

TRANSPORTATION

Project

Boyne Greenway

Drogheda to Mornington

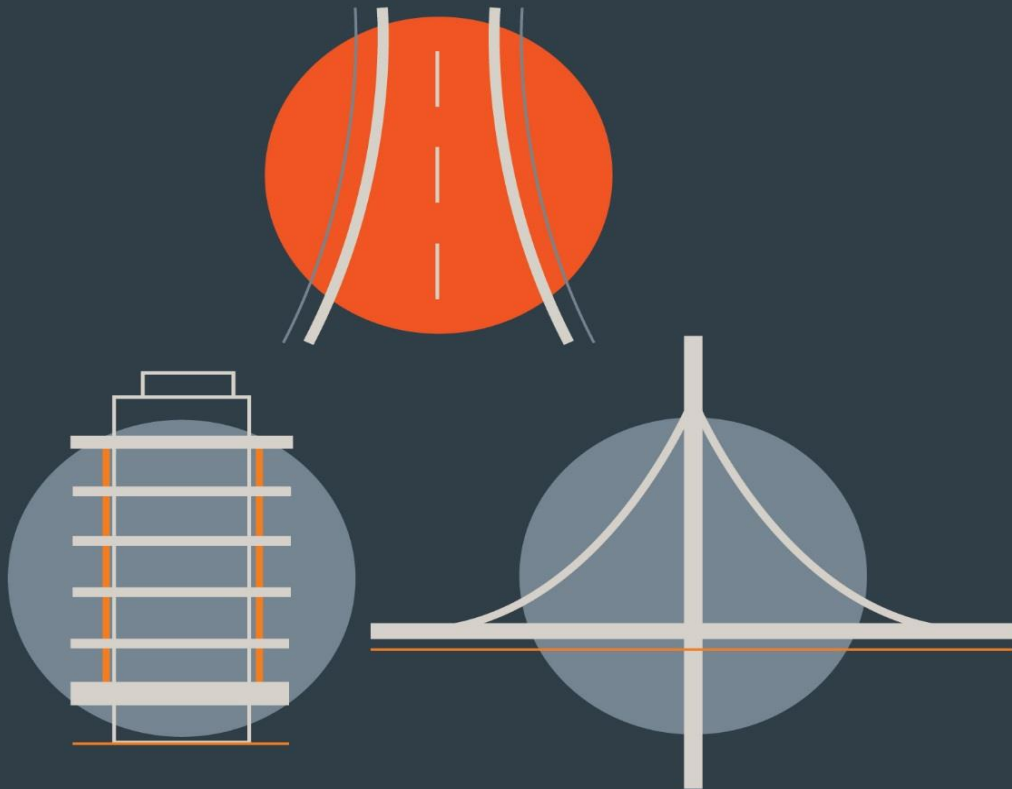
Report Title

Route Options Assessment

Main Report

Date

July 2020



DBFL CONSULTING ENGINEERS

Document Control

Job Title: Boyne Greenway – Drogheda to Mornington

Job Number: p170029

Report Ref: p170029-Rep-003

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Reviewed by: Robert Kelly

Date: July 2020

Distribution: Meath County Council
DBFL Consulting Engineers

Revision	Issue Date	Description	Prepared	Reviewed	Approved
1 st Working Draft	21/08/2019	Client Review	MK	RK	TJ
Final	30/08/2019	Non-Statutory Public Consultation	MK	RK	TJ
Draft	20/04/2020	Design Team & Client Review	MK	RK	BB
Draft	28/04/2020	Design Team & Client Review	MK	RK	BB
Final	15/07/2020	Planning	MK	RK	BB

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1.0 INTRODUCTION AND POLICY CONTEXT

1.1 Preamble

- 1.1.1 This report presents the findings of the route options assessment work undertaken for the Boyne Greenway- Drogheda to Mornington (hereafter referred to as the 'proposed scheme') and a recommendation on a preferred route is made.
- 1.1.2 This route options assessment report describes the assessment undertaken of potentially viable route options within the study area identified for the proposed scheme, against established assessment criteria.

1.2 Report Structure

- 1.2.1 The route option assessment process and corresponding report structure are detailed below:
- Section 1 – Subsequent parts of this section provide an introduction and background to the Boyne Greenway.
 - Section 2 – The proposed Study Area is described identifying key constraints and opportunities.
 - Section 3 – The methodology for identifying and assessing the feasibility of the various route options is discussed in this section including:
 - the identification of study area sections where practical route options were considered;
 - the selection and determination of initial criteria for screening and assessing technically feasible route options, based on distinct, project-specific objectives; and
 - the definition of assessment criteria.
 - Sections 4 to 5 – details the route option assessment for Sections 1-2 including sub-options for section 2.
 - Section 6 – The preferred route for the proposed scheme is described.

1.3 Boyne Greenway – Overall scheme

1.3.1 The overall objective of the proposed Boyne Greenway is to provide a dedicated pedestrian and cycle route from Drogheda Town to Mornington Village while also providing connections to schools along the route i.e. Le Chéile Educate Together, Bhradain Feasa Primary School and Drogheda Grammar Schools. The overall length of the Drogheda to Mornington section of the route is approximately 5.9km (see **Figure 1.1** below). The Boyne Greenway has been identified as a route which will eventually form part of the National Cycle Network (corridor 5 & 15) linking from the East Coast Trail at Drogheda to the international cross-country EuroVelo Route 2 from Galway to Dublin southwest of Trim. Once developed the Boyne Greenway will be a world class tourist facility creating significant economic opportunities for businesses and communities along the length of the valley and its surrounds. The proposed route will also help to link up existing tourist attractions at Mellifont Abbey, the Bridge of Peace, the Battle of The Boyne site at Oldcastle and Brú Na Bóinne at Newgrange.

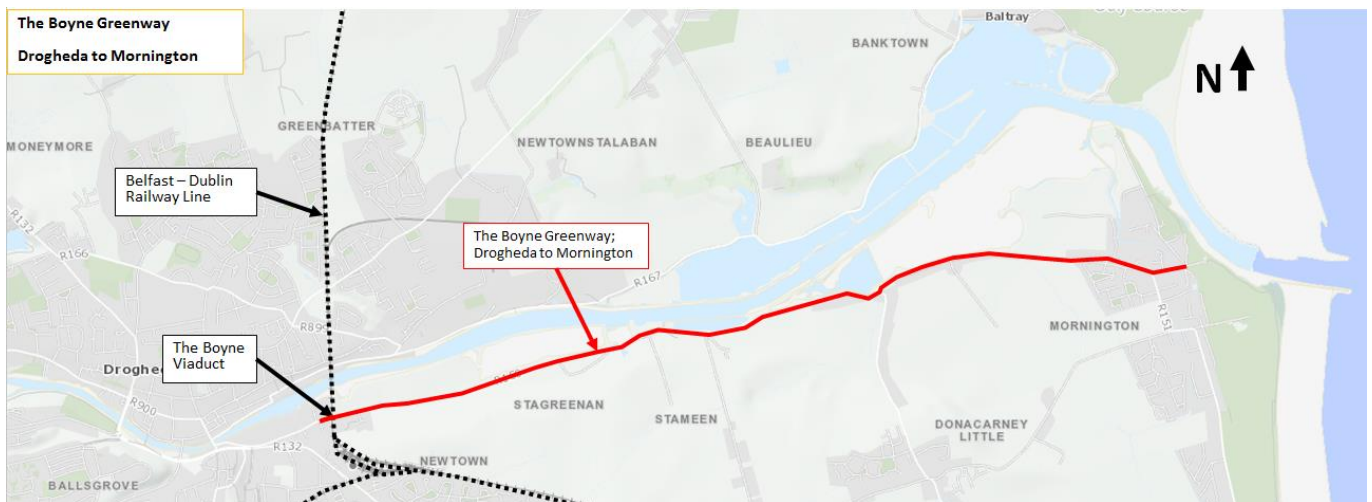


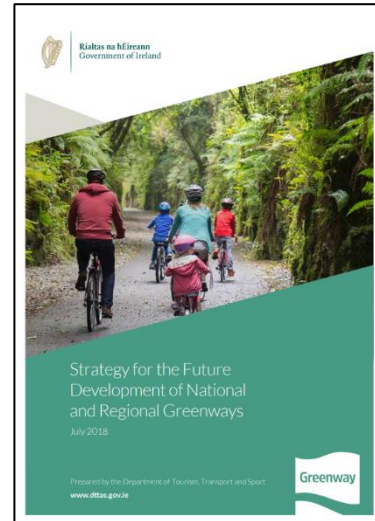
Figure 1.1: The Boyne Greenway – Drogheda to Mornington

1.4 Policies

Strategy for the Future Development of National and Regional Greenways

1.4.1 The Strategy sets out how National and Regional Greenways in Ireland should be planned, suitable locations and constructed to an appropriate standard. It also aims to increase the number and geographical spread of Greenways and quality around the country.

1.4.2 The Strategy sets out the importance of early and widespread consultation with landowners and communities along and adjacent to proposed Greenway routes. The Strategy also emphasises the need to minimise the impact on landholdings by minimising severance as far as possible and providing accommodation works such as fencing and underpasses where required. The Strategy also sets out the importance of access to Scenery and things to See and Do in order to attract tourists.



Transport Strategy for the Greater Dublin Area 2016-2035

1.4.3 The Transport Strategy for the Greater Dublin Area 2016-2035 as compiled by the National Transport Authority sets out the Strategic Transport Plan for the Greater Dublin Area for the period up to 2035.

1.4.4 The purpose of the NTA's Strategy is to:

"provide a framework for the planning and delivery of transport infrastructure and services in the Greater Dublin Area (GDA) over the next two decades. It also provides a transport planning policy around which other agencies involved in land use planning, environmental protection, and

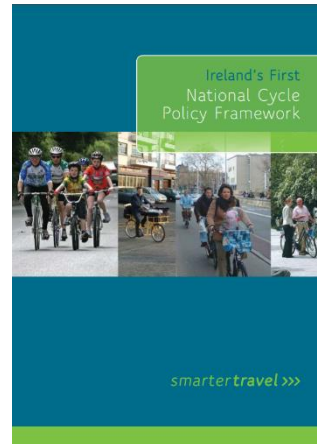


delivery of other infrastructure such as housing, water and power, can align their investment priorities”

- 1.4.5 The Strategy sets out a clear hierarchy of transport users, commencing with the sustainable modes of travel such as walking, cycling and public transport users at the very top of the hierarchy. The Strategy adopts the general principle that these users should have their safety and convenience needs considered first and that the hierarchy is applied where a large share of travel is (or could be) made by walking, cycling and public transport.
- 1.4.6 In addition to guiding the development of specific Strategy measures, the NTA encourages that the “transport user hierarchy should guide engineers, planners and urban designers on the order in which the needs of transport users should be considered in designing new developments or traffic schemes in the Greater Dublin Area.”

National Cycle Policy Framework

- 1.4.7 The mission of the National Cycle Policy Framework is to create a strong cycling culture in Ireland. The vision is that all cities, towns, villages and rural areas will be bicycle friendly. Cycling will be a normal way to get about, especially for short trips. Cycling contributes to improved quality of life and quality of the public realm, a stronger economy and business environment, and an enhanced environment. The NCPF outlines 19 high level objectives and details the 109 individual but integrated actions, which aim to ensure that a strong cycling culture is developed in Ireland so that by 2020 10% of all journeys will be by bike. They are listed as follows:

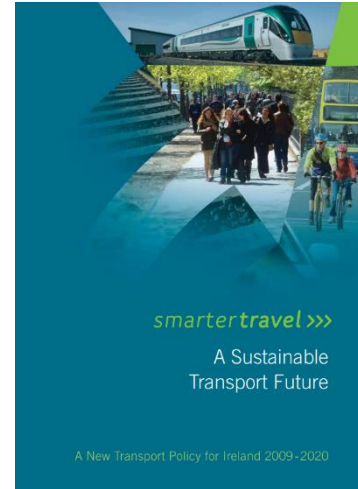


- 1. Support the planning, development and design of towns and cities in a cycling and pedestrian friendly way.*

- 2. Ensure that the urban road infrastructure (with the exception of motorways) is designed / retrofitted so as to be cyclist-friendly and that traffic management measures are also cyclist friendly.*
- 3. Provide designated rural cycle networks especially for visitors and recreational cycling.*
- 4. Provide cycling-friendly routes to all schools, adequate cycling parking facilities within schools, and cycling training to all school pupils.*
- 5. Ensure that all of the surfaces used by cyclists are maintained to a high standard and are well lit.*
- 6. Ensure that all cycling networks - both urban and rural - are signposted to an agreed standard.*
- 7. Provide secure parking for bikes.*
- 8. Ensure proper integration between cycling and public transport.*
- 9. Provide public bikes in cities.*
- 10. Improve the image of cycling and promote cycling using "soft interventions" such as promotional campaigns, events etc.*
- 11. Improve cyclists' cycling standards and behaviour on the roads.*
- 12. Improve driver education and driving standards so that there is a greater appreciation for the safety needs of cyclists.*
- 13. Support the provision of fiscal incentives to cycle.*
- 14. Provide appropriate levels of, and timely, financial resources towards implementing the NCPF.*
- 15. Introduce changes to legislation to improve cyclist safety.*
- 16. Improve enforcement of traffic laws to enhance cyclist safety and respect for cyclists.*
- 17. Develop a structure that can coordinate the implementation of activities across the many Government Departments, Agencies and NGO's.*

Smarter Travel – A Sustainable Transport Future

1.4.8 Smarter Travel was published in 2009 by the Department of Transport which represents the national policy documentation outlining a broad vision for the future and establishes objectives and targets for transport. The document examines past trends in population and economic growth and transport concluding that these trends are unsustainable into the future.



1.4.9 In order to address the unsustainable nature of current travel behaviour, Smarter Travel sets down a number of key goals and targets for 2020 - including:

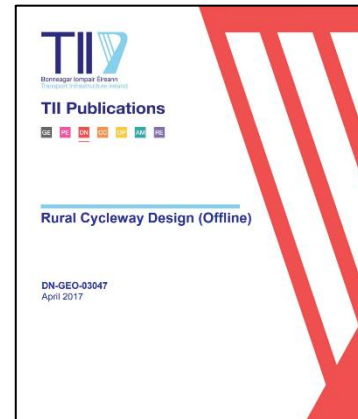
- Total vehicle km travelled by car will not significantly increase;
- Work-related commuting by car will be reduced from 65% to 45%;
- 10% of all trips will be by cycling;
- The efficiency of the transport system will be significantly improved.

1.4.10 The document recognises that these are ambitious targets, and outlines a suite of 49 actions required to achieve these targets – summarised under the following four main headings:

- Actions aimed at reducing distances travelled by car and the use of fiscal measures to discourage use of the car;
- Actions aimed at ensuring that alternatives to the car are more widely available;
- Actions aimed at improving fuel efficiency of motorised travel; and
- Actions aimed at strengthening institutional arrangements to deliver the targets.

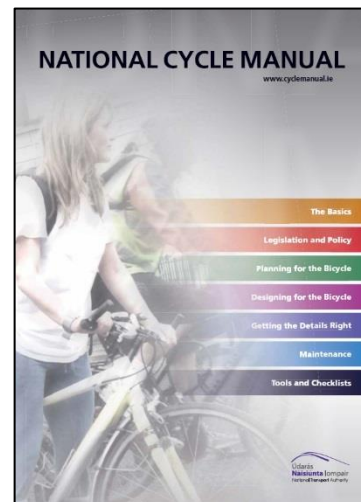
Rural Cycleway Design, TII Publications DN-GEO-03047 (2017)

- 1.4.11 The National Cycle Policy Framework 2009-2020 (NCPF) identified the requirement to develop and implement the National Cycle Network to promote cycling as a transport mode, leisure activity and tourist activity in Ireland. Transport Infrastructure Ireland published the National Cycle Network Scoping Study in August 2010, which identified a core network of corridors between the larger towns and cities, and through the regions of greatest interest for tourist and recreational cycling. This Design Standard will assist in the delivery of the National Cycle Network and will ensure a consistent approach is applied to the design of cycle schemes in rural areas.
- 1.4.12 In order to develop appropriate design standards for rural cycling facilities, there are a number of core design principles that need to be implemented. The principles include Coherence, Convenience, Directness, Safety, Comfort, Attractiveness and Access.



National Cycle Manual 2011

- 1.4.13 The National Cycle Manual was published by the National Transport Authority in 2011.
- 1.4.14 It embraces the Principles of Sustainable Safety which aims to create a safe traffic environment for all road users including cyclists.
- 1.4.15 The Manual challenges planners and engineers to incorporate cycling within transport networks more proactively than before.
- 1.4.16 It identifies 5 primary needs of cyclists which should be taken into account when any infrastructure incorporating cyclists is being developed, these are:



- Road Safety;
- Coherence;
- Directness;
- Attractiveness; and
- Comfort.

Greater Dublin Area Cycle Network Plan

- 1.4.17 In August 2013, the NTA published the Greater Dublin Area Cycle Network Plan. Following a period of consultation with the public and various stakeholders it was officially adopted and published in early 2014. The plan undertook a review of existing cycle facilities in the GDA and sets out the strategy for the development of an integrated cycle network for the future.
- 1.4.18 The Greater Dublin Area Cycle Network Plan proposes to expand the urban cycle network to over 1,485 kilometres in length and will provide over 1,300 kilometres of new connections between towns in the rural areas of the GDA. The network is intended to provide a quality of service sufficient to attract new cyclists, as well as catering for the increasing numbers of existing cyclists.
- 1.4.19 The plan proposes a number of Greenways – fully segregated off-road routes along canals, rivers and disused railway lines. In the case of the built-up area, these Greenways will also perform a vital commuter function and will effectively form a significant part of the primary network.
- 1.4.20 The full details of the proposed cycle network across the region are set out in the Greater Dublin Area Cycle Network Plan. As part of the Strategy it is intended to implement this network in full, delivering safe, high quality cycle facilities, which will be designed and constructed in accordance with the principles set out in the National Cycle Manual.
- 1.4.21 The study identified that there were no cycling facilities within East Meath between Drogheda and the Bettystown / Laytown area. The network plan proposed a cycle route network in East Meath consisting of rural cycle routes between the various towns, including the regional centre of Drogheda.

1.4.22 In particular the Plan proposed an East Coast Trail in County Meath (identified in **Figure 1.2** as Route M1) noting the following:

"There has been no route selection study so far for this national route along the coastal section of county Meath. It should follow the River Boyne Estuary eastward from Drogheda to Mornington, where it can turn south to Bettystown. There are environmental sensitivities along the estuary and careful assessment will be required for the selected route, which should be segregated from the R151 regional road that carries considerable traffic between Drogheda and the satellite villages on the coast."

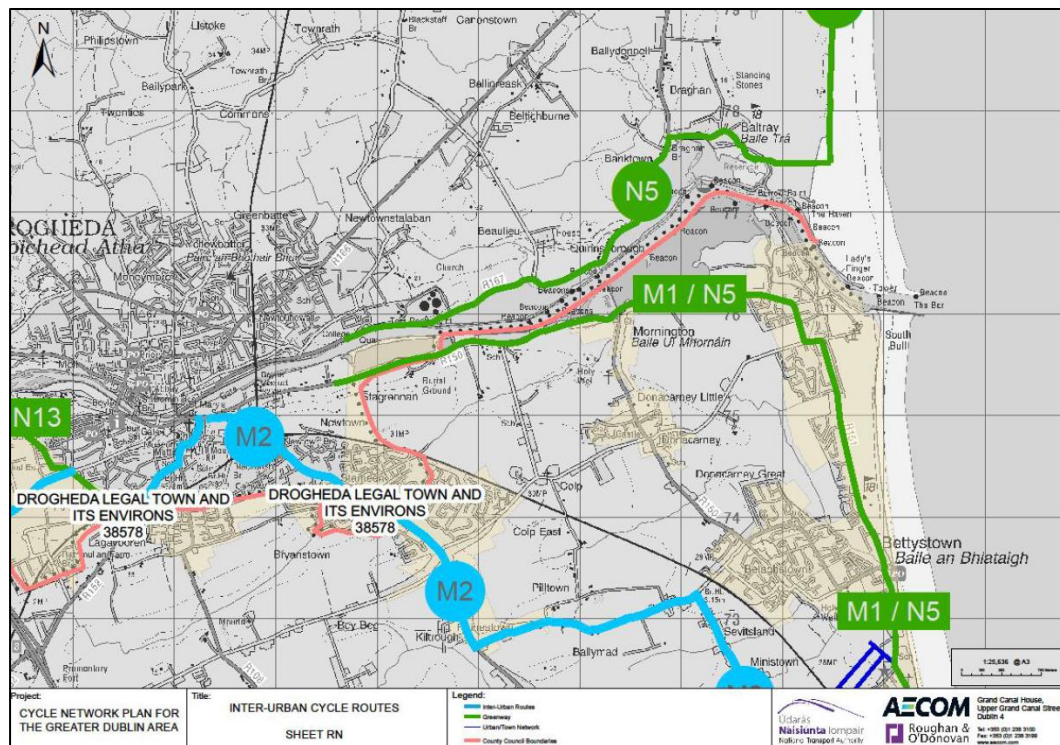


Figure 1.2 Greater Dublin Area Cycle Network Plan Sheet RN (East Meath)

Meath County Development Plan – 2013-2019

1.4.23 The aim of the Meath County Development Plan 2013-2019 is to advance the present-day evolution of the county and to create a framework for the coordinated and sustainable economic, social, cultural and environmental development of County Meath.

1.4.24 Some relevant objectives of Meath County Development Plan:

- *To explore the provision of sustainable medium and long-distance walking routes.*
- *To explore the feasibility of developing former disused transportation corridors for cycle / greenways.*
- *To provide for the development of the Trim – Navan – Slane – Drogheda cycle / greenway along the River Boyne subject to obtaining the necessary statutory planning consent, the carrying out of Appropriate Assessment, landowner cooperation and the securing of the necessary funding.*
- *To develop a system of cycle / greenways, subject to the availability of resources, along the banks of the Boyne and Blackwater Rivers, in such a manner so as not to significantly negatively impact on the conservation status of the Natura 2000 site either alone or in combination with other objectives in this or other plans.*
- *To encourage pedestrian access to certain areas of Natura 2000 sites for their appreciation and in a manner so as not to impact negatively on the sites' integrity or long term conservation status.*

1.4.25 Some relevant policies of Meath County Council include:

- *To promote the sustainable development of walking, cycling, public transport and other more sustainable forms of transport as an alternative to the private car, together with the development of the necessary infrastructure and promotion of the initiatives contained within 'Smarter Travel, A Sustainable Transport Future 2009 – 2020'.*
- *To promote the development of sustainable tourism and encourage the provision of a comprehensive range of tourism facilities, subject to satisfactory location, siting and design criteria, the protection of environmentally sensitive areas and areas identified as sensitive landscapes in the Landscape Character Assessment for the county.*

- *To identify and seek to implement a strategic, coherent and high quality cycle and walking network across the county that is integrated with public transport and interconnected with cultural, recreational, retail, educational and employment destinations and attractions.*
- *To explore the provision of sustainable medium and long distance walking routes.*

The Development Plan states that an essential element of any integrated transport system is to provide for the needs of cyclists and pedestrians. The increased provision of cycle lanes and safer facilities for pedestrians is identified as a key action in the Government's 'Sustainable Development – A Strategy for Ireland'.

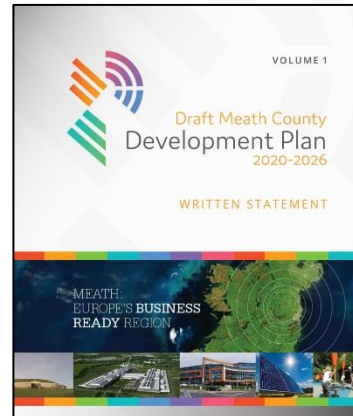
Draft Meath County Development Plan – 2020-2026

1.4.26 The Draft Meath County Development Plan 2020-2026 plan sets out the policies and objectives and the overall strategy for the development of the County over the plan period 2020-2026.

1.4.27 This Plan provides a positive vision for Meath which will enable the county to continue to make a significant contribution to national economic recovery by promoting sustainable development and facilitating stable economic growth thus delivering long term benefits for the citizens of the county.

1.4.28 Some relevant objectives of Meath County Development Plan:

- *To continue the development of a network of Greenways in the County in accordance with the Department of Transport, Tourism and Sport Strategy for Future Development of Greenways.*
- *To explore the provision of sustainable medium and long distance walking routes.*



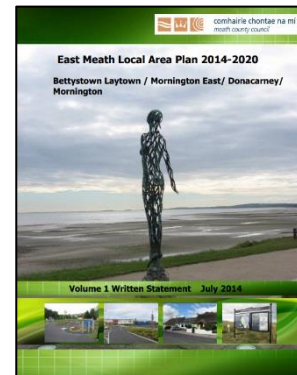
- *To implement, in conjunction with the NTA, the recommendations of the NTA strategy with regard to walking and cycling infrastructure*

1.4.29 Some relevant policies of Meath County Council include:

- *To encourage new and high quality investment in the tourism industry in the County with specific reference to leisure activities (including walking, cycling, angling, equestrian and family focused activities) and accommodation in terms of choice, location and quality of product.*
- *To identify and seek to implement a strategic, coherent and high quality cycle and walking network across the County that is integrated with public transport and interconnected with cultural, recreational, retail, educational and employment destinations and attractions.*
- *To support the creation of healthy and sustainable communities that encourages and facilitates walking and cycling and general physical activity through the implementation of best practices in urban design that promotes permeability and interconnecting spaces.*

East Meath Local Area Plan (2014 – 2020)

1.4.30 This LAP was drawn up to provide a framework for the future advancement and evolution of Bettystown-Laytown-Mornington East-Donacarney-Mornington. The ambition of the LAP is to help guide development of these towns and villages in a stable and viable fashion.



1.4.31 A key consideration of this LAP is the promotion of walking & cycling and broader Smarter Travel initiatives to reduce car dependency, recognising that challenges exist in addressing deficiencies in the existing pedestrian/cycling network.

1.4.32 The LAP states that the Boyne region has the potential to become one of the main development areas for cycling tourism with its numerous tourist attractions.

1.4.33 Some key aims of the LAP for transportation and Movement include:

- To promote the sustainable development of walking, cycling, public transport and other more sustainable forms of transport as an alternative to the private car, together with the development of the necessary infrastructure.
- To work with stakeholders to progress the Boyne Greenway, subject to proposals being screened for their potential impacts on the Boyne SAC and SPA.
- To promote and facilitate the provision of the necessary transport infrastructure to fully accommodate existing and future population needs as well as the demand for economic development in an environmentally sustainable manner.
- To recognise and investigate the use of river corridors as natural amenity corridors, connecting the different parts of the plan area and linking up with established amenity areas whilst ensuring that the qualifying interests of the Natura 2000 sites are protected. This would include potential amenity walks along the River Nanny and the proposed Boyne Greenway extension to Mornington. Protection of the natural environment and adherence to GI POL 7 will be prioritised during the preparation of design and implementation of proposals.
- To support for the development of the Boyne Greenway extension to Mornington along the River Boyne subject to carrying out a routing study and any necessary statutory planning consent, the carrying out of an AA screening, landowner cooperation and the securing of necessary funding.

1.5 Policy Conclusion

- 1.5.1 The various studies discussed in the preceding sub-sections set out the transport planning policy context and need to promote the sustainable development of walking, cycling, and other more sustainable forms of transport as an alternative to the private car and to facilitate the provision of the necessary transport infrastructure to fully accommodate existing and future population needs as well as the demand for economic development in an environmentally sustainable manner.

1.6 Boyne Greenway – Drogheda to Mornington Objectives

1.6.1 The main objective for the Boyne Greenway between Drogheda to Mornington is to provide a cycle and pedestrian route from Drogheda Town to the residential settlement in Mornington, with links to the schools on the route and to provide a leisure route of national interest that will attract both leisure cyclists and walkers alike to visit the area thus ensuring the continued prosperity of the historical town of Drogheda and surrounding hinterland. The proposed route will also provide viewing opportunities for the natural fauna and flora along the Boyne Estuary.

1.6.2 Having regard to the findings of the transport context for the proposed Greenway and using the Brief provided by MCC, the following objectives have been established for the Boyne Greenway, between Drogheda and Mornington:

- Provide a cycle and pedestrian route from Drogheda in County Louth to Mornington in County Meath.
- Create a first-class greenway and tourist attraction which can contribute to the economic development of County Meath and County Louth;
- Provide a greenway while respecting the existing environment along the route, including the designated European sites, the Boyne Coast and Estuary SAC and the Boyne Estuary SPA.
- Increase access to the locality and raise the profile of Counties Meath & Louth and the Boyne Valley by creating a facility which is recognised locally, nationally and internationally as a first-rate tourist attraction.
- Encourage use of a sustainable mode of transport, and interlink with existing public transport;
- Raise the profile of cycling and inspire people to cycle;
- Increased cyclist and pedestrian safety;
- Enhanced cyclist and pedestrian accessibility, including access to existing schools within Drogheda;
- Tackle obesity and promote activity and create a better quality of life;
- Reduce congestion and the number of motorised vehicle trips;
- Traffic calming;
- Reduced carbon emissions;

1.7 Background to the Proposed Route

1.7.1 The Boyne Greenway is an ambitious project which has the potential to deliver significant benefits to the local area and the greater surrounding region. This includes Assessment of Route Options, Feasibility Studies, inclusions into Development plans, field surveys and consultation. Below is a brief summary of the process to date:

- The National Trails Office completed an assessment of the route in February 2013.
- Oldbridge to Drogheda Ramparts opened in February 2014.
- Draft Feasibility Study completed by ROD 20th July 2014
- Final feasibility Study completed in August 2014 – review of 4 proposed routes and determination of best option.
- Boyne Greenway included in the Great Dublin Cycle Network Plan 2013 published by National Transport Authority
- Included in Laytown and Bettystown Walking and Cycling Study Jan 2014 completed on behalf of Meath County Council
- Included in Meath County Development Plan
- Included in Louth County Development Plan
- Alternative route proposed along the Gut following ROD feasibility study (route No. 5)
- In June 2016 East Meath Councillors voted in favour of Part 8 Planning Application.
- DBFL appointed consultants February 2017 to complete both the 'Drogheda Link' and the Mornington to Drogheda route, including the commissioning of Best Practice surveys to inform route design selection.
- Non-Statutory Public Consultation commenced September 2019
- Upgrade of the Dominic's Park/Drogheda Ramparts section commenced August 2019. Which is a second phase of an already very popular and successful Greenway.

1.8 Physical Character of the Greenway

1.8.1 The proposed Boyne Greenway Project extending due east from Drogheda Town to Mornington Village will be constructed utilising two different methodologies, selected according to the sensitivities of the landscape and environment requirements encountered within the areas crossed by the route. The characteristic habitats and landscapes crossed by the route, with respective constraints, are identified with regard to:

1. Construction directly alongside, or within very close proximity of, the regional road within an area of existing roadside verge or greenfield adjacent.
2. Construction significantly away from the roadside and/or within the intertidal zone.

1.8.2 Each of the above requirements is discussed below, providing an overview of the proposals and measures intrinsic to project design which will avoid impact on the ecological aspects of the scheme.

Greenway Construction Alongside Road

1.8.3 There is approximately 4.1km of the proposed greenway to be constructed alongside the road or very close to the road edge. Given the location, access and low maintenance requirements, robust construction forms are preferred. Therefore, bituminous construction in accordance with the recommendations of the TII Design Manual for Roads and Bridges (TII DMRB) is considered the most appropriate. With this proposed form of construction, verge vegetation would be cleared with limited additional excavation. The width of the cycle and pedestrian facility/greenway will be 4 metres and restrained on each side with a kerb. Some similar greenway examples are provided below.



Figure 1.3 Examples of Greenway Alongside Road (Holland and Ireland)

Greenway Construction Intertidal Zones/SPA/SAC

- 1.8.4 There is approximately 2.4km of proposed greenway within the intertidal zones. This part of the route traverses through the sensitive areas of the SPA/SAC. In these areas it is proposed that the greenway be elevated onto a boardwalk structure to minimise impact on the SPA/SAC. The boardwalk will be constructed at a minimum level defined within the flood risk assessment report (3.54m Above Ordnance Datum). This is approximately 1.5 metre above the present day highest astronomical tide level and will mitigate the risk of flood throughout the design life of the boardwalk section of greenway. The width of the boardwalk will be limited to 4metres (maximum). Following a review of the options it has been agreed that the elevated boardwalk be formed using propriety recycled plastic element.

Proprietary Recycled Plastic Elements

- 1.8.5 A part of the Boyne Greenway to the west of Drogheda Town, has already been constructed using this form (see **Figure 1.4** below). It involves installing recycled plastic components much like forming a similar timber structure. They are installed to a depth to suit the underlying geology and provide the required level of load capacity.



Figure 1.4 Boyne Greenway Upstream Recycle Plastic Elements Construction

2.0 STUDY AREA

2.1 Introduction

- 2.1.1 The section of the cycle and pedestrian route/Greenway route that this report will focus attention on is the section east of Drogheda from Ship Street, which is located adjacent to the railway viaduct (Belfast - Dublin line) out to Mornington (see **Figure 2.1**). This Chapter will outline the characteristics of this area in terms of physical features, opportunities and constraints as well as identifying potential for integration with other travel modes.
- 2.1.2 The study area begins east of Drogheda from the Ship Street/railway viaduct (Belfast Dublin line) out to Mornington via the existing R150/R151.

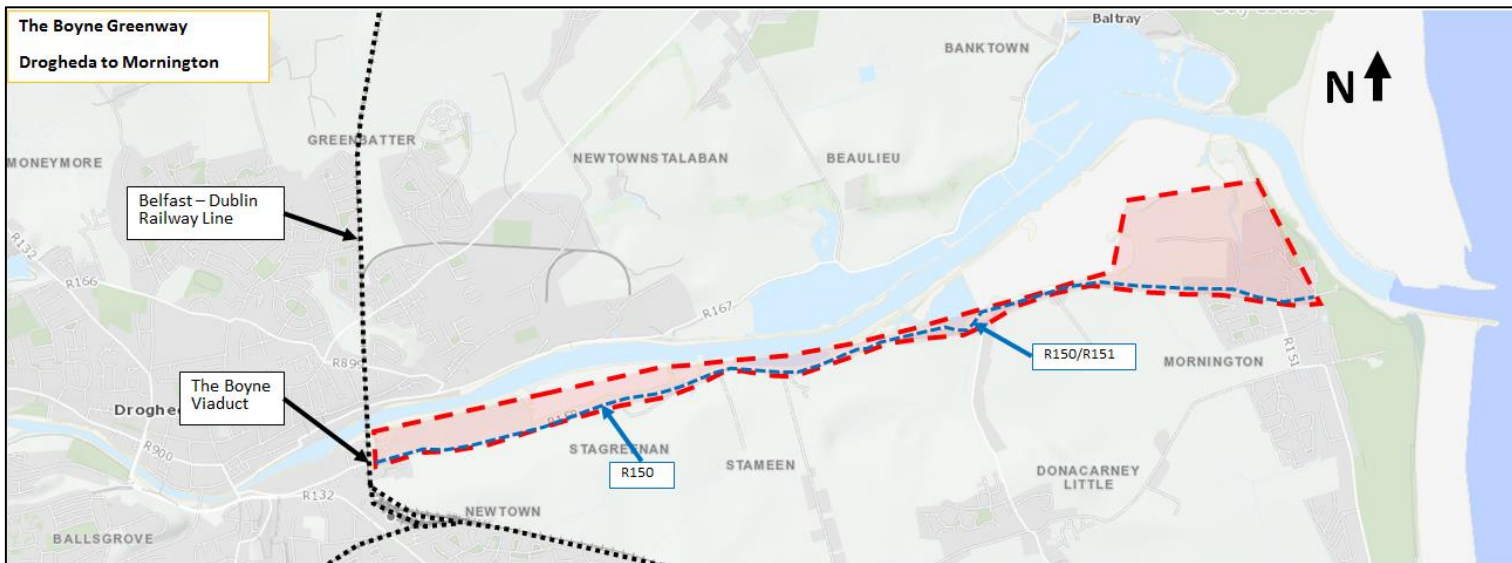


Figure 2.1: Proposed Study Area

2.2 Study Area Sections

2.2.1 The study area has been divided into two sections to simplify the assessment process as illustrated below in **Figure 2.2:** -

- Section 1 – between the Boyne Viaduct and Mornington Road/Old Golf Range access.
- Section 2 – between Mornington Road/Old Golf Range access and Tower Road/Crook Road junction.



Figure 2.2: Study Area Sections

Characteristics and Opportunities

Introduction

2.2.2 There are a number of constraints and opportunities, both natural (i.e. existing natural environment) and physical (the built environment), which constrain route options for the proposed scheme within the defined study area.

2.2.3 These include:

- River Boyne;
- River Boyne and River Blackwater SAC, Boyne Coast and Estuary SAC and the Boyne Estuary SPA;
- Existing and committed future development along the route;
- Existing monuments and protected structures along the route such as Mornington Bridge;
- Mature Trees and other natural features along the Marsh Road (R150) and Mornington Road (R151);
- Road alignment along the Marsh Road (R150) and Mornington Road (R151);
- The need to maintain traffic flow for access to local amenities;
- Land ownership;
- Environmental impacts and engineering constraints such as steep topography, frequent watercourse crossings, and potential flooding.

2.2.4 The following Field Surveys were undertaken to assess and identify the Characteristics & Constraints specific to each of the Study Areas outlined above.

Field Surveys

Ecological Field Surveys

2.2.5 Inis Environmental Consultants carried out a comprehensive gap analysis on available Biodiversity data for the route, covering the following:

1. Any previously commissioned baseline surveys and reporting on same;
2. The route iteration then proposed for development;

3. Results of consultation undertaken with Statutory Consultees, such as NPWS, in 2017 and 2019.

2.2.6 Following this exercise and a comprehensive desktop review of available baseline data, a range of bespoke Biodiversity sensitive aspect-based surveys were undertaken in January 2018 to fully inform an iterative design process.

- i. **Habitat and Mammal Survey** – This survey focussed on habitat and mammal potential along the route corridor but importantly also the density and abundance of bird species present during the winter months, and their respective levels of habitat usage for foraging, roosting etc within proximity to the route (reference to Irish Wildlife Manuals No. 80).
- ii. **Bird Survey** – The Bird survey was undertaken in line with Best Practice in ecological surveying and following established methods for Bird Surveys (including The Irish Wildlife Manual No. 80). Examination and Analysis of the extent of usage by wildfowl of the intertidal zones adjacent to the route corridor was carried out by an expert ornithologist, and included evaluation of known sensitivities (in particular to noise and disturbance), the availability of suitable displacement habitat and provided insight into whether any effects were likely from the presence of a Greenway via either disturbance pathways or habitat related pathways would be positive or negative in terms of effect quality with possibility of resulting pathways to European Sites.

2.2.7 The methodologies for these surveys are described in the Natura Impact Statement report submitted as part of this Planning Application.

Archaeological and Built Heritage Field Surveys

2.2.8 Irish Archaeological Consultancy Ltd (IAC) have undertaken an archaeological and built heritage assessment in advance of the proposed Boyne Greenway. This assessment has been carried out to ascertain the potential impact of the proposed greenway on the archaeological and built heritage resource that may exist within the area.

- 2.2.9 The archaeological and built heritage assessment involved a detailed study of the archaeological and historical background of the proposed greenway and the surrounding area. This included information from the Record of Monuments and Places of Meath, the Register of Protected Structures, the National Inventory of Architectural Heritage, the Meath Industrial Heritage Survey, the topographical files within the National Museum and all available cartographic and documentary sources for the area. A field inspection has also been carried out with the aim to identify any previously unrecorded features of archaeological or historical interest.
- 2.2.10 The methodologies for these surveys are described in the Archaeological and Built Heritage Assessment Report included in the planning package.

2.3 Study Area Characteristics & Constraints

- 2.3.1 The following chapter will address the Characteristics & Constraints specific to each of the Study Areas identified above.

Section 1 (Ch. 0–4800)

- 2.3.2 Section 1 extends east of Drogheda from Ship Street/railway viaduct (Belfast Dublin line) to the Old Golf Range on approach to Mornington Village via the existing R150/R151.
- 2.3.3 The proposed cycle and pedestrian/Greenway route starts at Ship Street/Railway viaduct which is in a suburban area of Drogheda Town. The suburban Section of the route travels from the viaduct to the Flo Gas yard located east of Drogheda. After the Flo Gas yard (i.e. to the east of Drogheda travelling towards Mornington) a number of dwellings are sparsely located along the route.
- 2.3.4 There is significant ribbon development along the R150 and R151 regional roads to the east, as well as along the local road network. A significant amount of land is zoned for future housing, transport corridors and heavy industrial uses within the study area.
- 2.3.5 There are currently very limited pedestrian/cycle facilities between Drogheda Town and the residential houses, Le Chéile Educate Together and Drogheda Grammar Schools, which are all located along the R150/R151. There are also plans to construct an additional secondary school on the Mill Road.
- 2.3.6 It is identified that there are a number of permitted developments in the area of the proposed Boyne Greenway development. These permitted developments are referred to **Figure 2.3** below.

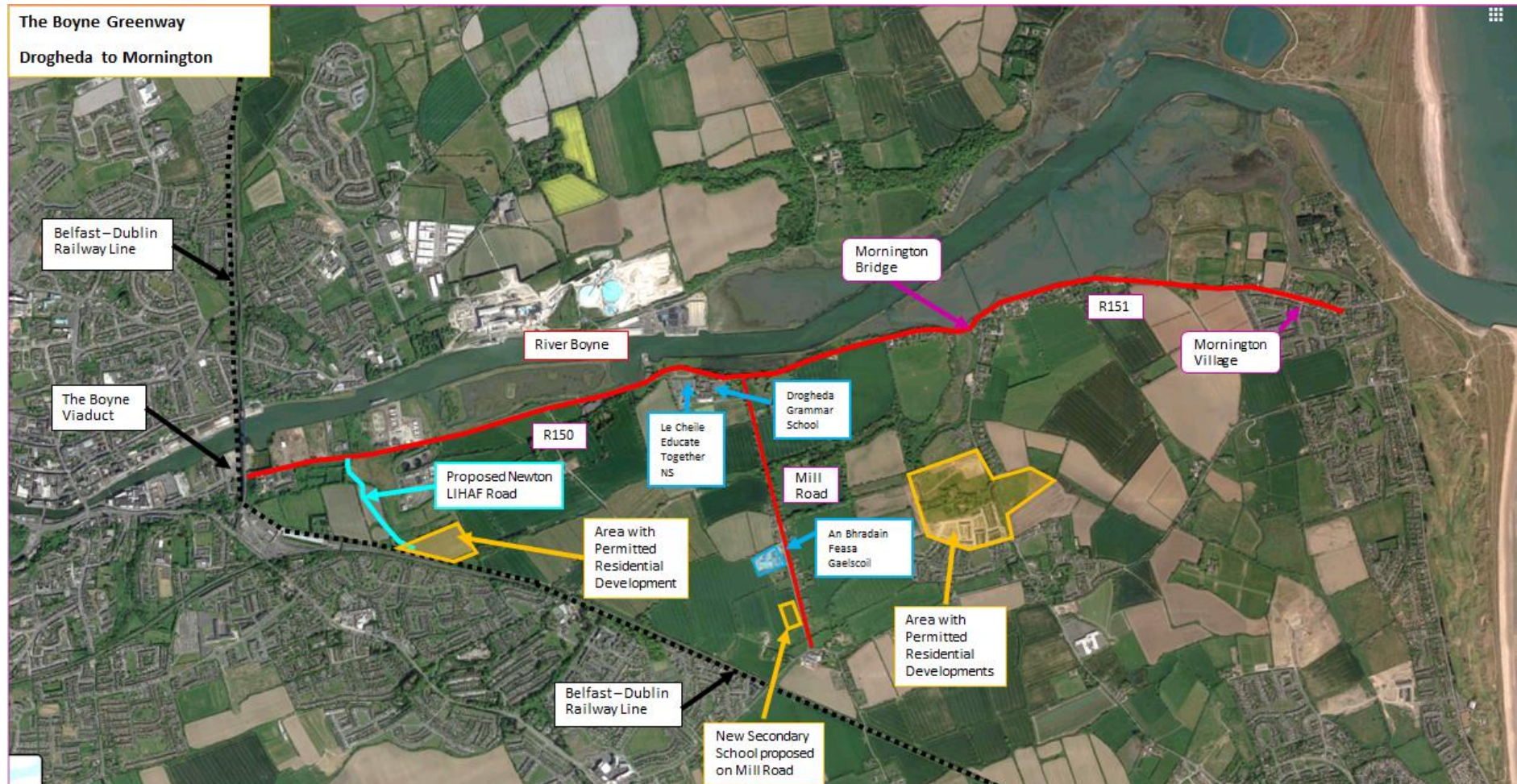


Figure 2.3: Locations of some of the Permitted Developments within the Area

2.3.7 There are pedestrian footpaths along the Marsh Road from Drogheda to the FloGas yard. However, for the majority of Section 1, there are no pedestrian footpaths along the R150/R151. **Figure 2.4** to **Figure 2.9** illustrates the lack of pedestrian facilities along the R150 and R151 for Section 1.



Figure 2.4 Marsh Road approaching Flo Gas approx. Chainage 650 (facing east)



Figure 2.5 Marsh Road Chainage 1150 (facing east)



**Figure 2.6 Marsh Road approaching Le Chéile Educate Together National School
approx. Chainage 2080 (facing east)**



Figure 2.7 Marsh Road approaching Drogheda Grammar School approx. Chainage 2430 (facing west)



Figure 2.8 Mornington Road at Mornington Graveyard Approx. Chainage 3860 (facing east)



Figure 2.9 Mornington Road approx. Chainage 3940 (facing east)

Natural Environment

Topography & Landscape

- 2.3.8 The landscape character of Section 1 east of Drogheda is coastal plain bounded to the north by the Boyne River estuary. It is characterised by scrubby rolling lowland near the coast with the estuary, back from the coast, being a steep sided river plain bound by mixed woodland.
- 2.3.9 The elevation of the proposed greenway will be in line with the existing Regional Roads (R150 and R151) elevations and will not create a negative visual impact for residents along the extent of the route.
- 2.3.10 The nature of the proposed Boyne Greenway along the Estuary foreshore to the east of Drogheda, with potential areas of hardcore pathway, piling and boardwalk, is considered unlikely to have any significant impact on the landscape of the area.

- 2.3.11 The greenway has the potential to have a positive landscape and visual impact through the provision of additional views and interpretation of the area and its heritage for users.

Ecology (including Flora & Fauna)

- 2.3.12 Sections of the proposed Greenway are located within the Boyne Coast and Estuary Special Area of Conservation (SAC) and the Boyne Estuary Special Protection Area (SPA) and includes a number of habitats and species listed on Annex I/II of the EU Habitats Directive.
- 2.3.13 Upper Salt Marsh, Lower Saltmarsh, Mud Shores, Dry Meadows and Grassy Verges and Improved Grassland habitats comprise the most frequently recorded habitats within 50m of the R150/R151 between the viaduct at Drogheda and where the route meets the area locally known as 'The Gut' along the R150/R158 to Mornington.
- 2.3.14 A range of bespoke Biodiversity sensitive aspect-based surveys were undertaken in January 2018 to fully inform an iterative design process e.g. Bird Surveys, Habitat and Mammal Surveys as outlined in Section 2.2.
- 2.3.15 In intertidal zones, it is it is proposed that the cycle and pedestrian/Greenway route will be elevated onto a boardwalk structure to avoid impact, through disturbance pathways, on potentially foraging birds or through habitat loss, as designed through consultation with the Consultant Ecologist and the NPWS; in addition, side boards will be in place which will avoid source of intrusion, in particular dogs. A code of practice will be implemented during the operational phase to avoid the walking of dogs off leash (literature suggests dogs as opposed to cyclists present the greatest potential source of disturbance).

The Built Environment

Archaeological and Built Heritage

- 2.3.16 There are a number of recorded monuments within the area surrounding the proposed greenway. The closest is the zone of archaeological notification associated with the former medieval settlement at Mornington (RMP ME021-001;

Ch. 3680-4040). The proposed greenway will pass through this area. Three further monuments are located within the immediate vicinity of the proposed greenway, Mornington church, graveyard, and a chest tomb (ME021-001001-3; Ch. 3820-3900).



Figure 2.10: Graveyard walls (RMP ME021-001002), facing northeast

2.3.17 The proposed greenway begins at the corner of Ship Street and passes the lower car park for Drogheda Railway Station and then underneath the Boyne Viaduct (RPS DB-184). The northside of the road through this section represents the townland boundary between the River Boyne and both Lagavooren and Stagrennan. To the west of the viaduct the road is bordered by a relatively recent stone wall.



Figure 2.11: Boyne Viaduct, facing northeast

2.3.18 There is a total of 17 protected structures located within the complete study area of the proposed scheme, along with 14 structures included on the NIAH Survey and 13 features included in the Meath Industrial Heritage Survey. The closest

protected structures consist of Mornington Bridge (RPS MH021-200; Ch. 3690-3730). Here a new bridge will be constructed to the north of the existing bridge, with the scheme also passing beneath the Boyne Viaduct (RPS DB-184, Ch. 70-100) at the western end of the scheme. A number of demesne walls directly associated with protected structures border the proposed greenway directly. These include walls associated with St James (RPS DB-148; Ch. 150-160) and Weirhope House (RPS DB-149; Ch. 390-430). Several smaller items of street furniture, including milestones and water pumps, are also located within the immediate vicinity of the proposed greenway.



Figure 2.12: St James House (RPS DB-148), facing southwest

- 2.3.19 The proposed greenway is considered to be low impact in nature, due to the limited requirement for groundworks. No adverse impacts are predicted in relation to where the proposed greenway passes in close proximity to the four recorded monuments. It is possible that ground works associated with the construction of the scheme across greenfield areas may have an adverse impact on previously unrecorded archaeological remains (Ch. 2270-2360, Ch. 2970-3090 and Ch. 4430-4620).
- 2.3.20 As mentioned above, Mornington Bridge is a protected structure (RPS MH021-200). As part of the proposed scheme, there is no room to provide a facility on the landward side of the bridge wall hence a new independent structure will be required to bridge the estuary. Whilst the proposed development will result in an indirect impact on Mornington Bridge, the design is sympathetic to the existing

structure, allowing the main elements of the northern elevation to remain visible. This will be discussed further in **Chapter 4**.



Figure 2.13: Mornington Bridge (RPS MH021-200), facing southwest

- 2.3.21 The milestone and water pump (RPS MH021-201/2; Ch. 3750 & 3740) at the junction of Church Street and the R151 are valuable architectural features of the street furniture. The milestone harkens back to the great coaching era of Ireland.



Figure 2.14: Water pump (RPS MH021-202), facing southwest

- 2.3.22 The Halpin and Moran Memorial borders the footpath on Marsh Road (Ch. 460-470). While this is not a protected structure it does constitute a feature of architectural and cultural heritage interest.



Figure 2.15: The Halpin and Moran Memorial, facing north

Section 2 (Ch. 4800–5860)

- 2.3.23 Section 2 extends east from Mornington Road/Old Golf Road access road through Mornington Village to the Tower Road/Crook Road junction.
- 2.3.24 The character of the Study Area changes from rural to predominantly suburban in nature through Mornington Village. This Section is predominately residential, see land zoning map below from the East Meath Local Area Plan 2014-2020 (A1 Existing Residential - yellow hatching). See Land Zoning map below (**Figure 2.16**).

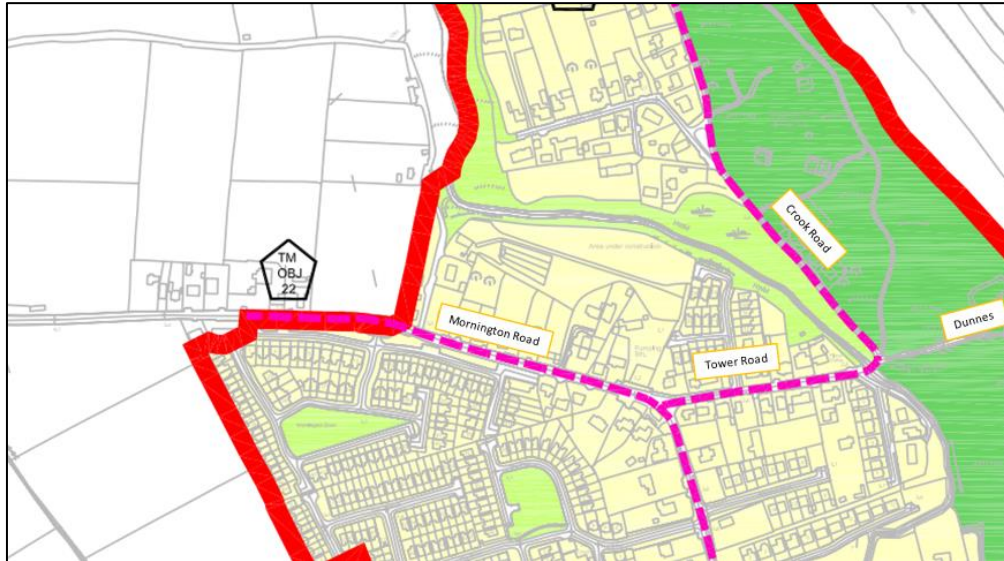


Figure 2.16: East Meath Local Area Plan (2014-2020) Land Zoning Map

2.3.25 From the Old Golf Range Access to Mornington Village there are currently no pedestrian footpaths along Mornington Road R151. However, through Mornington Village there is a footpath on the southern side of the carriageway, while Tower Road does not have any pedestrian footpaths, see **Figures 2.17 to 2.19**.



Figure 2.17 Mornington Road approx. Chainage 4980 (facing east)



Figure 2.18 Mornington Road approx. Chainage 5240 (facing east)



Figure 2.19 Tower Road approx. Chainage 5720 (facing east)

Natural Environment

Topography & Landscaping

- 2.3.26 The landscape character of Section 2 is predominantly suburban in nature along the R151 through Mornington Village. North of the R151 is a walking trail which is just south of the Old Golf Range site, the trail is known locally as 'Butterfly Alley' which ties into 'The Gut', where the Mornington River enters the River Boyne at the Crook.



Figure 2.20: 'Butterfly Alley' walking trail and 'The Gut'

Ecology (including Flora & Fauna)

- 2.3.27 'The Gut' section is located within the Boyne Coast and Estuary Special Area of Conservation (SAC) and the Boyne Estuary Special Protection Area (SPA) and includes a number of habitats and species listed on Annex I/II of the EU Habitats Directive.
- 2.3.28 The Upper Saltmarsh habitat is present within 50m of the R150/Mornington Village. The Mud Shores habitat recorded within the survey area is considered to be Annex I habitat.

- 2.3.29 A range of bespoke Biodiversity sensitive aspect-based surveys were undertaken in January 2018 to fully inform an iterative design process e.g. Bird Surveys, Habitat and Mammal Surveys.
- 2.3.30 In intertidal zones, such as 'The Gut', options that run through this area would be elevated onto a boardwalk structure to avoid impact on potentially foraging birds through habitat loss, as designed through consultation with the Consultant Ecologist and the NPWS; in addition, side boards will be in place which will avoid visual intrusion from dogs and a code of practice will be implemented during the operational phase to avoid the walking of dogs off leash and hence any resultant disturbance effects.

The Built Environment

Archaeological and Built Heritage

- 2.3.31 Through Mornington Village there is a protected cottage with a corrugated iron roof (RPS MH021-118; Ch. 5510-5530) on the northern side of the R151; however the roof has been replaced and it appears the house has been renovated, see **Figure 2.21** below.



Figure 2.21 Cottage (RPS MH021-118), facing north-northeast

- 2.3.32 Along Tower Road the scheme is lined by residential homes and gardens. A water pump is situated at the eastern end of Tower Road. This is not listed on the RPS

or NIAH but does form part of the street furniture within the landscape (Ch.5850), see **Figure 2.22** below.



Figure 2.22 Water pump on Tower Road, facing west

2.3.33 The proposed greenway terminates on the eastern side of a modern bridge from Tower Road to the west of the Lady's Finger (RPS MH021-121; Ch. 5870+), Lifeboat House (RPS MH021-123; Ch. 5870+), and the Maiden Tower (RPS MH021-124; Ch. 5870+;).



Figure 2.23 Lady's Finger (RPS MH021-121), facing northeast



Figure 2.24 Lifeboat House and the Maiden Tower (MH021-123/4), facing east

3.0 ROUTE OPTION ASSESSMENT METHODOLOGY

3.1 Assessment Process

- 3.1.3 This section of the report presents the structure & methodology used for the assessment of route options within the study area. A detailed Multi-Criteria Analysis Assessment was adopted.

3.2 Route Option Assessment Methodology

- 3.2.1 This route option assessment comprised a detailed qualitative and quantitative assessment, using criteria established to compare route options.

The 'Guidelines on a Common Appraisal Framework for Transport Projects and Programmes' published by the Department of Transport, Tourism, and Sport (DTTAS), March 2016, requires schemes to undergo a 'Multi-Criteria Analysis' (MCA) under the following criteria: -

- Economy;
- Integration;
- Physical Activity;
- Safety; and
- Environment.

- 3.2.2 An appreciation of constraints and opportunities within the study area as well as the defined project objectives, led to the establishment of project-specific route options assessment criteria.

- 3.2.3 These were tailored to have commonality to the Common Appraisal Framework guidelines where practical.

- 3.2.4 The physical activity criterion, added most recently to the Common Appraisal Framework, relates to the health benefits derived from using different transport modes. The subject scheme options under consideration relate to the same mode of travel (walking & cycling). As such, this criterion will not produce any relative differences between the options. Therefore, this criterion will not be applied in the multi – criteria assessment for the subject scheme.

3.2.5 The physical benefits associated with the scheme will be quantified as part of a future Cost – Benefit Analysis.

3.2.6 **Table 3.1** presents a summary of the assessment criteria and sub criteria used as part of the detailed route options assessment process.

Assessment Criteria	Assessment Sub-Criteria
1. Economy	1a. Capital Cost
2. Integration	2a. Cycle Network Integration
	2b. Traffic Network Integration
3. Safety	3a. Road Safety
	3b. Pedestrian Safety
4. Environment	4a. Archaeological/Architectural and Cultural Heritage
	4b. Flora & Fauna
	4c. Landscape and Visual
	4d. Risk of Flooding
	4e Soil & Hydrology
	4f. Land Use Character

Table 3.1: Assessment Criteria

3.2.7 In applying these criteria to the assessment process, it is clearly recognised that for different sections of the study area corridor, greater emphasis may need to be applied to some criterion over others in terms of their significance and influence on the route selection process. In some instances, certain criteria such as Environmental, will be identical between route options. As such, these will not be specifically assessed in such cases.

1. Economy

a. Capital Cost

3.2.8 Capital cost consists of both the indicative infrastructure cost estimates and land acquisition costs. Whilst specific estimates have not been produced at this stage, professional judgement has been used to determine the anticipated scale of cost of the different options on a relative basis.

2. Integration

a. Cycle Network Integration

3.2.9 This criterion is established to assess route options for the practicality of achieving greenway segregation and their potential to integrate high quality cycle facilities. The assessment considers the following: -

i. Compatibility with the GDA Cycle Network Plan

3.2.10 This criterion considers whether a route option forms part of the GDA Cycle Network Plan.

ii. Quality of Infrastructure for Cyclists

3.2.11 The quality of cycle provision which is practically achievable on the route options has been assessed. For comparison purposes, the highest level of practical cycle provision achievable on each route has been determined and compared between route options.

b. Traffic Network Integration

3.2.12 A comparative assessment of the expected traffic impact of each option has been undertaken for the routes. This assessment was undertaken based on professional judgement and an understanding of traffic conditions in the Study Area.

3.2.13 This represents a high-level assessment of the traffic impact of the route options considered in the Stage 2 Multi – Criteria Analysis (MCA). The anticipated traffic impact expected to be incurred by motorists using private vehicles as a result of the different route options will be assessed.

3. Safety

a. Road Safety

- 3.2.14 For the purposes of comparing route options, the number of junctions along the route has been used as a proxy for road safety. The number of junctions is effectively a measure of the number of potential conflicts on the route and therefore a measure of the potential for a collision.
- 3.2.15 The degree of segregation from live traffic along the greenway has also been used as a proxy for road safety.
- 3.2.16 The type of movement required by the cyclist at junctions on the route is also considered with routes where turning movements (either left or right) are required being assigned a lower ranking in terms of safety.

b. Pedestrian Safety

- 3.2.17 This criterion assesses the safety of pedestrians within the proposed scheme option. This is predominantly concerned with the presence of footpaths along the route, whether it is shared with cyclists, and the number of pedestrians crossing on the route.

4. Environmental

3.2.18 The scope and methodology for the environmental assessment was established by considering what environmental aspects are likely to be impacted and are therefore of importance in evaluating the route options. A list of the environmental topics considered is outlined in **Table 3.2** below.

Aspect	Rationale
Included in Environmental Assessment	
4.a Archaeological, Architectural and Cultural Heritage	The provision of the greenway has the potential to impact on the archaeological, architectural and cultural heritage environment. At this stage of the assessment process, a conservative approach has been adopted in assessing the potential for impact and this is further described below.
4.b. Flora and Fauna	The provision of the greenway has the potential to impact on flora and fauna.
4.c. Landscape and Visual	The provision of the greenway has the potential to impact the townscape/streetscape along the route.
4.d. Risk of Flooding	The proposed greenway may experience flooding depending on the route location. CFRAM Coastal and Fluvial Flood maps were used to assess the possibility of the proposed route becoming flooded and the frequency of the event (1 in 10yr etc).
4.e. Soils, Geology & Hydrology	The provision of the Greenway infrastructure has the potential to impact on soil and geology as a result of land-take and possible ground excavation (including potential to encounter ground contamination). In relation to Hydrology, the provision of the Greenway infrastructure has the potential to impact on surface water bodies as a result of land-take (with particular emphasis on floodplains and flood zones).
4.f. Land Use Character	The provision of greenway has the potential to impact on land use character through land-take, severance or reduction of viability of properties which prevents or reduces it from being used for its intended use.

Table 3.2: Environmental Aspects Considered

a. Archaeological, Architectural and Cultural Heritage

- 3.2.19 As mentioned previously a conservative approach has initially been adopted in undertaking the route options assessment in relation to the archaeological, architectural and cultural heritage environment. The constraints comprise Recorded Monuments and Protected Structures (RMPs) within 50m of each greenway section, extending to 250m in greenfield areas. Sites of archaeological and cultural heritage merit and sites of architectural heritage merit which are directly intersected by the greenway sections are also included within the scope of this assessment.
- 3.2.20 During the detailed design of the proposed scheme, the aim will be to avoid known constraints and/or minimise the number of constraints which may be directly or indirectly impacted by the proposed scheme. Appropriate mitigation for construction will be included which will seek, where practicable, to ensure preservation in situ of archaeological remains and the avoidance of impacts on archaeological and cultural heritage constraints. A similar approach has been adopted in relation to the route options assessment for architectural heritage.
- 3.2.21 As a result, the assessment effectively evaluates the potential for impact on architectural heritage from façade to façade which provides for a comparative and qualitative evaluation of Protected Structures along route sections.

b. Flora & Fauna

- 3.2.22 The provision of the greenway infrastructure has the potential to impact on flora & fauna.
- 3.2.23 A broad assessment of the likely impacts of each of the route options on the key ecological receptors was undertaken, with an indication as to which, if any, of these were likely to be significant, and at what geographical level. The impacts were compared to allow an order of preference to be determined.
- 3.2.24 Features considered included the following:
- Records of rare or protected plant species;
 - Records of protected fauna;

- Identified designated ecological areas and other areas of ecological importance including ecological corridors and areas of green infrastructure; and
- Watercourses and fisheries waters.

c. Landscape & Visual

3.2.25 The provision of the greenway infrastructure has the potential to impact the landscape/streetscape along the route.

3.2.26 The assessment comprised the compilation of a desktop understanding of:

- the landscape/streetscape, its character and features;
- the visual environment, including the location of residential and other properties and views over the landscape;
- the landscape planning context, including landscape designations, open spaces, identified views and prospects, etc.; and
- relationship with protected structures, conservation areas, national monuments etc.

3.2.27 The impact at each geographic level was compared to allow an order of preference to be determined.

d. Flooding

3.2.28 The proposed Greenway may experience flooding depending on the route location. CFRAM* Coastal and Fluvial Flood maps were used to assess the possibility of the proposed route becoming flooded and the frequency of such event (1 in 10yr, 1 in 200yr and 1 in 1000yr).

3.2.29 *The Eastern CFRAM study is the most comprehensive flood mapping undertaken in the eastern region of Ireland. It commenced in June 2011 with final flood maps issued during 2016. The study involved detailed hydraulic modelling of rivers and their tributaries.

e. Soils, Geology & Hydrology

- 3.2.30 The provision of the greenway infrastructure has the potential to impact on soil and geology as a result of land-take and possible ground excavation (including potential to encounter ground contamination).
- 3.2.31 Attributes (and impacts) assessed for each route option included the following (where relevant):
- Historic land use and potential contamination;
 - Geology / Areas of Geological Significance;
 - Soil quality, drainage characteristics and range of agricultural uses of soil along each route corridor; and
 - Potential implications for existing quarry or mining activities and future extractable reserves.
- 3.2.32 The impact at each geographic level was compared to allow an order of preference to be determined. The provision of the greenway infrastructure has the potential to impact on surface water bodies as a result of land-take (with particular emphasis on floodplains and flood zones). Attributes (and impacts) assessed for each route option included the following (where relevant):
- watercourses crossed by each route corridor and potential impact on water quality arising from re-alignment works;
 - discharge to receiving waters and drainage network;
 - aquatic ecological sites close to and downstream of water crossings;
 - surface water abstraction close to and downstream of water crossings;
 - established amenity value of surface waters traversed by each route corridor, and
 - potential increase (or reduction) in flood risk to existing properties.
- 3.2.33 The impact at each geographic level was compared to allow an order of preference to be determined.

f. Land Use Character

- 3.2.34 The provision of the greenway infrastructure has the potential to impact on land use character through land-take, severance or reduction of viability which prevents or reduces it from being used for its intended purpose.

Route Options Summary Table

- 3.2.35 For the study area, a route options summary table (in Project Appraisal Balance Sheet, (PABS)) format has been prepared which collates and summarises the appraisal of route options under each of the assessment criterion.
- 3.2.36 The route options summary table for the sub-options and primary route options are presented in **Appendix A - B**.
- 3.2.37 For each individual assessment criterion considered, routes have been relatively compared against each other based on a five-point scale, ranging from having significant advantages to having significant disadvantages over other route options. For illustrative purposes, this five-point scale is colour coded as presented in **Table 3.3**, with advantageous routes graded to 'dark green' and disadvantaged routes graded to 'dark red'.

Colour	Description
	Significant advantages over the other options
	Some advantages over other options
	Neutral compared to other options
	Some disadvantages over other options
	Significant disadvantages compared to other options

Table 3.3: Route Options Colour Coded Ranking Scale

- 3.2.38 The extent of reporting may vary between each study area section route options assessment, depending on the significance attached to specific criterion in terms of route differentiation.

- 3.2.39 At the end of each study area section route options assessment, an overall Multi-Criteria Appraisal (MCA) table is provided, bringing together each of the individual criterion assessments.
- 3.2.40 This is then summarised for each study area section under the main assessment criterion as set out in **Table 3.1**.
- 3.2.41 A qualitative appraisal of the conclusions from the route options assessment is then provided, highlighting the key issues considered in determining recommended route options ('preferred' and in some instances, where applicable, 'next preferred'). It should be noted that a balanced approach is taken when assessing the preferred routes. All criteria are considered in undertaking the assessment and a lower ranking on one criterion, for example, will not necessarily mean that the route is not suitable.
- 3.2.42 The outcome from the multi-criteria assessment is considered in a holistic manner to derive a preferred 'end-to-end' route.

4.0 SECTION 1 ROUTE OPTION ASSESSMENT

4.1 Options Assessment

4.1.1 When assessing the route options for Section 1, generally there are 3 principal routes (Options S1-1, S1-2 and S1-3) from the Ship Street/railway viaduct (Belfast Dublin line) to the Old Golf Range on approach to Mornington Village via the R150/R151, are illustrated in **Figures 4.1 & 4.2** below. It should be noted that additional scheme options were considered initially but were not progressed to the scheme assessment stage as they were not feasible or were less effective than the scheme options taken forward.

4.1.2 The following three principle route options, as identified above, were assessed:

- **Option S1-1** - Greenway along the northern side of the R150/R151, north of the Road carriageway as much as possible to maximise views of the Boyne Estuary ('The Boyneside Trail Route' developed originally by others, with some minor updates). This route involved substantial encroachment into Designated Sites.
- **Option S1-2** - Greenway along the northern side of the R150/R151. Modified following iterative design process, to limit the encroachment into the SPA and SAC and avoid where possible any likelihood of adverse effects on same. The route option is adjacent to the R150 & R151 for a large proportion of the section
- **Option S1-3** - Greenway along the southern side of the R150/R151. To limit the encroachment into the SPA and SAC, the route option is proposed on the southern side of the R150/R151. The route option is adjacent to the R150 & R151 for the majority of the section, to ensure that any land severance issues are kept to a minimum.

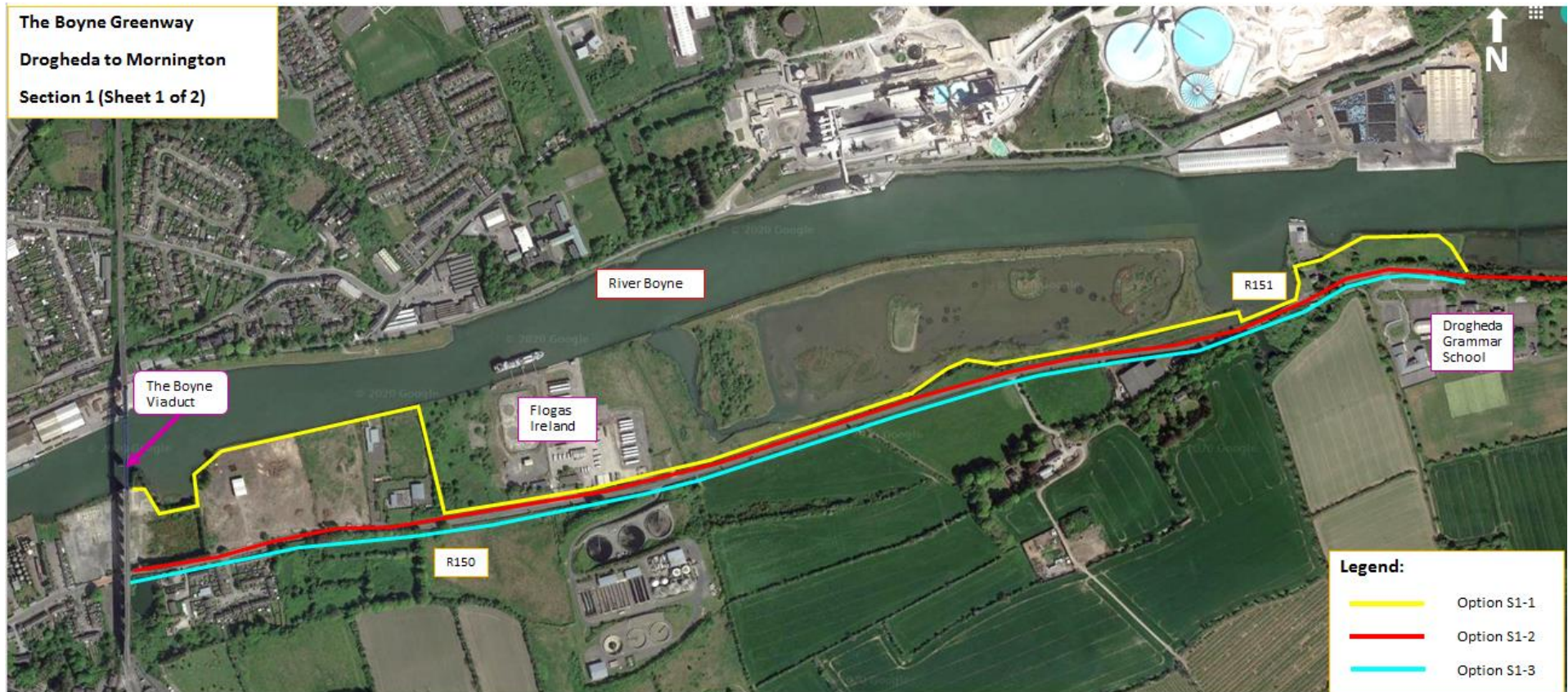


Figure 4.1: Route Options for Section 1

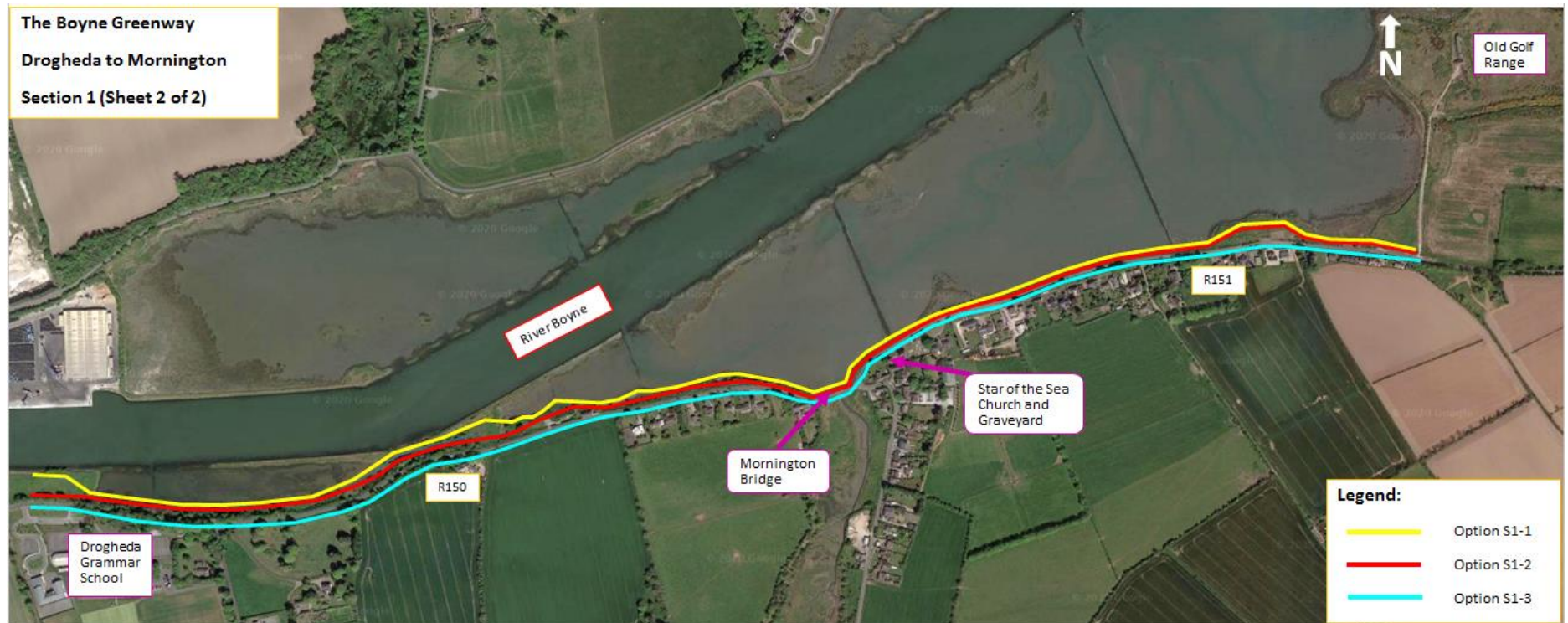


Figure 4.2: Route Options for Section 1

4.2 Section 1 – Option Assessment

- 4.2.1 As previously mentioned, there are three principal route options considered for the study area between the railway viaduct (Belfast - Dublin line) to the Old Golf Range on approach to Mornington Village. These options are discussed below in the following paragraphs.

Option S1-1 - Greenway along the northern side of the R150/R151, north of the Road carriageway as much as possible to maximise views of the Boyne Estuary (Boyneside Trail Route developed originally, with some minor updates).

- 4.2.2 This option proposed a 4m wide paved greenway route which commences along the River Boyne north of the Drogheda Port Lands and The Boathouse (Boyne Fishermen's, rescue & recovery service) from the Boyne Viaduct to Flogas Ireland premises. The route then continues along the northern side of Marsh Road (R150) adjacent to the carriageway. The proposed route moves northwards away from the existing road carriageway to the east of the Flo Gas site and enters Drogheda Port Lands.
- 4.2.3 At the approach to Harbourville, the headquarters of the Drogheda Port Company, the existing road carriageway is retained by a stone wall from the tidal estuary. There is no room to provide a facility on the landward side of wall hence a new boardwalk structure will be required to bridge the estuary.
- 4.2.4 From Harbourville to Drogheda Grammar and Le Chéile Educate Together Schools, the facility will once again be provided adjacent to the existing carriageway.
- 4.2.5 From the school to Mornington Bridge over the estuary at the junction of Mornington Road (R150/R151) and Church Road (R150) the route generally follows the toe of the river plain embankment.
- 4.2.6 Over Mornington Bridge there is no room to provide a greenway facility on the landward side of wall hence a new structure will be required to bridge the estuary. The proposed bridge will be an Arched Vierendeel half-through steel

truss bridge. There will be no direct impacts on the existing bridge as a result of the development. However, the new bridge will result in an indirect visual impact. This has been minimised with the design of the new bridge as the arches will remain visible beneath the new structure and the parapet walls will be visible through the spans of the new bridge (see drawing 170029-5201 and Archaeological and Built Heritage Assessment Report in the planning package).

4.2.7 From the Church Road (R150/R151) junction, this option continues eastwards along the seaward side of the existing sea wall utilising either a boardwalk construction or standard paved construction with kerb segregation from the existing road carriageway.

4.2.1 The following constraints would need to be considered if this route option is progressed:

- Impacts on the Boyne Coast and Estuary SAC and the Boyne Estuary SPA
- Existing monuments and protected structures along the route such as Mornington Bridge;
- The need to maintain traffic flow for access to local amenities; and
- Land ownership.

Option S1-2 - Greenway along the northern side of the R150/R151. Modified following iterative design process, to limit the encroachment into the SPA and SAC, the route option is adjacent to the R150 & R151 for a large proportion of the section.

4.2.2 This option proposed a 4m wide paved greenway which commences at the Boyne Viaduct and continues east along the along the northern side of the Marsh Road (R150) adjacent to the carriageway. This is to limit the impact on the Boyne Coast and Estuary SAC and the Boyne Estuary SPA.

4.2.3 The route will continue east adjacent to the carriageway to Drogheda Grammar and The Le Chéile Educate Together schools.

4.2.4 At the approach to Harbourville, the headquarters of the Drogheda Port Company, the existing road carriageway is retained by a stone wall from the tidal estuary. There is no room to provide a facility on the landward side of wall hence a new boardwalk structure will be required to bridge the estuary.

- 4.2.5 From the school entrance to Mornington Bridge over the estuary at the junction of Mornington Road (R150/R151) and Church Road (R150) this route option will move away from the R150 towards the river plain embankment, however, maintaining sufficient distance from the SPA and SAC.
- 4.2.6 Over Mornington Bridge there is no available space to provide a greenway facility on the landward side of wall hence a new structure will be required to bridge the estuary. The proposed bridge will be an Arched Vierendeel half-through steel truss bridge as per Option S1-1 (see drawing 170029-5201 and Archaeological and Built Heritage Assessment Report in the planning package).
- 4.2.7 From the Church Road (R150/R151) junction, this option continues eastwards along the R151 adjacent to the carriageway for the majority of the section, utilising a boardwalk construction or standard paved construction with kerb segregation from the existing road carriageway.
- 4.2.8 The following constraints would need to be considered if this route option is progressed:
- Existing monuments and protected structures along the route such as Mornington Bridge;
 - The Halpin and Moran Memorial borders the proposed greenway route. While this is not a protected structure it does constitute a feature of architectural and cultural heritage interest. The proposed scheme will impact on the enclosing wall of the memorial. Alterations to the enclosing wall will have to be sympathetically undertaken by appropriately qualified masonry experts.
 - The need to maintain traffic flow for access to local amenities;
 - Land ownership;

Option S1-3 - Greenway along the southern side of the R15/R151. The route option is adjacent to the R150 & R151 for the majority of the section.

- 4.2.9 This option proposed a 4m wide paved greenway which commences at Ship Street/Railway Viaduct and continues east along the southern side of Marsh Road (R150) adjacent to the carriageway. To limit the impact on the Boyne Coast and Estuary SAC and the Boyne Estuary SPA, the route will continue on the southern side of the R150 to Drogheda Grammar and Le Chéile Educate Together Schools.
- 4.2.10 From the school entrance to Mornington Bridge over the estuary at the junction of Mornington Road (R150/R151) and Church Road (R150) this route option will continue on the southern side of the R150 adjacent to the carriageway.
- 4.2.11 Over Mornington Bridge there is no available space to provide a greenway facility on the landward side of wall hence a new structure will be required to bridge the estuary. The proposed bridge will be an Arched Vierendeel half-through steel truss bridge as per option S1-1 (see drawing 170029-5201 and Archaeological and Built Heritage Assessment Report in the planning package).
- 4.2.12 From the Church Road junction, this option continues eastwards along the southern side of the R151 adjacent to the carriageway for the majority of the section, utilising a standard paved construction with kerb segregation from the existing road carriageway.
- 4.2.13 Providing the greenway adjacent to the carriageway for the majority of the route ensures that any land severance issues are kept to a minimum however land acquisition is required for the majority of this route. This will also include accommodation works such as boundary wall treatments.
- 4.2.14 The route option will have an impact on the boundary wall of the Mornington Church, Graveyard and Tomb which is a recorded monument and protected structure (RMP ME021-001001-3).
- 4.2.15 The following constraints would need to be considered if this route option is progressed:

- Existing monuments and protected structures along the route such as Mornington Bridge, Mornington Church and Graveyard (ME021-001001-3);
- Land ownership, potential impact on a number of private residents, potential boundary wall reinstatement required;
- Mature Trees and other natural features along the Marsh Road (R150) and Mornington Road (R151);
- The need to maintain traffic flow for access to local amenities;
- The need to maintain traffic flow for local access to properties;

4.3 Options Assessment

- 4.3.1 Prior to undertaking the MCA Assessment process outlined in Section 3, certain route options were discounted or screened out as they did not fulfil the study brief or would not be practical to deliver.
- 4.3.2 Route **Option S1-3** has been screened out due to the potential significant impact the route may have on the Graveyard by the Star of the Sea Church by Church Road, which is a recorded monument and protect structure. Also, due to its distance from the Boyne Estuary and its vista (route along the southern side of the R150/R151), one of the primary aims of the proposed greenway is to provide a greenway corridor for users to enjoy the natural and built heritage of the Boyne River Estuary. And, the extent of land acquisition required for the entire route (impacts on residential developments, boundary wall reinstatements and potential impacts on local access/agrees to properties).
- 4.3.3 As mentioned previously in Chapter 2, one of the major natural constraints upon the route options for the proposed scheme is the Boyne Coast and Estuary SAC and the Boyne Estuary SPA;
- 4.3.4 Following preliminary Biodiversity investigative works undertaken in 2017 it became clear that the previously proposed iteration of the proposed Greenway Option S1-1 (The original 'Boyneside Trail Route') had to be re-visited from a design perspective. A comprehensive design process was undertaken in 2018, comprising of a collaborative and holistic approach, whereby DBFLs route designs were reviewed by Inis and revised accordingly by DBFL – to allow for a route design that was fully cognisant of the Biodiversity receptors likely to be present and subject to source-impact-effects from any likely development.
- 4.3.5 Therefore, to limit the encroachment into the SPA and SAC, the only feasible route option for this Section, is to provide a route option that is adjacent to the R150 & R151 for the majority of the section as outlined in route **Option S1-2**. The route option has been designed to avoid the potential for likely adverse effects on European Sites and Biodiversity receptors.

- 4.3.6 The proposed greenway route for Section 1 is approximately 4.7km in length with approximately 2.3km directly alongside the R150/R151 Regional Road and 1.8km slightly away from the road to ensure both a safe continuation of the route and the retention of the view across the Boyne Estuary.
- 4.3.7 Although it would be preferable to have the greenway completely away from the road, this approach balances the avoidance of effects on the SPA/SAC with access and functionality yet still providing the outstanding views available.
- 4.3.8 The proposed alignment of the greenway avoids Annex I Upper Saltmarsh habitat.
- 4.3.9 The Mud Shores habitat recorded within the survey area is considered to be Annex I habitat – there is overlap between the proposed raised boardwalk and this habitat type where it runs immediately adjacent to the Regional R150/R151 road, in a small number of instances. In all cases however the raised boardwalk is to be located in rocky substrate immediately adjacent to the existing road as oppose to directly within intertidal muds.

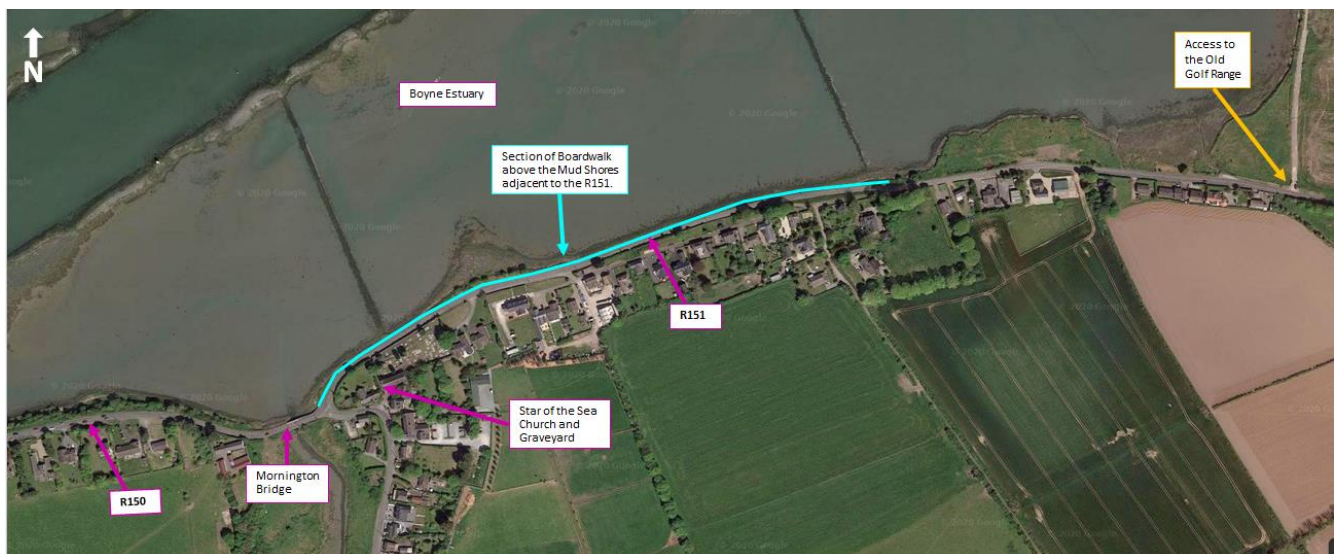


Figure 4.3: Section of Boardwalk above the Mud Shores adjacent to the R151

5.0 SECTION 2 ROUTE OPTION ASSESSMENT

5.1 Options Assessment

5.1.1 When assessing the route options for Section 2, generally there are 4 principal routes (Option 1, Option 2, Option 3 & Option 4) between the Mornington Road/Old Golf Range access road to the Tower Road/Crook Road junction as shown in **Figure 5.1** below. It should be noted that a number of additional scheme options were considered initially but were not progressed to the scheme assessment stage as they were not feasible or were less effective and/or feasible than the scheme options taken forward.

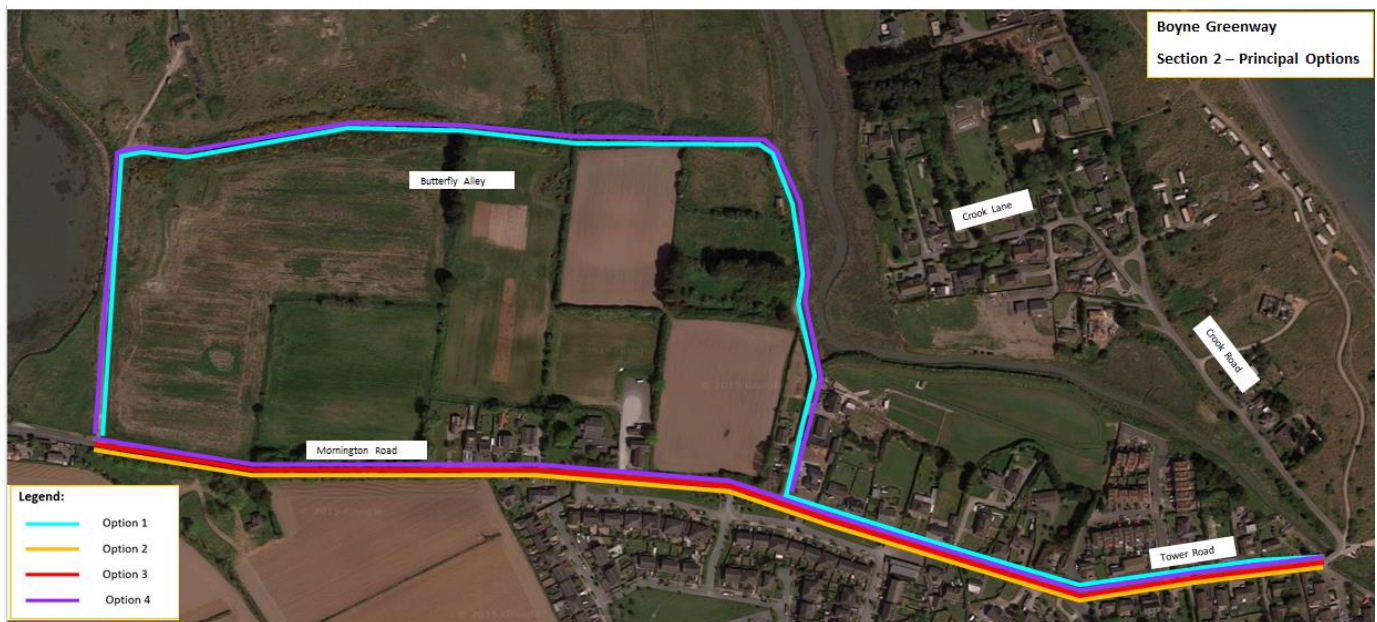


Figure 5.1: Principal routes for the Study Area.

5.1.2 The following four route options, as identified above, were taken forward:

- Option 1 via the access track from Mornington Road to the old golf range, Butterfly Alley (locally named), Mornington Road, Tower Road;
- Option 2 via Mornington Road, Tower Road (Shared/mixed street facilities); and
- Option 3 via Mornington Road, Tower Road (greenway facility on the northern side of Mornington Road);

- Option 4 via Mornington Road, Tower Road (two-way cycle on the northern side of Mornington Road with parallel cycle pedestrian trail);

5.1.3 The assessment process has been outlined in Section 3 of this report. In this Section of the report it is proposed to set out the assessment procedure and results for the section of the study area between the access track to the old golf range access route from Mornington Road and the Tower Road/Crook Road junction.

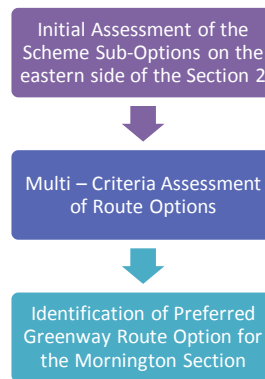


Figure 5.2: Route Option Assessment Stages

5.2 Initial Assessment of Scheme Sub-options for 'The Gut'.

5.2.1 Within the aforementioned route options, there is a location on the eastern side of the study which includes the "The Gut" of the River Boyne Estuary which requires specific consideration. These scheme options have been brought through an initial assessment to determine the optimum layout for this area to be included in the principle route Option 1 listed above. These sub-options are presented in **Figure 5.3** below:

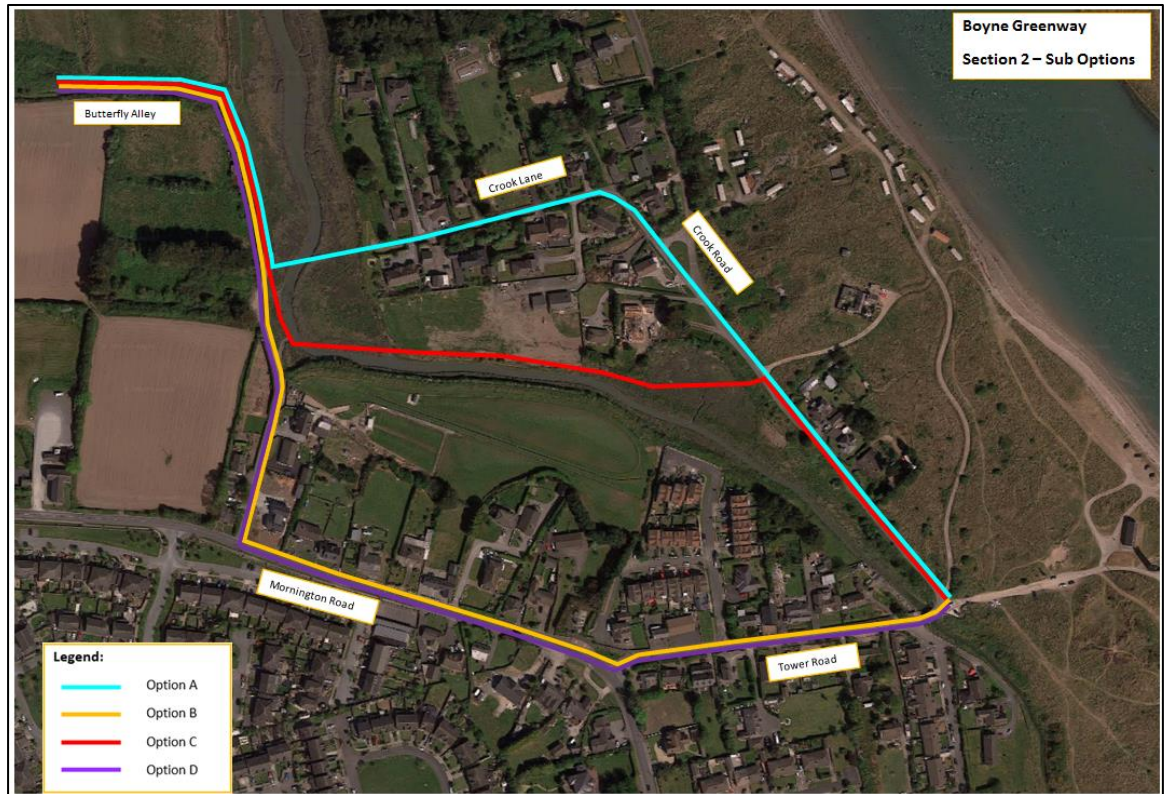


Figure 5.3: Sub-Option Locations

5.2.2 The following four route options, as identified above, were taken forward to initial assessment:

- Option A via Butterfly Alley (local name), Crook Lane and Crook Road;
- Option B via Butterfly Alley, Mornington Road and Tower Road (Shared/mixed street facilities on Mornington Road & Tower Road);
- Option C via Butterfly Alley, boardwalk to the south of Crook Lane and Shared/mixed street facilities on Crook Road;
- Option D - via Butterfly Alley, Mornington Road and Tower Road (greenway facility on the northern side of Mornington Road);

5.2.3 Multi-criteria assessment will be utilised to assess these sub options to determine the optimum layout to be included in the principle route options considered for the Section 2. The initial assessment of these constrained locations is outlined below.

- 5.2.4 There are four sub-options (A-D) considered for the eastern section of the study area. It should be noted that a number of additional scheme options were considered initially but were not progressed to the scheme assessment stage as they were not feasible or were less effective than the scheme options taken forward.

Option A - via Butterfly Alley (local name), Crook Lane and Crook Road

- 5.2.5 This option proposed a 4m wide paved greenway which follows the locally named 'Butterfly Alley' trail heading eastwards. These lands are in private ownership however permissive access has been discussed and verbally agreed with the landowner should this option be identified as being preferred. It is proposed that Route Option crosses the estuary at a location known as "The Gut" to connect with Crook Road. The crossing of the estuary will require the construction of a pedestrian/cycle bridge. The Route Option will then join with Crook Lane via a Boardwalk and shared facility provided along Crook Lane and Crook Road. A boardwalk is proposed on the eastern side of the bridge due to the high risk of flooding. Crook Lane and Crook Road are residential roads with very light traffic flows and slow traffic speeds suitable for shared facilities. It is likely the road would need to be resurfaced and the existing road lighting improved to adequately provide for the facility. Removing the existing cul-de-sac on Crook Lane, may cause concerns amongst residents, see **Figure 5.4**.

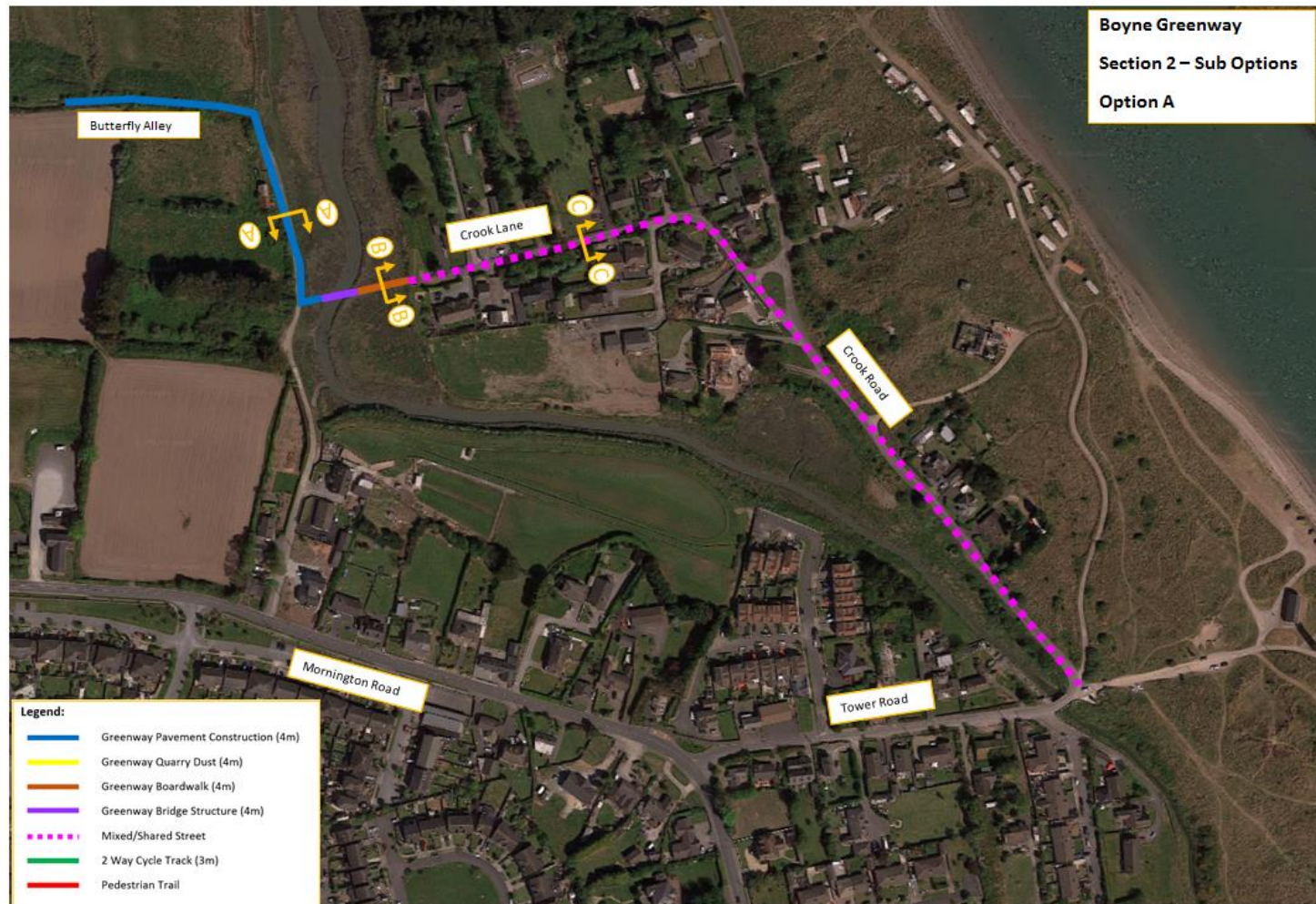


Figure 5.4: Route Option A

5.2.6 The option A sample cross sections are presented in **Figure 5.5** below.

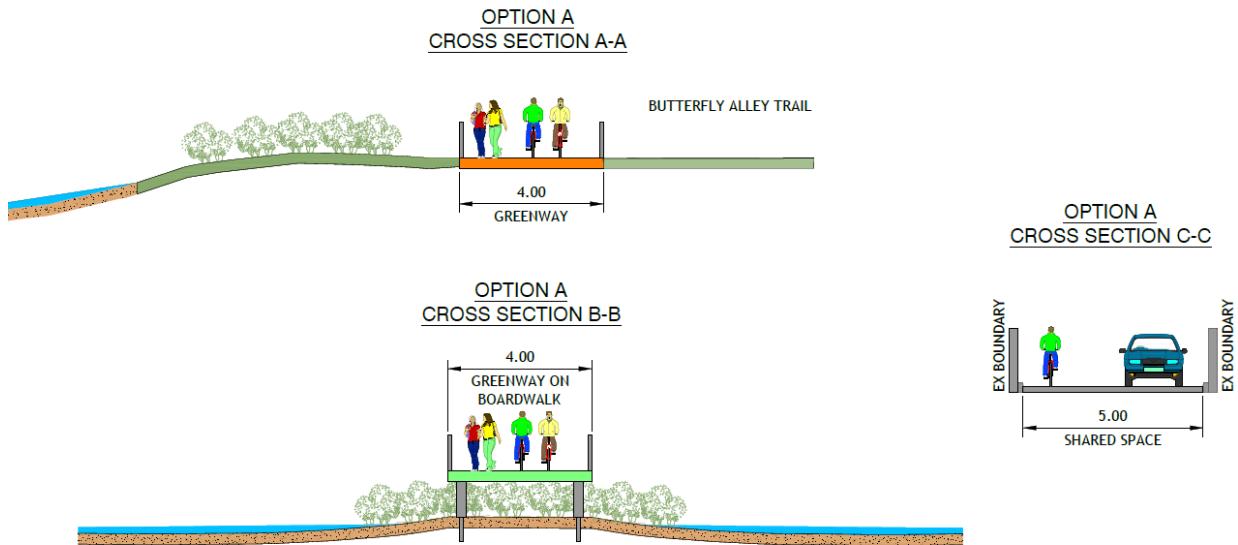


Figure 5.5: Route Option A: Proposed Cross Section.

5.2.7 The following constraints would need to be considered if this route option is progressed:

- The Boyne Coast and Estuary SAC and the Boyne Estuary SPA at “The Gut” and the potential for substantial habitat loss within same, or disturbance to birds.
- Residents have concerns regarding the alteration of the cul-de-sac and loss of privacy on Crook Lane and the provision of a shared street facility.
- The raised boardwalk may be very challenging to construct and it may obstruct the coastal view for residents.
- Shared street facilities are provided on Crook Lane and Crook Road, however, they are residential roads with very light traffic flows and slow traffic speeds suitable for shared facilities.

***Option B - via Butterfly Alley, Mornington Road and Tower Road
(Share/mixed street facilities on Mornington Road & Tower Road);***

- 5.2.8 This option proposed a 4m wide paved greenway which follows the locally named Butterfly Alley trail heading eastwards. It is proposed that Route Option will travel adjacent to the Estuary at a location known as “The Gut” and continue in the south direction to the Mornington Road (R151). Due to width constraints along Mornington Road segregated cycle facilities are not achievable without widening the carriageway, removal of the verge and potential land acquisition. Therefore, shared cycle facilities are proposed for Mornington Road, see **Figure 5.6**. Mornington Road has high traffic volumes with an Average Annual Daily Traffic (AADT) Flow of approx. 5000 vehicles along with high vehicle speeds of approx. 64km/hr (85th percentile) heading eastbound approaching Mornington Village and 75km/hr westbound (85th percentile). These conditions are not suitable for shared road cycle facilities. Tower Road, however, is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared road cycle facilities. It has an AADT of approximately 1300 vehicles. A new footpath will also be provided on Tower Road.

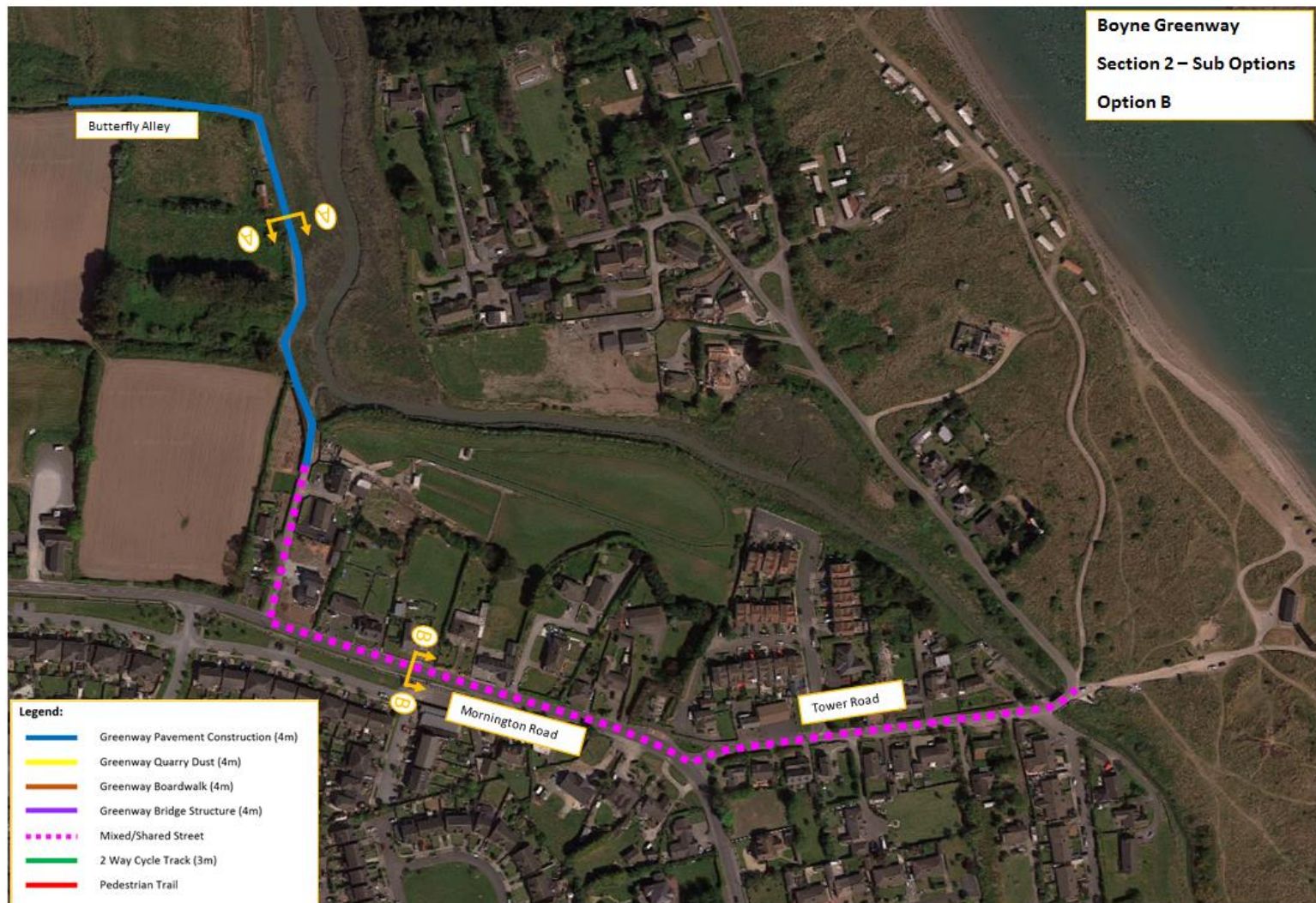


Figure 5.6: Route Option B

5.2.9 The option B sample cross sections are presented in **Figure 5.7** below.

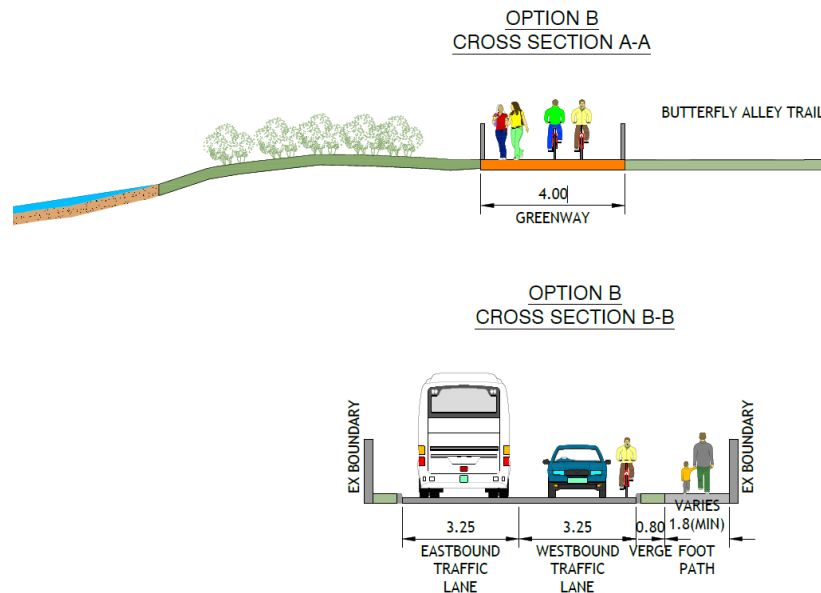


Figure 5.7: Route Option B: Proposed Cross Section

5.2.10 The following constraints would need to be considered if this route option is progressed:

- Shared street facilities are not suitable for Mornington Road which has high traffic volumes and vehicle speeds.
- Shared street facilities are provided on Tower Road, however, it is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities.
- Increased proximity to sensitive habitats and birds.

Option C - via Butterfly Alley, boardwalk to the south of Crook Lane and Share/mixed street facilities on Crook Road;

- 5.2.11 This option proposed a 4m wide paved greenway which follows the locally named Butterfly Alley trail heading eastwards. It is proposed that Route Option crosses the estuary at a location known as “The Gut” and travels on the northern side of the Estuary towards Crook Road. Boardwalk facilities will need to be provided on the northern side of the estuary due to Coastal/Fluvial flooding and to minimise impact on the Mud Shores habitat (Annex I habitat). Crook Road is a residential road with very light traffic flows and slow traffic speeds, which are suited to a shared facility. It is likely the road would need to be resurfaced and the existing road lighting improved to adequately provide for the facility. The raised boardwalk may be very challenging to construct and it may obstruct the view of the estuary for residents, see **Figure 5.8**.

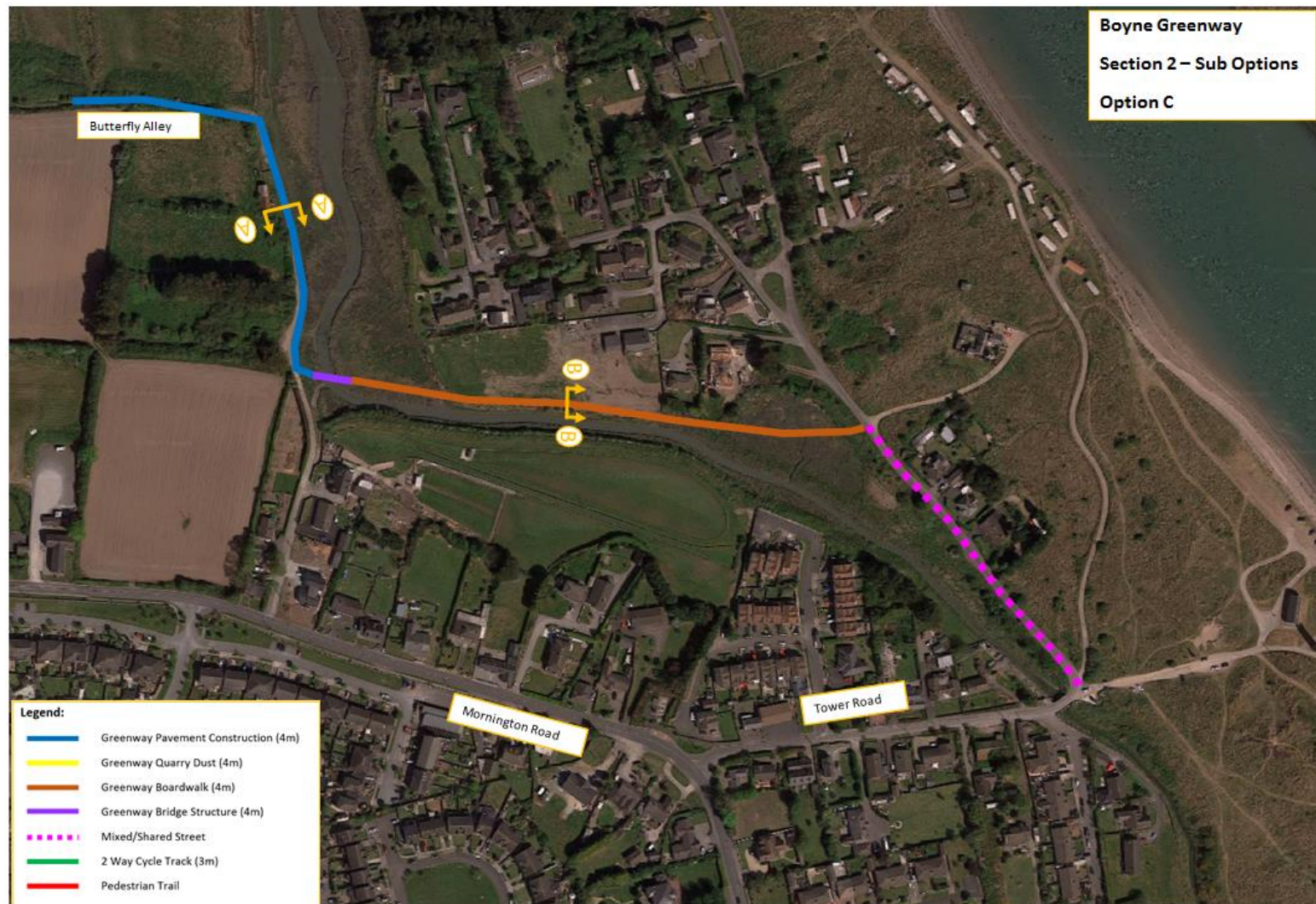


Figure 5.8: Route Option C

5.2.12 The option C sample cross sections are presented in **Figure 5.9** below.

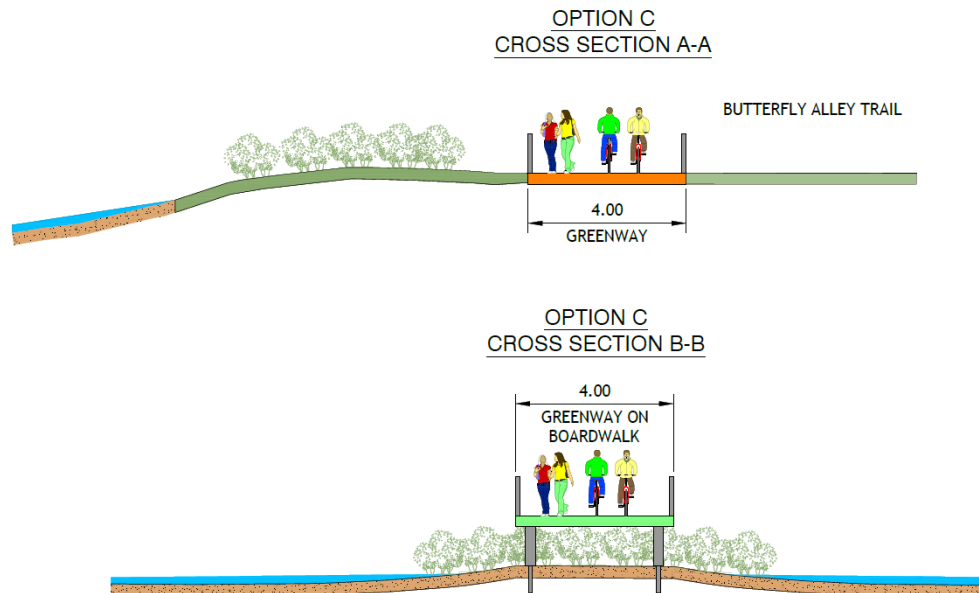


Figure 5.9: Route Option C: Proposed Cross Section.

5.2.13 The following constraints would need to be considered if this route option is progressed:

- The Boyne Coast and Estuary SAC and the Boyne Estuary SPA at “The Gut”, Mud Shores habitat (Annex I habitat).
- The raised boardwalk may be technically challenging to construct and it may obstruct the view of the estuary for residents.
- A Piled boardwalk facility may disturb the marsh and grassland at the ‘The Gut’ of the Boyne River Estuary (50m length) and potentially result in adverse effects on EU Site integrity.
- Shared street facilities are provided on Crook Road, however, it is a residential road with very light traffic flows and slow traffic speeds suitable for shared facilities.

Option D - via Mornington Road, Tower Road (greenway for a section of Mornington Road);

- 5.2.14 This option proposed a 4m wide paved greenway which follows the locally named Butterfly Alley trail heading eastwards. It is proposed that Route Option will travel adjacent to the Estuary at a location known as “The Gut” and continue in the south direction towards the Mornington Road (R151). This option proposes a 4m wide greenway on the northern side of the Mornington Road. The provision of the greenway will require the widening of the carriageway, removal of the verge, relocation of the Mornington Court boundary wall and potential land acquisition for residential houses (impact on front boundary wall). Due to width constraints along Tower Road (proximity of adjacent properties), mixed or shared street facilities are only feasible, see **Figure 5.10**. Tower Road, however, is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities. It has an AADT of approximately 1300 vehicles. A new footpath will also be provided on Tower Road.

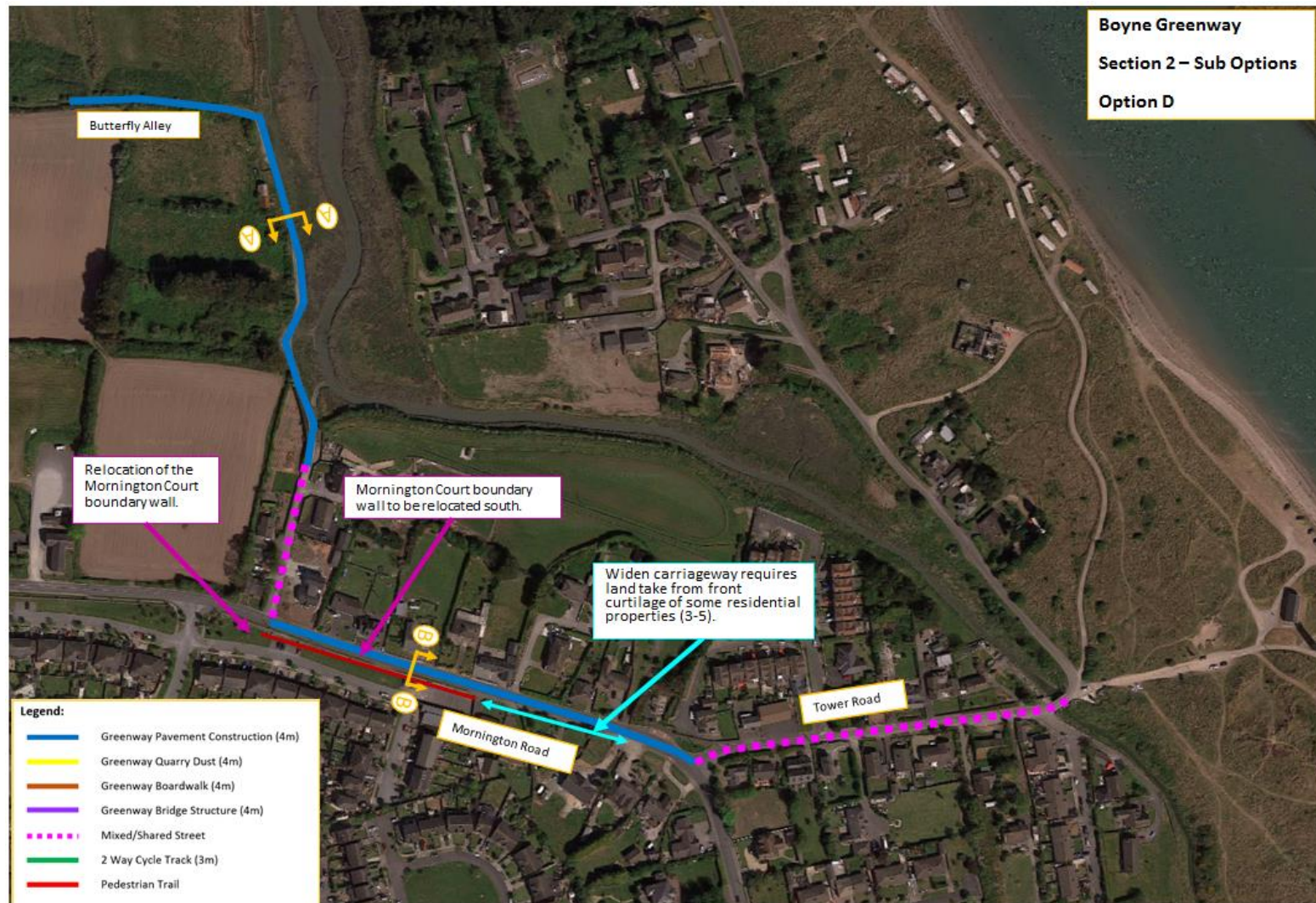


Figure 5.10: Route Option D

5.2.15 The option D sample cross sections are presented in **Figure 5.11** below.

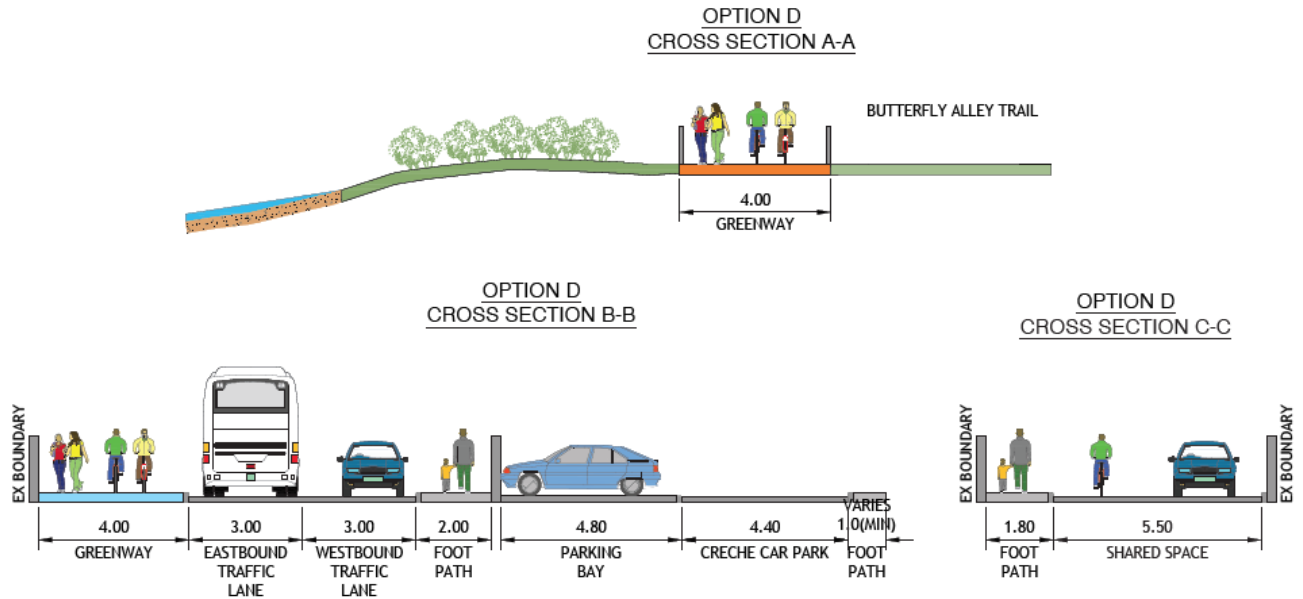


Figure 5.11: Route Option D: Proposed Cross Section

5.2.16 The following constraints would need to be considered if this route option is progressed:

- Shared street facilities are provided on Tower Road, however, it is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities.
- Increased proximity to sensitive habitats and birds.
- Relocation of the Mornington Court boundary wall.
- Potential land acquisition for residential properties (approx. 11), including reinstatement of boundary walls.

Route Options Multi-Criteria Analysis

- 5.2.17 The route options assessment summary tables for the Sub-Options for Section 2 are presented in **Table 1** of **Appendix A**. The relative ranking of route options against the scheme assessment sub-criteria are summarised in **Table 5.1** below.

Section 2 Sub-Options					
Appraisal Criteria	Sub-Criteria	Option A	Option B	Option C	Option D
1 Economy	1A Capital Cost				
2 Integration	2A Cycle Network Integration				
	2B Traffic Network Integration				
3 Safety	3A Road Safety				
	3B Pedestrians Safety				
4 Environment	4A Architectural and Cultural Heritage				
	4B Flora & Fauna				
	4C Landscape and Visual				
	4D Risk of Flooding				
	4E Soil & Hydrology				
	4F Land Use Character				

Table 5.1: Sub-Options MCA Summary (Sub-Criteria)

- 5.2.18 In terms of 'Economy', the primary differentiator between route options is the provision of segregated cycle facilities, boardwalk facilities and the provision of cycle/pedestrian bridges, option C proposes shared/mixed street facilities with no cycle/pedestrian bridge and therefore has the least capital costs.
- 5.2.19 In terms of 'Integration', option C scores highest because it includes a parallel segregated greenway facility for the majority of the route providing a high quality of service while also not impacting on the general traffic.
- 5.2.20 Under 'Safety', option C scores highest, it includes a parallel segregated cycle facility for the majority of the route. The only section that does not have pedestrian facilities is Crook Road (190m). In terms of 'Road Safety' option B scores lowest because it proposed shared street cycle facilities which are not suitable for Mornington Road due to the fact it has high traffic volumes and vehicle speeds.
- 5.2.21 In terms of 'Environment', route option C is considered to be the least attractive compared to the other options due to the fact that the paved greenway along the 'The Gut' of the Boyne River Estuary may experience flooding (approx. 260m length) (0.5% for coastal flooding <3.54m), the piled boardwalk facility may disturb the marsh and grassland (Annex I habitat) at the 'The Gut' of the Boyne River Estuary and potentially result in adverse effects on EU Site integrity.
- 5.2.22 The pedestrian & cycle bridge with a section of Boardwalk (with pedestrian railings) may impact on the existing vista of the Estuary. Route options B & D scored highest due to the fact that they do not have a boardwalk or pedestrian/cycle bridge that would impact on the existing vista of the River Boyne Estuary and disturb the marsh and grassland at the 'The Gut' of the Estuary (Annex I habitat).
- 5.2.23 A summary of the assessment and relative ranking of route options against the four main assessment criteria is presented in **Table 5.2** below.

Section 2 Sub-Options				
Appraisal Criteria	Option A	Option B	Option C	Option D
1 Economy				
2 Integration				
3 Safety				
4 Environment				

Table 5.2: Sub-Options MCA Summary (Main Criteria)

5.2.24 Based on the assessment undertaken, route option D appears to offer more benefits over the other options. Option D is therefore preferred route for the eastern section of the Study Area for the following reasons:

- It provides segregated cycle facilities for a large proportion of the route;
- It is one of the safest options;
- It has a low environmental impact. It has no appreciable impact on Landscape & Visual and a low impact on Flora & Fauna and Soil & Hydrology.

5.2.25 Based on the multi-criteria assessment undertaken, option D is identified as the preferred route option for the eastern section of the Study Area from the Butterfly Alley/Mornington Road to the Tower Road/Crook Road junction. Therefore, **Option D** will form part of the principal option.

5.3 Assessment of Principal Route Options

Introduction

- 5.3.1 As previously mentioned, there are four principal route options considered for the study area between the Mornington Road/Old Golf range access track and the Crook Road/Tower Road junction. These options are discussed below in the following paragraphs.

Principal Route Option 1: Access track from Mornington Road to the old golf range, Butterfly Alley, Mornington Road & Tower Road;

- 5.3.2 This option proposes a 4m wide paved greenway which follows the existing flood defence embankment travelling northwards along the old golf range access track until it meets with the Butterfly Alley heading east. These lands are in private ownership however permissive access has been discussed and verbally agreed with the landowner. It is proposed that this Route Option will travel adjacent to the Estuary at a location known as “The Gut” and continue in the south direction towards the Mornington Road (R151). This option proposes a greenway 4m wide on the northern side of the Mornington Road. The provision of the greenway requires the widening of the carriageway, removal of the verge, relocation of the Mornington Court boundary wall south and potential land acquisition from the front curtilage residential properties (approx. 11 properties). Due to width constraints along Tower Road (proximity of adjacent properties), mixed or shared street facilities are only feasible see **Figure 5.12**. Tower Road, is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities. It has an AADT of approximately 1300 vehicles. A new footpath will also be provided on Tower Road.

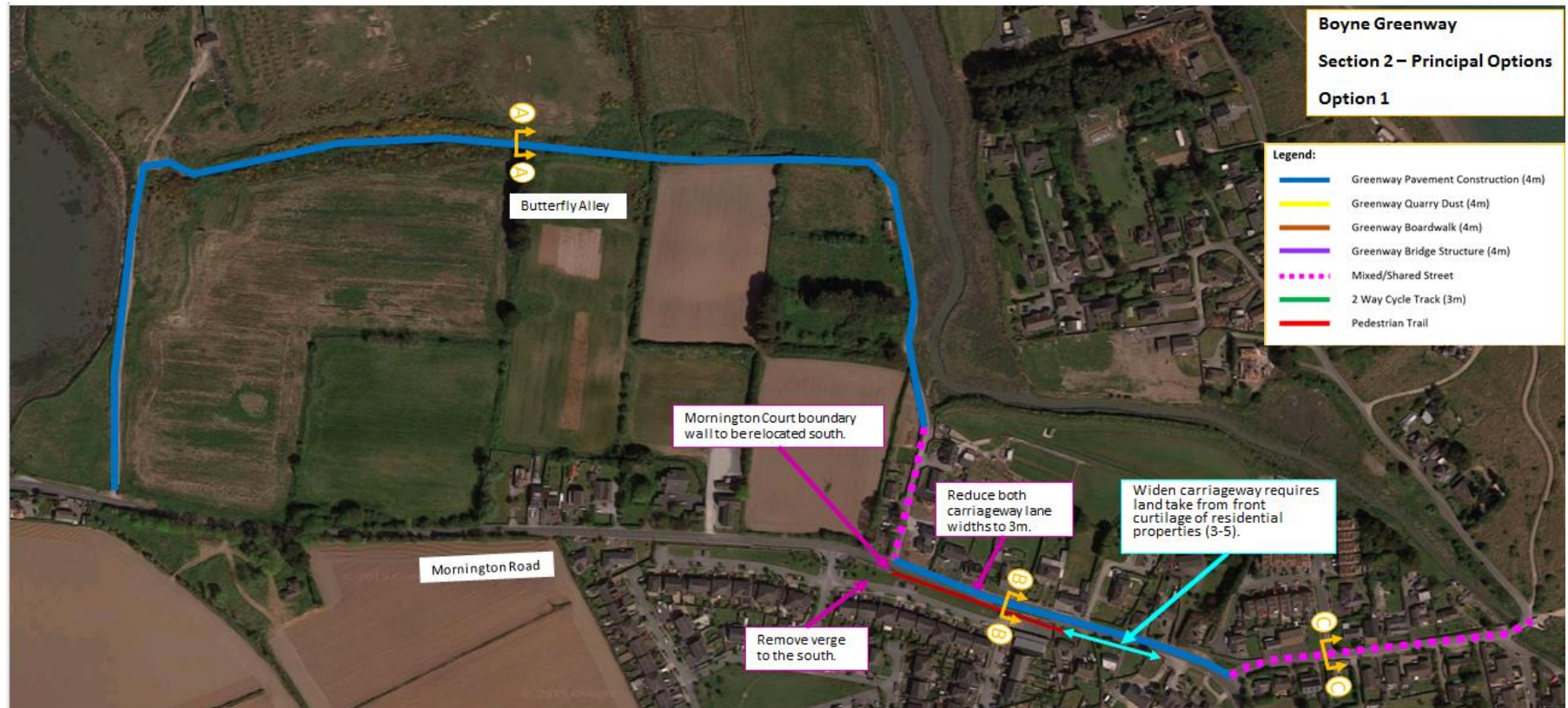


Figure 5.12: Route Option 1

5.3.3 The option 1 sample cross sections are presented in **Figure 5.13** below.

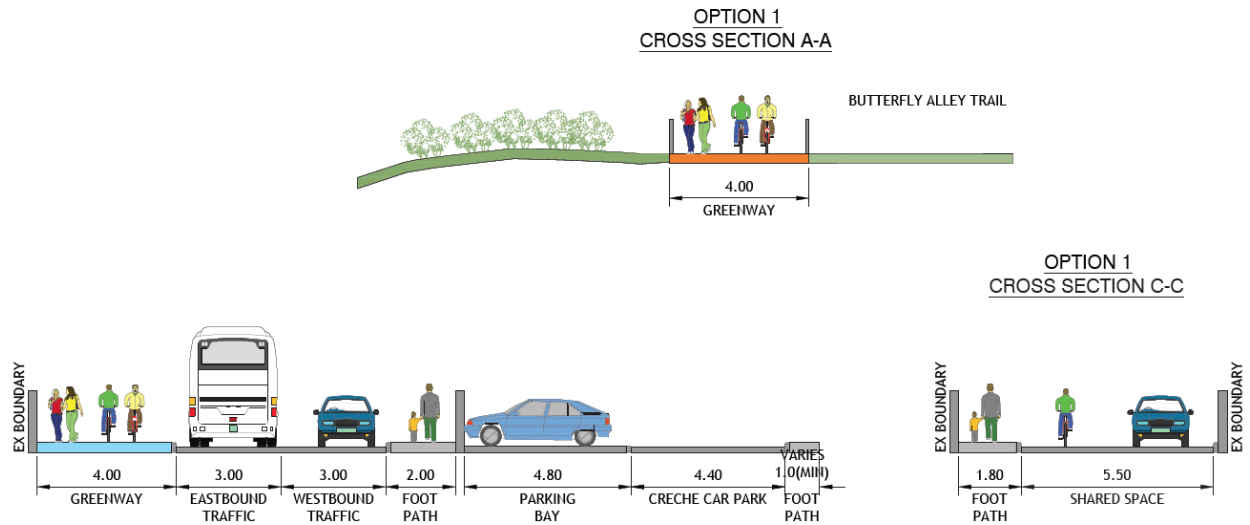


Figure 5.13 Route Option 1: Proposed Cross Section.

5.3.4 The following constraints would need to be considered if this route option is progressed:

- Shared street facilities are provided on Tower Road, however, it is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities.
- Relocation of the Mornington Court boundary wall.
- Potential land acquisition for residential properties (approx. 11), including reinstatement of boundary walls.
- Proximity to and possible loss of Annex I Habitat.

Principal Route Option 2: Mornington Road – Tower Road;

- 5.3.5 This option proposes mixed or shared street facilities along Mornington Road and Tower Road. Due to width constraints along Mornington Road segregated cycle facilities are not achievable without widening the carriageway resulting in a removal of a number of trees/bushes and land acquisition, see **Figure 5.14** below. Mornington Road has high traffic volumes with an Average Annual Daily Traffic (AADT) Flow of approx. 5000 vehicles along with high vehicle speeds of approx. 64km/hr (85th percentile) heading eastbound approaching Mornington Village and 75km/hr westbound (85th percentile). These conditions are not suitable for shared road cycle facilities. Tower Road, however, is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities. It has an AADT of approximately 1300 vehicles. A new footpath will also be provided on Tower Road.



Figure 5.14: Route Option 2

5.3.6 The option 2 sample cross sections are presented in **Figure 5.15** below.

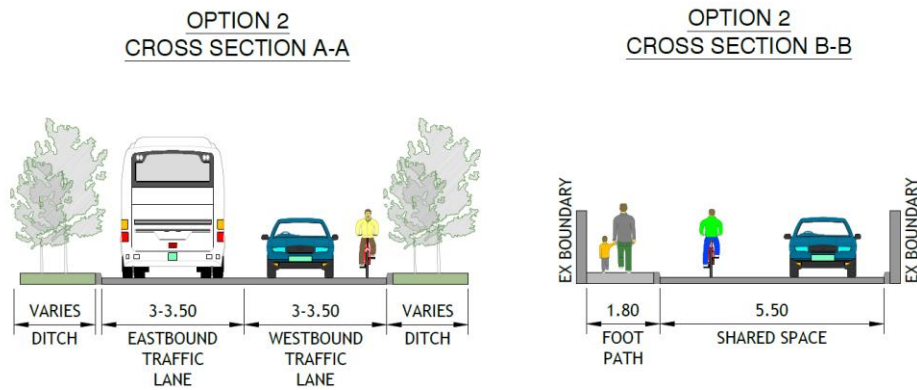


Figure 5.15: Route Option 2: Proposed Cross Section.

5.3.7 The following constraints would need to be considered if this route option is progressed:

- Shared street cycle facilities are not suitable for Mornington Road which has high traffic volumes and vehicle speeds.
- Shared street facilities are provided on Tower Road, however, it is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities.

Principal Route Option 3: Mornington Road – Tower Road (greenway facility on the northern side of Mornington Road);

- 5.3.8 This option proposes a greenway 4m wide on the northern side of the Mornington Road. Due to width constraints along Mornington Road the provision of segregated cycle facilities is only achievable through widening the carriageway, resulting in a removal of a number of bushes/trees, relocation of the Mornington Court boundary wall south and potential land acquisition from the front curtilage residential properties (approx. 16 properties). Due to width constraints along Tower Road (proximity of adjacent properties), mixed or shared street facilities are only feasible see **Figure 5.16**. Tower Road, is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities. It has an AADT of approximately 1300 vehicles. A new footpath will also be provided on Tower Road.

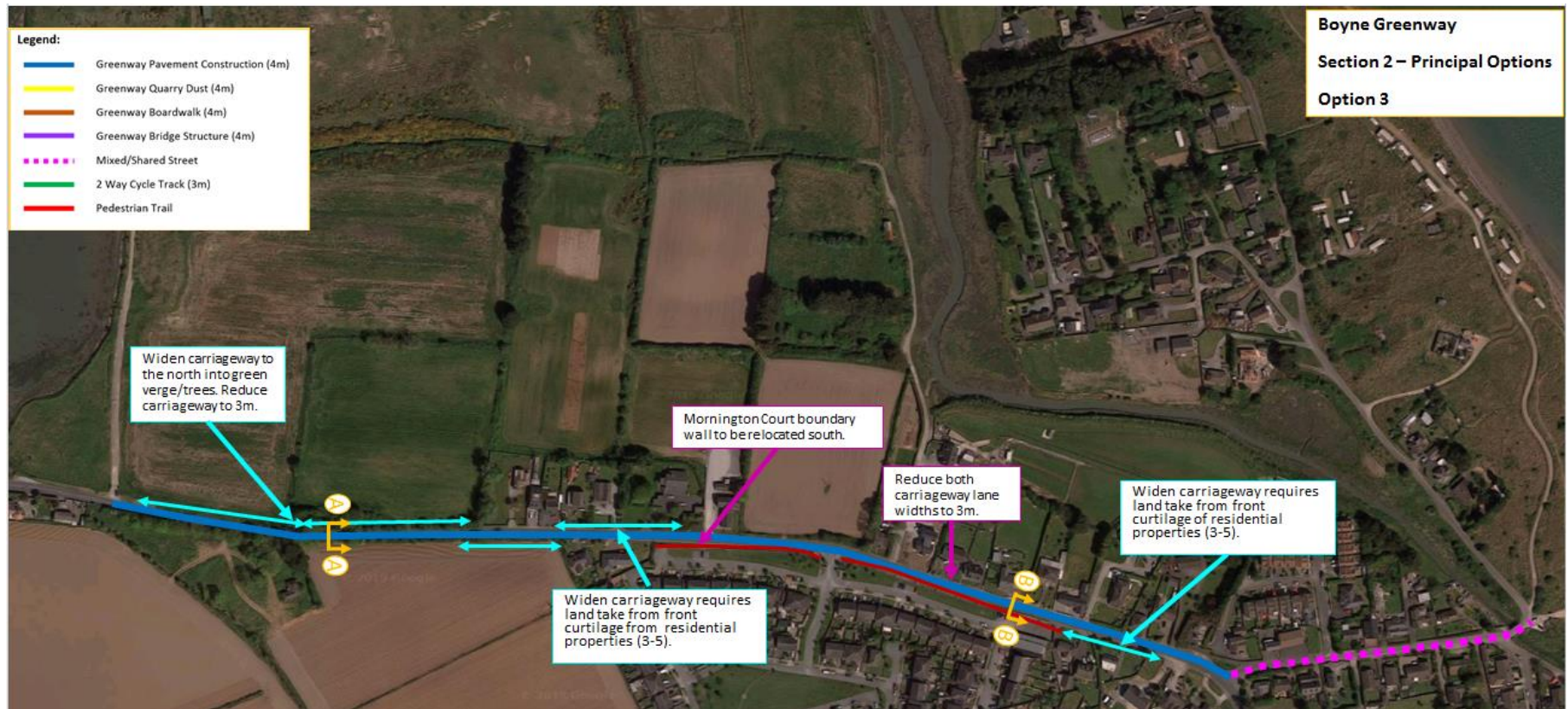


Figure 5.16: Route Option 3

5.3.9 The option 3 sample cross sections are presented in **Figure 5.17** below.

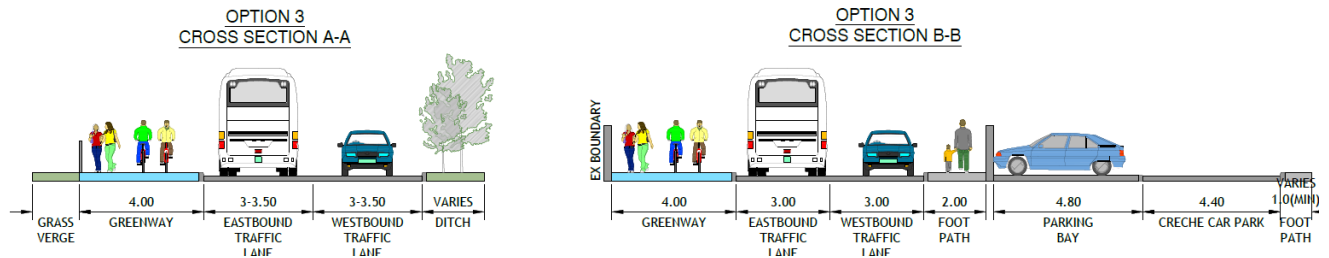


Figure 5.17: Route Option 3: Proposed Cross Section.

5.3.10 The following constraints would need to be considered if this route option is progressed:

- Shared street facilities are provided on Tower Road, however, it is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities.
- Relocation of the Mornington Court boundary wall.
- Potential land acquisition for residential properties (approx. 16), including reinstatement of boundary walls to ensure adequate sightlines are achievable.

Principal Route Option 4: Mornington Road – Tower Road (two-way cycle facility for a section of Mornington Road with parallel pedestrian trail);

- 5.3.11 This option proposes a two-way cycle track (3m wide) on the northern side of the Mornington Road. Due to width constraints along Mornington Road the provision of segregated cycle facilities is only achievable through widening the carriageway to the north, resulting in a removal of a number of bushes/trees and minor land acquisition. Proceeding east towards Tower Road it is proposed to relocate the boundary wall of Mornington Court to provide the two-way cycle track and footpath. Due to width constraints (proximity between adjacent properties) along Tower Road segregated cycle facilities are not achievable without widening the carriageway resulting land acquisition from residential properties, mixed or shared street facilities are only feasible, however a new footpath will be provided.
- 5.3.12 This option also proposes a pedestrian Trail (2m wide) which follows the existing flood defence embankment travelling northwards along the old golf range access track until it meets with the Butterfly Alley heading eastwards. The trail will then continue south along the pier access route towards Mornington Road, see **Figure 5.18**.
- 5.3.13 It should be noted that a variant to this option was considered where the proposed pedestrian trail would cross the estuary at “The Gut” and travels on the northern side of the Estuary towards Crook Road. Boardwalk facilities would be required on the northern side of the estuary due to Coastal/Fluvial flooding. The trail would connect with Crook Road by the access trail to the Drogheda Port North Lighthouse. However, this option was not progressed to the scheme assessment stage as it was less feasible and had a significant environmental/ecological impact than the scheme option taken forward.

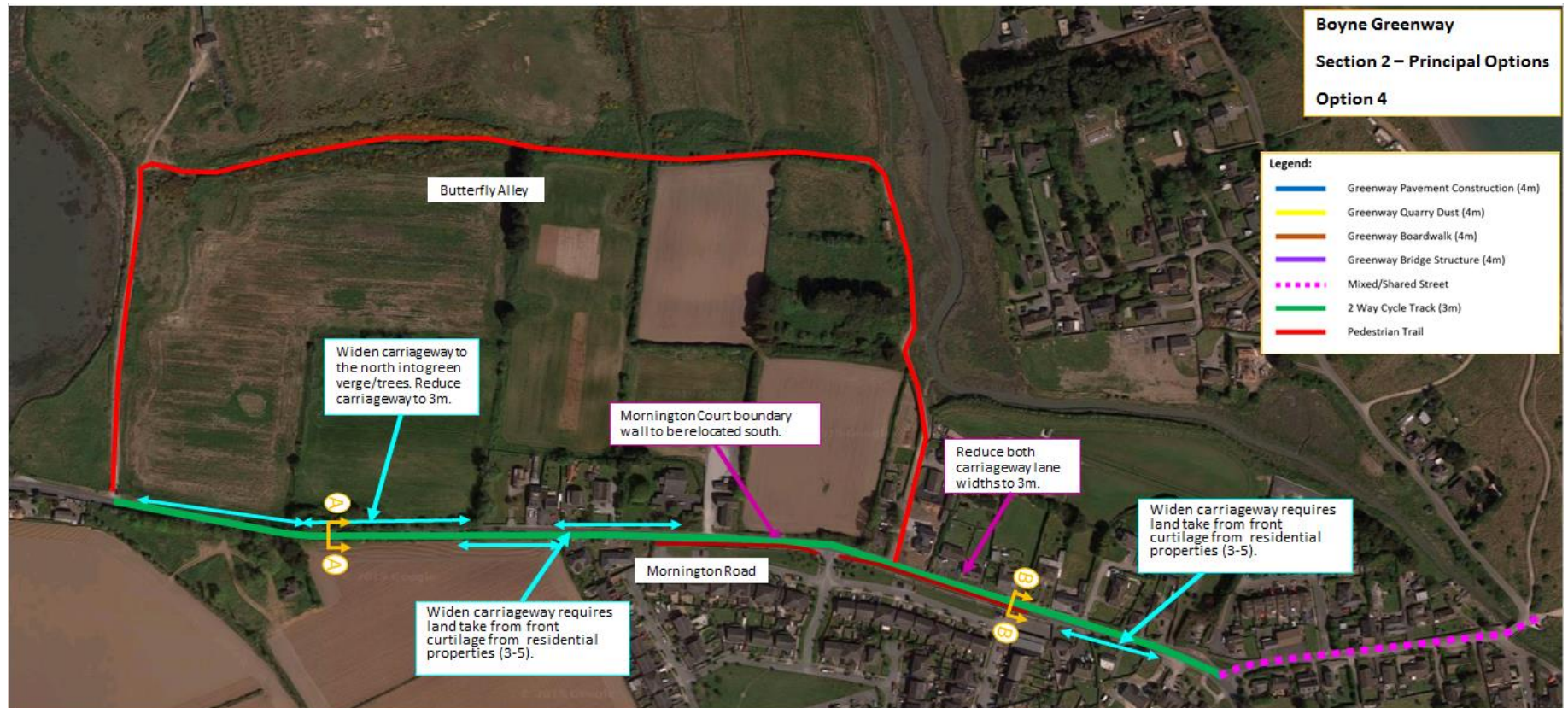


Figure 5.18: Route Option 4

5.3.14 The option 4 sample cross sections are presented in **Figure 5.19** below.

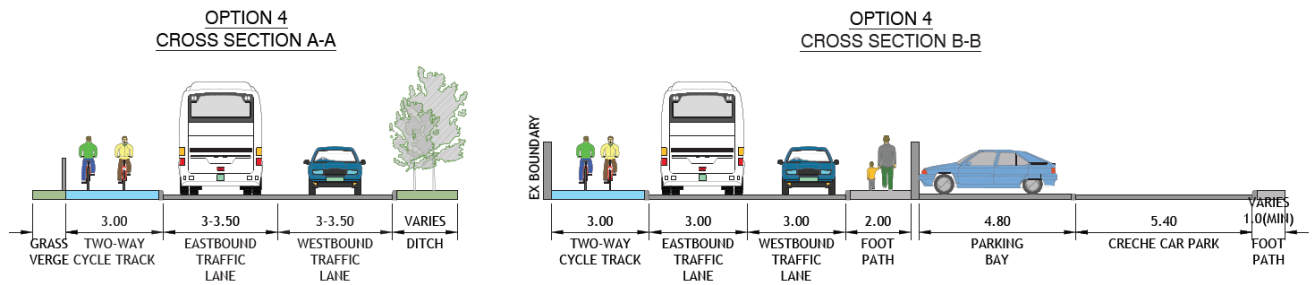


Figure 5.19: Route Option 4: Proposed Cross Section.

5.3.15 The following constraints would need to be considered if this route option is progressed:

- Shared street facilities are provided on Tower Road, however, it is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities.
- Potential land acquisition for residential properties (approx. 10), including reinstatement of boundary walls.
- Increased potential for disturbance to birdlife in sections of the pedestrian trail adjacent to the estuary.

Stage 2 Route Options Multi-Criteria Analysis

5.3.16 The 'Stage 2' route options assessment summary tables for the greenway Options for Section 2 are presented in **Table 2** of **Appendix A**. The relative ranking of route options against the scheme assessment sub-criteria are summarised in **Table 5.3** below.

Section 2

Principal Route Options

Appraisal Criteria	Sub-Criteria	Option 1 - Access track to the old golf range, Butterfly Alley, Mornington Road & Tower Road (Shared/mixed street facilities);	Option 2 – Mornington Road – Tower Road (Shared/mixed street facilities);	Option 3 - Mornington Road – Tower Road (greenway facility on the northern side of Mornington Road);	Option 4 - Mornington Road – Tower Road (two-way cycle facility with parallel cycle pedestrian trail);
1 Economy	1A Capital Cost				
2 Integration	2A Cycle Network Integration				
	2B Traffic Network Integration				
3 Safety	3A Road Safety				
	3B Pedestrians Safety				
4 Environment	4A Architectural and Cultural Heritage				
	4B Flora & Fauna				
	4C Landscape and Visual				
	4D Risk of Flooding				
	4E Soil & Hydrology				
	4F Land Use Character				

Table 5.3: Principal Route Options MCA Summary (Sub-Criteria)

- 5.3.17 In terms of 'Economy', the primary differentiator between route options is the infrastructure costs associated with construction of the greenway facilities, option 2 proposes shared/mixed street facilities and therefore has the lowest capital costs. While option 4 proposes a two-way cycle route and a parallel pedestrian Trail via Butterfield Alley.
- 5.3.18 In terms of 'Integration', options 3 & 4 score highest because cyclists are segregated from vehicular traffic for the majority of the route along Mornington Road compared to the aesthetically pleasing but circuitous route taken by option 1. Option 2 only provides Mixed/Shared street facilities which may also impact on the general traffic.
- 5.3.19 Under 'Safety', Options 3 is ranked the highest, providing a safe segregated 4m wide greenway along the Mornington Road to Tower Road. A new footpath is also proposed for Tower Road. Option 2 is ranked lowest because there are no pedestrian facilities for 300m of Mornington Road and also Shared street cycle facilities are not suitable for Mornington Road due to its high traffic volumes and vehicle speeds.
- 5.3.20 In terms of 'Environment', route option 2 is considered to be the most attractive compared to the other options because only mixed/shared street facilities will be provided along the Mornington Road & Tower Road. This option has no appreciable environmental impact. Route Option 1, is considered the least attractive, as it provides a large proportion of its route along the edge of the estuary (via Butterfly Alley & 'The Gut') which will have an effect on the landscape & aesthetic vista, the paved 4m wide greenway along the 'The Gut' of the Boyne River Estuary may have an impact on the Flora and Fauna (increased potential for disturbance to birdlife) and will experience flooding (approx. 850m length) (0.5% for coastal flooding <3.54m). Option 1 is in close proximity to and may possibly impact on the Annex I habitats.
- 5.3.21 A summary of the assessment and relative ranking of route options against the four main assessment criteria is presented in **Table 5.4** below.

Section 2 Principal Route Options				
Appraisal Criteria	Option 1	Option 2	Option 3	Option 4
1 Economy				
2 Integration				
3 Safety				
4 Environment				

Table 5.4: Principal Route Options MCA Summary (Main Criteria)

5.3.22 Based on the assessment undertaken, route option 3 appears to offer more benefits over the other options. Option 3 is therefore preferred route option for the following reasons:

- It offers a more direct route compared to Option 1;
- It provides cycle facilities that are segregated from vehicular traffic for much of the route compared with Option 2;
- It generates less Environmental Impacts compared to Option 1; and
- It is one of the safest options.

5.3.23 Based on the multi-criteria assessment undertaken for this section of the study area, Option 3 is identified as the preferred route option for the section 3 between the access track to the old golf range and the Tower Road/Crook Road junction.

5.3.24 The key benefits of the preferred route (Option 3) can be summarised as follows:

- Continuous cycle facilities segregated from vehicular traffic provided for the majority of the route 850m (250m shared/mixed street along Tower Road), delivering a safer, more comfortable and attractive route.
- The environmental impact of delivering the scheme would be minimal as the proposed greenway facility will be provided adjacent to the Mornington Road.

6.0 EMERGING PREFERRED SCHEME

6.1 Introduction

- 6.1.1 This section of the report presents the final conclusions from the assessment process for the greenway route options considered and recommends a preferred scheme. A description of the preferred greenway route is given together with ancillary measures required and key issues to be addressed through the scheme design development.

6.2 Route Options Assessment Conclusions

- 6.2.1 Sections 5 of this report presented an appraisal to each of the potential route options for each of the study area sections identified. Within each study area section, where potential route options were considered to be available, they have been assessed in accordance with the methodology set out in Chapter 3 including a 'Multi-Criteria Analysis' under the headings of Economy, Integration, Safety and Environment.

6.3 Recommended Preferred Option

- 6.3.1 Based on the conclusions from the route options assessment process (as set out in Section 5) and the restrictions due to the SPA and SAC, the recommended preferred route for the proposed scheme is presented in **Figure 6.1** below.

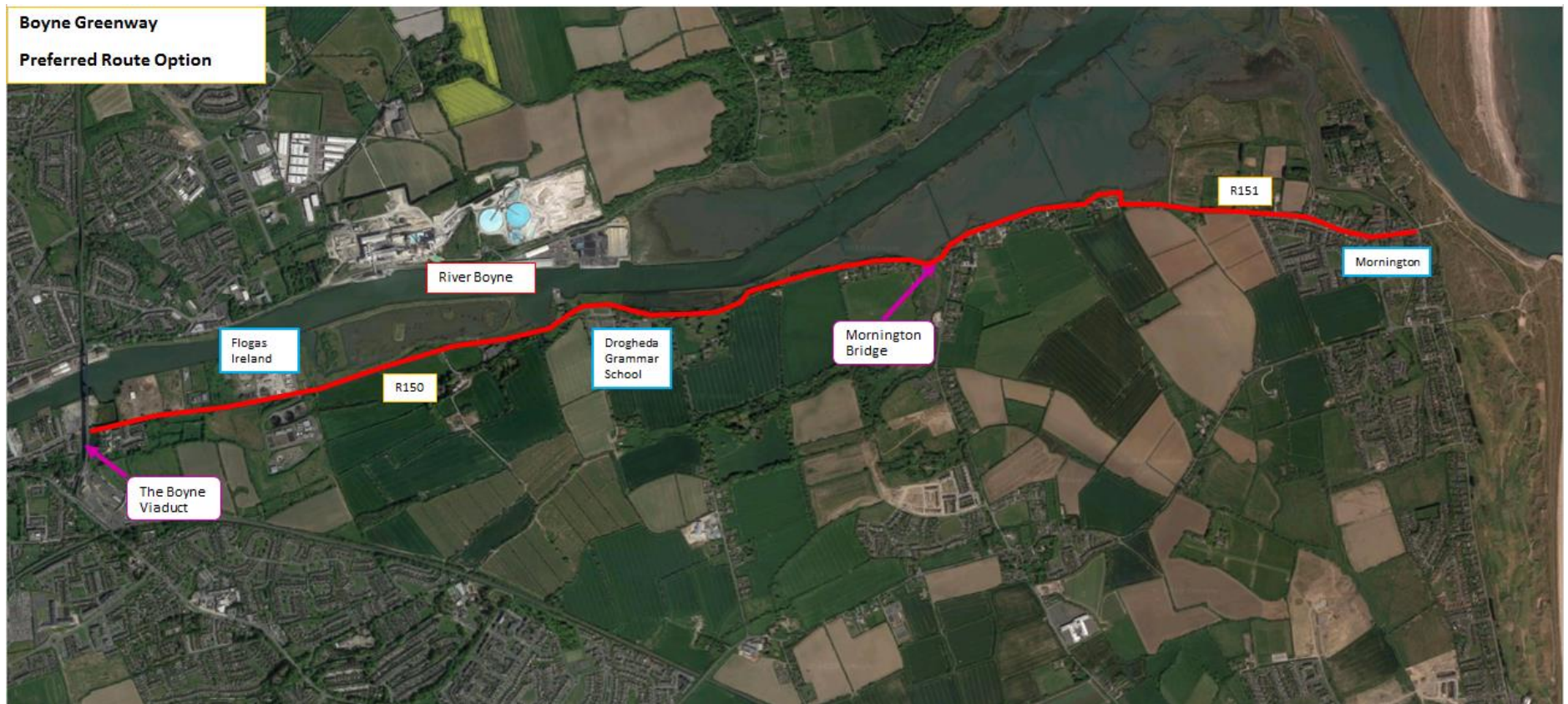


Figure 6.1: Preferred Route Option

- 6.3.2 The Emerging Preferred Route (EPR) has been determined following a detailed route option selection process which included an evaluation of extensive background surveys in the areas of ecology and conservation amongst other items. A range of bespoke Biodiversity sensitive aspect-based surveys were commissioned to fully inform an iterative design process. In addition, a consultation process was undertaken with NPWS throughout the design process. While also including the comments and suggests received from members of the local communities, interested individuals and groups during the Non-Statutory Public Consultation process in October 2019.
- 6.3.3 The proposed greenway route corridor is principally aligned along existing road corridors, amenity areas and existing trackways and disturbed ground, following the southern margin of the River Boyne estuary.
- 6.3.4 The preferred route for route for the Boyne Greenway, between Drogheda East and Mornington, generally follows the northern side of the existing R150/R151 Regional Road (restriction due to SPA/SAC). The route moves away from the R150 road at Drogheda Grammar School providing views to the Boyne Estuary. For the majority of the route from Mornington Bridge to Tower Road the greenway will be adjacent to the R151, as either a boardwalk structure or kerbed bituminous surface.
- 6.3.5 The preferred route for the Boyne Greenway is approximately 5.9km in length with approximately 4.1 km of the route directly alongside the Regional Road and approximately 1.8km slightly away from the route of the road to ensure both a safe continuation of the route and the retention of the views across the Boyne Estuary
- 6.3.6 The proposed greenway, as well as providing a walking and cycle route for tourists, will provide a safe walking and cycle route between Drogheda and Mornington for local people and also provide a safe route for school children walking or cycling to the schools from Mornington or Drogheda.

- 6.3.7 Although it would be preferable to have the greenway completely away from the road, this approach balances the proximity to the SPA/SAC with access and functionality that ensures that this amenity can be enjoyed by users of the facility.
- 6.3.8 Previously, the proposed greenway route continued past Tower Road/Crook Road junction onto the dunes east of Mornington Town (illustrated in the drawings for the Non-Statutory Public Consultation). This section of the route has been removed to avoid permanent land use change of the Annex I habits.
- 6.3.9 For an illustration of the EPR, refer to the Scheme Planning drawings 170029-2200.

7.0 APPENDIX A – Sub Options Assessment

Section 2 Sub-options					
Appraisal Criteria	Sub-Criteria	Option A	Option B	Option C	Option D
1 Economy	1A Capital Cost	<u>Indicative Infrastructure costs include:</u> <ul style="list-style-type: none">This option proposes a 4m wide paved greenway which travels along the trail locally named Butterfly alley heading east towards Bettystown Beach (210m).It is proposed that Route Option crosses the estuary at a location known as “The Gut” to connect with Crook Road. The crossing of the estuary will require the construction of a pedestrian/cycle bridge.The Route Option will connect with Crook Lane via a Boardwalk (50m).Mixed/shared cycle facilities are proposed along Crook Lane and Crook Road.It is likely the Crook Lane/Crook Road would need to be resurfaced in places and the existing road lighting improved to adequately provide for the facility.	<u>Indicative Infrastructure costs include:</u> <ul style="list-style-type: none">This option proposes a 4m wide paved greenway which will travel along the trail locally named Butterfly alley adjacent to the Estuary at a location known as “The Gut” and continue in the south direction to the Mornington Road (R151) (320m).Due to width constraints along Mornington Road segregated cycle facilities are not achievable without widening the carriageway, removal of the verge and potential land acquisition. Therefore, shared cycle facilities are proposed for Mornington Road.	<u>Indicative Infrastructure costs include:</u> <ul style="list-style-type: none">This option proposes a 4m wide paved greenway which travels along the trail locally named Butterfly alley heading east towards the coast (270m).It is proposed that Route Option crosses the estuary at a location known as “The Gut” and travels on the northern side of the Estuary towards Crook Road. Boardwalk facilities will need to be provided on the northern side of the estuary due to Coastal/Fluvial flooding (290m).Mixed/shared cycle facilities are proposed along Crook Road.It is likely the Crook Road would need to be resurfaced in places and the existing road lighting improved to adequately provide for the facility	<u>Indicative Infrastructure costs include:</u> <ul style="list-style-type: none">This option proposes a 4m wide paved greenway which will travel along the trail locally named Butterfly alley adjacent to the Estuary at a location known as “The Gut” and continue in the south direction to the Mornington Road (R151) (320m).This option proposes a greenway (4m wide) on the northern side of the Mornington Road (270m).The provision of the greenway will require the widening of the carriageway, removal of the verge, relocation of the Mornington Court boundary wall and potential land acquisition for approx. 11 residential houses (impact on front boundary wall).It is likely the Tower Road would need to be resurfaced in places and the existing road lighting improved to adequately provide for the facility
	Rank				
2 Integration	2A Cycling - Quality of Service	4m wide paved greenway, which will be segregated from live traffic (210m). Raised Boardwalk for 50m. Shared/mixed street facility for Crook Lane and Crook Road (500m). Greater Aesthetic views from Crook Road compared to the greenway along Mornington Road/Tower Road.	4m wide paved greenway, which will be segregated from live traffic (321m). Shared/mixed street facility provided for Mornington Road and Tower Road and Crook Road (500m).	4m wide paved greenway, which will be segregated from live traffic (270m). Raised Boardwalk for 290m. The raised boardwalk will provide a more enjoyable experience Shared/mixed street facility along Crook Road (190m). The Boardwalk structure constructed adjacent to the Boyne estuary will provide a more enjoyable experience than sections which are constructed close to the carriageway edge, however boardwalk surfacing provides a lower quality of comfort compared to smooth as asphalt which provides the better level of comfort.	4m wide paved greenway, which will be segregated from live traffic (320m). Greenway facility on Mornington Road (270m). Shared/mixed street facility along laneway to Mornington Road and Tower Road (300m). Greater Aesthetic views from Crook Road compared to the greenway along Tower Road.
	Rank				
	2B Traffic Network Integration	Shared/mixed street facility along Crook Lane and Crook Road will have a negative impact on traffic (500m). The removal of the cul-de-sac on Crook Lane will have a negative impact on traffic calming.	Shared/mixed street facility along Mornington Road and Tower Road will have a negative impact on traffic (500m).	Option C is segregated from the existing road network for the majority of its length, it therefore has the least amount of traffic impact. Shared/mixed street facility along Crook Road (190m).	Shared/mixed street facility along Tower Road will have a negative impact on traffic (190m). Traffic lane widths on Mornington Road may need to be reduced to 3m.
	Rank				

Section 2 Sub-options					
Appraisal Criteria	Sub-Criteria	Option A	Option B	Option C	Option D
3 Safety	3A Road Safety	Shared street facilities are provided on Crook Lane and Crook Road, however, they are residential roads with very light traffic flows and slow traffic speeds suitable for shared facilities (500m).	Shared street cycle facilities are not suitable for Mornington Road which has high traffic volumes and vehicle speeds (250m). Shared street facilities are provided on Tower Road, however, it is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities (250).	Shared street facilities are provided on Crook Road, however, it is a residential road with very light traffic flows and slow traffic speeds suitable for shared facilities (190m).	Shared/mixed street facility along the laneway to Mornington Road and Tower Road (300m).
	Rank				
	3B Pedestrian Safety	No pedestrian facilities are provided along Crook Lane and Crook Road (500m).	No pedestrian facilities provided in the laneway to Mornington Road. A new footpath will be provided on Tower Road.	This option is segregated from Traffic for the majority of the route. No pedestrian facilities are provided along the section Crook Road (190m).	No pedestrian facilities provided in the laneway to Mornington Road. A new footpath will be provided on Tower Road.
	Rank				
4 Environment	4A Architectural and Cultural Heritage	No appreciable impacts	1 designated as protected structure Recorded Monument identified within the assessment area on the on Mornington Road. However, the structure has been recently renovated and this option does not involve land take by this structure, therefore this option will have no impact.	No appreciable impacts	1 designated as protected structure Recorded Monument identified within the assessment area on the on Mornington Road. However, the structure has been recently renovated and this option does not involve land take by this structure, therefore this option will have no impact.
	Rank				
	4B Flora and Fauna	The paved greenway and the Boardwalk facility along the 'The Gut' of the Boyne River Estuary may have an impact on the Flora and Fauna (approx. 260m length). Potential for substantial habitat loss within same, or disturbance to birds.	The paved greenway along the 'The Gut' of the Boyne River Estuary may have an impact on the Flora and Fauna (approx. 260m length). Increased proximity to sensitive habitats and birds.	Boardwalk facility to the north of the estuary (south of Crook Lane) an impact on the protected species including Otters and Salmon (290m length). A Piled boardwalk facility may disturb the marsh and grassland at the 'The Gut' of the Boyne River Estuary (50m length) and potentially result in adverse effects on EU Site integrity.	The paved greenway along the 'The Gut' of the Boyne River Estuary may have an impact on the Flora and Fauna (approx. 260m length) Increased proximity to sensitive habitats and birds.
	Rank				
	4C Landscape and Visual	Option A has a pedestrian & cycle bridge with a small section of Boardwalk (with pedestrian railings) which may impact on the existing vista of the Boyne River Estuary.	No boardwalk provided. Share/mixed street facility provided along Mornington Road and Tower Road which will have no significant impact on the existing vista of the River Boyne Estuary.	Option C has a pedestrian & cycle bridge with a section of Boardwalk (290m) (with pedestrian railings) which may impact on the existing vista of the Boyne River Estuary.	No boardwalk provided. Cycle facilities provided along the Mornington Road which will have no significant impact on the existing vista of the River Boyne Estuary.
	Rank				
	4D Risk of Flooding	The paved greenway and the Boardwalk facility along the 'The Gut' of the Boyne River Estuary will experience flooding (approx. 260m length) (0.5% for coastal flooding <3.54m).	The paved greenway along the 'The Gut' of the Boyne River Estuary will experience flooding (approx. 260m length) (0.5% for coastal flooding <3.54m).	The paved greenway along the 'The Gut' of the Boyne River Estuary will experience flooding (approx. 260m length) (0.5% for coastal flooding <3.54m). Boardwalk facility to the north of the estuary (south of Crook Lane) will experience flooding (290m length).	The paved greenway along the 'The Gut' of the Boyne River Estuary will experience flooding (approx. 260m length) (0.5% for coastal flooding <3.54m).

Section 2 Sub-options					
Appraisal Criteria	Sub- Criteria	Option A	Option B	Option C	Option D
	Rank				
4 Environment	4E Soil & Hydrology	Impacts on soil and geology as a result of possible ground excavation (including potential to encounter ground contamination) along the grassed trail approaching the 'The Gut' of the estuary to provide for a paved greenway (210m length). A Piled boardwalk facility may disturb the marsh and grassland at the 'The Gut' of the Boyne River Estuary (50m).	Impacts on soil and geology as a result of possible ground excavation (including potential to encounter ground contamination) along the grassed trail approaching the 'The Gut' of the estuary to provide for a paved greenway (320m).	Impacts on soil and geology as a result of possible ground excavation (including potential to encounter ground contamination) along the grassed trail approaching the 'The Gut' of the estuary to provide for a paved greenway (270m). A Piled boardwalk facility may disturb the marsh and grassland at the 'The Gut' of the Boyne River Estuary (290m).	Impacts on soil and geology as a result of possible ground excavation (including potential to encounter ground contamination) along the grassed trail approaching the 'The Gut' of the estuary to provide for a paved greenway (320m).
	Rank				
	4F Land Use Character	No appreciable impacts	No appreciable impacts	No appreciable impacts	The level of land take required on Mornington Road would not affect the viability of residential properties from being used for its intended use.
	Rank				

8.0 APPENDIX B – Principal Route Options Assessment

Section 2					
Principal Route options					
Appraisal Criteria	Sub-Criteria	Option 1	Option 2	Option 3	Option 4
1 Economy	1A Capital Cost	<u>Indicative Infrastructure costs include:</u> <ul style="list-style-type: none">This option proposes a 4m wide paved greenway which follows the existing flood defence embankment travelling northwards until it meets the trail locally named “Butterfly alley” adjacent to the Estuary at a location known as “The Gut” and continue in the south direction to the Mornington Road (R151) (850m).This option proposes a greenway (4m wide) on the northern side of Mornington Road (270m).The provision of the greenway will require the widening of the carriageway, removal of the verge, relocation of the Mornington Court boundary wall and potential land acquisition for approx. 6 residential houses (impact on front boundary wall).It is likely the Tower Road would need to be resurfaced in places and the existing road lighting improved to adequately provide for the facility.Traffic lane widths on Mornington Road may need to be reduced to 3m.	<u>Indicative Infrastructure costs include:</u> <ul style="list-style-type: none">This option proposes mixed or shared street facilities along Mornington Road and Tower Road. Due to width constraints along Mornington Road segregated cycle facilities is not achievable without widening the carriageway resulting in a removal of a number of trees and land acquisition.It is likely the Tower Road would need to be resurfaced in places and the existing road lighting improved to adequately provide for the facility.	<u>Indicative Infrastructure costs include:</u> <ul style="list-style-type: none">This option proposes a greenway (4m wide) on the northern side of the Mornington Road. Due to width constraints along Mornington Road the provision of segregated cycle facilities is only achievable through widening the carriageway, resulting in a removal of a number of bushes/trees, relocation of the Mornington Court boundary wall south and potential land acquisition from the front curtilage residential properties (approx. 16 properties).Due to width constraints along Tower Road (proximity of adjacent properties), mixed or shared street facilities are only feasible. Tower Road, is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities.Traffic lane widths on Mornington Road may need to be reduced to 3m.It is likely the Tower Road would need to be resurfaced in places and the existing road lighting improved to adequately provide for the facility.	<u>Indicative Infrastructure costs include:</u> <ul style="list-style-type: none">This option proposes a 3m two-way cycle track on the northern side of the Mornington Road. Due to width constraints along Mornington Road the provision of segregated cycle facilities is only achievable through widening the carriageway, resulting in a removal of a number of bushes/trees, relocation of the Mornington Court boundary wall south and potential land acquisition from the front curtilage residential properties (approx. 10 properties).Due to width constraints along Tower Road (proximity of adjacent properties), mixed or shared street facilities are only feasible. Tower Road, is a local/residential road with very light traffic flows and slow traffic speeds suitable for shared facilities.Traffic lane widths on Mornington Road may need to be reduced to 3m.It is likely the Tower Road would need to be resurfaced in places and the existing road lighting improved to adequately provide for the facility.This option also proposes a pedestrian trail which will travels along the trail locally named as Butterfly alley heading east towards the coast (270m) and then proceeding south towards Mornington Road via the pier access route.
	Rank				
	2 Integration	2B Cycling - Quality of Service			
	Rank	4m wide paved greenway provided along Mornington Road which will be segregated from live traffic (850m). Greater Aesthetic views from Butterfly Alley than from Mornington Road, however it is a very circuitous route. Shared/mixed street facility along the laneway to Mornington Road and Tower Road (300m).	Shared/mixed street facility for the entire route (1 km).	Greenway (4m wide) on Mornington Road (850m). Shared/mixed street facility along Tower Road (250m).	Two-way cycle facility (3m wide) on Mornington Road (850m). Shared/mixed street facility along Tower Road (250m).

Section 2 Principal Route options					
Appraisal Criteria	Sub-Criteria	Option 1	Option 2	Option 3	Option 4
2 Integration	2C Traffic Network Integration	Shared/mixed street facility along Tower Road will have a negative impact on traffic (250m). Traffic lane widths on Mornington Road may need to be reduced to 3m.	Shared/mixed street facility along Mornington Road and Tower Road will have a negative impact on traffic (1 km).	Shared/mixed street facility along Tower Road will have a negative impact on traffic (250m). Traffic lane widths on Mornington Road may need to be reduced to 3m.	Shared/mixed street facility along Tower Road will have a negative impact on traffic (250m). Traffic lane widths on Mornington Road may need to be reduced to 3m.
	Rank				
3 Safety	3A Road Safety	Shared/mixed street facility along Tower Road (250m).	Shared/mixed street facility along Mornington Road and Tower Road (1 km).	Shared/mixed street facility along Tower Road (250m).	Shared/mixed street facility along Tower Road (250m).
	Rank				
	3B Pedestrian Safety	Greenway provided along the Butterfly Alley Trail. No pedestrian facilities provided in the laneway to Mornington Road (100m).	No pedestrian facilities provided for a section of Mornington Road (300m) which has high traffic volumes and vehicle speeds.	Pedestrian facilities provided for the entire route.	Pedestrian trail provided along the Butterfly alley and along the northern side of "The Gut".
	Rank				
4 Environment	4A Architectural and Cultural Heritage	1 designated as protected structure Recorded Monument identified within the assessment area on the on Mornington Road. However, the structure has been recently renovated and this option does not involve land take by this structure, therefore this option will have no impact.	1 designated as protected structure Recorded Monument identified within the assessment area on the on Mornington Road. However, the structure has been recently renovated and this option does not involve land take by this structure, therefore this option will have no impact.	1 designated as protected structure Recorded Monument identified within the assessment area on the on Mornington Road. However, the structure has been recently renovated and this option does not involve land take by this structure, therefore this option will have no impact.	1 designated as protected structure Recorded Monument identified within the assessment area on the on Mornington Road. However, the structure has been recently renovated and this option does not involve land take by this structure, therefore this option will have no impact.
	Rank				
	4B Flora and Fauna	The paved 4m greenway along Butterfly Alley and the 'The Gut' of the Boyne River Estuary may have an impact on the Flora and Fauna (approx. 850m length). Proximity to and possible loss of Annex I Habitat. Increased potential for disturbance to birdlife.	No appreciable impacts	The widening of the carriageway along the Mornington Road to provide for a greenway may have an impact on the Flora and Fauna (approx. 300m length).	The widening of the carriageway along the Mornington Road to provide for a two-way cycle track may have an impact on the Flora and Fauna (approx. 300m length). The pedestrian trail along the Butterfly Alley Estuary may have an impact on the Flora and Fauna. Increased potential for disturbance to birdlife
	Rank				
	4C Landscape and Visual	This option is located along the Butterfly Alley and edge of the estuary by 'The Gut' which will have a landscape and Visual impact..	This option has the least impact, as it is the existing Mornington Road carriageway.	This option has less impacts, as it can be considered as an existing Mornington Road widening. Removal of Trees and Bushes required along Mornington Road.	This option is located along the Butterfly Alley and edge of the estuary by 'The Gut' which will have a landscape and Visual impact. Removal of Trees and Bushes required along Mornington Road.
	Rank				

Section 2 Principal Route options					
Appraisal Criteria	Sub-Criteria	Option 1	Option 2	Option 3	Option 4
4 Environment	4D Risk of Flooding	The paved greenway along Butterfly Alley and along the 'The Gut' of the Boyne River Estuary will experience flooding (approx. 850m length) (0.5% for coastal flooding <3.54m).	The Mornington Road only experiences some minor flooding.	The Mornington Road only experiences some minor flooding.	The paved greenway along Butterfly Alley and along the 'The Gut' of the Boyne River Estuary will experience flooding (approx. 850m length) (0.5% for coastal flooding <3.54m). The Mornington Road only experiences some minor flooding.
	Rank				
	4E Soil & Hydrology	Impacts on soil and geology as a result of possible ground excavation (including potential to encounter ground contamination) along the old access road to the Golf Driving Range and Butterfield alley approaching the 'The Gut' of the estuary to provide for a paved greenway (850m length).	No appreciable impacts	Impacts on soil and geology as a result of possible ground excavation (including potential to encounter ground contamination) along the Mornington Road due to widening of the carriageway to provide for the Greenway (300m length).	Impacts on soil and geology as a result of possible ground excavation (including potential to encounter ground contamination) along the old access road to the Golf Driving Range and Butterfield alley approaching the 'The Gut' of the estuary to provide for a paved greenway (850m length).
	Rank				
	4F Land Use Character	No appreciable impacts	No appreciable impacts	The level of land take required on Mornington Road would not affect the viability of residential properties from being used for its intended use.	The level of land take required on Mornington Road would not affect the viability of residential properties from being used for its intended use.
	Rank				