01.22 | ISSUE FOR PLANNING | LT | KBS | KT |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CLIENT
WICKLOW COUNTY COUNCIL

PROJECT
ARKLOW FLOOD RELIEF SCHEME

DRAWING TITLE
SITE COMPOUNDS LAYOUT

STATUS
FOR PLANNING

| Date: 11.01.22 | Scale: 1:500 | Drawn: LT | Chk: KBS | App: KT |
|---|---|---|---|---|
| Project No: PH00886/01 | Drg. No: 1081 | | | Rev: P0 |

# Appendix C

Survey of Moore's Horsetail (*Equisetum moorei*) and Wild Clary (*Salvia verbenaca*) at Arklow South Beach, Co. Wicklow

# C1 Survey of Moore's Horsetail *(Equisetum moorei)* and Wild Clary *(Salvia verbenaca)* at Arklow South Beach, Co. Wicklow

**SURVEY OF MOORES'S HORSETAIL (*Equisetum moorei)* AND WILD CLARY (*Salvia verbenaca*) AT ARKLOW SOUTH BEACH, CO. WICKLOW**

*FINAL REPORT*

**Prepared for**

**Wicklow County Council**

**10th July 2021**

**(updated 10th December 2021)**

**Faith Wilson and Dr Tom Curtis**

Faith Wilson
ECOLOGICAL CONSULTANT

*Faith Wilson Ecological Consultant B.Sc. (Hons) CEnv MCIEEM*
*Kestrel Ridge, Tigroney West, Avoca, Co. Wicklow*

**SURVEY OF MOORES'S HORSETAIL (*Equisetum moorei)* AND WILD CLARY (*Salvia verbenaca*) AT ARKLOW SOUTH BEACH, CO. WICKLOW**

**SURVEY OF MOORE'S HORSETAIL (*Equisetum moorei)* AND WILD CLARY (*Salvia verbenaca*) AT ARKLOW SOUTH BEACH, CO. WICKLOW**

## 1. INTRODUCTION

Wicklow County Council and the Office of Public Works propose, as part of the flood relief scheme for the Avoca River flowing through Arklow Town, to dredge the river and deposit the dredged material on land at Arklow South Beach. This material is then to be examined by archaeologists to determine if there are any historical artefacts present in the spoil, especially from the Viking period when the town of Arklow was founded.

Currently, Arklow Town Council are maintaining this area through regular mowing except for those areas which are occupied by the Protected Species, Moore's horsetail.

Wicklow County Council commissioned Faith Wilson and Dr Tom Curtis, who are both independent ecological consultants to conduct a survey of a legally protected Red Data Book plant species (Moore's horsetail, *Equisetum moorei*), which is known from only counties Wicklow and Wexford and nowhere else in Ireland.

During the course of the field survey a population of Wild clary, *Salvia verbenaca* was discovered, which had not been previously formally recorded from here and which was last seen in County Wicklow in 1865.

## 2. NATURE CONSERVATION DESIGNATIONS

### 2.1 Nature Conservation Designations

The lands at South Beach, Arklow are not currently designated for nature conservation purposes under either national or international legislation but are a known location for the legally protected plant species legally protected Red Data Book plant species (Moore's horsetail, *Equisetum moorei*).

There are a number of designated Natura 2000 sites in the wider vicinity of Arklow Town. These are:

- Kilpatrick Sandhills SAC (Site Code: 001742), which is located 5.8km south of the site, and
- Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729), which is located 5.5km north of the site.

The location of these Natura 2000 sites are shown on **Figure 1** below and further information on these site designations (the site synopsis) is presented in **Appendix 1**.

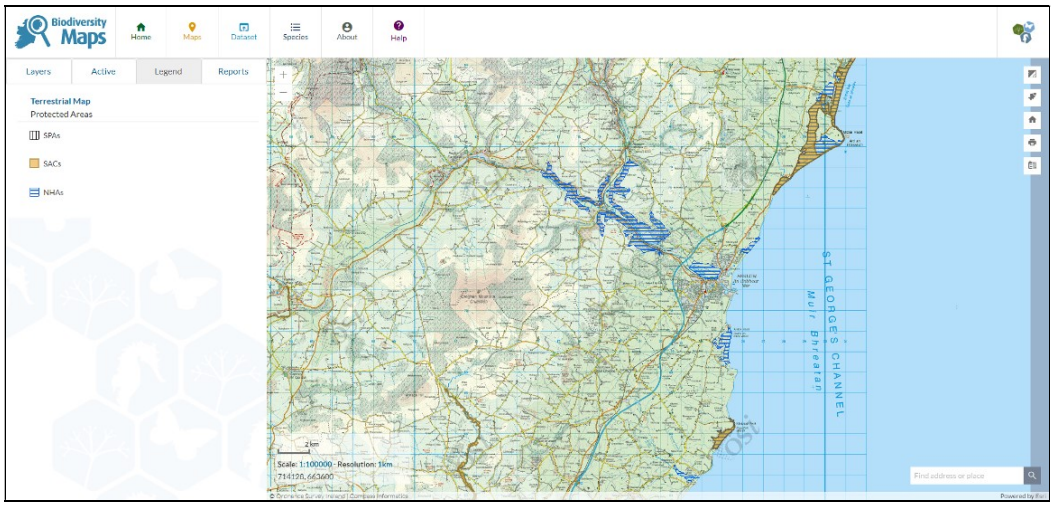



**Figure 1. Areas legally designated for nature conservation within 10km of Arklow Town (Source: NBDC).**

There are also a number of areas designated for nature conservation as proposed Natural Heritage Areas of national importance within the general environs of Arklow Town – the location of these are shown on **Figure 2** and **3** below.

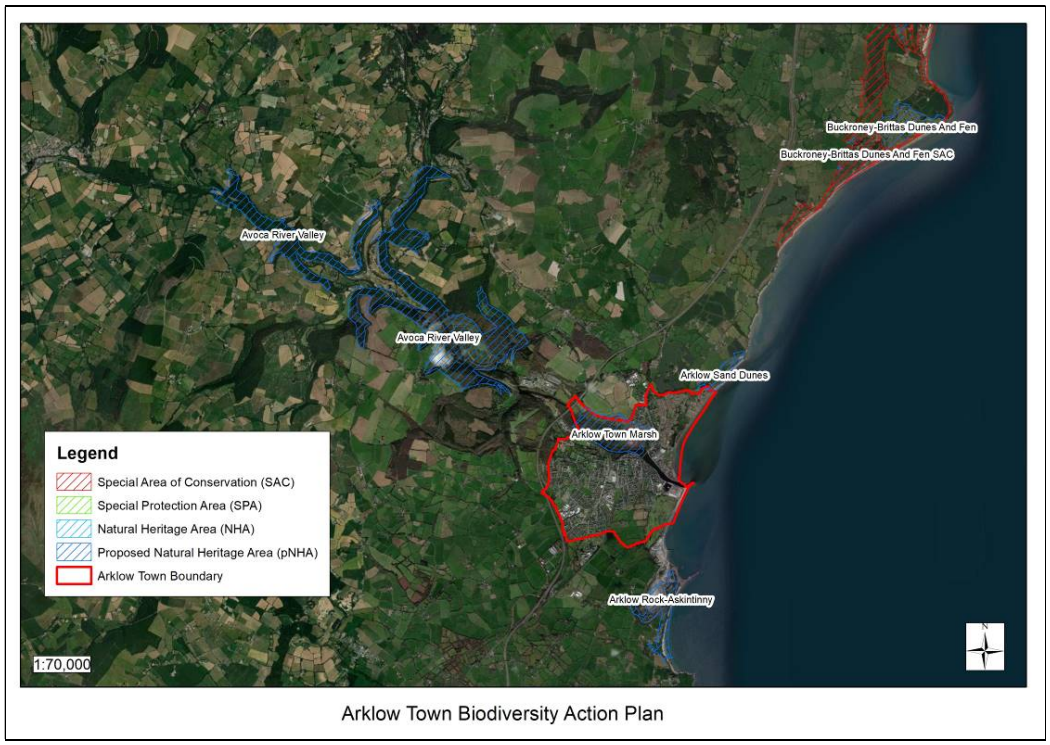



**Figure 2. Areas legally designated for nature conservation within the general environs of Arklow Town (Source: Wilson, 2021).**


**Figure 3. Areas legally designated for nature conservation within/adjacent to the boundaries of Arklow Town (Source: Wilson, 2021).**

Kilpatrick Sandhills SAC (Site code: 001742) is designated for the following habitats:

- Annual vegetation of drift lines [1210]
- Embryonic shifting dunes [2110]
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
- Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
- Atlantic decalcified fixed dunes (Calluno-Ulicetea) [2150]

Buckroney-Brittas Dunes and Fen SAC (Site Code: 000729) is designated for the following habitats:

- Annual vegetation of drift lines [1210]
- Perennial vegetation of stony banks [1220]
- Mediterranean salt meadows (Juncetalia maritimi) [1410]
- Embryonic shifting dunes [2110]
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
- Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
- Atlantic decalcified fixed dunes (Calluno-Ulicetea) [2150]
- Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae) [2170]
- Humid dune slacks [2190]
- Alkaline fens [7230]

## 2.2 Local Nature Biodiversity Designations

This area of Arklow Town has been the subject of various biodiversity surveys in recent years as reported in the Biodiversity Action Plan for Arklow prepared in 2020/2021 as follows:

### 3.4.7 South Arklow Beach

The sense of a natural sand dune system on the south side of the Avoca River is almost completely lost as a result of the large number of interventions and developments here. These include:

- the development of the Arklow Golf Course on the dunes inland,
- the bisection of the dune system by the access road to the Roadstone Quarry at Arklow Rock,
- the development of the road and car parking and the amenitisation of the remaining coastal section of the system through the flattening of the dunes to create amenity grassland and a car park, and
- the development of the rock armoury along the coast here.

This area was examined as part of the Urban habitat Mapping project in 2008 (Site 18) and the results of that survey is presented on **Figure 35** below.

Likewise the surveys and results for this area (Area C) from the Arklow Biodiversity Action Plan prepared in 2017 were also reviewed. The report and recommendations from that survey for this site are presented below in **Figure 36** and **37**.

There is a remnant population of **Moore's horsetail** in a shallow depression in the South Arklow Dunes biodiversity area and along the margins of the road. The species was not reported in the Flora of Wicklow (1950) by Brunker from this site and botanical specimens were lodged in the national herbarium in the late 1950s with records of the population made here in the mid-1980s.

Neither of the previous surveys of the area (or the ecological studies conducted for the recent Arklow Flood Defence Scheme) appear to have been aware of the presence of the **Moore's horsetail (*Equisetum* x *moorei*)** which is a legally protected plant at this site. The population here was documented during the rare plant surveys of County Wicklow in 2007 which were conducted for National Parks and Wildlife Service as outlined above in **Section 3.3.1**.

**Site: 18**

| Habitats Present | Grid Reference |
|---|---|
| CB1: Shingle and gravel banks | 325370/172417 |
| CC1: Sea walls piers and Jetties | |

A shingle beach with sparse vegetative cover. The site is backed by a road so banks are absent and as a result the area is devoid of vegetation

The conservation value of this area relates to its amenity value rather than its biodiversity value and it is considered to be of low to medium conservation value.

There are no obvious threats to this site.

**Figure 35. Site 18 - Arklow South Beach (Source: Arklow Urban Habitat Mapping Project (MERC, 2008)).**

C. South Beach Amenity Area Biodiversity Enhancement

South beach is a small amenity area just south of the harbour. A trail runs along the top of the narrow dune system. Coast Care a voluntary group clean the area and are involved in other environmental projects. The area supports a surprising number of plant species for such a small area. Coast Care have recorded 57 species including pyramidal orchid which are displayed on an information sign. The invasive plant species Montbretia has also been recorded and it would be advisable to remove this plant as it may proliferate across the area. An area of amenity grassland occurs adjacent to the dune system. By altering the mowing regime of the grassland and planting a native hedgerow the area could be enhanced both visually and for wildlife

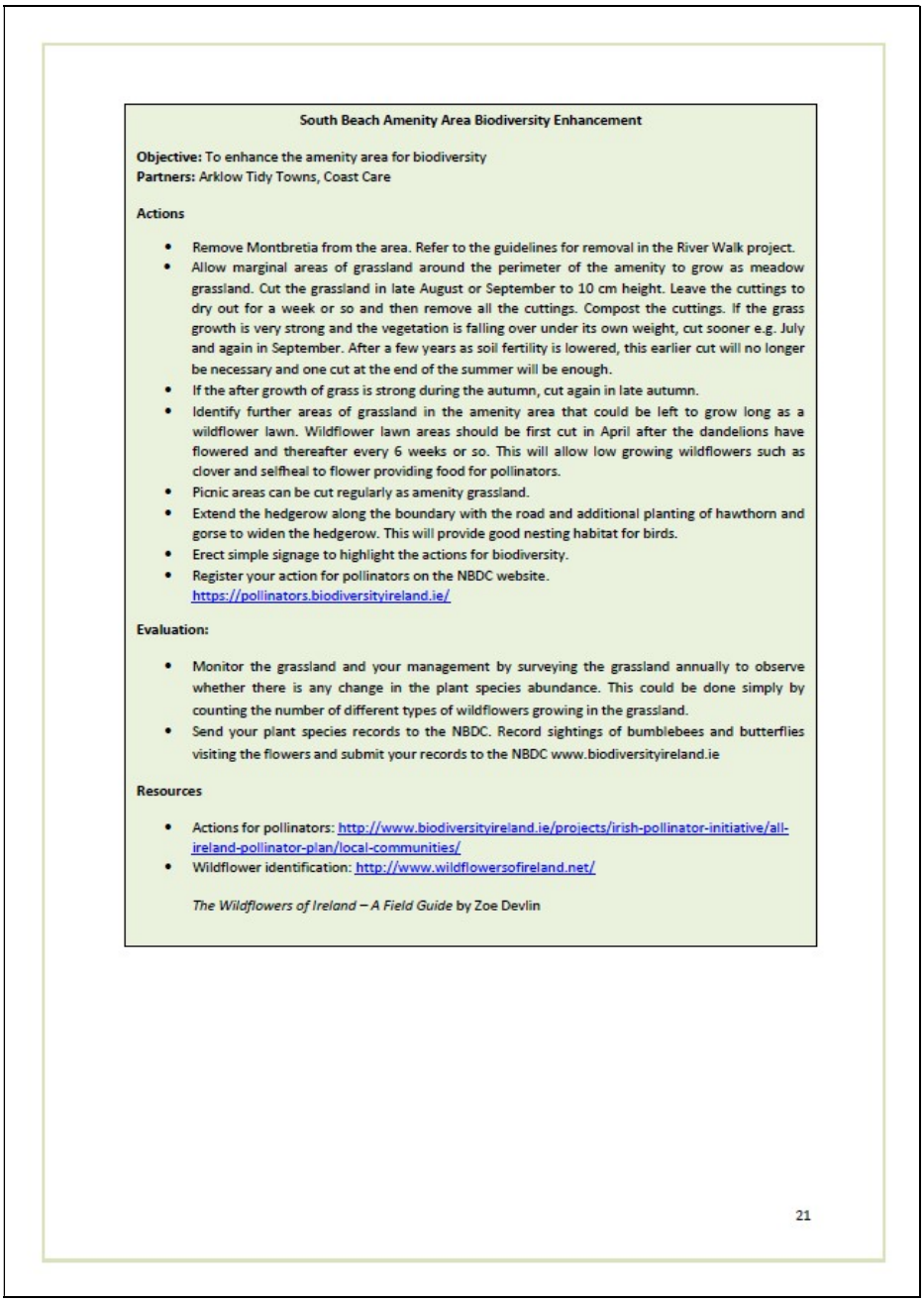

*Location of Project C*

Dunes at South Beach

Amenity area at south beach

20

**Figure 36. South Beach Amenity Area (Meehan & D'Arcy, 2017).**



**South Beach Amenity Area Biodiversity Enhancement**

**Objective:** To enhance the amenity area for biodiversity
**Partners:** Arklow Tidy Towns, Coast Care

**Actions**

- Remove Montbretia from the area. Refer to the guidelines for removal in the River Walk project.
- Allow marginal areas of grassland around the perimeter of the amenity to grow as meadow grassland. Cut the grassland in late August or September to 10 cm height. Leave the cuttings to dry out for a week or so and then remove all the cuttings. Compost the cuttings. If the grass growth is very strong and the vegetation is falling over under its own weight, cut sooner e.g. July and again in September. After a few years as soil fertility is lowered, this earlier cut will no longer be necessary and one cut at the end of the summer will be enough.
- If the after growth of grass is strong during the autumn, cut again in late autumn.
- Identify further areas of grassland in the amenity area that could be left to grow long as a wildflower lawn. Wildflower lawn areas should be first cut in April after the dandelions have flowered and thereafter every 6 weeks or so. This will allow low growing wildflowers such as clover and selfheal to flower providing food for pollinators.
- Picnic areas can be cut regularly as amenity grassland.
- Extend the hedgerow along the boundary with the road and additional planting of hawthorn and gorse to widen the hedgerow. This will provide good nesting habitat for birds.
- Erect simple signage to highlight the actions for biodiversity.
- Register your action for pollinators on the NBDC website. https://pollinators.biodiversityireland.ie/

**Evaluation:**

- Monitor the grassland and your management by surveying the grassland annually to observe whether there is any change in the plant species abundance. This could be done simply by counting the number of different types of wildflowers growing in the grassland.
- Send your plant species records to the NBDC. Record sightings of bumblebees and butterflies visiting the flowers and submit your records to the NBDC www.biodiversityireland.ie

**Resources**

- Actions for pollinators: http://www.biodiversityireland.ie/projects/irish-pollinator-initiative/all-ireland-pollinator-plan/local-communities/
- Wildflower identification: http://www.wildflowersofireland.net/

*The Wildflowers of Ireland – A Field Guide* by Zoe Devlin

21

**Figure 37. South Beach Amenity Area (Meehan & D'Arcy, 2017).**

The discovery of the population of **Wild clary (*Salvia verbenaca*)** in the general environs of the car park in the summer of 2021 was a very exciting find seeing as how the plant was last formally recorded in the county in 1866 from The Murrough as outlined above in **Section 3.3.1**.

The current management by the Coastcare team of sweeping up sand and depositing it by the access track to the beach is favourable to the population and should be continued. Mowing and removing of cuttings in the population near the shipping container should only take place once the see here has set.

There are small remnants of natural sand dunes at the rear of the former Qualercam factory site. These correspond to the habitats **CD2 Marram dunes** and **CD3 Fixed dunes**.

Adjoining the boundary fence of the now derelict factory is the invasive species sea buckthorn (*Hippophae rhamnoides*) which the local authority/landowner are legally obliged to remove and control under the Birds and Natural Habitats Regulations 2011 (see **Section 2.3.6**). Large areas of sea buckthorn are also present in the golf course and along the access road to the quarry.

Typical species recorded here and further south at the back of the rock armour (**CC1 Sea walls, piers and jetties**) include; marram grass (*Ammophila arenaria*), restharrow (*Ononis repens*), red fescue (*Festuca rubra*), wild carrot (*Daucus carota*), sea mayweed (*Tripleurospermum maritimum*), sea pink/thrift (*Armeria maritima*), yellow horned poppy (*Glaucium flavum*), sea plantain (*Plantago maritima*), ribwort plantain (*Plantago lanceolata*), sea holly (*Eryngium maritimum*), and sand sedge (*Carex arenaria*).


Arklow Town Biodiversity Action Plan

**Figure 38. Habitat map of South Beach.**

The area mapped as **CD3 Fixed dune** below on the habitat map to the west of the access road to the Grotto car park is a remnant of dune grassland surrounding a former dune slack. Species recorded here include; sand sedge (*Carex arenaria*), red fescue (*Festuca rubra*), marram grass (*Ammophila arenaria*), ribwort plantain (*Plantago lanceolata*), bird's-foot trefoil (*Lotus corniculatus*), wild carrot (*Daucus carota*), restharrow (*Ononis repens*), tufted vetch (*Vicia cracca*), kidney vetch (*Anthyllis vulneraria*), ladies bedstraw (*Galium verum*), eyebright (*Euphrasia* sp.), sea holly (*Eryngium maritimum*), sea bindweed (*Calystegia soldanella*), sea mayweed (*Tripleurospermum maritimum*), sea pink/thrift (*Armeria maritima*), pyramidal orchid (*Anacamptis pyramidalis*), yellow horned poppy (*Glaucium flavum*), hare's

foot clover (*Trifolium arvense*), sea plantain (*Plantago maritima*), and perennial rye-grass (*Lolium perenne*).

The sterilisation, levelling and amenitisation of the area south of here has completely destroyed any former dune grassland which has been replaced with a commercial mix of perennial rye-grass (*Lolium perenne*), dandelions (*Taraxacum* agg.), red and white clover (*Trifolium pratense* and *T. repens*) resulting in an area of **GA2 amenity grassland (improved)**, and the dumping of various garden/green waste and grass cuttings here has encouraged the development of a weedy flora of nettles (*Urtica dioica*), thistles (*Cirsium arvense*), docks (*Rumex* sp.), garden escapes such as purple toadflax (*Linaria purpurea*) and coltsfoot (*Tussilago farfara*). Only sea mallow (*Malva maritima*) gives a hint of a coastal flora. The practice of cutting the grass here and not removing the cuttings also reduces any chance of a coastal native flora re-emerging as the nutrients provided by the decomposing grass favours the coarser grasses.

There are clumps of Montbretia (*Crocosmia* x *crocosmiiflora*) within the area of fixed dune adjoining the old factory site, which should be removed.

**Plate 39. Looking north towards the south pier.**

**Plate 40. Yellow horned poppy at the rear of the rock armoury.**

**Plate 41. Moore's horsetail at South Beach.**

**Plate 42. Pyramidal orchid.**

**Plate 43. Wild clary.**

**Plate 44. Restharrow and ladies bedstraw.**

**Plate 45. Sea holly.**

Continuing south towards Arklow Rock the vegetation at the rear of the rock armoury consists of a mixture of coastal and scrub species. Species recorded here include bramble (*Rubus fruticosus* agg.), grey willow (*Salix cinerea*), dog rose (*Rosa canina*), and the non native species buddleia (*Buddleia davidii*) and old man's beard (*Clematis vitalba*). The latter non native species should be controlled and removed. There are elements of

the grassland flora found previously in small patches along here with the addition of greater knapweed (*Centaurea nigra*) and hemp agrimony (*Agrimonia eupatorium*).

**Plate 46. Weedy element which has developed on account of dumping of green waste.**

**Plate 47. Old man's beard along the rock armoury.**

## 2.3 Rare, Scarce and Threatened Species

A number of rare, scarce and threatened species (including several plants legally protected under the Flora Protection Order 2015 (asterisked*) and many orchid species) are recorded from the 10km square (O27) in which Arklow South Beach is located. Species in double brackets indicates that they were formerly known from the square but have not been seen recently.

These include the following plants:

- *Moore's horsetail (*Equisteum moorei)*
- Wild Clary (*Salvia verbenaca*) - New record
- Pyramidal orchid (*Anacamptis pyramidalis*)
- Common Spotted-orchid (*Dactylorhiza fuchsii*)
- Heath spotted-orchid (*Dactylorhiza maculata* subsp. *ericetorum*)
- Early Marsh-orchid (*Dactylorhiza incarnata*)
- Early Marsh-orchid (*Dactylorhiza incarnata* subsp. *incarnata*)
- Early Marsh-orchid (*Dactylorhiza incarnata* subsp. *pulchella*)
- Early Marsh-orchid (*Dactylorhiza incarnata* subsp. *coccinea)*
- Northern marsh-orchid (*Dactylorhiza majalis* var. *brevifolia*
- Fragrant Orchid (*Gymnadenia conopsea)*
- Common Twayblade *(Listera ovata)*
- Marsh Helleborine (*Epipactis palustris*)
- Green-flowered helleborine (*Epipactis phyllanthes)*
- Bee Orchid (*Ophrys apifera*)
- Early-purple Orchid (*Orchis mascula*)
- *Wild asparagus (*Asparagus prostratus*)
- Spring Vetch (*Vicia lathyroides*)
- Soft-knotted clover (*Trifolium striatum)*
- Dune Fescue (*Vulpia fasciculata*)
- Bird's foot (*Ornithopus perpusillus)*
- *Greater broomrape (*Orobanche rapum-genistae)*
- Climbing corydalis *(Ceratocapnos claviculata)*
- *Meadow saxifrage (*Saxifraga granulata*)
- *(Lanceolate spleenwort (*Asplenium obovatum)*)
- (Alder buckthorn (*Frangula alnus)*)
- (Dwarf spike-rush (*Eleocharis parvula)*)
- (Common wintergreen (*Pyrola minor)*)

## 3. METHDOLOGY

The habitats and notable species present within the lands under the ownership of Wicklow County Council at South Beach were first surveyed and mapped using the habitat survey and mapping techniques described by Smith *et al.* (2011) and described using the Heritage Council Habitat Classification (Fossitt, 2000) on 9th July 2021. A series of field notes were taken to describe the receiving environment and a record of the plant populations encountered was completed. These were recorded directly in the field on an IPad running IGis on Google Mapping. This data was then exported into ARCGIS 10 to produce the maps for the populations. The field team were accompanied by Finbarr Mooney of Wicklow County Council who plotted the locations of the plants encountered.

**Plate 1. *Equisetum moorei* at South Beach Arklow.**

Subsequent field surveys were completed on the 10th July 2021, 14th August 2021, 4th September 2021, 10th October 2021 and 23rd October 2021.

## 4. RESULTS

### 4.1 Previous Records and Surveys

With respect to Moore's horsetail, this species was first reported from within the boundaries of the site at Arklow in September 2007 during surveys conducted for National Parks and Wildlife Service. The NBDC maps hold very few records for the species as can be seen on **Figure 4** below.

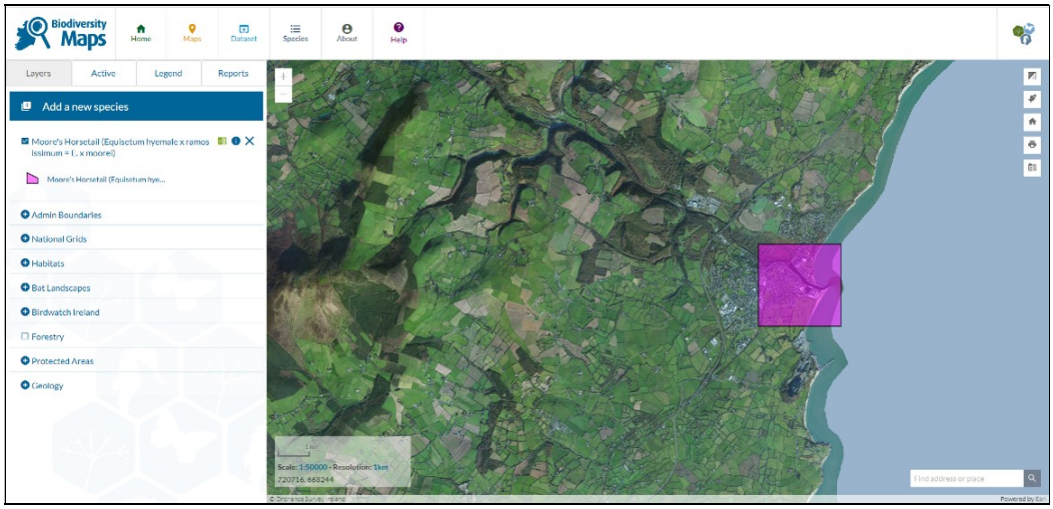



**Figure 4. Moore's horsetail recorded at Arklow (Source: NBDC maps).**

The result of the 2007 survey (Curtis & Wilson, 2008) is presented below.

**Wicklow Rare/Threatened and Scarce Plant Survey 2007**

| | | |
|---|---|---|
| **Species**<br>*Equisetum moorei*<br>**(Moore's horsetail)** | **6" Map**<br>Wicklow Sheet No. 45 | **Discovery Series Map**<br>62 |
| **Locality**<br>South side of Arklow Harbour, Tinahask Lower, Arklow, Co. Wicklow | **Vice-county (No.)**<br>H20 | **SAC/NHA**<br>Undesignated |
| **Grid reference**<br>T 25393 72587 to T 25400 72598 | **2000 Photo**<br>O4428-C | **Recorder(s), Date**<br>Tom Curtis, Faith Wilson 23/07/2007 |
| **Site description** | This population occurs in modified dune habitat which lies between the road linking Arklow Town to Arklow Rock and the road linking the 2 car parks just behind the south beach at Arklow. The sandhills here lie just to the south of the Qualceram plc. Factory and in the depression in the dunes to the south and to west of beach road the species is found. | |
| **Population description** | Approximately 200 - 300 plants 50% of which bore cones. | |

| | |
|---|---|
| **Associated species/ vegetation** | Modified fixed dune with *Ammophila arenaria* dominant with *Daucus carota, Anthyllis vulneraria, Ononis repens, Festuca rubra* and *Crepis capillaris*. |
| **Current management** | Modified in parts through sand removal and mowing. Amenity usage. Grazed by rabbits. |
| **Threats** | None apparent but any further encroachment on the site for amenity development will seriously affect the population. |
| **Ownership** | Arklow Town Council. |
| **Access** | Access is very easy and can be made by roads west and east of site and by pedestrians. |
| **Conservation measures** | Inform local NPWS conservation ranger of the presence of the species on the site. Inform Arklow Town Council of the presence of a protected species on the site and engage with them to produce a management plan to minimise disturbance and threats to the species here. |
| **Other remarks** | The species was not reported from here by Brunker (1950). There is a specimen in BM collected probably from here by D.P. Young on 16/6/1958. It was seen here by Curtis & McGough in 1985. |

**Synonymous habitat/vegetation type**

Fossitt (2000) – **CD3** Fixed dunes.

**GPS readings for the species**

| Letter | Northing | Easting | Comments |
|---|---|---|---|
| T | 25394 | 72587 | |
| T | 25394 | 72603 | |
| T | 25393 | 72587 | |
| T | 25400 | 72598 | |
| | | | |

**References:**

Brunker, J. P. (1950). *Flora of the County Wicklow. Flowering Plants, Higher Cryptogams and Characeae.* Dundalgan Press (W. Tempest Ltd.), Dundalk.


**Plate 1.** ***Equisetum moorei*** **was found in this depression.**

**Plate 2. The depression in which** ***Equisetum moorei*** **was found is clearly visible here.**

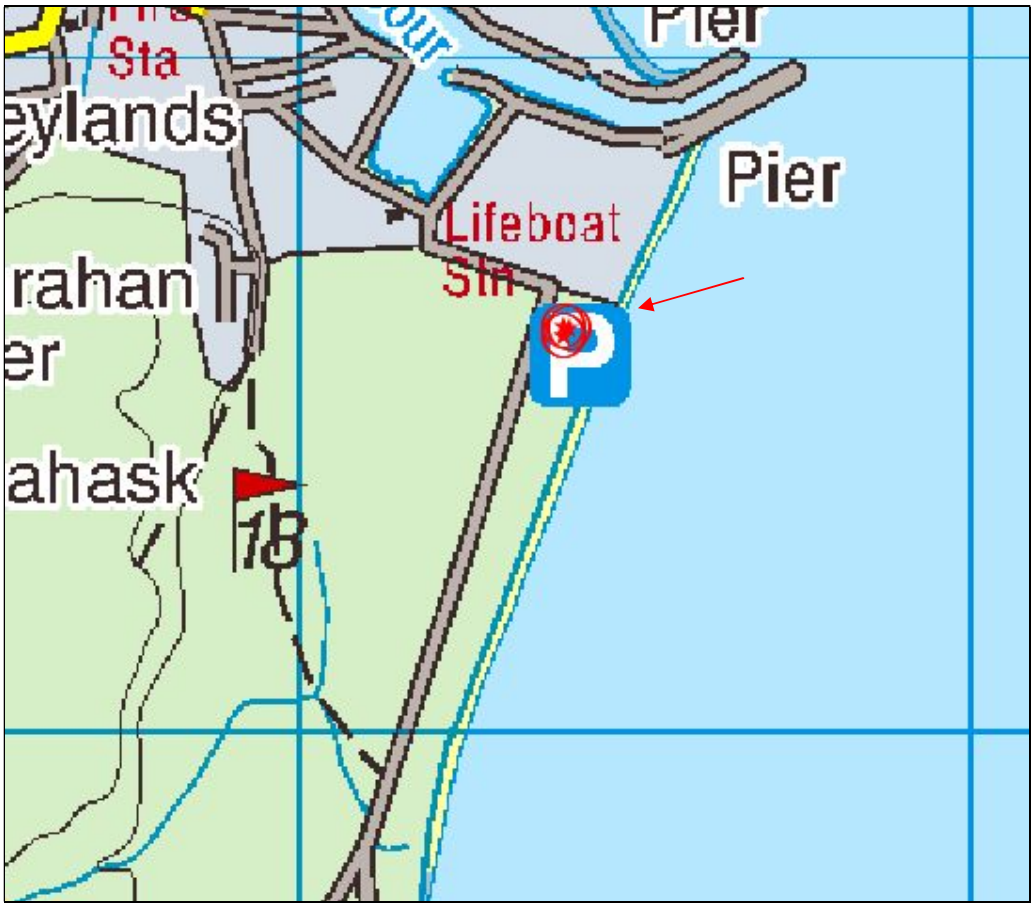



**Figure 1. The distribution of *Equisetum moorei* at Arklow, Co. Wicklow shown on the Discovery Series Map (Sheet No. 62) at a scale of 1:10560. The location of the population is indicated in red.**

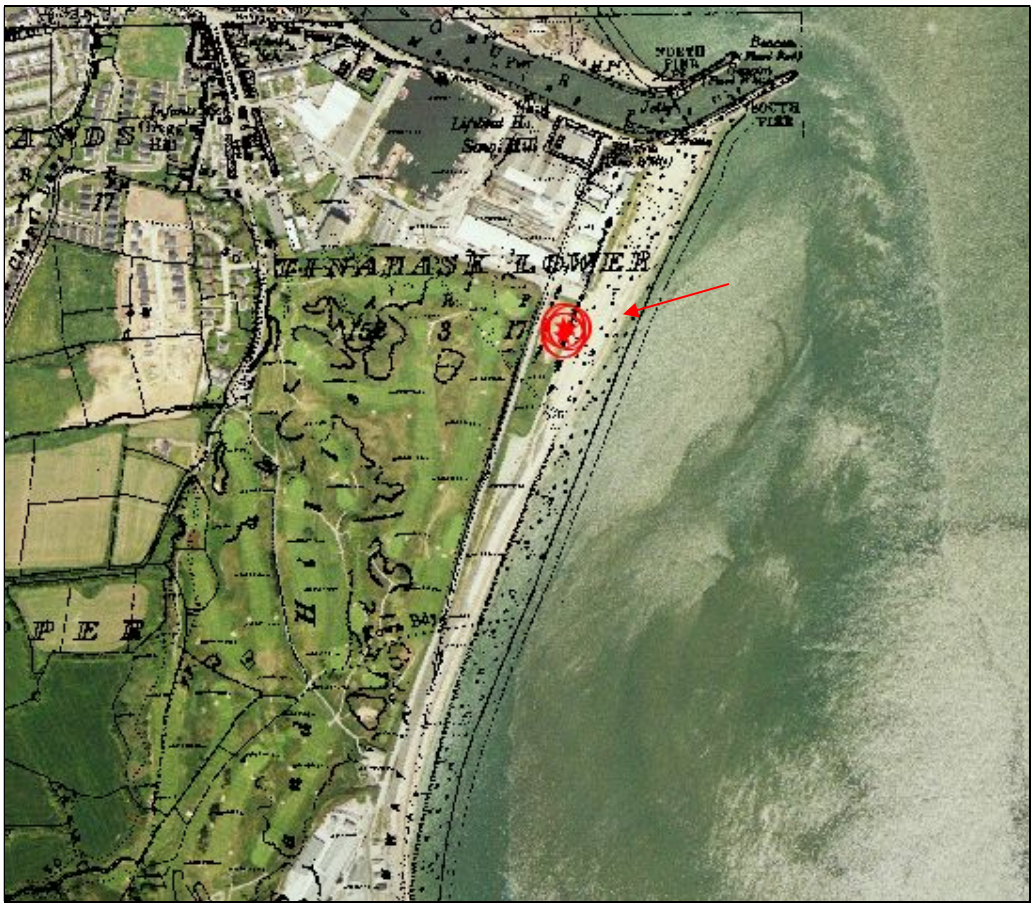



**Figure 2. The location of *Equisetum moorei* at Arklow, Co. Wicklow shown on the OSI 2000 series aerial photographs and 6″ maps (Sheet No. 45) at a scale of 1:10560.**

## 4.2 2021 Survey Results

### 4.2.1 Receiving Environment

The receiving environment of the lands at South Beach are described in the Biodiversity Action Plan for Arklow 2021, in Section 2.2 above, which describes South Arklow Beach.

### 4.2.2 Moore's horsetail *Equisetum moorei*

The surveys in 2021 were first conducted on the 9th July 2021 when the presence of Moore's horsetail on the site was reconfirmed and the boundary to the population was mapped at 10m intervals by Finbarr Mooney surveyor provided by Wicklow County Council as shown on **Figure 5** below.

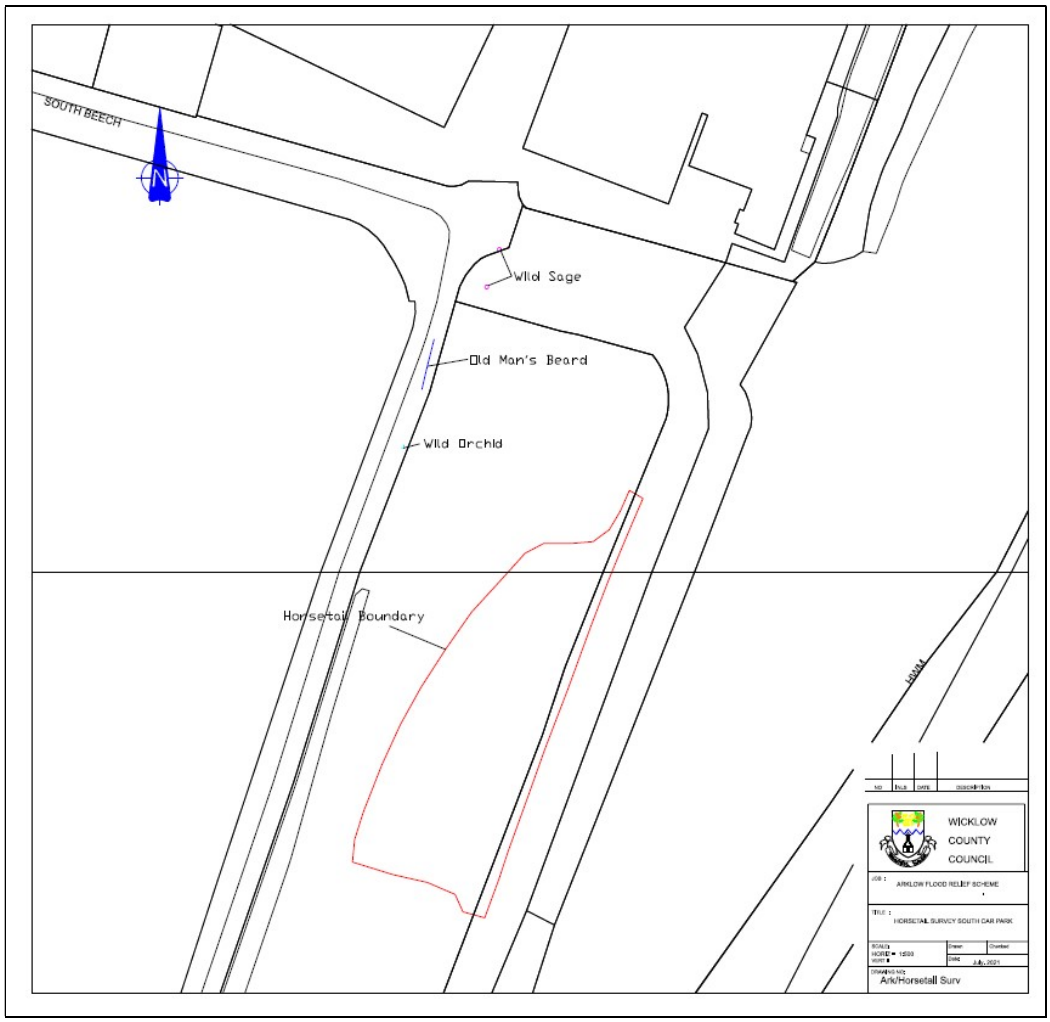



**Figure 5. Area of *Equisetum moorei* (indicated in red) at South Beach, Arklow (July 2021).**

### 4.2.3 Wild clary *Salvia verbenaca*

During the mapping, the presence of two plants of Wild clary, *Salvia verbenaca* were recorded, following an absence of the documented presence of the species in County Wicklow over the last 156 years. The locations and numbers of plants were noted and are shown on **Figure 6** below.

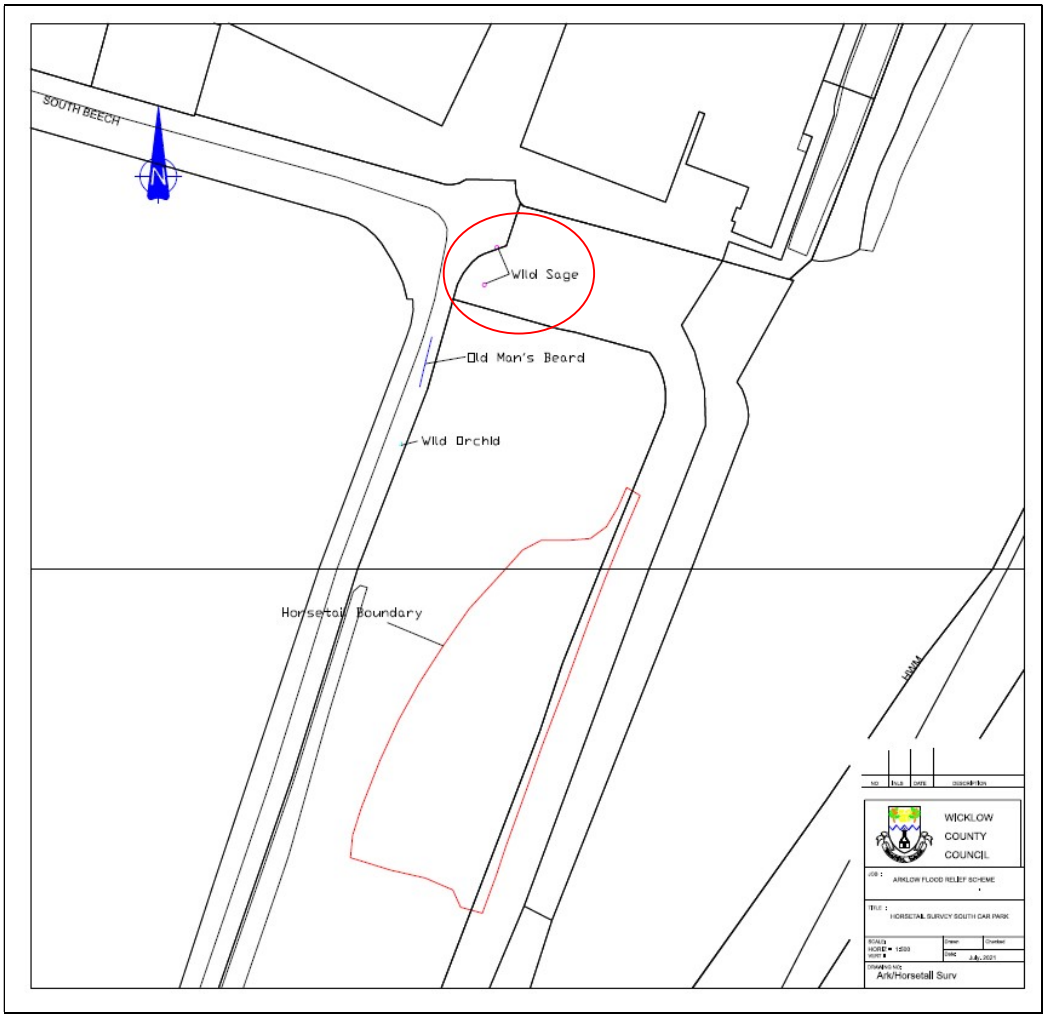



**Figure 6. Populations of *Salvia verbenaca* (shown within the red circle) recorded at South Beach, Arklow (July 2021).**

Additional surveys completed by Faith Wilson over the following weeks and months (August, September and October) recorded several additional populations in the vicinity of the north car park area as shown on **Figure 7** below, bringing the population to approximately thirty plants, with several new plants recorded later in the season.


**Plate 2.** ***Salvia verbenaca*** **near the car park entrance.**

**Plate 3.** ***Salvia verbenaca*** **within the car park.**

**Plate 4.** ***Salvia verbenaca*** **within unmown grassland.**

**Plate 5.** ***Salvia verbenaca*** **near the path to the beach.**

**Plate 6.** ***Salvia verbenaca*** **in unmown grassland near the container.**


**Figure 7. Additional *Salvia verbenaca* populations recorded in July 2021.**

Discussions with the Arklow Coastcare Team and Eileen Gough revealed that the *Salvia verbenaca* had been previously noticed in the area near the dog waste bins but it had not been reported or formally identified and the rarity and significance of the population was not recognised. A pressed specimen of the plant was kept in the Arklow Coastcare Team reference collection as shown on **Plate 7** below.

**Plate 7. Pressed specimen of *Salvia verbenaca* courtesy of Eileen Gough, Arklow Coastcare Team.**

### 4.2.4 Current Site Management

The current management of the site is neither favourable for either the Moore's horsetail nor Wild clary populations. This includes:

- Regular mowing of the grassland area, this activity may be mowing the legally protected plant and preventing it from reproducing
- Mowing activity may also be obscuring the true distribution of both species in this area
- Grass cuttings left in situ following mowing which increases fertility in the soil at the expense of native wildflowers
- Dumping of garden waste which has introduced a weedy element to the area
- Amenisation of the area through the provision of picnic benches, football goal posts etc.

**Plate 8. Inappropriate mowing, which may be illegally cutting *Equisetum moorei* plants with cuttings left in situ.**

**Plate 9. Rank grassland vegetation.**

**Plate 10. Rank vegetation consisting of weedy species following the dumping of garden waste.**

**Plate 11. Docks, thistles and nettles arising from dumped garden waste.**

**Plate 12. The maintenance works by Coastcare of the access track to the beach of sweeping the sand off the track and depositing near the dog bin are having a positive impact with new plants germinating in this area.**

## 5. DISCUSSION

It is clear from the survey that the presence of both Moore's horsetail and Wild clary make the site proposed for the spreading of dredged material highly significant from the perspective of the Irish flora, due to the presence of a Protected Species and another in its only site in County Wicklow which had not been formally recorded in the county for 156 years. The latter is also particularly 'vulnerable to pressures in its coastal locations due to recreation, development and erosion' (Wyse Jackson *et al*.).

Given the importance of the site for these two species, it is difficult to see what protective and/or restorative measures can be put in place to conserve their populations.

### 5.1 Previous Site History

The lands at this site are currently managed by Arklow Town Council and have been subject to disturbance, dumping of vegetation and other materials in the past. As described in the 'Biodiversity Action Plan for Arklow' presented in **Section 2.2** above this area has undergone significant alterations which, obscures its former natural sand dune system habitat.

#### 5.1.1 Mapping Review

A review of the historic mapping held by the Ordnance Survey Ireland (**Figures 8 – 11** below) shows the location and extent of this natural habitat which is now much altered. The Arklow Golf Club was formed in 1927 and a links course developed on the majority of the sand dune system of the South Beach.

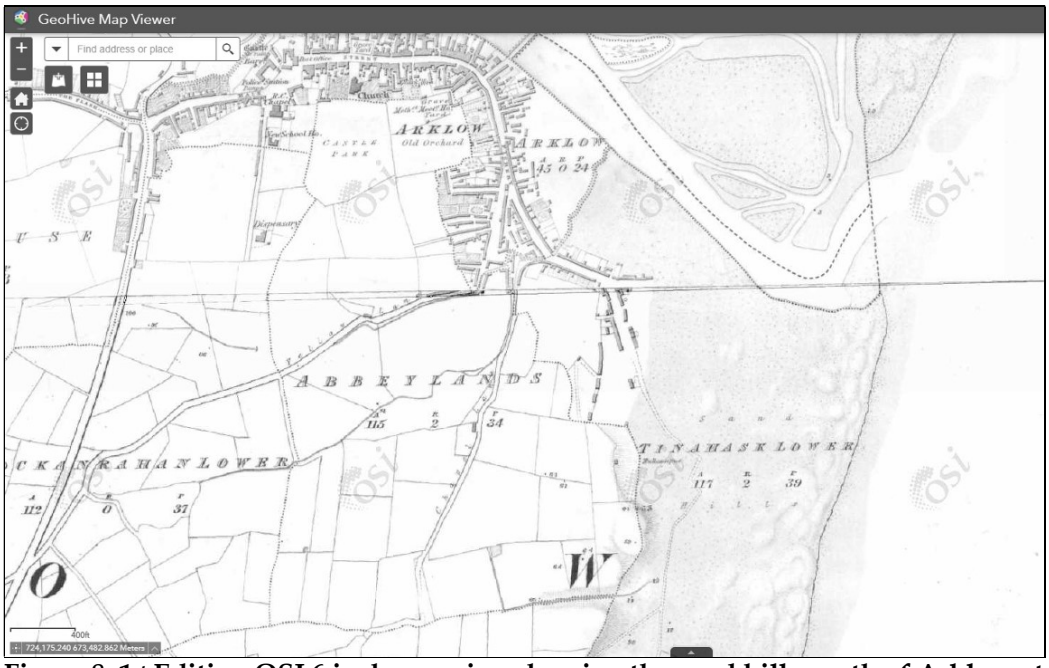



**Figure 8. 1st Edition OSI 6 inch mapping showing the sand hills south of Arklow at Tinnahask Lower.**

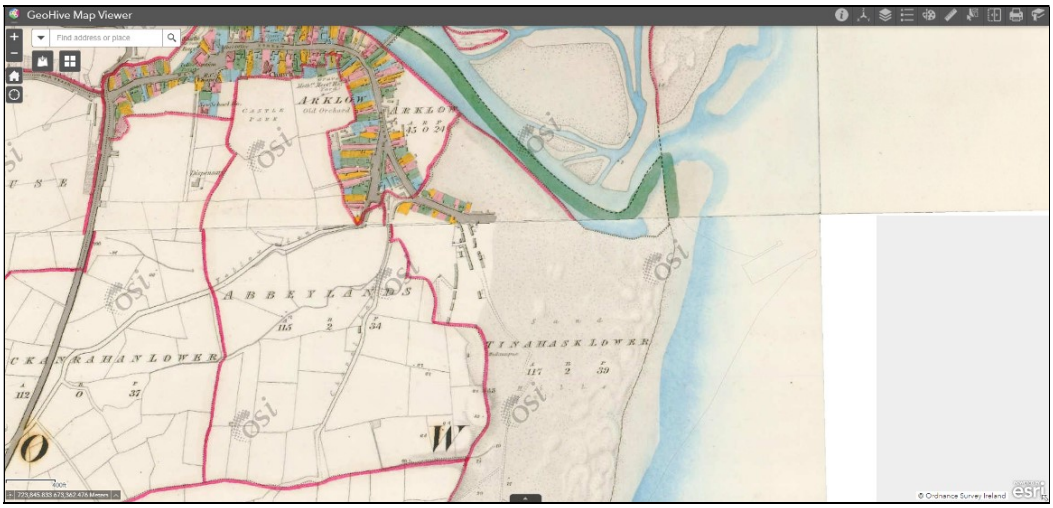



**Figure 9. 1st Edition OSI 6 inch mapping (colour version) showing the sand hills south of Arklow at Tinnahask Lower.**


**Figure 10. 2nd Edition OSI 6 inch mapping showing the sand hills south of Arklow at Tinnahask Lower and the development of the South Pier.**

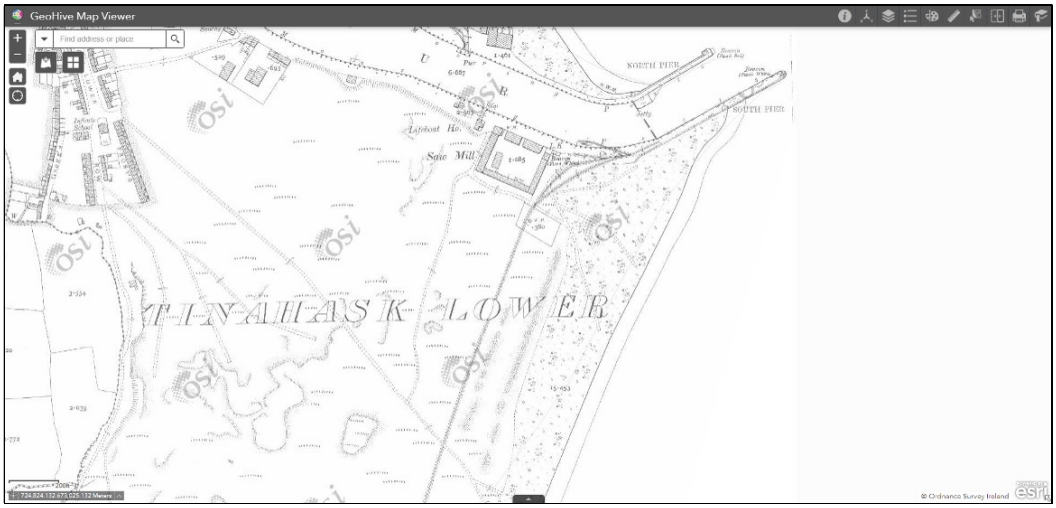



**Figure 11. OSI 25 inch mapping showing the sand hills south of Arklow at Tinnahask Lower and the development of the South Pier and the tramline to serve the Arklow Rock Quarry.**

In more recent years the ground in the vicinity of the population of *Equisetum moorei* (as recorded) in 2007 has been disturbed and infilled as can be seen on the aerial images from 1995, 200 and 2005 presented on **Figure 12**, **13** and **14** below.


**Figure 12. Works in this area in 1995.**


**Figure 13. Works in this area in 2000.**


**Figure 14. Works in this area in 2005.**

### 5.1.2 Archaeological Test Trenching Works

This land was the subject of archaeological test trenching works in November 2020 (RedARc Consulting). The results of the test trenching is presented below:

> 'Site Compound 6 (SC6) is located in the townland of Tinahask Lower (*117 acres, Arklow Barony, Arklow Parish, Rathdrum Poor Law Union*) immediately west of South Beach and flanked to the west by the access road to the Roadstone Quarry.
>
> This site presents as an amenity area to the west of the South Beach and is a level grassed area with picnic tables. Cartographic analysis would suggest that this area was reclaimed during the 19th century when the harbour was extended to accommodate increased maritime traffic and industrial activities. The site is also located close to the former Arklow Pottery factory and testing was requested to assess if this site had been used as a dump for ceramic waste from this factory. A search of the NMI topographical files specific to the townland of Tinahask Lower (30.11.2020) produced no results. Two trenches were excavated at this location to assess the site totalling 131.60m in length.
>
> **SC6 - Trench 1 – SC6-1** (Appendix 1)
> SC6-1, the northernmost trench, was excavated on a bearing of 22° (NNE-SSW). The NNE coordinates (ITM) were 725320.00/672671.00 (3.87m OD). SC6-1 was 68.3m in length with its SSW coordinates at (ITM) 7252281.00/672615.00 (3.93m OD).
>
> At the SSW the topsoil and sod layer (C1) were 0.30m in depth. C1 overlay a grey, sandy clay reclamation deposit, laid down on a stiff clay deposit with frequent stones and domestic and demolition waste. From the results of SC6-2 it is likely that at the SSW terminus of SC6-1 the original beach level is 1.50m below present ground level (2.40m OD).
>
> 6.00m from the SSW terminus the form of the reclamation deposit changed to brown clay with frequent inclusions of grey decayed stone. Ceramic tile fragments and polystyrene packaging was frequent if the upper 0.30m.
>
> 25.00m from the SSW terminus the compaction of the reclaimed material changed to water bearing, loose clay containing demolition rubble. The frequency of ceramic tile fragments and polystyrene packaging is visibly greater.
>
> The water bearing reclamation material continued and at 36.00m from the SSW terminus the depth of Trench 1 reached 0.70m. Throughout its depth modern debris was noted inclusive of plastic membrane, drainage pipes and ceramic tile fragments.
>
> At 50.00m from the SSW terminus the clay material, demolition and household waste, ceramic fragments and packaging gave way to sandy clay devoid of waste of any kind. Depth at this location was 0.30m and continued as such until the NNE terminus was reached.

**SC6 – Trench 2 – SC6-2** (Appendix 1)
SC6-2, the southernmost trench, was excavated on a bearing from SSE to NNW. The NNW coordinates (ITM) were 725271/672575 (4.25m OD). Trench 2 was 63.3m in length with its SSE coordinates at (ITM) 725265/672512 (4.43m OD).

As with SC6-1, the SC6-2 sod and topsoil (C1) was between 0.20m and 0.30m in depth. The C1 layer overlay dense grey/orange mottled clay material with stone inclusions and intermittent pockets of modern domestic and structural waste. The depth of Trench 2 at the SSE terminus was 0.20m. The depth of the trench was graded to a depth of 0.80m without any noticeable change in the material.

Dry stone filled gullies designed to provided drainage were noted at 24.00m, 46.00m and 51.00m from the SSE terminus. These drains are modern features inserted to provide drainage to this amenity area (SC6).

A consistent spread of domestic pottery (Arklow Pottery) fragments is noticeable throughout the C1 deposit. The spread is quite random and at no time was any particular density noted.

At the NNW terminus the excavation was extended to a depth of 1.50m to confirm the original level of the beach sand prior to the reclamation. At this location the original sand level was confirmed at 2.75m OD.

**Summary of Test Excavation at SC6 – Tinahask Lower Townland**
The test trenches at this location confirm that the area was reclaimed using imported material or material dredged from the river during the construction of the harbour in the 19th century. In more recent times it was used as a landfill site for waste material from the Vitra tile factory. This material was in turn spread by Arklow Municipal Council to create the amenity area.

While some fragments of Arklow Pottery were identified in the C1 deposit of Trench 2, these could only be described as random and not indicative of any major deposit of discarded pottery. The reclamation deposits were extremely varied and contained waste of modern date throughout their depth.

SC6 will not suffer any major impacts as it will be clad with stone and used for site accommodation and for drying out dredged material from the river for reuse. SC6 will offer an ideal location for finds retrieval and metal detection of the dredged material during the course of construction. SC6-1 and SC6-2 were backfilled and fully reinstated on the 8th December 2020'.


Fig 1.1: General site location of SC6

Fig 1.2: Trench layout SC6 (right)

Plate 1.1: General view SC6-2 looking NNE

Plate 1.2: SC6-2 looking SE

Plate 1.3: SC6-1 looking NE

## 5.2 Proposed Works within the Arklow Flood Defence Scheme

As set out in Chapter 5 – Construction Strategy of the EIAR for the Arklow Flood Defence Scheme Site Compound 6 is proposed to be located along South Beach Road as follows:

> Site compound six (SC6) is situated in the green area along South Beach Road. It will accommodate site offices, welfare facilities, temporary storage and relevant activities for WP4. It will also be used for site offices, welfare facilities and temporary storage for WP2 and for archaeological examination of inert dredged material for WP2.

A large area of ground is required for the archaeological examination of inert dredged material as described below:

> Archaeological monitoring licensed by the *Department of Housing, Local Government and Heritage* will be undertaken of all ground and riverbed disturbances associated with the proposed scheme.
>
> Archaeological examination of the dredge material by metal detection and visual inspection will also be undertaken. The dredge material will be transported to the construction compounds prior to removal offsite. This will provide a second opportunity to assess the archaeological potential of the sediments and recover material of archaeological interest. This archaeological examination will be of a percentage of the dredge material. This percentage will be agreed with the National Monuments Service and the National Museum of Ireland. A higher percentage of such examination is anticipated for dredge material from archaeologically sensitive locations upstream of Arklow Bridge and adjacent to Arklow Bridge itself.

The Flood Defence Scheme is expected to take 54 months to complete over a five year period.

> Subject to obtaining planning approval and foreshore consent, construction of the proposed scheme is expected to take approximately 54 months to complete; over a 5-year period. Works are expected to commence in 2022 and continue to 2026[1].

The site preparation and enabling works proposed for Site Compound 6 are set out below:

**Site Compound 6 (SC6):** Access will be provided from South Quay. The carpark facilities (north and south) will be maintained for public use for the duration of works between Q3, 2024 until Q4, 2026. A 2.4m high security fence and gates will be erected around the site.

A plant known as *Equisetum Moorei* (Moore's Horsetail) has been reported as being adjacent to the site (Refer to **Chapter 10** *Biodiversity* for further details). A 5m buffer zone will be created between the working area and the habitat through the construction of a low bund (approximately 0.5m high) and 1.5m high fence. The bund will prevent any runoff from the dredged material flowing into the habitat of the *Equisetum Moorei.*

Archaeological examination of inert dredge material will be on the southern half of the site compound. Topsoil will be stripped from the grass area and stockpiled on site for reuse during reinstatement following completion of the works. A suitable geotextile membrane will be placed over the ground and suitable hardcore material will be placed over the geotextile to form a working surface for the archaeological metal detecting of the dredged material. A low bund, comprising precast concrete traffic barriers or similar, will be constructed around the perimeter of the site to retain the dredged material. Suitable dust control and monitoring measures will be installed around examination and monitoring perimeter.

Contractor's compounds comprising site offices, storage units and staff parking will be placed on the northern third of SC6. Water supply, wastewater and electrical services will be installed. The contractor will liaise with main service providers i.e. ESB and Irish Water for connectivity. A 2.4m high security fence and gates will be erected around the compound. The fencing will comprise solid hoarding.

SC6 will be reinstated to its existing condition on completion of the permanent works.

The following enabling works will typically be required at each of the site compounds and the working areas:

i. Obtain appropriate approvals for construction traffic management requirements for diversions and haulage routes (refer to **Section 5.5** for further details);

ii. Establish and implement appropriate surface water management procedures as outlined in **Chapter 14** *Water*;

iii. Establish and implement appropriate procedures for monitoring of instream water levels in accordance with the requirements set out in **Section 14.6** of **Chapter 14**, *Water* of the EIAR;

iv. Construct temporary site access roads to working areas, site compounds and material laydown areas from the existing road network where required and install trafficable surfaces where required (Refer to **Section 5.5** for further details);

v. Install secure hoarding and fencing (2.4m in height as a minimum) that will remain in-situ for the duration of the construction works (Refer to **Section 5.5** for further details);

vi. Install services and site lighting for work packages and site compounds is described in **Section 5.6** below;

vii. Undertake vegetation removal and stripping of topsoil as required in relevant working areas, site compounds and material laydown areas;

viii. Install vehicle set down and material storage areas (typically by laying down hardcore to a depth of approximately 200mm) in relevant working areas;

ix. Install the main construction compounds to accommodate site offices and welfare facilities for construction activities (Refer to **Section 5.5** for further details);

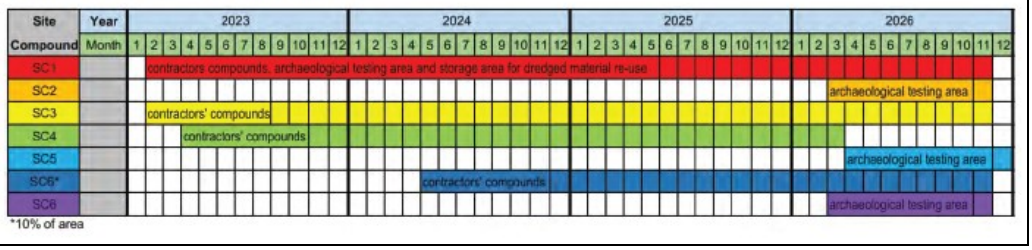
x. Undertake all required utility and services diversions and provide a connection to the local sewerage network, water distribution and electrical network as required;

xi. Installation of flooding mitigation measures is as described in **Section 14.6** of **Chapter 14**, *Water*.

The overall working area that will be made available for the construction of the project is indicated in **Figure 5.2** of **Appendix 5.2** *Chapter 5 Figures*. Individual working areas for each work package are described in **Section 5.5**. The working areas will be secured and not accessible to the public for the duration of the construction contract. The contractor will not be permitted to use any other lands outside of these areas.

The works at SC6 are expected to take place between March to November inclusive in Year 4 as follows:

**Table 5.3**: Duration of site compound use



### 5.3 Moore's horsetail *Equisetum moorei*

This Protected Species is found scattered throughout Europe, including Iceland though absent from Britain and Spain. It is a species of horsetail, which is one of the most ancient types of plants on the planet. The oldest remains of modern horsetails (of the genus *Equisetum*) first appear in the Early Jurassic (182.7 - 201.3 million years ago).

This horsetail is thought to be a putative hybrid between two other species of horsetail (*Equisetum hyemale* x *Equisetum ramosissimum* = *Equisetum x moorei*) but one of the parents is not found in Ireland so it's origins here are unclear. One of its putative parents has been recorded from two localities in Britain where it is as an introduction.

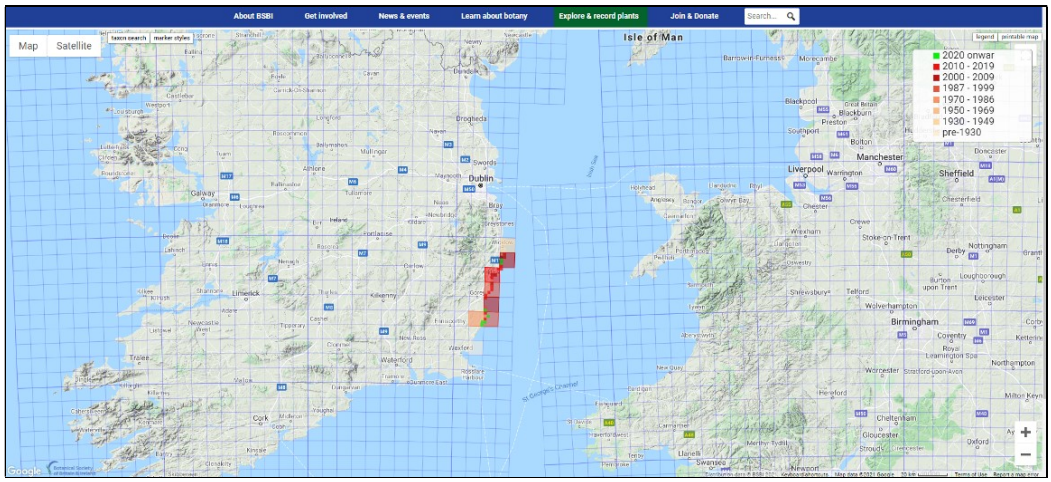



**Figure 15. Distribution of Moore's horsetail (*Equisetum x moorei*) in Ireland (Courtesy BSBI).**

It was first found in Ireland by David Moore in 1867 at Rockfield, north of Brittas Bay. It commonly forms cones but it is not certain if ripe spores are produced.

**Wicklow Context:**
The species is locally abundant from Seapark Bay, Maherabeg to Arklow South Beach. It has declined in its sites south of Arklow Rock, apparently due to the disappearance of its dune habitat through erosion. Where it occurs, it tends to favour the upper parts of sandhills and dunes which border areas of boulder clay. It is frequently found on very bare dune but that is indicative of severe erosion of areas of former mature, fixed dune.

Surveys carried out in 2007 (Curtis & Wilson *op.cit.*) recorded tens of thousands of plants in County Wicklow but it is clear that populations are susceptible to loss and damage from a variety of impacts, including recreational activities, developments, changes in land management and coastal erosion. It has never been refound at some of its recorded sites both in Wicklow and Wexford.

Wyse Jackson *et alia* state that '*Future population reduction suspected; the future prospects for its main habitat (fixed dunes) are assessed as unfavourable (NPWS 2013a; 2013b) and an assessment of NT (Near Threatened) is appropriate*'.

The proposed use of the dunes at Arklow South for the dumping of sediment clearly poses a challenge to the continued presence of the species there which is the southernmost population in the county.

The designation of Near Threatened for the species on the Red List and its habitat as Unfavourable, infer that this population is important for conservation and should be protected.

It is listed on the Flora (Protection) Order (2015) and it and its habitat cannot be disturbed without the permission of the National Parks & Wildlife Service through the issuing of a Licence.

As this is a species protected under S.I. No. 356/2015 - Flora (Protection) Order, 2015, National Parks and Wildlife Service may advise that they require WCC to put some protective and restorative measures in place for the species.

### 5.4 Wild clary *Salvia verbenaca*

This species is known from only 14, 10km squares in Ireland as shown on **Figure 16** below and has declined in some sites notably Cork, Limerick and Kilkenny.

Despite a rating of Least Concern by Wyse Jackson *et* alia, they state that it is a rare species in Ireland found in vulnerable habitats and, as such they recommend regular monitoring of sites.

It prefers open, well-drained, sandy sites and in Ireland its distribution is nearly totally coastal and these are some of the most vulnerable to pressures from recreation, development and erosion.

**Wicklow Context:**
The population at Arklow South discovered in July, 2021, is the first confirmed record for County Wicklow since 1865 after an absence of 156 years (see Brunker 1950: Moore & More 1866).

It was first reported in County Wicklow from the Murrough, north of Wicklow Town, by David Moore around 1865 and not seen again there or elsewhere in the county since that time. It is assumed that the species succumbed there to development pressures and/or erosion.

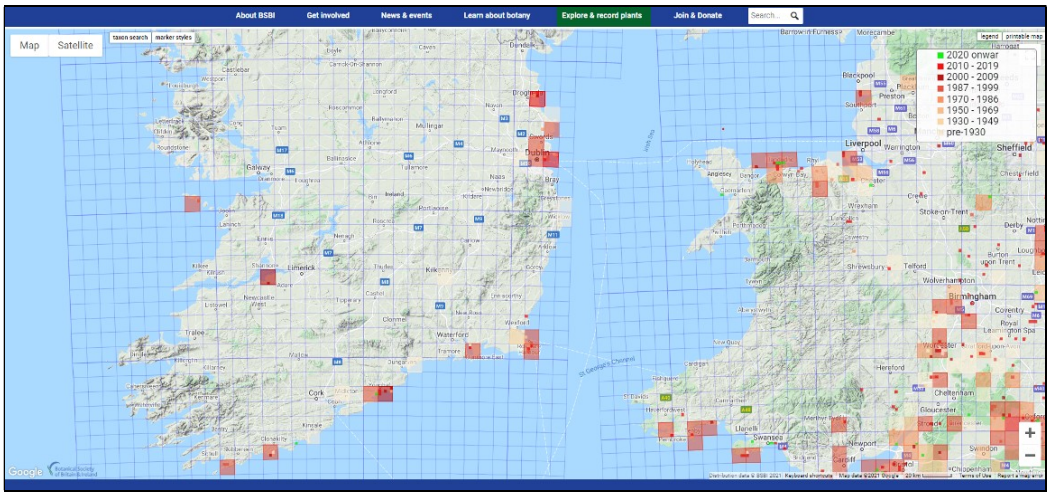



**Figure 16. Distribution of Wild clary (*Salvia verbenaca*) in Ireland (Courtesy BSBI).**

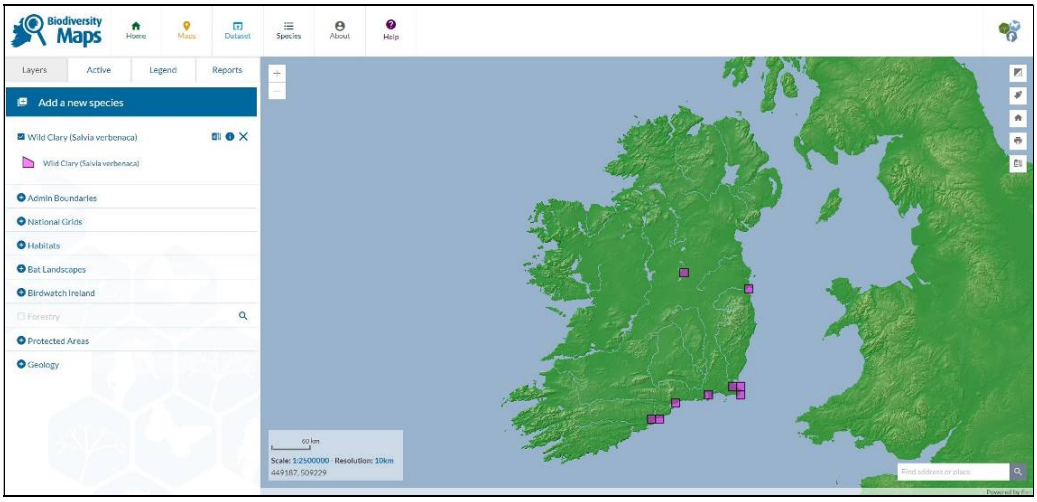



**Figure 17. Distribution of Wild clary (*Salvia verbenaca*) in Ireland (Courtesy NBDC).**

As this is the only population along the east coast between Carne, Co. Wexford and Bull Island, Co. Dublin as well as being the only one in County Wicklow, its presence at Arklow is very important for conservation and consequently requires full protection. It is a vital genetic link between the Dublin and Wexford sites. Most losses in Britain have been due to changes in land use.

Irish plants are said to be referable to subsp. *horminoides*.

As this species is very rare and declining and this is the first confirmed record for County Wicklow in over a century, Wicklow County Council's stated commitment to protect biodiversity should set out to ensure its continued existence at this site.

### 5.5 Legal Constraints

The Planning and Legal constraints for the property have already been detailed in **Section 2.3** above noting that as Moore's horsetail is protected by S.I. No. 356/2015 - Flora (Protection) Order, 2015 and the Wildlife Act, there are potential restrictions arising from its occurrence on the sandhills.

In short, it is an offence to collect or interfere with the habitat of a Protected Species of Flora without having a Licence to do so from NPWS.

### 5.6 Potential Impacts of the Proposed Construction of SC6 and Storage of Dredged Material

There are a number of potential impacts arising from the proposed construction of SC6 and the storage of dredged material in this area for archaeological review. These include and are not limited to:

- Direct impacts on the legally protected plant *Equisetum moorei*
- Direct impacts on the *Salvia verbenaca* populations
- Direct loss of dune grassland habitat in the area
- Dust, with subsequent impacts on the plants and adjoining dune flora
- Potential for leachate from dredged material to alter local ecology
- Length of works with subsequent impacts on local ecology
- Introduction of further weeds to the area
- Cumulative impacts and effects arising from the previous works to the area which have degraded the dune grassland habitat here

### 5.7 Mitigation Measures Considered

The erection of hoarding around the site for Moore's horsetail was originally considered to prevent physical disturbance of its site and to exclude dust and an area was mapped out to consider same.

However, with the presence of Wild clary over an area larger than this, it would be impracticable to erect hoarding around the entire area as this would entail not having sufficient area to spread the dredged material and access with large machinery and plant would still have to travel through the north car park threatening the populations there.

This suggests that this area is not at all suitable for the spreading of the material as it would be very difficult if not impossible to protect and maintain the two important plant species *in situ*.

The recommendation is thus to identify an alternative location for the spreading of the dredged material from the Avoca River and the development of site compounds.

## 6. CONCLUSION & RECOMMENDATIONS

The results of the surveys and study were discussed with local and scientific staff from National Parks and Wildlife Service from whom a license would be required for the works.

Our professional opinion is that this site is not suitable for the construction of Site Compound 6 given the presence of a legally Protected plant and a very rare species that will be interfered with/destroyed should these works go ahead.

As set out in the CIEEM guidelines (CIEEM, 2018) when considering ecological impacts and mitigation a sequential process should be adopted to avoid, mitigate and compensate negative ecological impacts and effects. This is often referred to as the 'mitigation hierarchy'.

The number one mitigation measure that should always be applied in the first instance is that of avoidance of negative impact. It is therefore our recommendation that:

- An alternative location is found for Site Compound 6,
- Implementation of the measures set out in the 2008 NPWS Field Survey of Rare, Threatened and Scarce Vascular Plants in County Wicklow report are completed by the local authority in consultation with NPWS - these consist of the implementation of an appropriate mowing regime, measures to deal with the weedy species introduced to the area and the restoration of dune grassland habitat for these two plants.

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## 8. APPENDIX 1. Site Synopses

# SITE SYNOPSIS

**Site Name: Kilpatrick Sandhills SAC**

**Site Code: 001742**

Kilpatrick Sandhills are located about 8 km south of Arklow town, and just south of the Wicklow/Wexford county boundary. The site is comprised of a mosaic of coastal habitats but primarily a mature sand dune system which extends along 2 km of coastline.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1210] Annual Vegetation of Drift Lines
[2110] Embryonic Shifting Dunes
[2120] Marram Dunes (White Dunes)
[2130] Fixed Dunes (Grey Dunes)*
[2150] Decalcified Dune Heath*

Various stages of sand dune formation can be seen at this site, from small fore dunes which are stabilized by Marram (*Ammophila arenaria*), to mature fixed dunes colonised by a species-rich sward of grasses and herbaceous plants.

Embryonic shifting fore dunes occur mainly along the middle and southern sections of the site. Species such as Marram, Sand Couch (*Elymus farctus*) and Sea Sandwort (*Honkenya peploides*) are present. The Marram dunes are dominated by Marram, with species such as Sea Spurge (*Euphorbia paralias*), Sea Bindweed (*Calystegia soldanella*) and Sea-holly (*Eryngium maritimum*) also found.

In the fixed dunes Red Fescue (*Festuca rubra*) is the dominant grass. Other species present include Lady's Bedstraw (*Galium verum*), Kidney Vetch (*Anthyllis vulneraria*), Wild Thyme (*Thymus praecox*) and Sheep's-bit (*Jasione montana*). On the older dunes, there is an abundance of legumes, including Common Bird's-foot-trefoil (*Lotus corniculatus*), White Clover (*Trifolium repens*), Hop Trefoil (*Trifolium campestre*) and Lesser Trefoil (*Trifolium dubium*). Further inland, on the more mature grey dunes, Burnet Rose (*Rosa pimpinellifolia*) is common. The scarce species Lesser Meadow-rue (*Thalictrum minus*) occurs among the vegetation of the more mobile dunes.

Dune heath occurs behind the fixed dunes in the mid and southern sections of the site. This is a very rare vegetation type in Ireland. The heathy scrub is dominated by Gorse (*Ulex europaeus*), and other species recorded in this area include Blackthorn (*Prunus spinosa*), Bracken (*Pteridium aquilinum*), Cleavers (*Galium aparine*), Common

Sorrel (*Rumex acetosa*), Common Ragwort (*Senecio jacobaea*), Burnet Rose, Tormentil (*Potentilla erecta*) and Bramble.

On the landward side of the dunes, in the middle of the site, there is a low-lying marsh which is dominated by Bulrush (*Typha latifolia*), with Branched Bur-reed (*Sparganium erectum*), Yellow Iris (*Iris pseudacorus*), Tubular Water-dropwort (*Oenanthe fistulosa*), Wild Angelica (*Angelica sylvestris*) and sedges (*Carex* spp.). To the west of the marsh is an area of wet scrub woodland. The canopy is formed of Alder (*Alnus glutinosa*) and willows (*Salix* spp.), with Bramble (*Rubus fruticosus* agg.), Honeysuckle (*Lonicera periclymenum*), Great Horsetail (*Equisetum telmateia*), Wood Dock (*Rumex sanguineus*) and Narrow Buckler-fern (*Dryopteris carthusiana*) among the ground flora.

At the northern end of the site is a rocky headland, Kilmichael Point, which affords fine views along the coastline. Rock outcrops occur where the overlying clay drift has eroded, exposing cliffs which rise in steps to about 10 m. The headland supports a species-rich coastal grassland and cliff vegetation, including the scarce species, Rock Sea-lavender (*Limonium binervosum*).

The Red Data Book species, Sea Stock (*Matthiola sinuata*), has been observed among rocky crevices here in the past, but has not been recorded recently. The species is now thought to be extinct in Ireland.

At the southern end of the site, the sand dunes and beach are used by visitors for amenity purposes. Parts of the site are also used for grazing cattle. Grazing is a critical factor in coastal systems: the correct grazing pressure maintains species-rich open swards and curtails scrub encroachment. Over-exposure to grazing and amenity usage can cause damage to dune vegetation and exacerbate dune erosion.

The site is ecologically important as a good example of a mature and fairly intact sand dune system which shows the developmental stages of dunes from fore dunes to mature grey dunes. A good diversity of habitats and species are present. Fixed dunes and dune heath are priority habitats under Annex I of the E.U. Habitats Directive.

# SITE SYNOPSIS

**Site Name: Buckroney-Brittas Dunes and Fen SAC**

**Site Code: 000729**

Buckroney-Brittas Dunes and Fen is a complex of coastal habitats located about 10 km south of Wicklow town. It comprises two main sand dune systems, Brittas Bay and Buckroney Dunes, connected on the coast by the rocky headland of Mizen Head. The dunes have cut off the outflow of a small river at Mizen Head and a fen, Buckroney Fen, has developed. A further small sand dune system occurs south of Pennycomequick Bridge.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

| |
|---|
| [1210] Annual Vegetation of Drift Lines |
| [1220] Perennial Vegetation of Stony Banks |
| [1410] Mediterranean Salt Meadows |
| [2110] Embryonic Shifting Dunes |
| [2120] Marram Dunes (White Dunes) |
| [2130] Fixed Dunes (Grey Dunes)* |
| [2150] Decalcified Dune Heath* |
| [2170] Dunes with Creeping Willow |
| [2190] Humid Dune Slacks |
| [7230] Alkaline Fens |

Along much of the higher parts of the beach at this site, typical annual strandline vegetation occurs. Species such as Sea Rocket (*Cakile maritima*), Prickly Saltwort (*Salsola kali*) and Spear-leaved Orache (*Atriplex prostrata*) are frequent in this zone, with the scarcer Yellow Horned-poppy (*Glaucium flavum*) present in places.

A shingle ridge occurs along the Buckroney dune system. The amount of exposed shingle is low, but it is likely that shingle underlies much of the sandy areas also. The vegetation on the shingle is similar in composition to that which occurs as part of the drift line and embryonic dune habitats. Sea Sandwort (*Honkenya peploides*) is characteristic, and other species include Sand Couch (*Elymus farctus*), Sand Sedge (*Carex arenaria*), Sea Rocket and Yellow Horned-Poppy.

An area of saline vegetation which conforms to 'Mediterranean salt meadows' occurs in the Buckroney dune system south of the inlet stream to the fen, and possibly in small areas elsewhere within the site. It is typically dominated by rushes (*Juncus* spp.), and of note is the presence of Sharp Rush (*J. acutus*). Sea Club-rush (*Scirpus*

*maritimus*) also occurs. The area is inundated by the tide only occasionally via the narrow inlet leading to Buckroney Fen.

Embryonic dune development occurs at the southern part of Brittas and more widely at Buckroney and Pennycomequick. Typical species are couch grasses (*Elymus* sp.), Sand Sedge and Sea Sandwort. The main dune ridges are dominated by Marram (*Ammophila arenaria*), with herbaceous species such Sea Spurge (*Euphorbia paralias*), Sea-holly (*Eryngium maritimum*) and Common Restharrow (*Ononis repens*) occurring throughout. The main dune ridges are well developed, reaching heights of 10 m at Brittas. The northern end of the Brittas system has fine examples of parabolic dunes.

Stable fixed dunes are well developed at Brittas and Buckroney. Marram is less frequent in these areas and is replaced by Red Fescue (*Festuca rubra*) as the most common grass species. A rich flora occurs, especially in the more open areas. Common species include Pyramidal Orchid (*Anacamptis pyramidalis*), Common Milkwort (*Polygala vulgaris*), Wild Pansy (*Viola tricolor* subsp. *curtisii*), Carline Thistle (*Carlina vulgaris*), Biting Stonecrop (*Sedum acre*), Wild Thyme (*Thymus praecox*) and Common Bird's-foot-trefoil (*Lotus corniculatus*). The mature areas of fixed dune also contain Burnet Rose (*Rosa pimpinellifolia*), Bracken (*Pteridium aquilinum*), Wood Sage (*Teucrium scordonia*) and Common Sorrel (*Rumex acetosa*). Mosses such as *Tortula ruralis* subsp. *ruraliformis*, *Rhytidiadelphus triquetris*, and *Homalothecium lutescens* are frequent, along with lichens (*Cladonia* spp., *Peltigera canina*).

This is one of the few Irish east coast sites to possess good examples of wet dune slacks and dunes with Creeping Willow (*Salix repens*). These areas of the dunes have a rich and varied flora, including species such as Creeping Willow, Water Mint (*Mentha aquatica*), Silverweed (*Potentilla anserina*), Meadowsweet (*Filipendula ulmaria*) and Meadow Thistle (*Cirsium dissectum*). The slacks are notably rich in rushes and sedges. Of particular interest is the presence of Sharp Rush (*Juncus acutus*), a scarce species in eastern Ireland and one that is indicative of a saline influence.

The site is also notable for the presence, at the back of the dunes, of areas of decalcified dune heath, a rare habitat type, and one which is listed with priority status in the E.U. Habitats Directive. Heath species present include Heather (*Calluna vulgaris*), Bell Heather (*Erica cinerea*) and Gorse (*Ulex europaeus*).

Buckroney Fen lies west of Mizen Head. It is backed to the west by a dense swamp of Common Reed (*Phragmites australis*). The fen is dominated by Tussock Sedge (*Carex paniculata*), with Water Mint, Purple Loosestrife (*Lythrum salicaria*), Marsh Pennywort (*Hydrocotyle vulgaris*), Greater Bird's-foot-trefoil (*Lotus uliginosus*), Water Horsetail (*Equisetum fluviatile*), small sedges (*Carex* spp.) and other flowering plants. An extensive stand of Blunt-flowered Rush (*Juncus subnodulosus*) is of note. Throughout this area the rare Marsh Fern (*Thelypteris palustris*) is frequent. There are also extensive areas of Rusty Willow (*Salix cinerea* subsp. *oleifolia*) scrub.

This site contains two rare plant species protected under the Flora (Protection) Order, 1999: Wild Asparagus (*Asparagus officinalis* subsp. *prostratus*), in its most northerly

Irish station, and Meadow Saxifrage (*Saxifraga granulata*). Other rare species which occur within the site include Green-flowered Helleborine (*Epipactis phyllanthes*), Bird's-foot (*Ornithopus perpusillus*) and Spring Vetch (*Vicia lathyroides*). All of these are Red Data Book species. The rare sedge hybrid *Carex riparia* x *C. vesicaria* (*Carex* x *csomadensis*) is only known from Mizen Head.

The invertebrate fauna of Buckroney fen has been investigated and some notable species have been recorded, including the beetle *Eurynebria complanata* and the following flies: *Machimus cowini, Anasimyia lunulata, Parhelophilus consimilis* and *Lejogaster splendia*.

Little Tern, a species listed on Annex I of the E.U. Birds Directive, has bred or attempted to breed at Buckroney strand in recent years. In 1992 between 7 and 10 pairs were present and in 1993 up to 8 pairs. Teal are regular in winter (119), as are Curlew (46), Lapwing (515) and Snipe (87). All figures are average peaks for 1994/95 - 1995/96.

The dune systems and beaches are subject to high amenity usage from day-trippers and several areas around the site have been developed as caravan parks, car parks and golf courses. The marginal areas of the fen have been reclaimed, especially at the south end, though these areas still flood in winter and attract waterfowl.

This site is important as an extensive sand dune/fen system with well developed plant communities. Several coastal habitats listed on the E.U. Habitats Directive, including two priority habitats - fixed dune and decalcified dune heath - are present. The area contains two legally protected plants, as well as a number of other rare or scarce plant species. The site provides habitat for some rare species of invertebrate and for the vulnerable Little Tern. A rich flora and fauna has persisted on this site despite extensive amenity use and adjacent farming. However, future land use practices will need to be managed to ensure the continued survival of this unique mosaic of coastal habitats.

# Appendix D

Arklow FRS Otter Survey 2021

# D1 Arklow FRS Otter Survey 2021

# Arklow Flood Relief Scheme otter survey 2021


Prepared by Triturus Environmental Ltd. for Wicklow County Council

**December 2021**

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# Table of contents

# 1. Introduction

## 1.1 Project background

Triturus Environmental Ltd. were commissioned by Wicklow County Council to undertake a baseline otter (*Lutra lutra*) survey of the Avoca River estuary and connecting habitats in the vicinity of Arklow, Co. Wicklow. The baseline survey was completed to inform the Arklow Flood Relief Scheme (FRS) and was undertaken along 8.5km of riverine, transitional and coastal habitat during November 2021.

The proposed scheme is being undertaken for the purpose of preventing the periodical localised flooding of lands and properties in the Arklow town area. The proposed scheme will involve the construction of flood defences and an embankment, as well as conveyance improvements in the Avoca River. This is proposed to include deepening of the river channel, the introduction of new debris and gravel traps and strengthening works to the existing quay walls and Arklow Bridge. The flood scheme has been designed to withstand a 1 in 100-year flood event from the Avoca River (fluvial) as well as 1 in 200-year tidal flood event. A full works description is provided in the Environmental Impact Assessment Report for the scheme ARUP (2021).

This baseline survey identified the most important areas for otters along the Avoca River and connecting habitats relative to the proposed FRS scheme. This was based on an assessments of sign distribution and human-related disturbance, in addition to observations on general aquatic and fisheries habitats. The distribution of these signs (i.e. holts, spraints, couches, prints and other signs) acted as an indicator regarding areas of channel and aquatic habitat used by otters, inclusive of potential breeding and resting areas (i.e. holts and couches). The data collated would facilitate the recommendation of otter specific mitigation measures for the proposed flood relief works.

## 1.2 Legislative protection

The Eurasian otter (*Lutra lutra*) is a species of conservation concern and high priority having suffered major declines in its range and population throughout Europe since the 1950s. It is classified as 'near threatened' by the IUCN Red List with a decreasing population trend and, as such, is listed in Appendix I of CITES, Appendix II of the Bern Convention (Council of Europe, 1979) and Annexes II and IV of the EC Habitats Directive (92/43/EEC).

Otters, along with their breeding and resting places, are also protected under provisions of the Irish Wildlife Acts 1976-2021. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Directive 92/43/EEC, which is transposed into Irish law by the European Union (Birds and Natural Habitats) Regulations 2011-2021.

The protection of otters is outlined in Article 51(1) and (2):

Protection of fauna referred to in the First Schedule;

***51.(1)*** *The Minister shall take the requisite measures to establish a system of strict protection for the fauna consisting of the species referred to in Part 1 of the First Schedule.*

***51.(2)*** *Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a license granted by the Minister under Regulation*

*54, a person who in respect of the species referred to in Part 1 of the First Schedule (listed below). Items (b) and (d) may be considered most relevant to developments.*

***(a)*** *deliberately captures or kills any specimen of these species in the wild,*

***(b)*** *deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,*

***(c)*** *deliberately takes or destroys eggs of those species from the wild,*

***(d)*** *damages or destroys a breeding site or resting place of such an animal, or*

***(e)*** *keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive, shall be guilty of an offence.*

In an Irish context, according to the most recent Article 17 reporting (NPWS, 2019), otter conservation status has improved, with the species now evaluated as being of 'Favourable' conservation status. Otters were considered to be previously 'Near Threatened' (Marnell, 2009) based on a 20-25% decline between 1980 and 2005 (Bailey & Rochford, 2006). However, the current conservation status is now of 'Least Concern' (Marnell et al., 2019).

## 1.3 Study area description

The Avoca River (EPA code: 10A03) forms at the confluence of the Avonmore and Avonbeg Rivers near Avoca village and flows in a south-east direction for 56km before discharging to the Irish Sea at Arklow. The Avoca River catchment covers an area of approximately 645km$^2$, with land use primarily comprised of pastures (CORINE 231). In the lower reaches land use also includes broad-leaved forests (311) and discontinuous urban fabric (112). The proposed scheme boundary is bordered to the north by Arklow Town Marsh pNHA (site code: 001931), a large area designated for its value as a wetland habitat.

The river suffers legacy pollution from the Avoca copper and sulphur mines, which closed in 1982. Additionally, wastewater discharges in the vicinity of Arklow have also significantly impacted water quality over a long period, resulting in the Avoca being one of the most polluted rivers in Ireland (Doyle et al., 2007; O'Boyle et al., 2019).

Despite ongoing water quality issues, the Avoca supports both Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta*) (McGinnity et al., 2003), in addition to brown trout (also *Salmo trutta*), European eel (*Anguilla anguilla*) and minnow (*Phoxinus phoxinus*) (Matson et al., 2018). The Avoca also supports all three species of Irish lamprey, namely sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*) and brook lamprey (*Lampetra planeri*) (Roche, 2003). Additionally, the Avoca estuary is known to support a range of transitional and marine fish species including flounder (*Platichthys flesus*), thick-lipped grey mullet (*Chelon labrosus*), sand goby (*Pomatoschistus minutus*), three-spined stickleback (*Gasterosteus aculeatus*), fifteen-spined stickleback (*Spinachia spinachia*), cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), greater pipefish (*Syngnathus acus*), 5-bearded rockling (*Ciliata mustela*), sprat (*Sprattus sprattus*) and whiting (Merl*angus merlangus*) (Kelly et al., 2009, 2011)

Otters are widespread throughout the Avoca catchment, including in the vicinity of Arklow town (see section 4.1 for more details).

Within the survey area, the Avoca Estuary (transitional water body code IE_EA_150_0100) is of 'moderate status' in terms of water quality and is considered 'at risk' of not achieving good ecological status, primarily due to historic mines (EPA, 2021). There are no contemporary EPA biological monitoring stations present on the Marsh River, Arklow River (culverted underground) or unnamed stream (culverted underground) within the survey area.

# 2. Methodology

## 2.1 Desktop review of otter records

A desktop review of published and unpublished data for the Avoca River estuary and connected habitats was undertaken in respect of otter. Data pertaining to otters held by the National Biodiversity Data Centre (NBDC) was also reviewed.

## 2.2 Otter sign surveys

Walkover otter surveys of the Avoca Estuary and adjoining Marsh River (EPA code: 10M21) and unnamed Avoca tributary (no code) were undertaken on 18th and 19th November 2021. The survey area comprised approx. 9.8km of linear habitat, comprising the Avoca Estuary (both banks) and Marsh River, in addition to the perimeter of Arklow Duck Pond and sections of Arklow North and South beaches (**Table 2.1; Figure 2.1**).

The riverine and coastal habitats surveyed were divided into a total of 24 no. discrete survey sections to enable more effective data evaluation against our novel Human Disturbance Index (HDI) (see below methodology).

The survey was completed during dry, mild, bright and settled conditions, which ensured that a good representation of habitat marked by otter could be recorded in the field, including territorial marking or marking of feeding areas. The survey also deliberately coincided with prolonged dry periods (≥3 days after significant rainfall) to not only ensure safe site access but also that the extent of otter signs (spraint, smears etc.) washed away due to recent precipitation was minimised.

Each otter sign was logged by type, location (handheld GPS), condition and approximate age for later interpretation to distinguish differences in habitat use and activity. Spraints were subjectively assessed as either fresh (very recent), mixed-age (recent and older spraints typically indicative of a regular sprainting site) or old (spraint breaking down and not recently deposited). Furthermore, indicative counts of spraint (i.e. number of individual spraints) and the number of sprainting sites (often separate clusters in one area) were noted. This helped indicate the frequency of otter marking, which can clarify levels of activity in particular areas of river channel or other aquatic habitats.

**Table 2.1** List of watercourses and coastal habitats surveyed as part of the Arklow otter survey 2021

| Watercourse | EPA code | Length of habitat surveyed (km) |
|---|---|---|
| Avoca Estuary | EA_150_0100 | 5.6 |
| Marsh River | 10M21 | 0.6 |
| Arklow North Beach | n/a | 0.9 |
| Arklow South Beach | n/a | 1.6 |
| Arklow Duck Pond | n/a | 1.1 |
| **Total length of habitat surveyed (km)** | | **9.8** |

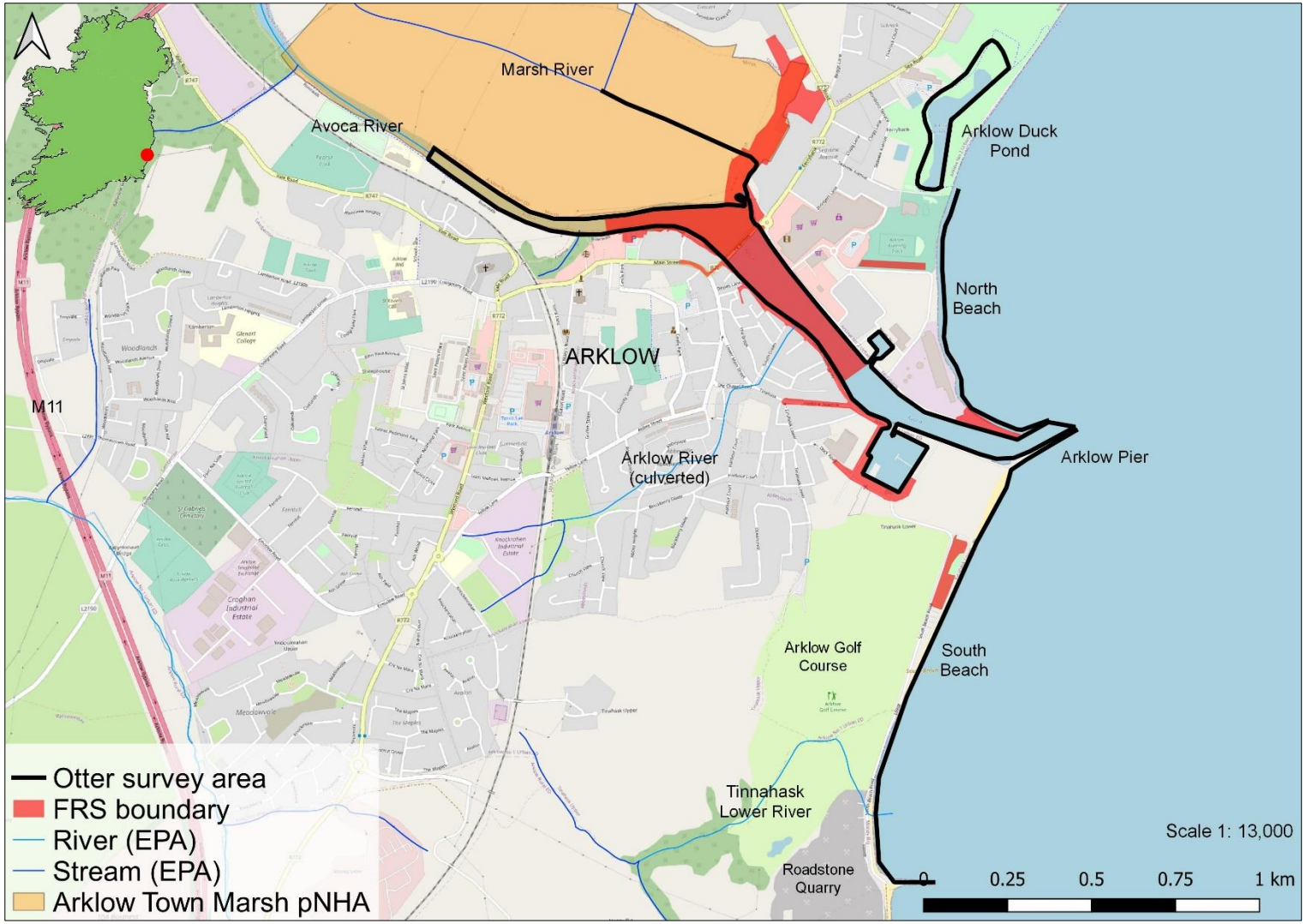


**Figure 2.1** Overview of the Arklow FRS otter survey area, November 2021

## 2.3 Total corridor otter survey (TCOS) methodology

The survey broadly followed the best practice survey methodology for otter as recommended by Lenton et al. (1980), Chanin (2003) and Bailey & Rochford (2006). However, methodology differed in that the entire waterline was surveyed rather than the standard 500-600m sections from accessible points (e.g. bridges). The novel survey technique, known as a total corridor otter survey (TCOS) (Macklin et al., 2019), encompassed the entire riparian zone and in-channel (boat-based) surveys along both banks of the Avoca Estuary. The survey area was divided into 23 no. discrete 500m sections to facilitate greater resolution of data.

Total corridor survey methodology typically involves the use of two (or more) surveyors working independently (in tandem) along each respective bank of an individual watercourse (where practical). This also facilitates one to work from a more elevated position (e.g. bank top) with one surveying (with appropriate PPE such as a dry suit or chest waders) from within the channel, thus greatly increasing the likelihood of otter sign detection. This is especially true of more cryptic signs such as holts, which can be located in undercut banks, under tree root systems etc. out of the view of traditional surveys. Surveyors can alternate between the river channel and each bank depending on surveyor knowledge and experience of preferential areas of habitat likely to be used by otter.

## 2.4 Human Disturbance Index (HDI)

In order to assess the relative impact of human-related disturbance on otter sign distribution and habitat usage throughout the survey area, the novel Human Disturbance Index (HDI) was used (Macklin et al., 2019).

In summary, the HDI assesses a length of river channel, lake/pond habitat or coastal habitat in discreet 500m sections and scores the bank(s) in terms of three broad, yet key disturbance-related categories, namely;

1. Human activity (category A)
2. Land use (category B)
3. Human accessibility & otter seclusion (category C) (not taken to be mutually exclusive)

Scores for each disturbance category are assigned to each bank (where applicable) of a given survey section (left and right, facing downstream), ranging from a minimum score of 0.2 (best, lowest disturbance) to a maximum score of 1.0 (worst, highest disturbance) (**Table 2.2**). This results in a total of six individual scores for any given 500m section of bank or coastal habitat, which can be considered in isolation (total per bank score, as below) or simply added together and averaged between left and right banks (applicable only on smaller watercourses) to calculate an overall mean score for a given section.

Given the large width of the Avoca Estuary (up to 50m across), each bank of the river was considered in isolation. Only a single score was calculated for coastal habitats (only one bank available). The total per bank score for a particular 500m section is as follows, where;

A = human activity, B= land use & C= human accessibility and otter seclusion (X)

$X_1$ = 0-10m score (from channel edge),

$X_2$ = 10-25m score (from channel edge),

is calculated as follows (for each bank);

$$(A_1 \times A_2 \times B_1 \times B_2 \times C_1 \times C_2)^{(1 / \text{number of scores})}$$

To allow for better resolution of data, HDI scores for each bank were calculated in both 0-10m and 10-25m zones relative to the channel edge, i.e. within ≤10m of channel edge and 10-25m of channel edge. This allows an average score to be calculated for each zone and bank in a given survey section and the section overall (both banks combined). This accounts for common discrepancies between disturbance levels along and adjoining a river corridor.

To account for natural physical habitat discrepancies, survey section AVO_003 was divided into _003a and _003b to prevent oversight of important habitat within this section. Therefore, the HDI was applied to a total of 24 no. sections.

**Table 2.2** Scoring system for each disturbance-related category of the Human Disturbance Index (Macklin et al., 2019)

| HDI score | Disturbance class |
|---|---|
| 0.8 -1.0 | Very high disturbance |
| 0.6 – 0.79 | High disturbance |
| 0.4 – 0.59 | Moderate disturbance |
| 0.2 – 0.39 | Low disturbance |

## 2.5 Biosecurity

A strict biosecurity protocol including the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between survey sites. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation.

# 3. Survey area description

The following section briefly describes the hydromorphological characteristics and habitats recorded along within the survey area, in the wider context of otter. The survey was undertaken in November 2021. Habitat codes, where provided, follow Fossitt (2000). Species' scientific names are provided (in parenthesis) at first mention only.

## 3.1 Avoca Estuary

The Avoca River survey area comprised the entirety of the Avoca Estuary (transitional water body code: IE_EA_150_0100), extending from Ghaelcoláiste na Mara school (upstream of the FRS boundary) to the Arklow piers (>2km length of channel). Upstream of Arklow town, the tidal river (CW2 habitat; Fossitt, 2000) averaged 40-50m wide and >2-3m deep with a bed dominated by silted cobble and coarse gravels. Transitional glide habitat predominated, with occasional pools present, typically in association with fallen or overhanging tree limbs. These areas provided holding habitat for migratory salmonids, in particular. The river in this area was flanked by an intermittent treeline of willow (*Salix cinerea*), sycamore (*Acer psuedoplatanus*), alder (*Alnus glutinosa*) and ash (*Fraxinus excelsior*) with abundant bramble scrub (*Rubus fruticosus* agg.), located alongside a paved riverside walk which extended for 1.6km upstream of the town. The north bank of the river supported an extensive mixed broad-leaved woodland (WD1) with willow, downy birch (*Betula pubescens*), alder, sycamore, ash, oak (*Quercus* sp.), holly (*Ilex aquifolium*) and abundant bramble scrub. This woodland extended to the Marsh River confluence, with dense scrub predominating in the area between this confluence and 19 Arches Bridge. A series of small river islands vegetated with willow, gorse (*Ulex europaeus*) and bird-grazed grass and exposed mud were present upstream of the bridge. These supported otter spraint sites (see section 4.2 below). An extensive mid-channel gravel bar (targeted for removal under the Arklow FRS) was also present immediately upstream of 19 Arches Bridge.

Downstream of 19 Arches Bridge the river channel became heavily modified, with retaining walls present along both the north and south banks (i.e. north and south quays). These areas provided poor otter habitat (high disturbance, low levels of otter seclusion etc.), although floating pontoons along the North quay and within Arklow Marina and the Fish Harbour, as well as a groyne along the South Quay, offered otter marking opportunities.

**Plate 3.1** Upper survey reaches of the Avoca Estuary as viewed from a RIB (facing downstream)

**Plate 3.2** View from small instream islands located immediately upstream of 19 Arches Bridge

**Plate 3.3** Avoca Estuary along the North Quay facing upstream to 19 Arches Bridge

**Plate 3.4** Avoca Estuary at the north (left) and south piers (right)

## 3.2 Marsh River

The Marsh River (EPA code: 10M21) survey area was located within Arklow Town Marsh pNHA (site code: 001931), a large area designated for its wetland habitats. The river had been extensively straightened, historically and represented a large, tidal drainage channel habitat with poor flows. The depth often exceeded 1.5m and the bed was dominated by deep silt. Common reed lined the channel, which was heavily shaded by reedbed (FS1) habitat and willow- and bramble-dominated scrub. Whilst offering very high levels of seclusion for otter (channel largely inaccessible to humans), otter foraging opportunities were noted as relatively poor.

**Plate 3.5** The confluence of the Marsh River with the Avoca Estuary

## 3.3 Arklow North and South Beaches

The Arklow North beach survey area extended from Arklow Duck Pond to Arklow North pier (0.9km). A narrow beach of sandy shore (LS2) and mixed sediment shore (LS5) habitat (covered at high tide) was present at the base of extensive, steep boulder revetment (rock armouring) installed for coastal protection. This ran the entire length of the beach as far as the north pier and did not support vegetation. The beach adjoined amenity grassland, small scrub and industrial areas (i.e. heavily modified land use). The area was exposed to frequent levels of human activity (walkers, dogs etc.) with the exception of the area near the pier (poor human access). There were no quay wall steps associated with this pier (often used as otter spraint sites).

In contrast, Arklow South Beach was a more extensive sandy shore (LS2), not covered at high tide. This extended approx. 700m southwards from Arklow South pier (no associated quay wall steps). The beach then narrowed considerably and was adjoined by steep boulder revetment (rock armouring), with a golf course and quarry present in the wider area. As per the North beach, the area was exposed to frequent levels of human disturbance with seclusion for otter limited to the boulder revetment.

The exception to this was the disused pier in the vicinity of the Roadstone quarry (present outside of the survey area).

**Plate 3.6** Arklow North Beach facing south towards the North pier

**Plate 3.7** Arklow South Beach facing south towards the Roadstone Quarry and Arklow Head

## 3.4 Arklow Duck Pond

Arklow Duck Pond is a 3ha, shallow, slightly saline, mature artificial lake. Located alongside Arklow North Beach, the pond averages <1.2m in depth with a heavily silted base. The lake supports frequent and sometimes extensive beds of common reed (*Phragmites australis*), with a small, well-vegetated central island. The lake is of high value to waterbirds such as mallard (*Anas platyrhynchos*), greylag geese (*Anser anser*), mute swan (Cygnus olor) and moorhen (*Gallinula chloropus*) although the fish population is limited to three-spined stickleback (*Gasterosteus aculeatus*), with some suitability for European eel (*Anguilla anguilla*). The lake was fringed by common reed with dense growth of grey willow (*Salix cinerea*) and alder (*Alnus glutinosa*) along the west, north and north-east banks. The south and east banks are largely open amenity grassland (GA2) with isolated pockets of scrub (WS1). A walkway encircles the lake although the northern and western banks feature a wider, poorly accessible buffer zone, providing seclusion for otter.

**Plate 3.8** Arklow Duck Pond facing towards Arklow Bay Hotel from the east bank

# 4. Results

## 4.1 Desktop review of otter records

A desktop review revealed a low number of otter records in the vicinity of Arklow town. A single otter record (live sighting in 2015) was available from the NBDC in the survey area, upstream of 19 Arches Bridge. Otter spraint was recorded at two locations along the south bank of the Avoca River between the M11 flyover and the start of the built-up banks in Arklow Town (ARUP, 2018) Live sightings of foraging otters have been recorded in the Avoca Estuary during ecological surveys completed for the Arklow FRS in 2020 (e.g. AQUAFACT, 2020). Unusually, an otter was filmed during the afternoon on Arklow Main Street in February 2021, with the video circulating on social media. During walkover survey undertaken as part of the Arklow Wastewater Treatment Plant Project, evidence of otter spraint was recorded at two (undefined) locations along the south bank of the Avoca River between the M11 Bridge and the start of the built-up banks in Arklow Town upstream of the FRS planning boundary (ARUP, 2021).

## 4.2 Otter records

A total of *n*=21 otter signs were recorded within the survey area during the current November 2021 otter survey comprising approx. 9.8km of linear estuarine, riverine and coastal habitat (**Table 3.1; Figures 3.1-3.4; Appendix A**). This equated to an average of 0.46 otter signs per kilometre of linear habitat.

Spraint sites accounted for approximately half (*n*=11, 52%) of all signs recorded. Otter prints were recorded in three areas (with prints abundant in each area). A low number of latrines, slides and anal jellies were also recorded. A single couch (resting area) was identified near 19 Arches Bridge, adjacent to proposed flood wall construction (**Figures 4.2 & 5.1**). Small islands immediately upstream of 19 Arches Bridge supported regular otter sprainting sites.

The majority of otter signs were recorded along the tidal Avoca River and Avoca Estuary. Low numbers of otter signs were present outside of the river along the coastal boundary and nearby Arklow Duck Pond. These included a single slide located in the vicinity of the Arklow Duck Pond and two spraint sites underneath the disused Roadstone Quarry pier (**Figures 4.1 & 4.3**). No otter signs were recorded along the Marsh River, Arklow North Beach or Arklow South Beach. No holts were identified within the survey area, despite some suitability, locally.

**Table 4.1** Summary of the otter signs recorded in the vicinity of Arklow, November 2021

| Otter sign | Total no. |
|---|---|
| Spraint site | 11 |
| Prints | 3 |
| Latrine | 2 |
| Anal jelly | 2 |
| Slide | 2 |
| Couch | 1 |
| **Total** | **21** |

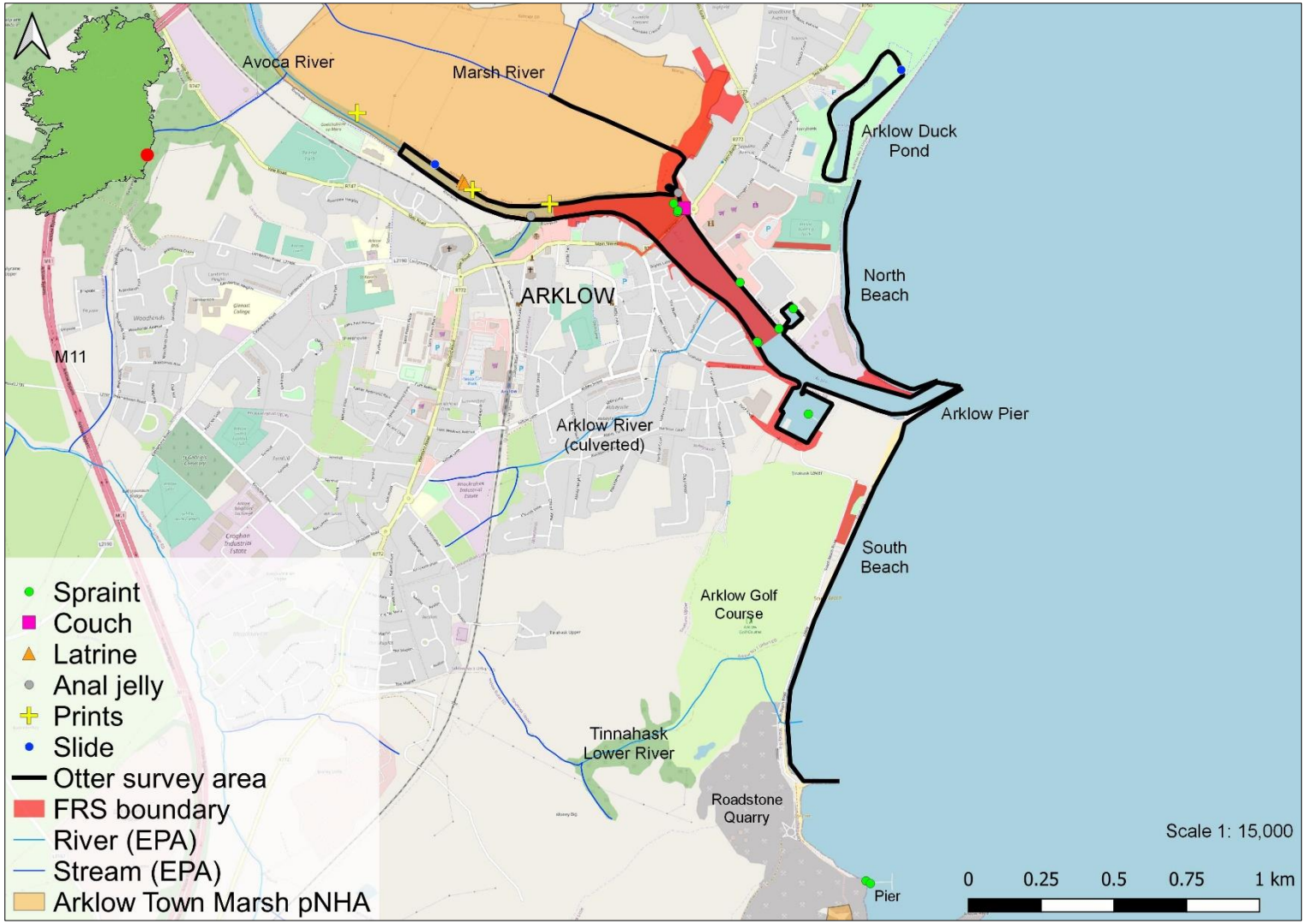


**Figure 4.1** Overview of the *n*=21 otter signs recorded in the Arklow FRS survey area, November 2021

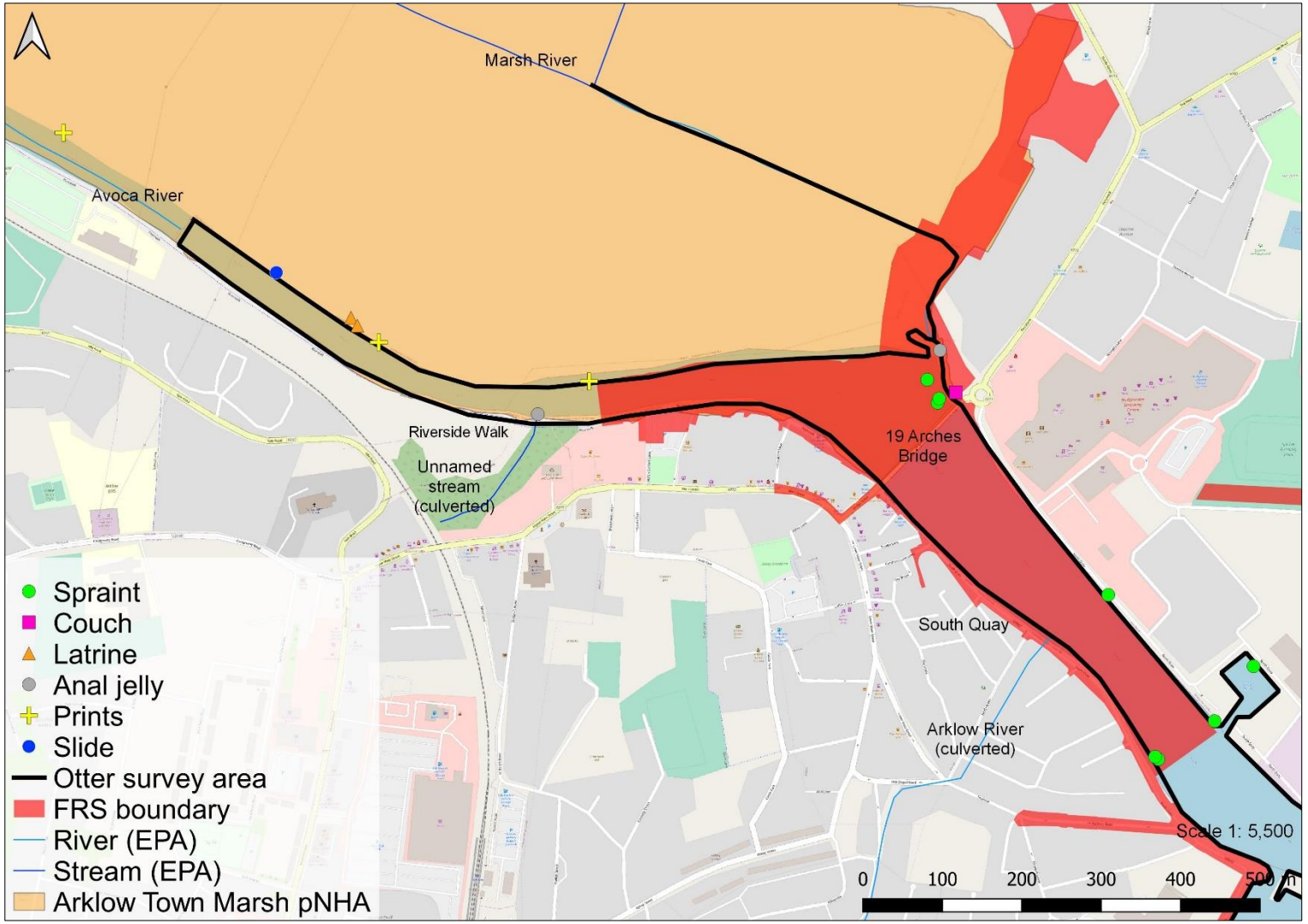


**Figure 4.2** Overview of the otter signs recorded in the Arklow FRS survey area (upper extent)

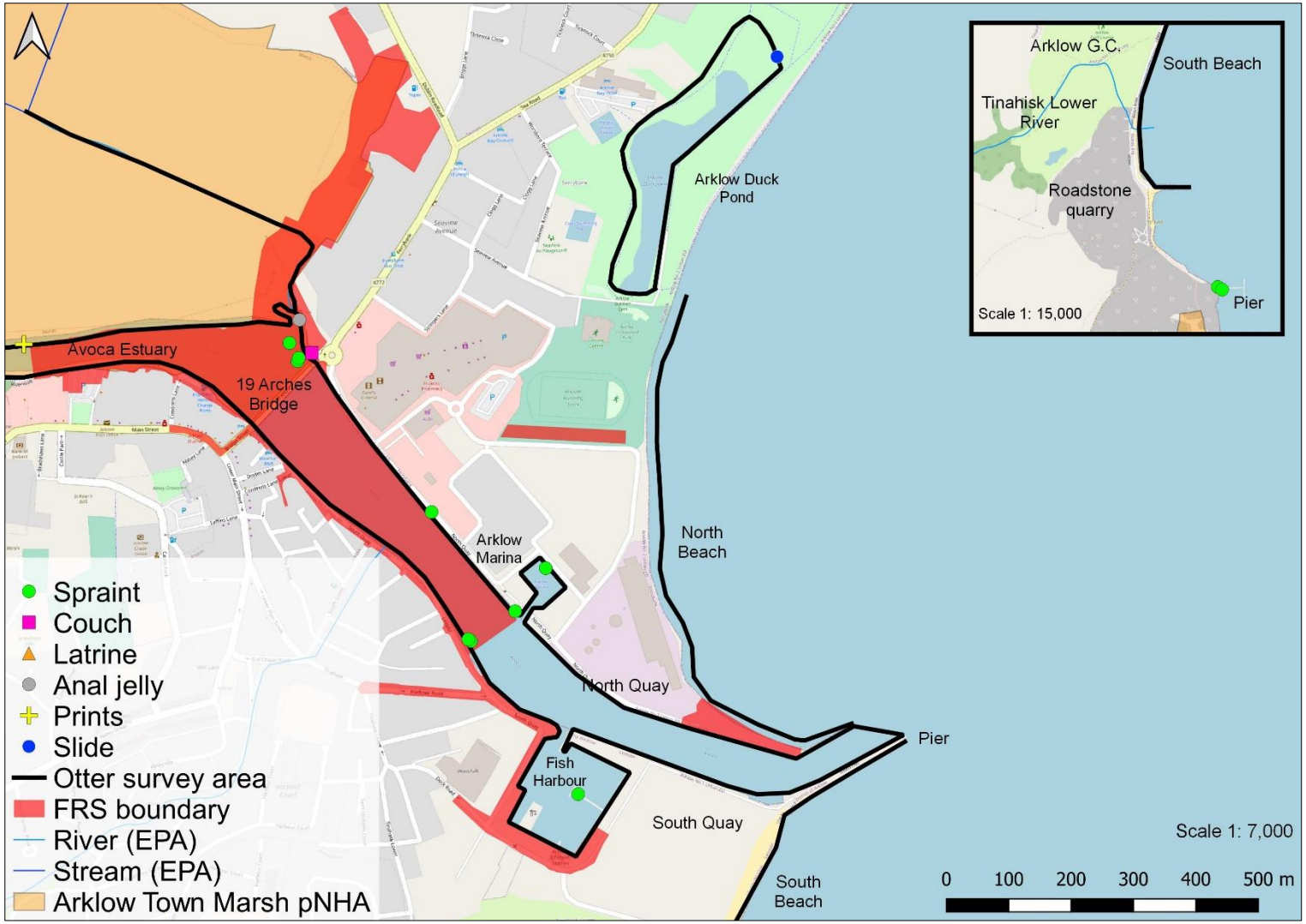


**Figure 4.3** Overview of the otter signs recorded in the Arklow FRS survey area (lower extent)

## 4.3 Human Disturbance Index (HDI) scores

Of the 24 no. survey sections assessed using the Human Disturbance Index (HDI), a total of five (AVO_001, AVO_002, AVO_003a, MAR_001 & MAR_002) fell within the **low disturbance class** (i.e. mean section HDI score ≤0.39) (**Table 4.2**; **Figures 4.4 & 4.5**). These were located on the north bank of the Avoca Estuary upstream of 19 Arches Bridge and on the Marsh River within Arklow Town Marsh pNHA.

Given high levels of human activity, heavily modified land use and poor otter seclusion, most of the Arklow survey area fell within the **high disturbance class** (i.e. 15 no. sections). These sections included much of the Avoca Estuary in the vicinity of Arklow town, most of Arklow Duck Pond and the North Beach and South Beach areas (**Figures 4.4 & 4.5**). These scores would be expected in a heavily modified, urban environment with only narrow riparian/natural buffers.

Survey sections AVO_003b, AVO_009 and AVO_010 on the Avoca Estuary and POND_003 (Arklow Duck Pond) fell within the **very high disturbance class** given very high levels of human activity, highly modified land use and very poor/no otter seclusion.

The spatial discrepancies between the disturbance scores for the 0-10m, 10-25m and both zones combined is shown in **Table 4.2** below.

The majority of all otter signs recorded, including the couch area identified near 19 Arches Bridge, were located in **low disturbance sections** of habitat. These are considered the most important areas for otter within the study area (**Table 4.2** and **Figure 4.4**).

**Table 4.2** Summary of the Human Disturbance Index (HDI) disturbance scores per survey zone and section in the vicinity of Arklow, November 2021 (colour coded for clarity)

| Section | 0-10m zone | 10-25m zone | Total section score (0-25m) |
|---|---|---|---|
| **AVO_001** | Low | Low | **Low** |
| **AVO_002** | Low | Low | **Low** |
| **AVO_003a*** | Low | Moderate | **Low** |
| **AVO_003b** | High | Very high | Very high |
| **AVO_004** | High | Very high | High |
| **AVO_005** | High | Very high | High |
| **AVO_006** | High | Very high | High |
| **AVO_007** | High | Very high | High |
| **AVO_008** | High | Very high | High |
| **AVO_009** | Very high | Very high | Very high |
| **AVO_010** | Very high | Very high | Very high |
| **AVO_011** | High | High | High |

| | | | |
|---|---|---|---|
| **AVO_012** | High | High | High |
| **MAR_001** | Low | Low | Low |
| **MAR_002** | Low | Moderate | Low |
| **POND_001** | Very high | High | High |
| **POND_002** | High | High | High |
| **POND_003** | Very high | Very high | Very high |
| **nBCH_001** | High | Very high | High |
| **nBCH_002** | High | High | High |
| **sBCH_001** | High | Very high | High |
| **sBCH_002** | High | Very high | High |
| **sBCH_003** | High | High | High |
| **sBCH_004** | High | High | High |

* Section contained an otter couch (resting area)

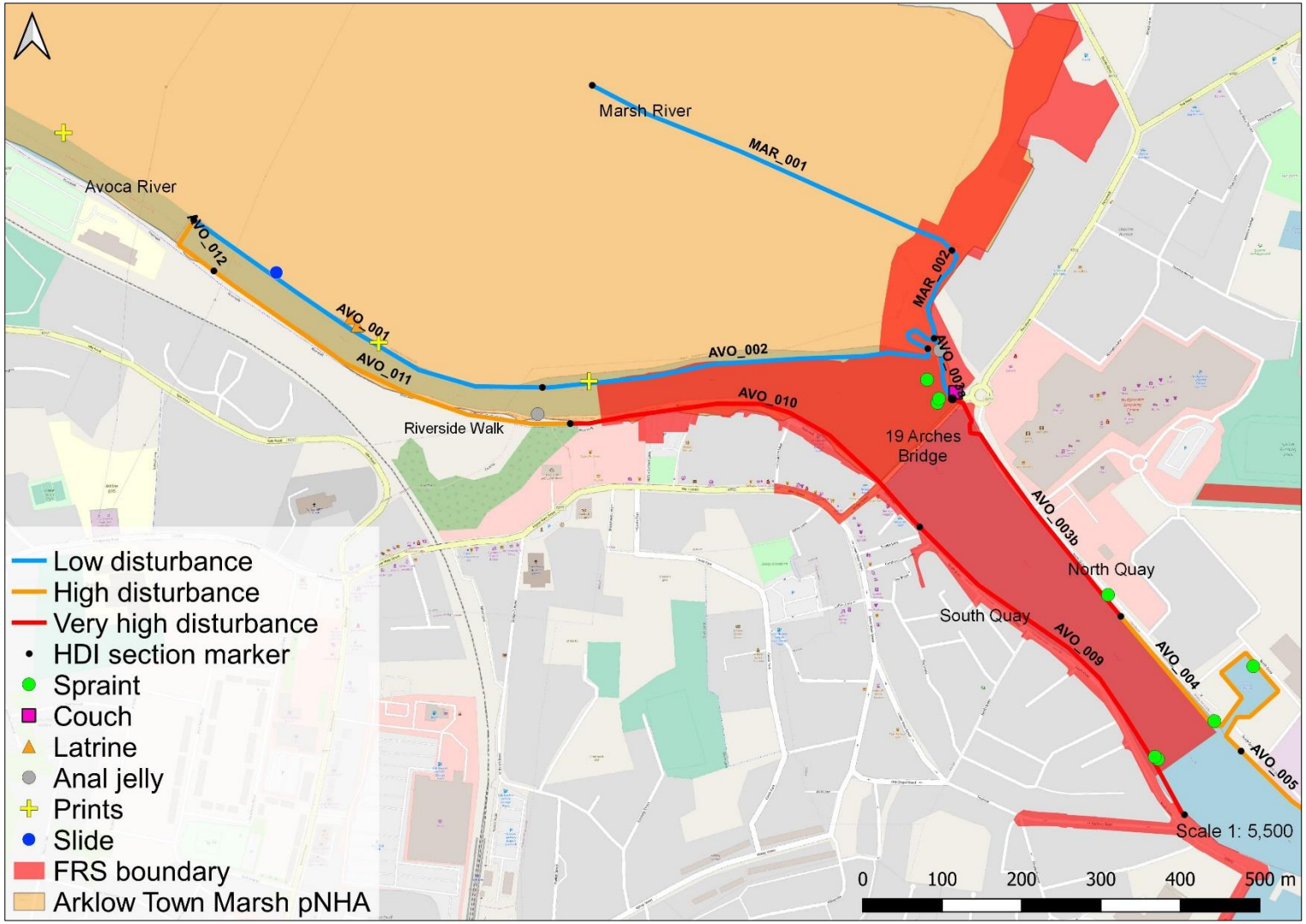


**Figure 4.4** Overview of the Human Disturbance Index scores and otter signs recorded in the Arklow FRS survey area (upper extent)


**Figure 4.5** Overview of the Human Disturbance Index scores and otter signs recorded in the Arklow FRS survey area (lower extent)

# 5. Discussion & management recommendations

As outlined below, our findings suggest that otter sign distribution and the location of otter sign marking correlates strongly with less disturbed areas of habitat and lower levels of human-related disturbance. This pattern has routinely been identified in other Irish otter studies of urban and peri-urban areas (e.g. Macklin et al., 2019; Brazier & Macklin, 2020). Our comprehensive approach, utilising total corridor otter survey (TCOS) methodology, has facilitated the identification of the most important areas for otter within the vicinity of Arklow town.

## 5.1 Otter sign distribution

This survey recorded a total of *n*=21 otter signs in the vicinity of the prosed Arklow FRS boundary, comprising approx. 9.8km of linear estuarine, riverine and coastal habitat (**Appendix A**). This equated to an average of 0.46 otter signs per kilometre of linear habitat, a relatively low occurrence rate based on other Irish otter surveys close to urban centres (Triturus data).

Otter signs were distributed throughout the survey area, although signs were typically associated with the Tidal Avoca River and Avoca Estuary. A single slide was located in the vicinity of Arklow Duck Pond and two spraint sites were present (outside of the original survey area) underneath the disused Roadstone Quarry pier (**Figure 4.1, 4.3**). These latter signs were located the lowest disturbance areas present at the local scale (i.e. in scrub and underneath a pier). The highest concentration of signs (such as prints, latrines and spraint) were present along the north bank of the Avoca Estuary, upstream of 19 Arches Bridge, where more natural, lower-disturbance habitat was present (i.e. no tow-paths, heavy vegetation cover and low human disturbance). Such areas are preferentially marked by otter (Macklin et al. 2019). The Avoca Estuary would also provide the best quality foraging habitat within the vicinity of Arklow town. There were no signs recorded along c. 2.5km of coastal habitat on Arklow North and South beaches, reflecting higher human disturbance levels and poorer-quality otter habitat.

Despite the presence of (very) low-disturbance habitat, there were no otter signs recorded along the Marsh River survey area (although an anal jelly secretion was identified near the Marsh River-Avoca Estuary confluence). Surveys at the Arklow Town Marsh did not report otter holts or evidence of otter activity although it was considered likely that the vegetation at the banks of the Arklow Town Marsh pNHA may provide suitable habitat for the species (AQUAFACT, 2020). The lack of signs recorded during this survey is taken to be due to the poor-quality otter foraging and holting habitat present along the river (i.e. wetland and drainage channel habitat). Nevertheless, occasional usage of the Marsh River channel (and wider wetland area) is considered likely (e.g. during higher water levels, waterbird nesting season etc., when otter foraging opportunities increase).

Although the nuances are not fully understood, marking is known to serve a variety of territorial and communicative functions in otter populations (Remonti et al., 2011; Kean et al., 2011; Sittenthaler et al., 2020). Sign marking is routinely associated with prominent features such as large instream boulders, marginal gravel shoals, tree root systems, grassy hummocks and holts, as well as at typical key foraging sites such as weirs and pools (Almeida et al. 2012). Should such suitable features be scarce or unavailable, otter signs may be sporadic or even absent entirely. This factor certainly limited otter sign marking along the more heavily modified sections of the Avoca Estuary (e.g. retaining wall banks). Nevertheless, a lack of signs in an area of habitat does not imply the absence of otter, rather habitat

less appropriate to otter marking. Animals may regularly use such areas for commuting between other areas, as suggested by our spatial results.

## 5.2 No breeding areas identified

No active or inactive otter holts were identified during this survey (November 2021). This is reflective of poor holting opportunities along the heavily modified Avoca Estuary and adjoining coastal habitat, where retaining walls and low-lying boulder revetments are commonplace. Whilst the mature woodland located along the (low disturbance) north bank of the Avoca Estuary (adjoining Arklow Town Marsh) does indeed provide good quality otter habitat (that is regularly used), no holts were recorded in the current survey. In light of regular otter activity along the Avoca Estuary upstream of Arklow, it is considered likely that a breeding area is likely upstream of the survey area. Otter breeding areas (holts) are widely accepted as being especially sensitive to direct human disturbance (Mason & Macdonald, 2009), with otter reproductive success known to be higher in less disturbed habitat; hence their preferential fidelity for low disturbance areas of habitat (Scorpio et al., 2016; Ruiz-Olmo et al., 2011; Loy et at., 2009; Kruuk, 2006).

## 5.3 Management recommendations

The otter data collated in this report will inform mitigation measures to protect otters and their habitat in light of the proposed Arklow FRS.

Of particular note is the identification of an otter resting area (i.e. couch) immediately upstream of 19 Arches Bridge on the north bank (**Figure 5.1**), adjacent to a proposed flood wall installation. Otters, along with their breeding and resting places, are protected under provisions of the Irish Wildlife Acts 1976-2021. Therefore, as works will likely disturb this otter resting area (given the close proximity), a derogation licence will be required from the National Parks and Wildlife Service (NPWS) in advance of any works in this area. As part of mitigation artificial holts could also be installed on the north bank of the river that is secluded from humans and dogs, i.e. situated in an area with a low human disturbance (**Table 4.2** and **Figure 4.4** of the Results section).


**Figure 5.1** Location of otter couch (resting area) identified in vicinity of 19 Arches Bridge, Arklow town

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# 7. Appendix A – otter signs database

**Table 7.1** Summary of the *n*=21 otter signs recorded in the Arklow survey area, November 2021

| Sign ID | Watercourse | Location | Survey section | Bank | Sign | Spraint site (no. spraints) | Sign age | Notes | ITM x | ITM y |
|---|---|---|---|---|---|---|---|---|---|---|
| ARKLOW_21_001 | Arklow duck pond | South bank | POND_001 | South | Slide | n/a | Recent | Slide and trail in scrub to water in low-disturbance area | 725456 | 674109 |
| ARKLOW_21_002 | Avoca Estuary | Arklow Marina | AVO_004 | n/a | Spraint | 2 (5) | Old | On old mooring rope on floating pontoon | 725085 | 673289 |
| ARKLOW_21_003 | Avoca Estuary | North quay | AVO_003 | North | Spraint | 1 (3) | Recent | On pontoon pile guide | 724902 | 673379 |
| ARKLOW_21_004 | Avoca Estuary | North quay | AVO_004 | North | Spraint | 1 (2) | Recent | On fallen steel revetment, collapsed in margins of channel adjacent to floating pontoon | 725036 | 673220 |
| ARKLOW_21_005 | Avoca Estuary | South quay | AVO_009 | South | Spraint | 1 (1) | Recent | On rocky promontory along otherwise featureless section of quay | 724965 | 673172 |
| ARKLOW_21_006 | Avoca Estuary | South quay | AVO_009 | South | Spraint | 1 (1) | Recent | On same rock promontory as above | 724961 | 673175 |
| ARKLOW_21_007 | Arklow South Beach | Roadstone quarry pier | n/a | n/a | Spraint | 1 (1) | Old | Under disused pier | 725335 | 671323 |
| ARKLOW_21_008 | Arklow South Beach | Roadstone quarry pier | n/a | n/a | Spraint | 1 (1) | Recent | Spraint with prey remains (velvet swimming crab) under disused pier | 725350 | 671314 |
| ARKLOW_21_009 | Avoca Estuary | Concrete pipe | AVO_011 | South | Anal jelly | 1(1) | Recent | Anal jelly and slide on top of old concrete wastewater pipe | 724183 | 673607 |
| ARKLOW_21_010 | Avoca Estuary | North bank, opposite Gaelcholáiste na Mara | AVO_001 | North | Prints | n/a | Mixed age | Abundant prints in sand along river margins | 723586 | 673961 |
| ARKLOW_21_011 | Avoca Estuary | Near Marsh River confluence | AVO_003 | North | Anal jelly | 1(1) | Recent | Anal jelly on alder root system, no accompanying spraint | 724690 | 673687 |
| ARKLOW_21_012 | Avoca Estuary | North bank of river, opposite river walk | AVO_001 | North | Slide | n/a | Recent | Regularly used slide on muddy bank to river | 723854 | 673785 |
| ARKLOW_21_013 | Avoca Estuary | North bank of river, opposite river walk | AVO_001 | North | Latrine | 5 (20) | Mixed age | 5 x latrine sites on flat area of muddy bank under mature oak. Abundant prints also | 723948 | 673728 |
| ARKLOW_21_014 | Avoca Estuary | North bank of river, opposite river walk | AVO_001 | North | Latrine | 2 (5) | Recent | Fresh latrines in same area as above | 723956 | 673718 |
| ARKLOW_21_015 | Avoca Estuary | North bank of river, opposite river walk | n/a | North | Prints | n/a | Recent | Fresh, abundant prints in mud under alder on narrow muddy paludal | 723983 | 673697 |
| ARKLOW_21_016 | Avoca Estuary | North bank of river, opposite river walk | AVO_002 | North | Prints | n/a | Mixed age | Abundant prints on mud under birch and near elephant painting | 724248 | 673648 |
| ARKLOW_21_017 | Avoca Estuary | Islands upstream of 19 Arches Bridge | AVO_003 | Mid-channel | Spraint | 1 (1) | Old | Spraint on small island upstream of 19 Arches Bridge, on moss/mud | 724674 | 673650 |

| Sign ID | Watercourse | Location | Survey section | Bank | Sign | Spraint site (no. spraints) | Sign age | Notes | ITM x | ITM y |
|---|---|---|---|---|---|---|---|---|---|---|
| ARKLOW_21_018 | Avoca Estuary | Islands upstream of 19 Arches Bridge | AVO_003 | Mid-channel | Spraint | 1 (3) | Recent | Fresh spraint site on nearest island to 19 Arches Bridge | 724687 | 673621 |
| ARKLOW_21_019 | Avoca Estuary | Islands upstream of 19 Arches Bridge | AVO_003 | Mid-channel | Spraint | 1 (5) | Mixed age | Regular spraint site on same island as above | 724689 | 673626 |
| **ARKLOW_21_020** | **Avoca Estuary** | **19 Arches Bridge** | **AVO_003** | **North** | **Couch*** | **4 (8)** | **Mixed age** | **Couch and regular spraint under privet immediately next to 19 Arches Bridge, downstream of Marsh River confluence** | **724710** | **673634** |
| ARKLOW_21_021 | Avoca Estuary | Arklow South Marina | AVO_007 | n/a | Spraint | 1 (4) | Mixed age | Regular spraint site on old mooring rope of floating pontoon | 725137 | 672927 |

*** Conservation value:** Otters, along with their breeding and resting places (i.e. holts and couches), are protected under provisions of the Irish Wildlife Act 1976-2021. Otters are also listed under Annex II and IV of the Habitats Directive [92/42/EEC].

# 8. Appendix B – survey images

**Plate 8.1** Otter prints in muddy paludal area along the Avoca Estuary (opposite Ghaelcoláiste na Mara school)

**Plate 8.2** Otter latrine located along the north bank of the Avoca Estuary

**Plate 8.3** A classic (and regularly used) otter spraint site on a prominent marginal mound along the Avoca Estuary (north bank of river)

**Plate 8.4** Otter spraint site (adjacent to GPS) located on small island immediately upstream of 19 Arches Bridge

**Plate 8.5** Otter couch area in dense scrub immediately upstream of 19 Arches Bridge (north bank) with slide

**Plate 8.6** Photographing an otter spraint site on floating pontoon mooring pile guide along the North Quay

**Plate 8.7** Significant pollution point source along North Quay near Arklow Omniplex (November 2021)

**Plate 8.8** Significant pollution point source emanating from an unnamed, culverted stream along the Arklow river walk (November 2021)

**Plate 8.9** Otter bolt hole (path) and slide to water recorded at the northern end of Arklow Duck Pond

**Plate 8.10** Otter spraint (with crab & fish remains) recorded underneath Roadstone Quarry pier


Triturus Environmental Ltd.

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T12 ECF3.

# Appendix E

Correspondence with Arklow Marina

# E1 Correspondence with Arklow Marina

# FW: FW: Contact Arklow Flood Relief Scheme

Marc Devereux
**Sent:**04 January 2022 10:17
**To:** John Daly

**From:** Arklow Crane Hire [mailto:info@ach.ie]
**Sent:** Monday 12 October 2020 16:16
**To:** John Daly
**Subject:** Re: FW: Contact Arklow Flood Relief Scheme

Many thanks for this.
Niall
Arklow Marina Ltd
North Quay,
Arklow,
Co. Wicklow.
Tel: 0402 32619
Mob: 087 2588 078

On Mon, 12 Oct 2020 at 16:11, John Daly <JDaly@wicklowcoco.ie> wrote:

> Niall,
>
> Thanks for taking my call, I've attached a draft copy of the proposed scheme, we are aiming to go to planning in Q1 2021, if granted its hoped to begin construction in 2022 for a 3 year period. The dredge works close to the Marina is estimated to take 4 months commencing Q3 2025. As you can see there's 4 main aspects to the design large scale dredging of the Avoca River, Underpinning the 19 Arch Bridge, an Upstream Debris and Gravel Trap and Flood Defence Walls (and Embankments). I'd be happy to discuss the scheme or give more information with anyone if they would like to contact me.
>
> *Regards,*
>
> ***John Daly***
> *MEng CEng MIEI*
> Executive Engineer | Planning, Development and Environment
> Wicklow County Council | Station Road | Wicklow Town | Co. Wicklow
> **Phone**: 0404 20100 |**Email: jdaly@wicklowcoco.ie**


**From:** Arklow Shipping [mailto:personnel@asl.ie]
**Sent:** Tuesday 6 October 2020 16:30
**To:** John Daly
**Subject:** Re: Contact Arklow Flood Relief Scheme

**Doc-No. 9254741 06/OCT/2020 (TUE) 16:30 (+0100) BD**
**Arklow Shipping**
**North Quay, Arklow, Ireland**

**Tel: +353 402 39901**
**Fax: +353 402 39902**
**AH: +353 87 2375189** ***(Brian Dempsey After Hours)***
**AH: +353 87 7391796** ***(Sandra Finn After Hours)***
**AH: +353 86 8861665** ***(Paul Canavan After Hours)***
**AH: +353 85 1515932** ***(Peter Fitzgerald After Hours)***
**Email: personnel@asl.ie - *Please be aware emails may not be monitored outside of office hours.***
**www: asl.ie**

**john**

**for arklow sailing club it would be best to post the letter addressed to**

**'the commodore'**
**mr colin calahanan**
**arklow sailing club,**
**north quay**
**arklow**

**but we here would also like to be very interested**

**regards**
**brian**

**---------- Original Message ----------**

**From : John Daly (JDaly@wicklowcoco.ie)**
**To : personnel@asl.ie (personnel@asl.ie)**
**Subject : Contact Arklow Flood Relief Scheme**
**Date : 06/10/2020 12:15:10**

**Hi Brian,**

**I was given your name from Ann Breslin in Arklow, I'm the Project Engineer on the proposed River Avoca (Arklow) Flood Relief Scheme, and I'm looking to discuss the scheme with some stakeholders such as Arklow Sailing Club. Is there anyone in particular who I could contact directly?**

***Regards,***

***John Daly***
***MEng CEng MIEI***
**Executive Engineer | Planning, Development and Environment**
**Wicklow County Council | Station Road | Wicklow Town | Co. Wicklow**
**Phone: 0404 20100 |Email: jdaly@wicklowcoco.ie**