Public Consultation Brochure

East Coast Railway Infrastructure Protection Projects

Preferred Scheme for KILCOOLE TO NEWCASTLE

Rialtas na hÉireann Government of Ireland | Tionscadal Éireann Project Ireland 2040

NTA Údarás Náisiúnta Iompair National Transport Authority

Jacobs

ECRIPP Iarnród Éireann Irish Rail

Iarnród Éireann Irish Rail

Co-funded by the European Union

Contents

01 Introduction to the East Coast Railway Infrastructure Protection Projects

The East Coast Railway Infrastructure Protection Projects (ECRIPP) were established to provide improved coastal protection against predicted climate change effects of sea level rise and coastal erosion on the east coast railway corridor between Merrion Gates (Co. Dublin) and Wicklow Harbour (Co Wicklow).

In recent years Iarnród Éireann has seen an increase in the frequency of storm events as a result of climate change. This necessitates more and more maintenance works to be carried out to respond to the effects of coastal erosion, wave overtopping and coastal flooding on the east coast rail line and supporting infrastructure. These works result in increasing disruption to existing services.

The Dublin to Wicklow section of the East Coast Railway is a critical part of the Iarnród Éireann rail network, with southside DART, Gorey commuter and Rosslare Europort Intercity services operating along this scenic route. ECRIPP will deliver the necessary enhanced coastal protection to the existing railway infrastructure in a number of key locations on this rail network.

Why are Coastal Protection Measures Required?

Iarnród Éireann has first-hand experience of the impacts of climate change on railway infrastructure on the east coast. Some areas of the east coast rail line have seen encroachment through the loss of coast of up to 20-30 metres in the last 10 years alone.

This has resulted in large losses of land, and incursions to such levels that the railway line between Dublin and Wicklow is vulnerable to further loss due to coastal erosion. This rate of loss will increase in line with climate change as storm frequency and intensity increases due to climate change.

These key sections of the coastal railway south of Dublin to Wicklow are particularly vulnerable to the impacts of coastal erosion, coastal flooding, wave overtopping and cliff instability. All of which are expected to increase both in frequency and severity in future years.

Each location is a standalone project as part of ECRIPP to address coastal erosion on the east coast railway corridor. Each project will be taken forward as a separate planning application submission and the programme for delivery may vary between the projects.

ECRIPP is funded by the Department of Transport, through the National Transport Authority under Project Ireland 2040 and is provided for in the Programme for Government and the National Development Plan.

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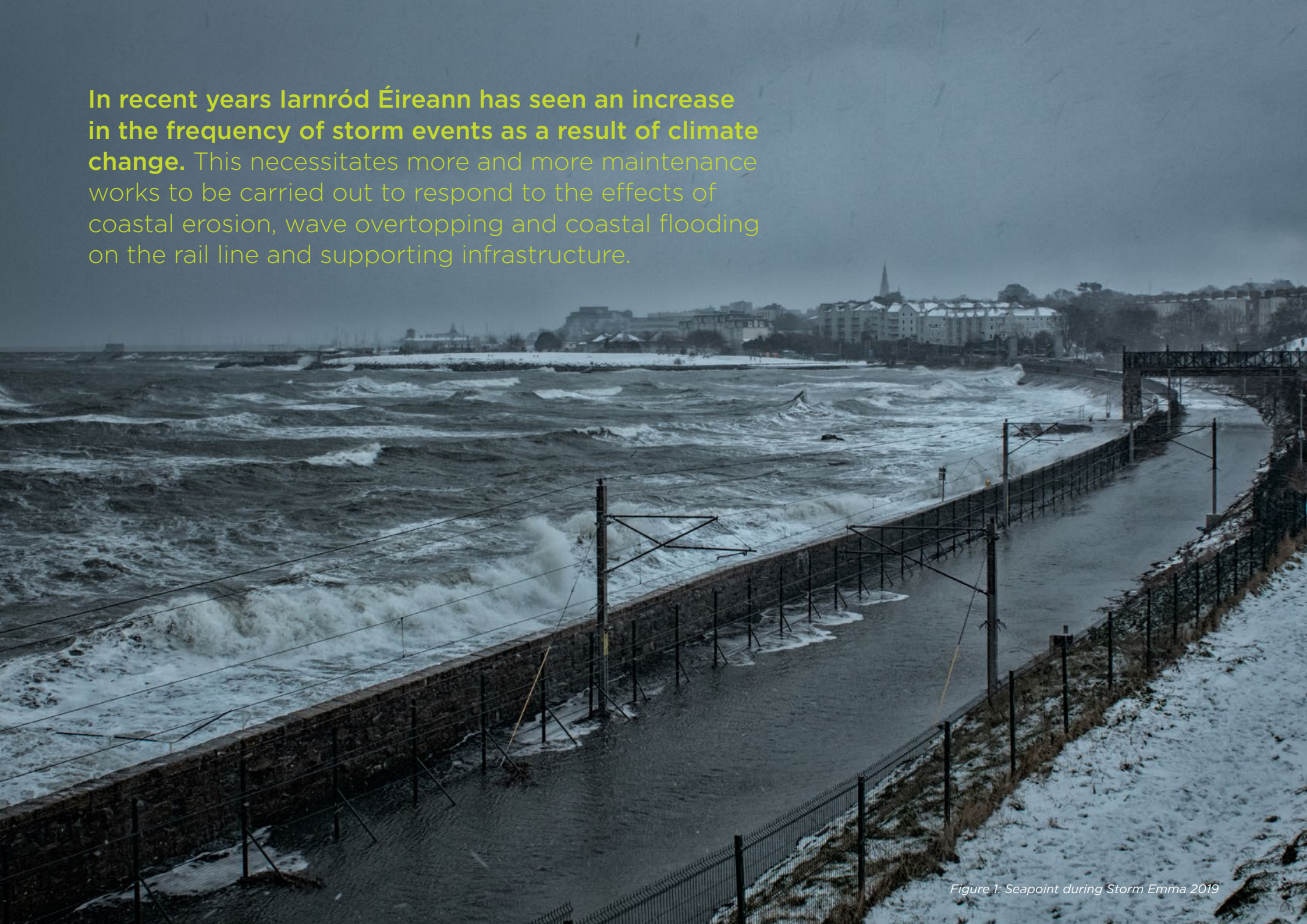

Figure 1: Seapoint during Storm Emma 2019

Figure 2: ECRIPP Key Locations Map

Five key locations, along a 65 km route have been **identified and assessed as particularly exposed to coastal erosion and climate change effects.**

Key Locations

The locations of the five projects are:

- Merrion Gates to Seapoint Beach
- Whiterock Beach to South Killiney
- Bray Head to Greystones North Beach
- Kilcoole to Newcastle
- Newcastle to Wicklow Murrough

Figure 3: Blackrock Station

Objectives of the East Coast Railway Infrastructure Protection Projects

The objectives of the projects are:

- Support the continued safe operation of rail services.
- Increase railway infrastructure resilience to climate change.
- Provide improved and sustainable coastal protection works against predicted climate change effects such as sea level rise, coastal erosion and storm surges on the east coast railway corridor.
- Secure the railway line for future generations.
- Allow for the long-term efficient management and maintenance of the railway corridor.
- Support sustainable low carbon local, regional, and international connectivity fostering a low carbon and climate resilient society.

Benefits of the East Coast Railway Infrastructure Protection Projects

Iarnród Éireann's role as a sustainable national transport system is recognised in the publication of the All-Island Strategic Rail Review commissioned by the Governments of Ireland/Northern Ireland which proposes a very significant increase in capacity of our existing infrastructure and future expansion of the rail network across the island. ECRIPP will aid Iarnród Éireann increased capacity and expansion ambitions by supporting the development of the DART+ Programme and other improvements to the rail network on the east coast of Ireland.

02 Public Consultation Process

The East Coast Railway Infrastructure Protection Projects includes two non-statutory public consultation phases.

Public Consultation 1 sought feedback on the Emerging Preferred Scheme for the five projects. This input helped refine the designs for Public Consultation 2 where the Preferred Scheme for each project is now presented.

Public consultations are an opportunity for communities and stakeholders to share their views while the design is still in development.

Feedback can be submitted via the project website, email, phone, or post. More details are available in the “How to Engage” section.

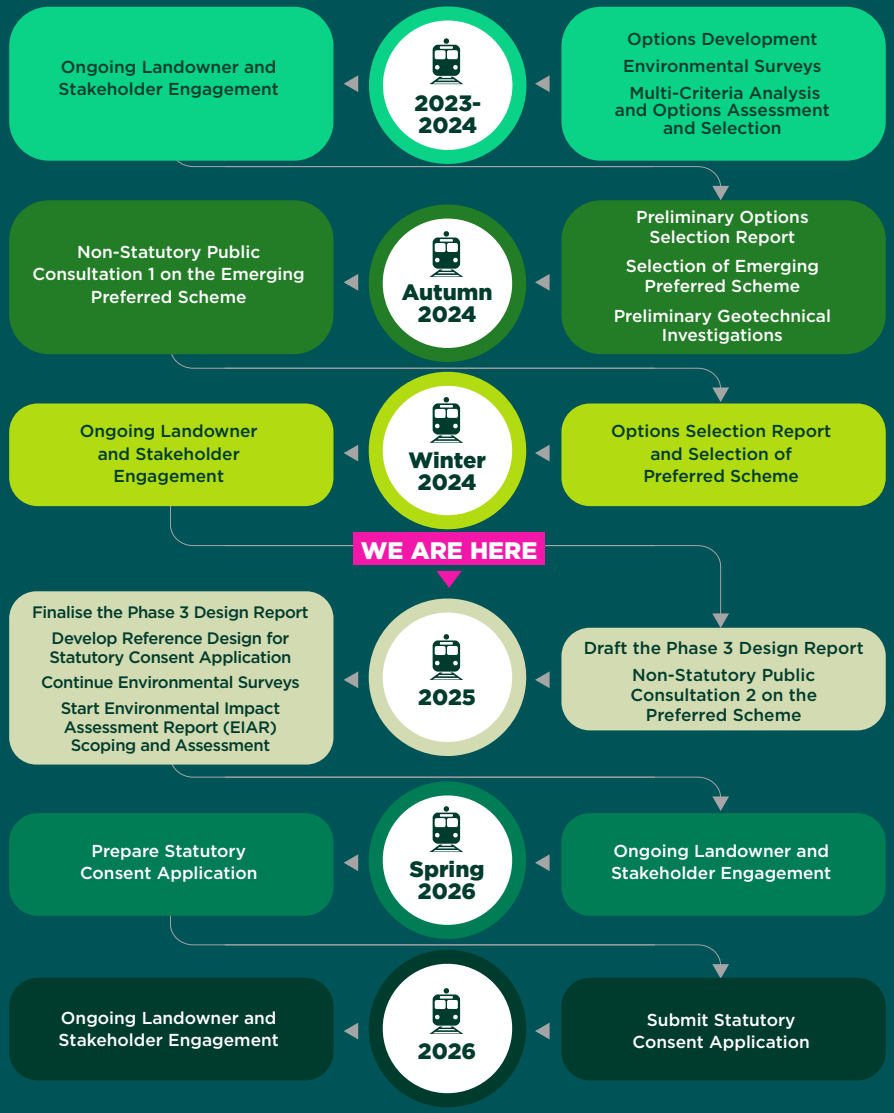

Figure 4: Consultation Roadmap

Figure 5: Bray Tunnels

03 Current Design Status

The project is in the Phase 3 Design Stage of the Preferred Scheme.

This stage refines the concept designs, clarifies structure, geometry and explores construction methods and ways to minimise impacts. Feedback from Public Consultation 1 has also been incorporated.

At Public Consultation 2, stakeholders have another opportunity to provide commentary on the Preferred Scheme, which will be documented and considered in the preliminary design.

Once this information has been reviewed and considered, the Preferred Scheme will be finalised and the preliminary design completed.

This design may be adjusted further based on technical, environmental, and stakeholder input.

Figure 6: Seapoint

Figure 7: Typical Rock Revetment

04 Key Inputs of ECRIPP

The concept designs for each of the options considered the following:

- Wave climate and extreme water level data has been extracted from hydrodynamic modelling work undertaken during preliminary investigations for ECRIPP.
- Rock stability calculations have been undertaken to identify the required rock size to ensure long term stability of the rock armour.
- An assessment of wave overtopping rates during storm events has been undertaken. This includes an allowance for sea level rise. This analysis informs the required geometry of the improved defences to provide the required Standard of Protection (0.5% Annual Exceedance Probability, also known as a 1 in 200-year storm protection level).
- The condition of the existing coastal defences has been informed by condition survey.
- Defence type and material selection have been selected to provide a long design life and to minimise future maintenance requirements.
- Constructability and technical viability have been considered in the design to ensure the design is feasible.
- The impact on the environment and community have been considered at a high level through multicriteria assessment (MCA).

05 Option Selection Process

To assist the design development process and to determine the Preferred Scheme for each of the five projects, a structured engineering process has been followed.

STAGE 1

Preliminary Assessment consists of the assessment of a long list of options against engineering, economic, and environmental criteria to evaluate the 'feasibility' of each option to meet the project objectives and requirements.

This approach allowed for the long list of options to be filtered to a shorter list of feasible options. All feasible options were brought forward to Stage 2 where they could be explored in greater detail.

STAGE 2

The Multi-Criteria Analysis process consists of a more detailed multi-disciplinary comparative analysis of the feasible options that passed through Stage 1.

The options for addressing coastal erosion and wave overtopping risks to the railway were evaluated using seven criteria: economy, safety, environment, accessibility and social inclusion, integration, engineering/technical, and planning risk to identify the Emerging Preferred Scheme.

Public Consultation 1 provided the public with the opportunity to provide commentary on the Emerging Preferred Scheme. This information has been reviewed and considered and the Preferred Scheme has been selected to progress to phase 3 design.

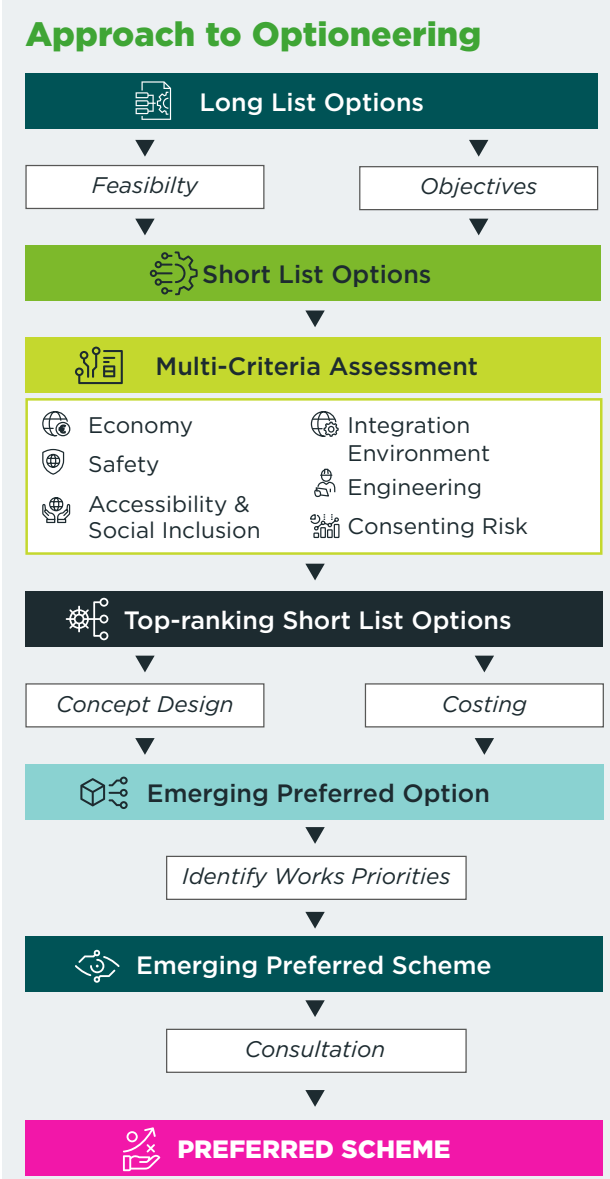

Figure 8: Approach to Optioneering Scheme

Figure 9: View from Blackrock beach

06 The Preferred Scheme — Kilcoole to Newcastle

The project area spans approximately 4km between Kilcoole and Newcastle, with proposed works covering 2.5 km of this stretch. The railway is situated on a natural embankment at the back of the beach, which is a soft barrier beach feature underlain by hard geology. The railway is locally protected by rock revetments at Kilcoole Station and at the estuary mouth, known as The Breaches. The Breaches is reclaimed intertidal land. The project area falls within several designated conservation sites, including The Murrough Special Protection Area and the Murrough Wetland Special Area of Conservation.

The main hazards in this area are wave overtopping, due to the low elevation of the railway and the narrowness of the beach, and the steepening and narrowing of the beach caused by longshore sediment transport. This latter process could eventually undermine the rock structures and the railway itself.

Project Objectives

The objectives of the project between Kilcoole and Newcastle are:

- To reduce the impacts of wave overtopping on railway infrastructure and operations,
- To reduce the risk of coastal erosion undermining the railway

Preferred Scheme

Rock Revetments:

A rock revetment will be built along parts of the coastline from Kilcoole to Newcastle to prevent erosion and reduce wave overtopping onto the railway. It will consist of two layers of high-quality graded armour rock placed over a geotextile. The design, including the slope, dimensions, and wave wall (where required), is based on calculations using wave models that account for sea level rise, ensuring long-term stability and protection of the railway.

Concrete revetment:

At The Breaches underbridge, a concrete revetment is proposed instead of a rock revetment to minimise predator presence near the Little Tern nesting site. This structure will include a concrete slope, a vertical sheet pile at the base, and rock toe protection to counteract potential scour and undermining. Unlike rock revetments, concrete is impermeable and does not absorb wave energy, leading to higher wave run-up and overtopping. As a result, a larger wave wall will be required. The final design, including sheet pile length and rock toe size, will be based on ground investigations and wave impact calculations.

Wave wall:

Many of the rock revetments require a wave wall at the rear of the crest to provide an impermeable barrier at the back of the permeable rock revetments. These will be precast reinforced concrete. The size of the walls are determined through overtopping and wave loading calculations.

In some locations, the beach is sufficiently stable to construct a wave wall at the back of the beach to protect the railway and no revetment is currently required.

Pedestrian access steps:

To facilitate safe pedestrian access/egress from the beach, pedestrian access steps are included within the Phase 3 Design Report. A new set of pre-cast concrete pedestrian access steps is proposed to the south of The Breaches

Figure 10: South of Kilcoole Station

to reduce the possibility of pedestrians being cut-off by the tide between The Breaches. No access steps are proposed in the section of the beach between Leamore Lower and Newcastle as full access to the beach remains. The existing set of steps near Newcastle will be replaced under the Project to provide continued beach access at this location.

Maintenance access ramp:
To facilitate safe maintenance access for continued clearing of blockages at The Breaches, a concrete access ramp is included adjacent to the nearby level crossing south of The Breaches. The access ramp will be blocked by a demountable structure to prevent unauthorised access.

Design Considerations:
The project prioritises preserving public space by minimising the footprint of coastal defences. Rock revetments are only used where necessary, and their slopes are kept steep to reduce land use. In stable beach areas, only crown walls are constructed to limit wave impact beyond the beach crest.

Future Adaptability:

All defence structures in the project are designed with future adaptability in mind. For wave walls, adding rock in front of the wall is a likely next step—either increasing crest height or flattening the slope to reduce overtopping.

Integration with existing structures:

The project includes multiple interface points with existing structures, particularly at Kilcoole, The Breaches, and Newcastle. Where no existing structures exist, proposed rock revetments will taper around the wall crest for a smooth transition.

Key tie-ins include:

- Kilcoole: New rock revetment will blend in with the existing revetment near the viewing platform.
- Breaches underbridge: The concrete revetment will have a row of sheet piles installed under the northern end of the concrete structure and the rock toe protection will curve round to provide additional support to this corner should the beach levels erode in the future. The interface between the north and south bridge piers and the concrete revetment is proposed to comprise a rock armour tie-in detail where the rock tapers around the crest.

Maintenance

Minimal maintenance is planned for the proposed revetments, as they are designed to adapt to natural beach movement and toe scour. However, if a storm exceeds the design conditions during the revetments' design life, re-profiling of the rock may be required.

Land Acquisition

The Project Team have been identifying and engaging with landowners in relation to temporary and permanent land take for the project. This information will support the planning application and land acquisition requirements.

Environmental Assessments

Walkover surveys of the project area to inform the environmental baseline are ongoing. The Project Team have applied to MARA for a Marine Usage Licence to undertake environmental baseline surveys in the foreshore which will inform the Environmental Impact Assessment Report and the Appropriate Assessment.

Construction

The construction site has good marine access but very limited road access, so materials and equipment are expected to be delivered primarily by rail or sea. The project spans 2.5 km within a 4 km frontage, allowing multiple independent work fronts to operate simultaneously. A significant volume of rock armour is required, making rock procurement critical to the project's success.

Rock is expected to arrive by barge, be offloaded at low tide, and transported to the work front using land-based machinery. Precast concrete wave walls will be manufactured off-site and delivered via rail-road vehicles. Most of these elements will be installed near the railway line, but at The Breaches and Newcastle, cranes may be needed due to the distance from the tracks.

Key construction risks include interactions between construction equipment and workers or the public, working in an exposed marine environment, working close to the railway line and encountering unforeseen ground conditions. Safety will be managed through careful planning, marked and fenced working zones, and restricted public access. Additional ground investigations will be conducted to understand site conditions and locate any buried services.

Value engineering will be applied to optimise rock usage and reduce the size and height of structures where possible. Modelling of beach behaviour may be used to assess how the beaches will respond to the new structures and to refine wave loading designs, particularly near The Breaches.

Through the design process we will identify and develop construction methodologies, haul routes, construction compounds and landing locations for the contractor and materials to construct the project. Further details on construction methodologies will be developed to inform the Environmental Impact Assessment Report (EIAR) that will support the Planning Application for the project.

Figure 11: Wicklow Railway Line

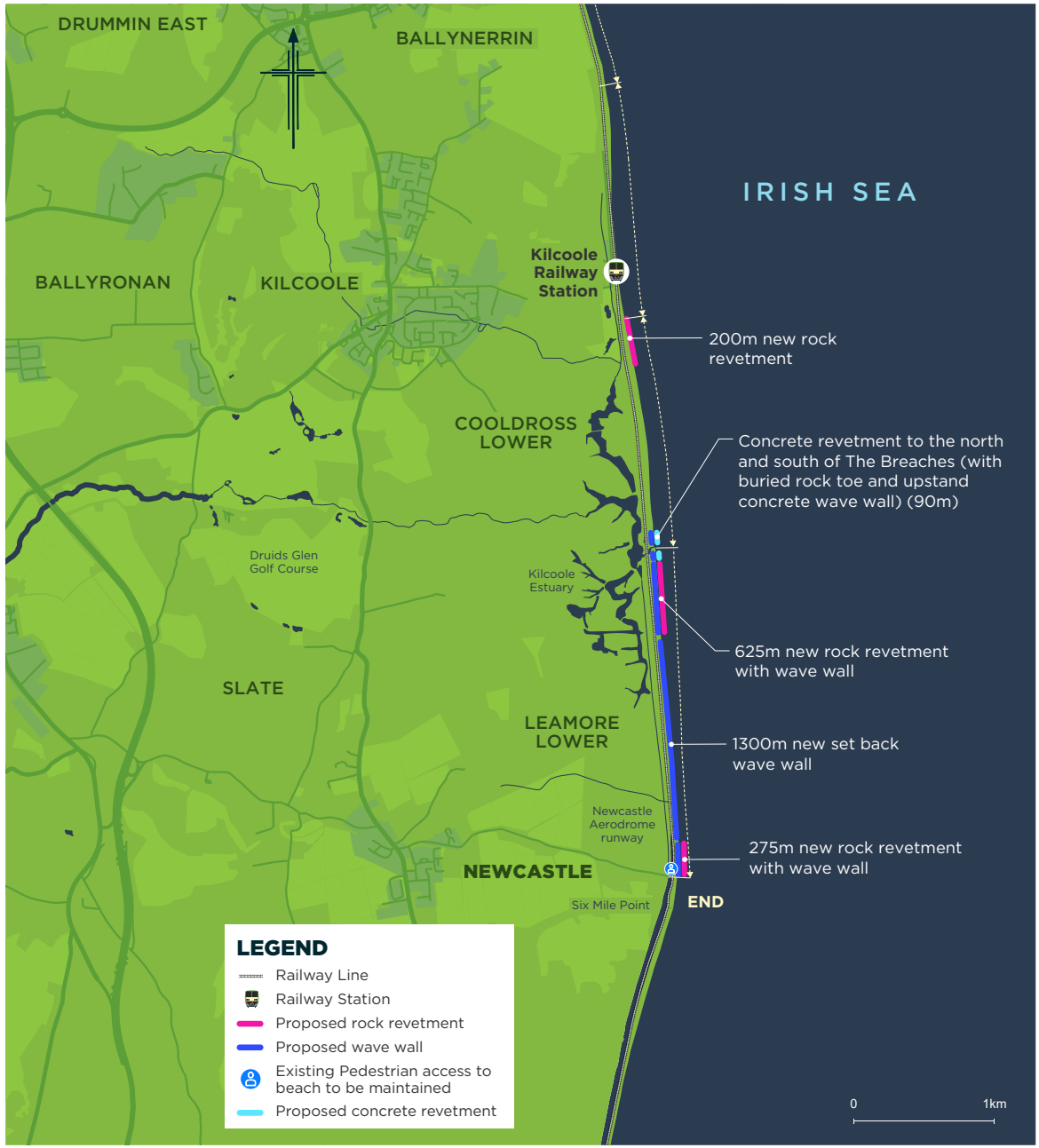

Figure 10: Preferred Scheme Kilcoole to Newcastle

Figure 11: Illustrative view showing the proposed concrete revetments at The Breaches

Figure 12: Illustrative view looking South to Newcastle showing the transition from the set back wall to a rock revetment with wave wall

Figure 13: Mount Merrion

07 Next Steps

Further Design Development

After this consultation, all feedback will be reviewed and used to help finalise the Preferred Scheme A Consultation Findings Report will be published to document the feedback received.

Next steps include continued design development and option refinement, which will inform the Environmental Impact Assessment and Appropriate Assessment and other documentation in support the statutory planning process for the Project. Stakeholders will be afforded the opportunity to engage on the Project again at this point through the statutory stakeholder engagement process.

Public feedback is welcome throughout the design process and can be submitted via the project website, email, phone, or post.

Figure 14: Greystones

08 How to Engage

The project team is inviting public feedback on the Preferred Scheme. This is an opportunity for communities and stakeholders to share their views on the proposed coastal protection measures.

Local knowledge is essential to help shape and improve the design, ensuring it benefits both local communities and railway users, while also protecting infrastructure for future generations.

The consultation period is now open, and full details, including submission deadlines, are available on the project website.

Please contact us via the following means:

Website

Email: ecrippenquiries@irishrail.ie

Phone line: 01 202 7900

Postal Address: If you would prefer to write to us, please send correspondence to:

ECRIPP,
Engineering & New Works Building,
Iarnród Éireann,
Inchicore Works,
Dublin 8,
D08 K6Y3

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