Údarás
Náisiúnta Iompair
National Transport Authority

SANDYMOUNT / MERRION TO BLACKROCK CORRIDOR STUDY

FEASIBILITY STUDY AND OPTIONS ASSESSMENT REPORT

Part A: Coastal Cycle Route No.13E / East Coast Trail

AECOM ROD
ROUGHAN & O DONOVAN

Sandymount / Merrion to Blackrock Cycle Route Corridor Study

Feasibility Study & Options Assessment Report - Part A

Coastal Route 13E / *East Coast Trail*

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Sandymount / Merrion to Blackrock Cycle Route Corridor Study

Feasibility Study & Options Assessment Report - Part A

Coastal Route 13E / *East Coast Trail*

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PART A - COASTAL CYCLE ROUTE 13E

1. BACKGROUND

This report considers a proposed 6.5km long cycle route from Irishtown at the edge of Dublin City Centre extending south-eastward along the coastline of Dublin Bay South through Sandymount, Merrion, Booterstown and Blackrock to Seapoint. This route is identified as Corridor 13E in the *Greater Dublin Area Cycle Network Plan* published by the NTA in December 2013.

A previous study was completed by Scott Wilson consultants in 2007 for an 8m wide promenade project, including a 3.5m wide cycleway, along the shoreline of South Dublin Bay. That study assessed a variety of options for the promenade and reached certain conclusions about potentially significant impacts for ecology in the bay. The project did not proceed beyond feasibility study stage at that time due to concerns about the potential impact as well as high capital costs. The previous work is informative and provides much background material that need not be repeated in this report.

2. SCOPE AND OBJECTIVES OF THIS STUDY

This new study was commissioned in Autumn 2014, following earlier studies for the "Sutton to Sandycove Route" in 2007 and 2002, which did not identify feasible options for a walking and cycling route along the coast of Dublin Bay south due to environmental difficulties and significant construction costs.

This latest study provides a fresh assessment of the feasibility of a cycleway and walking route around Dublin Bay south that would have lesser impacts and more affordable costs. It is supported by the *Greater Dublin Area Cycle Network Plan* published by the National Transport Authority in 2013, which includes proposals for Radial Route 13E and the *East Coast Trail* greenway along the coast between Dun Laoghaire and Ringsend. At a national level the *National Cycle Network Scoping Study (2010)* included a long-distance Route Corridor 5 along the East Coast from Carlingford to Rosslare, which would be provided on a coastal cycleway along South Dublin Bay as considered in this study.

The Project Brief consists of the following requirements:

> "The study area extends from Blackrock at the south end to Sean Moore Road (in the case of the East Coast Trail) and to junction of Merrion Road and Ailesbury Road (in the case of the Blackrock to City Centre Cycle Scheme). The objectives of the study are:
>
> - to establish the feasibility of developing the two cycle routes referenced above through the study area, together with associated pedestrian facilities, having particular regard to the environmental constraints within the study area;
> - to identify and evaluate all of the feasible route options; and
> - to identify a preferred option for each of the two cycle routes."

Rather than the clumsy term "cyclist and pedestrian facility" this report will use the term "greenway" which has become common short-hand. It essentially means a route that is segregated from traffic and mostly, but not always, follows a separate route away from roads.

3. FUNCTIONAL REQUIREMENTS

The previous Scott Wilson report for the S2S Route gave consideration to the issues of width of the various facilities to be provided and concluded with a standard promenade width that included the following provisions:

- 0.5m to 1.0m edge buffer strip depending on proximity to a wall;
- 3.0m cycleway
- 0.5m separator strip (typical, but low kerb alternative);
- 3.0m footpath;
- 0.5m parapet

8.0m total typical

A road-side cycle track was not addressed in that study as the scheme was to be located entirely on the seaward side of the coastline and separated from traffic by the existing sea wall and footpath.

Photomontage of Proposed Promenade at Sandymount North from Scott Wilson Study (2007)

This new study provides consideration of alternative cross-section arrangements that may reduce the overall width considerably where necessary to respond to physical and environmental constraints, likely density of usage and cost considerations.

3.1 Shared or Segregated Facility?

Amenity facilities for cyclists and pedestrians may be either shared or segregated according to the circumstances, volume of usage and surrounding constraints. Guidance on the appropriate layout and widths is contained in the *National Cycle Manual (NCM)* and other literature such as the *European Greenways Best Practice Guide*. The guidance on shared facilities in the NCM is as follows:

"Shared facilities are disliked by both pedestrians and cyclists and result in reduced Quality of Service for both modes. With the exception of purpose-designed shared streets, shared facilities should be avoided in urban areas as far as possible.

Where shared facilities cannot be avoided, there are a number of considerations as follows that will help both cyclists and pedestrians to be aware of the other's presence.

- *Pedestrians should always have priority, reinforced by signage;*
- *Cyclists should consider themselves as 'cycling on the footpath';*
- *Segregate pedestrians and cyclists vertically and/or horizontally;*
- *Delineation markings should not be used as they give cyclists an incorrect sense of a dedicated cycle space;*
- *Sufficient width of footpath and cycle track will help both modes to travel in comfort;*
- *Sufficient width to facilitate evasive action and/or avoidance of potential conflict;*
- *Shared facilities next to vehicular traffic should have a minimum combined width 3.0m;*
- *Cycling alignment and speed reduction measures should be considered.*

Shared facilities might be appropriate at locations where footpaths are wide and the volume of pedestrians and cyclists is low, e.g. in low-density towns and cities, and suburban or recreational areas."

For this coastal greenway, the objective will be to segregate cyclists and pedestrians to the maximum extent possible so as to give the greatest benefit to both sets of users. This will be especially desirable where volumes will be high, such as at Sandymount, close to the city, and with generous green space beside the beach for leisure relaxation.

However, in other locations that are more remote from the city and dense neighbourhoods, the level of pedestrian activity should be quite low. In addition these locations are likely to be more environmentally sensitive and the scale of the greenway facility will be a significant factor that will determine the degree of environmental impact involved.

In conclusion, according to the different conditions along the route, the width of the proposed greenway may vary, and segregation between pedestrians and cyclists may not always be feasible or really necessary. It may be appropriate for environmental reasons, physical constraints, and cost, to provide a fairly narrow shared facility on some sections of the route where the volume of usage is expected to be fairly low. This compromise arrangement should be carefully limited in extent so as not to undermine the overall quality of the greenway route.

3.2 Cycleway Width

The NCM provides guidance on the width required for a two-way cycle track, which will vary according to conditions and quality of service to be provided. This gives a range of basic widths as follows, excluding necessary edge strips as appropriate to the location:

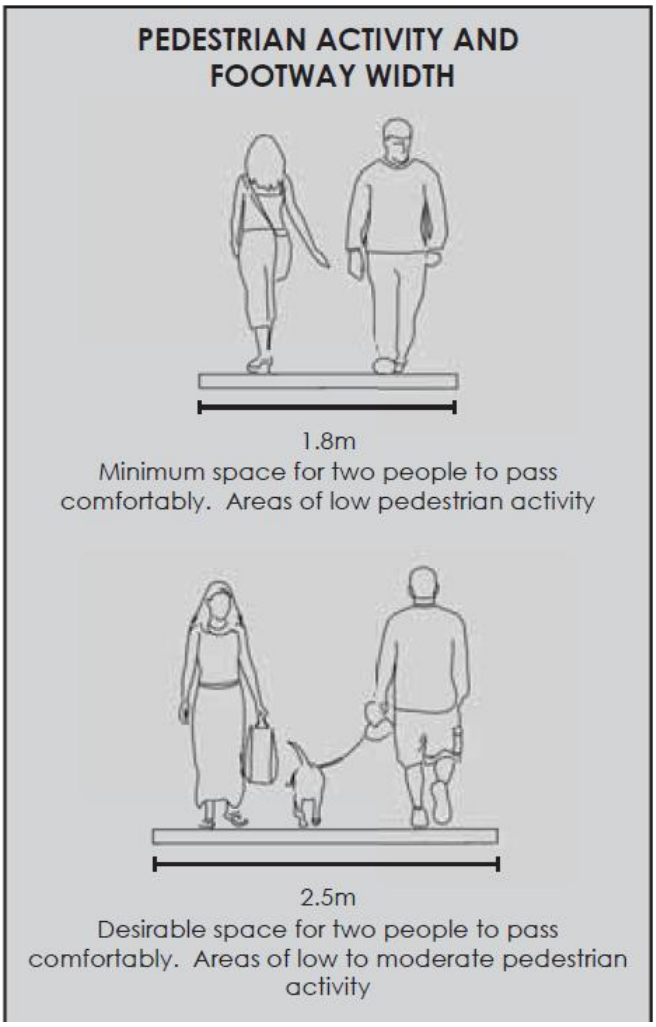
- 2.5m absolute minimum for two-way cycling;
- 3.0m normal width;
- 3.5m desirable width for comfort: two-abreast in each direction.

Edge separation:

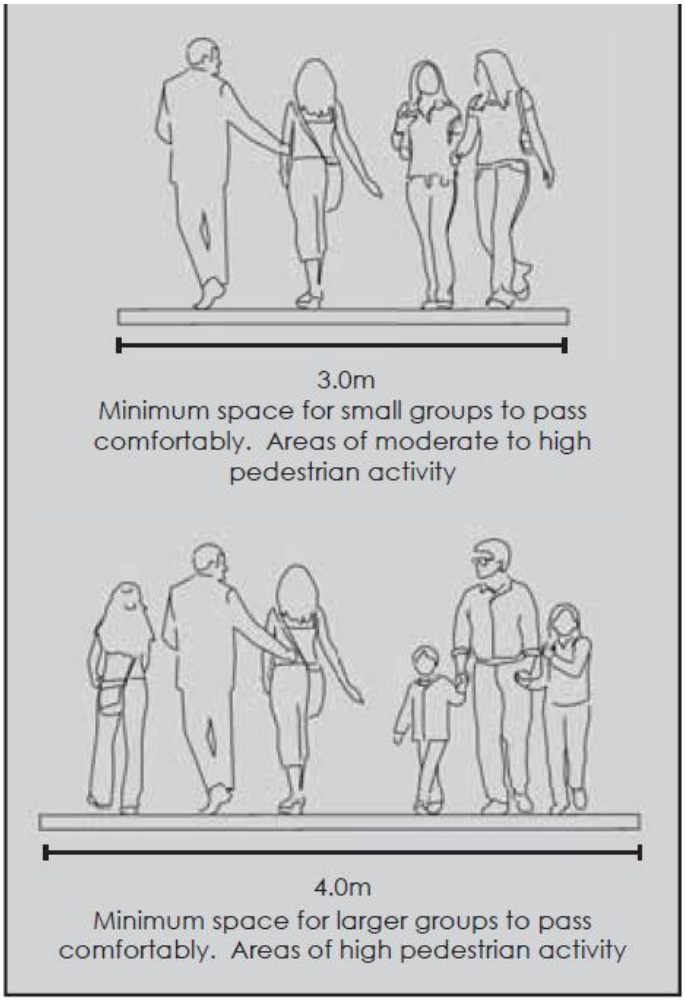
- 0.65m to wall or fence;
- 0.5m to raised kerb;
- 0.25m to soft verge

3.3 Footpath Width

The *Design Manual for Urban Roads and Streets (DMURS)* outlines appropriate footpath widths for various conditions. These range from a minimum of 1.8m to a desirable width of 4.0m for busy locations to provide a comfortable facility.



Extract from page 87 of DMURS for Minimum Footpath Widths



Extract from page 87 of DMURS for Generous Footpath Widths

The previous Scott Wilson study for the Sutton to Sandycove project proposed a segregated 3.0m wide footpath. This is a reasonable proposal in general for new sections of the proposed greenway, but is less than the existing 4m width on the Sandymount Promenade.

In conclusion, where a segregated footpath is provided along the proposed route, this may vary from a minimum width of 2.5m in a constrained location, up to 4.0m at a busy location, or where an existing facility is to be incorporated in the scheme.

3.4 Segregation Strip

The NCM provides the following guidance for segregation between a cycle track and a footpath:

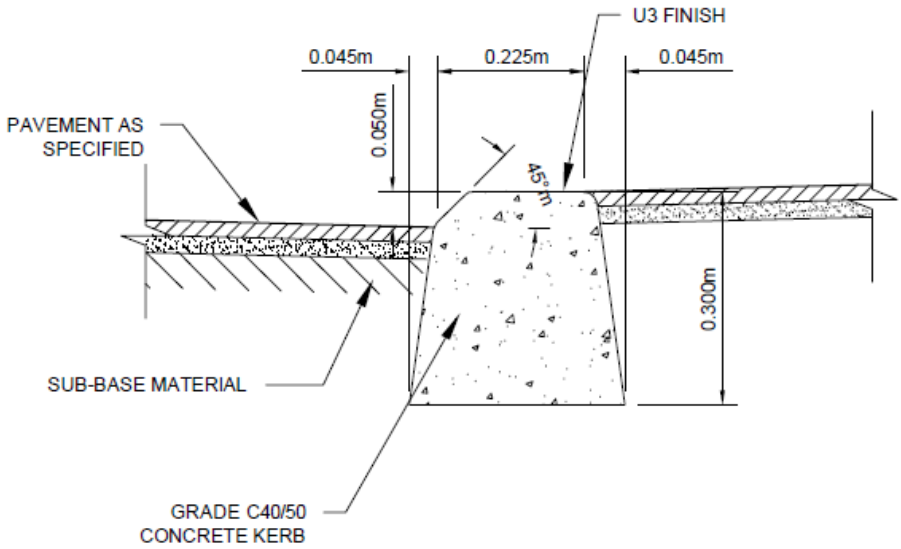
> *"Do Not Use Painted White Lines*
> *Painted white lines separating the 'walking side' from the 'cycling side' are not recommended. Even with good signage, pedestrians frequently disregard these lines and will walk or stand on the cycling side.*

The NCM recommends that segregation between the footpath and cycle track should be either horizontally or vertically, but does not give guidance on suitable dimensions. The following photographs show some examples of previous practice on other greenway routes in Ireland.

1m wide grass separator verge: Shannon Canal, Limerick

Tactile Hump Kerb separator: Coastal Greenway at Ballyloughane Strand, Renmore, Galway

The *Dollymount* section of the *East Coast Trail* in Dublin Bay North is to be constructed on the inland side of the sea wall where space is somewhat limited. That scheme provides for a 50mm high chamfered concrete kerb as separation between the cycleway and footpath. This detail can also be provided elsewhere along the route in the Dublin Bay South where space is limited, but sufficient for segregated facilities.



50mm high Separator Kerb Detail for Dollymount Section of East Coast Trail

3.5 Overall Width for Segregated Cycleway and Footpath

In light of the foregoing considerations the following is the proposed range of arrangements for locations where segregated cycling and pedestrian facilities may be provided according to the available space:

<u>Optimum Width</u>

- 0.65m edge buffer strip to a wall (NCM standard);
- 3.5m cycleway
- 0.5m separator strip (with seating and street furniture);
- 4.0m footpath;
- 0.5m parapet;

9.15m total typical

<u>Minimum Width</u>

- 0.3m edge buffer strip to a wall (Departure from NCM);
- 2.5m cycleway
- Vertical separator kerb;
- 2.5m footpath;
- 0.3m parapet;

5.6m total typical

3.6 Shared Greenway Width

A shared greenway may vary in width as illustrated in the following examples.

Example of Shared Greenway (3m wide): Royal Canal at Ashtown

Example of Shared Greenway (4m wide): Old Harcourt Line, Leopardstown

Example of Shared Greenway (6m wide): Essen University District, Germany

For this study, where the available space is less than the 5.6m minimum required for a segregated facility, then a shared greenway will be provided. This will typically be 4m wide, but may reduce to an absolute minimum of 3m over limited sections where the constraints are such as to otherwise render the route infeasible. An allowance of

0.3m width will be required in addition for a narrow parapet wall or railing on the seaward side.

3.7 Summary of Cross-Section Width Options

Option 1: 9.15m Segregated Optimum

Option 2: 5.6m Segregated Minimum

Option 3: 4.3m Shared Desirable

Option 4: 3.3m Shared Minimum

4. COST ESTIMATES METHODOLOGY

The cost estimates for each route option have been prepared using a mini-Bill of Quantities methodology with provisions under the following headings:

i) Major basic construction items such as earthworks, drainage, pavement, kerbs, etc measured and costed based on typical rates from current similar projects, and benchmarked against the database in the NRA *Cost Management Manual*, which normally account for 80% of the base construction cost;

ii) 20% factor for minor non-measured minor items to arrive at a base construction cost;

iii) Provisions for special items such as traffic signals, structures (boardwalk, underpass, retaining wall), Public Lighting, CCTV;

iv) 20% for contingencies and unforeseen items;

v) 10% for preliminaries;

= Total Construction Cost.

+ VAT at 13.5% for Construction;

Other Direct Costs:

vi) Planning, Surveys, Design & Construction Supervision: 7.5% to 15% of construction cost, depending on scale and complexity;

vii) Land Acquisition, at a rate of €6m/Ha for large plots of non-residential land, and €10m/Ha for small strips of residential land;

viii) Accommodation works and Boundaries;

ix) CPO Compensation;

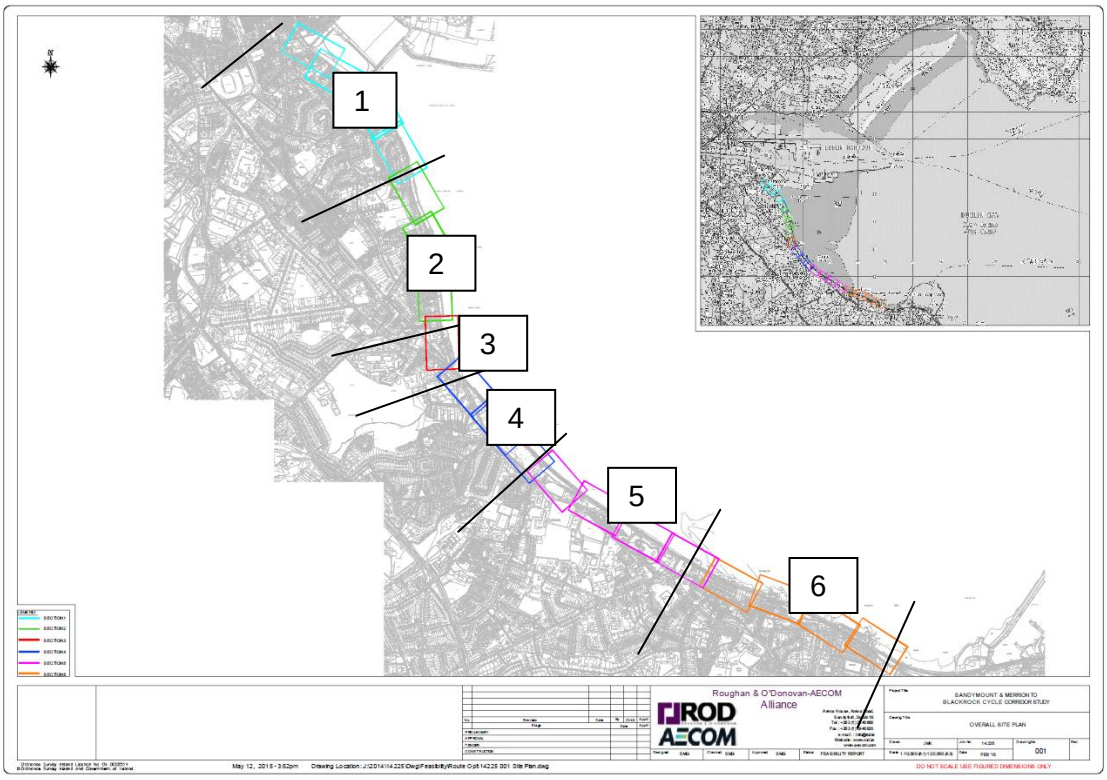
x) Legal Costs and Risk Allowances.

Cost Estimates are provided for the various options in each section of the report, and this informs the Options Assessment under the "Economy Heading".

5. ROUTE SECTIONS

This report deals with the route in 6 sections from North to South over a total length of 6.5 km as follows and as shown on the Overall Site Plan Drawing No.001 in Volume 2:

Section 1:	Irishtown to Sandymount	1.3 km
Section 2:	Sandymount Promenade	1.1 km
Section 3:	Merrion	0.4 km
Section 4:	Merrion to Booterstown	1.0 km
Section 5:	Booterstown to Blackrock	1.4 km
Section 6:	Blackrock to Seapoint	1.3 km



Route Sections (Overall Site Plan Drawing No.001 in Volume 2)

Each section of the route is discrete in terms of the constraints to be addressed and the available options for the cycleway. These sections could also be developed separately if necessary as part of a phased approach, while delivering a worthwhile addition to the cycle route network on an individual basis. At each node between adjoining sections the route may be comprised of the most suitable option for the linking sections and thus the nature of the route may change at these nodes. In addition the coastal route will interact to varying degrees with the parallel and complementary inland route along the Rock Road and Merrion Road corridor as described in Part B of this study. There will be connections between the two corridors at some nodes, including nodes 3-4, 4-5 and 5-6 where the corridors are in close proximity.

6. OPTIONS ASSESSMENT PROCEDURE

The procedure for the assessment of the scheme options follow the directions of the "*Guidelines on a Common Appraisal Framework for Transport Projects and Programmes"* published by the Department for Transport, Tourism and Sport (DTTaS), under 5 general headings of Economy, Safety, Environment, Accessibility & Social Inclusion and Integration.

A number of sub-headings have been selected that are specific to this scheme so as to enable an appropriate method of assessment that will distinguish between the options under consideration. These will vary slightly between sections to reflect the different factors to be considered in the selection of the most suitable option.

Economy
Capital Cost
Maintenance Cost
Transport Quality of Service - primarily for cyclists in accordance with the National Cycle Manual
Safety
Pedestrian and Cyclist Safety
Railway Safety (at Merrion Gates only)
Environment
Landscape and Visual Quality
Biodiversity
Cultural Heritage
Land Use
Accessibility & Social Inclusion Generally No Difference between Options
Integration
Cycle Network Integration - a primary objective
Coastal Walk - an associated objective of the project
Traffic Disruption

The options in each section of the route have been assessed relative to each other under the above headings using the following rating system. The results of the assessments are included in a table at the end of the chapter for each section.

Assessment Ratings

Colour	Description
+ +	Significant advantages
+	Some advantages
	Neutral
-	Some disadvantages
- -	Significant disadvantages

7. CONSTRAINTS - OUTLINE

7.1 Biodiversity Constraints

This report was prepared with the assistance of *Scott Cawley* Ecological Consultants who undertook a comprehensive review of previous ecological studies and surveys in Dublin Bay, supplemented by additional site inspections and data collection for migratory seabird concentrations and activity during Winter 2014/2015.

Designated Sites in South Dublin Bay

European Sites

- South Dublin Bay Special Area of Conservation (SAC); and,
- South Dublin Bay and River Tolka Estuary Special Protection Area (SPA).

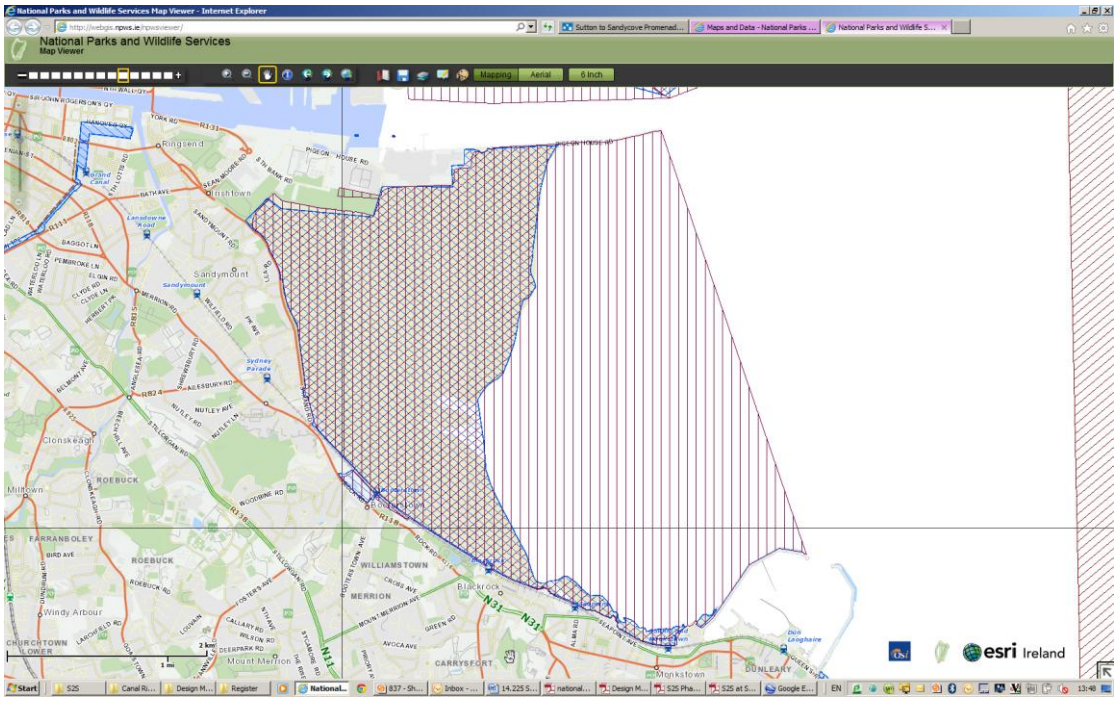
National Sites

- South Dublin Bay proposed Natural Heritage Area (pNHA); and,
- Booterstown Marsh pNHA.

Annex I Habitat – Qualifying Interest (QI)

The Feature of Interest (QI) for the designation of the SAC is the Annex I Habitat *Mudflats and Sand-flats not covered by seawater at low tide* [1140] which is protected under the EU Habitats Directive (92/43/EEC)[1]. This habitat exists in each of the sections listed below.

Further local details of ecological features are provided for the route in 6 sections in later chapters of this report.



Designated Sites in Dublin Bay South

[1] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, O.J. L206, 22.07.92

Management of Disturbance for Birds

At all locations along the edge of the bay there is potential for disturbance/displacement of birds which occur in significant numbers in the various sections of the South Dublin Bay SPA, particularly if user numbers along the route are to significantly increase over current numbers. An analysis of current use, and a forecast of future predicted use, is required for evaluation of the potential scheme impacts.

Significant disturbance/displacement impacts could potentially be reduced with appropriate mitigation measures *e.g.:*

- screening,
- control of disturbance by introducing a dog warden system,
- provision of dog parks and educational signage to encourage users to use the new facility instead of the strand, particularly during autumn and winter.

For there to be any degree of confidence in the certainty of these mitigation measures avoiding impacts on the integrity of the SPA it is likely that a properly funded management plan outlining these mitigation measures, as well as broader issues, would need to be prepared. The management plan would need to be prepared and implemented as a collaboration between a number of organisations including at a minimum the local authorities and the National Parks and Wildlife Service.

Loss of Habitat and Relevant Habitats Directive Procedures

The loss of even very small areas of beach habitat in the context of the overall available habitat within the SAC and in the wider Dublin bay context is a factor that requires careful evaluation where this habitat is Annex I Qualifying Interest (QI) habitat for the SAC. The European Court of Justice ruling Case C258/11 of 11th April 2013 presents a significant difficulty for such a proposal. The generally assumed implication and current practice in the application of this judgement in Ireland, is that any loss of any QI habitat will result in an impact on site integrity for the relevant European site and therefore would prevent a proposal from proceeding through a Habitats Directive Article 6(3) process. The proposal would then have to proceed under a Habitats Directive Article 6(4) process which presents significant procedural and legal challenges to overcome. There is some evidence that the UK (and possibly also other member states) may apply this judgement (and the related judgement C-521/12) differently such that this proposal might in fact be viewed as appropriate to proceed under a Habitats Directive Article 6(3) process. If such an option was progressed as the preferred proposal, it would need significant and careful thought and consultation with the NPWS and others, regarding its viability under either an Article 6(3) or 6(4) process.

There is a precedent of a cycleway in the Exe Estuary SPA in England, where following detailed analysis of the impacts, appropriate and specific design of mitigation and monitoring was undertaken to ensure that the mitigation was working. In this case, it was proven to do so without any significant impacts upon the SPA (Goss-Custard, 2008[2]).

[2] Goss-Custard, J. D. (2008) Monitoring the effects of the Exmouth-Lympstone section on the shorebirds of the Exe Estuary Special Protection Area, National Cycle Network – Exe Estuary Cycleway. Report to Devon County Council.

7.2 Railway Line and Coastal Protection

The current shoreline along 4km of Dublin Bay South is man-made and was formed with the construction of the Dublin to Kingstown Railway embankment in 1835. The 180 year old railway line is protected from the sea by a revetment and parapet wall constructed of large granite blocks. A key public transport corridor for Dublin is dependent on this marine structure which is an essential piece of the Iarnród Éireann national infrastructure. Some options for the greenway route may be located alongside and on top of the railway revetment.

Booterstown DART Station

This section of coastline is relatively sheltered compared to the rest of the Irish Sea due to the protection afforded by Dun Laoghaire Harbour piers. However, in certain conditions of wind and tide, the coastline between Booterstown and Seapoint can be exposed to moderately severe wave action as shown in the following photograph.

Rare Winter Storm at High Tide on Shoreline between Booterstown and Blackrock

Dublin Bay Hydraulic Model

This study has obtained information about extreme tide levels and storm surge predictions for Dublin Bay from our sub-consultants *Royal Haskoning* who prepared the hydraulic model of the bay for Dublin City Council as part of flood studies for coastal protection of the city.

To assist in preparing this report, Royal Haskoning DHV were commissioned to provide a preliminary desk study assessment of the coastal processes along the Sandymount coastline, in Dublin Bay. The assessment considered the proposed Sandymount cycle corridor that is planned to run along the southern coastline of Dublin Bay, between Sandymount/Merrion to Blackrock and advises on coastal water levels and wave heights.

Flood Protection

In 2005 Royal Haskoning prepared a report titled *Dublin Coastal Flooding Protection* Project (DCFPP), which examined the risk to Dublin from coastal flooding. This study evaluated historic tidal data (between 1924 and 2002) from Dublin Port, to assist in the prediction of extreme still water levels in Dublin Bay and a joint probability assessment of still water and wave combinations. The DCFPP used the IPCC (2001) and UKCIP02 climate change guidance and predicted an extreme still water level of 3.13m ODM for a 1 in 200 year event, i.e. no climate change or wave height allowance included. At that time the projected rise in sea level due to climate change over a 120 year period was 0.5m.

A 1 in 200 year still water, plus a 1 in 1 year wave event, was considered to produce the worst case 1 in 200 year coastal flood risk event. DCFPP wave simulation of a 1 year offshore wave indicated that Blackrock is exposed to the highest incident waves

heights, compared to the Sandymount/Irishtown area. The greatest inshore wave height is ~1 m at Blackrock and the Sandymount/Irishtown area is exposed to a ~0.5 m wave. Shallower inshore bathymetry helps to shelter the Sandymount/Irishtown frontage from greater incident wave heights at the seawall. **This gave a target surface level of 4.13m ODM for a coastal promenade at Sandymount/Irishtown frontage and 4.63m ODM at Blackrock.**

The Environment Agency's 'Adapting to Climate Change' and the UKCP09 'Marine and Coastal Projections' guidance documents, provide the most up to date climate change requirements for the UK and have been adopted by Irish authorities. Guidance on sea level rise and surge projections for the forthcoming century, were used to provide an indication of revised extreme 1 in 200 year still tide levels for Dublin Bay, for various time horizons.

This preliminary study estimated that an extreme still water level of 3.4 m ODM for 2015, 4.4 m ODM for 2080 and 4.9 m ODM for 2115. These estimated levels are significantly higher than the DCFPP 1 in 200 year extreme still water estimated for 2005. Therefore, the expected still water level for the proposed cycle corridor will be significantly higher than previously reported in the DCFPP report.

It is recommended that a detailed coastal investigation/modelling study is undertaken to inform the detailed design phase with a more robust indication of total peak water levels along the Sandymount to Blackrock frontage.

Expectations for rising sea levels and increased wave action in Dublin Bay give rise to significant challenges for existing infrastructure along the coastline. This poses increased risk of flooding and storm damage for the railway line between Dun Laoghaire and Merrion, as well as for Strand Road and the residential area at Sandymount. The two local authorities and Iarnród Éireann are undertaking technical studies to evaluate this risk and to devise a strategy for increased coastal flood protection. To date this greenway feasibility study has been informed of preliminary concepts developed by Dublin City Council for coastal protection works at Strand Road between Seán Moore Park and Sandymount Promenade. Further south, there are no coastal protection proposals developed so far, but it is clear that any greenway along the seaward side of the railway will require to be elevated significantly to avoid flooding and protection from wave action. Further details are provided in each geographical section of this report.

Potential Promenade with Coastal Protection

There is very limited scope to build an infill promenade along the shoreline between Booterstown and Blackrock that would not extend into the SAC, depending on the width of the top surface and slope steepness on the seaward edge. Habitat loss would arise from a boulder revetment on the seaward side, and a seawall is likely to be required to avoid such an impact.

7.3 Residential Amenity

There are two locations on the coastline where residential amenity could be affected by a coastal greenway:

- At Merrion Strand where there are 17 houses that back onto the beach, and
- At Brighton Vale where there are 2 houses directly on the shoreline.

Inland route options may affect other properties where land may need to be acquired to provide the width necessary for the cycleway and footpath. These impacts are noted for the relevant options later in this report.

7.4 Cultural Heritage

There are a number of structures included in the Record of Monuments and Places (RMP) and in the Record of Protected Structures (RPS) along the route corridor including::

1) The sea wall at Sandymount Strand (RPS);
2) Martello Towers at Sandymount (RPS/RMP), Seafort Parade (RPS/RMP) and at Brighton Avenue;
3) At the Maretimo Headland east of Blackrock, a complex of features associated with Maretimo House including a private pedestrian bridge over the railway, three harbours and a bathing house (all included in the RPS); and
4) Various other individual and terraced residential properties, predominantly of nineteenth century date (included in the Record of Protected Structures, Architectural and Candidate Architectural Conservation Areas).

Links for the relevant development plan maps:

http://46.137.120.35/DLRDevelopmentPlan/DevPlanViewer.aspx#

http://www.dublincity.ie/sites/default/files/content//Planning/DublinCityDevelopmentPlan/Documents/MapsetF.pdf

http://www.dublincity.ie/sites/default/files/content//Planning/DublinCityDevelopmentPlan/Documents/MapsetH.pdf

8. ROUTE OPTIONS FOR SECTION 1: IRISHTOWN TO SANDYMOUNT STRAND

8.1 Section 1 Over-view

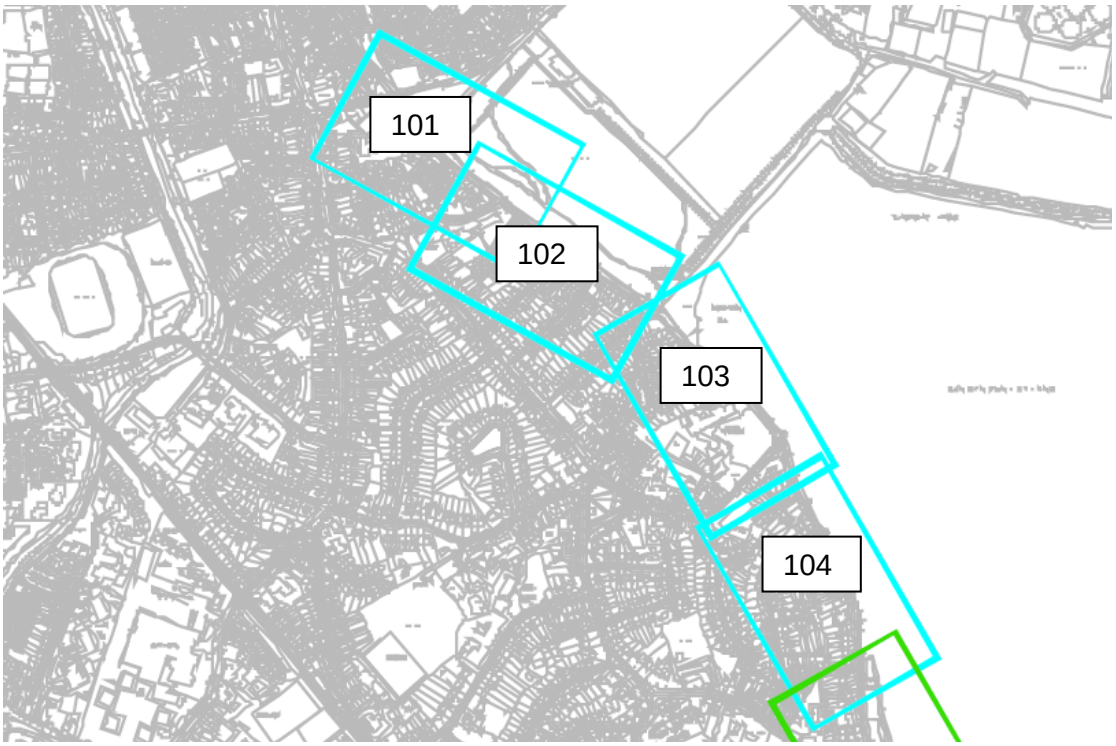
Section 1 commences just north of the junction of Seán Moore Road and Beach Road in Irishtown and extends for 1.3km to Sandymount Promenade. For reference purposes on the drawings included in Volume 2, Chainage marks are provided commencing at Ch.0 on Pembroke Street in Irishtown about 30m north of Seán Moore Road.

There are two distinct sub-sections:

- Section 1.1 at Seán Moore Park to Sandymount Strand over a length of 0.6 km (Sheet Plans 101 & 102); and
- Section 1.2 along Strand Road for 0.7 km (Sheet Plans 103 & 104).

Given the availability of extensive public open space in Seán Moore Park adjoining Beach Road, just one option was considered within the park for Sub-Section 1.1 as described in 8.2 below.

In the case of Sub-Section 1.2 along the north-western corner of Sandymount Strand there were 4 options identified as described in 8.3 to 8.6 following.



Key Map for Section 1 and Sheet Plans

8.2 Section 1.1: Seán Moore Park Cycleway

This section extends for a distance of 600m from Seán Moore Road at Irishtown to the coast at the junction of Beach Road and Marine Drive. It is proposed to provide the cycleway within the public park to the east of Beach Road as shown on Drawings No.111 and 112.

At the northern end, the cycle route will commence with suitable cycleway connections to the existing traffic calmed one-way streets of Pembroke Street and Bath Street that pass through Irishtown. From here towards the City Centre and northward along the east coast, there is potential for future extension of a cycleway via Ringsend Park as identified by Roughan & O'Donovan in previous studies for Dublin City Council and the National Transport Authority.

Signal controlled toucan crossings will be provided across the two arms of Seán Moore Road that are separated by a large landscaped traffic island. These crossings would be arranged within the existing signalised junction, and would require separate control of the left-turn movements.

The cycleway will then enter Seán Moore Park with removal of the existing kissing gate that restricts access for cyclists. There is generous room available for the cycleway within the park parallel to and separated from the existing footpath that runs southward at a distance of approximately 30m from the western park boundary along Beach Road. A 1.5m wide landscaped separator verge will be provided between the footpath and the cycleway, which will discourage mixing of pedestrians and cyclists for safety and comfort of both user groups. Lighting columns and other street furniture can be provided in this verge to emphasise the separation.

Seán Moore Park at Seán Moore Road Junction

At the south-western corner of the park, there is a potential for a spur greenway as an upgrade to the existing footpath that extends eastward along the Poolbeg Peninsula to the South Bull wall and lighthouse. The main cycleway would thread

through a stand of trees to exit the park and join Beach Road at the traffic signal junction with Marine Drive before linking with one of 4 options in Section 1.2 next.

8.3 Section 1.2: Seán Moore Park to Sandymount Promenade

This section extends for 800m along Strand Road where the beach of Sandymount Strand is separated from the road by a granite masonry seawall, which is a protected structure in the Dublin City Council Development Plan.

Strand Road, Sandymount at Low Tide

The footpath along the eastern seaward side of this road varies in width from a generous size of 4m or more in places to an adequate minimum of about 2.5m. As can be seen from the preceding photograph the footpath is heavily used by walkers and joggers in fine weather, and especially at high tide when the beach is under water. At low tide many people prefer to walk along the strand outside the sea wall.

8.4 Ecological Constraints for Section 1.2

The Dublin Bay Special Area for Conservation (SAC) and Special Protection Area (SPA) for birds extend up to the seawall along Strand Road and forms a significant ecological constraint for any proposal to construct a walkway or cycleway on the seaward side of the wall. The key ecological issues are as follows:

a) Annex I Habitat – Qualifying Interest (QI): The Feature of Interest (QI) for the designation of the SAC is the Annex I Habitat *Mudflats and sand-flats not covered by seawater at low tide* [1140] which is protected under the EU Habitats Directive;

b) Other Annex I habitats occur in this section which are not QI's but are also protected under the Habitats Directive such as the *Embryonic shifting dunes* [2110] and *Annual vegetation of drift lines* [1210];

c) The intertidal mudflats and sand-flats support a highly dynamic ecosystem and all areas which provide suitable invertebrate assemblages are used by various water-birds for hunting and feeding as the tide recedes;

d) Diving species such as Red-breasted Merganser and Cormorant feed in the sub-tidal areas;

e) Within the intertidal zone, water birds roost on the flats and also on the high tide (particularly gulls and geese);

f) Sandbars in this area are used for roosting at low tide and pre-roosting as the tide rises;

g) The terrestrial grasslands such as Sean Moore Park provide feeding grounds for Light-bellied Brent Geese;

h) The dry beach at Sandymount provides an important high tide roosting site;

i) Internationally important congregations of Terns roost here in autumn (these birds can be found roosting on the flats and will follow the movement of the tide generally between Blackrock and Poolbeg); and,

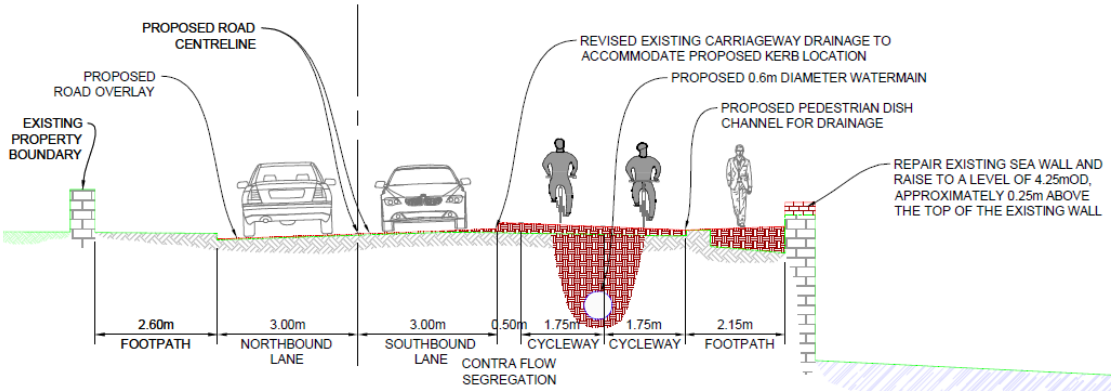
j) The sea wall revetment adjacent to Irishtown Nature reserve (outside of the proposed development area) is regularly used by roosting waders e.g. Redshank at high tide.

8.5 Option 1A: Strand Road Cycleway

This option seeks to avoid encroaching on the seaward of the seawall by provision of a cycleway on the inland side along Strand Road within a re-organised road layout, and with some land take where necessary from the frontage properties on the inland side of the road.

It is feasible in places to narrow the road to permit widening of the eastern footpath sufficiently for shared use by cyclists and pedestrians, or preferably to achieve a segregated facility to provide the desirable level of amenity and comfort that is the objective for a premium recreational facility.

There is a precedent for this approach at Dollymount, where construction has commenced in 2015 on the missing 2km section of the *East Coast Trail* between the Wooden Bridge to the North Bull wall and Causeway Road to Bull Island. That scheme is shown in the following cross-section diagram:



Proposed Cycleway at Dollymount

The *Dollymount Cycleway* consists of the following elements:

- Existing 2.0 to 2.6m wide footpath maintained on the inland side of the road to suit visibility from driveways at frontage properties;
- Informal on-road parking generally removed;
- 2 x 3.0m wide traffic lanes;
- 0.5m wide buffer strip;
- 3.5m wide two-way cycleway;
- 2.0m+ wide footpath segregated vertically from the cycleway by 40mm.
- Overall road width: 14.0m to 14.6m typical.

- Width of Cycleway and Footpath on seaward side: 6.0m+.

Close examination of the available road width has confirmed where the required width is available, and where it will be necessary to widen outside the existing road reservation.

Parking

Many of the houses along Strand Road are generally over a century old of either Victorian or Edwardian vintage, with some modern infill developments, including apartments. Many residences do not have off-street parking at the front, and this gives rise to parking on-street at various places along the road. Parking is not formally provided for on the road, but neither is it prohibited in front of most houses, except for short lengths of double yellow lines at some junctions and along the front of Roslyn Park College. Because of the relative narrowness of the road carriageway and the fairly high volumes of traffic, many drivers park with their inside wheels on the footpath which is illegal, but appears to be a general practice of residents on this road. The western footpath is over 2m wide and the residual space inside parked cars is usually about 1.5m wide.

Section 1.2a - Marine Drive to Seafort Avenue

Parking on Strand Road between Marine Drive and Seafort Avenue

A total of 17 cars were observed parked on the western, inland, side of the road during a site visit on the morning of 30th of January 2015. There is a small mechanic business towards the northern end of this section and 5 residences facing onto this section of road, 3 of which have driveways, leaving 2 households dependent on on-street parking. It appears that most of the parking on this section of road is by staff working nearby in Sandymount Green, for which this is the nearest place with uncontrolled parking.

The existing road varies in width along this section and is quite wide in the range of 14m to 15m. This is sufficient space for a cycleway on the eastern side of the road with some parking restriction in the 70m length mid-way between junctions where the road is narrowest.

For Option 1A a revised road layout could consist of the following elements:

- 2.1m existing western footpath retained;

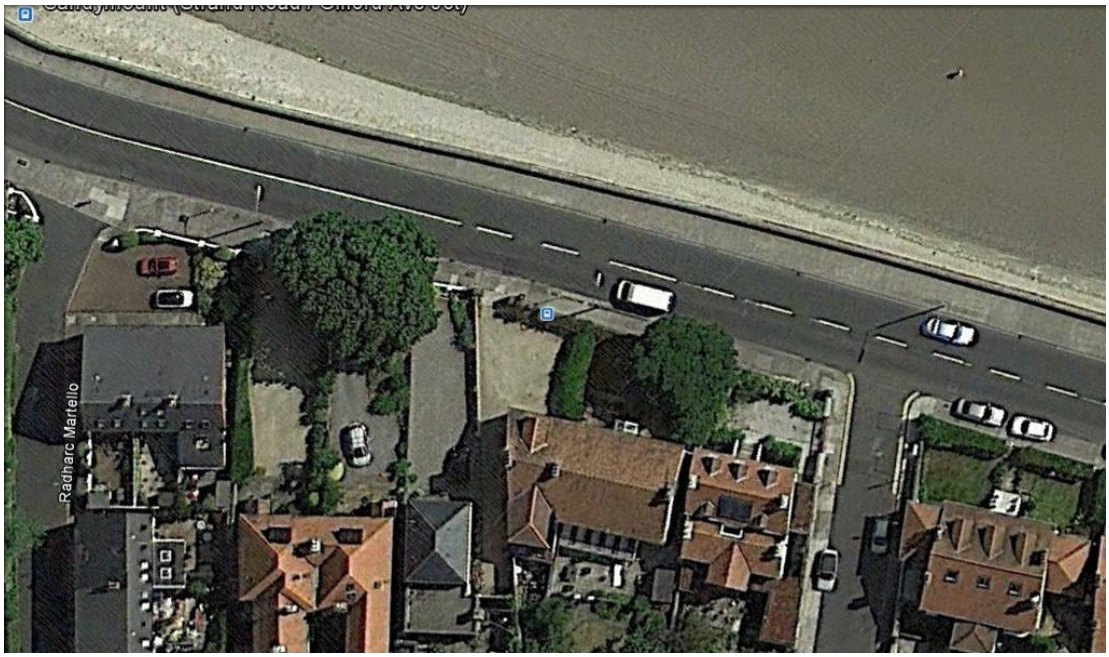
- 6.0m carriageway;
- 5.8m for cycleway and footpath on the eastern, seaward side:
  - 0.3m buffer zone at road edge;
  - 3.0m cycleway;
  - 2.5m footpath;
- Overall Width: 14m approximately.

Section 1.2b - Seafort Avenue to Newgrove Avenue

Roslyn Park College, part of the Rehab Group complex, fronts onto Strand Road over most of the 160m length between Seafort Avenue and Newgrove Avenue where on-street parking is prohibited. The existing road is generally 12.5m wide, and therefore 1.5m of widening would be required to provide the necessary overall width of 14m for the cycleway on the seaward side. It will be necessary therefore to acquire a narrow strip of land from the grounds of Roslyn Park College and to widen the road in the inland direction by 1.5m over a length of 100m.

Section 1.2c - Newgrove Avenue to Lea Road

From Newgrove Avenue to Lea Road, over a length of 140m, there is no parking restriction, but all residences have off-street parking and there appears to be no demand to park on street. The existing road varies in width along this section varies from 14m wide at Newgrove Avenue for a distance of 70m and then narrows to 12.5m at Chainage 1,000 southward. It would be necessary to acquire a 1.5m wide strip from the front gardens of 6 houses over a length of 60m so as to achieve the necessary width of 14.0m for the realigned road and cycleway. This would result in the loss of 2 fairly large trees, of which there are few along the coast in this area. The two trees in private gardens, are a Sycamore of moderate arboricultural value and a somewhat larger Horse Chestnut that may be of moderate to high value.

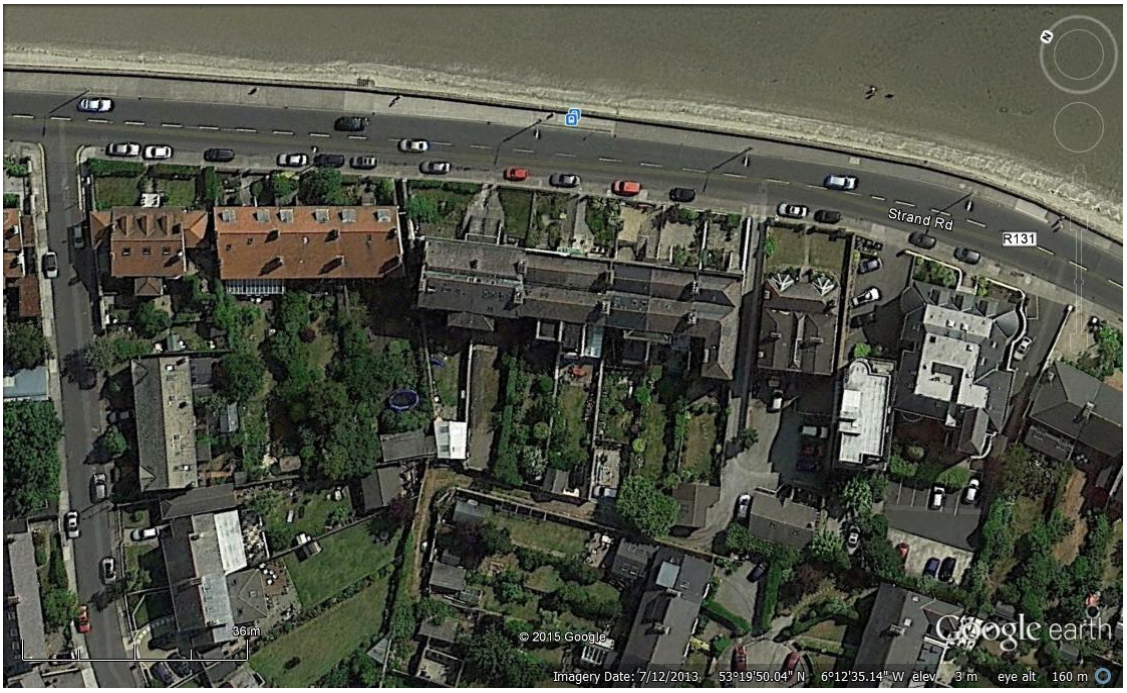


Strand Road north of Lea Road - Potential widening into gardens with loss of 2 trees

Lea Road to Gilford Avenue

Along the 250m length of this section the road is typically 12.5m wide and there is a variable situation in relation to the demand for on-street parking. Usually there may be 20 cars parked on the western side of the road. Most of the properties have off-street parking available at the front, and others have potential for parking at the rear. The following aerial photograph shows an example of the situations that pertain on the section of Strand Road south of Lea Road:

- 5 houses at the northern end with no parking at front and no rear access (on the left-hand side in the aerial photograph);
- 7 Edwardian houses in a terrace in the middle with no parking at front but with rear access from a laneway that could facilitate parking;
- 2 attached houses with parking to the rear via the laneway;
- 2 apartment blocks with off-street parking to front or rear.
- 6 houses with driveways to the south of apartments (not on photo);
- 3 houses at corner of Gilford Road without parking.



Residences south of Lea Road with varied parking provision or potential

Informal Parking at houses on Strand Road - rear access available from laneway

From the preceding it can be seen that just 8 houses at either end of this section either do not have off-street parking or the potential for self-sufficiency of parking. These houses could avail of on-street parking on the adjoining side street if parking were prohibited on Strand Road in front of their property.

On-Street Parking on Gilford Road

In conclusion, parking could be prohibited along this section of Strand Road to facilitate the provision of a cycleway on the eastern, seaward side of the road.

In general, the existing road is about 1m to 2m too narrow for the provision of a segregated cycleway and footpath on the inland side of the seawall over this section, even with the carriageway narrowed to 6m and parking prohibited.

The choice therefore will be between:

a) Shared facility of between 4.1m and 5m width, or

b) Cycleway of between 3.3m and 4.3m wide, with a 0.3m buffer zone on the traffic side, and a pedestrian boardwalk outside the seawall - See Option 1B, or

c) Acquisition of a 1.5m wide strip from front gardens of 25 properties over 250m length.

A relatively narrow shared facility will not be appropriate in such a location where pedestrian and cyclist numbers will be high.

Biodiversity Impact for Option 1A Strand Road Cycleway

This option will remain entirely within the existing hard standing and involves narrowing of the road to permit widening of the eastern footpath. No SAC or SPA Qualifying Interest (QI) habitat will be removed. People, dogs and cyclists would be encouraged to use this inland amenity outside of the SPA & SAC boundaries. There is nonetheless potential for disturbance/displacement of birds due to proximity of increased numbers of pedestrians and cyclists along the coastline.

There is potential for this option to be ecologically acceptable with the inclusion of appropriate and careful mitigation. **This is a preferred option due to the significantly reduced level of impacts by comparison with other options**, which are described later in this chapter**.**

Cultural Heritage Impact for Option 1A Strand Road Cycleway

The proposed road widening for the cycleway will impact on the setting Roslyn College, a protected structure, involving the removal of a section of the existing boundary wall.

Landscape and Visual Impact for Option 1A Strand Road Cycleway

Option 1A will result in construction stage impacts as a number of property boundaries are modified and set back, however, post construction, the appearance of the streetscape will not be changed. Between Newgrove Avenue and Lea Road, a Sycamore tree and a Horse Chestnut tree will be lost. Visually, while both trees are attractive in themselves and serve as local landmarks along the seafront that generally has no significant trees, their loss will result in a local moderate negative impact but will not undermine the overarching seafront character.

Summary for Option 1A Strand Road Cycleway

This option would entail the following arrangements:

a) Road carriageway narrowed to 6.0m wide;

b) 3.0m wide minimum Cycleway + 2.5m wide footpath, with 0.5m wide buffer zone separation from the road, inside the sea wall over 500m length from Marine Drive to Lea Road;

c) No encroachment into the strand area outside the seawall;

d) Prohibition of parking along Strand Road over the 750m length between Marine Drive and Gilford Road, with the exception of short sections for about 10 spaces near the junctions of Marine Drive and Seafort Avenue;

e) There would be 10 houses without off-street parking that would be adversely affected by the parking restriction;

f) Acquisition of narrow strips of land, up to 1.5m wide from:

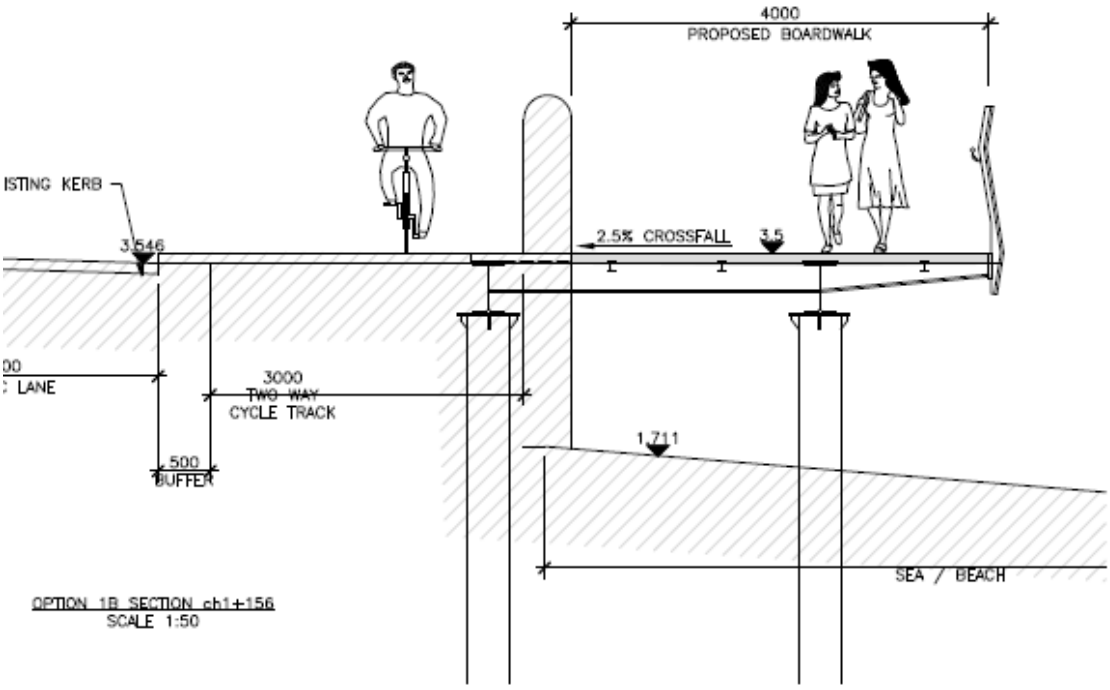
- Roslyn Park College over a length of 100m
- 6 houses north of Lea Road over a length of 60m;
- 25 houses or apartment blocks over 250m length south of Lea Road.

g) Loss of 2 trees between Newgrove Avenue and Lea Road;

8.6 Option 1B: Sandymount Boardwalk

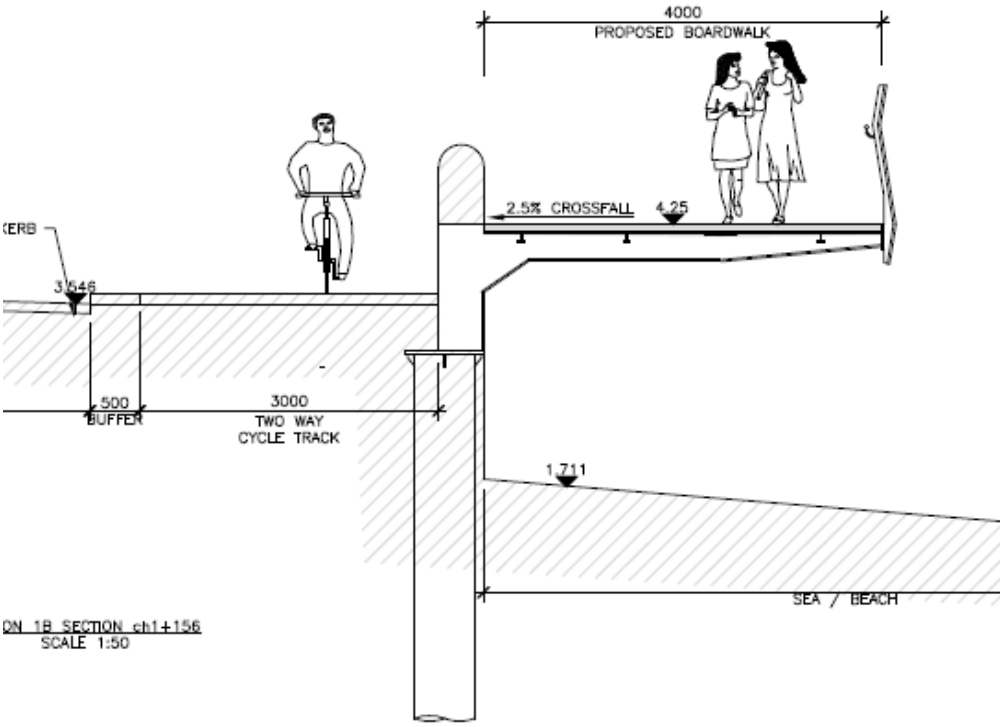
So as to avoid the need to encroach into gardens of houses on the inland side of Strand Road as required for Option 1A, this option would provide a boardwalk suspended above the strand on the seaward side of the seawall. The boardwalk would extend for a length of 780m from the corner of Seán Moore Park to the northern end of the existing Sandymount Promenade. This structure could provide a footpath outside the sea wall in combination with a two-way cycleway on the existing footpath on the inland side of the wall beside the road, and with some minor widening into the road as necessary.

Coastal protection proposals by Dublin City Council indicate that the boardwalk should be set at a level of approximately 0.75m above the existing footpath level on the inland side of the seawall. For reasons of dead weight on the new structure, it would be difficult to provide a robust edge parapet on the seaward side of the boardwalk that would be resistant to wave action. Consideration could be given to provision of a glass wall parapet similar to that recently erected along the river quays in Waterford City.



Boardwalk Type A - Piers on Beach

Example: Glass Flood Protection Wall in Waterford (Image from RPS)



Boardwalk Type B - Fully Cantilevered with Level Raised for Flood Protection

The boardwalk structure would be 4m wide to provide a high level of pedestrian amenity. It would be supported on slender concrete piers extending down to beach level. This would result in the loss of very small areas of beach habitat at each pier. With 15m spans, there would be 52 piers, consisting of 0.3m diameter columns with a plan area of 0.1m^2 each and a cumulative area of about 5m^2.

A further option could be to cantilever over the beach and avoid any direct impact on the habitat within the SAC. This would, however, entail the removal of the coping and upper part of the sea wall, a protected structure, and constitute an impact on

architectural heritage. In that case the wall could be reinstated on top of the boardwalk structure to provide segregation and also flood protection. The design of the boardwalk will be reviewed by a Conservation Architect for best practice in reinstatement of the original wall materials.

In structural terms the cantilever option will be quite technically difficult as it will require piles behind the seawall on the inland side and a heavy concrete counterweight under the footpath. This will add significantly to the construction costs. It is questionable if the additional cost and complexity would be warranted to avoid the loss of very small areas of beach habitat associated with pier supports.

The following photograph shows the boardwalk along the Grand Canal between Leeson Street and Charlemont which illustrates what might also be provided at Sandymount. This structure is supported on piles and cantilevers over the canal bank and channel.

Boardwalk along the Grand Canal between Leeson Street and Charlemont

Another example of a boardwalk for a pedestrian and cycle route is on the *Boyne Greenway* near Drogheda. That facility is constructed within the River Boyne Special Area for Conservation. There is no loss of habitat as the lightweight plastic structure is suspended over the river bank and tidal marsh area. This arrangement was acceptable to the National Parks & Wildlife Service as there was no alternative option available outside of the SAC boundary due to the limited space available along the narrow local road that follows the river below a steep escarpment.

Boardwalk along River Boyne near Drogheda

Access to a pedestrian boardwalk outside the sea wall would be required at intervals and coordinated with the 3 side roads where pedestrians may cross Strand Road to reach the sea front. There is a traffic signal junction with a pedestrian crossing at Marine Drive at the northern end of this section, and a further pedestrian crossing signal at Roslyn Park College midway along this section. Otherwise pedestrian crossing points are uncontrolled, including at the mini-roundabout at Newgrove Avenue. For flood protection reasons there will need to be small ramps at all pedestrian access points over the sea wall.

Marine Factors

The marine environment at Sandymount is very sheltered from wave action due to the 3km long tidal zone and the sandbanks that absorb most of the wave energy well out from the shore. The design of a boardwalk will take into account the relevant marine forces that need to be resisted, as well as forecast increases in general sea level due to climate change.

As described earlier in 7.2 (Page 19) technical report advice was received from Royal Haskoning a specialist in marine hydraulic modelling with extensive prior knowledge of Dublin Bay. This advice has informed the proposed raised level of the boardwalk as shown in Option B earlier. The estimates of future water levels in Dublin Bay indicate an increased likelihood of coastal flooding in Sandymount for which protective measures will required in due course. The raised boardwalk option would provide some synergy by combining the greenway facility with coastal defences.

Biodiversity Impact for Option 1B Sandymount Boardwalk

In the design option of a boardwalk structure on piers, in a broader sense of ecological impacts, the loss of $5m^2$ of beach habitat in this location due to the location of the piers within a strip of dry sand close to the existing wall, would not be deemed to be a significant ecological impact. The area to be lost is extremely small in the context of the overall available habitat within the SAC and in the wider Dublin bay context. However, this habitat is Annex I QI habitat for the SAC; "Mudflats and Sand-flats not covered by sea water at low tide".

In addition, the boardwalk option in 1B will directly impact upon Annex I non-QI habitats in the far north-west corner of this beach.

The design option of a cantilevered structure would avoid any direct habitat loss (of either QI or non-QI Annex I habitat) and would therefore be preferable from an ecological point of view.

Other potential impacts which this boardwalk option (whether on piers or cantilevered) could give rise to are through displacement and disturbance of feeding and roosting for birds such as Turnstone and Sanderling. This option would result in a max 4m wide indirect encroachment into the SAC & SPA (by overhanging) across a 750m length. It is considered to pose the following potential risks to the SAC and SPA:

- Encroachment of boardwalk, overshadowing SAC and SPA, along 4m wide strip beside existing sea wall;
- Small area (c. 5m2) direct loss of QI habitat & non QI habitat and feeding areas for birds such as Turnstone where the structure is supported on slender concrete piers (overshadowing of this habitat would also occur);
- Indirect loss of QI habitat for birds such as turnstone beneath a boardwalk structure (even if cantilevered to the wall);
- Potential disturbance/displacement of birds which occur in significant numbers in this section of the South Dublin Bay SPA;
- Potential disturbance/displacement of roost on Sandymount Strand (e.g. for Sanderling and Turnstone) which is believed to be possible due to encroachment of boardwalk to this high tide roosting area bringing cyclists into closer proximity.

If the potential impacts on the SPA's Special Conservation Interest bird species (indirect loss of habitat and disturbance/displacement from feeding and roosting areas) are deemed to be significant, then this would result in an impact upon the integrity of the SPA. Significant disturbance/displacement impacts could potentially be reduced with appropriate mitigation measures.

Similar structures have been built in the Exe Estuary SPA in England without any significant impacts upon the SPA (Goss-Custard, 2008[3]).

There is potential for this option to be ecologically acceptable with the inclusion of appropriate and careful mitigation, and subject to the comments above regarding the structure on piers. However, due to the potential impacts and the existence of other lower impact options, **this is not a preferred option for this section.**

Cultural Heritage Impact for Option 1B Sandymount Boardwalk

There would be an impact on the sea wall, a protected structure, which constitutes an impact on architectural heritage.

The seawall would be mainly untouched for the pier supported boardwalk option, except for removal of a 4m wide section at access points.

[3] Goss-Custard, J. D. (2008) Monitoring the effects of the Exmouth-Lympstone section on the shorebirds of the Exe Estuary Special Protection Area, National Cycle Network – Exe Estuary Cycleway. Report to Devon County Council.

Landscape and Visual Impact for Option 1B Sandymount Boardwalk

Option 1B will result in a permanent change by virtue of the construction of a 4.0m wide boardwalk along the seaward side of the existing sea wall. The level of the boardwalk will be approximately the same as the top of the existing low sea wall, and the sea wall will be increased in height and railings included on the seaward side of the boardwalk. The increased sea wall height and the railings will intrude on the existing open visual connection between the road and sea and will give rise to a moderate negative impact for this section of the road.

Summary for Option 1B Sandymount Boardwalk

This option would entail the following arrangements:

a) Road carriageway narrowed to 6.0m wide;

b) 3.0m wide minimum Cycleway, with 0.5m wide buffer zone separation from the road, inside the sea wall;

c) 4m wide x 780m long pedestrian boardwalk outside the seawall and encroaching over the strand area.

d) Prohibition of parking along Strand Road over the 400m length between Newgrove Avenue and Gilford Road;

e) There would be 8 houses without off-street parking that would be adversely affected by the parking restriction;

f) No Acquisition of land.

8.7 Option 1C: Combination Strand Road Cycleway & Sandymount Boardwalk

This option would consist of a combination of Options 1A and 1B as follows:

- Strand Road Cycleway (Option 1A) over 500m length from Marine Drive to Newgrove Avenue with acquisition of a strip of land from Roslyn Park College over 100m length;
- Pedestrian Boardwalk (Option 1B) over 250m length south of Newgrove Avenue;
- Limited encroachment of cantilever structure over SAC, of 1/3rd the length of Option 1B;
- No land take from residential properties;
- Parking prohibited along Strand Road.

Biodiversity Impact for Option 1C

The habitat loss due to the shorter boardwalk (either direct loss from piers or indirect loss) would be less than in option 1B, and would only occur across a length of 250m south of Newgrove Avenue (approximately 1/3rd of the length of Option 1B and would not directly affect non-Annex I habitats in north-west corner of beach, nor would it indirectly impact the high tide roost area in the north west corner of Sandymount beach). The remainder of the impacts as described under option 1B above will apply, except they would be lesser due to the reduced length of the boardwalk.

If the potential impacts on the SPA's Special Conservation Interest bird species (indirect loss of habitat and disturbance/displacement from feeding and roosting areas) are deemed to be significant, then this would result in an impact upon the integrity of the SPA. Significant disturbance/displacement impacts could potentially be reduced with appropriate mitigation measures *e.g.* screening, control of disturbance by introducing a dog warden system, provision of dog parks and

educational signage to encourage users to use the new facility instead of the strand, particularly during autumn and winter.

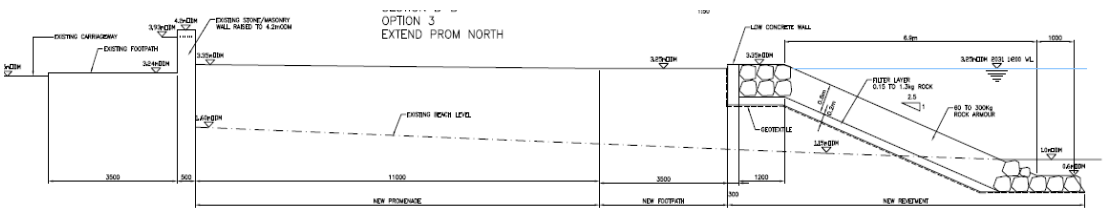
There is potential for this option to be ecologically acceptable with the inclusion of appropriate and careful mitigation, and subject to the comments under option 1B above regarding the structure on piers. However, due to the potential impacts and the existence of other lower impact options, **this is not a preferred option for this section.**

This option has less impacts than Option 1B, however from an ecological perspective Option 1A is still preferred over this option. **If other constraints cannot be overcome in Option 1A, Option 1C would be a preferred option when compared with Option 1B.**

8.8 Option 1D: Strand Road Infill Promenade

This option would involve a new sea wall or rock armour revetment with rock infill and a conventional path on top. Such an arrangement would provide an extension of the existing infill promenade further south. It could enlarge the public amenity space above beach level. Such an intrusion into the environmentally designated tidal strand area may not be acceptable, albeit the area of habitat to be lost would be very small within the overall scale of the tidal flats in the south bay area. The existing sandy beach strip would be likely to re-form on the new shoreline. This area is already intensively used by people for recreation.

The top width of a promenade could range from a minimum of 4m for a footpath only, to 20m or more if it were to be similar to the existing promenade with a grass area for recreation. The level difference between the beach and the road varies up to 2.5m, and therefore a rock armour slope on the seaward edge with a 1:2 slope would be 5m wide. An overall maximum base width will therefore be 25m. On the other hand, with a vertical seawall and a 0.5m wide parapet, the minimum base width would be 4.5m.



Promenade Concept for Coastal Flood Protection Scheme

This option as shown on Drawing No.143 & 144 is indicated as 20m wide, and extends for 600m north from the existing promenade at Sandymount. The most northerly 120m long section is omitted at the small beach beside Seán Moore Park, as this has been highlighted in the ecological studies as being of particular sensitivity for certain bird species as a high-tide roosting site. On that section, the route would instead revert to the layout as for Option 1A with the cycleway provided inland of the seawall on the existing road footprint.

There would be a loss of beach area ranging from 3,000m^2 for a 4m wide promenade with a vertical wall, to 15,000m^2 for a 20m wide promenade with a rock armour revetment, 600m long, of beach habitat and high-tide roosting for birds, although the beach can be reinstated outside the new rock revetment, with burial of 3,000m^2 of mud-flat for a 4m wide strip of new beach.

Biodiversity Impact for Option 1D Strand Road Promenade

This option would involve an infill of QI habitat between 4m and 20m in width across a length of 750m (*i.e.* between 0.3 and 1.5 hectares of QI habitat loss), as well as the loss of a smaller area of non-QI Annex I habitat. Despite being a small proportion of both the QI habitat within the SAC as well as of the overall SAC site (between 0.04% and 0.2% in both cases), in light of the ECJ ruling C258/11, this would almost certainly be deemed to be an impact on the integrity of the SAC and therefore would prevent this proposal from proceeding through a Habitats Directive Article 6(3) process. It would be particularly important for this to demonstrate compliance with the test regarding an absence of alternative solutions, in order to pass through an Article 6(4) process.

The loss of foraging and roosting areas for the SPA's Special Conservation Interest bird species and possibly also impacts from disturbance and displacement are also likely to be significant and therefore result in an impact upon the integrity of the SPA. Significant disturbance/displacement impacts might be reduced with appropriate mitigation measures *e.g.* screening, control of disturbance by introducing a dog warden system, provision of dog parks and educational signage to encourage users to use the new facility instead of the strand, particularly during autumn and winter.

This is a least favoured option, and when compared to the other options considered.

Cultural Heritage Impact for Option 1D Strand Road Promenade

No significant impacts on cultural heritage.

Landscape and Visual Impact for Option 1D Strand Road Promenade

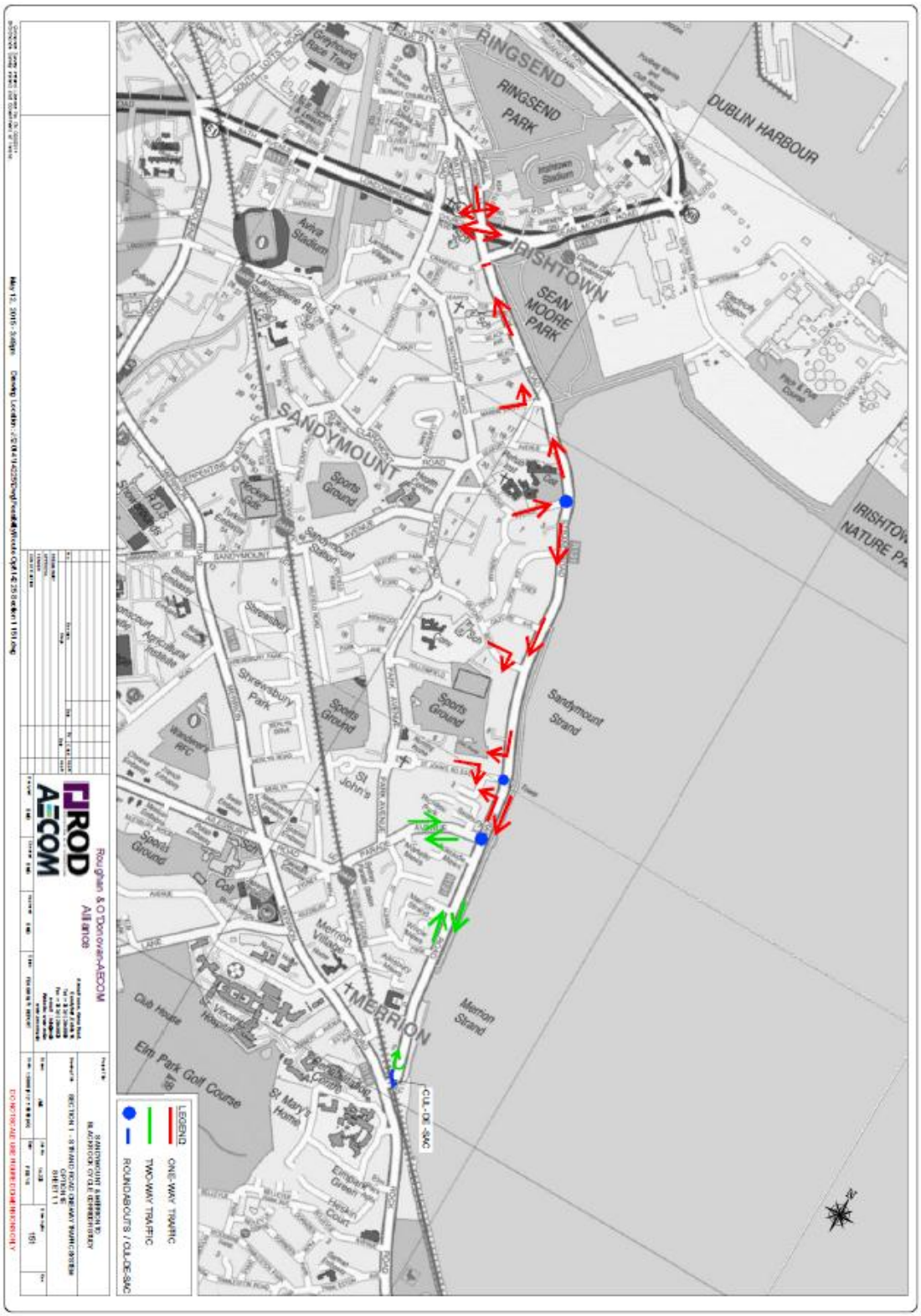
Option 1D will introduce a public amenity space on the seaward side of the sea wall with a new sloped rock armour face on the seaward side. This will reduce the visual proximity of the streetscape and footpath to the sea but will be mitigated by the provision of a new amenity that is equally close to the sea. This proposal is considered to be of neutral visual impact.

8.9 Option 1E: One-Way Traffic System on Strand Road

This option would entail reduction of Strand Road to a single traffic lane in alternate directions between various side road junctions on suitable link routes inland to Sandymount Road, Gilford Road and Park Avenue. It would work in combination with a possible traffic restriction at Merrion Gates as discussed in Section 3. This fairly radical proposal would sever the R131 regional route linking the southeast coast area of Dublin to the East Link Bridge as a bypass of the city centre. It would restore traffic conditions on Strand Road to less than what they may have been like before the East Link Bridge opened up this effective eastern bypass route of the city.

The additional road space provided by this option could amount to 4m typically, which would accommodate a cycleway alongside the existing footpath on the seaward side of the road, and without direct impact on any of the frontage properties. Potentially on-street parking could be provided on some sections of the road where there is demand from frontage residences.

A revised traffic system is shown on Drawing No.151.



Potential Alternate One-Way Traffic System along Strand Road, Sandymount

The revised traffic system could work as follows from north to south:

- Sean Moore Road to Newgrove Avenue: northbound only over 0.75km;
- Newgrove Avenue to St. John's Road East at the Martello Tower: southbound only over 0.9km; (Not essential for road space for the cycleway south of Gilford Avenue, but necessary to avoid displacing additional traffic onto Gilford Road, which is narrow).
- St. John's Road East at the Martello Tower to Sydney Parade Avenue, two-way over 0.2km;
- Sydney Parade Avenue to Merrion Gates: preferably a cul-de-sac over 0.8km for access from the north only to severely limit traffic volumes displaced onto local roads in Sandymount. Merrion Gates closed to traffic.

Each junction at the suggested transition points of alternate traffic flow directions along Strand Road is controlled by a mini-roundabout, which provides a suitable arrangement to manage the traffic system. The link roads between Strand Road on the coast and the inland parallel route through Sandymount Green are suitable for the suggested traffic system, which will lead to slightly re-directed traffic movements, mainly in a single direction on each link, and unlikely to change in volume. The overall traffic volumes on the road network in Sandymount should greatly reduce as a result of the restricted accessibility of Strand Road as a through route. In general terms the proposed traffic system would operate somewhat like Strand Road in Bray.

The displacement traffic effects that would arise outside of the Sandymount area would be as follows:

<u>Northbound Traffic Displaced from Merrion Gates</u>

- The next permitted right-turn is at Serpentine Avenue in Ballsbridge, 2km further north. A further 0.4km beyond that is the turn into Shelbourne Road.
- Traffic headed towards Pearse Street and Docklands areas is likely to divert to Shelbourne Road.
- Traffic to East Link Bridge could seek to divert via Serpentine Avenue and Tritonville Road, on which there is a 5 axle restriction. Large trucks headed towards Dublin Port would be diverted around the M50 and Dublin Tunnel. The volume of such trucks is low and their routing away from residential areas would be beneficial to those areas.
- Tritonville Road is a narrow residential street that has traffic calming and is unsuitable as a main traffic route. This possible route towards East Link could be prevented by a right-turn ban from Sandymount Road onto Church Avenue in Irishtown, coupled with a change to one-way traffic westbound on Leahy's Terrace at Star of the Sea Church.

<u>Southbound Traffic Displaced at Sean Moore Road</u>

- A one-way northbound traffic flow on Beach Road beside Sean Moore Park would close this route for southbound traffic from the city via Irishtown towards Blackrock.
- Traffic from East Link and Sean Moore Road would be diverted towards Church Avenue and Sandymount Road.
- To block southbound through traffic from both the city centre and East Link from filtering through Sandymount Green towards Sydney Parade, there could be a one-way northbound restriction applied to Park Avenue, which is already restricted in width beside Railway Union sports grounds. This would work in

tandem with a one-way southbound flow on Strand Road to form a local traffic circulation box.

- A left-turn restriction at Church Avenue in Irishtown could divert East Link traffic away from other routes such as Tritonville Road and Sandymount Avenue.

Diversion of through traffic from Strand Road would have significant adverse impacts for strategic traffic network in the south-eastern area of Dublin City:

a) The R131 Regional Route along Strand Road is one of two key access routes serving Dublin Port, with the *Dublin Tunnel* being the equivalent route from the northern direction;

b) Diversion of through traffic from Sandymount to Ballsbridge would have adverse implications for the environment in an important and vibrant employment and mixed-use inner suburb of the city;

c) Traffic toward the East Link Bridge would be diverted through the Irishtown and Sandymount residential areas;

d) Additional traffic pressure on the Merrion Road could present difficulties for the provision of additional capacity and priority for public transport and cyclists on that main radial route to the city centre.

In conclusion, it is unlikely that the traffic impacts of this option would be considered acceptable or proportionate for the objective of this cycleway project.

Biodiversity Impact for Option 1E

This option will remain entirely within the existing hard standing and there will be no direct encroachment into the SAC or SPA with no resulting Qualifying Interest (QI) habitat loss. People, dogs and cyclists would be encouraged to use this inland amenity outside of the SPA & SAC boundaries. There is nonetheless potential for some disturbance/displacement of birds if user numbers are to significantly increase over current numbers, which might be reduced with appropriate mitigation measures.

There is potential for this option to be ecologically acceptable with the inclusion of appropriate and careful mitigation. **This is a preferred option due to the significantly reduced level of impacts by comparison with other options, and from an ecological perspective, is preferred over option 1A.**

8.10 Summary of Route Options in Section 1.2: Sandymount Strand North

Length: 780m

Option 1A: Strand Road Cycleway

- Road width reduced to 6m;
- Parking prohibited along Strand Road;
- 4.5m to 6m wide promenade inside sea wall: 2.5m Footpath + 3.0m Cycleway + 0.5m buffer strip;
- Land acquisition from 32 properties; and
- No encroachment outside the sea wall.

Option 1B: Sandymount Boardwalk

- Road width reduced to 6m;
- Parking permitted along Strand Road only over 120m length between Marine Drive and Seafort Avenue;
- Cycleway on existing widened footpath on Strand Road: 3.0m Cycleway min + 0.5m buffer;
- 4m wide x 750m long Pedestrian Boardwalk, either with piers or cantilevered; and
- Limited encroachment outside the sea wall over 750m length.

Option 1C: Combination Strand Road Cycleway & Sandymount Boardwalk

- Road width reduced to 6m;
- Parking prohibited along Strand Road;
- Cycleway inside sea wall for 500m;
- 4m wide x 250m long Pedestrian Boardwalk, either with piers or cantilevered;
- Very limited encroachment outside the sea wall over 250m length; and
- Land acquisition from 1 property.

Option 1D: Strand Road Infill Promenade: 4.5m min to 25m max wide at base.

- No change to Strand Road layout;
- Significant intrusion in beach area; and
- No impact on properties.

Option 1E: One-Way Traffic System on Strand Road

- Major change to Strand Road layout with reduction to a single traffic lane over 1.65km length;
- Severance of R131 regional coastal route between Merrion and East Link;
- Significant traffic displacement through Ballsbridge, and possibly Irishtown;
- Greatly reduced traffic flow on Strand Road and in Sandymount area in general;
- No intrusion in beach area; and
- No impact on properties.

8.11 Options Assessment for Section 1: Sandymount Strand North

The table on the following page provides a detailed assessment for the options identified in Section 1 in accordance with the procedure described in Chapter 6.

Option 1D for an infill promenade was not brought forward for detailed assessment as it would give rise to major impacts within the Dublin Bay South SAC and SPA and would not pass the Stage 1 Screening Appropriate Assessment in accordance with the EU Habitats Directive. In the context of 4 alternative options that are available for this section which would have much lower impact, or no impact, for ecology, there is no point in further consideration of an option that would require a Stage 2 Appropriate Assessment for habitat impacts and would most likely fail at that stage.

OPTIONS ASSESSMENT TABLE 1: Section 1 - Sean Moore Road to Sandymount Promenade (1.3km)

	Option				
Criterion	**1A**	**1B**	**1C**	**1E**	**Notes**
	Inland	Boardwalk	Combination	One-Way Strand Road	
Economy					
Capital Cost	**€4.7m**	**€8.6m**	**€4.3m**	**€0.22m**	Boardwalk costs are very high compared to on-road alternative.
Maintenance Cost					Marine environment leads to onerous maintenance for structures.
Transport Quality of Service	A	A	A	A+	All routes provide same width and full segregation from traffic but in close proximity. For 1E adjoining traffic volume is much lower.
Safety					
Pedestrian and cyclist safety					All achieve high level of safety for Cyclists. No change for Pedestrians.
Environment					
Landscape and Visual Quality					Raised boardwalk will affect sea views from houses facing across the road.
Biodiversity					1C avoids close encroachment near the Sanderling and Turnstone roosting area.
Cultural Heritage					Sea wall is a protected structure and is affected by the boardwalk cantilever supports.
Land Use					Up to 27 properties affected by 1A. Option 1C affects only 1 property. Parking restrictions in all options.
Accessibility & Social Inclusion - No Differential between Options					
Integration					
Cycle Network Integration					Delivers most of Route 13E
Coastal Footpath					Minor improvement to existing path with boardwalk.
Traffic Disruption					For 1E: Transfer of through traffic to Merrion Road and Ballsbridge / Irishtown
Preference	**3**	**4**	**1**	**2**	**Option 1C**

8.12 Preferred Option for Section 1: Sandymount Strand North

The overall ranking has found that Option 1C is the best option for this section, and will entail the following elements:

a) Cycleway link from Bath Street / Pembroke Street in Irishtown over a 150m length across the wide Seán Moore Road junction to Seán Moore Park;

b) A 3.5m wide cycleway through Seán Moore Park over a length of 450m to the junction of Strand Road and Marine Drive;

c) Modifications to the traffic layout on Strand Road over a length of 400m from Marine Drive to Martello View with narrowing to a 6m wide carriageway to accommodate a 3.5m wide cycleway, a 2.5m wide footpath and a 0.5m wide buffer strip on the inland side of the seawall;

d) Property acquisition over 100m length from Roslyn Park College between Seafort Avenue and Newgrove Avenue;

e) A 4m wide boardwalk projecting over the strand over a length of 350m south of Martello View as far as Sandymount Promenade.

9. ROUTE OPTIONS FOR SECTION 2: SANDYMOUNT PROMENADE

9.1 Section 2 Over-view

Section 2 commences at the northern end of Sandymount Promenade at Chainage 1,340 and extends for 1.1km to the southern end of the promenade at Chainage 2,420.

Key Map for Section 2 and Sheet Plans

A total of 3 options were identified for this section.

Given the availability of extensive public open space along the promenade an obvious option is to provide the cycleway within this green space as described for Option 2A.

However, open amenity space is in short supply in the Sandymount area, and the promenade is already congested on fine summer days. This is the nearest access point to the sea at a beach for people living in the city centre and it is very busy at times. Option 2B therefore considers an alternative route along the existing footpath on the coastal side of Strand Road which is little used since most people tend to walk nearer the sea on the promenade footpath.

The third Option 2C is similar to Option 1E in Section 1 by reducing Strand Road to a single one-way traffic lane.

Northern end of existing promenade at Sandymount Strand

Promenade at Sandymount Strand – scope for cycleway to rear of footpath

Aerial view of narrow pinch-point at Sandymount Martello Tower

Pinch-Point at Sandyford Martello Tower

9.2 Option 2A - Promenade Cycleway

In Option 2A the cycleway can continue along the existing promenade at Sandymount with a new cycle track constructed to the rear of the existing heavily used footpath. Some minor adjustments would be required at the existing car parks and at the Martello Tower where space is a little bit tight at just 3m between the existing footpath and the boundary railing. This section extends over a length of 1.2km.

9.3 Option 2B - Strand Road Cycleway

This option would avoid loss of any part of the grass promenade area, by placing the cycleway on the existing footpath on the seaward side of the road which has very little pedestrian traffic. Additional width can be gained for the cycleway through road narrowing to 6m and prohibition of parking as described earlier for Option 1A in Section 1.

This option would need to divert around seaward side of the Martello Tower as for Option 2A to overcome a severe lack of space on the inland side of the tower beside the mini-roundabout junction at St. John's Road East.

Option 2B would involve crossing the access routes into car parks at 5 locations where cyclists would be in conflict with cars, and it is not preferred compared to Option 2A on that basis.

9.4 Option 2C - Strand Road One-Way

If Option 1E were selected to the north, then Strand Road could be narrowed to a single traffic lane along the full length of Section 2, and the cycleway could be provided on the redundant half of the existing road instead of on the promenade. However, as described earlier for Option 1E, the traffic impacts of this option are likely to be severe and unacceptable. This option was not therefore brought forward for detailed assessment.

9.5 Biodiversity Impacts for Section 2

The option for this section is to stay entirely within the existing confines of the Sandymount Promenade. There will be no encroachment into the SAC or SPA within this section. The main impacts that need to be considered for this section are the potential increase in recreational users to the area which may increase levels of bird disturbance and displacement. There is potential for this option to be ecologically acceptable with the inclusion of appropriate and careful mitigation.

9.6 Preferred Option for Section 2

Option 2A would involve the loss of a 3.5m wide strip of the 20m wide green area along the promenade, which will amount to a reduction of 17.5% in the available amenity space. This is a fairly minor reduction in the context of the greatly increased amenity for cyclists that will be provided by the cycleway.

As Option 2B will involve 5 conflicts points with car traffic at the car park entrances, the Quality of Service of the cycleway will be reduced compared to Option 2A.

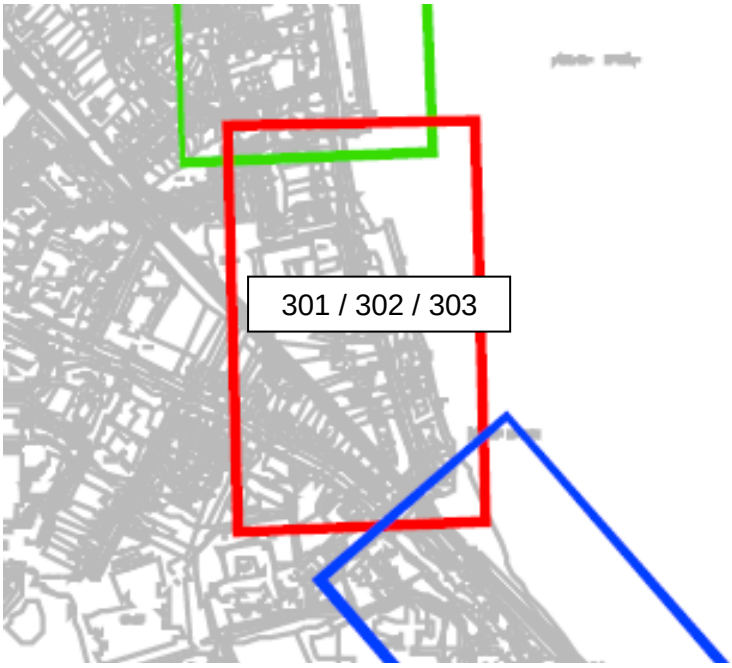
In conclusion, Option 2A is preferred as it will provide the best Quality of Service for Cyclists while involving an acceptable loss of amenity green space along Sandymount Promenade.

10. ROUTE OPTIONS FOR SECTION 3: MERRION STRAND

10.1 Section 3 Over-view

Section commences at the southern end of Sandymount Promenade at Chainage 2,420 and extends for 0.4 km to the Merrion Gates at Chainage 2,800. There are 2 distinct sub-sections:

- Sub-Section 3.1 at the northern 100m length where there is a gap between the southern end of the Sandymount Promenade and the first of the houses on the seaward side of Strand Road; and
- Sub-Section 3.2 over 300m length where there are 17 houses along the seaward side of Strand Road.



Key Map for Section 3 and Sheet Plans

A single and suitable option is available for Sub-Section 3.1 as described in 10.2.

For Sub-Section 3.2 a total of 5 options were identified as described in 10.3 to 10.7:

Option 3A: Coastal Promenade

Option 3B: Coastal Boardwalk

Option 3C: Strand Road Widened for Cycleway

Option 3D: Strand Road One-Way for Cycleway

Option 3E: Merrion Bypass

The layout plans on Drawings 301 to 363 are at twice the scale of the other sections to provide an appropriate level of detail in this critical area where space is tight amongst many constraints.

10.2 Section 3.1 Merrion Strand Gap

There is a 100m long section of coast immediately south of the existing promenade where the sea extends inland to the original seawall along the side of Strand Road, as shown in the following aerial photograph.

The options for the cycleway at this section could be the same as for the section north of the Sandymount Promenade, with a cycleway along the road, a boardwalk or an infill promenade. The beach area in this gap has ecological value, but this could be reinstated on the seaward side of an infill area that would extend the coastline consistent with that on each side of the gap.

Alternatively, the existing road is 7.5m wide on this section and could be narrowed to 6.0m. This would then enable the existing 4.5m wide footpath to be widened sufficiently to accommodate the 6.0m width required for a cycleway and footpath on the inland side of the seawall.

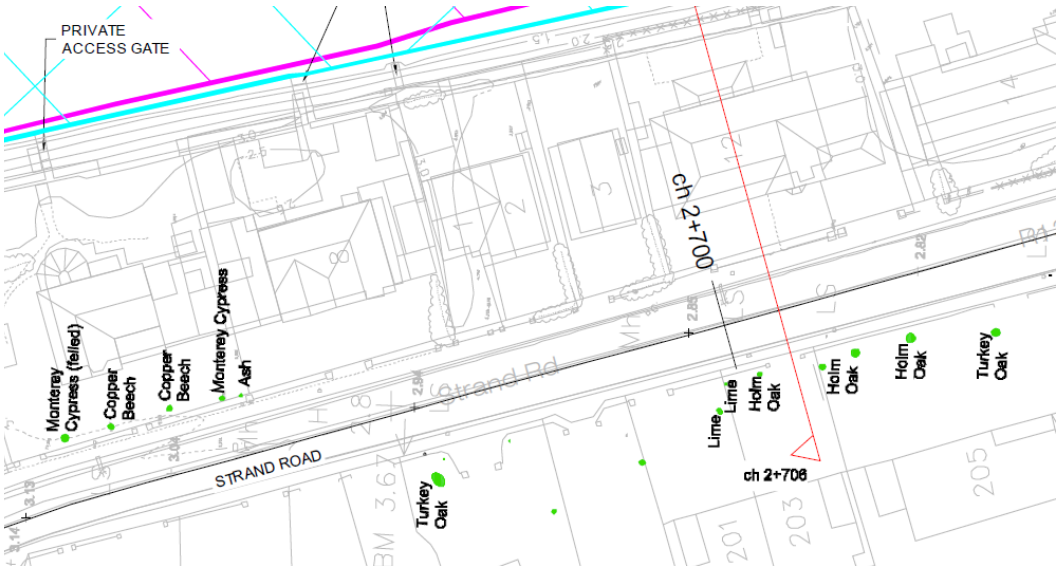
Gap in Coastline at Merrion Strand

The route choice in this section will be determined by the chosen solution to the challenging problem of reaching the Merrion Gates in the next section. The options for Section 3.2 therefore have been extended to include Section 3.1 with appropriate variation for consistency.

10.3 Section 3.2 Strand Road to Merrion Gates

There are numerous particular physical constraints over the 270m long section immediately north of the Merrion Gates level crossing that pose a difficult challenge for the provision of a coastal greenway:

- 17 houses backing onto the sea that are protected by a stone revetment and wall, with open views across Dublin Bay towards Howth;
- Several of houses have beach access steps that descend across the rock revetment in front of the seawall;
- The gardens of the houses on the seaward side are generally very small and are typically less than 10m long, with a few as short as 3m or 4m. Most of the houses have large windows or conservatories facing the sea view and therefore are vulnerable to significant loss of privacy if a walking and cycling route were developed on the seaward side;
- The carriageway on Strand Road is narrow at 6.5m to 7m wide;
- The footpaths are approximately 2m wide on each side;
- At the northern end of this section on the western side of the road is the *Merrion Hall* office building where the boundary is set back from the road with a grass verge in front than ranges from 2m to 5m wide;
- The front gardens and driveways of the houses on the eastern (seaward) side of Strand Road are generally very small, ranging from 9m long at the northern end, 6m in the middle section, to only 4m long at the southern end;
- On the western (inland) side of Strand Road the front gardens of the houses are generally bigger (typically 13m long) than on the eastern side with the exception of one house (No.195) where the garden is only 5m long at the narrowest point;
- There are a dozen large mature trees in several gardens along the road just behind the boundary walls. These have been surveyed and assessed by an arborist for their quality, and they are shown as green circles on Drawing No.302, with the species listed for each, which include Turkey Oak, Holm Oak, Lime, Monterey Cypress, Copper Beech and Ash. There are few other such trees along the coastline, and therefore the landscape value of these trees is quite significant.



Extract from Drawing No.302 Showing Large Trees on Strand Road

Biodiversity Constraints in Section 3 – Merrion Strand

- The most extensive bed of Dwarf eelgrass (*Zostera noltii)* in Dublin Bay is present here within 2-10m of the sea wall at the back of the houses on Strand Road (just North of Merrion Gates) – this is a particularly important foraging area for Light-bellied Brent Geese which visit this site in numbers of International importance;
- The intertidal habitat at Merrion Strand provides a rich feeding area for a wide variety of bird species, water birds can also be found roosting on the flats and certain species roost on the water here at high tide; and,
- Internationally important congregations of Terns roost here in autumn.

Dwarf Eel Grass Beds at Sandymount & Merrion Strands (Source: Dublin Eastern Bypass Constraints Study Report - 2007)

The two principal route corridors at this location are:

1. Coastal route to the rear, seaward side, of the houses, or
2. Inland route on or beside Strand Road.

Close-up view of seaward side of houses at Merrion Strand with stone revetment

Strand Road at Merrion Hall offices- Possible Room for cycling facilities on this short wide section

Narrow section of Strand Road

10.4 Merrion Gates Traffic Issues

Traffic delays frequently occur at the Merrion Gates level crossing resulting in a long queue most days on Strand Road in the southbound direction, particularly in the afternoon and evening peak period. This queue usually extends back for a kilometre to the Martello tower at Sydney Parade Avenue. This traffic delay factor is not of great concern in strategic terms as it deters even more traffic from using this route through a residential area. However, there is an amenity impact for the residents of Strand Road due to the traffic queue that constrains local accessibility and also causes noise and air pollution.

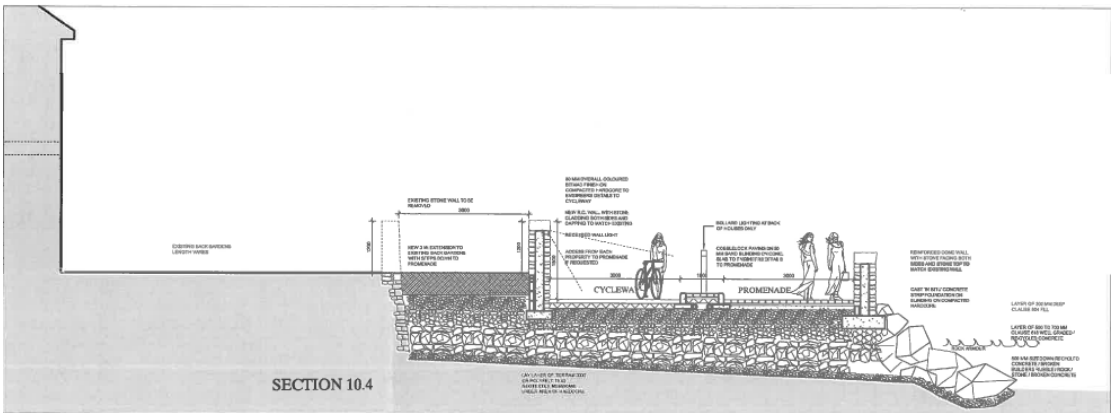
Iarnród Éireann has operational and safety difficulties at the Merrion Gates level crossing due to the regular incidents that cause blockages and delay to trains. From their perspective it would be desirable for safety reasons to close the level crossing to traffic and replace it with a bridge. A Feasibility Study was prepared in 2009 that identified 3 options for a traffic bypass of Merrion Gates. Two of those options involved a bridge beside the existing level crossing, and hence would be of little relevance to this cycle route project, other than providing a grade-separated link to the Merrion Road cycle route. The other option is for a bypass route 300m north of Merrion Gates via a new road link between Merrion Church west of the railway and Merrion Hall offices east of the railway. That proposal would make a cul-de-sac of the most southerly 300m long section of Strand Road. In that case the road would serve for local access only to 32 houses, and it would be suitable for shared use by the cycle route. This concept is discussed further in Option 3E.

10.5 Option 3A: Promenade at Merrion Strand

Previously in the first stage of the S2S project, there was a proposal for a promenade at Merrion Strand behind the houses as shown in the diagram below. This would have absorbed the existing rock revetment slope and extended into the strand area

and may affect the Zostera bed which comes to within 2m of the rock revetment in places. An obvious issue with this promenade concept is that it would intrude into the SAC and result in some loss of marine habitat.

The level of the promenade could be 0.6m below the level of the adjoining gardens, with a 1.8m high boundary wall to preserve the privacy of the residents. This wall would be 1.2m high on the garden side, thus not obscuring the view northward across the bay to Howth. There would be enhanced coastal protection for the properties due to the buffer zone provided by the promenade. Nevertheless, some residents may object to the proximity of a public route so close to the rear of their properties.



Previous S2S Proposal for a Promenade at Merrion Strand
(2006 Study by Dublin Regional Authority)

Concept for a narrow promenade with seawall at Merrion Strand (Scott Wilson 2010)

Concept for a promenade with parapet wall and revetment at Merrion Strand (Scott Wilson 2010)

Close inspection shows that the revetment width varies considerably from 5m at the northern end to nil at the southern end where the seawall is vertical.

Seawall revetment at rear of houses on Strand Road midway along this section

Vertical Seawall at houses at southern end of Strand Road

It is clear that a promenade could not be developed at the rear of the houses on Merrion Strand that would avoid directly impacting on the SAC generally due to the restricted width available. The degree of encroachment could be very limited, by providing a minimum 4m wide shared facility with a vertical seawall.

Biodiversity Impact for Option 3A Merrion Strand Promenade

This infill promenade option would permanently remove varying quantities of QI habitat (*Mudflats and Sand-flats not covered by sea water at low tide*), depending on the final design and width of the promenade. At a minimum it is estimated that a width of approximately 2 - 4m of this QI habitat across a length of *c.*280m (i.e. between c. 560m^2 and 1120m^2) would be lost. In addition this option would encroach onto the *Zostera* bed (a sub-community of the QI habitat) which was found at the time of survey for this study to lie within 2-3m of the rock revetment in places, and may in fact grow closer during the growing season. Despite being a small proportion of both the QI habitat within the SAC as well as of the overall SAC site (between 0.01% and 0.02% in both cases), the European Court of Justice ruling Case C258/11 presents a significant difficulty for this proposal. If this option was progressed as the preferred proposal, it would need significant and careful thought and consultation with the NPWS and others, regarding its viability under either an Article 6(3) or 6(4) process.

The loss of foraging area for the SPA's Special Conservation Interest bird species and possibly also impacts from disturbance and displacement are likely to be significant and therefore result in an impact upon the integrity of the SPA. Significant disturbance/displacement impacts might be reduced with appropriate mitigation measures and educational signage to encourage users to use the new facility instead of the strand, particularly during autumn and winter.

This is a least favoured option when compared to the other options considered.

Landscape and Visual Impact for Option 3A Merrion Strand Promenade

Option 3A proposes a new promenade and supporting structure along the seafront that may at first be perceived as a significant negative visual impact as it changes the

appearance and function of the seafront. In time, such a feature will integrate and is likely to become more broadly acceptable, particularly as it provides an excellent public amenity. The visual impact from the private residences however must also be considered, and the introduction of a public amenity between the ends of the rear gardens and the sea will result in a negative visual impact from these residences as adjustments to their existing boundary walls will alter the level of direct visibility of the sea.

Property Impact for Option 3A Merrion Strand Promenade

Loss of privacy for rear gardens of 17 houses if the promenade level is set high enough to avoid flood risk, which would cause reduced value of the properties, which is very difficult to quantify.

10.6 Option 3B: Boardwalk at Merrion Strand

A boardwalk could carry the proposed greenway from the end of the existing Sandymount Promenade around the east side of the houses to Merrion Gates. This would be suspended over the strand and minimise impact on habitat to small areas at each supporting column. The previous proposal in the Scott Wilson report was for a timber structure with short spans and many pile supports.

Previous Concept for a Timber Boardwalk at Merrion Strand (Scott Wilson 2010)

A better option in terms of durability and footprint in the SAC, would be a concrete structure with much longer spans of up to 20m, and fewer larger diameter concrete piers. This alternative will be developed for this new study.

The boardwalk shown in the above image is 100m long and crosses the small inlet at the southern end of the Sandymount Promenade, which is part of the SAC and SPA. Careful evaluation will be required to determine to what degree this would impact on ecology. Alternatively the boardwalk could take an indirect route and connect to the Strand Road seafront footpath and thereby avoid crossing through the SAC by skirting along the edge of it. There would still be intrusion into the SAC along the Strand Road edge as shown on Drawing No.321.

Extract from Drawing No.321 showing Boardwalk Option 3B (in green) intruding into the SAC (boundary line in pink)

Impacts for Option 3B Merrion Strand Boardwalk

At the rear of the houses, the boardwalk option would involve most of the same issues as the promenade option in terms of impacts for ecology and privacy for the residents.

Biodiversity Impact for Option 3B Merrion Strand Boardwalk

In this design option of a boardwalk structure on piers, in a broader sense of ecological impacts, the loss of very minor areas of beach habitat in this location, would not be deemed to be a significant ecological impact. The area to be lost is extremely small in the context of the overall available habitat within the SAC and in the wider Dublin bay context. However, this habitat is Annex I QI habitat for the SAC; "Mudflats and Sand-flats not covered by sea water at low tide. If this option was progressed as the preferred proposal, it would need significant and careful thought and consultation with the NPWS and others, regarding its viability under either an Article 6(3) or 6(4) process.

Other potential impacts which this boardwalk option could give rise to are through displacement and disturbance of feeding and roosting for birds, in particular to tern species and other regularly occurring overwintering waders including the Brent Geese. If the potential impacts on the SPA's Special Conservation Interest bird species are deemed to be significant, then this would result in an impact upon the integrity of the SPA.

Similar boardwalk structures have been built in the Exe Estuary SPA in England without any significant impacts upon the SPA.

Due to the potential impacts and the existence of other lower impact options, **this is not a preferred option for this section.**

10.7 Cycleway on Strand Road at Merrion

The alternative to the seaward route taken by Options 3A and 3B is along the Strand Road corridor for which 3 options were identified. These options would avoid encroaching on the strand area and thereby eliminate the risk associated with environmental issues. They are however, very difficult solutions with other major challenges. The existing road reservation is only a little over 10m wide which is too narrow for two-way traffic with any cycling facilities unless the road is widened into the frontage properties, or the traffic is reduced to one lane.

Aerial Photograph of Houses and Large Trees on Narrow Section of Strand Road at Merrion

There are three options according to how traffic may be managed:

- Option 3C: Cycleway with Two-Way Traffic on Strand Road
- Option 3D: Cycleway with One-Way Traffic on Strand Road
- Option 3E: Merrion Bypass and Shared Use Cul-de-sac Strand Road

10.8 Option 3C Cycleway with Two-Way Traffic on Strand Road

Land will need to be acquired to provide the necessary additional width of 4m for a segregated two-way cycle track on the eastern side of the road (3.5m cycle track + 0.5m separator strip for contra-flow cycling). The front gardens on that side of the road are very small and barely accommodate a single car length on the driveways. There is no alternative on-street parking available nearby. Land acquisition of more than 1m on the eastern side of the road is therefore not a realistic option. It may nevertheless be necessary to acquire such a narrow strip from some of the properties at the central part of this section to provide a suitable boundary and bell-mouth for visibility for exiting vehicles towards cyclists on a nearby cycleway.

The front gardens of the houses on the western side of the road are generally much larger than on the eastern side, and most could lose a 4m strip without too much impact. At one of the 15 houses on that side of the road, at the northern end, the front garden is only 6m wide, and the loss of a 4m width could cause difficulty for parking. As can be seen in the following photograph, the occupiers appear to park sideways parallel to the house. The impact of road widening at this house would be significant. It may therefore be appropriate to balance land take between the properties on both sides of the road at this location.

So as to mitigate the impact of road widening, for this option it is proposed to locally narrow the cycleway from 3.5m wide to 2.5m wide over a length of 50m. This would reduce the width to be acquired from properties to just 0.8m at 2 houses on the eastern side of the road and 6 houses on the western side. For the remainder of the length southward to Merrion Gates, an average width of 1.5m would be acquired on the western side only. In total therefore, land would be acquired from 13 residential properties.

House on western side of Strand Road with smallest front garden

The cycle track would be provided on the eastern side of the road so as to avoid the need for two road crossings. Therefore the road carriageway would need to shift slightly westward into the gardens on the opposite side.

Biodiversity Impact for Option 3C Strand Road Cycleway

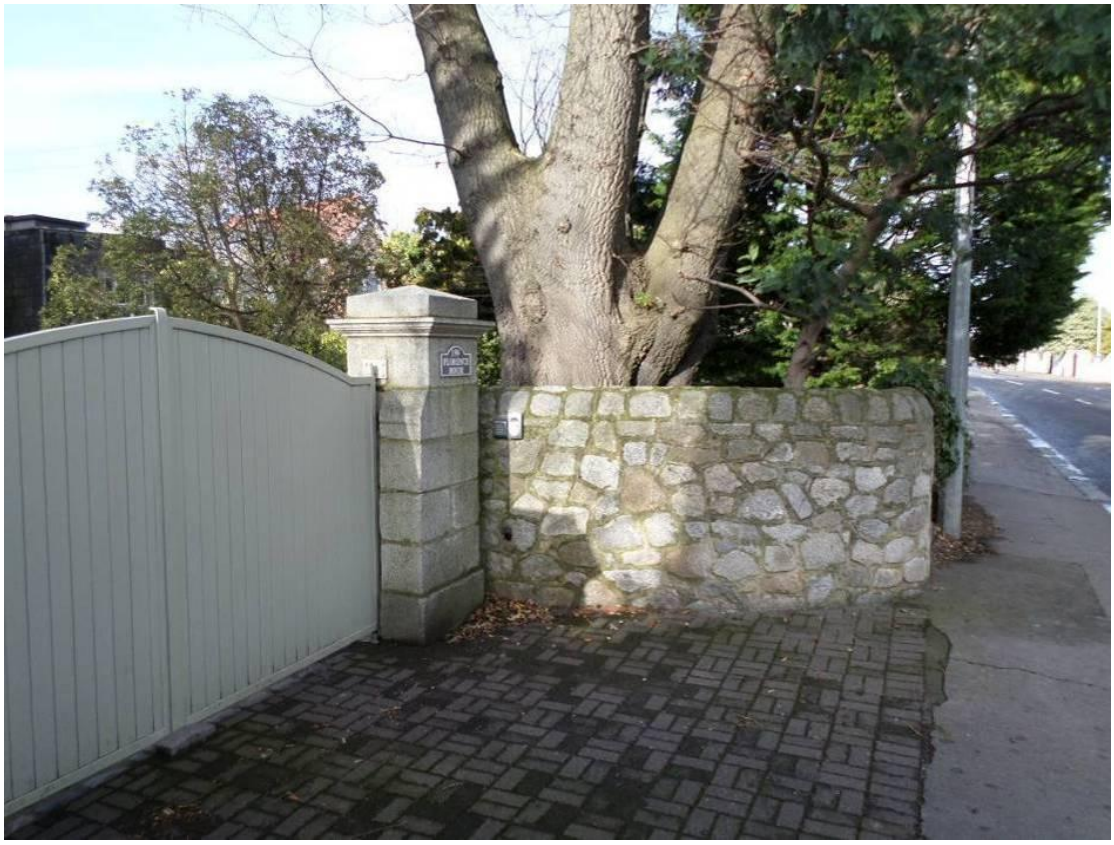
This option involves an inland road with a cycleway and pedestrian facilities on the road. The route will involve no direct encroachment into the SAC or SPA with no resulting loss of any QI habitat. People, dogs and cyclists would be encouraged to use this inland amenity outside of the SPA & SAC boundaries. There is no potential for this option to impact upon the SAC or SPA **and this option is preferred in terms of ecology over options 3A and 3B.**

Cultural Heritage Impact for Option 3C Strand Road Cycleway

No significant impacts on cultural heritage.

Landscape and Visual Impact for Option 3C Strand Road Cycleway

There are a number of large trees in private properties near the boundary walls on the western side including a Turkey Oak, 4 Holm Oaks and 2 Lime trees that are in fair condition, and a large Turkey Oak at Florence House which is of high value. On the eastern side, there are 2 Copper Beech that are of moderate to high value and an Ash and Monterey Cypress that is in poor condition. Loss of these trees would give rise to a significant negative visual impact locally. The location and condition of these trees have been surveyed by a qualified arborist from Brady Shipman Martin, and the road widening has been optimised so as to balance the intrusion into gardens. Special measures will be required to protect root systems, including use of lightweight boundary materials rather than masonry walls on strip foundations, so as to ensure the retention and integrity of the trees and the character they provide along this section of the road.



Large Oak Tree at Florence House to be retained - road to be widened by 0.8m and boundary set back

At the narrowest section of the road there are 4 trees (1 Monterey Cypress, 2 Copper Beech and 1 Ash) in the front garden of a house as shown in the photograph below that would need to be removed for Option 3C. The boundary wall is already damaged by one of the trees, and another large tree (Monterey Cypress) at the northern end fell in a recent storm, leaving a hole in the wall as seen in the background of the photograph. These trees are of less value than the healthier specimens on the western side of the road nearby. However, their loss would have a locally significant landscape impact.

4 Trees to be removed for Option 3C on eastern side of Strand Road

Property Impact for Option 3C Strand Road Widening

Significant land acquisition costs for small areas of front gardens of 13 houses has been included in the cost estimate for this option, along with compensation for the reduced value of the properties, based on typical rates for other urban road schemes.

10.9 Option 3D Cycleway with One-Way Traffic on Strand Road

In this option, the road would be reduced to one-way in the northbound direction. This would retain the existing right-turn stacking lane approaching the Merrion Gates from the Booterstown direction where there is space to accommodate the peak time queue. This queue could not be displaced further north to Sydney Parade where the road is much narrower.

Traffic Impact for Option 3D

Southbound traffic would be diverted right, westward at the Sydney Parade Avenue junction on Strand Road where there is a mini-roundabout. This traffic would cross the railway line at Sydney Parade DART station, and then join the Merrion Road at the Merrion Centre via a re-opened left-out only junction to the south of the Ailesbury Road junction. This arrangement will add to the traffic queuing on Sydney Parade Avenue, and will have less capacity than the existing route due to the longer closure time of the level crossing which is immediately beside the railway station.

Alternatively, there could be a combination with Option 1E further north to divert through traffic away from Strand Road, which would greatly reduce the traffic flow through Merrion Gates in both directions.

The very southern end of Strand Road could remain open for two-way traffic as far south as the Merrion Hall office building to provide access from the north.

The traffic impact of this option would be quite severe locally as it would reduce the southbound traffic capacity by half with all traffic diverted to one railway level crossing rather than two. In addition, the barrier open time is shorter at Sydney Parade due to the station adjoining with longer durations required for trains stopping or starting off. The already long traffic queues on Strand Road southbound would get longer with this option. It is likely that some traffic will divert away from Strand Road through residential streets in Sandymount to cross the railway at other locations further north at Sandymount Avenue, Serpentine Avenue and Lansdowne Road. This will adversely impact on residential amenity across a wide area.

While this option might appear attractive in terms of avoidance of other impacts and low cost, it is unlikely to be acceptable in traffic terms.

Biodiversity Impact for Option 3D

This option will involve no direct encroachment into the SAC or SPA. People, dogs and cyclists would be encouraged to use this inland amenity outside of the SPA & SAC boundaries. There is no potential for this option to impact upon the SAC or SPA **and this option is preferred in terms of ecology over options 3A and 3B.**

Cultural Heritage Impact for Option 3D

No impacts on cultural heritage.

Landscape and Visual Impact for Option 3C Strand Road Cycleway

No impacts.

Property Impact for Option 3D

No impacts.

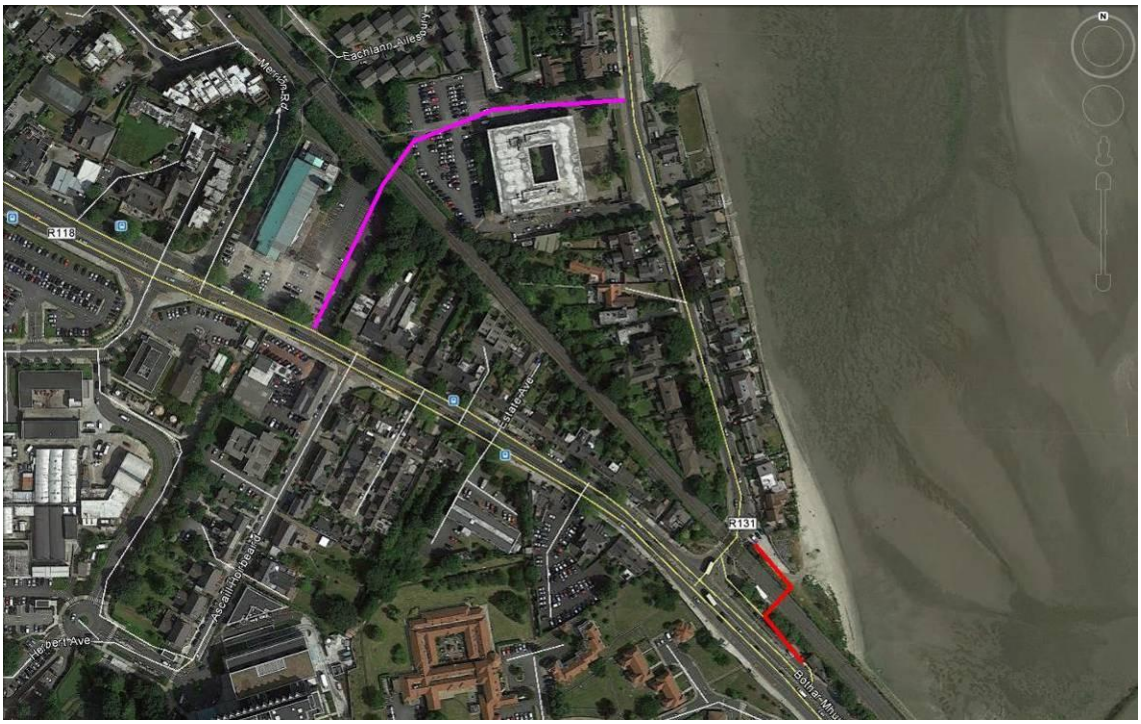
10.10 Option 3E Merrion Gates Bypass and Shared Use Cul-de-Sac Strand Road

This option would be possible if a traffic bypass of Merrion Gates is provided from Merrion Hall offices to Merrion Church. This possibility was the subject of a feasibility study for Iarnród Éireann in 2009. That study identified major benefits to be derived from closure of the existing level crossing and diversion of traffic onto a new bridge over the railway line:

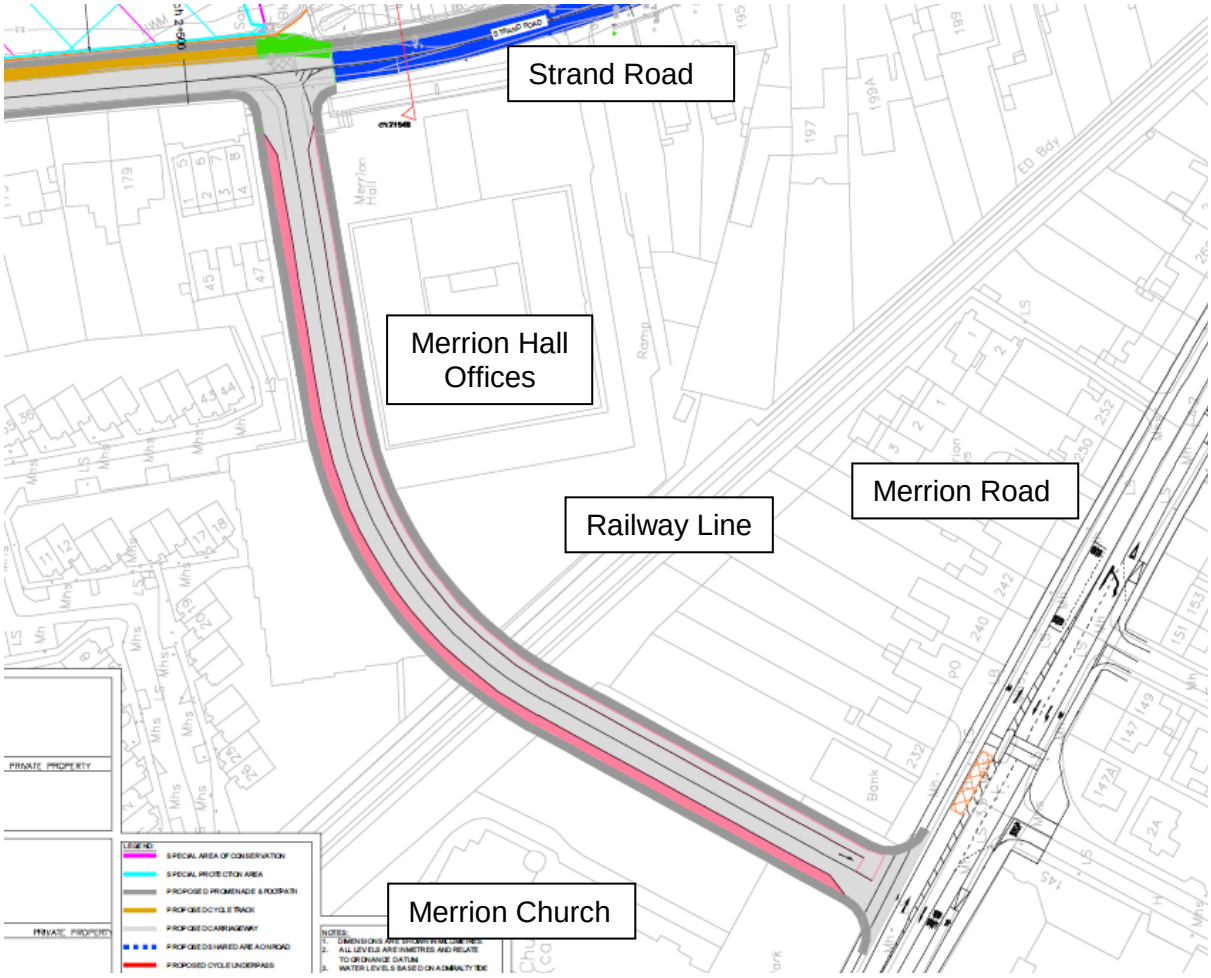
- Elimination of accident risk at the existing level crossing where traffic incidents occur regularly;
- Major economic benefits from removal of delay to train traffic and large numbers of passengers due to elimination of closures following a traffic accident at the level crossing.

The feasibility study for the Merrion Gates project identified 3 possible options for a traffic bridge over the railway. Due to significant environmental issues on Merrion Strand immediately south of the level crossing, that study concluded with a recommendation to locate a new bridge 300m to the north of the level crossing at Merrion Church. A new 250m link road would be required climbing up to a bridge over the railway line. This new link would traverse car parks beside Merrion Church on the western side of the railway and at Merrion Hall offices on the eastern side with some loss of parking space in both. The offices have access roads on both sides leading from Strand Road into the car park, and the new link road would entail closure of the northern access route, with reliance placed on the southern one.

The overall budget cost of the Merrion Bypass is estimated at €7m inclusive of land purchase. This does not however include road layout modification along Merrion Road to accommodate the traffic diversion northward from Merrion Gates over a 300m length. Those works are accounted for in the Merrion Road Cycle Route scheme in Part B of this current study, and they are intertwined with improvement proposals for cycling facilities and bus priority measures along that route.



Proposed Merrion Gates Bypass at Merrion Church (in purple)



Extract from Drawing No.361A showing Proposed Merrion Gates Bypass

Photomontage of Proposed Merrion Gates Bypass view south along Strand Road at Merrion Hall Offices with through traffic route diverted to the right towards the new bridge over the railway at Merrion Church

Strand Road Cul-de-Sac

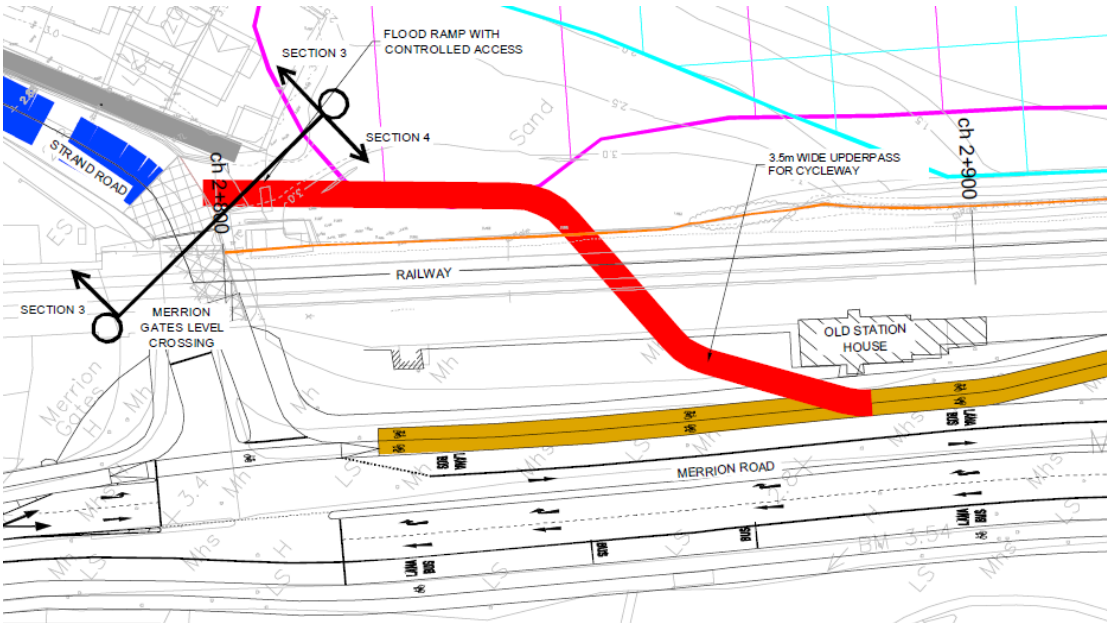
No change would be required to the existing road layout on Strand Road. The segregated cycleway would be curtailed at the northern end of the Strand Road cul-de-sac and would recommence at the southern end. A very low volume of access traffic to the 32 houses and the Merrion Hall offices would share the road with cyclists. This arrangement will avoid the need to encroach into the gardens of the houses and to remove mature trees as would be the case with Option 3C.

Merrion Gates Cycleway Underpass

At Merrion Gates an underpass would be provided for cyclists and pedestrians to cross beneath the railway line and connect between Strand Road and Merrion Road. By going underneath the railway line the vertical clearance of 2.5m plus structure depth would be half that required to pass over the railway line with 5.1m clearance at an over-bridge. The access ramps would then be half the length as well. Assuming a 3m level difference, at a 1:20 gradient (maximum desirable for cyclists and pedestrians), the ramps would be 60m long on each approach.

So as to avoid restrictions for access to the houses at the southern end of Strand Road the underpass ramp would commence at the level crossing and extend southward on the seaward side of the railway where there is an access onto Merrion Strand with a flood protection ramp.

An old station house is located on the western side of the railway line at about 75m south of the level crossing. The proposed underpass would be located a short distance north of this building, and the access ramp on the western side would extend in front of the building where there is a traffic slip ramp at present.



Extract from Drawing No.363 for Merrion Gates Cycleway Underpass

Flood Protection Ramp at Beach Access at Merrion Gates (Old Station House visible in background)

The estimated cost of the proposed underpass is €0.6 million. The works would involve a short closure of the railway line for installation of the underpass. Such works were previously undertaken further south along the DART line at Woodbrook Golf Club near Bray for the construction of two underpasses. A pumped drainage system will be required as the underpass will be below sea level.

10.11 Summary of Route Options in Section 3: Merrion Strand

Length: 370m (100m at Merrion Hall offices + 270m at houses on seaward side)

Option 3A: Promenade at Merrion Strand:

- 4m wide with vertical sea-wall;
- Shared use by cyclists & pedestrians;
- Encroachment into SAC beyond toe of revetment at the southern end towards Merrion Gates; and
- Privacy issues for 17 houses.

Option 3B: Boardwalk at Merrion Strand

- 6.5m wide structure
- 1.4m high parapet including 0.7m high lower screen panel on seaward side;
- Segregated 3.0m for cyclists & 3.0m for pedestrians;
- No direct encroachment into SAC but shadow effect above beach area at southern end towards Merrion Gates; and
- Privacy issues for 17 houses.

Option 3C: Cycleway on Two-way Strand Road at Merrion

- 3.5m two-way on eastern side +0.3m buffer;
- 6m road;
- 2m footpaths each side;
- 3m to 4m encroachment into gardens on western side;
- 1m encroachment + bell mouths at 4 properties on the eastern side; and
- Alternative 4m wide shared footpath & cycleway, with reduced encroachment of 1.5m to 2.0m on western side;

Option 3D: Cycleway on One-way Strand Road at Merrion

- 3.0m two-way cycleway on eastern side +0.3m buffer;
- No direct impact for properties;
- No impact for strand and ecology; and
- Southbound traffic displaced to Sydney Parade with reduced capacity.

Option 3E: Shared use on Cul-de-Sac Strand Road at Merrion

- Shared use of quiet road instead of cycleway;
- No direct impact for residential properties on Strand Road, but land required from Merrion Church and Merrion Hall offices;
- No impact for strand and ecology;
- Through traffic displaced to a new road bridge over the railway beside Merrion Church; and
- Underpass at Merrion Gates for Cyclists and Pedestrians.

10.12 Options Assessment for Section 3: Merrion Strand

The table on the following page provides a detailed assessment for the options identified in Section 3 in accordance with the procedure described in Chapter 6.

OPTIONS ASSESSMENT TABLE 3: Section 3 - Merrion Strand (0.3km)

	Option					
Criterion	**3A**	**3B**	**3C**	**3D**	**3E**	**Notes**
	Promenade	Boardwalk	Strand Road Widened	Strand Road One Way	Merrion Bypass	
Economy						
Capital Cost	**€1.3m**	**€5.3m**	**€3.6m**	**€0.1m**	**€8m**	Option 3E is the route via Merrion Hall & Merrion Church + underpass for cyclists and pedestrians at Merrion Gates
Maintenance Cost						
Transport Quality of Service	**A+**	**A+**	**A**	**A**	**A**	Proximity to traffic for Options 3C & 3D
Safety						
Pedestrian and Cyclist Safety						All achieve high level of safety for cyclists
Railway Safety						Resolution of problems at Merrion Gates with 3E.
Environment						
Landscape and Visual Quality						Rear of houses on Strand Road affected by 3A & 3B. Loss of trees for 3C. Impact at Merrion Church and on Merrion Road for 3E.
Biodiversity						Options 3A & 3B ruled out due to impact on SAC & SPA (Particularly Tern roosting habitat and the *Zostera* community in this location.)
Cultural Heritage						Sea wall is a protected structure and is impacted by Options 3A and 3B.
Land Use						Houses devalued even if no land acquired for 3A & 3B. Impacts on Merrion Road for 3E.
Accessibility & Social Inclusion	No Differential between Options					
Integration						
Cycle Network Integration						
Coastal Footpath						Inland diversion is very short over 300m length in 3C, 3D & 3E.
Traffic Disruption						Transfer of southbound traffic to Sydney Parade for 3D with long delays and knock-on impacts.
Preference	**5**	**4**	**2**	**3**	**1**	**Option 3E**

10.13 Selected Option for Section 3: Merrion to Booterstown

The overall ranking has found that Option 3E is the best option for this section, and will entail the following elements:

a) Cycleway link from the southern end of Sandymount Promenade for 100m to the Merrion Hall offices with road narrowing to 6m to provide for a 3.0m wide cycleway, a 2.0m wide footpath and a 0.5m wide buffer strip on the inland side of the seawall;

b) A new 250m long road link from Strand Road at Merrion Hall offices to Merrion Road at Merrion Church with a bridge over the East Coast Railway Line at an estimated cost of €7m;

c) Modified traffic layout on Merrion Road over 300m length between Merrion Gates and Merrion Church to suit the diversion of traffic to the new bridge over the railway;

d) Closure of Merrion Gates level crossing to traffic;

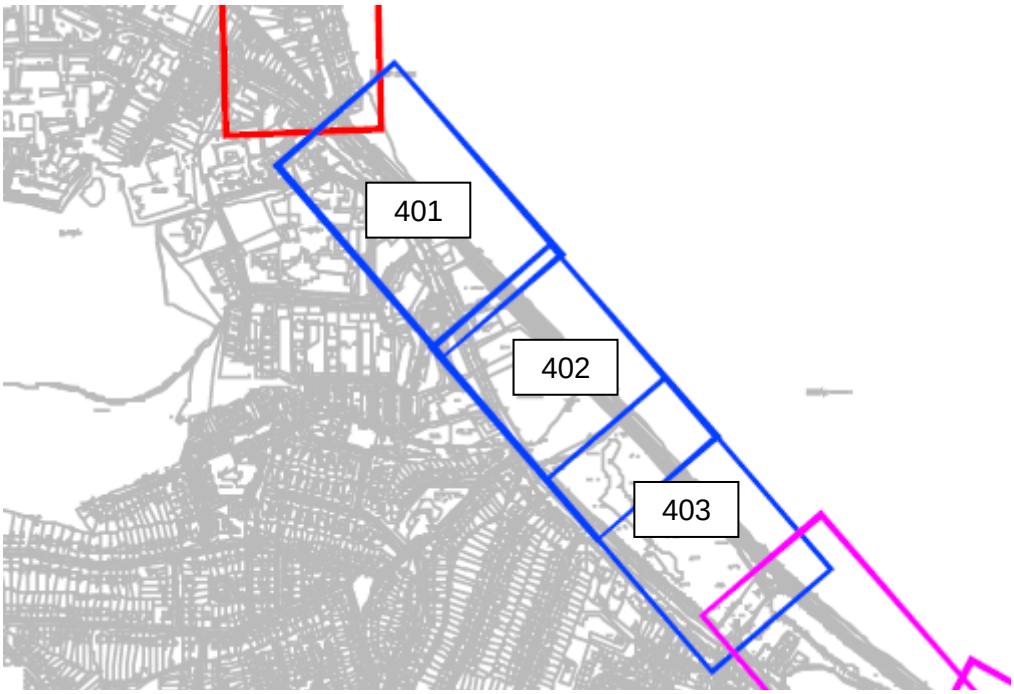
e) Shared use of the cul-de-sac section of Strand Road by cyclists and local access traffic; and

f) A new underpass at Merrion Gates for cyclists and pedestrians.

11. ROUTE OPTIONS FOR SECTION 4: MERRION GATES TO BOOTERSTOWN

11.1 Section 4 Over-view

Section 4 commences at Merrion Gates at Chainage 2,800 and extends for 1km alongside the East Coast Railway Line to Booterstown Railway Station at Chainage 3,800. This section is covered in 3 sheets on Drawings No.401 to 403.



Key Map for Section 4 and Sheet Plans

A total of 5 options were identified as described in 11.3 to 11.7:

Option 4A: Coastal Promenade

Option 4B: Coastal Boardwalk

Option 4C: Inland Boardwalk beside the railway line

Option 4D: Rock Road Cycleway

Option 4E: Rock Road Cycleway with Coastal Footpath

11.2 Biodiversity Constraints in Section 4

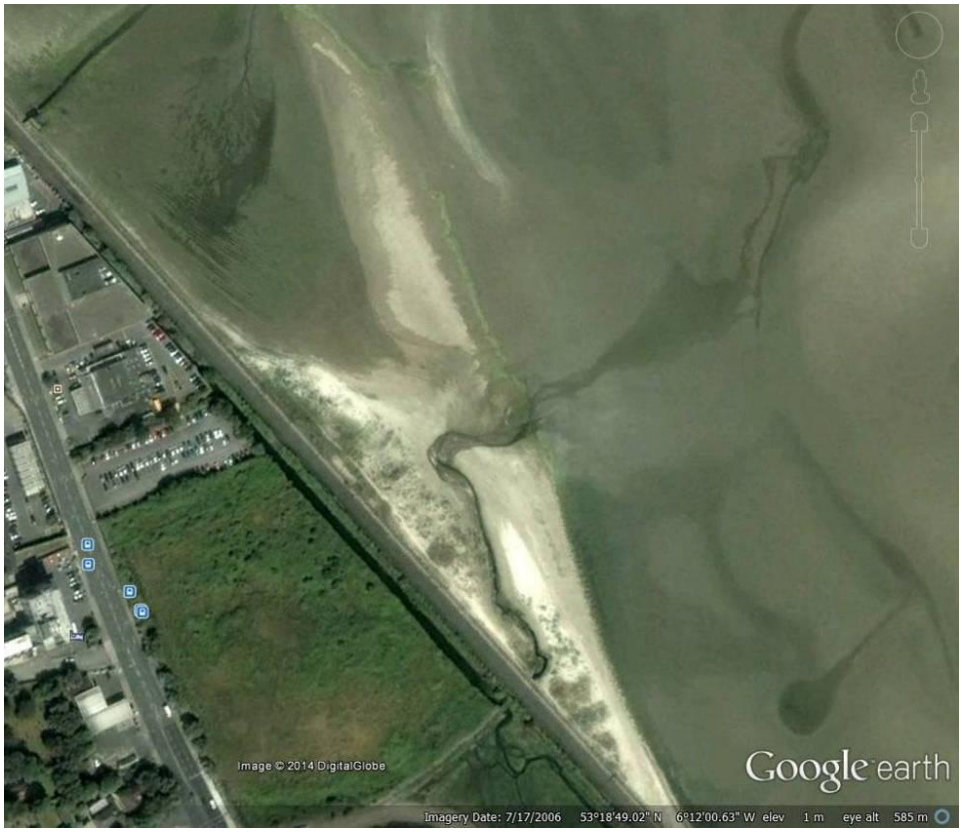
In this section of the route the ecological factors within Dublin Bay South are a major consideration. Merrion Strand is separated from the nearby urban area by the East Coast Railway line. Public access to the beach is very restricted, and is only available at Merrion Gates at the northern end and at a footbridge over the railway beside Booterstown Station. Further access barriers are formed by the Nutley Stream and Trimleston Stream which outfall to the bay in this section and form wet barriers to pedestrian progress along the beach. At high tide the whole strand is under water and there is no footpath available, with access reduced to walking along the top of the seawall for people who are sure-footed and confident to tackle such a difficult route. Due to these factors, this part of the bay has much less human disturbance than the area further north at Sandymount.

In addition to relative seclusion from human activity, there are particular physical factors that support an ecological hot-spot in this part of the bay as described below.

- This area is extensively used by water-birds;
- The beach at Merrion Gates provides a feeding and high tide roosting area for a number of water-birds;
- Birds (gulls and geese) can be found roosting on the water in the vicinity of Merrion Gates at high tide;
- There are sandbars in this area which can be used for roosting at low tide and pre-roosting as the tide rises;
- Small numbers of Turnstone roost and feed along the shoreline and seawall in this section;
- The outflows from freshwater streams in the area provide some of the only freshwater sources for water-birds in these areas;
- A dynamic sand-spit has formed to the south of Merrion Gates, which acts as a crucial high tide roosting area for significant numbers of waders in winter time, in addition to roosting Tern species during autumn time; and,
- This area supports a number of Annex I habitats including Saltmarsh habitats e.g. *Salicornia* flats (which provides important feeding grounds for a number of water-birds), Atlantic salt meadows (these areas can provide roosting habitat for birds), Annual vegetation of drift lines, Embryonic shifting dunes (this habitat was only noted in small patches as much of it had been eroded and washed away) and Shifting dunes along the shoreline with *Ammophila arenaria* (Marram grass) ('white dunes') which occurs right up to the rock revetment along the sand spit. Small areas of estuarine habitat (Tidal rivers) can also be found e.g. Trimlestown Stream outlet.

Roosting Birds at Trimleston Sand Spit

The sand spit is a dynamic feature that has changed considerably over the years and has generally moved northward due to long-shore drift currents in the bay. It has also varied in size and shape, with a small lagoon like inlet forming at the northern end in recent years. The shoreline of the spit is generally about 100m from the sea wall along the railway line at present.



Trimleston Sand Spit in 2006

Trimleston Sand Spit in 2014

There is relatively little human activity on the strand between Merrion Gates and Booterstown due to the difficulty of access at present compared to the highly

accessible strand area further north. In addition, the outlets from the *Elm Park Stream* and the *Trimleston Stream* form wet barriers for pedestrians who do not have waterproof boots. This relative tranquillity suits the flocks of birds that congregate in this part of the bay. Nevertheless, there is still occasional disturbance by walkers, especially those with dogs as seen in the following photograph. Previous consultations with NPWS has indicated that such disturbance in this part of the bay is a particular concern. This is a critical factor for the feasibility of a coastal route along the 1km section between Merrion Gates and Booterstown Railway Station.

Man with Dog at Trimleston Sand Spit

Currently there are no formal bye-law restrictions to prevent dogs and their owners from access to this or any other part of the bay.

Railway Revetment north of Trimleston Sand Spit - Roughly 4m wide

11.3 Option 4A: Promenade on Seaward side of Railway

There is no scope for a narrow rock fill promenade in this section that does not encroach into the SAC and cause habitat loss. The previous S2S study proposed a

promenade on an embankment that was about 15m wide at the toe and encroached into the SAC to a considerable extent.

Previous Promenade Proposal by Scott Wilson at Booterstown Trimleston Sand Spit

Unlike the busy seafront area at Sandymount to the north, the level of pedestrian activity in this section should be considerably lower as it is more remote from the city and residential areas. In that case it would make sense to reduce the promenade to the minimum width to minimise the footprint of the embankment on the seashore. It would also be necessary to provide a sea wall rather than a rock armour revetment to minimise the footprint. In combination with a narrow top width, the overall width of the infill structure would therefore be about 4.5m, which would not extend beyond the existing outer edge of the rock revetment as visible on the surface. However, it would bury a narrow strip of the sand dune at the back of the sand-spit where this currently fully covers the rock revetment.

Dune and Salt Marsh beside railway revetment at Trimleston Sand-Spit

A solid parapet wall at the seaward edge of the promenade would screen the inter-visibility between dogs on the promenade from seabirds roosting on the edge of the sand spit at about 100m distance.

There would be no public access point from the promenade down to the strand along the 1km length. That would ensure that the provision of the promenade would not give rise to an increase in the likelihood of people walking across the strand where it is of greatest ecological value at Trimleston Sand Spit. In fact the provision of a convenient and dry place to walk on the promenade would probably draw pedestrians away from the strand, thereby reducing environmental risks of disturbance to seabirds roosting on the sand spit.

Biodiversity Impact for Option 4A Trimleston Promenade

This option would result in the permanent removal of non-QI Annex I habitat at the sand-spit and also at Merrion Gates, as well as removal of the Annex I habitat "Mudflats and Sand-flats not covered by sea water at low tide" at the base of the existing seawall revetment. The Annex I habitat at Merrion Gates, although not QI, is nonetheless included within the SAC boundary and so the promenade at this location does encroach into the SAC. For the same reasons explained below regarding mudflat/sand-flats, the non-QI Annex I habitats at the sand-spit are likely to fall outside of the SAC boundary; it is likely that these have built up over the bottom portion of the seawall revetment over time.

It is questionable as to whether much of the affected areas of Annex I mudflat/sand-flat habitat are in fact part of the QIs of the SAC. It would appear from the available mapping that the intention of the SAC boundary is to follow the toe of the seawall revetment as existed in historic 6 inch Ordnance Survey mapping. The bottom sections of the wall have since been partially covered by silt and so the position of the SAC boundary is in fact now a short distance from where the current toe of the seawall revetment exists. Therefore while it would appear that the original intention of the SAC boundary was to sit along the boundary of where the mudflats/sand-flats of the strand met the toe of the revetment, there currently is a narrow strip of mudflats/sand-flats at the base of the seawall revetment which falls outside the SAC. In this section this strip of mudflats/sand-flats, which is likely to fall outside of the SAC boundary, varies between approximately 0-7m (see Note 2), being widest between Merrion Gates and the northern end of the sand-spit and narrowest south of the sand-spit near Booterstown station.

It would appear that the intention of the SPA boundary is to run approximately along the current location of the toe of the seawall revetment. Therefore it would appear that most of this option would encroach by small amounts into the SPA boundary.

During extreme tidal events (when there are few other available high tide roosts), nationally and internationally important numbers of birds use the upper reaches of the sand-spit adjacent to the sea wall, as a high tide roost. In addition, Turnstone and other waders can be regularly found feeding and roosting in close proximity to the sea wall on and around the sand-spit. These birds would be directly displaced from this habitat by an infill promenade in this section. With the use of a sea wall to minimise the footprint of the promenade and encroachment into the SAC and SPA there would be no replacement opportunity for high tide roosting. The alternative of reinstating a similar revetment opportunity for high tide roosting would increase the footprint of the structure and encroach further into the SAC and SPA with increased loss of non-QI Annex I habitat. Even if a revetment was reinstated there would be no guarantee that birds would avail of this for high tide roosting given proximity to promenade users which, even with screening, might deter birds.

This scheme would bring people and dogs into an area that does not currently undergo high levels of disturbance, albeit they would be confined to the promenade

structure as there would be no access provided to the strand in this location. This restriction of access by a new promenade might serve as a slight improvement on the current situation in terms of reducing levels of disturbance whereby determined walkers (including dog walkers) do currently access the sand-spit in low numbers.

Crucial shoreline roosting habitat (mainly the leading edge of the sand-spit but birds move inland up the sand-spit with encroaching tides) which is used by several thousand Annex I Special Conservation Interest tern species during the autumn congregation might be displaced due to the immediate proximity of promenade users to the sand-spit.

This option would also involve a connection toward the Rock Road along the northern side of the Trimleston Stream box culvert, running along the boundary of Booterstown Marsh pNHA and SPA. Although the culvert is not of ecological value itself, it does fall within the SPA and pNHA boundary. This link will include ramps of approx. 70m to provide access across the railway line. The link and ramps would need to be sufficiently screened in order to avoid causing disturbance to birds both in Booterstown Marsh SPA and the seawards extents of the SPA. There would be no access from this connection into the marsh or directly to the seaward extents of the SPA.

Due to the encroachment into the SAC and SPA, the direct removal of both QI and non-QI Annex I habitats, the removal of high tide roosting areas, and potential for displacement and disturbance effects on birds, this is a least favoured option.

Cultural Heritage Impact for Option 4A Trimleston Promenade

There would be an impact on the sea wall, a protected structure, which constitutes an impact on architectural heritage.

Landscape and Visual Impact for Option 4A Trimleston Promenade

Option 4A provides a promenade on the seaward side of the railway and existing sea wall. In general, this will have a neutral visual impact from the landward side as the new structures will be seen in the context of the existing railway infrastructure. For ecological reasons, the promenade will require a solid parapet wall along the Trimleston Sand Spit and this will give rise to a slight negative visual impact as views to the sea from passing commuter trains are slightly reduced.

11.4 Option 4B: Boardwalk on Seaward Side of Railway Line

Previous Boardwalk Proposal by Scott Wilson at Booterstown Railway Station and Trimleston Sand Spit

A more refined boardwalk structure could be provided above the railway revetment with only supporting piers extending down to ground level. Such a lightweight structure could be elevated above railway level so as not to interfere with the function of the existing revetment and seawall to protect against wave action. Construction of a prefabricated bridge structure would involve less machinery and much smaller volumes of materials than a promenade. The most difficult operations would be:

- Piling through the stone revetment for pier foundations, and
- Erection of the deck structure with a crane.

Lightweight equipment is available for such operations in difficult locations with confined access as illustrated in the following examples. It should also be noted that various construction projects have taken place within the Dublin Bay SAC, with only temporary and insignificant impacts. A recent example is the demolition of the Blackrock Baths structure for which haul trucks traversed for 2km along the strand from Merrion Gates. This work was monitored by ecologists and only minor disturbance of birds took place.

Marine issues will become more significant for the design of a robust structure on this section of the route, which progresses from the sheltered environment at Merrion to more exposed sea conditions at Booterstown outside the protection afforded by the Trimleston Sand Spit.

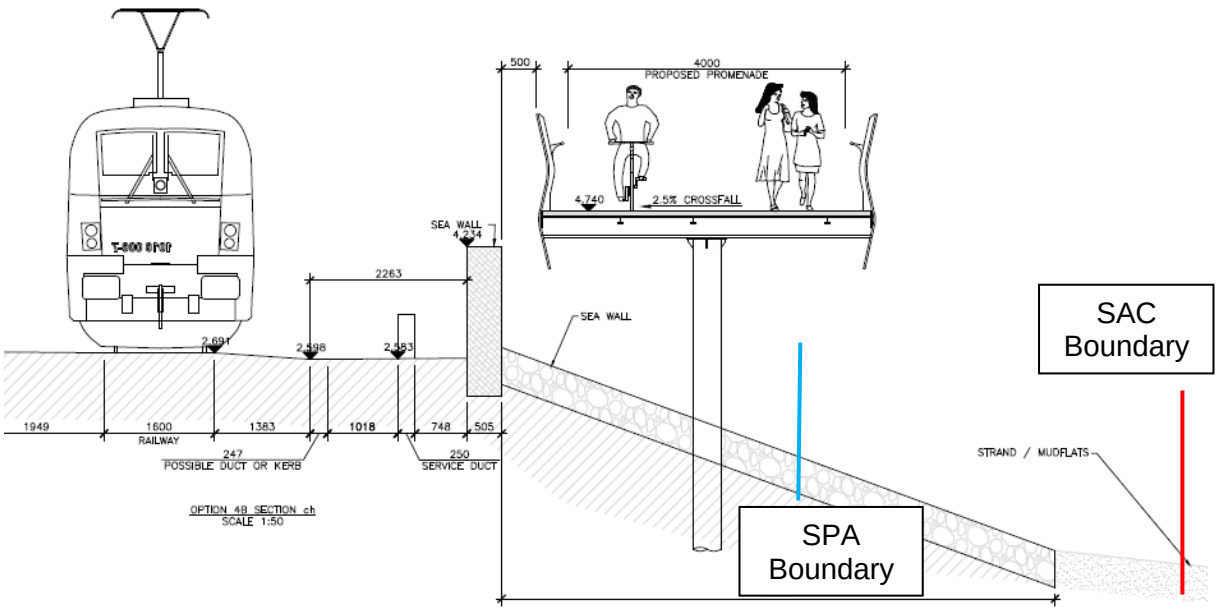
The boardwalk option would therefore entail the following elements:

- 6m width between parapets for a 3.5m wide cycleway and 2.5m wide footpath, or
- 4m width between parapets for a shared cycleway and footpath, which would reduce the cost by 1/3rd;

- No direct physical impact in the SAC and very limited encroachment into the SPA by overhanging by less than 1m plan extent along the length of the structure;
- Screening from birds by an opaque parapet to avoid potential impacts for the SPA;
- Elevated structure above wave level in the exposed part of the coast to avoid marine impacts;
- No means of access down to strand level;
- High-level link inland at Booterstown Station, with no connection to the existing beach access at the station.

The "Snake Cycle Bridge" in Copenhagen Harbour (designed by ROD)

Mini-Piling Rig working in a Confined Space



Schematic Diagram of a Boardwalk Concept beside the Railway - away from Trimleston Sand-Spit

Biodiversity Impact for Option 4B Trimleston Boardwalk

On the map the SAC boundary appears to lie about 10m out from the seawall and therefore provides a narrow corridor between it and the railway wall. However, due to the changing nature of the Trimleston sand-spit there is an area of Annex I habitat that extends outside the SAC boundary right up to the vertical section of the railway wall where the original revetment slope has become buried in drifted sand. Under the relevant regulations the environmental assessment for the project must take account of such habitat regardless of where the SAC boundary has been shown on the official map.

Similar to Option 4A, this option would result in the permanent removal of non-QI Annex I habitat at the sand-spit outside of the SAC boundary, although with greatly reduced areas of direct habitat loss (c. 1.7m^2 only for piers), and small areas of Annex I mudflat habitat south of the sand-spit where the boardwalk piers extends slightly beyond the existing outer edge of the rock revetment as visible on the surface. However the boardwalk also has potential to have shading effects on additional areas of Annex I habitats directly underneath, thereby possibly resulting in indirect habitat degradation or loss.

Disturbance/displacement impacts would be similar as for Option 4A. However, similar boardwalk structures have been built in the Exe Estuary SPA in England without any significant impacts upon the SPA.

This option would involve a high-level link inland at Booterstown Station, with no connection to the existing beach access at the station. The link will involve a small embankment through Blackrock Park, which will not involve any encroachment into the SAC or SPA. The link bridge would need to be sufficiently screened in order to avoid causing disturbance to birds in Williamstown Creek, which is part of the SPA.

Although this option is slightly preferred over Option 4A, it is also a least favoured option due to the encroachment into the SAC and SPA, the direct removal of both QI and non-QI Annex I habitats, the effective removal of high

tide roosting areas, and potential for displacement and disturbance effects on birds.

Cultural Heritage Impact for Option 4B Trimleston Boardwalk

There would be a slight impact on the sea wall, a protected structure, which constitutes an impact on architectural heritage.

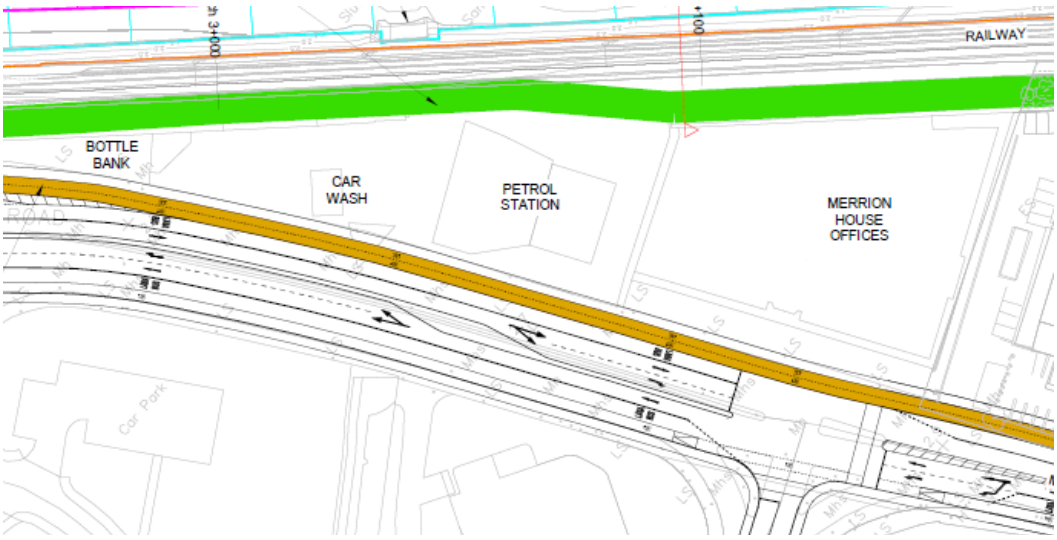
Landscape and Visual Impact for Option 4B Trimleston Boardwalk

Option 4B proposes an elevated boardwalk on the seaward side of the railway and sea wall. This will be partially visible from the landward side, but in the context of the existing railway infrastructure, and will partially impede views towards the sea resulting in a slight negative visual impact. Direct views of the sea from commuter trains will be impacted to a greater extent, however this is transient and will be replaced by new pedestrian and cycling activity along the seafront resulting in a slight negative impact.

11.5 Option 4C: Boardwalk on Inland Side of Railway Embankment

This option avoids the major ecological constraints on the seaward side of the railway line by following a route along the inland side of the railway corridor. Over a long length of Section 4 there is a wide drainage ditch immediately inside the railway embankment that flows towards the Booterstown Marsh to the south. A boardwalk structure would be required to span over this water feature.

A route on the inland side of the railway would be quite difficult in one place at the northern end as there is a petrol station forecourt in the way. A narrow greenway could be brought along the northern edge of the forecourt where there are picnic tables shown in the photograph below. This should limit adverse impact on the commercial operations of the petrol station. Similar considerations would apply for the associated car wash facility in the adjoining site just to the north, where some adjustment to the layout would be required to enable enough space for the greenway before it would link onto Merrion Road beside the old railway station building. The concept layout is shown on Drawing No.441.



Option 4C south of Merrion Gates

Petrol Station at Merrion beside railway line on left

South of the petrol station at the Merrion House office block, over a 70m length, there is a narrow strip 7m wide between the railway and the facade of the offices, which is filled by a vegetated embankment and a drainage ditch.

Confined Corridor on Inland Side of Railway at Merrion Petrol Station and Offices

Booterstown Marsh

South of Merrion House the boardwalk would continue for 270m beside car parks and an undeveloped site to reach the concrete box culvert of the Trimleston Stream, which forms the northern boundary of the Booterstown Marsh and Bird Sanctuary. The next 340m length of the boardwalk would extend along the northern boundary of the marsh to Booterstown Station.

The marsh is designated as a Natural Heritage Area (NHA) and is part of the Dublin Bay Special Protection Area for Birds, with the boundary set at the toe of the railway embankment. Direct intrusion into the designated area at the marsh could be avoided by design of the boardwalk to fit within the width of the railway embankment.

Biodiversity Impact for Option 4C Trimleston Boardwalk

This option would be entirely inland and therefore would not encroach into any part of the SAC or to the seaward extents of the SPA. The 6.5m wide boardwalk may need to be narrower where it would run along the top of the existing railway embankment beside the Booterstown Marsh SPA/pNHA so as not to encroach beyond the boundary. This option could pose a significant threat to birds within the marsh if it were not designed and built in a sympathetic manner. Following an initial site assessment, this option is unlikely to remove any Annex I habitat. In addition the design would need to incorporate sufficient screening so as to avoid impacts to birds.

This option runs in close proximity to a stream/drainage ditch that runs on the landward side of the railway line. This stream is connected both to the marine SAC and SPA as well as with Booterstown Marsh SPA/pNHA. The design of this option would need to demonstrate that flow within this stream would be maintained and that importantly the freshwater/saline balance in Booterstown Marsh would not be significantly altered by any changes to the stream/ditch profile.

In comparison with other options available, this is not a preferred option in terms of its potential to impact upon Booterstown Marsh SPA and pNHA. However, with consultation and collaboration with BWI, NPWS, An Taisce and Friends of Booterstown Marsh (in addition to Iarnród Éireann), this option could provide an enhanced educational amenity within the marsh.

11.6 Option 4D: Cycleway on Rock Road

This option would provide a two-way cycle track on the eastern side of Rock Road and is described in Part B of this Preliminary Route Options Report for the inland cycle route.

Biodiversity Impact for Option 4D

This option would be entirely inland, and would not encroach any part of the SAC or SPA, including even on the roadside edge of the Booterstown Marsh SPA and pNHA. Sufficient existing vegetation along the roadside of Booterstown Marsh should be retained to service as screening. **This is a preferred option.**

11.7 Option 4E: Cycleway on Rock Road & Coastal Footpath

This option would be as for Option 4D with an inland cycleway consisting of a two-way cycle track on the eastern side of Rock Road.

It would also provide a limited footpath with minimal intrusion along the coastline. This would consist of an extension of the existing 2.0m to 2.5m wide concrete shelves that exist on the revetment at each of the existing public access points at Blackrock, Williamstown and Booterstown. Part of this coastal path east of the Trimleston sand spit would be somewhat rugged in character and would not be suitable for use in stormy conditions. It would also be vulnerable to rising sea levels and in time would be submerged at high tide.

There could be safety concerns for an exposed walking route that does not have a proper edge protection, and a railing should probably be provided along the seaward edge. In addition, there could be public liability risks by providing a facility that could be unsafe in certain weather and tidal conditions, and for which active management would be required for closures for safety reasons.

Existing 2m wide Ledge on Revetment south of Booterstown Station

There could be flexibility with this option to close the coastal path seasonally to protect intrusion for wintering seabirds, if it were found that disturbance was a significant problem.

At the Trimleston sand spit, the footpath could be suspended a little above ground level with cantilever supports off the old seawall so as to limit impact on the plants and habitat beneath as necessary.

Biodiversity Impact for Option 4E Coastal Footpath at Trimleston

This option would involve an inland cycleway as per Option 4D (which does not encroach into Booterstown Marsh SPA/pNHA) along with a seasonal (closed with gates from August until March), narrow coastal ledge that only exists within the current extents of the rock revetment. It would be designed in such a way that it does not directly impact upon the non-QI Annex I sand-spit's habitats or QI Annex I mudflat habitat. However, some overshadowing of non-QI Annex I habitats at the sand-spit might occur if the design were cantilevered off the existing sea wall along the sand-spit. There would be no encroachment of QI Annex I habitat as the ledge would only exist within the existing sea wall revetment. The design could be such that the narrow path ledge could act as a potential high tide roost for birds during the winter time when not accessible. As this option does not include any element of screening or restriction of access, the seasonal restrictions would be a necessary mitigation measure for this option.

This is not a preferred option as it does introduce encroachment into the SAC and SPA. However due to its much reduced scale, seasonal closure and avoidance of direct Annex I habitat loss it is significantly preferable over Options 4A and 4B.

Conclusion for Option 4E

In conclusion, the limited footpath facility in Option 4E could be quite problematic in operational terms, and would probably be quite risky in terms of impact for ecology. It is unlikely to be a satisfactory arrangement to deliver on the project objectives.

11.8 Connectivity between Coastal and Inland Routes at Booterstown

There are two potential locations for connections between the two routes on this 1km long section:

a) Trimleston Avenue at the midway point, and

b) Booterstown Railway Station.

11.8.1 Possible Link to Rock Road at Trimleston

The Trimleston Avenue route would provide a continuation from University College Dublin at Belfield to a coastal greenway on either the inland or seaward side of the railway. For an at-grade connection to an inland boardwalk this 160m long link could go on the roof of the Trimleston Stream concrete box culvert which is 3m wide. The roof is at a level of about 4m OD and there is a drop manhole at the end where it passes underneath the railway line and outfalls onto the beach.

Possible Greenway Link from Trimleston Avenue along Trimleston Stream Culvert

For a link to a route on the seaward side, the connection would need to rise up and over the railway line on a ramp structure. Possibly supports for a ramp could be taken off the culvert structure. Presumably the culvert is in public ownership, while the land on the northern side is private, and the land to the south in the marsh is designated as a Special Protection Area (SPA) for birds. It would appear that the culvert is within the SPA boundary. The concrete culvert itself does not constitute an ecologically valuable habitat and therefore placing the route along it will not remove ecologically valuable habitat within the SPA. However any indirect impacts as a result of construction in this area would need to be carefully considered and any disturbance impacts to birds in Booterstown Marsh would need to be assessed.

Rock Road is at a level of about 5m OD at Trimleston Avenue. The railway line is at about 2.5m OD, which with a 6m vertical clearance would give a bridge deck level of 8.5m OD. The greenway ramp will therefore need to climb a height of 3.5m, and at a gradient of 1:20 (maximum desirable according to the *National Cycle Manual)* the ramp will be 70m long. The length of the ramp on the seaward side will depend on the level proposed for the main boardwalk or promenade.

The need for a link between the inland and coastal routes at this location may not be sufficiently strong to justify the cost involved for a new bridge over the railway line in the context of other links nearby to the north and south, and with an improved Rock Road Cycleway to provide a good quality alternative route.

11.8.2 Possible Link to Rock Road at Booterstown

The access route to Booterstown Railway Station is located 400m south of Trimleston Avenue. A 130m long link from Rock Road to the coast could be provided here rising at a gentle gradient of 1:40 (2.5%) to a bridge over the railway line. Initially the link could be provided on a small embankment in the public park to the south of the existing access footpath to the station. This could then switch to a bridge for the eastern half of 65m to cross over the tidal lagoon and the railway just south of the existing footbridge.

Potential Link from Rock Road to Coastal Route at Booterstown Station

A cycle bridge link at Booterstown would provide access to a coastal cycleway for a large catchment area along Booterstown Avenue which is denoted as a Secondary Route in the GDA Cycle Network Plan extending further afield to the southwest via the Stillorgan Road (Route 12).

11.9 Exercise Facility for Dogs at Booterstown?

There is an existing public access point onto Booterstown Strand via the narrow footbridge beside the station. As well as the Merrion Gates, this is the nearest access route for walkers, including those with dogs, to the sensitive Trimleston Sand Spit. There are no official dog exercise areas in this vicinity, and dogs may not be let off the leash in the nearby Blackrock Park. The absence of such an exercise facility is probably the reason that dog walkers use the strand at low tide. Thus there is a problem of loose dogs on the beach disturbing birds, which is a matter of concern for the NPWS.

If a dog exercise facility were provided in Blackrock Park beside Booterstown Station, this could lead to a major reduction in the number of dogs on the beach, especially if accompanied by a legal restriction on the beach and conspicuous signs to that effect. Such facilities are now provided in various parks within the DLRCC area, such as at Cabinteely Park, Marlay Park and Shanganagh Park. The north-western corner of the park beside Booterstown Station is not currently used for any specific purpose. In fact this area was used for a construction compound for the Rock Road QBC scheme a few years ago. This would make an ideal place for a dog exercise area as a compensatory measure to complement a proposed greenway along the coast.

Further north a similar facility could be provided in Sean Moore Park at Irishtown to cater for the large catchment area at the northern end of the route.

11.10 Summary of Route Options in Section 4: Merrion Gates to Booterstown

Length: 1km

Option 4A: Promenade on Seaward side of Railway:

- 4m wide with vertical sea-wall;
- Shared use by cyclists & pedestrians;
- No encroachment into SAC beyond toe of railway revetment?

Option 4B: Boardwalk on Seaward side of Railway

- 6.5m wide structure (including 2 x 0.25m for parapets);
- Segregated 3.5m for cyclists & 2.5m for pedestrians;
- Alternatives: 4.0m wide shared facility or 3.5m wide structure for cyclists only;
- 1.4m high parapet including 0.7m high lower opaque screen panel on seaward side to reduce potential disturbance for birds in the SPA;
- No encroachment into SAC.

Option 4C: Boardwalk on Inland side of Railway as for Option 4B.

Option 4D: Cycleway on Rock Road: 3.5m wide + 0.5m buffer.

Option 4E: Cycleway on Rock Road & Limited Coastal Footpath

11.11 Options Assessment for Section 4: Merrion Gates to Booterstown

The table on the following page provides a detailed assessment for the options identified in Section 4 in accordance with the procedure described in Chapter 6.

OPTIONS ASSESSMENT TABLE 4: Section 4 - Merrion Gates to Booterstown (1km)

	Option					
Criterion	**4A**	**4B**	**4C**	**4D**	**4E**	**Notes**
	Promenade	Coastal Boardwalk	Inland Boardwalk	Rock Road	Rock Road + Coast Path	
Economy						
Capital Cost	**€4.4m**	**€17m**	**€17.4m**	**€3.5m**	**€3.9m**	
Maintenance Cost						
Transport Quality of Service	**B**	**A+**	**A+**	**A**	**A**	Cyclists not segregated from pedestrians in 4A and must travel more slowly. Route 4D/4E is beside very busy traffic route and will be slightly less attractive for Cyclists.
Safety						
Pedestrian and Cyclist Safety						Shared space for cyclists and pedestrians in 4A may lead to conflicts when busy.
Environment						
Landscape and Visual Quality						Limited visibility of route by the coast, and high quality sea views. No view from 4D
Biodiversity					**?** **?**	4E: Potential seasonal closure of coastal path / alternative roost sites?
Cultural Heritage						Sea wall is a protected structure in DCC area and is impacted by Options 4A and 4B.
Land Use						
Accessibility & Social Inclusion	No Differential between Options					
Integration						
Cycle Network Integration						Better linkage to catchment area for 4D
Coastal Footpath						4D is remote from the coast. 4E is a limited and seasonal facility.
Preference	**3**	**4**	**5**	**1**	**2**	**Option 4D**

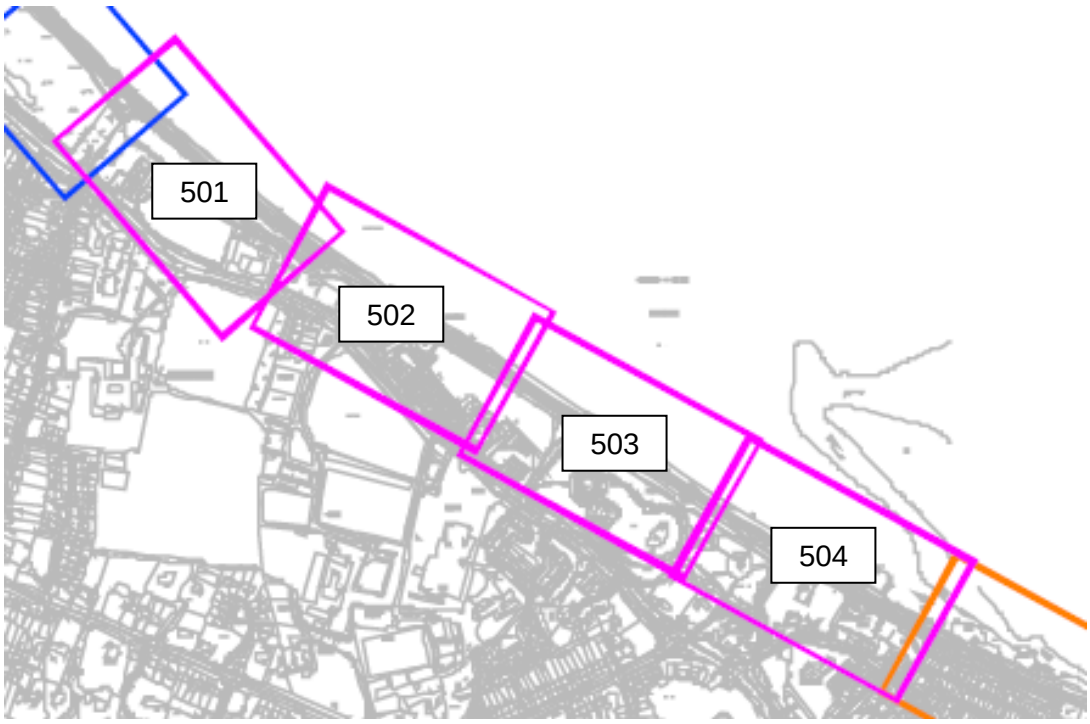
11.12 Selected Option for Section 4: Merrion to Booterstown

The overall ranking has found that Option 4D is the best option for this section, and will consist of a two-way cycle track along the eastern side of Rock Road from Merrion Gates to Booterstown Railway Station over a length of 1km. This will form a shared corridor between the coastal route and the inland route along Rock Road.

12. ROUTE OPTIONS FOR SECTION 5: BOOTERSTOWN TO BLACKROCK

12.1 Section 5 Over-view

Section 5 commences at Booterstown Railway Station at Chainage 3,800 and extends for 1.4km to Idrone Terrace just south of Blackrock Station at Chainage 5,200 where there is a footbridge that gives access to the seafront. This section is covered in 4 sheets on Drawings No.501 to 504.



Key Map for Section 5 and Sheet Plans

A total of 4 options were identified as described in 12.3 to 12.6:

Option 5A: Coastal Promenade

Option 5B: Coastal Boardwalk

Option 5C: Blackrock Park Cycleway

Option 5D: Blackrock Park Cycleway with Coastal Footpath

12.2 Biodiversity Constraints in Section 5

- Annex I *Reefs* [1170] – Rocky biotypes along the sea wall and rock outcrops in the southern section of South Dublin Bay, which support a zonation of benthic communities of algae and animal species as well as concretions and corallogenic concretions (European Commission, 2013). Annex I Reefs habitat is present along most of this section on rocky outcrops and along various parts of the seawall;
- The sea walls/rock revetment, rocky outcrops and the Blackrock baths act as high tide roosts for significant numbers of Oystercatcher (One roost held *c.*290 individuals roosting on the seawall wall here in a single survey in 2014) and small numbers of Turnstone (amongst occasional other species such as Redshank and Curlew) in various locations from Booterstown Station further south;

- Small numbers of Brent Geese and Gulls have been recorded roosting on the sea wall in this section;
- Internationally important congregations of Terns roost here in autumn; and,
- In addition, small numbers of Black-headed gull, Herring gull, Mediterranean gull, Shag and Cormorant are recorded using the rocky outcrops. These habitats also provide some feeding resources for species such as Turnstone and Brent geese. The mud flats between Booterstown and Williamstown are particularly muddy and therefore provide excellent foraging habitat. The area is relatively undisturbed and attracts very large numbers of Tern and Black-headed gull when not covered by the tide.

Oystercatchers at Willamstown

(04/02/2015) Photo courtesy of Michael Collins. (Note: Invasive plant Japanese Knotweed along railway line)

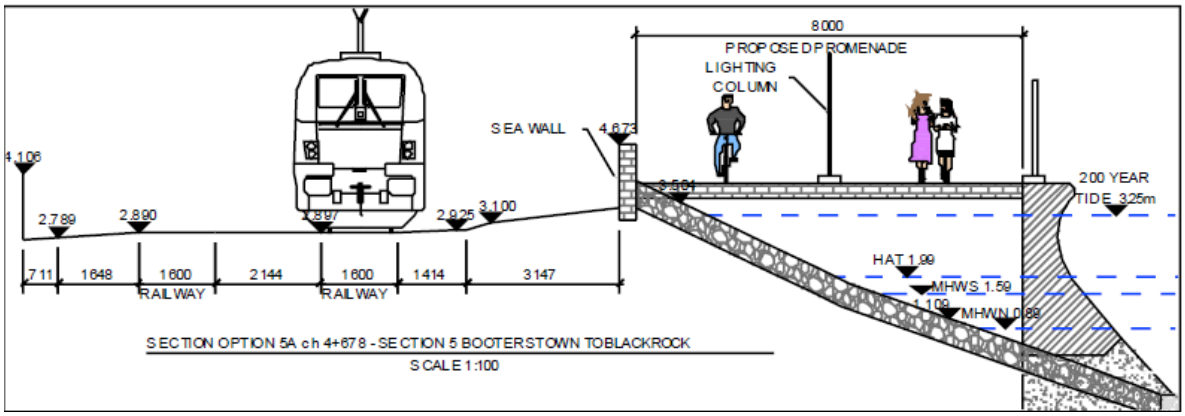
Oystercatchers (at rear) and Brent Geese (at front) at Willamstown
(10/02/2015) Photo courtesy of Michael Collins

12.3 Options 5A/5B: Promenade or Boardwalk on Seaward side of Railway

In Section 5 there is a wider rock revetment than in Section 4 and this provides more space for a promenade or boardwalk before they would encroach onto the strand.

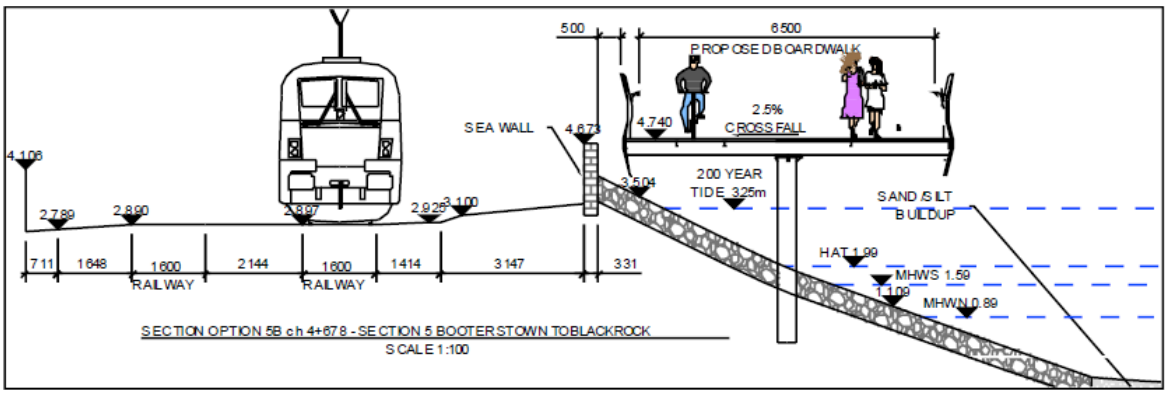
8m+ Wide Revetment at Williamstown

Option 5A: 8m wide promenade supported on rock fill on top of the existing rock revetment with a new wave reflective seawall. The level of the promenade would be higher than the railway to allow for rising sea levels.



Option 5A

Option 5B: 6.5m wide boardwalk suspended above the existing rock revetment along the railway seawall.



Option 5B

Rare Winter Storm at High Tide on Shoreline between Booterstown and Blackrock

The former Blackrock Baths projects into the sea on the northern side of the station, and there is a moderately wide concrete platform along the shore that then passes between the baths and the wall of the railway station. Most of the baths structure was recently demolished as it had become dangerous, but the seawalls remain as an enclosure.

The former Blackrock Baths - now mostly demolished

Existing coastal path at demolished Blackrock Baths

It would be a simple matter to widen the above path into the former baths site.

Biodiversity Impact for Option 5A Williamstown Promenade

This promenade, restricted to within the width of the existing 8m+ wide revetment, would not encroach into either the SAC or SPA. It would appear from the available mapping that the intention of the SAC boundary is to follow the toe of the seawall revetment as existed in historic 6 inch Ordnance Survey mapping. The wall has since been partially covered by silt and so the position of the SAC boundary is in fact now a short distance from where the current toe of the seawall revetment exists. Therefore while it would appear that the original intention of the SAC boundary was to sit along the boundary of where the mudflats/sand-flats of the strand met the toe of the, there currently is a narrow strip of mudflats/sand-flats at the base of the seawall revetment which falls outside the SAC. In this section this strip of mudflats/sand-flats, which is likely to fall outside of the SAC boundary, varies between approximately 6-15m[4], being widest at the Williamstown Creek inlet/outlet and narrowest near both Booterstown and Blackrock stations.

While this option will not result in any loss of any Annex I mudflat/sand-flat habitat, it will impact upon minor areas of non-QI Annex I reef habitat where this is removed at Booterstown and Blackrock stations. Depending on the design of the promenade, marine biotopes might re-colonise the new structure overtime.

It is assumed that closing existing access points to the strand will not be feasible and that these existing access points would remain open in this section. An additional connection to the promenade (albeit with no direct access off the promenade at this location to the sea) would exist from Blackrock Park across the railway line at the existing Williamstown pedestrian bridge. A promenade in this location is likely to increase the number of users in this section over current usage levels and this is likely to increase the number of people gaining access to the beach via existing

[4] Note that measurements such as this can only be read off digital boundaries which may be offset and/or have other inaccuracies and therefore cannot be relied up on as being a reflection of the legal boundary of the SAC. Any measurements to SAC or SPA boundaries provided in this report are approximate estimates only and a best interpretation of what distances are likely to be.

access points to the strand (i.e. the steps at Booterstown and Blackrock stations and the footbridges at Williamstown and Idrone Terrance). Unmitigated, this may increase the numbers of bird disturbance events occurring here. A peak of 4,600 Annex I QI tern species was recorded in this section (BES, 2008). On the other hand there may be a slight improvement on the current situation, if the proposal was successful in directing and encouraging the majority of people onto the promenade facility rather than going out onto the beach. The success of this would be dependent on the success of the mitigation as discussed below.

In addition, this option would permanently remove important high tide roosting sites for significant numbers of Oystercatcher and small numbers of other species such as Curlew, Redshank, Ringed Plover and Brent Goose. These species roost in various locations along the sea wall revetment at high tide between Booterstown and Seapoint – peak numbers of 290 Oystercatcher were recorded in a single roost on the sea wall within this section. The creation of this structure would also remove feeding habitat for Turnstone and Brent Goose.

Significant disturbance/displacement of feeding birds (in particular around mudflats between Booterstown and Williamstown) and internationally important congregations of Terns which roost on these flats in autumn, could potentially be reduced with appropriate mitigation measures.

The permanent loss of important high tide roosting sites for SPA bird species is the most significant ecological constraint for this option. In the absence of mitigation this would be viewed as resulting in an impact on the integrity of the SPA and therefore would prevent this proposal from proceeding through a Habitats Directive Article 6(3) process. The only "mitigation" possible would be the provision of alternative replacement high tide roosting areas. However, it is questionable as to whether this falls under the definition of "mitigation" and is likely to be more akin to "compensation" which would require addressing through an Article 6(4) process, rather than Article 6(3). A Habitats Directive Article 6(4) process presents significant procedural and legal challenges to overcome. There is some evidence from experience in the UK of the application of ECJ judgement C-521/12, that the provision of alternative replacement high tide roosting areas might in fact be viewed as "mitigation" thereby allowing the process to proceed under a Habitats Directive Article 6(3) process. If this option was progressed as the preferred proposal, it would need significant and careful thought and consultation with the NPWS and others, regarding its viability under either an Article 6(3) or 6(4) process.

In either case considerable effort would need to be undertaken to identify suitable locations for replacement high tide roosts and to ensure that they would in fact be successful. This might involve experimental design with adaptive management, long before the scheme would be constructed to provide the necessary evidence and confidence regarding their success.

Locations that may be suitable as new or improved high tide roosts would be at the Blackrock and Sandymount baths sites which currently are used by low numbers of birds for high tide roosting but with enhancement might be made more suitable for increased numbers of birds. Any such provisions for new or improved high tide roosts would need to be developed in consultation with NPWS, BWI and the appropriate landowners.

This option involves two links between the coastal and inland routes; at Williamstown (600m southeast of Booterstown where there is an existing footbridge) and at Idrone Terrace (in Blackrock village at the southern end of this section). Due to the a 6.5m

level difference at the Williamstown footbridge, 130m long ramps would be required on both sides for a cycle bridge over the railway. The ramps would need to be sufficiently screened in order to avoid causing disturbance to feeding and roosting birds at this location. The location at Idrone Terrance would not require a ramp on the landward side. Any ramp on the seaward site would need to be sufficiently screened in order to avoid causing disturbance to feeding and roosting birds at this location. It is assumed that there would be no access from either of these connection points directly onto the strand, although it is likely that the existing access arrangements would remain in place.

Due to the removal of important high tide roosting areas, and potential for additional displacement and disturbance effects on feeding and roosting birds, this is a least favoured option.

Biodiversity Impact for Option 5B Williamstown Boardwalk

As all piers would be founded within the width of the existing 8m+ wide rock revetment, there will be no encroachment into either the SAC or SPA. It would appear from the available mapping that the intention of the SAC boundary is to follow the toe of the seawall revetment as existed in historic 6 inch Ordnance Survey mapping. The wall has since been partially covered by silt and so the position of the SAC boundary is in fact now a short distance from where the current toe of the seawall revetment exists. Therefore while it would appear that the original intention of the SAC boundary was to sit along the boundary of where the mudflats/sand-flats of the strand met the toe of the, there currently is a narrow strip of mudflats/sand-flats at the base of the seawall revetment which falls outside the SAC. In this section this strip of mudflats/sand-flats, which is likely to fall outside of the SAC boundary, varies between approximately 6-15m[5], being widest at the Williamstown Creek inlet/outlet and narrowest near both Booterstown and Blackrock stations.

This option will not result in any loss of any Annex I mudflat/sand-flat habitat. Nor will it impact upon the non-QI Annex I reef habitat at Booterstown and Blackrock stations.

It is assumed that closing existing access points to the strand will not be feasible and that these existing access points would remain open in this section. An additional connection to the promenade (albeit with no direct access off the promenade at this location to the sea) would exist from Blackrock Park across the railway line. A boardwalk in this location is likely to increase the number of users in this section over current usage and this is likely to increase the number of people gaining access to the beach via existing access points to the strand (i.e. the steps at Booterstown and Blackrock stations and the footbridges at Williamstown and Idrone Terrance). Unmitigated, this may increase the numbers of bird disturbance events occurring here. A peak of 4,600 Annex I QI tern species was recorded in this section (BES, 2008). On the other hand there may be a slight improvement on the current situation, if the proposal was successful in directing and encouraging the majority of people onto the boardwalk facility rather than going out onto the beach. The success of this would be dependent on the success of the mitigation as discussed below.

In addition, this option would permanently remove important high tide roosting sites for significant numbers of Oystercatcher and small numbers of other species such as Curlew, Redshank, Ringed Plover and Brent Goose. These species roost in various

[5] Note that measurements such as this can only be read off digital boundaries which may be offset and/or have other inaccuracies and therefore cannot be relied up on as being a reflection of the legal boundary of the SAC. Any measurements to SAC or SPA boundaries provided in this report are approximate estimates only and a best interpretation of what distances are likely to be.

locations along the sea wall revetment at high tide between Booterstown and Seapoint – peak numbers of 290 Oystercatcher were recorded in a single roost on the sea wall within this section. These birds would be directly displaced from this habitat by a boardwalk in this section; it is extremely unlikely that birds would roost under such a structure. The creation of this structure would also remove feeding habitat for Turnstone and Brent Goose.

Significant disturbance/displacement of feeding birds (in particular around mudflats between Booterstown and Williamstown) and internationally important congregations of Terns which roost on these flats in autumn, could potentially be reduced with appropriate mitigation measures.

The permanent loss of important high tide roosting sites for SPA bird species would be as described for Option 5A.

Although this option being a structure of reduced scale is slightly preferred over Option 5A, due to the removal of important high tide roosting areas, and potential for additional displacement and disturbance effects on feeding and roosting birds, this is a least favoured option.

12.4 Option 5C: Cycleway in Blackrock Park

If a coastal route is not feasible for environmental or cost reasons between Merrion Gates and Blackrock, then an inland route would be required. This could be connected from either the Rock Road route or an inland boardwalk at Booterstown Station. From these points onward there is an existing low-quality greenway through Blackrock Park from the Booterstown Avenue junction to the south-eastern end at Blackrock Village. The main problem with the existing facility is width, which can be easily rectified. It was presumably 3m wide originally, but grass has overgrown the edges and it is now only 2.5m wide typically, with a white centre line to separate cyclists from pedestrians. As a minimum for comfort of both users the existing width should be doubled by provision of a new cycle track separated from the existing path which can be dedicated to pedestrians only.

The route through the park is mostly at a very low elevation and is screened from views of the bay by the railway line, except for the more northerly 600m length between Booterstown and Williamstown where the ground level is about 1.5m higher than further south. A sense of being by the sea is therefore not available over 1km on this route.

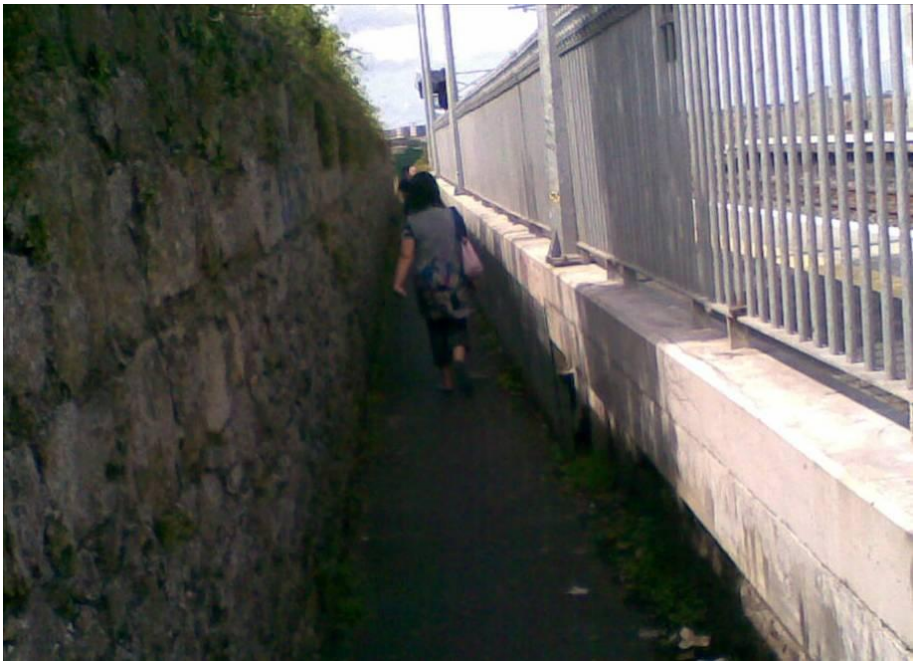
Existing Greenway in Blackrock Park - too narrow for comfort, but popular

There is also a blind spot where the route curves around the Electricity Transformer Station for the DART railway line. Cyclists are at risk of collision with each other or pedestrians at this location where realignment is necessary.

Blind spot on existing cycleway in Blackrock Park

The cycle route in the park is only connected to Blackrock Station by a very sub-standard laneway that is less than 1m wide between the back of the platform and the high boundary wall of *Deepwell* a large residential property. Despite the severely restricted width, many cyclists use this link, either by walking, or by waiting for a chance to cycle through in single file when it is clear. Land acquisition would be required from the garden of the house to provide a minimum 4m wide shared facility

over the 100m length. Preferably a 6.5m width would be provided for a segregated facility.



Very narrow laneway at Blackrock Station & Deepwell House

Deepwell House & Blackrock Station with very narrow laneway link to Blackrock Park

Deepwell house is a protected structure, and there would be cultural heritage impacts for changes to the curtilage at the northern boundary, and the ornamental gardens. It is also a property of significant value, and the compensation required for the land purchase would be substantial.

Biodiversity Impact for Option 5C

This option lies entirely inland and (subject to the comment regarding screening for Williamstown Creek) will not have significant impacts upon the SAC or SPA sites. There is existing screening by hedges of the Williamstown Creek, which is part of the SPA and is used by QI bird species. (Note also that the invasive species Japanese Knotweed is present within Blackrock Park and measures will be required prior to and during construction to ensure it is not caused to spread by works). **This is a preferred option.**

12.5 Option 5D: Cycleway in Blackrock Park & Coastal Footpath

This option would be as for Option 5C with an inland cycleway, and would also provide a footpath with minimal intrusion along the coastline. This would consist of an extension of the existing 2.0m to 2.5m wide concrete shelves that exist on the revetment at each of the existing public access points at Blackrock, Williamstown and Booterstown. The coastal path would be somewhat rugged in character and would not be suitable for use in stormy conditions, similar to the situation at other parts of the coast such as between Seapoint and Salthill.

There could be flexibility with this option to close the coastal path seasonally to protect intrusion for wintering seabirds, if it were found that disturbance was a significant problem.

As previously described for Option 4E, there could be safety concerns for an exposed walking route that does not have a proper edge protection, and a railing should probably be provided along the seaward edge. In addition, there could be public liability risks by providing a facility that could be unsafe in certain weather and tidal conditions, and for which active management would be required for closures for safety reasons.

Biodiversity Impact for Option 5D Williamstown Coastal Path

The cycleway in this option lies entirely inland as in Option 5C, along with a seasonal (closed with gates from August until March), narrow coastal ledge that only exists within the current extents of the rock revetment. It would be designed in such a way that it does not encroach into the SAC or SPA and does not directly impact upon any QI Annex I habitat but would results in minor loss of non-QI Annex I reef habitat where this is removed at Booterstown and Blackrock stations. The structure could be built in such a way that it would allow reef biotypes to recolonize the rock surface.

This option would have similar constraints to Option 4E. The major constraint with the coastal ledge here would be the possible loss of important high tide roosting sites along and adjacent to the sea wall, including for significant autumn congregations of Annex I tern species, and to a lesser extent possible displacement/disturbance from bird feeding habitat. The design of the coastal footpath would need to be carried out in consultation with NPWS and BWI in order to ensure it can continue to provide a roosting site for SPA bird species. The design could be such that the narrow path ledge could act as a potential high tide roost for birds during the winter time, if not accessible. As this option does not include any element of screening or restriction of access, the seasonal restrictions would be a necessary mitigation measure for this option. However given the existing access points these would have to be closed off in order to allow seasonal closure to happen and the practical realities of this might be impossible to achieve.

Unless seasonal closure could be achieved on this option, this is not a preferred option due to the removal of important high tide roosting areas, and potential for additional displacement and disturbance effects on feeding and roosting birds.

12.6 Connectivity Between Coastal and Inland Routes between Booterstown and Blackrock

There are two locations for potential links between the coastal and inland routes along this 1.5km section:

- At Williamstown, 600m southeast of Booterstown where there is an existing footbridge; and
- At Idrone Terrace in Blackrock village at the southern end.

Pedestrian Link at Williamstown

Due to the full 6.5m level difference, 130m long ramps would be required on both sides for a cycle bridge over the railway at this location. This will add significantly to the cost of a bridge, as well as making quite a visual impact for views from adjoining houses across the bay. There is little advantage to be gained from a cycle link at this location due to the very small catchment area, except for Blackrock College boys secondary school. Access to this school will in any case be available from the improved Rock Road cycle route.

Link at Idrone Terrace, Blackrock

South of Blackrock Station the terrain rises up and the road on the inland side at Idrone Terrace is perched high above the railway line such that the existing footbridge has only a few steps up to it on the inland side.

Existing footbridge at Idrone Terrace, Blackrock

Slightly further south of the existing bridge, the road is about 1m higher again and a level bridge crossing could be provided. This is a good connection point which provides access to a large catchment area to the south via Mount Merrion Avenue, Carysfort Avenue and other local cycle routes as shown in the Cycle Network Plan.

GDA Cycle Network Plan showing links to Coastal Route at Blackrock

12.7 Summary of Route Options in Section 5: Booterstown to Blackrock

Length: 1.5km

Option 5A: 4m wide Promenade on Seaward side of Railway;

Option 5B: 6.3m wide Boardwalk on Seaward side of Railway;

Option 5C: Cycleway in Blackrock Park; and

Option 5D: Cycleway in Blackrock Park & Limited Coastal Footpath.

12.8 Options Assessment for Section 5: Booterstown to Blackrock

The table on the following page provides a detailed assessment for the options identified in Section 5 in accordance with the procedure described in Chapter 6.

OPTIONS ASSESSMENT TABLE 5: Section 5 - Booterstown to Blackrock (1.4km)

	Option				
Criterion	**5A**	**5B**	**5C**	**5D**	**Notes**
	Promenade	Coastal Boardwalk	Blackrock Park	Blackrock Park + Coastal Footpath	
Economy					
Capital Cost	**€4.6m**	**€22.5m**	**€2.4m**	**€2.9m**	
Maintenance Cost					Aggressive Marine Environment for 5B
Transport Quality of Service	**B**	**A+**	**A+**	**A+**	Cyclists not segregated from pedestrians in 5A and must travel more slowly.
Safety					
Pedestrian and Cyclist Safety					Shared space for cyclists and pedestrians in 5A may lead to conflicts when busy.
Environment					
Landscape and Visual Quality					Sea views best on outer side of railway, but visual intrusion by new structures. No views for 5C south of Williamstown.
Biodiversity					5D: Potential seasonal closure of coastal path / alternative roost sites . 5D is orange if coastal ledge can be designed and managed successfully?
Cultural Heritage					Sea wall is impacted by Option 5A. Revetment of sea wall is impacted by 5B and 5D. Curtilage of protected structure at Deepwell impacted by 5C and 5D.
Land Use					
Accessibility & Social Inclusion	No Differential between Options				
Integration					
Cycle Network Integration					Better linkage to catchment area for 5C
Coastal Footpath					5C path is near the sea, but screened by railway line in places. 5D path could have safety issues and seasonal restrictions.
Preference	**3**	**4**	**1**	**2**	**Option 5C**

12.9 Selected Option for Section 5: Booterstown to Blackrock

The overall ranking has found that Option 5C is the best option for this section, and will entail the following elements:

a) Upgraded and widened cycleway and footpath through Blackrock Park; and

b) Land acquisition from the garden of one large residential property (*Deepwell*) for a widened link between Blackrock Park and Railway Station.

13. ROUTE OPTIONS FOR SECTION 6: BLACKROCK TO SEAPOINT

13.1 Section 6 Over-view

Section 6 commences at Idrone Terrace just south of Blackrock Station at Chainage 5,200 and extends for 1.3 km to just beyond Seapoint Martello Tower at Chainage 6,500 at the junction of Brighton Vale and Seapoint Avenue where there is a bridge that gives access to the seafront. The shoreline is very different on this section of coast with rock outcrops on the seaward side of the railway line and a small headland at Maretimo. In places there is a wide corridor available between the railway and seawall that is not available in Sections 5 and 4 further north.

This section is covered in 4 sheets on Drawings No.601 to 604.

Key Map for Section 6 and Sheet Plans

A total of 5 options were identified as described in 12.3 to 12.6:

Option 6A: Coastal Promenade & Boardwalk

Option 6A1: Coastal Promenade Variant

Option 6B: Seapoint Avenue One-Way with Cycleway

Option 6B1: Seapoint Avenue One-Way with Cycleway & Coastal Footpath

Option 6C: Seapoint Avenue Two-Way with Cycleway

Coastline east of Blackrock Station with Maretimo Headland in the background

13.2 Biodiversity Constraints in Section 6

- Annex I *Reefs* habitat in the Study area is present from Seapoint Martello Tower up to the rock revetment at Seapoint Station and is present along various parts of the seawall;
- There are significant Oystercatcher high tide roosts located on the sea wall revetment between Maretimo Point and Seapoint Dart Station (one roost held *c.*240 individuals roosting on the seawall wall here in a single survey in 2014); and,
- Water-birds feed and roost within the rock pools and on the intertidal flats in this section.

13.3 Option 6A: Coastal Promenade from Blackrock to Seapoint with Short Boardwalk at Eastern End

For a length of 400m east of Blackrock Station there is a width of about 5m on the inland side of the seawall, between it and the railway fence, even though the posts for the overhead power wires of the railway are in this space. A cycleway could be provided between the seawall and the railway fence, with a walkway on the seaward side of the seawall where there are some rough concrete shelves. However, these shelves run out after a short distance, and a new narrow promenade of about 4m width would be required over most of the distance to the Maretimo headland.

Generally along this section of coastline the boundary of the SAC appears to be about 10m north of the toe of the railway revetment, and therefore a promenade may not extend into the SAC, but it would still impact on the rocky foreshore where there are mussel clusters and seaweed that are part of a distinct habitat.

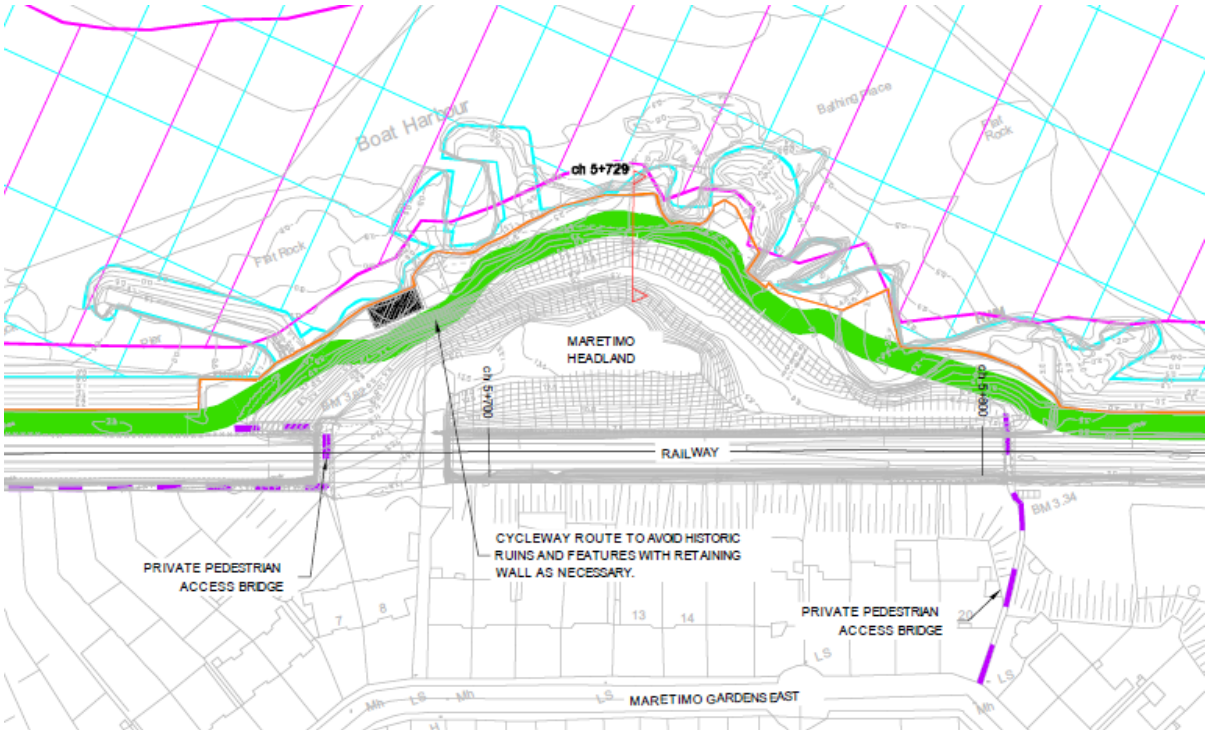
The most appropriate solution between Blackrock and Seapoint would seem to be a 5m wide shared greenway so as to fit on the inland side of the seawall alongside the railway. T he overhead gantries for the railway electric catenary could be modified to move the posts into a less intrusive location and maximise the effective width for the greenway.

Space between Railway and Seawall East of Blackrock

The small headland at Maretimo is a curious feature on the coastline that extends for a length of 160m on the seaward side of the railway line. It is in private ownership, with private access only from Maretimo Gardens on the other side of the railway via a narrow footbridge at the eastern end and over a short tunnel of about 30m length at the western end. There are various cultural heritage features on the headland, with narrow informal footpaths winding between them. With negotiated access and careful design a promenade route for pedestrians and cyclists could be developed through this section of the route.

Folly at Maretimo

Maretimo Headland with Rock Reefs



Extract from Drawing No.612 showing Route Option 6A at Maretimo (in green)

The next section is 430m long between the Maretimo headland and Brighton Vale. For the first 200m, the greenway route could resume on the inland side of the seawall as far as Seapoint Station where there is a 4m to 5m width available as shown in the photograph below. This arrangement would limit disturbance for seabirds that may roost on the rock revetment on the seaward side of the wall.

Railway Corridor West of Seapoint Station towards Maretimo

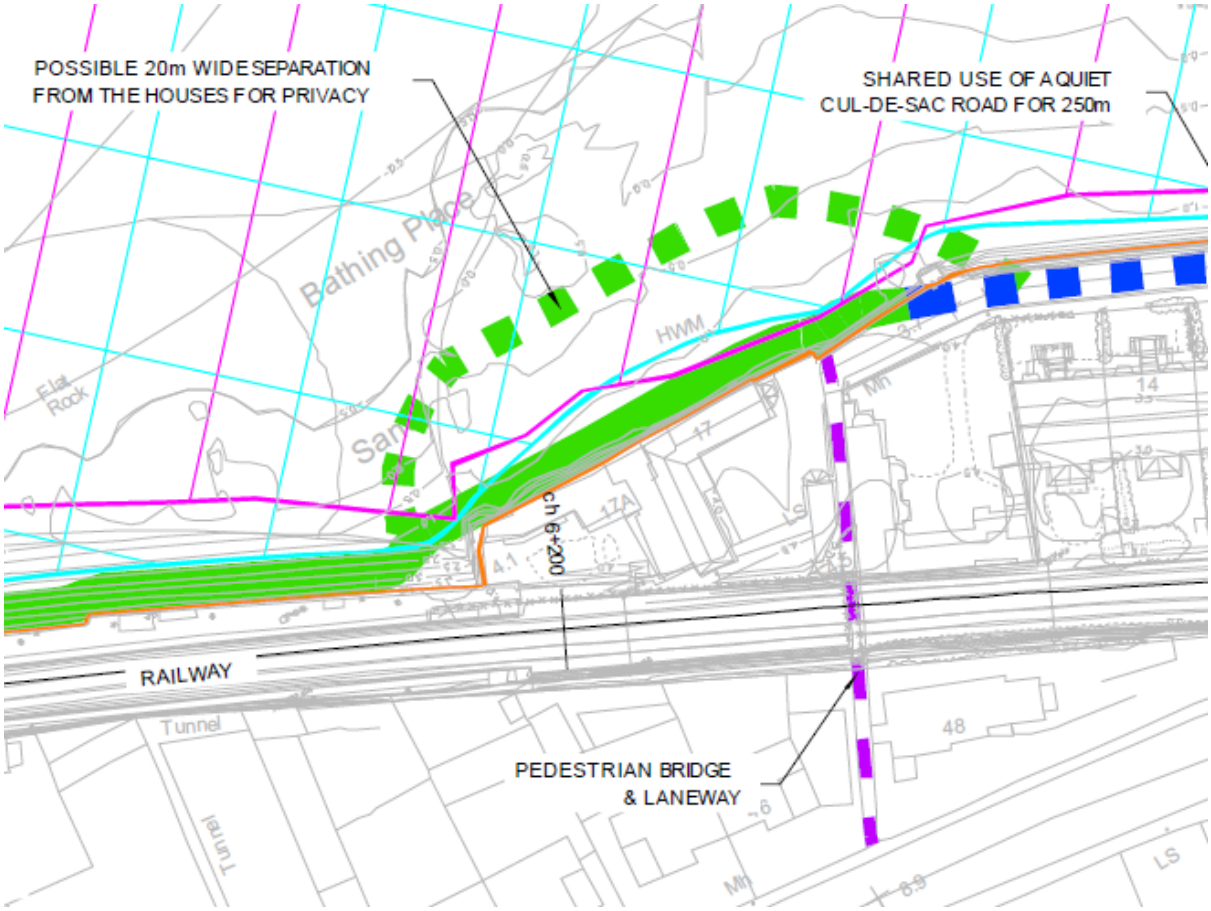
At Seapoint Station the greenway route would pass back onto the seaward of the wall. Here a new greenway promenade could be constructed on the stone revetment on the coastline outside the station wall, with either a new vertical sea-wall, or a rock armour slope extending out from the shoreline by over 10m. Alternatively a boardwalk could be provided that would have little footprint on the shore.

Wide Sloped Revetment at Seapoint Station

At the western end of Brighton Vale a new promenade or boardwalk would pass in front of the windows of two houses at that look out to sea, (No.17, The Breakers, and No.17a, The Cormorants, as seen in the next photograph), which will have privacy implications. It may be necessary to provide a buffer zone between the promenade and these houses by moving a boardwalk perhaps 20m out from the shore, but that

would entail greater encroachment into the SAC on the rocky shoreline that is exposed at low tide.

View westward from Brighton Vale towards Maretimo Headland



Route Option 6A and Variant at Brighton Vale Houses (Extract from Drawing No.613)

Biodiversity Impact for Option 6A at Seapoint

Annex I Reefs habitat is present along most of this section on rocky outcrops and along various parts of the seawall.

It is difficult to interpret what the intention is for the location of the SAC boundary in this section. It would appear that the intention of the SAC boundary is, as with other sections further north, to follow the toe of the seawall revetment as existed in historic 6 inch Ordnance Survey mapping. In this section there would not appear to have been as much build up of silt as in areas further north. Therefore the assumed positioning of the SAC boundary at the toe of the seawall revetment would appear to be in a very similar condition to that of the historic 6 inch Ordnance Survey mapping on which the SAC boundary would have been drawn. The interpretation of the SAC boundary is that it excludes the seawall revetment but includes the rocky outcrops and mudflats/sand-flats that extend from its base.

It would appear that the intention of the SPA boundary is to include some or all of the seawall revetment. At least it appears from digital NPWS mapping to be located slightly further south (inland) than the SAC boundary and it is likely that the intention of the SPA boundary was to include either part or all of this seawall revetment which is used as a high tide roost by SPA bird species.

Between Blackrock and Maretimo and from the southern end of Maretimo headland to Seapoint station this option would involve a greenway largely behind the existing sea wall, between it and the railway line. Where this is behind the existing sea wall this would not involve any encroachment into either the SAC or SPA. However there is a stretch of approximately 140m from the southern end of Blackrock baths which will be on the seaward side of the railway wall. Approximately 80m of this (between ch5+200 and ch5+300) follows the route of an existing concrete shelf just outside Blackrock dart station and the proposal would not encroach beyond the existing footprint of this shelf. The remaining approximately 60m will involve the loss of a small area of non-QI Annex I reef habitat, which it would appear may be outside of the SAC boundary. Where this is lost it is likely to recolonize on the new structure depending upon its design. No loss of QI habitat would occur. This option would traverse Maretimo headland without encroaching into either the SAC or SPA. Indirect disturbance/displacement impacts on the SPA are discussed further below.

At Seapoint station the route would pass onto the seaward side of the wall. Here a new promenade would be constructed on the railway revetment, with either a new vertical sea-wall, or a rock armour slope extending out from the shoreline by over 10m. Alternatively a boardwalk would be provided that would have little footprint on the shore. At the western end of Brighton Vale a new promenade or boardwalk would pass in front of two houses. It may be necessary to provide a buffer zone between the promenade and these houses to provide privacy, but that would entail greater encroachment into the SAC on the rocky shoreline that is exposed at low tide. These elements of the option are likely to involve encroachment into the SPA (depending on whether the SPA boundary includes part of all of the revetment and depending on what height the promenade/boardwalk is provided at). The section from Seapoint station to the two houses at the western end of Brighton Vale would more than likely not involve any encroachment into the SAC, assuming that the interpretation of the SAC boundary falling at the toe of the revetment is correct. However the SAC boundary appears to include everything to the seaward side of the two houses, therefore the route around these houses would appear to be within the SAC at this point. Encroachment into the SAC at this location would not entail any loss of QI Annex I habitat but would involve direct impacts on non-QI Annex I reef habitat. As an alternative Option 6A1 would involve the purchase of these properties but these houses are protected structures which limits the scope for demolition or modification of the buildings to create space for a route that does not extend onto the foreshore. Therefore it is assumed that the impact of Option 6A1 will be identical to Option 6A.

The final 250m of the route would share the small existing quiet cul-de-sac road on Brighton Vale to reach the end of the scheme at Seapoint Martello Tower and public swimming area. This will be entirely outside of both the SAC and SPA. There is an existing low wall along this section which will provide little screening. Therefore if user numbers are to significantly increase over current numbers, an analysis of current use, and a forecast of future predicted use, may be required with provision for screening if necessary.

This scheme would bring people and dogs into an area that is extremely inaccessible and currently experiences little or no levels of access or disturbance by people (in particular the area up to the start of Brighton Vale). Users of the scheme would be confined to the promenade structure and there would be no access provided to the seaward site in this section so there presumably would be little or no increased access to the sea in this location. There are two private accesses across the railway to the sea for residents at Maretimo Headland and it is assumed that these accesses will remain private, although this option does indicate the possible opening up of these pedestrian accesses to the public. However despite not increasing direct access to sea, the proximity and visibility of users to birds using the revetment wall could result in disturbance or displacement of birds from this area. The area of primary importance in this section is the area between Maretimo Point and Seapoint Dart Station which supports a significant oystercatcher high tide roost (e.g. in 2014/2015 surveys 217 Oystercatcher were recorded at approximately ch5+900 and 240 Oystercatcher were recorded at approximately ch6+000). Significant disturbance/displacement impacts could potentially be reduced with appropriate mitigation measures.

At the southern end of this section, where this section requires a short promenade/boardwalk on the rocky shore (*c.*70m long from the end of Seapoint station around the two houses to Brighton Vale) there is potential for disturbance/displacement impacts on rocks and rock-pools used for feeding and roosting by a number of SPA bird species. The impacts on birds, which primarily use this area for feeding (mainly in small numbers but 329 Dunlin were recorded here during the BES 2008 study), will not be as significant as the potential disturbance/displacement to the Oystercatcher high tide roosts and it is deemed likely that screening mitigation would be sufficient to avoid significant negative impacts.

The potential for disturbance to the important high tide Oystercatcher roost between Maretimo Point and Seapoint Dart Station is the most significant ecological constraint for this option. In addition the loss of the high tide roost at the section parallel to Seapoint station could be of significance. While this section does not appear to be used as frequently as the section immediately north, the permanent loss of a high tide roost site for SPA bird species is the most significant ecological constraint for this option. In the absence of mitigation this could be viewed as resulting in an impact on the integrity of the SPA and therefore might prevent this proposal from proceeding through a Habitats Directive Article 6(3) process. As described earlier the possible provision of alternative replacement high tide roosting areas might provide "compensation" through an Article 6(4) process, rather than Article 6(3).

This option additionally might involve a number of additional pedestrian only linkages which would involve making public the existing private accesses at Maretimo Gardens East and Maretimo Gardens West (Lord Cloncurry's Bridge), as well as from residences at Ardenza Park. There additionally is a footbridge within Seapoint station which could be extended to connect to the new seaward promenade. In all cases these pedestrian links would bring people and dogs into an area that is

extremely inaccessible and currently experiences little or no levels of access or disturbance by people (in particular the area up to the start of Brighton Vale). Users of the scheme would be confined to the promenade structure and there would be no access provided to the seaward side, so there presumably would be little or no increased access to the sea in this location. However despite not increasing direct access to sea, the proximity and visibility of users to birds using the revetment wall could result in disturbance or displacement of birds from this area. The area of primary importance in this section is the area between Maretimo Point and Seapoint Dart Station which supports a significant oystercatcher high tide roost; three of these four possible pedestrian links would provide access at these locations. Significant disturbance/displacement impacts from these pedestrian links could potentially be reduced with appropriate mitigation measures as already described above.

From a biodiversity perspective this is a least preferred option in comparison with the other available options.

Landscape and Visual Impact for Option 6A at Seapoint

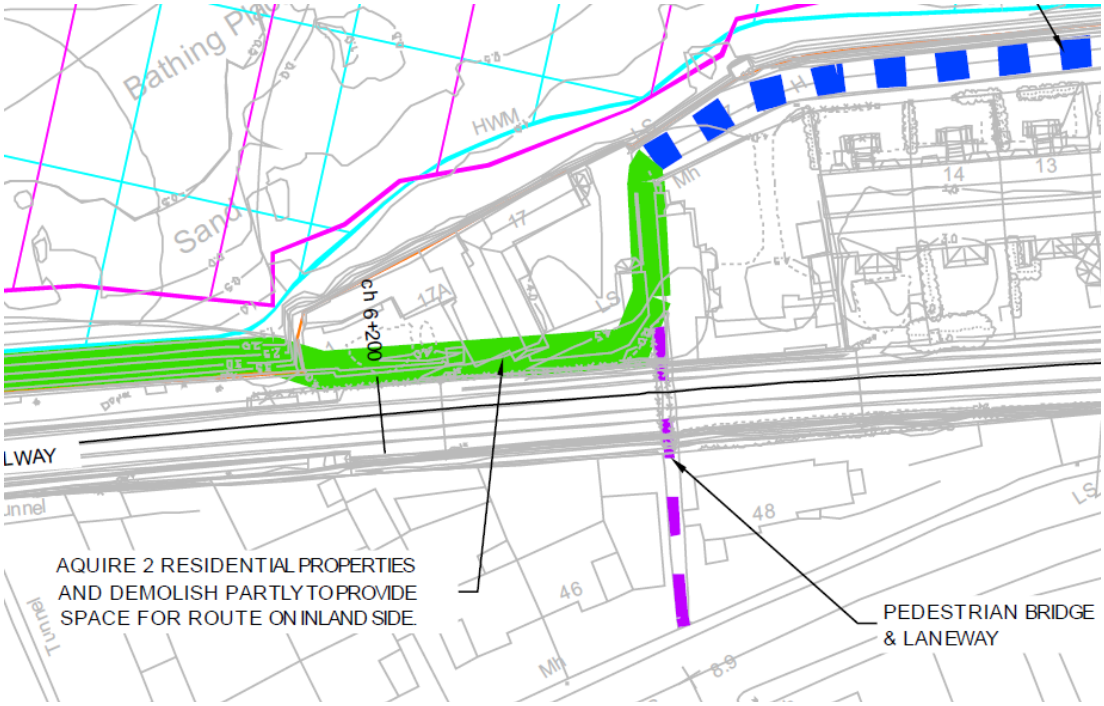
The route for Option 6A is predominantly on existing ground and will result in no additional visual impacts between Blackrock and Seapoint Railway Station. The only new bridge structure required would be at Idrone Terrace in Blackrock where a new cycling bridge would be provided about 20m east of the existing footbridge. This bridge will be at-grade on the inland side of the railway where the existing road level is high enough above the railway to not require a ramp access. The new bridge and ramp on the seaward side will not be visible from the houses on Idrone Terrace, and will not intrude on seaward views from the public footpath across the bay towards Howth.

At the western end of Brighton Vale, there are two private dwellings that face directly out to sea. Option 6A proposes a new boardwalk to get past these dwellings and this would pass the seaward side of these dwellings and impact on sea views from the houses and there will be a significant negative visual impact for the residents.

13.4 Option 6A1: Coastal Promenade from Blackrock to Seapoint with Route Behind Houses at Brighton Vale

In this option it may be appropriate to purchase the two residential properties at the western end of Brighton Vale if the current owners have major difficulties with the loss of privacy involved with Option 6A. Rather than provide a boardwalk on the shore in front of the houses, which would have an ecological impact, the greenway route could instead be diverted to the rear of the houses and through the rear edge of the properties as shown in Drawing No.615.

The two houses are protected structures which limits the scope for demolition or modification of the buildings to create space for a route that does not extend onto the foreshore. There appears to a yard at No.17A that the route could traverse. The house at No.17 is configured around a courtyard and some demolition of the rear part of the house beside the railway would be required.



Route Option 6A1 at Brighton Vale Houses (Extract from Drawing No.615)

Cultural Heritage Impact for Option 6A1 at Seapoint

There would be a slight impact on the revetment of the sea wall, which constitutes an impact on architectural heritage.

There will be a direct impact on two buildings included in the Record of Protected Structures at 17 and 17A Brighton Vale with partial demolition of these buildings to provide a 6m wide route alongside the railway, constituting a <u>significant impact on architectural heritage</u>.

<u>Brighton Vale</u>

For the final 250m length, the route would share the small existing cul-de-sac road on Brighton Vale to reach the end of the scheme at Seapoint Martello Tower and public swimming area.

Brighton Vale

From Seapoint onward for 700m there is an existing narrow footpath along the coast to Dun Laoghaire Harbour at Salthill Station. This path is only about 2m wide in places and is therefore not suitable for shared use by pedestrians and cyclists. Although there is an alternative pedestrian route on the seaward side of the seawall for the westerly 300m length of this section, the inland path is too narrow for comfortable cycling. There is also a very steep ramp at the western end that is too steep for most cyclists. A further section of promenade will be required between Seapoint and Salthill to complete the coastal route to a satisfactory standard. From Salthill to Dun Laoghaire Harbour there is an existing 5m wide greenway.

Existing Very Narrow and Unsuitable Greenway from Seapoint to Salthill

13.5 Option 6B: Cycleway from Blackrock to Seapoint via Seapoint Avenue with One-Way Traffic

If it is found to be undesirable or impractical for the cycleway to follow the coastline in this section, then the alternative would be to take an inland route via Idrone Terrace and Newtown Avenue in Blackrock to Seapoint Avenue.

Idrone Terrace is a quiet residential Street on the seafront in Blackrock that has very low volumes of low speed traffic. It is suitable for cycling without active provision of cycling facilities.

Idrone Terrace, Blackrock

Newtown Avenue extends eastward from the centre of Blackrock Village at the Idrone Terrace junction for 400m to the junction with Seapoint Avenue. This is a one-way street westbound for traffic. In recent years the obvious need for eastward cycling has been catered for with a segregated contra-flow cycle track. As can be seen in the next photograph, some westbound cyclists prefer not to share the road with traffic and cycle the wrong way on the cycle track, which is too narrow to cater for two-way cycling in comfort. The current facility provides a satisfactory arrangement within the constraints of the fairly narrow street, but it is not great as an amenity route in the westbound direction.

Contra-Flow Cycle Track on Newtown Avenue, Blackrock

The traffic signals at the junction of Newtown Avenue and Seapoint Avenue do not have cyclist detection. In the eastbound direction the cyclist needs to push a button to call on the green cycle signal to proceed. In the westbound direction there is no equivalent provision and a cyclist will not get a right-turn filter signal unless the loop in the road is triggered by a motor vehicle. There is scope for considerable improvement in the signalling at this junction to the benefit of cyclists. For example westbound cyclists could be separately signalled from general traffic with a long green stage that would enable cyclists to get well ahead before release of following traffic. As this route is for local access only, the green time for general traffic should be shortened to discourage through traffic.

Seapoint Avenue is quite a wide road at 8.5m at the Blackrock end and wider in other places. However, there are pinch-points where the carriageway is just 7.3m wide, such as at between Tobernea Terrace at the Midway shop over a 110m long section to the Alma Road junction beside the access to Seapoint Railway Station. There is another 120m long narrow section between Trafalgar Terrace and the railway cutting just west of the Brighton Avenue junction.

There is on-street parking on the northern side of the road at the Blackrock end over a 90m length where some houses do not have driveways. Three of these houses are set at a higher level than the road and provision of a driveway would not be feasible. There is a loading bay at the Midway local shop between the junctions with Temple Park Avenue and Tobernea Terrace, a little further to the east. Otherwise there are double yellow line parking restrictions on the rest of the road on both sides.

Seapoint Avenue western end at Blackrock with Parking

Seapoint Avenue carries the N31 national route to Dun Laoghaire harbour for access to ferry services to Wales. However, in recent years the ferry service has been reduced and operates only seasonally, with freight traffic no longer carried, and in early 2015 Stena announced the permanent end of the ferry service. The importance of this route for non-local traffic is therefore much reduced. It does however form one of a pair of traffic routes, in conjunction with Monkstown Road, linking Dun Laoghaire town centre and Dalkey beyond to Dublin City Centre.

Seapoint Avenue east of Alma Road without Parking

If a segregated cycleway were to be provided on Seapoint Avenue where it is at its narrowest width of just 7m, the road would need to be reduced to a single traffic lane so as to provide the necessary space. This could be achieved by diverting through traffic to Monkstown Road and Temple Hill, which is just 150m to the southwest. Seapoint Avenue could then provide local access only in alternating directions on one-way sections linked back to Monkstown Road via the many connecting streets, of which there are 12 in the 1.5km length between Blackrock and Monkstown Village.

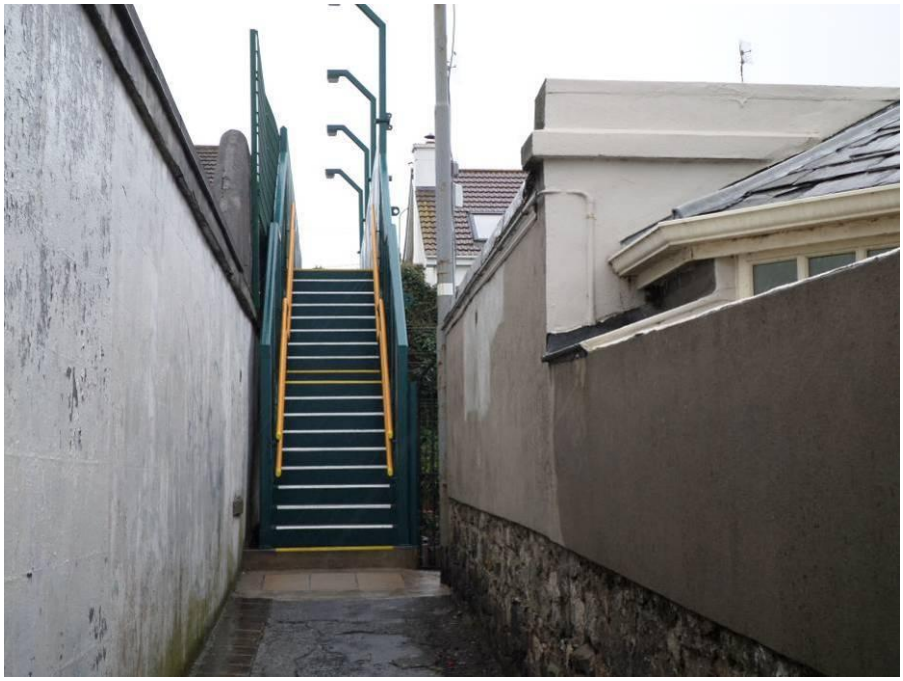
Photomontage of Proposed Option 6C Seapoint Avenue Cycleway with Widening at Properties on Eastern side

Biodiversity Impact for Option 6B

This option would occur entirely inland from Idrone Terrace to Seapoint Avenue and therefore would not have any impact on the SAC or SPA. **This is a preferred option.**

13.6 Option 6B1: Cycleway from Blackrock to Seapoint via Seapoint Avenue with One-Way Traffic & Coastal Footpath

This hybrid option would involve a combination of Option 6B for the cycleway on the inland route, with a coastal footpath that could skirt around the rear of the two houses at 17 and 17a Brighton Vale. There is a 1.8m wide laneway at the western end of Brighton Vale that connects to a footbridge over the railway line.



Laneway at Brighton Vale West

Access to No.17a, The Cormorants, is from the southern end of this laneway at the foot of the steps up to the pedestrian bridge. With land acquisition, it should be feasible to develop a narrow 50m long public footpath between the railway and the adjoining properties westward as far as the end of the platform at Seapoint Station. This new public pedestrian route would be narrower than desirable, but would be similar to some existing laneways in Dalkey and Killiney that provide access to important public amenity areas.

Narrow Private Lane beside Railway for access to No.17a Brighton Vale.
Part of House at No.17 on right of lane.

By skirting inland between Brighton Vale and Seapoint Station, this option would avoid the visual impact difficulties associated with Option 6A at these two houses and ecological issues associated with a boardwalk across the foreshore area.

The pedestrian route would then cut through to the seaward side of the sea wall with a 135m long boardwalk to pass around the station, before resuming on the inland side of the seawall for the remainder of the length to Blackrock.

Generally the coastal footpath would be 3m wide, with narrower sections where necessary, such as on the boardwalk section (2.5m) and around the houses at Brighton Vale (1.5m min).

Biodiversity Impact for Option 6B1

The cycleway for this option would be as for Option 6B and would similarly have no impacts on the SAC or SPA. However this option would additionally provide a coastal footpath that would skirt around the rear of the two houses at 17 and 17a Brighton Vale making use of an existing laneway at the western end of Brighton Vale

that connects to a footbridge over the railway line. This would avoid the need for a promenade/boardwalk across the foreshore area to the front of these two houses.

The pedestrian route would then cut through to the seaward side of the sea wall with a 135m long approximately 2.5m wide boardwalk to pass around Seapoint station on the seaward side, before resuming on the inland side of the seawall for the remainder of the length to Blackrock as per Option 6A but being pedestrian only.

The coastal footpath element of this option would avoid most of the impacts as already described for Option 6A and so are not repeated here. The key difference is the absence of the boardwalk to the front of No.17 and No.17A Brighton Vale and therefore the avoidance of any encroachment into the SAC at this point with no loss of non-QI Annex I reef habitat.

There would be a short boardwalk provided at the seaward side of Seapoint Station which would adversely affect roosting by seabirds on the rock revetment locally.

The impacts of this option are similar to those for Option 6A, they would be of a much reduced level. **While preferable to Option 6A, this is still a less preferred option in comparison with the other available options inland from the coast.**

13.7 Option 6C: Cycleway from Blackrock to Seapoint via Seapoint Avenue with Two-Way Traffic & Coastal Footpath

If traffic disruption associated with a one-way system on Seapoint Avenue is considered to be unacceptable, then the alternative would be to widen the road at the two narrow sections so as to accommodate the cycleway.

In Option 6C, the cycleway would have the minimum desirable width of 2.5m, with a 0.2m wide upstand kerb to separate it from traffic. The footpaths on either side of the road would be 1.8m wide, which is the minimum requirement of the DMURS manual (Section 4.3.1, page 86). The overall width required is therefore 12.3m minimum, which is available along 2/3rds of the road. Widening will be required over 2 sections:

Road Widening - Section 1: Tobernea Terrace to Alma Road

- for 110m length;
- typically 11.3m wide between boundaries;

Narrow Section 1 of Seapoint Avenue between Tobernea Terrace and Alma Road

In Section 1, it will be necessary to acquire a small strip, up to 2m wide, from 14 gardens on the northern side of the road. Most of the properties along this section are large period houses that face northward onto the coast at Tobernea Terrace and Ardenza Terrace, all of which are listed as protected structures, and their back gardens front onto Seapoint Avenue. Many of these houses have garages or sheds with access from the public road, as well as trees and shrubs on the boundary. Changes to the curtilage of these properties could have cultural heritage implications, although as can be seen in the following photograph, many have had modern interventions.

Typical Situation on Northern side of Seapoint Avenue at rear of Ardenza Terrace

In addition there is a pair of semi-detached houses fronting onto the northern side of the road mid-way along the block.

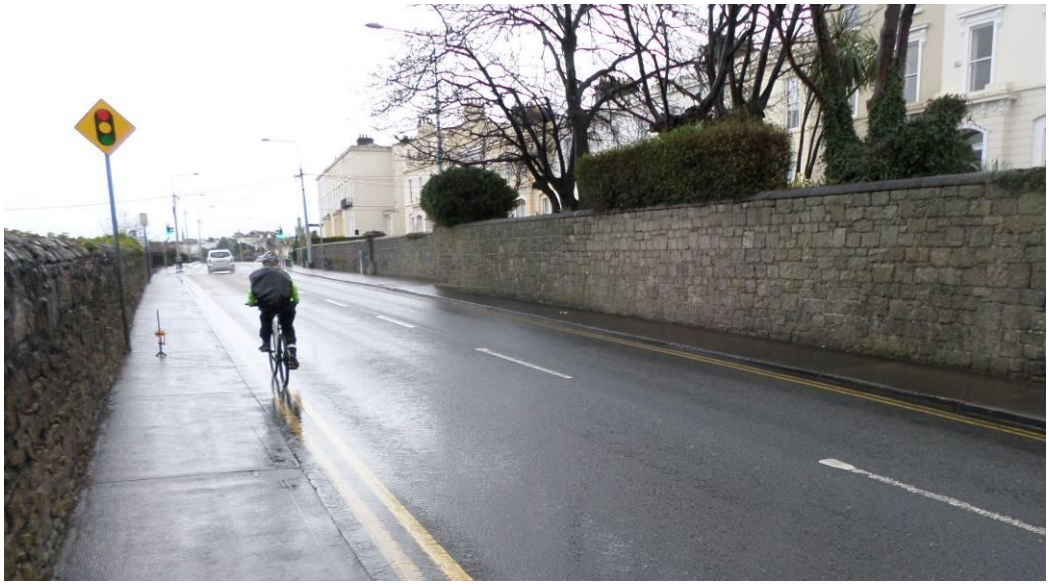
On the southern side of the road there is little scope for road widening due to 2 buildings that have facades directly on the boundary line.

Seapoint Dental Clinic on southern side of Seapoint Avenue

Recently constructed house on southern side of Seapoint Avenue

Road Widening - Section 2: Trafalgar Terrace

- 120m length, just west of the Brighton Vale junction;
- 10.3m wide between boundaries at the narrowest section where there is a localised step in the retaining wall on the southern side that supports a row of trees in front of the houses.

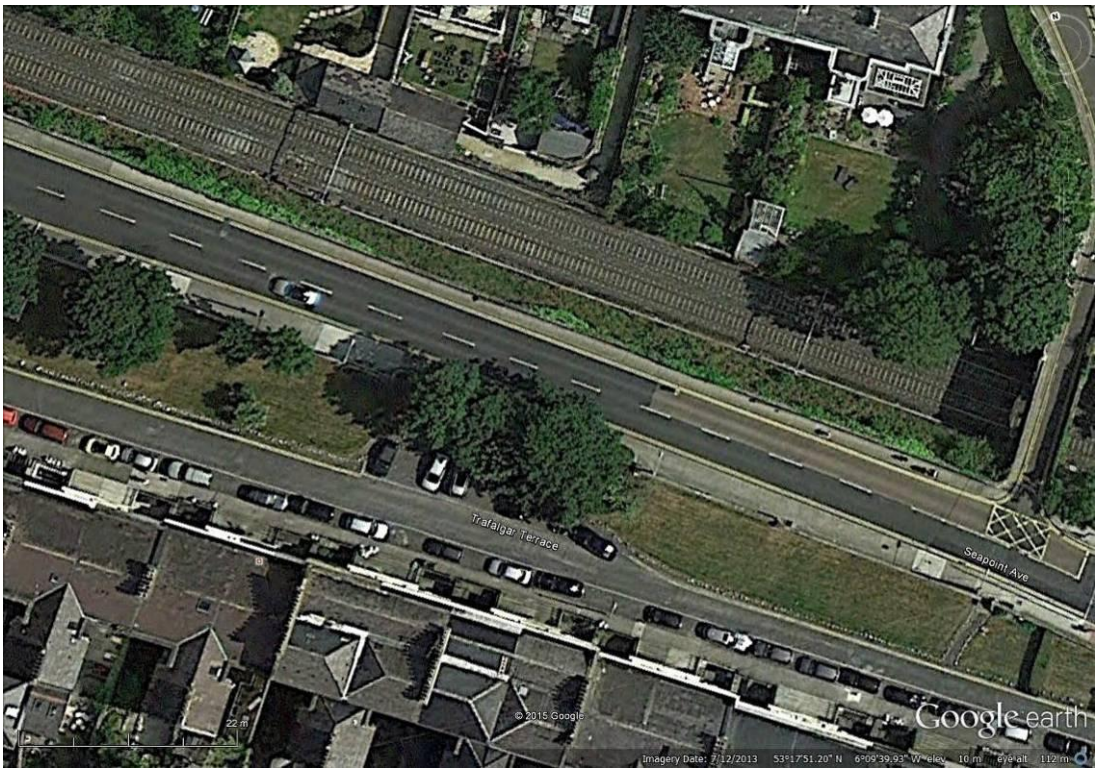


Narrow Section 2 of Seapoint Avenue at Trafalgar Terrace

The full extent of Trafalgar Terrace is a protected structure, and this presumably includes the granite masonry retaining wall on the road edge shown in the above photograph. The most appropriate solution for the required road widening on this section would be on the railway side to the north, where there is a steep bank at the top of the cutting slope.

Railway Cutting at Trafalgar Terrace

A retaining wall could be constructed with secant piles as an extension of the lower masonry retaining wall beside the railway track. The available width measures at about 3.5m, which will accommodate the required 2m of road widening. This wall would be 180m length to extend as far as Belgrave Place where the road becomes wider and there is a logical end point for the cycleway scheme.



Aerial Photograph at Trafalgar Terrace.

Note trees and car parked at salient that projects towards Seapoint Avenue in the central section.

Biodiversity Impact for Option 6C

The cycleway for this option would be as for Option 6B and would similarly have no impacts on the SAC or SPA. However this option would additionally provide a coastal footpath similar to that described in Option 6B1 above with identical impacts to that option.

Cultural Heritage Impact for Option 6C - Seapoint Avenue Widened Locally

There will be slight impact on the setting of protected structures at Tobernea Terrace and Ardenza Terrace. The impact will be limited to the rear boundary walls which front onto Seapoint Avenue. Cartographic analysis and site survey indicate the original boundary walls and mews buildings have been altered or replaced over time and the impact on architectural heritage is considered slight.

Landscape and Visual Impact for Option 6C - Seapoint Avenue Widened Locally

Option 6C requires acquisition of a strip of land along the rear of a row of properties that back onto Seapoint Avenue that will result in significant negative visual impacts during construction stage. Post construction, boundaries will have been replaced to match existing. One substantial Oak tree will be lost, resulting in a moderate negative impact for landscape. This tree could be replanted with a semi-mature of same species with the consent of the property owner so as to mitigate this impact over time.

13.8 Connectivity between Coastal and Inland Routes between Blackrock and Seapoint

There are two locations for potential links for cyclists between the coastal and inland routes at each end of this 1.3km section:

- From Idrone Terrace via Newtown Avenue to Temple Hill
- At Brighton Vale via the narrow road bridge over the railway line beside the Martello Tower at Seapoint.

Because of private properties backing onto the railway line on the western side there are no real opportunities for intermediate access points for cyclists along this section. At the modest pace of 15 km/h a cyclist would cover the 1.3km distance in just 5 minutes, so there so there is no real need for additional linkage.

For a pedestrian on the other hand, walking at 5 km/h, it would take 15 minutes to cover this distance. Intermediate pedestrian links would be desirable for convenience, as well as personal safety to provide escape routes in the event of attack. There is a narrow laneway with steps from the western end of Brighton Vale that links onto Seapoint Avenue, and this reduces the distance to the next public access point at Idrone Terrace to about 1km.

There are other private pedestrian access points as follows:

a) Beside Seapoint Railway Station, where there is a footbridge within the station, and a private footbridge from *Ardenza*, a small terrace of houses, 50m to the west;

b) Maretimo Gardens East, where there is a private footbridge and a tunnel link over the railway to the small headland;

c) Maretimo Gardens West, where there is a private footbridge referred to as *Lord Cloncurry's Bridge.*

If all three of these existing access routes were opened to the public, (which seems unlikely) it would give a connection at roughly 300m intervals along this section of a coastal route.

13.9 Summary of Route Options in Section 6: Blackrock to Seapoint

Length: 1.3km

Option 6A Shared Cycleway and Pedestrian Route with a Combination of

- Promenade (5m wide) inside the existing seawall for 800m south of Blackrock Station, around the Maretimo headland and to Seapoint Station;
- Boardwalk (5m wide) for 260m around Seapoint Station to Brighton Vale;
- Shared cul-de-sac road at Brighton Vale for 250m.

Option 6A1: As for 6A, but with purchase of 2 houses at western end of Brighton Vale to fit cycleway on inland side.

Option 6B: Cycleway on Seapoint Avenue with One-Way Traffic

Option 6B1: Cycleway on Seapoint Avenue with One-Way Traffic & Coastal Footpath

Option 6C: Cycleway on Seapoint Avenue with Two-Way Traffic & Coastal Footpath

13.10 Options Assessment for Section 6: Blackrock to Seapoint

The table on the following page provides a detailed assessment for the options identified in Section 6 in accordance with the procedure described in Chapter 6.

OPTIONS ASSESSMENT TABLE 6 - Section 6 - Blackrock to Seapoint (1.3km)

	Option					
Criterion	**6A**	**6A1**	**6B**	**6B1**	**6C**	**Notes**
	Coastal	6A and partly through Houses	Seapoint Ave. One-way	Seapoint Ave. One-way + Coast Path	Seapoint Ave. Two-way + Coast Path	
Economy						
Capital Cost	**€5.4m**	**€7.2m**	**€0.2m**	**€0.7m**	**€5.7m**	
Maintenance Cost						Short section of structure in 6A requires maintenance. Segregated cycleway in 6B adds to road maintenance.
Transport Quality of Service	**A+**	**A+**	**A**	**A**	**B**	6A remote from road. 6B/6C share with traffic in Blackrock. 6C narrow 2-way cycleway, 2.5m wide.
Safety						
Pedestrian and Cyclist Safety						Remote from Traffic for 6A. Driveway accesses across 6B.
Environment						
Landscape and Visual Quality						Views from 2 houses affected by 6A
Biodiversity				**?**	**?**	Potential impact of 6A1, 6B1 & 6C. Further consideration required for mitigation and consultation with NPWS.
Cultural Heritage						Significant impact associated with 6A1 – partial demolition of protected Structures 17/17a Brighton Vale. Impact on setting of Tobernea Terrace & Ardenza Terrace associated with 6C
Land Use						Loss of value for 2 houses with 6A, or purchased with 6A1. CPO from 14 gardens for 6C.
Accessibility & Social Inclusion	No Differential between Options					
Integration						
Cycle Network Integration						6B/6C more accessible from catchment area
Coastal Walk						
Traffic Disruption						Transfer of through traffic to Monkstown Road for 6B/6B1
Preference	**4**	**5**	**2**	**1**	**3**	**Option 6B1**

13.11 Selected Option for Section 6: Blackrock to Seapoint

Option 6B1 is selected as it will fulfil the objectives of the scheme by provision of a high quality cycleway on Seapoint Avenue combined with a coastal footpath, while avoiding significant impacts for Biodiversity and Cultural Heritage. It is also far more economical than all but one of the other options. There will be significant change required for the local traffic system, but the road network in the area should cope without great difficulty.

Option 6B1 will entail the following elements:

a) Use of the existing cycle route from Blackrock Station towards Seapoint along Idrone Terrace and contra-flow cycle track along Newtown Avenue.

b) Modification of Seapoint Avenue to a single traffic lane with alternate one-way traffic flow between Newtown Avenue and Brighton Vale at Seapoint;

c) Two-way segregated cycle track along the northern side of Seapoint Avenue;

d) Retention of existing parking on Seapoint Avenue between the traffic lane and the proposed cycle track; and

e) A coastal footpath alongside the railway line on the inland side of the seawall, and around the Maretimo Headland, with a short boardwalk on the seaward side of Seapoint Station. The connection to Brighton Vale would use a narrow laneway currently used for access to house No.17a.

14. SELECTED OPTIONS SUMMARY

Section 1: Irishtown to Sandymount Strand	**1.3 km**
Option 1C: Strand Road Cycleway & Boardwalk	
a) Cycleway link from Bath Street / Pembroke Street in Irishtown over a 150m length across the wide Seán Moore Road junction to Seán Moore Park; b) A 3.5m wide cycleway through Seán Moore Park over a length of 450m to the junction of Strand Road and Marine Drive; c) Modifications to the traffic layout on Strand Road over a length of 400m from Marine Drive to Martello View with narrowing to a 6m wide carriageway to accommodate a 3.5m wide cycleway, a 2.5m wide footpath and a 0.5m wide buffer strip on the inland side of the seawall; d) Property acquisition over 100m length from Roslyn Park College between Seafort Avenue and Newgrove Avenue; e) A 4m wide boardwalk projecting over the strand over a length of 350m south of Martello View as far as Sandymount Promenade.	
Section 2: Sandymount	**1.1 km**
Option 2A: Cycleway on Sandymount Promenade	
3.5m wide cycleway beside existing coastal footpath at Sandymount Promenade.	
Section 3: Merrion to Booterstown	**0.4 km**
Option 3E: Merrion Gates Traffic Bypass	
a) Cycleway link from the southern end of Sandymount Promenade for 100m to the Merrion Hall offices with road narrowing to 6m to provide for a 3.0m wide cycleway, a 2.0m wide footpath and a 0.5m wide buffer strip on the inland side of the seawall; b) A new 250m long road link from Strand Road at Merrion Hall offices to Merrion Road at Merrion Church with a bridge over the East Coast Railway Line at an estimated cost of €7m; c) Modified traffic layout on Merrion Road over 300m length between Merrion Gates and Merrion Church to suit the diversion of traffic to the new bridge over the railway; d) Closure of Merrion Gates level crossing to traffic; e) Shared use of the cul-de-sac section of Strand Road by cyclists and local access traffic; and f) A new underpass at Merrion Gates for cyclists and pedestrians.	
Section 4: Merrion to Booterstown	**1.0 km**
Option 4D	
Two-way cycle track along the eastern side of Rock Road from Merrion Gates to Booterstown Railway Station.	
Section 5: Booterstown to Blackrock	**1.4 km**
Option 5C: Blackrock Park Cycleway	
a) Upgraded and widened cycleway and footpath through Blackrock Park; and b) Land acquisition from the garden of one large residential property (*Deepwell*) for a widened link between Blackrock Park and Railway Station.	

Section 6: Blackrock to Seapoint	**1.3 km**
Option 6B1: Seapoint Avenue Cycleway & Coastal Footpath	
a) Use of the existing cycle route from Blackrock Station towards Seapoint along Idrone Terrace and contra-flow cycle track along Newtown Avenue. b) Modification of Seapoint Avenue to a single traffic lane with alternate one-way traffic flow between Newtown Avenue and Brighton Vale at Seapoint; c) Two-way segregated cycle track along the northern side of Seapoint Avenue; d) Retention of existing parking on Seapoint Avenue between the traffic lane and the proposed cycle track; and e) A coastal footpath alongside the railway line on the inland side of the seawall, and around the Maretimo Headland, with a short boardwalk on the seaward side of Seapoint Station. The connection to Brighton Vale would use a narrow laneway currently used for access to house No.17a.	

15. SUMMARY OF ENVIRONMENTAL ISSUES

This study has taken careful account of the many major environmental constraints along Dublin Bay South and has addressed these through avoidance to the maximum degree possible as is appropriate in compliance with the EU Habitats Directives. Viable alternative solutions have been developed for each section of the route so as to avoid encroachment into, or impact on *Natura 2000* designated sites.

This study has ruled out provision of a coastal route for cyclists and pedestrians over the 2.8km length between Sandymount Promenade and Blackrock where there are internationally significant numbers of migratory seabirds that congregate, especially in the August to March period of the year, and roost along the shoreline at high tide. This will avoid additional human disturbance to seabirds in this relatively isolated part of Dublin Bay.

The key environmental aspects for the selected options for the proposed cycleway route are as follows:

1) Avoidance of direct encroachment into the Dublin Bay South Special Area for Conservation;
2) Pedestrian boardwalk along Strand Road to overhang the beach by 4m width over a 350m length at Sandymount Strand North, but with no impact expected for ecology;
3) No impact at Merrion Strand, Booterstown and Blackrock where the route will be located inland of the coastline;
4) Very localised impact possible for seabird roosting over 150m length at Seapoint Railway Station where a pedestrian boardwalk will be provided to complete a coastal footpath between Blackrock and Seapoint. In the context of an overall length of 3.7km of coastline available for roosting between Merrion and Seapoint, the length affected amounts to just 4% which is negligible.

16. COST ESTIMATES SUMMARY

OVERALL COSTS SUMMARY	Cost € million	Selected
Section 1: Seán Moore Road to Sandymount Promenade		
Section 1.1 - Sean Moore Park Cycleway	€0.4	€0.4
Section 1.2 - Strand Road		
Option 1A - Strand Road Cycleway	€4.7	
Option 1B - Sandymount Boardwalk	€8.4	
Option 1C - Combination Cycleway & Boardwalk	€4.3	€4.3
Option 1D - Promenade.	n/a	
Option 1E - One-Way Strand Road	€0.3	
Section 2 - Sandymount Promenade	€0.4	€0.4
Section 3 - Merrion Strand		
Option 3A - Promenade	€1.3	
Option 3B - Boardwalk at Merrion Strand	€5.3	
Option 3C - Cycleway on Two-way Strand Road	€3.6	
Option 3D - Cycleway on One-way Strand Road	€0.1	
Option 3E - Traffic Bypass at Merrion Church	€7.1	€7.1
Section 4 - Merrion Gates to Booterstown		
Option 4A - Promenade	€4.4	
Option 4B - Boardwalk on Coast	€17	
Option 4C - Boardwalk on Inland Side of Railway	€17.4	
Option 4D - Cycleway on Rock Road & Underpass at Merrion Gates	€3.5	€3.5
Option 4E - Rock Road + Coastal Footpath	€3.9	
Section 5 - Booterstown to Blackrock		
Option 5A - Promenade	€4.6	
Option 5B - Boardwalk on Seaward Side of Railway	€22.5	
Option 5C - Cycleway in Blackrock Park	€2.4	€2.4
Option 5D - Cycleway in Blackrock Park + Coastal Footpath	€2.9	
Section 6 - Blackrock to Seapoint		
Option 6A - Combination Promenade & Boardwalk.	€5.4	
6A1 - Variant with Houses at Brighton Vale	€7.4	
Option 6B - Cycleway on One-Way Seapoint Ave.	€0.2	
Option 6B1 - with Coastal Footpath	€0.7	€0.7
Option 6C - Coastal Footpath & Cycleway on Two-Way Seapoint Avenue	€5.7	
Overall Total		**€18.8**
VAT		€2.5m
Total inc VAT		€21.3m