

Wicklow County Council

**N11/M11 Junction 4 to Junction 14  
Improvement Scheme**

Option Selection Report  
Appendix D1 - Biodiversity

265455-ARP-EBD-SWI-RP-LB-0003

C01 | 6 December 2021

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Job number 265455

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# Document verification

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# 1 Biodiversity

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## 1.1 Introduction

This report details the environmental assessment of the Stage 2 Project Appraisal Matrix for the N11/M11 Scheme with respect to the Biodiversity constraints identified in **Section 12** (Biodiversity) of **Volume B**.

For the corridor assessment, the overall scheme has been split into two sections, i.e. the Northern Section and the Southern Section. The corridor options assessed are those discussed in **Section 8.1** of **Volume A**.

There are two zones associated with each corridor option referred to in the corridor assessment:

- The potential road “footprint” which is the potential landtake required to construct or improve the road; and
- The road “corridor” which is a 200m wide corridor centred around the alignment centre line for all off-line corridors. For the on-line Corridor Options 1 (North), 1 (South) and 5 (South), the width is variable, but is typically narrower than the width of the off-line corridors. The “footprint” sits inside the “corridor” boundary.

A transport scenario assessment forms part of this Stage 2 Project Appraisal Matrix. This assessment is included in **Section 1.5**. The transport scenarios that were assessed are as follows:

- Transport Scenario 5A – Parallel Links + Junction Rationalisation;
- Transport Scenario 5B – N11/M11 Additional Lane(s) + Junction Improvements; and
- Transport Scenario 4 – Bus Service Enhancements.

**Section 1.2** outlines the methodology that was used to carry out the assessment, and **Section 1.3** outlines the assessment criteria which were used. The Stage 2 assessment is presented in **Section 1.4** (Corridors) and **Section 1.5** (Transport Scenarios) and references are listed in **Section 1.6**.

The principal objectives of the options assessment are to:

- Evaluate all corridor options contained within each section, based on ecological criteria, as per the National Road Authority (NRA) Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009)<sup>1</sup> and Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater, Coastal and Marine (2019)<sup>2</sup>;
- Assess the significance of the likely impacts of the proposed scheme on each of the biodiversity receptors potentially impacted by each corridor option. As per the Transport Infrastructure Ireland (TII) guidance, this step discounted biodiversity receptors or ecological sites where the risk of significant impacts is unlikely considering where the application of standard mitigation and best practice during construction is unambiguous and success is highly likely; and
- To assess each option in accordance with the TII Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis<sup>3</sup> (hereafter referred to as the TII PAG).

In fulfilling these objectives, an assessment of the likely or potential impacts of each corridor option on ecological receptors is carried out so that an informed comparison of the corridor options contained in both sections can be made with the knowledge of the potential ecological consequences.

## 1.2 Methodology

The process by which the corridor options were assessed was as follows:

- The key ecological receptors within the scheme study area were identified based on a combination of desktop data, consultation and field survey;
- The key ecological receptors were attributed an ecological valuation based on a geographic frame of reference ranging from international to local importance;
- The likely impacts of each of the corridor options on the key ecological receptors were identified and assessed, indicating which, if any, of these are likely to be significant, and at what geographical level;
- The impacts of each of the corridor options on the key ecological receptors were scored based on a seven-point scale ranging from ‘*major or highly negative*’ to ‘*major or highly positive*’. This scale is detailed in **Section 1.3**;

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<sup>1</sup>National Roads Authority (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes. Available from: <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf>

<sup>2</sup>Chartered Institute for Ecology and Environmental Management (CIEEM) (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater, Coastal and Marine. Available from: <https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1.pdf>

<sup>3</sup>Transport Infrastructure Ireland (2016) Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis Available from: <https://www.tiipublications.ie/library/PE-PAG-02031-01.pdf>

- The overall cumulative impact of each corridor option across all the key ecological receptors affected was also scored on the same seven-point scale; and,
- The scores attributed to each of the corridor options were assessed comparatively and together with professional experience, the options were assigned a preference ranking.

### 1.2.1 Key ecological receptors

Key ecological receptors are those biodiversity receptors confirmed, or likely to occur, within the overall scheme study area with an ecological value of local importance (higher value) or greater and, therefore, likely to affect the scoring and ranking of the corridor options. These include:

- Designated sites for nature conservation (e.g. SACs, SPAs, NHAs, pNHAs and Nature Reserves);
- Sensitive habitats (e.g. non-designated areas of Annex I habitat<sup>4</sup>, non-Annex I semi-natural woodland habitats and watercourses<sup>5</sup>); and,
- Ecological sites.

The key ecological receptors were initially identified in **Section 12** (Biodiversity) of **Volume B** based on a collation of available existing information from the desk study and consultations with relevant bodies/organisations, and focussed on the known/potential ecological value for the habitats/species present. In the case of the ecological sites, the boundaries were initially defined based on interpretation of orthophotography and collation of available existing habitat information.

This was supplemented at the corridor options stage by field surveys. The aim of the field surveys was a ground truthing exercise to verify the orthophotography interpretation and selection of ecological sites, refine site boundaries and to capture additional ecological sites not identified during the desk study. Walkover surveys of ecological sites which were located in close proximity to, or overlapped with one of the corridor options were undertaken between June and August 2020.

In some cases, ecological sites were viewed from a distance, owing to limited access. In a small number of situations, ecological sites could not be viewed at a distance due to the local topography or limited access. However, assumptions have been made on the value of those ecological sites based on local information gathered during the field surveys and desk study.

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<sup>4</sup> The short-hand names of Annex I habitats is used in this assessment, as per NPWS (2019). The Status of European Habitats and Species in Ireland. Volume 2: Habitat Assessments. Available from: [https://www.npws.ie/sites/default/files/publications/pdf/NPWS\\_2019\\_Vol2\\_Habitats\\_Article17.pdf](https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol2_Habitats_Article17.pdf)

<sup>5</sup> Watercourses are referred to as per the names presented on the EPA's online Map Viewer. Available from: <https://gis.epa.ie/EPAMaps/> [Accessed 03 April 2020]

Where possible, during the site walkover surveys, habitat types were classified using the *Guide to Habitats in Ireland* (Fossitt, 2000)<sup>6</sup> and the likelihood/potential for Annex I habitat types was inferred where possible based on the professional judgement of the surveyor, with reference to the *Interpretation manual of European Union Habitats EUR 28* (CEC, 2013)<sup>7</sup>. A precautionary approach was adopted with regards to the identification of the potential presence of Annex I habitats within an ecological site.

Multidisciplinary surveys were carried out within 250m of the existing N11/M11 road so the design team could be fully informed of the environmental constraints adjacent to the existing, heavily constrained road. The multidisciplinary surveys identified habitats along the existing N11/M11 road of varying ecological value, ranging from local ecological value to international value. The results of these surveys have been used to refine and inform the ecological sites identified during the desktop study. Precise definition of existing constraints on the N11/M11 road is required to inform this assessment as there is limited space to manoeuvre along the existing road corridor.

Dedicated habitat surveys have been undertaken at certain highly-sensitive ecological sites (Glen of the Downs SAC, Kilmacanoge Marsh pNHA, Druids Glen Woodland Ecological Site (EC24) and Ballyvolan Upper – Coyne’s Cross Ecological Site (EC29)) and this information has informed the Option Selection process (Refer to **Section 12.3.3** of **Volume B** for methodology of these surveys).

## 1.2.2 Ecological valuation

The key ecological receptors identified have been valued with regard to ecological valuation guidance set out in *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009)<sup>1</sup> and *Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2019)<sup>2</sup>.

The following geographic frame of reference is used when valuing the key ecological receptors:

- International importance;
- National importance;
- County importance; or
- Local importance (higher value).

All Annex I habitats that lie outside of European sites, are valued as being of national importance, given that these habitats are of high conservation concern.

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<sup>6</sup> Fossitt, J.A. (2000) *A Guide to Habitats in Ireland*. Heritage Council, Kilkenny. Available from: <https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf>

<sup>7</sup> CEC. (Commission of the European Communities) (2013) *Interpretation manual of European Union Habitats EUR28*. European Commission, DG Environment. Available from: [https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int\\_Manual\\_EU28.pdf](https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf)

However, priority Annex I habitat types are valued as being of international importance given that they are of the highest conservation concern at a European level (i.e. natural habitat types in danger of disappearance<sup>8</sup>).

For individual sites (e.g. designated sites, watercourses or ecological sites identified during the Constraints Study), the overall ecological valuation for each of the key ecological receptors was based upon the highest value receptor known to be present, or potentially present, within the ecological site.

### 1.3 Assessment criteria

The assessment of each corridor option included both a quantitative and qualitative assessment. Each potential impact on sensitive receptors was scored, based on the TII PAG<sup>3</sup> seven-point scale below, and an integer was assigned according to the impact significance:

- 7 – Major or highly positive;
- 6 – Moderately positive;
- 5 – Minor or slightly positive;
- 4 – Not significant or neutral;
- 3 – Minor or slightly negative;
- 2 – Moderately negative; or,
- 1 – Major or highly negative.

To interpret the above impact scoring key to assess the likely ecological impacts of each corridor option on individual key ecological receptors, the following criteria are applied, with the use of professional judgement as to the likelihood of significant effects occurring:

- Potential impacts on an ecological receptor of national/ international importance were assigned a score of 1 – Major or highly negative;
- Potential impacts on an ecological receptor of county importance were assigned a score of 2 – Moderately negative; and;
- Potential impacts on a receptor of local importance (higher value) were assigned a score of 3 – Minor or slightly negative.

Although a given corridor option may impact upon a particular key ecological receptor, the direct impact(s) on the site may not necessarily directly impact on the highest value receptor(s). This is taken into account in the assessment in so far as is possible based on the level of ecological information available.

To interpret the above impact scoring key to assess the likely cumulative overall ecological impacts for each corridor option, the following criteria are applied, with the use of professional judgement as to the likelihood of significant effects occurring:

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<sup>8</sup> From the definition of “*priority natural habitat types*” in Article 1(d) of the Habitats Directive.



- If a corridor option impacts directly on one or more ecological sites valued as international or national importance, or constructing a road in the ‘footprint’ would likely result in an adverse effect on the integrity of the SAC/SPA/pNHA/NHA site, the corridor is scored as *major or highly negative*;
- If a corridor option impacts directly on one or more ecological sites valued as county importance, or numerous ecological sites valued as local higher importance, the corridor is scored as *moderately negative*; or,
- If constructing a road in the ‘footprint’ would likely result in permanent/long-term effects on a habitat(s) or a species population considered to be of national, county or local (high) importance, the corridor is scored as *moderately negative*; and,
- If a corridor option impacts directly on a small number of ecological sites valued as local higher importance, or constructing a road in the ‘footprint’ would likely result in permanent/long-term effects on a habitat(s) or on a species population considered to be of local (high) importance, the corridor is scored as *minor or slightly negative*.

As all corridor options will have some level of impact on biodiversity, neutral or positive impacts do not apply in this context.

Each of the corridor options in the Northern Section, and separately each of the corridor options in the Southern Section, were comparatively assessed in terms of the overall impact significance to give a preference ranking for each of the two sections.

The preference ranking was as follows: ‘Preferred’, ‘Intermediate’ and ‘Least Preferred’. These terms are used to comparatively assess corridor options in either the Northern or Southern Section and should not be interpreted to compare the significance of impacts between those sections. For clarity, where the preference ranking for two or more corridor options was the same, the numerical ranking is given in brackets (e.g. if 4 options exist, the numerical ranking is given as 4,3,2,1 and where 5 options exist numerical ranking is given as 5,4,3,2,1 in ascending order of preference).

The following assumptions have been employed for the purpose of the Stage 2 Assessment:

1. It has been assumed that dewatering of the underlying aquifer will be a likely effect of the tunnel option through Glen of the Downs (Corridor Option 6 (South)- Purple Option). Dewatering is assumed to only occur during the construction phase and groundwater levels are assumed to return to normal levels for the operational stage. Further to this, it is assumed for the operational stage that there will be no dewatering of the underground aquifer due to the tunnel. The tunnel and tunnel portals are assumed to be watertight.

Following construction, it is assumed that the dewatering pumps will be turned off and that the water level would be allowed to rebound.

Therefore, there will be no passive or active dewatering of groundwater in the operational stage.

2. It has been assumed that ground investigations (GI) would be required in order to progress the design and construction of the tunnel option (Corridor Option 6 (South)- Purple Option). These can either be achieved through vertical boreholes, which are likely to result in direct impacts on Glen of the Downs SAC, or inclined boreholes, which may avoid direct impacts on the SAC but would result in increased cost. In carrying out GI works (either vertical or inclined boreholes), there is a risk that GI plant movements and operation may trigger slope instability, due to the high landslide susceptibility of the area, and this assumption has been considered during the Stage 2 Assessment.
3. The footprint of Corridor Option 2 (South)- Cyan Option) does not result in direct impacts to Glen of the Downs SAC in its north-western corner. Despite the fact that the corridor currently overlaps with the SAC here, the footprint shown is designed to avoid direct impacts on qualifying interest (QI) habitat here.
4. In accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009)<sup>1</sup>, key ecological receptors within the scheme study area were not assessed against the corridor options where the risk of significant impacts is unlikely, considering where the delivery of standard mitigation and best practice during construction is unequivocal and success is highly likely. For example, with the application of standard pollution control measures during construction and an operational drainage and pollution control system designed to current standards, sensitive biodiversity receptors downstream of corridor options are not likely to be affected. However, it should be noted that potential watercourse crossings were considered in this assessment as it cannot be assumed that clear-span crossings will be possible at each crossing point. In addition, potential watercourse crossings will undoubtedly result in habitat loss, with regards riparian habitat, and other indirect impacts on the watercourse in question (e.g. additional shading).
5. In addition, to ensure consistency with the hydrogeology assessment potential indirect impacts on hydrogeological dependent habitats (e.g. Petrifying springs [7220\*]) were assessed, based on potential for impacts on the preliminary zones of contribution (PZOCs) for each groundwater dependent habitat, as identified in the hydrogeology assessment – refer to **Appendix D3 (Hydrogeology) of Volume D**. PZOCs were identified for the following sites:
  - Ballywaltrim Ecological Site (EC45)- Petrifying springs [7220\*] and Alluvial woodland [91E0\*] habitats;
  - Glen of the Downs SAC- Petrifying spring [7220\*]; and;
  - Druids Glen Ecological Site (EC24)- Petrifying springs [7220\*] and Alluvial woodland [91E0\*] habitats.

## 1.4 Stage 2 Project Appraisal Matrix – corridor assessment

This section details the Stage 2 Corridor Assessment for both the northern and southern sections of the N11/M11 Scheme.

Key ecological receptors which are located within, or partially within, a corridor option for the proposed scheme, and on which the corridor options were assessed, are presented in **Table 1.1**. In addition, **Table 1.2** outlines which ecological receptors are impacted by each of the corridor options.

**Table 1.3** summarises the potential impacts associated with each of the two corridor options proposed in the Northern Section of the scheme and presents the scores allocated to each corridor option. Likewise, **Table 1.4** summarises the potential impacts associated with each of the four corridor options proposed in the Southern Section of the scheme and presents the scores awarded to each corridor option.

Table 1.1: Key ecological receptors located within, or partially within, a corridor option of the proposed scheme.

Site Name	Description	Ecological Value
Rathmichael Stream	River known to support Brown Trout ( <i>Salmo trutta</i> )	County Importance
County Brook Stream	River known to support Brown Trout ( <i>Salmo trutta</i> )	County Importance
River Dargle	Designated salmonid river under S.I No. 293/1988. River known to support Brown/ Sea Trout ( <i>Salmo trutta</i> ), Salmon ( <i>Salmo salar</i> ), Eel ( <i>Anguilla anguilla</i> ) and Lamprey species ( <i>Lampetra</i> spp.)	National Importance
Dargle Woodland Ecological Site (EC07)	Mixed broadleaved woodland along the valley of the River Dargle	Local Importance (Higher Value)
Glencullen Woodland Ecological Site (EC08)	Mixed broadleaved woodland along the valley of the Glencullen River	Local Importance (Higher Value)
Dargle River	There is a designated site (pNHA) upstream of where the river is located within a corridor option, this is the Dargle River Valley pNHA [001754]. Wooded valley along the River Dargle. Dominated by mature oak woodland. Yellow Archangel (Red Data Book species) occurs here.	National Importance
Kilmacanoge River	River known to support Brown Trout ( <i>Salmo trutta</i> )	County Importance
Hollybrook- Brennanstown Riding School Ecological Site (EC10)	Large area of broadleaf woodland, much of which is dominated by Beech, including the banks along the Kilmacanoge River.	Local Importance (Higher Value)
Barnacoille- Little Sugarloaf Ecological Site (EC16)	Mosaic of dense bracken and gorse scrub with areas of dry meadows and grassy verges also present. Upland heath habitats (Annex I) also occur on the higher slopes.	National Importance
Rocky Valley Stream	River known to support Brown Trout ( <i>Salmo trutta</i> )	County Importance
Kilmacanoge Marsh pNHA [000724]	Designated site (pNHA). Mosaic of wet woodland, wet grassland and fen. Wet willow-alder-ash woodland present here. Of international importance due to the fen/ fen carr invertebrate communities which are present here and presence of Annex I woodland.	International Importance
Great Sugar Loaf pNHA [001769]	Designated site (pNHA). Habitats present include heath and upland grassland, scree and rocky outcrops, oak dominated woodland, birch woodland and a stream, which forms a hydrological connection between this pNHA and Kilmacanoge Marsh pNHA [000724].	National Importance
Glen of the Downs SAC, pNHA & Nature Reserve [000719]	Designated site (SAC, pNHA, Nature Reserve). Annex I “Old Oak woodland [91A0]”. Other non-Annex woodland habitats including various semi-natural and modified woodland types. Non-QI Annex I “Alluvial woodland [91E0]” also present. Rare mosses also found here. Also known to contain the priority Annex I habitat Petrifying springs <sup>i</sup> [7220*]	International Importance
Bellevue Demesne Ecological Site (EC18)	Woodland including areas of mixed conifer/ broadleaved woodland and non-native conifer woodland.	Local Importance (Higher Value)
Three-trouts Stream	River known to support Brown/ Sea Trout ( <i>Salmo trutta</i> )	County Importance
Kilmurray South River	Watercourse	Local Importance (Higher Value)
Woodlands [10] River	Watercourse	Local Importance (Higher Value)

Site Name	Description	Ecological Value
Ballinashinnagh – Kilmurray Ecological Site (EC20)	Mainly composed of conifer plantations, with areas of dense bracken, gorse scrub and dry meadows and grassy verges also present. Annex I heath habitat located towards the top of the slope.	National Importance
Kilcoole Stream	River known to support Brown/ Sea Trout ( <i>Salmo trutta</i> )	County Importance
Newtown Demesne Ecological Site (EC37)	Modified mixed woodland habitats, agricultural lands and scrub	Local Importance (Higher Value)
Ballyronan Ecological Site (EC23)	Most of the site has been cleared of vegetation recently and is now composed of mounds of excavated soil. Broadleaved woodland occurs in the area north of Ballyronan Stream and the canopy here consists of Ash, Alder, Sycamore and Birch.	Local Importance (Higher Value)
Ballyronan Stream	River known to support Brown Trout ( <i>Salmo trutta</i> )	County Importance
Druids Glen Woodland Ecological Site (EC24)	Woodland mosaic including areas of wet willow woodland and the priority Annex I habitat “Petrifying springs <sup>i</sup> [7220]”.	International Importance
Newtownmountkennedy River	River known to support Brown/ Sea Trout ( <i>Salmo trutta</i> ) and Eel ( <i>Anguilla anguilla</i> )	County Importance
Moneycarrol River	River known to support Brown/ Sea Trout ( <i>Salmo trutta</i> )	County Importance
Newcastle River	River known to support Brown/ Sea Trout ( <i>Salmo trutta</i> )	County Importance
Newcastle Upper Ecological Site (EC27)	The area immediately adjacent to the existing N11 is composed of motorway/ roadside planting and dense gorse scrub. To the west exists an area of broadleaf woodland along the banks of the Newcastle River.	Local Importance (Higher Value)
Ballyvolan Upper- Coynes Cross Ecological Site (EC29)	Woodland habitat including Annex I Old oak woodland [91A0] and modified, semi-natural and non-native woodland types.	National Importance
Dunran Demesne River	River known to support Brown/ Sea Trout ( <i>Salmo trutta</i> )	County Importance
Cullenmore Stream	Watercourse which could potentially support Brown Trout ( <i>Salmo trutta</i> )	County Importance
Kilmartin Ecological Site (EC35)	The majority of the site is composed of conifer plantation along the banks of the Cullenmore Stream. Some scrub and broadleaved woodland further west in the site.	Local Importance (Higher Value)
Rathmore Ecological Site (EC36)	Woodland habitat along the banks of the Courtfoyle River. Semi-natural woodland, consisting of wet willow-alder-ash woodland is present in the eastern half of the site. On the western side, woodland consists of modified broadleaved woodland with conifer species occurring occasionally on a steep slope. Motorway/ roadside planting occurs immediately adjacent to the existing N11 along with gorse scrub and exposed rock surfaces.	Local Importance (Higher Value)
Courtfoyle River	Watercourse which could potentially support Brown Trout ( <i>Salmo trutta</i> )	County Importance
Tinnapark Ecological Site (EC38)	Woodland and potentially FPO species present	National Importance
Delgany Golf Club Ecological Site (EC39)	Mixed broadleaved woodland with occasional conifers.	Local Importance (Higher Value)
Delgany Ecological Site (EC40)	Mixed broadleaved woodland and scrub.	Local Importance (Higher Value)
Woodlands Ecological Site (EC41)	Broadleaved woodland, including native wet willow-alder-ash woodland, along with pockets of wet grassland and bramble/gorse scrub.	Local Importance (Higher Value)
Kilmurray South Ecological Site (EC42)	Broadleaved woodland, hedgerows, gorse scrub and dry meadows and grassy verges.	Local Importance (Higher Value)

Site Name	Description	Ecological Value
Dublin Oak Academy Ecological Site (EC43)	Woodland	Local Importance (Higher Value)
Old Connaught Ecological Site (EC44)	Broadleaved woodland and scrub, with motorway/roadside planting immediately adjacent to the existing N11/ M11.	Local Importance (Higher Value)
Ballywaltrim (EC45)	Area of broadleaved woodland between the R767 and the R768, which potentially contains pockets of the priority Annex I habitat Alluvial woodland [91E0*] and residential gardens on Ballywaltrim Lane along the Kilmacanoge River corridor, which are known to contain the priority Annex I habitat Petrifying springs <sup>i</sup> [7220*].	International Importance
Ballydonagh (EC46)	Area of grassland to the immediate north of Glen of the Downs SAC, which contains calcareous springs, which may align with the priority Annex I habitat Petrifying springs [7220*].	International Importance
<p>Note:</p> <p>i. As part of the hydrogeological assessment of these springs, a preliminary zone of contribution (PZOC), which is the area that contributes water to the spring, has been delineated. These are explained in further detail in Section 15.3.5 Groundwater dependent habitats, of Section 15 Hydrogeology in Volume B – Constraints Study Eco-hydrology.</p>		

Table 1.2: Breakdown of the key ecological receptors which are impacted by the proposed corridor options.

<b>Northern Section Corridor Options</b>				
	Receptors of International Importance Impacted	Receptors of National Importance Impacted	Receptors of County Importance Impacted	Receptors of Local Importance (Higher Value) Impacted
Corridor Option 1A (North)	<ol style="list-style-type: none"> <li>1. Kilmacanoge Marsh pNHA [000724]</li> <li>2. Ballywaltrim Ecological Site (EC45)</li> </ol>	<ol style="list-style-type: none"> <li>1. River Dargle</li> <li>2. Great Sugar Loaf pNHA [001769]<sup>9</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. Rathmichael Stream</li> <li>2. County Brook Stream</li> <li>3. Kilmacanoge River</li> <li>4. Rocky Valley Stream</li> </ol>	<ol style="list-style-type: none"> <li>1. Dargle Woodland Ecological Site (EC07)</li> <li>2. Glencullen Woodland Ecological Site (EC08)</li> <li>3. Hollybrook- Brennanstown Riding School Ecological Site (EC10)</li> <li>4. Dublin Oak Academy Ecological Site (EC43)</li> <li>5. Old Connaught Ecological Site (EC44)</li> </ol>
Corridor Option 1B (North)	<ol style="list-style-type: none"> <li>1. Kilmacanoge Marsh pNHA [000724]</li> <li>2. Ballywaltrim Ecological Site (EC45)</li> </ol>	<ol style="list-style-type: none"> <li>1. River Dargle</li> <li>2. Great Sugar Loaf pNHA [001769]<sup>9</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. Rathmichael Stream</li> <li>2. County Brook Stream</li> <li>3. Kilmacanoge River</li> <li>4. Rocky Valley Stream</li> </ol>	<ol style="list-style-type: none"> <li>1. Dargle Woodland Ecological Site (EC07)</li> <li>2. Glencullen Woodland Ecological Site (EC08)</li> <li>3. Hollybrook- Brennanstown Riding School Ecological Site (EC10)</li> <li>4. Old Connaught Ecological Site (EC44)</li> <li>5. Dublin Oak Academy Ecological Site (EC43)</li> </ol>
<b>Southern Section Corridor Options</b>				
	Receptors of International Importance Impacted	Receptors of National Importance Impacted	Receptors of County Importance Impacted	Receptors of Local Importance (Higher Value) Impacted
Corridor Option 1 (South)	<ol style="list-style-type: none"> <li>1. Glen of the Downs SAC, pNHA &amp; Nature Reserve [000719]</li> </ol>	<ol style="list-style-type: none"> <li>1. Ballyvolan Upper- Coynes Cross Ecological Site (EC29)</li> <li>2. Tinnapark Ecological Site (EC38)<sup>10</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. Kilmacanoge River</li> <li>2. Three Trouts Stream</li> <li>3. Kilcoole Stream</li> <li>4. Ballyronan Stream</li> </ol>	<ol style="list-style-type: none"> <li>1. Woodlands [10] River</li> <li>2. Newcastle Upper Ecological Site (EC27)</li> </ol>

<sup>9</sup> Impacts on the Great Sugar Loaf pNHA [001769] are reduced to being significant at a local level only, considering the habitats involved.

<sup>10</sup> Impacts on Tinnapark ecological site (EC38) are reduced to being significant at a local level only, considering the habitats involved.

	2. Druids Glen Woodland Ecological Site (EC24)		5. Newtownmountkennedy River 6. Moneycarrol River 7. Newcastle River 8. Dunran Demesne River 9. Cullenmore Stream 10. Courtfoyle River	3. Kilmartin Ecological Site (EC35) 4. Rathmore Ecological Site (EC36) 5. Ballyronan Ecological Site (EC23) 6. Newtown Demesne Ecological Site (EC37) 7. Delgany Ecological Site (EC40)
Corridor Option 2 (South)	1. Druids Glen Woodland Ecological Site (EC24)	1. Ballyvolan Upper- Coynes Cross Ecological Site (EC29) 2. Ballinashinnagh – Kilmurray Ecological Site (EC20) <sup>11</sup> 3. Tinnapark Ecological Site (EC38)	1. Kilmacanoge River 2. Three Trouts Stream 3. Ballyronan Stream 4. Newtownmountkennedy River 5. Moneycarrol River 6. Newcastle River 7. Dunran Demesne River 8. Cullenmore Stream 9. Courtfoyle River	1. Kilmurray River 2. Woodlands [10] River 3. Newtown Demesne Ecological Site (EC37) 4. Ballyronan Ecological Site (EC23) 5. Newcastle Upper Ecological Site (EC27) 6. Kilmartin Ecological Site (EC35) 7. Rathmore Ecological Site (EC36) 8. Woodlands Ecological Site (EC41) 9. Kilmurray South Ecological Site (EC42)
Corridor Option 5 (South)	1. Glen of the Downs SAC, pNHA & Nature Reserve [000719] 2. Druids Glen Woodland Ecological Site (EC24)	1. Ballyvolan Upper- Coynes Cross Ecological Site (EC29) 2. Tinnapark Ecological Site (EC38) <sup>10</sup>	1. Kilmacanoge River 2. Three Trouts Stream 3. Kilcoole Stream 4. Ballyronan Stream 5. Newtownmountkennedy River 6. Moneycarrol River 7. Newcastle River 8. Dunran Demesne River	1. Woodlands [10] River 2. Newcastle Upper Ecological Site (EC27) 3. Kilmartin Ecological Site (EC35) 4. Rathmore Ecological Site (EC36)

<sup>11</sup> Impacts on Ballinashinnagh – Kilmurray Ecological Site (EC20) are reduced to being significant at a local level only, considering the habitats involved.



			<ul style="list-style-type: none"> <li>9. Cullenmore Stream</li> <li>10. Courtfoyle River</li> </ul>	<ul style="list-style-type: none"> <li>5. Ballyronan Ecological Site (EC23)</li> <li>6. Newtown Demesne Ecological Site (EC37)</li> <li>7. Delgany Ecological Site (EC40)</li> </ul>
Corridor Option 6 (South)	<ul style="list-style-type: none"> <li>1. Glen of the Downs SAC, pNHA &amp; Nature Reserve [000719]</li> <li>2. Druids Glen Woodland Ecological Site (EC24)</li> </ul>	<ul style="list-style-type: none"> <li>1. Ballyvolan Upper- Coynes Cross Ecological Site (EC29)</li> <li>2. Tinnapark Ecological Site (EC38)<sup>10</sup></li> </ul>	<ul style="list-style-type: none"> <li>1. Kilmacanoge River</li> <li>2. Three Trouts Stream</li> <li>3. Kilcoole Stream</li> <li>4. Ballyronan Stream</li> <li>5. Newtownmountkennedy River</li> <li>6. Moneycarrol River</li> <li>7. Newcastle River</li> <li>8. Dunran Demesne River</li> <li>9. Cullenmore Stream</li> <li>10. Courtfoyle River</li> </ul>	<ul style="list-style-type: none"> <li>1. Woodlands [10] River</li> <li>2. Newtown Demesne Ecological Site (EC37)</li> <li>3. Ballyronan Ecological Site (EC23)</li> <li>4. Newcastle Upper Ecological Site (EC27)</li> <li>5. Kilmartin Ecological Site (EC35)</li> <li>6. Rathmore Ecological Site (EC36)</li> </ul>

## 1.4.1 Northern Section

### 1.4.1.1 Corridor Option 1A (North)

This is an on-line corridor option focused on the existing N11/M11 road. It crosses a number of watercourses of county importance, including the Rathmichael Stream, County Brook Stream, Kilmacanoge River (crossed three times) and Rocky Valley Stream, all of which are known to support populations of Brown Trout *Salmo trutta*. To the north of Junction 6 (Bray/Fassaroe), this corridor clips the eastern boundary of the Old Connaught ecological site (EC 44). This ecological site is composed of woodland which lines the banks of the County Brook Stream and is of local importance (higher value). At Junction 6a (Enniskerry), this corridor option crosses the River Dargle, a designated salmonid river, of national ecological importance, which is known to support Brown/Sea Trout, Salmon *Salmo salar*, Eel *Anguilla anguilla* and Lamprey species *Lampetra* spp.

At the same junction, this corridor option would potentially result in habitat loss from both the Dargle Woodland ecological site (EC07) and the Glencullen Woodland ecological site (EC08). These sites are of local importance (higher value) due to the presence of mixed deciduous woodland along the valley sides of the Dargle and Glencullen rivers. Just to the south, the corridor clips the western boundary of the Dublin Oak Academy ecological site (EC43), an area comprising woodland and grassland habitats of local importance (higher value).

East of the existing N11 road at Junction 7 (Bray South), habitat loss may occur at the Ballywaltrim ecological site (EC45), an area composed of woodland and scrub habitats and the priority Annex I habitat Petrifying springs [7220\*]. This ecological site is of international ecological importance due to the presence of these Petrifying springs, a priority Annex I habitat, and also due to the potential presence of an additional priority Annex I habitat – Alluvial woodland [91E0\*], which may be present in the woodland area located between the R767 and R768. Indirect impacts on the Petrifying springs [7220\*] (priority Annex I habitat), which are known to occur in residential gardens on Ballywaltrim Lane (contained within the same Ballywaltrim ecological site (EC45)), and which could also potentially result in indirect impacts to areas of the priority Annex I habitat Alluvial woodland [91E0\*], if present, are also likely to occur as a result of potential impacts to the PZOCs, on which these habitats depend.

To the south of Junction 7 (Bray South), this corridor option would also result in significant habitat loss at Brennanstown Riding School ecological site (EC10), which consists of Beech woodland along the banks of the Kilmacanoge River and is valued as being of local importance (higher value). The proposed corridor option here intends to provide a new link road between the existing R768 and a new southbound merge and diverge for Junction 7 (Bray South), which will run parallel to the existing N11 through Brennanstown Riding School woodland. This proposed link road will result in the loss of woodland habitat (c. 3.6ha) and fragmentation of same, resulting in an isolated island of woodland (c. 5.9ha) remaining between the existing N11 and the proposed link road.

An additional river crossing/culvert across the Kilmacanoge River will also be required to accommodate this proposed link road.

Finally, to the south of Junction 8 (Kilmacanoge / Roundwood), this corridor option impacts considerably on Kilmacanoge Marsh pNHA, ecologically important at an international level. This pNHA site is composed of a mosaic of habitats including wet woodland, wet grassland and fen. Wet willow-alder-ash woodland, which has affinities with the priority Annex I habitat type Alluvial woodland [91E0\*], is present here, along with riparian woodland. The proposed corridor option here would result in significant habitat loss, including considerable areas of wet willow-alder-ash woodland and riparian woodland (some of which corresponds to the priority Annex I Alluvial woodland [91E0\*] habitat type), wet grassland and scrub. Impacts on the Kilmacanoge River, which runs along the western boundary of the existing N11 road, would also be likely if road widening or alterations to the existing junction occurred here. In addition, this corridor option includes a proposal to link the existing parallel roads, which provide access to residential properties along the N11 here, with Quill Road to the west of the N11. The location of this proposed link road overlaps with the boundary of Great Sugar Loaf pNHA, a designated site of national ecological importance. The footprint of the proposed link road crosses a stream which provides a hydrological connection between this pNHA and the priority Annex I Alluvial woodland [91E0\*] habitat in Kilmacanoge Marsh pNHA. The impact on the Great Sugar Loaf pNHA here would be limited to that of local importance (higher value) considering the habitats which would be involved.

This is the least preferred (LP) corridor option in the Northern Section of the scheme, from a biodiversity perspective, due to the fact that it would require the provision of an additional crossing over the Kilmacanoge River and significant habitat loss and fragmentation effects on woodland at Brennanstown Riding School ecological site (EC10), to the south of Junction 7 (Bray South). Impacts on key ecological receptors of international importance will occur at Kilmacanoge Marsh pNHA and Ballywaltrim ecological site (EC45). Impacts on receptors of national importance are limited to the River Dargle, while this corridor option will also result in impacts on four watercourses of county importance and five ecological sites of local importance (higher value). Impact significance on Great Sugar Loaf pNHA is also limited to habitats of local importance (higher value).

#### 1.4.1.2 Corridor Option 1B (North)

This is an on-line corridor option focused on the existing N11/M11 road, following the same route, for the most part, as Corridor Option 1A (North), as described above. This corridor option only differs from Corridor Option 1A (North) at Junction 7 (Bray South) where an alternative junction layout is proposed.

As in Corridor Option 1A (North), this corridor option crosses a number of watercourses of county importance, including the Rathmichael Stream, County Brook Stream, Kilmacanoge River (crossed two times) and Rocky Valley Stream, all of which are known to support populations of Brown Trout *Salmo trutta*.

To the north of Junction 6 (Bray/Fassaroe), this corridor clips the eastern boundary of the Old Connaught ecological site (EC 44), which is composed of woodland lining the banks of the County Brook Stream and is of local importance (higher value). At Junction 6a (Enniskerry), this corridor option crosses the River Dargle, a designated salmonid river, of national ecological importance, which is known to support Brown/Sea Trout, Salmon *Salmo salar*, Eel *Anguilla anguilla* and Lamprey species *Lampetra* spp.

At the same junction, this corridor option would potentially result in habitat loss from both the Dargle Woodland ecological site (EC07) and the Glencullen Woodland ecological site (EC08). These sites are of local importance (higher value) due to the presence of mixed deciduous woodland along the valley sides of the Dargle and Glencullen rivers. Just to the south, the corridor clips the western boundary of the Dublin Oak Academy ecological site (EC43), an area comprising woodland and grassland habitats of local importance (higher value).

To the south of the Dublin Oak Academy ecological site (EC43), a new junction layout is proposed to alleviate pressure on the existing Junction 7 (Bray South). The proposed new junction layout would involve the construction of a new northbound diverge road to the west of the N11 to link into Kilcrouney Lane to the north (west diverge) and the existing Ballywaltrim roundabout (east diverge), as well as an altered junction layout to the existing Junction 7 on the east side of the existing N11, with the construction of a new southbound diverge and parallel service road. An underpass will also be needed, under the existing N11 road, to connect the proposed northbound diverge east with the existing Ballywaltrim roundabout. Indirect impacts on the priority Annex I habitats, Petrifying springs [7220\*] and potentially also Alluvial woodland [91E0\*], may also occur in the vicinity of Junction 7 (Bray South). These priority Annex I habitats are found within the Ballywaltrim ecological site (EC45) and the site is valued as being of international importance as a result. Indirect impacts on these groundwater dependent habitats are likely to occur as a result of potential impacts to the PZOCs, on which these habitats depend.

The two corridor options in the Northern Section are concurrent south of Junction 8 (Kilmacanoge / Roundwood), thus the impacts are the same as discussed for Corridor Option 1A (North) above.

This is the preferred (P) corridor option in the Northern Section, as it avoids the need for an additional crossing over the Kilmacanoge River, to the south of Junction 7 (Bray South), when compared to Corridor Option 1A (North). As this corridor option involves the construction of additional northbound diverge roads on the western side of the N11, it also avoids significant impacts on woodland in Brennanstown Riding School ecological site (EC10), whereas Corridor Option 1A (North) does not. In a similar manner to Corridor Option 1A (North), impacts on key ecological receptors of international importance will occur at Kilmacanoge Marsh pNHA and Ballywaltrim ecological site (EC45). Impacts on receptors of national importance are limited to the River Dargle, while this corridor option will also result in impacts on four watercourses of county importance and five ecological sites of local importance (higher value). Impact significance on Great Sugar Loaf pNHA is also limited to habitats of local importance (higher value).

Table 1.3: Corridor option assessment – Northern Section

	Corridor Option 1A (North)	Corridor Option 1B (North)
Assessment Criteria	Quantitative Assessment: Number of Impacts of Varying Significance	
Impacts of international significance	2	2
Impacts of national significance	1	1
Impacts of county significance	4	4
Impacts of local significance (higher value)	6	6
Qualitative Assessment	Major or Highly Negative	Major or Highly Negative
Score / Impact Level	1	1
Preference	Least Preferred	Preferred

Both corridor options score the same quantitatively, although subtle differences exist from a qualitative perspective. The main qualitative difference between Corridor Options 1A (North) and 1B (North) lies around the level of impact significance around Brennanstown Riding School ecological site (EC10) and the Kilmacanoge River, to the south of Junction 7 (Bray South).

Corridor Option 1A (North) includes the provision of a new link road between the existing R768 and a new southbound merge and diverge for Junction 7 (Bray South), which will run parallel to the existing N11 through Brennanstown Riding School woodland. This proposed link road will result in the loss of woodland habitat (c. 3.6ha) and fragmentation of same, resulting in an isolated island of woodland (c. 5.9ha) remaining between the existing N11 and the proposed slip road.

An additional river crossing/culvert across the Kilmacanoge River will also be required to accommodate this proposed slip road.

In comparison, Corridor Option 1B (North) avoids the need for an additional river crossing over the Kilmacanoge River, to the south of Junction 7 (Bray South) and will have less of an impact on woodland in Brennanstown Riding School ecological site (EC10) as it only requires the removal of the northernmost area (c. 0.34ha), close to the existing junction. This is because, while Corridor Option 1B (North) also proposes a new junction layout at Junction 7 (Bray South), the proposal under this corridor option would involve the majority of construction works occurring to the west side of the existing N11, rather than through the woodland of Brennanstown Riding School ecological site (EC10) in the east.

In addition, indirect impacts on vegetation, as a result of effects on air quality associated with any potential increase in traffic volumes and associated emissions during operation, could potentially impact sensitive species in Kilmacanoge Marsh pNHA and Ballywaltrim Ecological Site (EC45), which would be common to both corridor options, assuming such species are located within the zone of influence of air quality effects. The Air Quality Standard Regulations 2011 (S.I. No. 180 of 2011) provides limit values for certain air pollutants with respect to the protection of human health and ecosystems. The limit value for Nitrogen Oxides (NO<sub>x</sub>), which is set for the protection of vegetation, is given as 30µg/m<sup>3</sup>/yr. The predicted emissions of NO<sub>x</sub>, during operation of the proposed scheme do not exceed this limit value, and as such there is no potential for negative effects on vegetation due to indirect air quality impacts. Refer to **Appendix D6** (Air quality and climate) of **Volume D** for the predicted emissions of NO<sub>x</sub>.

## 1.4.2 Southern Section

### 1.4.2.1 Corridor Option 1 (South)

This is an on-line corridor option focused on the existing N11/M11 road, running from approximately Junction 9 (Glenview) to Junction 14 (Coyne's Cross). It crosses ten watercourses of county importance including the Kilmacanoge River (crossed twice), the Three Trouts Stream, Kilcoole Stream, Ballyronan Stream, Newtownmountkenedy River, Moneycarrol River, Newcastle River, Dunran Demesne River, Cullenmore Stream and Courtfoyle River. These watercourses are all regarded to be of county importance due to their known fisheries potential (capable of supporting populations of Brown/Sea Trout and Eel).

Moving southwards from Junction 9 (Glenview) this corridor option crosses the Kilmacanoge River and Three Trouts Stream before passing through the Glen of the Downs, a designated SAC, pNHA and Nature Reserve. The Glen of the Downs is regarded as being of international importance, given its status as a SAC. This corridor option would result in direct impacts on the SAC, particularly on the qualifying interest (QI) habitat, Old oak woodland [91A0] in the north-east corner of the site and along the existing road footprint on either side of the glen. Other non-qualifying interest habitats within the site, which form part of the conservation objectives for Glen of the Downs SAC, would also be directly impacted and include areas of oak-ash-hazel woodland, areas of mixed broadleaved woodland and areas of mixed broadleaved/ conifer woodland.

There is an area of priority Annex I habitat Alluvial woodland [91E0]\* in Glen of the Downs SAC, and although it is within the corridor boundary, it is not proposed to be impacted by the scheme design.

Impacts on the QI habitat [91A0] will have implications from an Appropriate Assessment (AA) perspective. Site Specific Conservation Objectives (SSCOs) for Glen of the Downs SAC were published in December 2020 and have informed the Stage 2 Options Assessment.

According to the published SSCOs the only QI habitat for which the SAC is designated is Old oak woodlands [91A0], and the overall conservation objective is to “*restore the favourable conservation condition of Old sessile oak woods with Ilex and Blechnum in the British Isles in Glen of the Downs SAC*”. A number of attributes underpin this overall conservation objective (e.g. habitat area, habitat distribution, woodland size, woodland structure and vegetative composition) and targets have been set for each attribute respectively.

In terms of Corridor Option 1 (South), the main interaction with the SSCOs relates to targets regarding “habitat area” of 91A0 woodland, “woodland size” (which relates to all areas of woodland habitat within the SAC) and “woodland structure: indicators of local distinctiveness”.

This corridor option has the potential to undermine the conservation objective regarding maintaining the area of QI 91A0 woodland within the SAC as developing a design within the corridor could result in the removal of QI habitat in the north-eastern corner of the site, south-eastern corner and along both sides of the existing N11 road (c. 0.2ha in total).

Likewise, this corridor option also has the potential to undermine the conservation objective regarding maintaining woodland size (area of woodland) within the SAC. This attribute includes all areas of semi-natural woodland and modified woodland within the SAC<sup>12</sup>. Therefore, any loss of woodland within the boundary of the SAC would undermine this conservation objective. Developing a design within this corridor option could result in the loss of areas of oak-ash-hazel woodland, mixed broadleaved woodland and mixed-broadleaved/ conifer woodland (c. 2ha in total), in addition to the loss of QI 91A0 woodland.

Finally, the conservation objective regarding “woodland structure: indicators of local distinctiveness”, states that “*several rare or scarce Myxomycete fungi and the Vulnerable bryophyte species Cephaloziella turneri and Plagiothecium curvifolium have been recorded*” within the SAC. Direct habitat loss within the SAC could undermine this conservation objective, as these are woodland species, and therefore the loss of woodland habitat could result in a reduction of the extent of these species within the SAC, if present in the woodland habitats affected.

In addition, indirect impacts on vegetation, as a result of effects on air quality associated with any potential increase in traffic volumes and associated emissions during operation, could potentially undermine this conservation objective, assuming such species are located within the zone of influence of air quality effects.

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<sup>12</sup> Please refer to Map 2: Glen of the Downs SAC Conservation Objectives Woodland Habitats, contained within the site-specific conservation objectives published for the Glen of the Down SAC. NPWS (2020). Conservation Objectives: Glen of the Downs SAC 000719. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available at: [https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO000719.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000719.pdf)

The predicted emissions of NO<sub>x</sub>, during operation of the proposed scheme at Opening Year for this corridor option exceed the limit value of 30µg/m<sup>3</sup>/yr and there is potential for negative effects on vegetation, including indicators of local distinctiveness such as rare bryophyte and fungi species, within Glen of the Downs SAC.

Refer to **Section 1.5 of Appendix D6 (Air quality and climate) of Volume D** for the predicted emissions of NO<sub>x</sub>. Depending on the magnitude of effects which would be determined following survey work during Phase 3 (should this option progress to this phase), this could potentially affect the vegetative composition and structure of habitats contained within the SAC, and undermine relevant conservation objectives.

Moving southwards from Glen of the Downs, at Junction 10 (Delgany / Drummin), this corridor option clips the western boundary of the Delgany ecological site (EC40), an area of mixed broadleaved woodland and scrub. This area is of local importance (higher value).

At Junction 11 (Greystones/ Kilpedder/ Kilcoole), this corridor option crosses the Kilcoole Stream. A new link road between the R774 and L1042 is proposed, and this will cross agricultural grasslands and immature woodland. To the south of Junction 11 (Greystones / Kilpedder / Kilcoole), on the northbound section of the existing N11 road, the proposed corridor will result in habitat loss from the Tinnapark ecological site (EC38) (National importance) and Newtown Demesne ecological site (EC37) (local importance (higher value)). Tinnapark ecological site (EC38) is composed of woodland and a number of species protected under the Flora Protection Order, 2015, are reported to exist here. The portion of the site which would be lost to the proposed corridor consists of a treelined avenue and is of local importance (higher value) only. Newtown Demesne ecological site (EC37) is an area comprising agricultural lands and woodland which is deemed to be of local importance (higher value).

Moving south, at Junction 12 (Newtownmountkennedy / Roundwood), this corridor option clips the western edge of Ballyronan ecological site (EC23), a site composed of recently cleared land and broadleaved woodland, which is of local importance (higher value). Roadside/ motorway planting, consisting of narrow strips of immature woodland, occurs along the western boundary of this ecological site, and this corridor option would likely result in the loss of this habitat type. This habitat type is regarded to be of local importance (lower value) and is therefore not regarded as a key ecological receptor. Therefore, this is not deemed to be a significant impact. In the same area, this corridor option crosses the Ballyronan Stream.

Further south, the corridor passes through the Druids Glen Woodland ecological site (EC24), which comprises a mosaic of habitats including wet willow-alder-ash woodland and calcareous springs. The Newtownmountkennedy River is also crossed by this corridor option here as it runs through this ecological site. This site is regarded as being of international importance due to the presence of calcareous springs which align with the priority Annex I habitat Petrifying springs [7220\*].



Here, the proposed corridor option would result in direct impacts on at least one of the priority Annex I Petrifying springs [7220\*] identified here, as well as a portion of the priority Annex I Alluvial woodland [91E0\*] habitat on the west of the N11. The non-Annex habitat, mixed broadleaved/ conifer woodland, would also be lost on the west side of the N11. In addition to the direct impacts on one of the Annex I Petrifying springs [7220]\*, this corridor option will also result in indirect impacts to three additional Annex I Petrifying springs [7220\*] located within this ecological site, as the corridor intersects with the PZOC for these groundwater dependent habitats. Both the direct, and indirect impacts on these springs would be regarded as being significant to these springs, which are of international ecological importance.

At Junction 13 (Newtownmountkennedy/ Newcastle), the corridor crosses the Moneycarroll River. To the south of the same junction, this corridor option passes through the western section of Newcastle Upper ecological site (EC27) and crosses the associated Newcastle River. This site comprises an area of broadleaf woodland along the banks of the Newcastle River and is deemed to be of local importance (higher value). Direct impacts here would comprise habitat loss, although most of the habitat loss would involve the removal of roadside/ motorway planting (immature woodland) and dense gorse scrub, both of which are regarded as being of low ecological value. A small portion of broadleaved woodland would also be lost from the site's western side. At the same junction, on the northbound side of the existing N11 road, this corridor option clips the eastern boundary of the Ballyvolan Upper – Coyne's Cross ecological site (EC29). This site comprises a mosaic of woodland habitats, including areas of the Annex I habitat type Old oak woodland [91A0]. This ecological site is deemed to be of national importance due to the presence of this Annex I woodland. Where this corridor option clips the eastern side of the ecological site, in the southern half of the site, habitat loss here would comprise the loss of gorse scrub habitat and exposed rocky slopes, which is not regarded to be ecologically significant. In the northern half of the site, to the east of Kiltimon House, this corridor option appears to closely follow the boundary of this ecological site. There are two areas where the corridor clips the boundary, which would result in direct impacts on the Annex I Old Oak woodland habitat, which occurs here. It should be noted that if this corridor was refined by as little as 5m, such that impacts on Oak trees could be avoided, direct impacts on this woodland habitat could be avoided, as well as other non-Annex woodland in this location. Just to the south of this area this corridor crosses the Dunran Demesne River.

At Junction 14 (Coyne's Cross), this corridor option would result in direct impact to both the Kilmartin ecological site (EC35) and the Rathmore ecological site (EC36). The Kilmartin ecological site (EC35) is mainly composed of conifer plantation along the banks of the Cullenmore Stream (also crossed by the proposed corridor here), which would be clipped along its western boundary by the proposed corridor.

The Rathmore ecological site (EC36) comprises woodland, including areas of wet willow-alder-ash woodland and mixed broadleaved woodland, along the banks of the Courtfoyle River (also crossed by the proposed corridor here).

Habitat loss here would comprise loss of a small amount of wet willow-alder-ash woodland as well as gorse scrub, roadside/ motorway planting and exposed rocky surfaces. Both the Kilmartin ecological site (EC35) and Rathmore ecological site (EC36) are of local importance (higher value).

Of the three least preferred corridor options, this is potentially the least damaging from a biodiversity perspective, compared with Corridor Option 5 (South) and Corridor Option 6 (South). This corridor option would result in direct impacts on, and could adversely affect the integrity of, Glen of the Downs SAC, including the loss of *c.* 0.2ha of the qualifying interest Old oak woodland [91A0] habitat from this SAC and potentially indirect air quality impacts. This corridor option would also result in impacts on two receptors of international importance, one ecological site of national importance, ten watercourses of county importance and eight impacts of local importance (higher value). However, within this corridor option there is scope to refine the design and lessen the potential environmental impact of this option and consequently, it remains uncertain whether a refined version of this option would adversely affect the integrity of Glen of the Downs SAC, and all developing designs will be subject to appropriate assessment of the implications for the designated site.

Corridor Option 5 (South) is less preferential to this corridor option, due to the fact that the wider corridor through Glen of the Downs SAC, present in Corridor Option 5 (South), would increase the extent of direct habitat loss which would occur in the SAC (*c.* 2.5ha of QI habitat). Corridor Option 6 (South) is also likely to result in direct impacts to larger areas of QI habitat than Corridor Option 1 (South), due to potential impacts of ground investigation works. Direct impacts on the non-designated priority Annex I Petrifying springs habitat [7220\*] and Alluvial woodland [91E0\*] habitat at the Druids Glen Woodland ecological site (EC24) will occur across all corridor options in the Southern Section of the scheme, as will direct impacts on the non-designated Old oak woodland [91A0] habitat at Ballyvolan- Coyne's Cross ecological site (EC29).

### 1.4.2.2 Corridor Option 2 (South)

The majority of this corridor option follows the on-line corridor option as described under Corridor Option 1 (South) above. However, an off-line corridor section (Cyan corridor) is proposed from Junction 9 (Glenview) to Junction 12 (Newtownmountkennedy/ Roundwood), which runs to the west of the existing N11 road. The Kilmacanoge River is crossed once by the on-line corridor option to the south of Junction 9 (Glenview), and then once again by the off-line portion (Cyan corridor) of this corridor option. The off-line portion (Cyan corridor) then crosses the Three Trouts Stream, Kilmurray South River and Woodlands [10] River. The Kilmacanoge River and Three Trouts Stream are regarded as being of county importance due to their fisheries potential (both known to support Brown/ Sea Trout). The Kilmurray South River and Woodlands [10] River are both of local importance (higher value). At the same point the corridor passes through the Kilmurray South ecological site (EC42) and Woodlands ecological site (EC41), both of local importance (higher value). These sites are composed of woodland and scrub habitat along the banks of the Kilmurray South River and Woodlands

[10] River. Kilmurray South ecological site (EC42) is composed of broadleaved woodland, hedgerows, gorse scrub and dry meadows and grassy verges.

Woodlands ecological site (EC41) is composed of broadleaved woodland habitats, including native wet willow-alder-ash woodland, along with pockets of wet grassland and bramble/ gorse scrub. The proposed corridor will result in direct loss and habitat fragmentation at these ecological sites.

The off-line section of the proposed corridor option also clips the north-western corner of Glen of the Downs SAC, pNHA and Nature Reserve. However, the footprint of the proposed corridor option lies to the immediate west of Glen of the Downs SAC boundary, therefore avoiding direct impacts on QI habitat here. As per the assumptions listed in **Section 1.3** with respect to this corridor option, and despite the fact that the corridor currently overlaps with the SAC, the footprint shown is designed to avoid direct impacts on qualifying interest (QI) habitat here. Therefore, this corridor option avoids impacts to Glen of the Downs SAC.

Further south, to the west of Junction 10 (Delgany/ Drummin), the off-line corridor passes through Ballinashinnagh – Kilmurray ecological site (EC20). This site comprises woodland and heath habitats, including non-designated Annex I heath habitat. This site is regarded as being of national importance due to the presence of non-designated Annex I heath habitat. However, the portion of the site, through which this corridor option would run, is mainly composed of conifer plantation, with areas of dense bracken, gorse scrub with dry meadows and grassy verges also present. Annex I heath habitat occurs further up the slope and is therefore not at risk of direct impact from this corridor option. The proposed off-line corridor option here would result in direct habitat loss and habitat fragmentation at this ecological site but given the value of the habitats which would be lost as a result, the level of impact significance here is reduced to a local level.

To the north of Junction 12 (Newtownmountkennedy/ Roundwood) the off-line corridor segment passes through Tinnapark ecological site (EC38) (National importance) and Newtown Demesne ecological site (EC37) (local importance (higher value)). Tinnapark ecological site (EC38) is composed of woodland and a number of species protected under the Flora Protection Order, 2015, are reported to exist here. A precautionary approach has been adopted with regard to impact significance here, given that the exact locations of Flora Protection Order species within the ecological site is as of yet unknown, and impacts here, as a result of the proposed corridor option, are regarded to be significant at the National level. Newtown Demesne ecological site (EC37) is an area comprising agricultural lands and woodland. Impacts here are regarded as being significant at the local level only.

The off-line corridor merges with the on-line (Red) corridor at Junction 12 and remains on-line for the remainder of the scheme. Impacts on key ecological receptors from Junction 12 (Newtownmountkennedy) to Junction 14 (Coyne's Cross) are described above under Corridor Option 1 South.

This is the preferred corridor option, in the Southern Section from a biodiversity perspective as it avoids direct impacts on Glen of the Downs SAC, and associated

QI habitat. This is due to the inclusion of an off-line section to the west of Glen of the Downs SAC.

Direct impacts on sites of international importance are limited to impacts on the non-designated priority Annex I Petrifying springs habitat [7220\*] and Alluvial woodland [91E0\*] habitat at the Druids Glen Woodland ecological site (EC24), which will also be subject to indirect impacts. All corridor options in the southern section of the scheme will result in impacts here. Unlike other corridor options, this corridor would also directly impact on the Ballinashinnagh - Kilmurray ecological site (EC20), which is deemed to be of national importance due to the presence of non-designated Annex I heath habitat there. However, given the limited ecological value of the habitats which would be impacted here within the corridor option, the overall impact significance for this site is reduced to local level only. This corridor option also impacts on Ballyvolan Upper- Coyne's Cross ecological site (EC29), also of national importance, as well as nine watercourses of county importance. The corridor option will also result in nine impacts, significant at the local level.

#### 1.4.2.3 Corridor Option 5 (South)

This is an on-line option with the same alignment as Corridor Option 1 (South) (Red Corridor) except that the section of the corridor option which passes through Glen of the Downs SAC (Red Corridor – Glen of the Downs Wider Corridor Alternative) is wider than that assessed under Corridor Option 1 (South). Thus the impacts outside those on Glen of the Downs SAC are the same as discussed for Corridor Option 1 (South). Due to the fact that Corridor Option 5 (South) is wider through the Glen than that section in Corridor Option 1 (South), the extent of habitat loss in the SAC, including QI habitat and non-QI habitat types that form part of the conservation objectives for Glen of the Downs SAC, would be greater for Corridor Option 5 (South).

The corridor returns to match that of Corridor Option 1 (South) using the Red corridor to the south of Glen of the Downs and remains on-line for the remainder of the scheme. Impacts on key ecological receptors from Junction 10 (Delgany / Drummin) to Junction 14 (Coyne's Cross) are described above under Corridor Option 1 (South).

Of the three least preferred corridor options, this is potentially the most damaging from a biodiversity perspective, compared with Corridor Option 1 (South) and Corridor Option 6 (South), on account of this corridor option having the greatest loss of qualifying interest Old oak woodland [91A0] habitat from Glen of the Downs SAC (c. 2.5ha in total compared to c. 0.2ha for Corridor Option 1 (South)). This would result in a significant impact on a site of international importance and would have complex implications from an Appropriate Assessment (AA) perspective.

#### 1.4.2.4 Corridor Option 6 South

The majority of this corridor option follows the on-line corridor option as described under Corridor Option 1 (South) above. However, an off-line corridor

section (Purple corridor), comprising a tunnelled section, is proposed under the western side of Glen of the Downs SAC.

The Kilmacanoge River is crossed once by the on-line corridor option to the south of Junction 9 (Glenview) to the north of Glen of the Downs. The Three Trouts Stream and Woodlands [10] River are crossed by the proposed corridor option at the northern portal of the tunnel as it enters the Glen of the Downs. The Kilmacanoge River and Three Trouts Stream are regarded as being of county importance due to their fisheries potential (both known to support Brown/ Sea Trout). The Woodlands [10] River is of local importance (higher value). The corridor then passes beneath the western side of the Glen of the Downs, emerging and merging with the existing N11 just south of Junction 10 (Delganey/ Drummin).

Although this corridor option passes beneath the Glen of the Downs, direct impacts on the SAC, and its QI Annex I habitat cannot be excluded. This is because ground investigation (GI) works would be required in order to progress the design and construction of the tunnelled section of this corridor option. GI works such as vertical boreholes or inclined boreholes, would require the operation of plant machinery, and due to the susceptibility of landslide in the area, this could trigger slope instability. Slope strengthening solutions could be employed to alleviate this risk but all typical slope strengthening solutions (e.g. retaining walls and regrading, soil nails etc.) would involve construction activity on and around the slope face, which is likely to constitute a direct impact on the SAC, and, depending on their locations, a direct impact on QI habitat. Furthermore, the necessity to have plant machinery installed and operational for GI works may also result in direct impacts to QI habitat, depending on the required locations of boreholes.

Impacts on the QI habitat [91A0] in Glen of the Downs SAC will have implications from an Appropriate Assessment (AA) perspective. Site Specific Conservation Objectives (SSCOs) for Glen of the Downs SAC were published in December 2020 and have informed the Stage 2 Options Assessment. According to the published SSCO the only QI habitat for which the SAC is designated is Old oak woodlands [91A0], and the overall conservation objective is to “*restore the favourable conservation condition of Old sessile oak woods with Ilex and Blechnum in the British Isles in Glen of the Downs SAC*”. A number of attributes underpin this overall conservation objective (e.g. habitat area, habitat distribution, woodland size, woodland structure and vegetative composition) and targets have been set for each attribute respectively.

In terms of Corridor Option 6 (South), the main interaction with the SSCO relates to targets regarding “habitat area” of 91A0 woodland and “woodland size” (which relates to all areas of woodland habitat within the SAC,).

This corridor option has the potential to undermine the conservation objective regarding maintaining the area of QI 91A0 woodland within the SAC as GI works, or slope strengthening solutions have the potential to result in the removal of QI habitat within the SAC. This would constitute a direct irreversible impact on QI habitat within the SAC. Likewise, this corridor option also has the potential to conflict with the conservation objective regarding maintaining woodland size

(area of woodland) within the SAC. This includes areas of semi-natural woodland and modified woodland. Therefore, any loss of woodland within the boundary of the SAC would undermine this conservation objective.

For the same reasons as outlined above (GI works and slope strengthening solutions) the loss of other areas of woodland cannot be excluded.

The corridor returns to match that of Corridor Option 1 (South) using the Red corridor to the south of Junction 10 (Delgany/ Drummin) and remains on-line for the remainder of the scheme. Impacts on key ecological receptors from south of Junction 10 (Delgany / Drummin) to Junction 14 (Coyne's Cross) are described above under Corridor Option 1 (South).

Of the three least preferred corridor options, this is potentially the second most damaging from a biodiversity perspective, on account of this corridor option having the potential to result in a greater extent of direct impacts on the QI habitat of Glen of the Downs SAC, than Corridor Option 1 (South) (c. 0.184ha in total), but to a lesser extent than that which is expected under Corridor Option 5 (South) (c. 2.5ha in total).

Table 1.4: Corridor assessment – Southern Section

	<b>Corridor Option 1 (South)</b>	<b>Corridor Option 2 (South)</b>	<b>Corridor Option 5 (South)</b>	<b>Corridor Option 6 (South)</b>
Assessment Criteria	Quantitative Assessment: Number of Impacts of Varying Significance			
Impacts of international significance	2	1	2	2
Impacts of national significance	1	2	1	1
Impacts of county significance	10	9	10	10
Impacts of local significance (higher value)	8	9	8	7
Qualitative Assessment	Major or Highly Negative	Major or Highly Negative	Major or Highly Negative	Major or Highly Negative
Score / Impact Level	1	1	1	1
Preference†	Least Preferred (LP1)	Preferred	Least Preferred (LP3)	Least Preferred (LP2)

† Numerical preference rankings were provided when the assessment indicated that two or more corridor options were Least Preferred.

Corridor Option 2 (South) is the preferred corridor option in the Southern Section of the scheme due to the fact that it avoids direct impacts on the QI habitat for which Glen of the Downs SAC is designated.

Impacts on this habitat type are avoided due to the fact that the off-line section of this corridor option lies to the west of the Glen of the Downs.

The remaining corridor options (Corridor Option 1 (South), Corridor Option 5 (South) and Corridor Option 6 (South)) are all least preferred options, as each one will result in a direct impact to the QI habitat of Glen of the Downs SAC. The degree to which each of these corridor options will affect the QI habitat has been used to differentiate between them qualitatively; Corridor Option 1 (South) will affect the smallest extent of QI habitat (c. 0.2ha) in comparison to Corridor Option 5 (South) (c. 2.5ha) and Corridor Option 6 (South) (quantity cannot be determined at this stage, but is assumed to be less than Corridor Option 5 (South)).

## 1.5 Stage 2 Project Appraisal Matrix – transport assessment

Direct impacts related to the transport scenarios are not considered relevant to Biodiversity as the transport scenarios are to be contained within the corridors provided for the corridor options. Indirect air quality impacts are guided by the air quality assessment and this transport assessment is based on these impacts only. Refer to **Appendix D6** (Air quality and climate) of **Volume D**.

Table 1.5: Transport scenario assessment

Assessment Criteria	Transport Scenario 5A	Transport Scenario 5B
Preference	Intermediate	Intermediate

### 1.5.1 Transport Scenario 4 assessment

The assessment of transport scenarios in relation to Biodiversity is guided by the air quality assessment. The air quality assessment noted that Transport Scenario 4 will have the effect of reducing pollutant concentrations in proximity to the N11/M11 corridor via reduction in congestion and a modal shift away from private car. Therefore, either Transport Scenario 5A or 5B coupled with Transport scenario 4 is likely to result in a *slightly positive* impact, compared to the Do-Minimum Scenario. Refer to **Appendix D6** (Air quality and climate) of **Volume D**.

## 1.6 References

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