
Non – Technical Summary

Waterford City Public Infrastructure Project

Flood Defences West

Non-Technical Summary of the Environmental Impact Assessment Report

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1.0 Introduction

This Environmental Impact Assessment Report (EIAR) is prepared for the proposed Waterford City Public Infrastructure Project, Flood Defences West, hereafter referred to as the 'proposed development'. The EIAR has been prepared in accordance with the requirements of Annex IV of Directive 2011/92/EU (as amended by Directive 2014/52/EU), and comprises "A statement of the effects, if any, which the proposed development, if carried out, would have on the environment" (Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (EPA, 2017)).

This EIAR has been prepared by Roughan & O'Donovan Consulting Engineers and a team of specialist sub-consultants on behalf of the applicant Waterford City and County Council. This EIAR forms part of the application that will be submitted by Waterford City and County Council to An Bord Pleanála for their approval of the proposed development.

It should be noted that surveys, assessments and information that form the basis of this EIAR are based on the current design of the proposed development which has been developed to a stage that permits a fully informed EIA. While some developments and refinements of the current design may occur during the detailed design stage, any such iterations of the development, if approved, will not include any significant adverse impacts on the environment not dealt with within this EIAR.

1.1. Overview

Roughan & O'Donovan Consulting Engineers were appointed by Waterford City and County Council to lead the Waterford City Public Infrastructure Project. The Project is being carried out in order to improve the public infrastructure in Waterford's North Quay area to enable the redevelopment within a Strategic Development Zone (SDZ). The redevelopment of SDZ is outside the scope of this project.

The Waterford City Public Infrastructure Project consists of several separate parts, such as rock face stabilisation, access road infrastructure, new railway station and Transport Hub, River Suir Sustainable Transport Bridge which have all been granted separate planning permissions. The Waterford City Public Infrastructure Project also comprises the provision of flood protection measures to the west of Plunkett Station, the Waterford railway station. The proposed Flood Defences West will provide flood protection measures under the scope of Waterford City Public Infrastructure Project.

The proposed development comprises c.1.1km of flood protection measures in the townlands of Mountmisery and Newrath in Co. Waterford, and the townland of Newrath in Co. Kilkenny located along the north bank and within the foreshore of the River Suir in Waterford City. The development extends approximately 1km to the west and 100m to the east of the Plunkett Station, following the alignment of the existing quay wall and the Iarnród Éireann (IÉ) railway corridor which is bound to the north of the proposed development.

The development will provide protection for lands and the existing built assets in Waterford City from future flood events, such as the existing and future rail infrastructure in the vicinity of Plunkett Station and the Rice Bridge roundabout over its extents. It will also form a continuation of the flood protection measures proposed along the North Quays SDZ as part of the new Transport Hub development.

The design flood level of the proposed flood protection measures is +4.0m OD (metres above Ordnance Datum), with the top-of-the-wall flood protection measures of +4.30m OD.

A high-level description of the proposed development is provided below:

- Construction of c.365m of impermeable shallow underground trench (0.35m wide and up to 3m deep) within Iarnród Éireann's Plunkett Station car park.
- Construction of c.185m of overground flood defence measures for the R680 Rice Bridge roundabout and along the 3 roundabout arms; R448 Terminus St., R711 Dock Rd.
- Remedial works to c.75m section of existing quay wall by raising its height to between 0.6m and 1.2m.
- Construction of c.730m of sheet pile flood defence wall with the top-of-the wall level at +4.30mOD consisting of:
 - c.540m of sheet pile wall within the foreshore from the riverside, 1m from the front face of the existing quay wall.
 - c.190m of sheet pile wall will be installed on Iarnród Éireann land, 1m behind the existing quay wall. Construction of c.20m underground isolation structure comprising of a sheet pile cut-off wall and a concrete capping beam. The concrete capping beam will facilitate the installation of temporary overground flood barriers to the structure should these be required to be implemented during a flood event.
 - Demolition of up to 3m of existing quay wall at transition point between the landside and riverside sheet pile wall.
- Drainage works will consist of:
 - Remedial works to the existing drainage outfalls to the River Suir.
 - Construction of new trackside drainage and groundwater drains to include 2 no. pumping stations and surface water outfalls to the River Suir.
 - Demolition of c. 540m of existing quay wall south of the railway corridor to approximately 800mm below the existing ground level. The demolition of approx. 25m of the existing quay wall to a level of between 2 to 4m below existing ground level to facilitate the construction of a surface water pumping station.
- And all ancillary works.

Detailed description of the proposed development is provided in Chapter 4 Description of Proposed Development in EIAR Volume 2. The location of the proposed development is shown in Figure 1.1 in Volume 3 of this EIAR.

1.2. Requirement for an EIAR

The planning application for the development of the Flood Defences West project is being submitted under Section 175 and Section 226 of the Planning and Development Act 2000 (as amended).

Section 175 (1) and 175 (3) states:

"175 – (1) Where development belonging to a class of development, identified for the purpose of section 176 , is proposed to be carried out –

*by a local authority that is a planning authority, whether in its capacity as a planning authority or in any other capacity, or
by some other person on behalf of, or jointly or in partnership with, such a local authority, pursuant to a contract entered into by that local authority whether in its capacity as a planning authority or in any other capacity.*

175 – (3) *Where an environmental impact assessment report has been prepared pursuant to subsection (1), the local authority shall apply to the Board for approval.”*

Section 226 (1) states the following:

“226.—(1) *Where development is proposed to be carried out wholly or partly on the foreshore—*

- (a) by a local authority that is a planning authority, whether in its capacity as a planning authority or otherwise, or*
- (b) by some other person on behalf of, or jointly or in partnership with, a local authority that is a planning authority, pursuant to an agreement entered into by that local authority whether in its capacity as a planning authority or otherwise, (hereafter in this section referred to as “proposed development”), the local authority concerned shall apply to the Board for approval of the proposed development.”*

The proposed development is being carried out by Waterford City and County Council and will involve the construction of c. 1.1km of flood defence measures, parts of which will be developed within the foreshore, and therefore the application will be made to An Bord Pleanála for approval under Sections 175 and 226 of the Planning and Development Act 2000 (as amended).

2.0 Need for the Proposed Development

Over the past 15 years, there has been a sequence of flood events at, and in the vicinity of Plunkett Station as reported in news articles¹ and observed by the Iarnród Éireann (IÉ) Inspection Staff – the latest being in October of 2020 (see Plate 2.1 below). It has been found that large sections of the existing quay wall are of inadequate height and are below the design flood level, rendering it ineffective at protecting IÉ lands and associated rail infrastructure against flooding.

¹ www.journal.ie published an article on the 17th of Oct. 2012 entitled ‘Waterford train station is flooded... very flooded’.

www.theirishindependent.ie published an article on the 11th of March 2008 entitled “Escaping in the eye of the storm” and describes that rail services at the existing Plunkett train station were affected due to flooding resulting in bus transfers to be put in place.

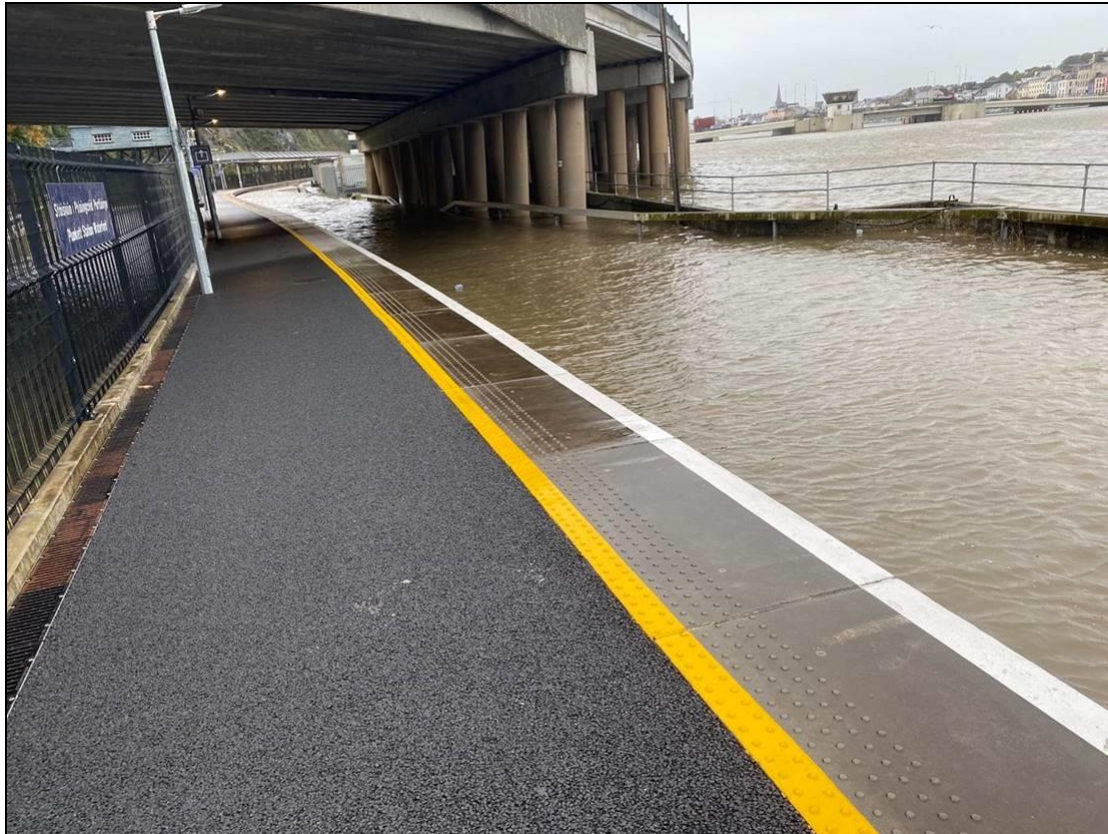


Plate 2.1 Flooding at Waterford (Plunkett) Station in October 2020

Flooding of the existing railway line at and to the west of Plunkett Station impedes on the operation of the railway service to and from Waterford City and has the potential to damage the rail infrastructure. The need for protection of the existing infrastructure and to build resilience against climate change induced flood events is outlined at national, regional, and local planning policy, specifically within the planning and guideline documents listed in Table 2.1. The development of flood defence measures will enable future development of the Waterford North Quays in a sustainable manner as well as preserving the existing rail infrastructure in proximity of Plunkett Station. The proposed development will also facilitate the upgrade of rail infrastructure proposed as part of the separately approved SDZ Transport Hub.

Table 2.1 Overview of Policy Documents which Support the Proposed Development

Policy Level	Policy Document
European	The EU Floods Directive
National	Project Ireland 2040, National Planning Framework and National Development Plan, 2018 – 2027;
	Investing in the Transition to a Low-Carbon and Climate-Resilient Society 2018-2027
	National Adaptation Framework: Planning for a Climate Resilient Ireland
Regional	Southern Regional Spatial and Economic Strategy (S-RSES)
Local	Waterford City Development Plan 2013-2019 (as extended)
	Kilkenny City and County Development Plan 2021 – 2027
	Ferrybank Belview Local Area Plan (LAP) 2017 – 2023

Policy Level	Policy Document
	Waterford North Quays SDZ Planning Scheme 2018
	Climate Change Adaptation Strategy 2019 – 2024

3.0 Alternatives Considered

3.1 Constraints

The main physical and environmental constraints within the study area include the existing railway line to the north, the River Suir and the existing quay wall to the south. The River Suir also forms part of the Lower River Suir Special Area of Conservation (SAC). The aforementioned constraints allowed for a limited number of options to be developed and considered as part of the assessment of alternatives. Two options, Option A and Option B were developed as part of the option selection process.

Table 3.1 provides the description of the two options considered, which both commence in front of the Plunkett Station and continue westwards in parallel to the alignment of the existing quay wall, see chainage (Ch.) reference points in Table 3.1. The design of the preferred option has been further developed since the options assessment stage, which is why the description of proposed works in Section 4 of this Report and in Chapter 4 of the EIAR is slightly different to either of the options presented below.

Table 3.1 Description of Options Considered

Chainage (Ch.) see Note 1	Option A	Option B
0.000 to 0.270	No works are proposed at this location as part of Options A and B as the existing flood wall between Chainage 0.000 and 0.270 is of sufficient height (i.e., above the design (top-of-wall) level of +4.3mOD).	
0.270 to 0.370	<u>Remedial Works to Existing Masonry Flood Wall</u> Raising of the existing masonry flood wall for c.100m to add between 0.7m and 1.3m in height is proposed as part of both options.	
0.370 to 0.520	<u>Riverside Sheet-Pile Flood Defence Wall</u> This section requires the construction of approximately 150m of new flood defence wall within the foreshore of the River Suir for both options. The sheet pile wall would be constructed approximately 1 metre in front of the existing quay wall (riverside) in the River Suir mudflats and the gap between the new wall and the existing quay wall would be backfilled with fill material. The reason for placing sheet piles in river in this section is due to requirements for minimum clear distance from rail tracks to the nearest structure that have to be respected according to Iarnród Éireann guidelines.	
0.520 to 0.950	<u>Landside Sheet-Pile Defence Wall (nightworks)</u> Construction of a sheet piled flood defence wall on land between the existing quay wall and the rail tracks, typically 1.0m behind the existing quay wall. The works will not encroach into the foreshore of the River Suir. As part of Option A, the works will be completed overnight (between 21.30 to 05.30	<u>Riverside Sheet-Pile Flood Defence Wall</u> Construction of a new flood defence wall located within the foreshore of the River Suir. This section of the driven sheet pile wall will be constructed from the riverside. The sheet pile wall would be constructed approximately 1.0m in front of the existing quay wall in the River Suir mudflats and the gap would

Chainage (Ch.) see Note 1	Option A	Option B
	hours) due to the requirement for possessions of the railway line. These reduced working hours will prolong the construction programme.	be backfilled with fill material. This would be a continuation of the sheet pile wall constructed between Chainages 0.370 and 0.520 section using the same method. Minimal night-works and rail possessions are required.
0.950 to 0.1090 and isolation structure	<p><u>Landside sheet piles</u></p> <p>Construction of a sheet piled flood defence wall on land between the existing quay wall and the rail tracks for both options. The works will not encroach into the foreshore of the River Suir. The works are envisaged to be undertaken during the day with a temporary fence separating the works from the railway tracks and will therefore not affect IÉ rail traffic. The underground isolation structure across and under the rail-line will be constructed 950m from the Plunkett Station. The structure will be approximately 25m in length and will require nightworks and track possessions.</p>	
0.000 to 0.1090	<p><u>Drainage.</u> Upgrade of drainage system and outfalls. Replacement/ provision of flap-valves on existing and proposed back-of-wall drainage. New drainage will be limited to the relief of any trapped groundwater behind the new wall. No alteration or addition to existing land drainage is proposed.</p>	
Notes	<p>Note 1: The design of the preferred option has been further developed since the options assessment stage, which is why the description of the proposed development in Section 4 of the NTS and in Chapter 4 of the EIAR Vol 2 has slightly different chainages to either of the options presented. Further design considerations implemented for the proposed development are summarised in Section 3.3 of the NTS and detailed in Chapter 3 of EIAR Volume 2.</p>	

3.2 Multi-Analysis Criteria Applied

A methodology was developed for the assessment of the two flood defence options considered. Options A and B were assessed in accordance with the Common Appraisal Framework (CAF) criteria of Safety, Economy, Integration, Environment, Accessibility & Social Inclusion, having regard to the associated sub-criteria outlined in the Transport Infrastructure Ireland's (TII) *'Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis'*. The options considered were not assessed under the Physical Activity criteria as they are considered to be very similar, with the adjacent lands being either within C oras Iompair  ireann (CI ) ownership which are not accessible to the public, or mudflats which are unsafe for public access. As such, the proposed options will not impede on any existing cycling/walking infrastructure, nor will they provide any additional infrastructure to enhance physical activity in the area.

While the two options were found to be comparable for most of the MCA criteria, the main differences arose under the following sub- criteria:

- Under the heading of Economy:
 - Construction and Cost
 - Constructability
- Under the heading of Environment:
 - Noise and Vibration
 - Landscape and Visual
 - Biodiversity

○ Soils and Geology

Taking into consideration the impact assessment of the proposed flood defence options under the MCA sub-criteria of land and cost, constructability noise and vibration, biodiversity and soils and geology, Option B was identified as the preferred option.

The larger extent of landside works proposed as part of Option A presented constraints both from economical, constructability and biodiversity perspectives when compared with Option B. In terms of biodiversity, the extended night-time works, and construction programme proposed as part of Option A is likely to cause disturbance to the Lower River Suir SAC over a longer period, and thus, will cause a slower recovery time. However, Option B will result in a greater habitat loss when compared with Option A.

Option A requires an installation of sheet piles from the landside over a larger area than Option B and will require longer night-time works that introduce greater complexity in terms of constructability, increased construction duration and health and safety risk. The longer night-time works required for construction of Option A are also likely to have a greater impact on noise sensitive receptors. Economically, the landside sheet piling installation over a longer distance proposed is more costly than driving sheet piles from a barge as proposed as part of Option B. Option B requires greater import of fill to backfill the gap between the new riverside sheet pile wall and the existing quay wall when compared to Option A. As such, Option A is preferred under the soils and geology sub-criteria, however the overall volumes of imported fill, and thus the significance of the impact, are very small to start with.

Option B is also seen as advantageous as it removes the risk of the existing quay wall, which is in poor condition, from collapsing into the River Suir, and avoiding any subsequent impacts to the Lower River Suir SAC over the design life of the proposed development.

Option B was therefore selected as the Preferred Option.

3.3 Further Design Considerations

As noted in Section 3.2, a number of design changes have been introduced to the design of the proposed development since Option B was determined as the preferred option in the option selection process. The main changes which have been made to Option B and which now form part of the design of the proposed development described in Section 4 of this NTS and in Chapter 4 Description of the Proposed Development (see, EIAR Volume 2) are as follows:

- Very minor changes in the alignment of the sheet pile wall have been introduced upon further review of the existing topography, quay wall geometry and condition and other obstacles.
- The extent of the concrete wall required to be remediated was reduced from 100m in length, to 75m.
- Inclusion of underground flood protection measures in a form of an impermeable trench in front of Plunkett Station. Measures to protect IÉ infrastructure and associated utilities from groundwater seepage were deemed necessary after reviewing further available groundwater monitoring data.
- Inclusion of overground flood protection measures for the Rice Bridge Roundabout in the form of glass flood barriers and demountable flood barriers.

- Drainage design and description is at a more advanced level compared to the options stage. However, no fundamentals were changed, and the drainage elements described as part of Options A and B have been retained. The vast majority of drainage works are the same for both options.

The design changes outlined above are stand-alone construction elements, and it is very likely that they would have been identical in Options A and B and as such, would not have affected the option selection process.

4.0 Description of the Proposed Development

Chapter 04 in Volume 2 of the EIAR provides a description of the proposed Waterford Flood Defences West which is summarised below.

The proposed development comprises c.1.1km of flood protection measures in the townlands of Mountmisery and Newrath in Co. Waterford, and the townland of Newrath in Co. Kilkenny located along the north bank and within the foreshore of the River Suir in Waterford City, refer to Figure 1.1 in Volume 3 of this EIAR. The development extends for approximately 1km to the west and 100m to the east of the Waterford (Plunkett) Station, following the alignment of the existing quay wall and the Iarnród Éireann (IÉ) railway corridor located to the north of the proposed development.

The proposed flood defence measures are for the protection of critical infrastructure including the existing Plunkett Station, the railway line east and west of Plunkett Station and the Rice Bridge roundabout. The proposed development will also form a continuation of the flood protection measures, Flood Defences East proposed along the North Quays Strategic Development Zone (SDZ) as part of the Transport Hub Part 8 planning approval, eliminating the risk of flooding to the Transport Hub.

An overview of the structural elements of the proposed development is provided from east to west below, and should be read in conjunction with Figure 4.1 to Figure 4.6 in Volume 3 of this EIAR:

- Construction of c.365m of underground flood defences (an impermeable shallow trench approx. 0.35m in width and up to 3m in depth) from Ch.0.0 to Ch.365 to cut off the potential groundwater seepage during high tide events. It is possible that parts of these underground flood protection measures may be omitted during detailed design or may be implemented on a phased basis depending on the ongoing groundwater monitoring results.
- Total of c.185m of overground flood defences from Ch.0.40 to Ch.210 consisting of:
 - c.170m of glass flood barrier on the river side of the road edge vehicular parapets on Rice Bridge roundabout and along the 3 roundabout arms (R680 Rice Bridge, R448 Terminus St. and R711 Dock Rd).
 - c.15m of demountable flood barriers on the R680 Rice Bridge for the section leading to the North Quays Strategic Development Zone.
- Remedial works to the existing quay wall from Ch.285 to Ch.360 by raising its height by 0.6m to 1.2m to conform with the design top-of-wall level of +4.30m OD.
- Construction of a sheet pile flood defence wall from Ch.360 to Ch.1090, with the top of wall at +4.30 mOD, to protect against overground flooding and underground groundwater seepage:

- From Ch.360 to Ch.900 the sheet pile wall will be installed within the foreshore from the riverside, 1m from the front face of the existing quay wall. The space between the sheet pile wall and the front face of the existing quay wall will be filled with clean imported granular fill. The intertidal zone of the sheet pile wall within the foreshore will be fitted with pre-cast concrete cladding material ("eco-seawall").
- From Ch.900 to Ch.1090, the sheet pile wall will be installed on land from the landside, 1m behind the existing quay wall.
- The demolition of minor localised section of existing quay wall (max length of 3m) will be required in order to connect the in-river sheet piles with the landside sheet pile walls at Ch.900.
- Construction of c.20m of underground isolation structure at Ch.1090, consisting of a sheet pile cut-off wall and a concrete capping beam. The concrete capping beam will facilitate the installation of temporary overground flood barriers (e.g. water filled inflatable flood barriers) should these be required to be implemented during a flood event.

Drainage works will be carried out for the entire extents of the proposed flood defence measures i.e., from Ch.0.0 to Ch.1090 as shown in Figure 4.11 to Figure 4.20 in Volume 3 of this EIAR:

- Remedial measures to the existing drainage outfalls to the River Suir from Ch.0.0 to Ch.1090 by extending them to reach an outlet within the new sheet pile wall, or to be retrofitted to pass through the new sheet pile wall, into the River Suir.
- In the vicinity of Plunkett Station, from Ch.0.0 to Ch.470, new trackside drainage and groundwater drains are included in the upgraded drainage works, which will include a pumping station (at approx. Ch.380) and a new surface water outfall structure in the River Suir at Ch.390.
- From Ch.370 to Ch.1090, new drainage system will be installed for trackside drainage and also to allow groundwater cut-off behind the sheet pile wall to drain to the River Suir with 2 No. new outfalls to the River Suir terminating at the front face of the proposed flood defence sheet pile wall (at Ch 550 and Ch.900). The works will also include the construction of pumping stations at Ch.390 and Ch.550 respectively.
- Existing surface water outfalls at Ch.470 and Ch.490 which extend into the riverbed will be demolished to allow installation of the new flood defence wall; these will be replaced by new surface water outfall structures in the River Suir.
- Demolition of the existing quay wall to approximately 800mm below the existing ground level and removal of handrails from Ch.360 to Ch.900 where it is level with or above, the existing ground level. The demolition of approx. 25m of the existing quay wall to a level of between 2 to 4m below existing ground level will be required in order to facilitate the construction of a surface water pumping station at Ch.390.
- All drainage outfalls (new and existing) will be fitted or retrofitted with non-return valves to prevent tidal water ingress.

Table 4.1 Overview of Proposed Flood Defences West

Chainage	Proposed Works
Ch.0.0 to Ch.365	Construction of an impermeable trench
Ch.0.40 to Ch.210	Construction of overground flood defences at Rice Bridge Roundabout.
Ch.285 to Ch.360	Remediation of existing quay wall
Ch.360 to Ch.1090	Construction of sheet pile flood defence wall
Ch.0.0 to Ch.1090	Drainage works

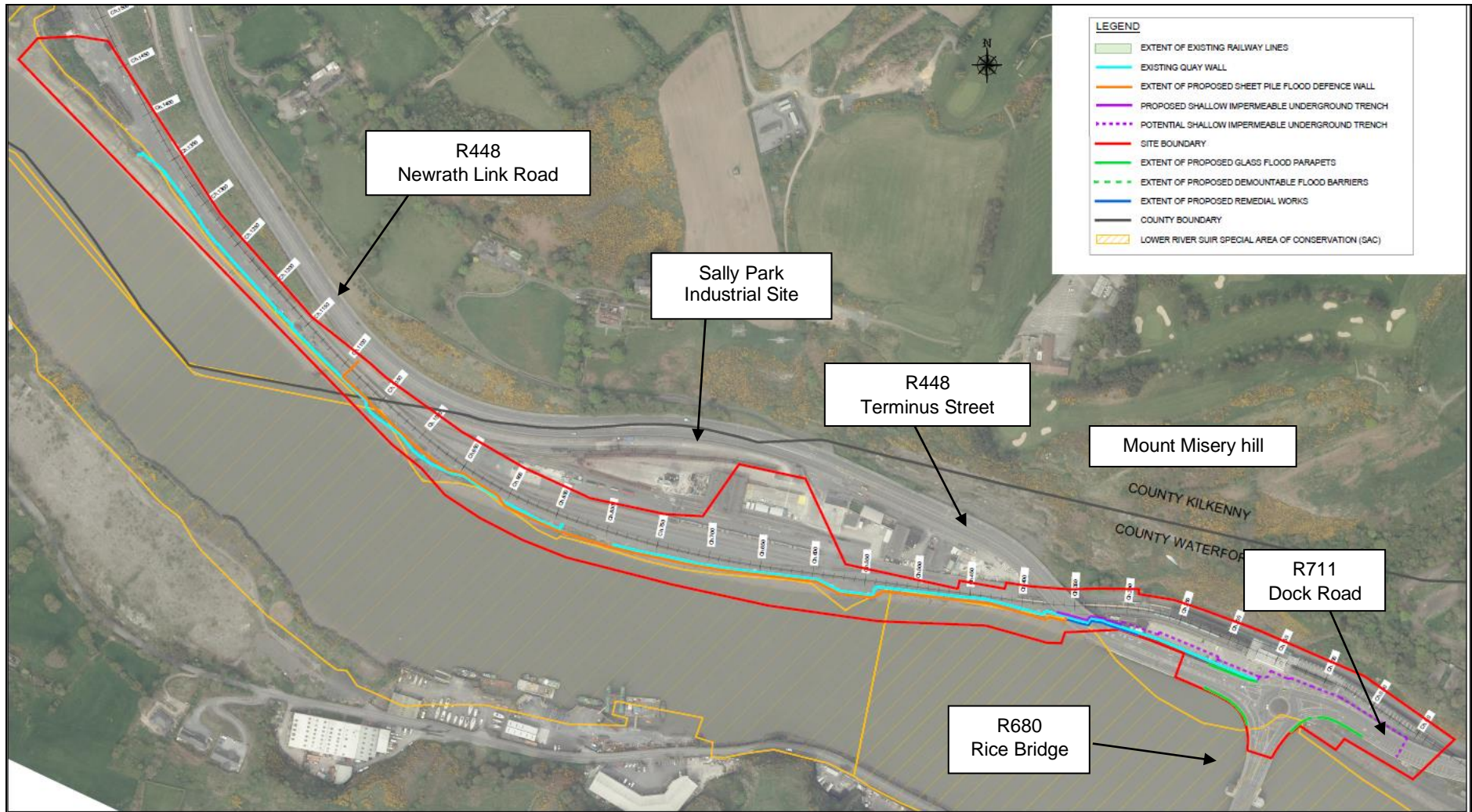


Plate 4.1 Location of proposed Waterford City Public Infrastructure Project - Flood Defences West (Scale: 1:1400)

The main temporary construction compound area is situated at Ch.1340, approximately 300 m northwest of the proposed development works, in a very wide cess area between River Suir and rail lines. The land is in C oras Impair  ireann (CI ) ownership and is operated by Iarnr d  ireann (I ). A public level crossing is situated nearby which facilitates access to the works area.

An ancillary site compound is proposed in the I 's Sally Park yard at Ch.640.

See Figure 4.21 in Volume 3 of this EIAR for locations of the temporary main and ancillary construction compounds.

No construction traffic will be permitted to enter the construction site via Waterford City Centre. Material and machinery for remedial works to the existing quay wall and impermeable trenching will be routed from the ancillary compound at Sally Park depot via R448 (Terminus Street) to the works area in front of the Plunkett station. It is envisaged that the loading of the pontoon with the steel sheet piles can be carried out by crane over the riverbank from the main construction compound area. From the main construction compound, the machinery can also track down the cess into the working area for the purpose of landside sheet piling and associated drainage works.

Environmental Management Plans have been drafted as part of this EIAR which will be finalised by the successful contractor prior to any demolition, excavation or construction phase to ensure commitments included in the statutory approvals are adhered to.

5.0 Traffic Analysis

The traffic assessment determines the additional traffic loading resulting from the construction stage of the proposed development and considers the potential impact on the surrounding road network and traffic conditions. Appropriate traffic management measures are then identified.

The proposed works will be carried out on both the riverside and the landside. With the exception of overground flood defence measures proposed for the Rice Bridge roundabout, the landside works will be carried out within the Iarnr d  ireann (I ) lands.

Considering the anticipated construction phase sequences for the proposed works, the peak of the HGV traffic load is estimated to occur for a total of 7 weeks of the 30-35-week construction programme. The peak loads are associated with the coinciding construction timeframes for construction of the impermeable trench, the sheet pile wall, installation of cladding and drainage works which will result in an increase in the number of HGVs on the existing road network of between 26 and 32 HGV movements/day over 7 weeks. Lower construction traffic movements are expected during the remainder of the construction programme, ranging from 4 to 20 HGV movements per day.

At the peak of the construction stage, the proposed development will result in an 0.1% increase in total traffic movements and an increase of 1.2% in HGV movements over the course of a working day on the R448 Terminus Street. This is likely to have *negative, temporary, not significant* impacts on the existing road network.

There are no predicted impacts on traffic as a result of the operational stage. Periodic maintenance works will be required during the operation phase of the proposed development however these works are not likely to generate significant volumes of traffic. The proposed development will protect the existing rail and road infrastructure within the site boundary from future flood events, which will have a *positive, permanent* impact on transport.

6.0 Population and Human Health

The EIAR has considered and assessed the likely significant effects with regard to population and human health associated with both the construction and operational phases of the proposed Flood Defences West. The proposed development is located in two Electoral Divisions (EDs), Ferrybank and Kilculliheen. According to the 2016 census, the total combined population residing within these EDs was 6,104 persons. Together, both EDs comprise the Waterford City suburbs north of the River Suir. The land uses within the footprint of proposed development is mainly industrial, focused on rail infrastructure to include the Waterford rail corridor and Plunkett Station, with road infrastructure encompassing the Rice Bridge roundabout and approach roads at the eastern extents of the development.

The assessment has found that construction activities may impact on journey times during specific periods as part of construction works for both roads and navigational channel users. Temporary traffic management arrangements are to be implemented to facilitate ongoing access for road users throughout the works. The potential impacts are likely to have *negative, temporary, not significant* impacts on the existing road network. Access will be maintained on the navigational channel throughout the construction phase. All boat users including search and rescue organisations vessels will continue to have access as required, therefore *no significant* impact on marine journey times is likely.

Access will be maintained to Plunkett Station and properties throughout the construction phase therefore no severance is predicted. Pedestrians will experience *imperceptible, neutral, temporary* severance.

It is envisaged that that the proposed development is a sufficient distance away from the Waterford City Core economic area that impacts to amenity and journey characteristics will be limited during the construction phase. Impacts / disruptions resulting from temporary noise, and visual disruption may impact sensitive sites such as hotels and other commercial properties in the vicinity and are likely to have a *negative, slight to moderate temporary* impact on economic operators.

Emissions from the construction activities such as dust and risk of accidents were found to potentially have negative, temporary impacts. Noise emissions from construction activities such as plant and machinery on site is likely to have *negative, slight to moderate* impact on all sensitive receptors. However night-time piling works may cause a *negative, significant and temporary* impact on some residential properties (see Chapter 12 Noise and Vibration in EIAR Volume 2). Whilst the entire programme of works is expected to last approx. 7 months, individual activities such as piling will likely last for a smaller percentage of the entire programme (approximately 4 weeks of night-time piling is required) and as such, these exceedances will not be occurring continuously throughout the construction phase. The piling works are expected to take place at a range of distances from the sensitive receptors.

All construction stage impacts will be temporary in nature and reduced and managed by Construction Environmental Management Plan (CEMP) and associated Environmental Operating Plan (EOP) and Construction and Demolition Waste Management Plan (CDWMP) and the range of mitigation measures of this EIAR.

The operation of the proposed development is expected to have *positive, long-term* impacts on the population and human health of the City and South East region, by reducing flood risk. The proposed development supports the national, regional and local policies and is seeking to protect the existing built infrastructure, such as the existing Plunkett Station and the associated rail infrastructure from flood damage. The proposed development will also support the sustainable growth of Waterford City on the north side of River Suir by minimising future flood risk attributed to climate change.

The development will also benefit the adoption of sustainable transport for the population's journey characteristics, journey amenity and general amenity due to the improvement in transportation infrastructure's resilience to climate change.

7.0 Biodiversity

The natural environment in the Zone of Influence of the proposed development was examined through a combination of desk studies, consultations and field surveys. Eight ecological receptors of Local Importance (Higher Value) or above are likely to be impacted upon by the proposed development. These are:

- River Suir, including Annex I 'Estuaries'
- Intertidal Habitats, including Annex I 'Mudflats and sandflats not covered by seawater at low tide'
- Shoreline Habitats, including Annex I 'Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)'
- Fish Species, including Annex II migratory species
- Otter
- Bat Species
- Invasive Alien Species
- Nationally Designated Sites

The potential impacts of the proposed development on the Key Ecological Receptors above were characterised and their significance was assessed. Where negative impacts were identified, mitigation measures have been proposed to avoid or minimise these impacts. Enhancement measures have been proposed to maximise the Biodiversity value of the proposed development, in accordance with national, regional and local policy, and ensure that there will be No Net Loss of Biodiversity.

Provided that the proposed development is constructed and operated in line with the mitigation described in Chapter 7 Biodiversity (see EIAR Volume 2), and the accompanying Natura Impact Statement, there will be no significant residual impacts on Key Ecological Receptors, either from the proposed development itself or in combination with other plans or projects. While there will be a loss of approximately 800m² of two European protected habitats, namely 'Estuaries' and 'Mudflats and sandflats not covered by seawater at low tide', there will be no effect on any European designated sites or the conservation status of these habitats nationally.

Based on the assessment of the pre- and post-mitigation impacts from the proposed development, including the ecological enhancements, the overall conclusion is that there will be No Net Loss of Biodiversity within the Zone of Influence as a result of the proposed development. Furthermore, the final specification for the eco-cladding ("eco-seawall") presents an opportunity to achieve an overall Net Gain for Biodiversity in relation to the Flood Defences West.

The Natura Impact Statement for the proposed development concluded, in view of best scientific knowledge and the Conservation Objectives of the relevant European designated sites, that the Flood Defences West, either individually or in combination with other plans or projects, will not adversely affect the integrity of the Lower River Suir SAC, the River Barrow and River Nore SAC, or any other European site.

8.0 Soils and Geology

This chapter describes the natural characteristics of the receiving environment, in terms of soils and geology. The likely significant impacts of the proposed development on these resources are assessed and where required, mitigating measures are put in place to avoid, reduce or minimise the impact of the proposed development.

The historical maps show that up to the 1850s, the land use within the area of proposed development was a mix of unused and agricultural lands. With the introduction of the rail infrastructure in the second half of 19th century, the land use was changed into railway and the old shoreline was slightly extended and fortified with a quay wall.

The bedrock geology consists of slates, shales and siltstones of Ballylane Formation over the eastern two thirds of the proposed development area, and conglomerates and sandstones of Carrigmaclea Formation at the western third of the area. The bedrock is typically found in excess of 10m below ground level, except in front (to the south) of Plunkett station where it is shallower due to the proximity to Mount Misery Hill. The quaternary sediments typically consist of Made Ground (thickness increasing west to east) overlying thick layers of soft sandy and silty alluvium, overlying modest depths of glacial overburden, overlying bedrock.

The contamination testing uncovered no hazardous material, with some samples exceeding inert and increased Waste Acceptance Criteria (WAC) limits.

Relatively little excavation and fill importation is required for this project given its size, due to design relying on significant lengths of driven steel sheet piles. As a consequence, the impacts from excavation and importation of material are assessed as *non-significant permanent negative*, mostly due to need for imported backfill for the gap between the proposed riverside sheet pile walls and the existing quay wall and for suitable drainage material. This is further mitigated by the reuse of the excavated material, either as landscaping across the site, or reuse of excavated material when forming impermeable trenches.

Installation of the sheet pile wall will also create *slight permanent positive* impact by controlling the transport of sediment and contamination across the rail yard and into the River Suir and preventing further fouling of the mudflats from collapsing parts of the quay wall.

Mitigation measures are incorporated through the design of the proposed development, while further specific measures are proposed, including the preparation of a project-specific Construction Environmental Operating Plan (CEMP) by the Contractor to address potential construction related impacts.

Following mitigation measures, the residual impact on soils and geology will be negative, non-significant and permanent as a result of covering the soft silts in the mudflats with imported backfill. In addition, residual impacts will be positive, slight and permanent as a result of preventing the uncontrolled debris from further quay wall deterioration from reaching and fouling the mudflats.

9.0 Hydrogeology

The EIAR considers and assesses the likely significant effects with regard to Hydrogeology associated with both the construction and operational phases of the proposed Flood Defences West.

Excavation of made ground will take place during the construction of the proposed development for the construction of shallow underground impermeable trenches within the car park areas of Plunkett Station, and for the installation of two pumping stations within the live Waterford to Dublin railway corridor. The excavation of any localised areas of ground contamination for disposal off-site at suitably licensed facility will improve the quality of soils which will have a corresponding benefit to the underlying groundwater resources due to the removal of a potential source of contamination for percolating water. Therefore, the likely impact of excavation activities on hydrogeology is *positive, slight and permanent*.

There is a risk that the contaminants present in the made ground across the site may be brought to the surface during excavation works or driven down into underlying aquifer. The impact associated with driven piles is slight, as contaminated material will be dragged down into the underlying soil layers by shaft friction, however the displacement of these contaminants is not likely to be significant. The potential impact is *negative, slight and short-term*.

The Lower River Suir SAC is hydrologically linked to the proposed development as a section of the proposed flood defence measures is located within the mudflats of the SAC. Given that this SAC is predominantly a surface water system and is not sensitive in relation to groundwater flows, the main potential impact would relate to construction related contamination of the aquifer impacting the SAC water quality. The potential impact to the Lower River Suir SAC water quality from construction related groundwater contamination would be *negative, imperceptible and temporary*.

During the operation phase, the proposed steel sheet pile wall will be installed to a depth of up to 8.5m for landside and between 11 – 16m for the riverside sections and may act as a barrier for natural groundwater flow towards the River Suir during low tide and may locally impact groundwater levels. While the groundwater seepage into the river at a local level may be restricted, it will be of minimal significance given that the majority of the outfall into the river is from precipitation and surface run-off from stormwater conveyance systems. Groundwater flow and seepage behind the proposed sheet pile wall will be redirected to the east and west behind the sheet pile wall. Any localised groundwater conduit flow will be managed by the upgraded trackside drainage. The potential effect of proposed development on groundwater flow is likely to be *negative, localised, imperceptible to slight, and permanent*.

During extreme weather events, the proposed sheet pile walls and the underground impermeable trench will reduce the risk of groundwater seepage into the rail infrastructure. The inclusion of filter drainage pipes along with the extension of existing stormwater pipes to the River Suir as part of the proposed development will help prevent backflow of the groundwater in the study area and help to mitigate flooding while only minimally impacting local hydrogeology. The significance of this impact is considered *positive, slight, and permanent*.

During the operational phase, the area will be an urban environment covered in hard standing (Sheet piles on the water edge with hard standing on the landward side of the piles). There are therefore no perceived activities which pose a risk of contamination to the hydrogeological features of importance during the operational phase of the proposed development.

A project-specific Environmental Operating Plan (EOP) and a Construction Environmental Management Plan (CEMP) have been prepared for the proposed development. The EOP will cover all potentially polluting activities and include an emergency response procedure. As a minimum, the EOP for the proposed development will be formulated in consideration of the standard best practice.

Once the relevant mitigation measures are implemented, the significance of all residual impacts during construction to be considered as *negative, imperceptible and temporary*. As there are no mitigation measures for the operation phase of the proposed development, the residual impacts remain as per the potential impacts outlined above.

10.0 Hydrology

The headwaters of the River Suir are located on the eastern slopes of Benduff, North West of Templemore in Co. Tipperary. The Suir becomes tidal just before reaching Carrick-on-Suir and is joined by a number of rivers between this point and Waterford City including the Lingaun, Portlaw Clodiagh, Pil, and Kilmacow Blackwater. It then makes its way to the confluence with the Nore and Barrow Rivers, downstream and east of Waterford City. The Suir estuary then turns south, flowing out to sea through Waterford Harbour between Dunmore East and Hook Head.

The River Suir is tidal at the location of the proposed development. Surface water features located in the vicinity of the proposed development are located entirely within the South Eastern River Basin District. The proposed development is located within Hydrometric Area No.16 (Suir). This catchment includes the area drained by the River Suir and all streams entering tidal water between Drumdowney and Cheekpoint, Co. Waterford, draining a total area of 3,542km². The largest urban centre in the catchment is Waterford City.

The Flood Risk at the site of the proposed Flood Defences West has been assessed as part of this study. Previous flood studies have been undertaken as part of the PFRAMS, CFRAMS, Waterford Flood Alleviation Scheme and Waterford North Quays SDZ Planning Scheme.

Key hydrological receptors identified in the vicinity of the proposed flood defences include:

- The Lower River Suir SAC (European Designated Site);
- Ecologically sensitive surface water features and catchment systems; and,

- Flood Risk Areas.

The main potential for contaminants to enter into the hydrology environment arising from construction runoff include:

- Elevated silt/sediment loading in construction site runoff;
- Spillage of concrete, grout and other cement-based products;
- Accidental Spillage of hydrocarbons from construction plant and at storage depots / construction compounds; and
- Faecal contamination arising from inadequate treatment of on-site toilets and washing facilities.

In the absence of mitigation measures, the potential impact is *negative, temporary moderate to significant*.

There is potential for flood events to occur during the construction phase. The construction works will increase the number of people near a known source of flooding, thus increasing the potential for flood risk related impacts on human health. This has the potential to have a *negative, temporary, imperceptible to slight* impact.

During operation phase, hard flood defences, by design, cause permanent disturbance to river channels, floodplains and the flood regime. These structures can, if not appropriately designed, create an obstacle to flow, particularly under flood conditions resulting in increased flood risk and damage in the vicinity of the proposed structures. Such structures can locally alter channel morphology resulting in changes in flow velocity and water depth. These structures can also result in localised riverbed and riverbank erosion, resulting in long-term changes to the morphology of the river channel.

In relation to water quality, new surface water outfalls which collect surface water run-off from the railway area shall pass through a Class 1 by-pass separator prior to discharge to the River Suir. This will limit the potential for impacts to the water quality of receiving waterbody and has the potential to have a *positive, long term, slight to moderate* impact. Operational phase maintenance works could result in accidental spillage of paint which will be used in the periodic (approximately every 10 years) repainting of the exposed sections of the new sheet pile flood defence wall. In order to control this risk, the paint specified for this purpose shall not contain lead or tributyltin (TBT) or shall be otherwise approved for use near water. This has the potential to have a *negative, temporary, imperceptible to slight* impact.

A computational model (see Appendix 10.1 in EIAR Volume 2) was undertaken to assess the hydrodynamics of Suir Estuary and to assess the effects of the proposed development on the circulation patterns of the estuary. The conclusion reached from this analysis is that the computed velocity increases from the proposed vertical sheet piled wall are relatively small and of insufficient magnitude to produce sufficient shear stresses (i.e. generally <0.7Pa) that would result in any potential significant erosion of the permanent consolidated sediments on the channel bed and banks in the vicinity of the affected area. Fresher unconsolidated silts will be mobile under tidal ebb and flood conditions both for the proposed and existing cases and a slight reduction in silt deposition adjacent to the sheet piled wall is anticipated. This has the potential to have a *negative, long-term, imperceptible to slight* impact.

The proposed flood defences will defend lands to the north from flooding including sections of the rail line, the existing Plunkett Station and Rice Bridge roundabout. The overall predicted impact is therefore *positive, significant and long-term*.

As is normal practice with infrastructure projects, an Environmental Operating Plan (EOP) and Construction Environmental Management Plan will be finalised for the Flood Defences West. These will be developed by the selected contractor to suit the detailed construction methodology and allocate responsibilities to individuals in the construction team. In doing so, the measures detailed in the appended reports will be considered minimum requirements to be considered and improved upon. The level of detail provided within the current drafts of the Plans is sufficient to allow an assessment of the anticipated impacts including residual impacts.

Following the implementation of the measures outlined in the Environmental Operation Plan, there will be a *negative, slight, temporary* residual impact on water quality during the construction of the Flood Defences West. Mitigation in place during the construction phase will limit flood risk and reduce the potential for pollution events. With the inclusion of mitigation during the construction phase, the proposed flood defences scheme will have a net *significant positive* impact.

11.0 Landscape and Visual

The landscape and visual assessment of the proposed Flood Defences West was carried out to assess the possible effects that the proposed development would have on the existing environment in terms of quality of the landscape of the area adjacent to the Suir River and what the changes to existing views are likely to be as a result of the project.

The site of the proposed Flood Defences West project is located on the north quays, approximately 0.7-1.5km northwest / west of Waterford City centre (Broad St./ Barrow St.). The proposed development is located on the northern edge of the River Suir, and stretches 100m to the east and c.1km to the west of Plunkett Station and Rice Bridge Roundabout. The site includes the existing quay wall, some of the rail lines along the quays and the area around the Plunkett Station and the Rice Bridge roundabout.

Existing views were identified through fieldwork and research, including Waterford City & County Council plans. The most important views are from residential dwellings and tourist areas, as well as those views listed in the Waterford North Quays Strategic Development Zone Planning Scheme 2018. The site is not visible from the city centre or South Quays due to R680 Rice Bridge screening the main areas of the site from view.

There are a number of visible elements in the proposed Flood Defence West that will change views of the river and landscape to some degree. The main change is the new flood defence wall along the river edge, which will be a little taller than the existing quay wall and of a different design – made out of steel with precast concrete cladding on the riverside sheet pile wall. Other visible elements of the proposed development include a system of low glass barriers and flood gates to be installed around the edges and existing railings of the Rice Bridge roundabout and repair works to the existing quay wall in specific places. The other proposed elements of the proposed development won't be visible. The Photomontages shown in Figures 11.1 to 11.12 in Volume 3 of this EIAR show computer-generated images of the new

structures based on photographs of the existing landscape to show how the proposed flood defences will look if constructed.

During construction, *slight to moderate* landscape and visual impacts will occur due to the presence of the machinery required to construct the new wall and the other elements. This will include barges on the river, with construction machinery building from the river as well as the land side.

Following completion of the works, the new flood defence wall along the river edge will result in *slight negative* impacts on the existing landscape at the edge of the river. The proposed wall will be present at a level of 3.3-5.3m above the level of the existing mud flats at low tide, which is up to 2m higher than the existing quay wall and offset further into the river approximately 1m from the existing quay wall. Over time, the pre-cast concrete cladding ("eco-seawall") at the intertidal zone of the riverside sheet pile wall will become colonised with vegetation and take on more natural colouring and texture which will lessen the contrast between the new structure and the river. It should be borne in mind that the existing condition of the quay wall is poor, and the train tracks of the site are also poor-quality landscape, so this is considered slight impact.

The effect on views and visual landscape from the nearby roads, Rice Bridge and from Grattan Quay are all considered to be generally *slight, negative* and *permanent* due to the current poor quality of the existing quay wall and visual environment. It is proposed to develop the Bilberry to Waterford City Centre Greenway Link along the South Quays and Grattan Quay in the future, so allowing for this additional tourism-related use and greater sensitivity, the visual impact would be *moderate and negative* to the Greenway users.

Views from residential dwellings are somewhat more sensitive, the nearest being Bilberry Road Halting Site at approximately 180m to the south and which will experience *moderate negative* impacts on views from the entrance area to the site. Other residential receptors are further away, such as Water's Gate (300m west) and Bowfield (450m west) and have partial or indirect views of the proposed Flood Defences West so would have *slight negative* impacts on their views.

12.0 Noise and Vibration

A baseline environmental noise survey was conducted in the vicinity of the proposed development and within Waterford City in order to quantify the existing noise environment in the vicinity of the noise-sensitive locations that may be affected by the proposed development. The prevailing noise levels in the area are primarily attributed to road and rail traffic.

The noise impact assessment has focused on the potential outward impacts associated with the construction phase of the proposed development on its surrounding environment.

During the construction phase the assessment has predicted that construction noise emissions will temporarily exceed the threshold of significant effect at receptor R3 (R448 Residential Properties), when night works are undertaken for the underground isolation structure and the landside sheet pile wall (see Chapter 12 Noise and Vibration in EIAR Volume 2 for more details). This work is expected to occur for a period of 4 weeks, Monday to Friday. The resulting impact will be *negative, temporary* and *significant*. All other activities are expected to cause a *negative,*

temporary and not significant impact at all receptors. A series of mitigation measures have been recommended in order to reduce the potential for impacts during the construction phase.

Due to the nature of the proposed development, there are no predicted noise emissions during the operational phase.

13.0 Air Quality and Climate

The existing air quality environment at the site of proposed development was determined using baseline monitoring data available from similar environments and indicates that levels of nitrogen dioxide, particulate matter less than 10 microns and less than 2.5 microns are generally well below the National and European Union (EU) ambient air quality standards.

The existing climate baseline was determined by reference to data from the EPA on Ireland's total greenhouse gas (GHG) emissions and compliance with European Union's Effort Sharing Decision "EU 2020 Strategy" (Decision 406/2009/EC). The EPA state that Ireland is predicted to have total GHG emissions of 59.9 Mt CO₂eq in 2019. This is 6.98Mt CO₂eq higher than Ireland's annual target for emissions in 2019. Emissions are predicted to continue to exceed the targets in future years.

Impacts to air quality and climate can occur during both the construction and operational phases of the proposed development. With regard to the construction phase, the greatest potential for air quality impacts is from fugitive dust emissions impacting nearby sensitive receptors. Impacts to climate can occur as a result of vehicle and machinery emissions. In terms of the operational phase, air quality and climate impacts are not predicted due to the nature of the proposed development. There will be no emissions to atmosphere once constructed.

The surrounding area was found to have a low sensitivity to dust soiling impacts and a low sensitivity to potential human health impacts as a result of dust emissions. As works will take place directly beside and within a section of the Lower River Suir SAC this is considered a high sensitivity area to potential dust related ecological impacts.

It was determined that there was a worst-case medium level risk of dust impacts associated with the proposed development in the absence of mitigation. Any potential dust impacts can be mitigated through the use of best practice minimisation measures which are outlined in Chapter 13 Air Quality and Climate in EIAR Volume 2. Therefore, dust impacts will be *temporary, negative, localised and imperceptible* at all nearby sensitive receptors. It is not predicted that significant impacts to climate will occur during the construction stage due to the nature and scale of the development and the low volume of vehicles and machinery predicted.

As the National and EU standards for air quality are based on the protection of human health, and concentrations of pollutants are predicted to be significantly below these standards, the impact to human health is predicted to be *long-term, neutral and imperceptible*.

To conclude, no significant impacts to either air quality or climate are predicted during the construction or operational phases of the proposed development.

14.0 Archaeology and Cultural Heritage

Waterford has a rich cultural heritage associated with the River Suir, with the foundation of Waterford as a city dating back to the Viking Age and the earliest date for the city itself being generally accepted around AD 912-33. Waterford began as a defended Viking longphort or ship-fortress and became Ireland's second city after Dublin.

The proposed Flood Defences West is located along the northern bank of the River Suir, to the west of the Edmund Rice Bridge, within the townlands of Newrath, within County Kilkenny and County Waterford and Mountmisery, County Waterford. There are no recorded monuments within the proposed development boundary.

Cartographic sources depict the proposed development area as occupied by the railway lines and associated infrastructure from the mid-19th century onwards. The development of the railway is clearly visible in the historic mapping. The current quay wall within the development area is directly associated with the railway and is contemporary with the construction of the expanded railway infrastructure during the late 19th century. It is likely that the quay wall was constructed in order to facilitate the stability of the railway tracks and also the loading and unloading of cargo from shipping. A total of eight post medieval landing stages protruding into the River Suir were identified within study area of proposed development in varying states of preservation. These timber structures facilitated the transfer of goods from shipping to the railway.

The proposed main construction compound at the western site boundary of the proposed Flood Defences West, currently contains a section of the iron railway bridge, the remaining sections of which are in-situ across the river, c.700m to the northwest and is listed as a protected structure (RPS WA731015).

No direct or indirect impacts will occur on the recorded archaeological resource, either during the construction or operation of the proposed development.

For the purposes of this assessment, the existing quay wall and riverine features are included in the archaeological impact assessment. The c.545m section of the existing quay wall will be demolished to approximately 800mm below the existing ground level as part of the proposed development. Approximately 28m of this section of the wall will be demolished above and below ground; c.25m will be demolished to facilitate the construction of a pumping station and up to 3m will be demolished to connect landside and riverside sections of the new sheet pile wall. The quay wall is not a recorded monument or a protected structure.

The demolition of sections of the quay wall, including the landing stage abutment, but not including the wall associated with landing stage 7, will result in a *direct, negative, significant*, impact on the archaeological resource. No direct impacts are predicted upon the remains of the timber landing stages that have been identified as part of this assessment.

It also remains possible that ground disturbances associated with the proposed development may have a *direct, negative, impact* on archaeological features or deposits that have the potential to survive behind the quay walls proposed for demolition or during any other associated ground works. In terms of cultural heritage, it is possible that works associated with the proposed compound may result

in a direct negative impact on the section of iron railway bridge that currently occupies the site.

The eastern section of the proposed development area is characterised by the existing train station and modern car park. Excavations associated with drainage and services will be required in this area as part of the development. Although the area has been disturbed, it remains possible that that ground disturbances associated with the proposed development may have a *direct, negative*, impact on archaeological features or deposits that have the potential to survive below the existing ground level. Impacts, prior to the application of mitigation, may range from *negative, moderate to very significant* in scale.

As part of the development, it is proposed to demolish and replace two existing outfalls and to construct a new outfall within the riverbed of the River Suir. It is possible that that ground disturbances associated with the construction of the outfalls may have a *direct, negative*, impact on archaeological features or deposits that have the potential to survive behind the riverbed. Impacts, prior to the application of mitigation, may range from *negative, moderate to very significant* in scale.

In order to ameliorate any negative impacts upon the archaeological resource, a full intertidal and wade/dive survey will be carried out along the sections of the existing quay wall to be directly impacted by the works and at the location of the upgraded and proposed outfalls. The survey will include a photogrammetry survey of the wall to be demolished, along with the mapping and recording of the former landing stages. All timber landing stages will be avoided during the course of works. The survey will also include a metal detecting survey and all works will be carried out by a suitably qualified underwater archaeologist, under licence to the National Monuments Service of the DoH/LGH.

All ground disturbances associated with the proposed development will be monitored by a suitably qualified underwater archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the Department of Housing, Local Government and Heritage (DoH/LGH).

All ground disturbances associated with excavations within the car park associated with the existing train station will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the Department of Housing, Local Government and Heritage (DoH/LGH).

The section of the iron railway bridge that currently occupies the works compound will be left in-situ and undisturbed by contractors.

15.0 Architectural Heritage

The proposed development is located along the northern bank of the River Suir, in the townlands of Newrath, County Kilkenny and Mountmisery, County Waterford. Due to a slight change in the county boundary in the late 19th century, a small section of Newrath townland is now located in County Waterford. There are five recorded built heritage sites within the boundary of the proposed development, four

relating to the railway; the Railway Station (NIAH 22500032), Signal Box (RPS 571, NIAH 22500027), Platform (RPS 709, NIAH 22500033 and post box (RPS 1036). The fifth built heritage site is the Edmund Rice Bridge (NIAH 22500075) across the River Suir, which is only partially within the development boundary. There are two additional built heritage sites within a 200m radius of the proposed development. The modest former demesne of Mountmisery Lodge (RPS C672), later known as Knockane Villa, is also located to the immediate northeast of the development, with the demesne associated with Newrath House (RPS C671) located to the north and northeast.

It is proposed to erect glass flood barriers along the three roundabout arms, at the Edmund Rice Bridge roundabout, to the immediate north of the bridge and south of the railway station. Demountable flood barriers are also proposed on the R680 Edmund Rice Bridge for the section leading to the North Quays Strategic Development Zone. Ground works associated with required drainage and the impermeable underground trench will also be carried out within the car park associated with the existing train station. The glass and the demountable flood barriers, and ground disturbances, which are proposed will not result in any negative direct or indirect impacts, either during construction or the operation of the development, on the bridge, station and post box. This is due to the developed nature of the existing suburban environment and the minimal changes proposed by the proposed development.

The post medieval signal box, which is located to the northwest of the proposed flood development works, will not be negatively impacted by the works, as no changes are proposed to the structure or its setting.

16.0 Material Assets and Land

Waterford City is the largest urban area in the South East of Ireland and is an important tourism centre with good transport linkages for both public and private transport. The construction of the proposed Flood Defences West will protect and prevent damage from flooding of existing rail infrastructure such as Plunkett Station and road infrastructure, particularly the Rice Bridge roundabout.

The permanent footprint of the proposed development is largely located within the railway corridor which is in the ownership of Córas Iompair Éireann (CIÉ) and operated by Iarnród Éireann, with whom the project team have been in consultation throughout the development of the project to agree consent to site access. CIÉ have consented to the proposed development and support the use of their lands for construction of the proposed flood protection measures.

The permanent footprint of the proposed development is also located within areas of the foreshore and on lands not in the ownership of either WCCC or CIÉ. These lands and areas of the foreshore will be obtained by WCCC through the Compulsory Purchase Order (CPO) process. WCCC or CIÉ will also pursue title to the unregistered lands within the permanent footprint of the proposed development for the purpose of this planning application.

A temporary works area for the proposed development is located within the foreshore. An application for Foreshore Licence consent will be made to the Marine Planning and Foreshore Section of the Department of Housing, Local Government and Heritage for the temporary works area.

Commercial/industrial facilities within the Sally Park industrial estate may be subject to indirect impacts during construction as a result of noise and vibration increases from activity of machinery and transport vehicles. There are no other commercial or community facilities in vicinity of the proposed works.

The construction works at the site may cause annoyance or nuisance to maritime recreational users of the River Suir over the duration of the construction phase, specifically during day-time piling activities which are estimated to occur intermittently throughout the day over approx. 3 months. As such, the construction phase has the potential for *negative, slight to moderate, temporary* effects on maritime recreational users.

The proposed development will permanently reduce a small section of the River Suir channel through the installation of the riverside sheet piles in front of the existing quay wall. However, this change to the width of the river channel is very minor in nature, and will not have any impacts on the maritime commercial and recreational activities within the River Suir.

The operation of the development will provide many significant positive impacts to the city. Specific significant positive impacts relating to the operational phase of the proposal include:

- Protecting the existing rail and road infrastructure such as Plunkett Station and the Rice bridge roundabout from existing and future flood risk.
- Upgrading the existing drainage network within the extents of the proposed development by increasing its capacity to account for extreme weather events induced by climate change
- Eliminating costs associated with flood damage on built assets, particularly the rail infrastructure at, and to the west of Plunkett Station and the road infrastructure, specifically Rice Bridge roundabout.

17.0 Interactions and Cumulative Impacts

Interactions

In addition to the assessment of impacts on individual environmental topics, the potential interactions between these factors have also been considered. Table 17.1 shows the principal interactions / interrelationships identified for the proposed development. The nature and magnitude of all identified interactions / interrelationships was assessed, and it was concluded that, provided the proposed mitigation measures are fully implemented, no significant adverse effects will arise as a result of interactions / interrelationships between the various environmental topics considered, either during construction or operation.

Table 17.1 Interactions Matrix

Receptor Activity	Traffic Analysis	Population and Human Health	Biodiversity	Soils and Geology	Hydrogeology	Hydrology	The Landscape	Noise and Vibration	Air Quality and Climate	Archaeological and Cultural Heritage	Architectural Heritage	Material Assets and Land
Traffic Analysis	✓	✓	✓					✓	✓			
Population and Human Health	✓	✓										
Biodiversity			✓					✓				
Soils and Geology	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Hydrogeology		✓			✓	✓						✓
Hydrology		✓	✓	✓		✓						✓
The Landscape		✓					✓					
Noise and Vibration		✓	✓				✓	✓				✓
Air Quality and Climate		✓	✓					✓	✓			✓
Archaeological and Cultural Heritage										✓		
Architectural Heritage											✓	
Material Assets and Land		✓			✓	✓						✓

Cumulative Impacts

It is considered that the scale of the works and implementation of effective environmental control measures will avoid all likely significant effects on environmental parameters. There is no potential for cumulative impacts arising in combination with any other plans or projects and therefore no potential for in-combination effects on environmental parameters.

Based on the above, it can be objectively concluded, in view of best scientific knowledge, on the basis of objective information and provided effective mitigation is in place, that the Project, individually or in combination with other plans and projects, will not have a significant adverse effect on the receiving environment.

18.0 Major Accidents and Disasters

There are no “Seveso” sites (establishments within the meaning of the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015) in close proximity to the proposed development. The closest establishment is at least 1.5km east of the proposed development. The design of the proposed development has taken account of the potential for flooding. The proposed development will prevent flooding of lands along the northern bank of Waterford City. In relation to accidents resulting in a spillage of polluting material, the risk of these occurring will be significantly reduced and if a spillage should occur the proposed development incorporates drainage to allow the spilled material to be contained and treated prior to discharge.

19.0 Further Information & What Happens Next

The Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement (NIS) may be inspected free of charge, or purchased at a reasonable fee (which shall not exceed the reasonable cost of making a copy) by appointment only due to current Covid -19 restrictions at the following locations and as detailed in the published newspaper notices:

- Waterford City and County Council, Customer Care Desk, Baileys New Street, Waterford X91 XH42;
- Waterford City and County Council, Civic Offices, Davitts Quay, Dungarvan, Co. Waterford X35 Y326;
- Kilkenny County Council, County Hall, John Street, Kilkenny R95 A39T; and,
- Kilkenny County Council, Ferrybank Area Office, Abbeylands, County Kilkenny X91 DE42.

The application including the EIAR, NIS and plans and particulars of the proposed development may also be viewed and downloaded online on the Waterford City and County Council website via the following link:

<http://waterfordcouncil.ie/projects/public-consultations/index.htm>

Submissions or observations may be made in writing only to **An Bord Pleanála, 64 Marlborough Street, Dublin 1, D01 V902** in relation to:

- The implications of the proposed development, if carried out, on the proper planning and sustainable development of the area;
- The likely effects of the proposed development, if carried out, on the environment; and
- The likely effects the proposed development, if carried out, on a designated European Site.

An Oral Hearing may be held, should the statutory requirements for one be met. Written submissions, together with any representations made at any oral hearing, will be considered by An Bord Pleanála in making its decision on whether or not to approve the Flood Defences West with or without modifications.

An Bord Pleanála's decision will be published in one or more newspapers circulating in the area, including where appropriate, particulars of any modifications to the Flood Defences West.