Public Consultation Brochure

East Coast Railway Infrastructure Protection Projects

Preferred Scheme for
BRAY HEAD TO GREYSTONES NORTH BEACH

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

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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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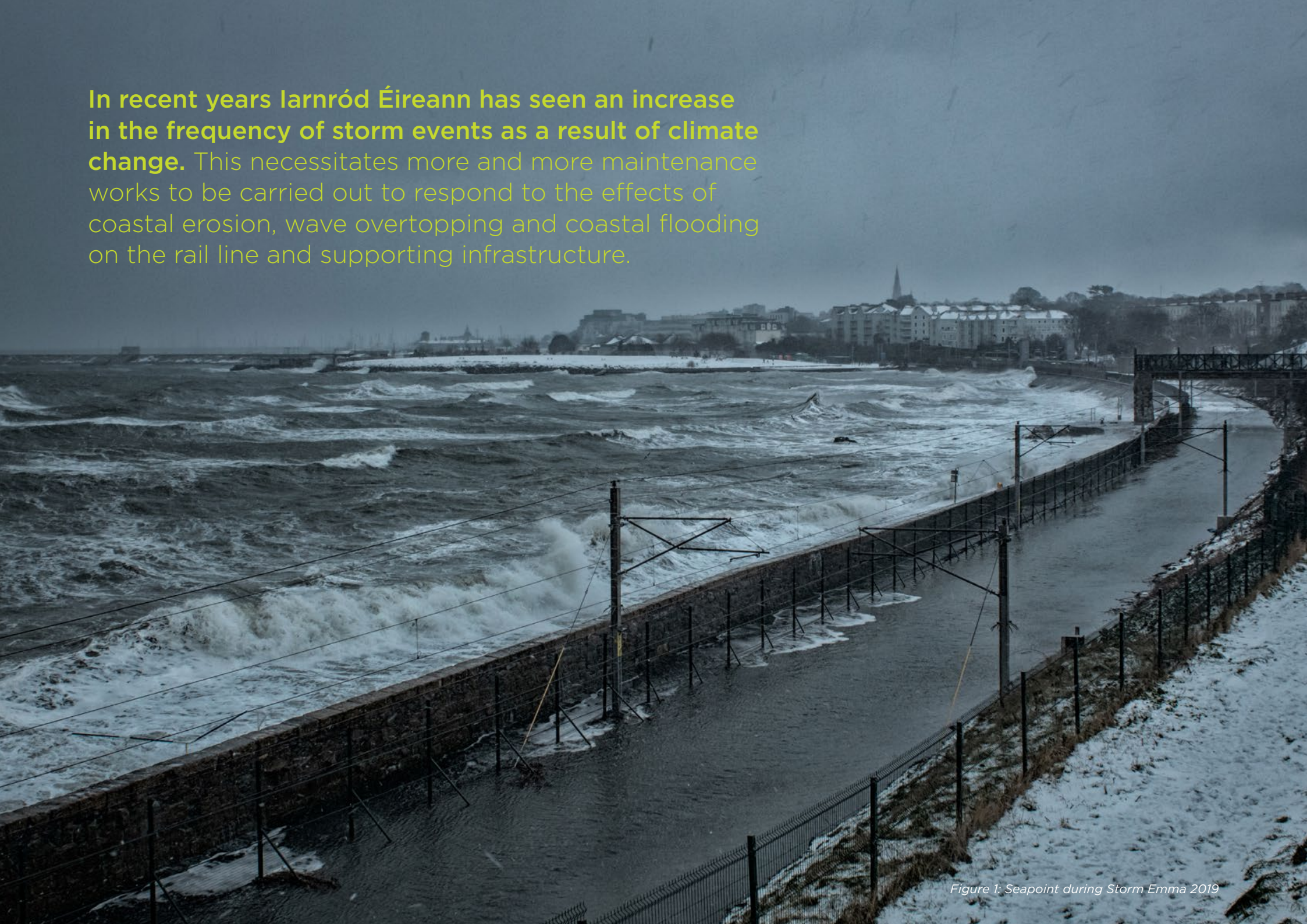

Figure 1: Seapoint during Storm Emma 2019

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: Mount Merrion

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.

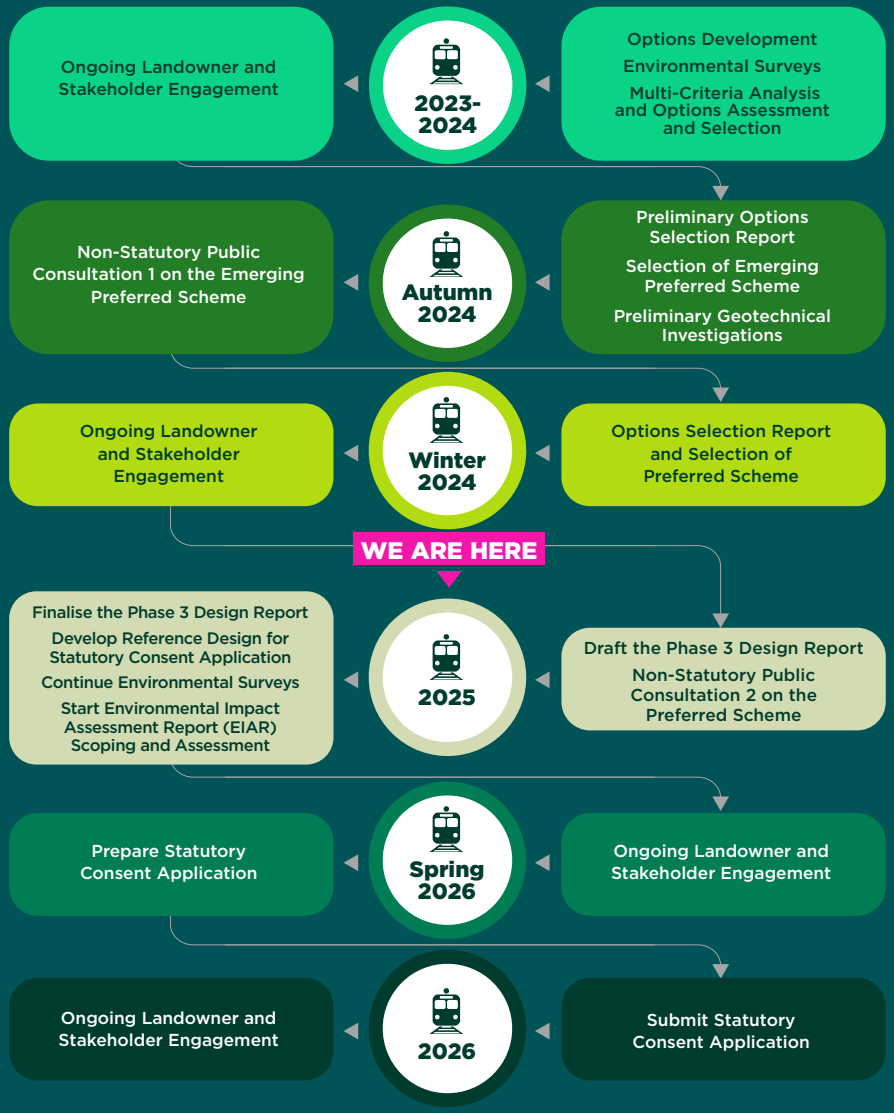

Figure 4: Consultation Roadmap

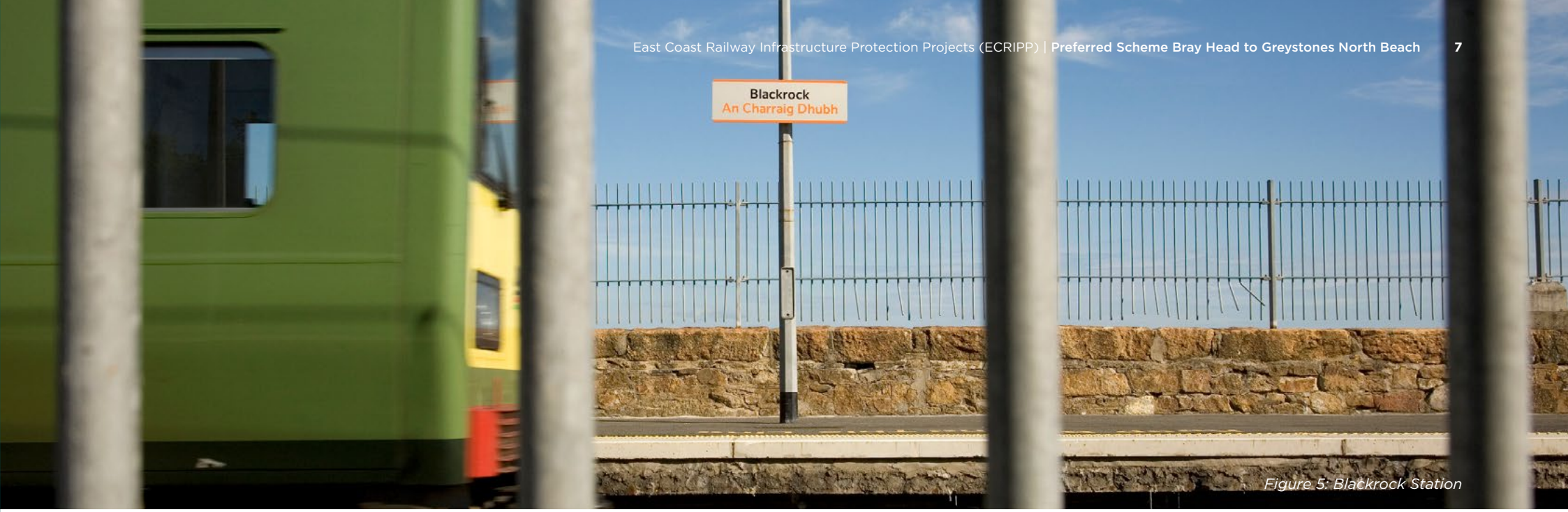

Figure 5: Blackrock Station

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.

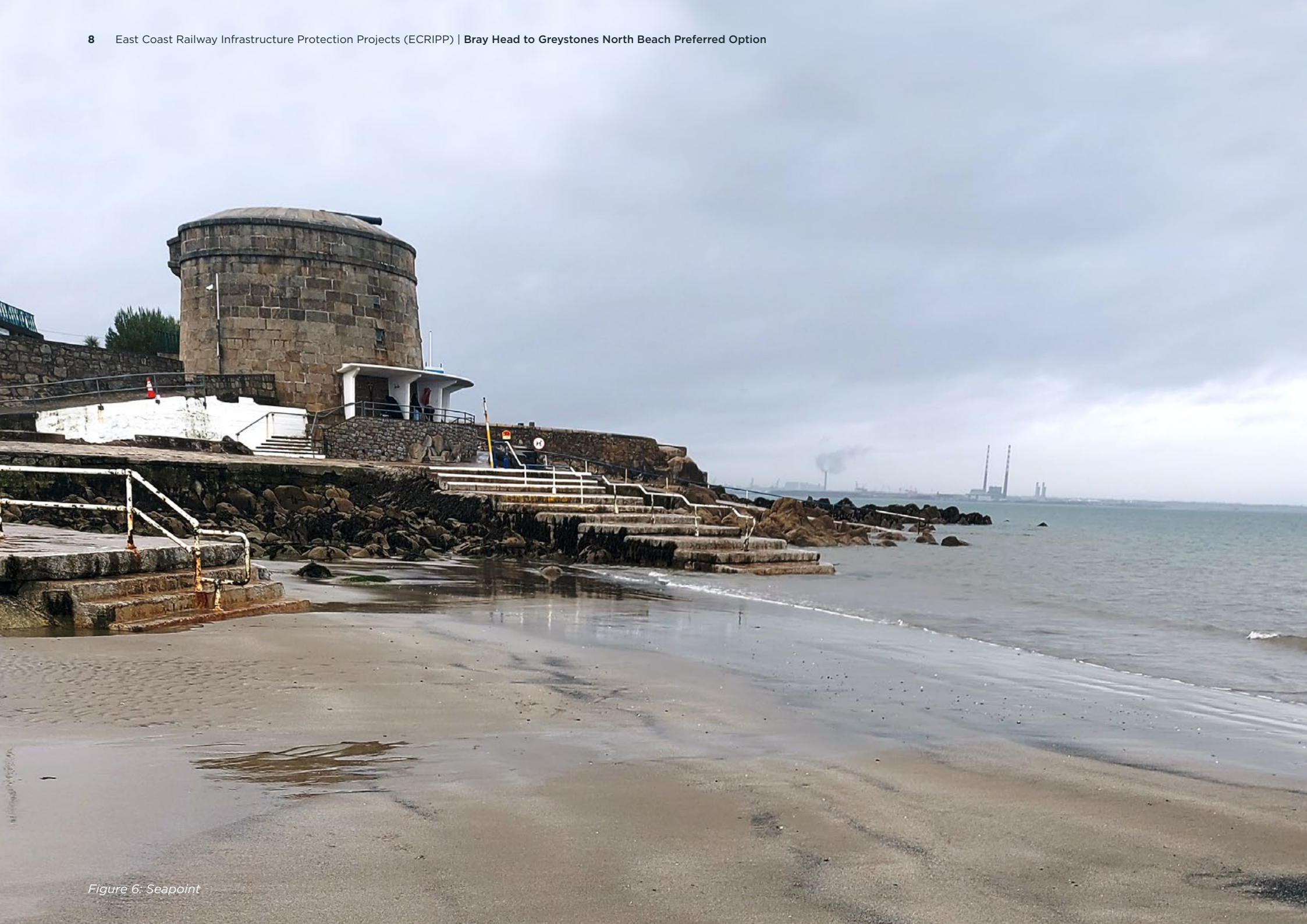

Figure 6: Seapoint

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.

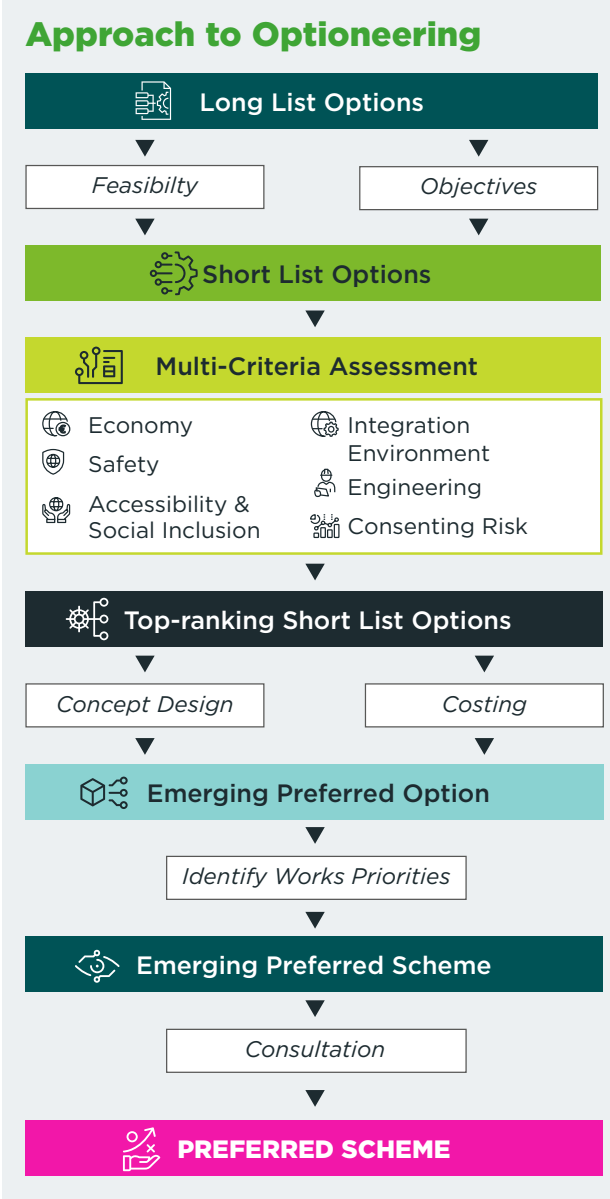

Figure 8: Approach to Optioneering Scheme

Figure 9: View from Blackrock beach

06 Preferred Scheme Bray Head to Greystones North Beach

The Project is located between Bray Head and Greystones North Beach and is divided into two sections. The first section, Bray Head, spans approximately 4 km of hard rock coastline from Naylor's Cove to the southern exit of Tunnel 3. It includes intermittent coastal defences and three tunnels.

The second section, Greystones North Beach, covers about 3 km of predominantly soft cliff coastline from Tunnel 3 to Greystones Harbour Marina and includes one tunnel. This section has experienced cliff instability and erosion, resulting in parts of the railway being rerouted inland through tunnels.

The primary hazards in both sections include cliff instability above and below the railway, undermining of coastal defences, and beach erosion. These issues increase the coastline's vulnerability to further hazards. Drainage and rock slope stability are managed through ongoing maintenance by Iarnród Éireann.

Project Objectives

The objectives of the Bray Head to Greystones North Beach project are focused on protecting the railway infrastructure from coastal hazards.

- At Bray Head rock revetments are being installed to protect existing masonry structures that span bedrock gullies or support embankments. Although these structures are currently sound, they are not sufficient to protect the railway from the future combined effects of rising sea levels and extreme weather events.
- At Greystones North Beach, the goal is to control the rapid erosion of soft cliffs, which could threaten sections of the railway within the next 50 years. Two rock revetments are being constructed to prevent toe erosion at the most vulnerable cliff sections. The design also allows the remaining sections of the cliffed coastline to erode naturally, eventually forming a stable bay that will provide natural protection to the railway line.

Preferred Scheme

Rock Revetments at Bray Head:

- The railway line runs along the cliff and is supported from below and protected by various masonry and rock structures. Rock revetments are proposed to protect vulnerable masonry/concrete structures from wave impact.
- Heavier rocks (6–10 tonnes) will be used in difficult construction areas to ensure stability and resistance.
- The revetments will sit on existing rock platforms with a thin layer of gravel spread over the rock platform.

Rock Revetments at Greystones North Beach:

- Initial designs with detached rock headlands on the beach at the base (toe) of the soft cliffs were revised due to safety and access concerns. These structures are now placed directly against the cliff to improve beach access and safety.
- Two revetments will protect the railway, built close to the cliff to maintain beach access. These will use 6–10 tonne rocks with a 0.3–1 tonne underlayer. Any beach material that is excavated during construction will be placed over the toe and lower slope of the revetment to restore the beach profile and natural shape.
- To maximise beach access, revetments will be built close to the cliff by excavating debris at the cliff toe. Temporary sheet piling will be installed during construction to prevent cliff instability during excavation and removed after construction is complete.

Future Adaptability:

- Bray Head designs consider conditions up to the year 2100, with potential to add more rock or reshape (reprofile) the revetments

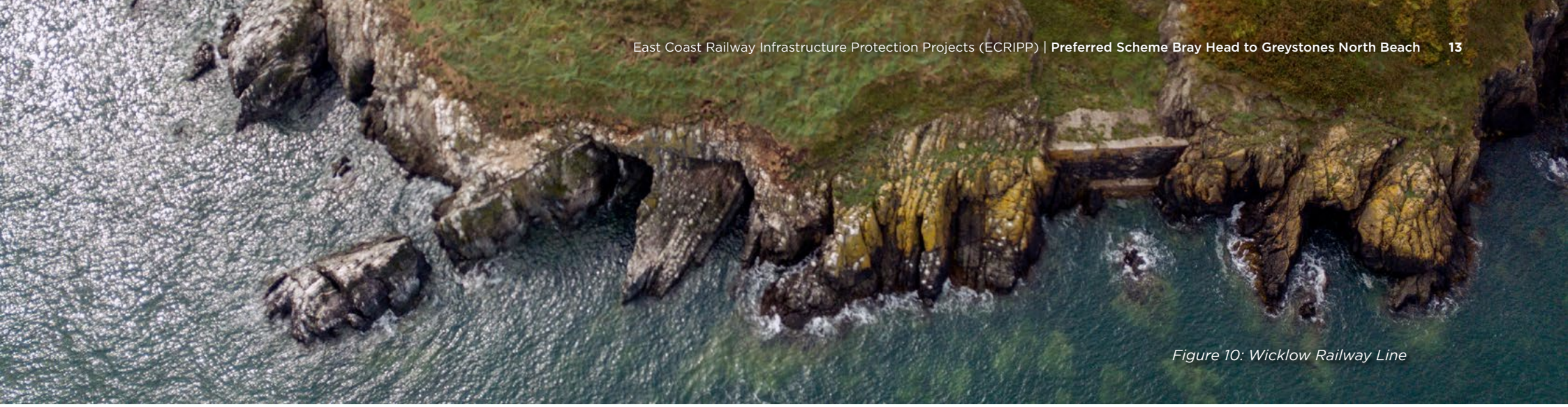

Figure 10: Wicklow Railway Line

if needed for maintenance or adaptation to changing coastal conditions.

- At Greystones, the design allows for natural bay formation between two revetments, with potential adaptation of adding more rock to the proposed revetment, or extending the length of the revetments.

Integration with existing structures:

- At Bray head the rock revetments have been designed to tie into the existing structures
- At Greystones North beach there are no existing structures to interface with.

Maintenance

Minimal maintenance is expected for the rock revetments over their design life, as they are designed to adapt to beach changes.

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

Construction at Bray Head and Greystones North Beach is heavily constrained by poor access, tidal conditions, and wave exposure, requiring sea-based delivery and careful planning to manage environmental and structural challenges. The main risks identified for the construction project involve the interaction between construction machinery and both workers and the public, the challenges of working in a marine environment, and the possibility of encountering unexpected underground utilities or ground conditions.
To mitigate these risks, the use of machinery will be carefully planned and managed to ensure worker safety. Beach access to the public will be restricted during the construction phase to manage health and safety risks.Before construction begins, further ground investigations will be conducted to fully understand the site conditions and locate any buried services, which will be factored into the design. Additionally, value engineering will be applied to optimize the amount of rock used in construction.

There are also potential environmental impacts of the construction phase on sensitive environmental receptors. A detailed environmental assessment will be undertaken, and mitigation measures will be identified to reduce the potential for impacts insofar as possible.

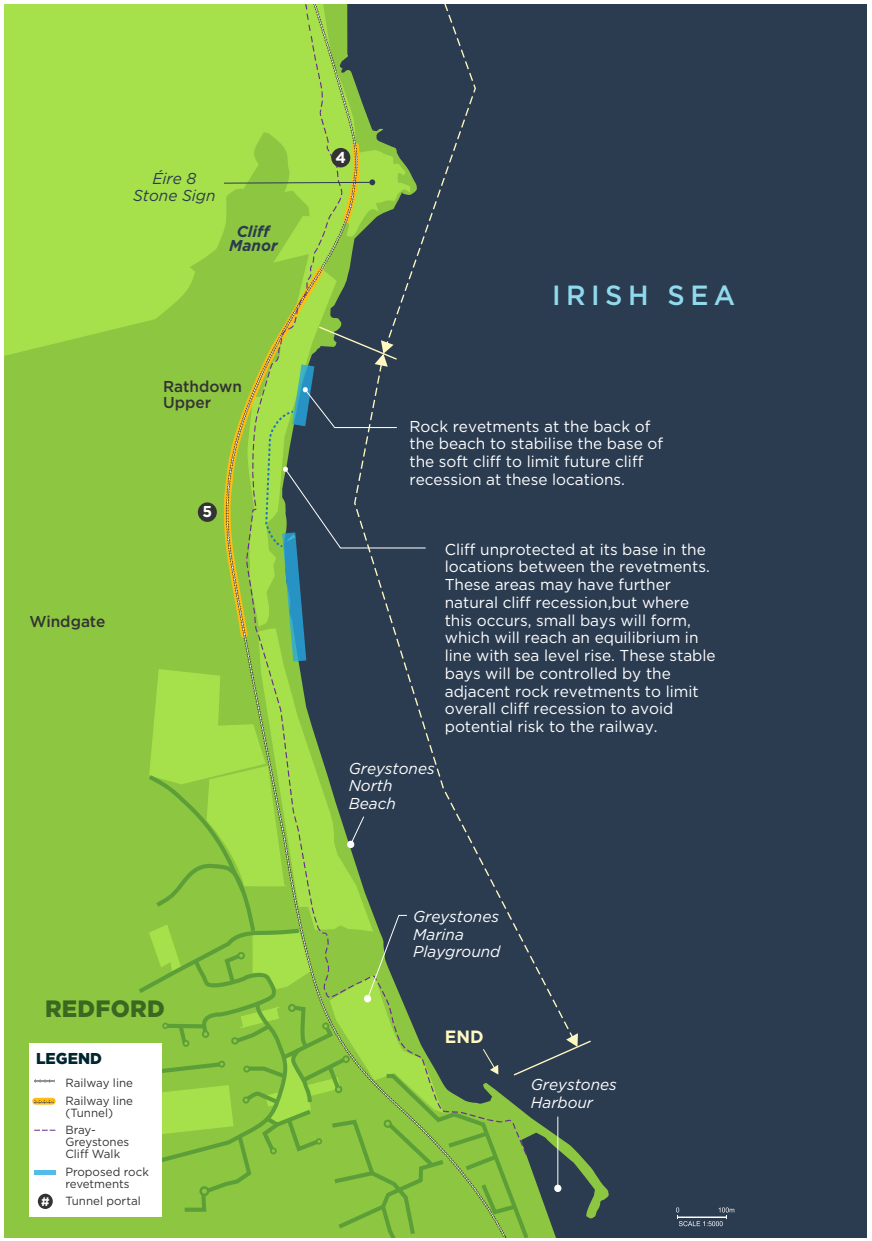

Figure 11 & 12: Preferred Scheme Bray Head to Greystones North Beach

Figure 13: Illustrative view looking south along Greystones North Beach

Figure 14: Illustrative view of proposed rock revetment at Naylors Cove

Figure 15: South of Kilcoole Station

07 Next Steps

Further Design Development & Option Selection

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 of 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 16: 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:

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