



N11/M11 Junction 4 to Junction 14 Improvement Scheme

December 2021



Phase 2 Option Selection Report

Volume B Constraints Study

265455-ARP-GEN-OSR-RP-ZX-0001-C01



An Roinn Iompair
Department of Transport



ARUP

Wicklow County Council

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

**Option Selection Report
Volume B – Constraints Study**

265455-ARP-GEN-OSR-RP-ZX-0001

C01 | 6 December 2021

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It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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1 Introduction

1.1 Aims and Objectives

The initial step in the option selection process is to undertake a detailed constraints study in order to identify the nature and extent, at an appropriate level of detail, of constraints within a defined study area. These constraints are documented and mapped and are used to inform the development of reasonable options for the scheme.

The constraints study seeks to identify the issues of international, national, regional and local importance which must be considered when planning and designing the scheme so that the phases which follow (Options Selection and Environmental Evaluation) can be properly informed.

1.2 Methodology

The constraints gathering exercise has comprised of a desktop study, with the extent and nature of certain constraints verified by means of windshield or walkover field surveys. These surveys have been further supplemented through stakeholder engagement and public consultation.

The specific methodology adopted and the sources of information consulted for each element of the constraints study are discussed in detail within each subsequent chapter.

1.3 Structure of this report

This constraints study has been prepared in accordance with the Transport Infrastructure Ireland (TII) Project Manager’s Manual for Major National Road Projects (PE-PMG-02042)¹ and divides constraints into three principal categories, namely;

- **Artificial Constraints** (forming part of the built environment including underground features);
- **Natural Constraints** (naturally occurring landscapes and features, including underground features); and
- **External Parameters** (design standards, policy, procedural, financial and legal issues).

¹ Transport Infrastructure Ireland (2019) Project Manager’s Manual for Major National Roads Projects PE-PMG-02042. Available from: <https://www.tiipublications.ie/library/PE-PMG-02042-01.pdf>.

This report comprises of 18 chapters, presenting the constraints within these categories in the order outlined in **Table 1.1**.

Table 1.1: Constraints study layout below.

Chapter of Constraints Study		Title
Chapter 1		Introduction
Chapter 2		Definition of the Study Area
Chapter 3		Consultation
Artificial Constraints	Chapter 4	Human beings
	Chapter 5	Air quality and climate
	Chapter 6	Noise and vibration
	Chapter 7	Material assets - agriculture
	Chapter 8	Material assets - non-agriculture
	Chapter 9	Archaeology, architectural and cultural heritage
	Chapter 10	Land use and planning
	Chapter 11	Engineering
Natural Constraints	Chapter 12	Biodiversity
	Chapter 13	Soils and geology
	Chapter 14	Hydrology
	Chapter 15	Hydrogeology
	Chapter 16	Landscape and visual
Chapter 17		External parameters
Chapter 18		Conclusion

2 Definition of the study area

At the commencement of Phase 2 (Option Selection), an initial study area for the N11/M11 Scheme was firstly defined. The study area is a boundary within which key scheme constraints are identified and appropriate options are examined and developed.

The definition of the scheme study area was influenced by a number of factors, including;

- Topography;
- Coastline;
- Existing N11/M11 corridor tie-in locations;
- Extent of public transport infrastructure and catchment for same;
- Environmental criteria; and
- Potential zone of influence of scheme options and impacts.

The northern boundary of the study area extends from the Irish Sea coastline to the east and runs between the south Dublin towns of Ballybrack and Shankill. An obvious consideration when defining the northern boundary was the tie-in point of the M11 and M50 motorways at the existing interchange east of Shankill.

However, in light of the need to examine alternative transportation solutions, the study area's northern boundary was extended to capture the southern portion of the green Luas line. The boundary was also extended to include the zone of influence of the existing M11 along the southernmost section of the M50 and along the N11 dual carriageway through Loughlinstown Roundabout as far as Cabinteely.

The western boundary of the study area commences at Kilternan, Co. Dublin and was largely influenced by the significant natural barrier presented by the Dublin and Wicklow mountains. It was not considered necessary to extend the boundary further west as the steeply undulating topography was not conducive to options development and would be too far removed from the desired transportation line within the corridor. Notwithstanding, the western boundary does encompass the Great Sugar Loaf Mountain, which is also a proposed National Heritage Area (pNHA) to the west of Kilmacanoge, and a portion of Knocksink Wood Special Area of Conservation (SAC) west of Enniskerry. The boundary also extends sufficiently west to include major regional route connections to the N11/M11 from western catchments, including the R116 from Kilternan, the R117 from Enniskerry, the R755 and the R765.

The southern boundary follows the line of the existing R764 regional road from a point close to the Vartry Reservoir in the west, then crosses a point on the existing M11 motorway approximately 1.5km south of the existing junction at Coyne's Cross (Junction 14). From here, the southern boundary follows the line of the L5067 local road towards the eastern coastline.

The eastern boundary of the study area entirely follows the Irish Sea coastline. As such, the study area includes the coastal towns of Shankill (as noted above), as well as the Co. Wicklow towns of Bray, Greystones, Kilcoole and Newcastle. These population centres impact significantly on the transportation demands within the corridor and it was considered that the zone of influence of any options to upgrade the N11/M11 could extend into these urban areas. Furthermore, it was also determined that the study area should include the Dublin-Rosslare railway line which closely follows the coastline.

2.1 Description of N11/M11 Scheme study area

The study area for the N11/M11 Scheme is presented in **Figures B2.1 to B2.3**. The study area extends partially across two counties, with the greater part of the area located within Co. Wicklow (approximately 83%) and the remainder in County Dublin (approximately 17%). The overall boundary encompasses an area of approximately 168km² and includes a portion of the southern Dublin suburbs of Shankill, Carrickmines, Loughlinstown and Kilternan, as well as much of coastal County Wicklow, extending as far south at Coyne's Cross to the south of Newcastle village.

3 Consultation

3.1 Non-statutory public consultation

At the outset of the project during Phase 1 (Concept and Feasibility Studies), a publicity campaign was launched by Wicklow County Council to raise awareness of the project amongst members of the public. A key component of this publicity drive involved the staging of a public information day, held on Tuesday 11 December 2018 at the Glenview Hotel, Glen of the Downs, Delgany.

The primary objective of this initial consultation was to initiate public engagement on the project, to present the study area to the wider public and explain the need for the scheme. In view of the fact that previous, publicly available reports had proposed a broad range of measures to ameliorate the N11/M11 route, the first public consultation also sought to affirm to the public that no definitive solutions had been identified and that all feasible options would be examined as part of the N11/M11 Scheme.

As the detailed constraints study had not yet commenced in earnest at this stage, the public display presented a number of important natural and artificial constraints identified through early desktop studies, with the aim of generating discussion and receiving feedback from the public on their own local knowledge of additional constraints and issues of concern.

Representatives from Arup, Wicklow County Council and Kildare National Roads Office were in attendance to assist the public in explaining the material on display and outlining the process and timeline that subsequent phases would follow. Approximately 200 people signed the attendance register at the consultation event, with the main findings summarised as follows:

- There was strong support for upgrades to the public transport system as a solution to the problems on the N11/M11 corridor;
- Significant safety concerns were voiced by residents with direct access onto the N11;
- Concerns were raised regarding the reliability of existing bus services, with such services frequently late and affected by the same congestion as other traffic. Concerns were also voiced on the cost of bus services, particularly for those outside the catchment of the Dublin Bus network;
- The frequency of train services, particularly during peak hours, from Wicklow Town and Greystones was described as inadequate; and
- Several people noted that the existing Park and Ride facility at Greystones is too small and typically full by 8.00am – forcing some people to drive who would otherwise take the train.

Details of this first consultation event and the submissions received from the public are included in **Appendix B1.1**.

In addition to the public consultation event, a website for the N11/M11 Scheme, <https://n11m11.ie/>, was established and went live on 3 December 2018.

3.2 Stakeholder consultation

As part of the Constraints Study, a number of key stakeholders were identified and contacted to inform them of the project and to invite their participation in the Constraints Study and Option Selection Phases. A list of the key stakeholders contacted as part of the study is provided below.

- Angling Council of Ireland;
- Air Coach;
- Astronomy Ireland;
- An Bord Pleánala;
- An Chomhairle Ealaíon (Arts Council of Ireland);
- An Garda Síochána;
- An Taisce;
- Bat Conservation Ireland;
- BIM/Sea Fisheries Protection Authority (SFPA);
- Birds Ireland ‘The Lodge’;
- Birdwatch Ireland;
- BirdWatch Ireland’s East Coast Nature Reserve;
- Bray Harbour;
- Bray Wheelers Cycling Club.
- Bus Éireann;
- Coillte Head Office;
- Commission for Energy Regulation;
- Commission for Railway Regulation;
- Construction Industry Federation;
- Department of Agriculture, Food and the Marine;
- Department of Defence;
- Department of Foreign Affairs & Trade;
- Department of Jobs, Enterprise and Innovation;
- Druids Glen Hotel & Golf Resort;
- Dún-Laoghaire Rathdown County Council;
- Dun Laoghaire-Rathdown Chamber of Commerce;
- Dun Laoghaire-Rathdown Planning Department;
- Eastern & Midlands Regional Assembly;
- Eirgrid;

- Environmental Protection Agency;
- ESB Networks;
- ESB International;
- Fáilte Ireland;
- Gas Networks Ireland;
- Geological Survey of Ireland;
- Glen Of Imaal, Wicklow Mountain Rescue;
- Greystones Harbour;
- Greystones Archaeological & Historical Society;
- Health Service Executive;
- Health & Safety Authority;
- Iarnród Éireann;
- Inland Fisheries Ireland;
- Inland Waterways Association of Ireland;
- Irish Cattle & Sheep Farmers Association (ISCA);
- Irish Farmer's Association;
- Irish Marine Institute;
- Irish Peatland Conservation Council;
- Irish Water;
- Irish Wildlife Trust;
- Irish Whale and Dolphin Group;
- Met Éireann;
- Minister and Department of Culture, Heritage and the Gaeltacht (DAHG)
(from September 2020 called Department of Tourism, Culture, Arts,
Gaeltacht, Sport and Media);
- Minister and Department of Communications, Climate Actions and
Environment (from September 2020 called Department Environment, Climate
and Communications);
- Minister and Department of Housing, Planning and Local Government (from
September 2020 called Department of Housing, Local Government and
Heritage);
- Minister for Justice & Equality;
- Minister for Transport, Tourism & Sport (from September 2020 called
Minister for Transport);
- National Inventory of Architectural Heritage (NIAH);
- National Monuments Service;

- National Parks & Wildlife Service;
- National Transport Authority;
- Newcastle Airfield;
- Newtown Team;
- Teagasc;
- The Heritage Council;
- The Office of Public Works;
- The Irish Aviation Authority;
- The Irish Wildlife Trust;
- Transport Infrastructure Ireland;
- Údarás na Gaeltachta;
- Waterways Ireland;
- Wexford Bus;
- Wicklow Chamber of Commerce;
- Wicklow County Council;
- Wicklow County Council Planning Department;
- Wicklow Public Participation Network and Environmental Network;
- Wicklow Tourism; and
- Wicklow Town Team.

A project website ‘www.N11M11.ie’ was set up as part of the public consultation process. The website includes regular updates on scheme progress and also allows members of the public to make submissions and raise concerns to the project team.

4 Human beings

4.1 Introduction

This section describes the constraints relevant to the assessment of potential impacts on human beings within the study area for the N11/M11 Scheme. Interactions are possible with other disciplines including air quality, noise and vibration, landscape and visual, and material assets.

4.2 Methodology and sources of information

The following guidelines were referred to while preparing and writing this section:

- Environmental Protection Agency (EPA): Guidelines on the Information to be contained in Environmental Impact Statements, 2002¹, and the Revised Guidelines (Draft, August 2017)²;
- Environmental Protection Agency (EPA): Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) 2003³, and the revised Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015)⁴; and
- National Roads Authority: Environmental Impact Assessment of National Road Schemes - A Practical Guide (Revision 1, November 2008)⁵.

A human beings assessment requires that an understanding of the community is built up through background research, site visits, and discussions with local people and community representatives. Specifically, for this stage of the assessment, data has been collected by means of:

¹ Environmental Protection Agency Guidelines on the Information to be contained in Environmental Impact Statements, 2002. Available from: http://www.epa.ie/pubs/advice/ea/guidelines/EPA_Guidelines_EIS_2002.pdf

² Environmental Protection Agency Revised Guidelines on the information to be contained in Environmental Impact Assessment Reports (Draft, August 2017). Available from: <https://www.epa.ie/pubs/advice/ea/EPA%20EIA%20Guidelines.pdf>

³ Environmental Protection Agency Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) 2003. Available from: http://www.epa.ie/pubs/advice/ea/guidelines/EPA_advice_on_EIS_2003.pdf

⁴ Environmental Protection Agency the Revised Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015). Available from: <https://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes/Draft%20Advice%20Notes%20for%20preparing%20an%20EIS.pdf>

⁵ National Roads Authority Environmental Impact Assessment of National Roads Schemes – A Practical Guide, Revision 1, November 2008. Available from: <https://www.tii.ie/technical-services/environment/planning/Environmental-Impact-Assessment-of-National-Road-Schemes-Practical-Guide.pdf>

- Primary data sources (e.g. demographic data from Census 2016 and from Census 2011 and Small Area Population Statistics for 2016 and 2011 produced by the Central Statistics Office)^{6 7};
- Maps of the study area, including Ordnance Survey Ireland (OSi) 1:50,000 maps 50 (5th Edition, 2017)⁸ and 56 (4th Edition 2018)⁹, and Google Maps (© Google)¹⁰
- A review of the Needs Assessment Report¹¹;
- A survey of the study area, including observation of local settlement and travel patterns and identification of sensitive properties and community facilities;
- Discussions with residents or users of community facilities where encountered during the survey; and
- Public Consultations, landowner and other interested party meetings.

The constraints assessment takes account of the location of settlements in the study area and the location and/or use of community facilities such as town and retail centres, commercial/industrial sites, sports clubs, schools, community centres and outdoor amenities. For ease of reading, the assessment is divided into a north study area including Bray and the eastern half of Enniskerry, a middle study area including Greystones, and a south study area including Newtownmountkennedy and Kilcoole. The discussion is generally from west to east within these sections. Each section discusses the built area and community facilities, outdoor rural amenities and the area of the N11/M11 road corridor. The last of these includes discussion of journey patterns and the accessibility or location of adjacent private residences, business and community facilities from north to south. In preparing this section of the Constraints Study, cognisance has been taken of journey characteristics for all road users, including cyclists and pedestrians, community severance, journey and general amenity, and the local economy. Detailed assessments of these affects will be included in the Environmental Impact Assessment Report (EIAR).

⁶ Central Statistics Office 2016 Reports. Available from: <https://www.cso.ie/en/census/census2016reports/> (Accessed May 2019)

⁷ Central Statistics Office 2011 Reports. Available from: <https://www.cso.ie/en/census/census2011reports/> (Accessed May 2019)

⁸ Ordnance Survey Discovery Series Map No. 50 Dublin, Kildare, Meath, Wicklow. 2017 (5th Edition) Map Scale 1:50,000

⁹ Ordnance Survey Discovery Series Map No. no. 56 Wicklow, Dublin, Kildare. 2018 (4th Edition) Map Scale 1:50,000

¹⁰ Google Maps. Available from: <https://www.google.com/maps>

¹¹ AECOM/ROD (2017) M11/N11 Corridor Study (J4 M50 – J14 Coyne’s Cross). Needs Assessment Report, Transport infrastructure Ireland (TII) April 2017. Available from: https://www.tii.ie/tii-library/strategic-planning/strategic-reports/M11_N11_Needs_Assessment_Report.pdf

4.3 Existing environment

4.3.1 Population

The study area extends between Junction 4 and Junction 14 of the N11/M11, taking in the south-eastern edge of Greater Dublin, including the suburbs of Shankill, and the settlements of Enniskerry, Bray, Greystones, Kilcoole, Delgany, Kilpedder and Newtownmountkennedy which are in County Wicklow. The population, and population change, of these communities is given in **Table 4.1**. The study area also includes the Electoral Divisions (EDs) listed in **Table 4.2**.

Table 4.1: Settlements: population*

Settlement	2016	2011	% change
Enniskerry	1,889	1,811	4.31%
Bray	32,600	31,872	2.28%
Kilmacanoge	1,042	1,028	1.36%
Greystones	18,140	17,468	3.85%
Kilcoole	4,239	4,029	5.21%
Newtownmountkennedy	2,835	2,410	17.63%
Newcastle	924	951	-2.84%
Kilpedder	1,255	1,287	-2.49%

* some change in settlement may have occurred between 2011 and 2016

Table 4.2: Electoral divisions: population

Electoral division	2016	2011	% change	population density
Cabinteely-Loughlinstown	4,280	3,806	12.45%	672
Killiney South	6,386	6,478	-1.42%	2943
Enniskerry	2,910	2,765	5.24%	90
Shankill-Rathmichael	5,623	5,353	5.04%	385
Shankill-Rathsallagh	3,268	3,250	0.55%	3173
Shankill-Shangalagh	5,488	5,334	2.89%	1829
Bray No.1	1,839	1,746	5.33%	245
Bray No.2	6,414	6,192	3.59%	2765
Bray No.3	6,459	6,424	0.54%	4549
Kilmacanoge	14,706	14,043	4.72%	515
Powerscourt	788	785	0.38%	14
Delgany	5,980	5,652	5.80%	488
Greystones	7,258	7,151	1.50%	1920
Kilcoole	10,731	9,834	9.12%	448
Altidore	365	363	0.55%	19

Electoral division	2016	2011	% change	population density
Calary	333	302	10.26%	10
Newcastle Upper	4,009	3,584	11.86%	147
Newcastle Lower	2,354	2,209	6.56%	94
Killiskey	1,062	1,038	2.31%	45

The study area has witnessed population growth since the previous census in 2011. Overall, this growth has been modest, except in the Dún Laoghaire-Rathdown suburb of Shankill which has experienced significant residential development in recent years, mostly apartments. However, the rate of new houses and apartment development since 2016 within the study area suggests that there will be a significant increase by the time of the next census. This construction has been supported by the Luas extension and the development of Cherrywood and has continued as the economy has recovered.

The following paragraphs describe the principal constraints in the study area. A full list of constraints is presented in **Table 4.3** and accompanying Constraints **Figures B4.1** to **B4.6**.

4.3.2 Constraints in the study area

4.3.2.1 Northern study area

Built areas and community facilities

The north of the study area includes a section of Dún Laoghaire-Rathdown including the suburbs of Loughlinstown and Shankill. Community facilities in this area include the Carrickmines Shopping Centre, smaller town/retail centres, St Columcille's Hospital, several schools, including a secondary school and Ballyowen Meadows Special School. The Dart line follows the coast to Greystones with stations at Shankill and Bray. The Cherrywood area, in particular, is experiencing rapid development following the extension of the LUAS line. This development includes apartments and housing, a town centre, parks and outdoor sports grounds, and a new secondary school.

The study area extends to the more dispersed section of Enniskerry village east of the R760. Community facilities within the boundaries of the village include two national schools and St. Patrick's Church located within the study area. The Summerhill House Hotel is also located in the study area. A small cluster of residential development is also located where Ballyman Road joins Monastery Road. Elsewhere, the west of this section of the study area has remained largely rural, including the area immediately south of the M50, although new development has recently occurred in Kiltiernan and historical linear development does follow the R116 Ballycorus Road along which the Lansdowne Old Wesley Rugby Club is located. Recent residential housing development has also occurred in the vicinity of Ballybride Road just to the west of the existing M11. Within this section of the study area, there are also numerous small businesses.

The presence of narrow lanes and steeply undulating countryside means that access is often concentrated on junctions along the N11/M11.

Bray is the major large town in the study area. It has a population of 32,600 as noted in **Table 4.1**. Many people commute into work in Dublin each day from Bray, mainly by using the N11/M11 and the Dart service, but Bray also contains numerous large businesses located in commercial estates, for example off the R768 (Southern Cross Road), off Schools Road, Killarney Road and Boghall Road (south side of town south of the Bray River), and industrial estates, for example at Woodbrook Downs/Corke Abbey Avenue (north town). The town is also the home of Ardmore Film Studios. It has a busy town centre and several large supermarkets north and south of the Bray River. There are local council offices, an arts centre, a central library and several community/social centres. The town possesses a Health Service Executive (HSE) health centre, primary and secondary schools, and the Bray Institute of Further Education located on Novara Avenue. Sports clubs include Bray Wanderers Football Club on Seymour Road, Ardmore Rovers, Bray Golf Club off Ravenswell Road, a boxing club, bowling club, lawn tennis club, badminton club, a hockey club and several leisure clubs and gyms. Bray Emmets GAA Club is located at Old Connaught. The People's Park is located along the north bank of the Bray River.

Bray still possesses hotels from its period as a seaside resort, although most visitors today are day-trippers who come to walk the recently restored promenade along the mostly shingle beach or to use the Bray to Greystones coastal path. The Royal Hotel is located on the main street, and the Wilton Hotel at the corner of the R761 and R768, but there are other hotels and public houses overlooking the beach on Strand Road. The Sea Life Aquarium is located on the promenade along with cafés as is a traditional amusement arcade. There is a small harbour and sailing club.

Rural amenities

Outdoor amenities in the northern section are numerous and include the prominent and popular viewpoint of Carrickgollogan Hill and a network of footpaths in Carrickgollogan Forest as far as the old Lead Mines. There is another nearby amenity at Barnaslingan Forest (overlooking The Scalp valley) and at Rathmichael Wood. The Cookstown River follows a scenic winding section of the R117 between the village and Kilcrouney Cross beside the M11. The Dargle River meets this river at the same location. A lightly used and un-signposted footpath passes through woodland above the river and a short path drops down to a small waterfall. The river has an active angling community and is well regarded for migratory sea trout. The Goulding Summerhouse is a well-known example of modernist architecture near Kilcrouney which extends above the river on a cantilever. This house is not open to the public.

There are numerous golf clubs and sports grounds in this section of the study area. Dún Laoghaire Golf Club (accessible from Ballyman Road) and Old Conna Golf Club (accessible from Ferndale Road) lie respectively south-west and south-east of Carrickgollogan Hill. Enniskerry AFC has playing fields on Berryfield Lane to the south. Bray Clay Pigeon Shooting Club is also located on this lane.

Woodbrook Golf Club is located in the east of the study area on both sides of the Dublin Connolly to Rosslare Europort railway line as far as the beach. Shankill beach itself comprises mostly shingle and low cliffs, but is a popular amenity, the more so for sections closer to residential areas to the north.

There is much leisure cycling use of regional and local roads within this part of the study area, especially at weekends, particularly in the vicinity of Enniskerry. There are, however, no cycle facilities along the N11 dual carriageway and bypassing Bray requires negotiating a network of narrow and steep lanes. Cyclists choosing to use the N11 are required to use the hard shoulder and are put in hazardous situations when crossing entrance points or choosing to either follow, or cross, junction ramps.

Existing N11/M11 corridor

Within this section, St. Joseph's Centre, a nursing home, backs onto the southbound carriageway of the M11 motorway between Junctions 4 M11/M50 (City Centre/Dún Laoghaire) and Junction 5 R761 (Bray North). The same is true of a residential amenity space on Mountain View Road. Junction 5 is a grade-separated junction connecting the R761 to Bray. There are other community facilities in the vicinity of the M11 including Woodbrook College which is located east of the southbound slip road of Junction 5 connecting with the R119 Dublin Road.

There are two amenity constraints at the Old Connaught Avenue Overbridge to the south where the only connection to the M11 is the northbound diverge of Junction 5. The constraint of most significance here is Bray Emmets GAA Club which is located beside the northbound carriageway and diverge slip road, and which is accessed from Old Connaught Avenue immediately west of the slip road. The club building itself is located beside the M11. To the immediate south are grounds and playing fields owned by St. Gerald's School, although access to the school from Thornhill Road is distant from the M11. St. Kieran's Special School is located on Old Connaught Avenue along with the access to Festina Lente equestrian centre and walled garden. The proximity of Little Bray Community Centre to the southbound carriageway, and in particular its garden area, is a possible constraint as regards any potential widening of the M11. The same is true of the residential amenity space between Old Connaught View and Blind Lane, and most especially the playground in its southwest corner.

Junction 6 R918 (Bray/Fassaroe) is a grade-separated junction which provides the access point to central Bray, mainly for residential areas in North Bray above the River Dargle, but connecting also with the town centre via Upper Dargle Road and Castle Street. The exit to the west provides access to Berryfield Lane, Fassaroe Lane, Thornhill Road and John Scottus School as well as to the Roadstone and recycling facilities. At the southbound exit from the N11, community facilities that include Little Harvard Creche and Montessori are located within the La Vallee Commercial and Apartment Development. This development is accessible from the eastern roundabout of the junction.

The N11 dual carriageway replaces the motorway just below Junction 6, although little change in the specification of the road is apparent to drivers at this point.

There is a footpath beside the N11 as far south as the Silverbridge Halting Site, but there is no continuous footpath and no cycle lane in either direction. The site has a hazardous direct access to the southbound carriageway with no slip lane and the hard shoulder being used as the slip lane. The N11 crosses the Bray River just south of the halting site.

The Bray River, and its tributary the Dargle River, respond suddenly to downpours and were the source of serious flooding in Bray prior to major mitigation works.

Just north of the left-in left-out Junction 6a (Enniskerry), there is a cul-de-sac off the southbound carriageway which provides access to four private houses, one of which is beside the N11. A fifth house is accessible from Herbert Road. Two businesses are also located here beside the N11, a hire and lawnmower shop, and a motor dealership. The businesses and houses represent significant constraints. There is a very short slip road to Junction 6a for the R117, with the hazard confirmed by a tall warning sign at the junction itself.

The Enniskerry Footbridge provides access from the N11 between the Enniskerry Road and Herbert Road and from the Ashton Wood residential estate via a woodland path. There is a rear entrance to the Dublin Oak Academy private school off the northbound carriageway at the short slip road for the R117. Shortly to the south, the southbound carriageway connects with Herbert Road which is a busy access and exit point for traffic from residential areas in Bray. Kilbride Church of Ireland is located at this junction beside the N11. It has no car park and is a significant constraint. South of the church, there are gardens and a private house located near the N11 southbound carriageway and, somewhat further away, a bed-and-breakfast, both accessible from Ballywaltrim Lane.

4.3.2.2 Middle study area

Built areas and community facilities

The middle study area includes Greystones and the village of Kilmacanoge. Kilmacanoge village straddles the N11. There are numerous businesses and a pub/restaurant beside the primary road as described in the section below. This includes Avoca which contains a popular café and clothing/household shop. The parish also contains Kilmacanoge National School and St. Mochonog's Parish Church and cemetery (each with access from the R755). Kilmacanoge GAA and Glencormac United FC are located at the foot of the Sugarloaf with access from Quill Lane. The Woodlands Academy School is located south of Junction 7 (Bray South). To the east of Junction 7 (Bray South) there is a Circle K service station.

Greystones is the second largest settlement in the study area with a population of 18,140 as of 2016 as noted in **Table 4.1**, but this has been expanding in the interim as new development has spread to the west and south. The town possesses a busy main street with a range of small shops. A major investment in a new harbour and marina was completed in 2013. Walkers often congregate in shops and pubs at these locations following the walk from Bray. The town is also the terminus of the Dart service, although regional services continue to Rosslare. There is a handful of large supermarkets.

There are also primary and secondary schools with a further secondary school due to open in 2021. Urban amenities in Greystones include a sailing club, soccer club, rugby club and a tennis club. Greystones Golf Club occupies a large green area that is now within the town boundary.

Between the N11 corridor and Greystones there is a Montessori school and a small music school in Delgany.

The SEK-Dublin International School is an International Baccalaureate school located at Windgates. The Glenview Hotel is located on the west side of the N11 and is accessible from Junction 9.

Rural amenities

The attractive countryside here sits below the Wicklow hills and amenity/recreation is a major feature of the area. This includes ascents of the prominent Sugarloaf Mountain which is a familiar prospect view for Wicklow and for people using the N11. The hill is usually accessed from the R755, but can also be climbed from the east. Carrigoona Commons is a much smaller outcrop and viewpoint to the north that is mostly visited by local people. Glendalough is well outside the study area, but is a major tourism and amenity destination that is usually accessed by private car via the R755 from Kilmacanoge. Tour buses use the wider R765 from Newtownmountkennedy to Roundwood.

East of the existing N11, the Little Sugarloaf is another popular amenity that is accessed using a path from Bohilla Lane where there is limited parking. The further outcrop of Bray Head to the east provides a popular ascent from the beach at Bray to a prominent cross, but with informal walking paths continuing on past minor rocky tops to Windgate beside the R761 Bray to Greystones road. There is a steep connection from Bray Head to the Bray to Greystones coastal walk which is a very popular amenity, including with overseas visitors. In between the Little Sugarloaf and Bray Head is Bray Golf Club, and Kilruddery House and Gardens, a seventeenth century house and popular attraction which includes a walled garden, farm shop, café and weekly farmers' market.

The Glen of the Downs is a steep sided glacial valley that is traversed by the N11. The valley represents a prospect view for users of the N11. However, it is also a significant amenity with the section on the eastern side being accessible from the southbound carriageway where there is a car park and picnic site. The woodland is also accessed from the vicinity of Ballydonagh. Although an important destination and Special Area of Conservation (SAC), its amenity value is affected by traffic noise. Kindlestown Woods is a smaller amenity to the east. A golf course is located north of Ballydonagh Road from Junction 9 (Glenview).

As with the northern section, there is much cycling use of roads within this part of the study area, especially at weekends.

Existing N11 corridor

Between Junction 7 (Bray South) and Junction 8 (Kilmacanoge / Roundwood) the northbound access from the R768 (Southern Cross Road) to the N11 carries significant morning traffic.

Kilcronney Furniture (and showroom) is accessed from the roundabout. The main access for Dublin Oak Academy private school is from Kilcronney Lane.

Brennanstown's Riding School is located beside the southbound slip of Junction 7 (Bray South). This is a large facility which backs onto the slip lane and the N11. The Woodlands Academy, a private boarding school, is located on the opposite side of the N11. Access is from the northbound lane, but there is no distinct slip lane or hard shoulder at this point. There is no footpath or cycle path south of Junction 7 in either direction.

Approaching Kilmacanoge on the southbound lane, there is access to a field managed by a perfume business on the opposite side of the N11, followed by three private houses. The houses have direct access to the N11 and are connected by a roadside footpath to the village. A short cul-de-sac then provides access to two houses and a motor/joinery business. This is followed by a small wastewater treatment facility and the premises of a towing business and a medical equipment company. The cul-de-sac, treatment plant and businesses each have direct access to the N11 at a point where vehicles are beginning to exit to a service station or Junction 8. The towing business, in particular, is quite busy. The hard shoulder here is narrow, of non-constant width and often mistaken for a slip road. The location of the residences, businesses, water utility and footpath are each a significant constraint.

The businesses are followed by a busy service station and then by a slip lane for Junction 8 which takes a significant proportion of the N11 traffic for the main part of Kilmacanoge village, the R755, Bohilla Lane and Kilmurray Cottages. Safe exit from the service station is reliant on southbound vehicles signalling their intention to leave the N11. The Kilmacanoge Footbridge crosses from immediately after the service station exit point to the main part of Kilmacanoge. The footpath continues alongside the road separated by a low crash barrier to a point where it can join a cul-de-sac road which leaves Bohilla Lane and provides access to six local houses and a farm. Three of these residential properties and a garden belonging to a fourth are located close to the N11 and the slip lane. Despite the footbridge the community is affected by significant severance.

Along the northbound carriageway, a short slip lane is provided to the R755. One property backs onto this slip lane. It has a rear door and is served by a footpath beside the slip lane which is protected by a low crash barrier. There is also a gated entrance to the rear of a private property which fronts onto the point where the slip lane connects with a small roundabout. An historic graveyard is located behind the property. The car park for the aforementioned public house and restaurant is located at the roundabout which also services the northbound slip lane. The slip lane provides access to another busy service station to which traffic sometimes backs up if the pumps are busy. The service station is followed by the footbridge and a bus stop lay-by connected by the slip lane. The private houses, graveyard, pub car park and service station are all significant constraints.

Houses (23 no.) at the edge of a public housing estate located on Rockfield Park and Carraigoona Close back onto the N11 and the parallel access road/northbound slip lane to the N11, although they are separated by several metres by a rear service lane and vegetated buffer strip.

These houses are followed by a small business park containing five companies, with three of these businesses backing onto the access/slip lane for Hollybrook Road (the buildings of two being close to the road). The business park is accessible from a cul-de-sac road leaving a parallel access road which also provides entry to Avoca which is visited by a steady stream of customers. The access lane becomes two-way at a small junction, providing access to and from Hollybrook road.

Fragrances of Ireland is accessible from Hollybrook Road and has a small car park for customers on the opposite side of the road. There is also an unoccupied (permanently) public utility bungalow beside the car park and beside the northbound slip to the N11. The location of the parallel/slip road and the access it provides to businesses is a significant constraint.

Junction 8 also provides access to Kilmurray Cottage, a parallel access road which also exits back onto the N11 after around 1km. At the start of this road is a bird sales/aviary business. Further down the lane there is a cluster of eight recently constructed private houses followed by ten older properties. Behind the exit point are two further larger residential properties and a farm that are more distant from the N11.

To the south of Junction 8, alongside the northbound carriageway, there is a cluster of six properties located opposite the exit to Kilmurray Cottages and served by another parallel access road. Further south, there are at least two properties connected to a long slip lane/parallel access road exiting from Quill Road. One of these properties has gated access directly onto the slip lane. At the junction with Quill Road, there are two private residences beside the N11, one with access from Donnelly's Lane.

Just north of Junction 9 (Glenview), there is a cottage close to the N11 connecting via a cul-de-sac with Foxborough Lane, followed by Horkan's Garden Centre and three other small businesses. The garden centre has service access to Foxborough Lane, but customer access is direct from the N11 via a slip lane. The garden centre can be busy with customers and is a significant constraint. It is followed by the exit lane to Junction 9. There are two private houses accessible from the exit lane and enclosed by the N11 and the exit lane as it circles back to the Glen of the Downs Overbridge. Two other private residences are accessible direct from the exit lane, while two further properties are located at the end of a cul-de-sac lane starting just before the southbound slip lane. The main exit lane also provides access to Ballydonagh Road and Foxborough Lane, the former providing access to woodland walks at Kindlestown Woods and to the Glen of the Downs. A footpath beside the N11 connects the garden centre to a bus stop and steps up to the overbridge, but there is no footpath connection to any of the roadside properties.

Paddy Connelly's Motors is located across the overbridge beside the northbound lane of the N11. There is also a walled bungalow beside the business. The T-junction here also provides access to Donnelly's Lane and to Red Lane, the latter supplying access to the Glenview Hotel.

Between Junction 9 and Junction 10 (Delgany / Drummin), the Glen of the Downs is on both sides of the existing N11. The woodland and SAC is severed by the N11.

The car park and picnic area has direct access and exit on to the southbound carriageway. At present, this is a serious hazard as southbound vehicles tend to have accelerated after leaving Kilmacanoge and are somewhat obscured from the car park exit by a bend in the road.

4.3.2.3 Southern section

Built areas and community facilities

New development has spread south of Greystones to Eden Gate connected by the recently built R774 relief road. The village of Kilcoole is located to the south along the R761 and includes a small retail centre, soccer club, camogie club, primary schools and a secondary school, an enterprise park and industrial park, and a station that is also used for commuting. Further south is the village of Newcastle which contains St. Catherine's Special School, and a church and community centre. Newcastle GAA Club is located on Sea Road close to the village.

Delgany and Old Downs are small communities to the south-west of Greystones, the latter located on the far side of the N11. Kilpedder is a small community 2km to the south which contains a handful of shops, a public house and Montessori. There is also an organic farm/shop at Tinnapark which is in the environs of the Kilpedder area.

Along with Kilcoole, Newtownmountkennedy is the other large community in the southern section of the study area. It possesses a retail centre including a large supermarket, a primary school, the Parkview Hotel, a community centre and St. Matthew's Church. Garden Village, a compact recent development, is located beside and east of the N11 connected to Newtownmountkennedy by the Junction 12 overbridge.

Rural amenities

The Shoreline Sports Park and athletics ground is located south-east of Greystones in the vicinity of Eden Gate. The shingle coast south of Kilcoole station is popular for walking as far as the saltmarsh lagoons at The Breaches and beyond. Newcastle Aerodrome is used by flying enthusiasts and is located on the coast off Sea Road as is the Birdwatch Ireland East Coast Nature Reserve which has paths and hides for visitors. Coillte's head offices are situated on the edge of Newtownmountkennedy, where there are also woodland grounds accessible to the public. Golf courses include the well-known Druids Glen/Heath Golf Resort south-west of Kilcoole. The Charlestown Golf Club is located on the coast between Greystones and Kilcoole. Delgany Golf Club is located behind the Glen of the Downs to the east. Roundwood Golf Club is located just within the study area with access to the east of the R765. There is relatively little public use of the countryside west of the N11 and before the R755 compared with areas to the north, although the area is scenically attractive and popular for roadside walking and cycling and there is a locally known walking trail sited on Old Downs Hill.

Existing N11 corridor

Junction 10 (Delgany/Drummin) is a grade-separated junction which serves the R762 and nearby extended community of Delgany. The northbound slip lane passes below the N11 and joins the road within a short distance of the exit from Drummin Lane. Traffic joining the N11 here is light, but the proximity of the two roads is a potential hazard given the speed and volume of traffic. Three private properties, including a B&B, are located between Drummin Lane and the N11. The southbound slip lane joins the N11 1km to the south, providing access also to residential properties in the vicinity. There is a connection here to the northbound lane from Drummin Lane to the west.

Junction 11 (Greystones/Kilpedder/Kilcoole) is a grade-separated junction which serves the R774 to Greystones and residential areas in Kilpedder. A few private properties on a residential estate at Glenview Park are located close to and south-west of the junction. The junction to the southern part of the community is accessible only to the northbound carriageway. A shop and public house are located at the junction along with a few private houses. Kilpedder Grove is accessible from the southbound carriageway and connects with residential areas to the east. Spirit Burton Motor Sales is located at this junction. Kilpedder Footbridge provides for pedestrian access from the east to the main part of the village. A parallel access road from here connects a line of 18 private properties, the last of which is a B&B. South of here, there is direct access from the southbound carriageway to a farm and, on the western side of the road, direct access to an avenue through pasture land leading to an estate house.

Junction 12 (Newtownmountkennedy/Roundwood) is a grade-separated junction which provides access to Ballyronan Road, local areas and a large, but rather isolated housing estate. It also provides access on the western side of the road to Newtownmountkennedy. Woodstock Road travels back under the N11 providing a connection with the Druids Glen/Heath Golf Resort and Kilcoole.

Junction 13 (R772 Newtownmountkennedy/Newcastle) is a grade-separated junction which provides access to the southern side of Newtownmountkennedy. A removal and storage business is located on the opposite side of the southbound carriageway junction with the R772. Junction 14 R772 (Coyne's Cross) is a grade-separated junction which provides access to local areas and to a large Applegreen service station.

Table 4.3: Human beings' constraints

Number	Type	Description	Location	Comments
Northern study area				
1	Community/ business/ retail	Retail and community facilities	Main Street, Shankill	
2	Amenity	Cabinteely Park	Cabinteely	
3	Amenity	Cabinteely Croquet and Lawn Tennis Club	Glenamuck Road	

Number	Type	Description	Location	Comments
4	Transport	Carrickmines Park & Ride and Luas station	Glenamuck Road	High significance given transport link
5	Retail	Carrickmines Shopping Centre	Glenamuck Road	High significance (given access needs)
6	Community	Once upon a Time Nursery	Glenamuck Road	
7	Amenity	Carrickmines Golf Club	Off Glenamuck Road	
8	Religious	Old Rathmichael Church	Off Rathmichael Road	
9	Religious	Kilternan Cemetery	Ballycorus Road	
10	Heritage	Puck's Castle	Puck's Castle Lane	
11	Amenity	Rathmichael Wood	Puck's Castle Lane	
12	Amenity	Rathmichael Lodge Gardens	Ballybride Road	
13	Religious	Rathmichael Parish Church	Rathmichael Road	Moderate significance (given proximity to M50)
14	Amenity	Shankill GAA	Stonebridge Road	
15	Transport	Shankill Dart Station	Shankill	
16	Amenity	Shankill Tennis Club	Quinn's Road	
17	Community	Beechfield Manor Nursing Home	Shanganagh Road	
18	Community	Garda Shankill	Darney Court	
19	Religious	Arann Reformed Baptist Centre	Quinn's Road	
20	Hotel	Rosedale House Beechfront Hotel	Shankill	
21	Religious	St. Anne's Church	Shankill	
22	Community	Shankill Library	Library Road	
23	Educational	Rathmichael Parish NS	R837 Shankill	
24	Medical	St. Colmille's Hospital	Off N11	Moderate significance (given access needs)
25	Community, Retail, Employment	Cherrywood Town and Retail centre	Cherrywood	Moderate significance (given access needs)
26	Community	St. Joseph's Centre	Between M11 Junctions 4 and 5	Moderate significance
27	Amenity	Shankill Football Club	Shankill	
28	Amenity	Shanganagh Park	Shankill	
29	Religious	Shanganagh Cemetery	Shankill	
30	Religious	St. James Church	R119	
31	Amenity	Cuala GAA	R119	

Number	Type	Description	Location	Comments
32	Amenity	Carrickgollogan Hill	North of Enniskerry	
33	Amenity	Old Conna Golf Club	South of Carrickgollogan Hill	
34	Amenity	Barnaslingan Forest	North of Enniskerry	
35	Educational	Woodbrook College	Between Junction 5 and R119	Moderate significance (given location)
36	Amenity	Woodbrook Golf Club	North of Bray	
37	Amenity	Bray Emmet GAA	West of M11. Old Conna, Old Connaught Avenue.	Significant (given proximity to existing N11).
38	Amenity/ Equestrian	Festina Lente Equestrian Centre	Old Conna View	
39	Educational	St. Kieran's Special School	Old Connaught Avenue	
40	Amenity	Bray Golf Club	North Bray	
41	Community	Little Bray Community Centre	Old Conna View	
42	Amenity	Playground, Local use	Hazelwood Crescent	High significance (given proximity)
43	Educational	St. Gerald's School	Thornhill Road	Significant (backs on to M11).
44	Community / Retail / employment	Urban area of Bray	Urban area of Bray	
45	Business	Ardmore Studios	Herbert Road, Bray	
46	Business	Roadstone Quarry	West of N11 Bray	Moderate significance (given traffic movements)
47	Employment/ amenity	Harbour and marina, Bray	Coast, Bray	
48	Transport	Dart station, Bray		
49	Amenity	Sea Life Centre and promenade	Promenade, Bray	
50	Amenity	Amusement arcade	Bray	
51	Community / Retail / employment	Urban area of Enniskerry	Built-up area of Enniskerry	
52	Amenity	Lansdowne Old Wesley Rugby Club	Ballycorus Road	
53	Amenity	Dun Laoghaire Golf Club	South of Carrickgollogan Hill	
54	Amenity	Carrigoona Commons	Access from R755	
55	Amenity	Enniskerry AFC grounds	Berryfield Lane	

Number	Type	Description	Location	Comments
56	Amenity	Bray Clay Pigeon Shooting	Berryfield Lane	
57	Community	Little Harvard Creche	La Valle Development	
58	Residential / halting site	Silverbridge Halting Site	N11 below J6	Sharp vehicle entrance. No pedestrian accessibility. Only bus
59	Residential	Five residential properties on cul-de-sac	Cul-de-sac off N11	Significant (given access and proximity to N11)
60	Business	Deerpark Motors	On same cul-de-sac	Significant. Direct and sharp access to existing N11.
61	Religious	Kilbride Church	Start Herbert Road/N11	Significant (beside N11)
62	Amenity	Woodland and walk	Start Herbert Road	
63	Footbridge	Footbridge Herbert Road	Across N11 from Herbert Road to R117	Significant.
64	Community/business	Dargle Valley Nursing Home	Kilbride Lane. West of N11	
65	Amenity	Start walk above River Dargle	Cookstown Cottages	
66	Residential	White house, direct access on N11	N11	Significant
67	Business	Woodville B&B	Ballywatrim Lane. East of N11	Significant given proximity to M11.
68	Education	Dublin Oak Academy	Berryfield Road	
69	Religious	Springfield Cemetery	Killarney Rad, Bray	
70	Education	St Killian's Community School	Schools Road, Bray	
71	Community	Bray Fire Station	Schools Road	
72	Business	Kilcrouney Furniture	Kilcrouney Lane	
73	Amenity / Equestrian	Brennanstown Riding School	Southbound slip of J7	Significant given proximity to N11 and nature of activity
74	Residential	Private house		Significant given proximity
75	Business	La Vallee commercial centre		
76	Business	The Hire & Lawnmower Shop	Cul-de-sac north of footbridge	
77	Businesses / employment	Commercial estate		
78	Retail	Retail centre and Woodies		
79	Educational	John Scottus Secondary School	Ferndale Road	

Number	Type	Description	Location	Comments
80	Heritage	Goulding Summerhouse	Architectural heritage. No public access	
81	Business	Circle K Service Station Brennanstown	Junction 7	
82	Educational	Woodlands Academy	Kilcronney	
83	Business	Recycling Facility	Junction 6	
Middle study area				
84	Amenity	Bray - Greystone Head Coastal Path		
85	Amenity	Cross Bray Head		
86	Amenity	Southern entrance to Bray Head	R761	
87	Amenity	Bray Head Golf Course	R761	
88	Community / Retail / employment	Urban area of Greystones	Urban area of Greystones	
89	Amenity	Greystones Golf Club	Within urban area of Greystones	
90	Educational	SEK-Dublin International School		
91	Business	Inis. Fragrances of Ireland	Kilmacanoge	Significant (given access from parallel road to N11).
92	Business	AVOCA	Kilmacanoge	Significant (as above)
93	Business estate	VBT IT, Avoca Clinic, Medicare	Kilmacanoge	Significant (given access from parallel road to N11).
94	Residential	Large residential estate.	Kilmacanoge. Rockfield Park is lane nearest N11 (west).	Significant (given proximity to N11).
95	Residential & business	Private houses and joinery business	Cul-de-sac off N11	Significant (given proximity to N11)
96	Residential	Three private houses with access to N11	N11	Significant (given proximity to N11)
97	Utility	Wastewater treatment	Kilmacanoge	Significant (proximity).
98	Business	Kelly's Towing	Kilmacanoge	Significant (given access, proximity of N11, traffic movement)
99	Business	Oxygen Care	Kilmacanoge	Significant (given access and proximity of N11)
100	Business	Circle K Service Station East	Kilmacanoge. Busy service station each side of N11	Significant (given access to N11).

Number	Type	Description	Location	Comments
101	Business	Circle K Service Station West	Kilmacanoge. Busy service station each side of N11	Significant (given access to N11).
102	Business	Glen Fuel	Kilmacanoge	Significant (given access and proximity of N11)
103	Footbridge	Footbridge Kilmacanoge	Kilmacanoge	Significant (given mitigation of severance).
104	Business	Pluck's public house	Kilmacanoge	Significant (given access and proximity of N11)
105	Religious/ Heritage	Kilmacanoge graveyard	Kilmacanoge	Significant (given access and proximity of N11)
106	Religious	St. Mochanog's Church and cemetery	Parish church	
107	Educational	Kilmacanoge National School	Access from R755	
108	Residential	House beside slip road	Access t R755 from N11	Significant (given access and proximity of N11)
109	Amenity	Sugarloaf Mountain	Access from R755	Significant: Major amenity destination. Views
110	Residential	Eighteen houses on service road	Beside N11 (east)	Significant (given access and proximity of N11)
111	Residential	Access to private properties	Beside N11 (east)	Moderate significance (given access and proximity of N11)
112	Residential	Six houses on service road	Beside N11 (west)	Significant (given access and proximity of N11)
113	Residential	Two houses with direct access to N11	Beside N11 (west)	Significant (given access and proximity of N11)
114	Residential	Two houses backing onto the N11	Beside N11 (west)	Significant given access and proximity of N11)
115	Residential	Cottage beside N11	Beside N11 (east)	Significant (given access and proximity of N11)
116	Business	Horkan's Garden Centre	Beside of N11	Significant. (Direct access from N11).
117	Residential	Single property	Access from Red Lane	Significant (given access and proximity of N11)
118	Residential	Two private properties with access from slip road	East of N11. Access from southbound slip lane.	Significant. Access on bend of slip lane.
119	Residential	Two single properties with access from slip road	East of N11. Access from southbound slip lane.	Significant. Access on bend of slip lane.
120	Business	Paddy Connolly's Car dealers	Red Lane L1031. West of N11	Significance (given proximity to N11).
121	Amenity	Little Sugarloaf (mountain)	Access from Bohilla Lane	Significant. Views

Number	Type	Description	Location	Comments
122	Amenity	Golf Course	Ballydonagh Road	
123	Business	Copsewood Aviaries	Kilmurrery Cottages.	Significant. Noise
124	Business/ Hotel	Glenview Hotel	West of N11. Access from Red Lane	Significant. Access needed from N11.
125	Amenity	Kindlestown Woods	Woodland walk and hill.	
126	Amenity	Glen of the Down access from the N11	Car park and picnic area is accessed from southbound carriageway of N11. (Other secondary accesses (x2) from Ballydonagh Lane)	Significant (given proximity to N11). Hazardous access to car park.
127	Amenity	Kilruddery Demesne House and Gardens	Southern Cross Rd, Kilruddery Demesne East, Bray, Co. Wicklow	
128	Amenity	Glencormac Untied FC	South of Kilmacanoge	
129	Amenity	Kilmacanoge GAA	South of Kilmacanoge	
Southern study area				
130	Community / Retail / employment	Urban area of Delgany	Delgany	
131	Business	The Gate Lodge Woodlands B&B		Significant (given location and partial dependence on traffic)
132	Amenity	Delgany Golf Club	Delgany	
133	Business/ Residential	Farm business		Significant: farm with direct entrance to N11
134	Amenity	Shoreline Sports Park	South-east of Greystones	
135	Amenity	Charlestown Golf Club	Delgany	
136	Amenity	Roundwood Golf Club	North of Roundwood	
137	Business	Cooladoyle Equestrian	Tooman Road	
138	Community / Retail / employment	Urban area of Kilpedder	Kilpedder south junction. West of N11	Significant. Proximity to N11 exit.
139	Residential	Kilmurray House	Just north of Garden Village. East of N11	Significant. Direct access to N11
140	Residential	Estate house and farm access	Opposite. West of N11	Direct (given access to N11).
141	Residential	Garden Village residential estate	Access from Ballyronan Road junction	Isolated estate adding traffic to N11.

Number	Type	Description	Location	Comments
142	Business / amenity	Coillte HQ and woodland	Newtownmountkennedy	
143	Residential	Houses beside northbound slip to Jn11 on edge of Glenview residential estate	Junction 11	Significant given proximity
144	Business	Spirit Burton Motor Sales	Kilpedder Grove junction east of N11.	Significant. Sharp entrance and exit at junction.
145	Residential	Eighteen private houses on service road including Thorndale B&B		Significant (given proximity to N11)
146	Amenity	Glen Mill Golf course	South of J12, east of N11.	Significant (given proximity to N11)
147	Religious	St Patrick's Church	Seaview Road	
148	Business/ amenity	Kilquade Arboretum and Garden Exhibition Centre	Seaview Road	
149	Religious	Kilquade Cemetery	Kilquade Road	
150	Community / Retail / employment	Urban area of Kilcoole	Kilcoole	
151	Transport	Kilcoole Station		
152	Community / Retail / employment	Urban area of Newtownmountkennedy	Newtownmountkennedy	
153	Business	Newtown Business and Enterprise Centre		
154	Medical	Newcastle Hospital		
155	Educational	St Catherine's Special School		
156	Business/ residential	Butterfly Hill Farm		Significant (given proximity to N11)
157	Business	DJ Hanley Removal & Storage	Just south Junction 13. Access from R772.	Significant. (given proximity to N11)
158	Amenity	Druid's Glen/ Health Golf Resort	Delgany	
159	Amenity/ biodiversity	Birdwatch Ireland East Coast reserve	Coast at Newcastle	
160	Community / Retail / employment	Urban area of Newcastle	Newcastle	
161	Amenity	Newcastle GAA	Sea Road, Newcastle	
162	Amenity/ Business	Newcastle Aerodrome	Coast at Newcastle	
163	Business	Applegreen service station	N11	Significant (given connection with N11)

Number	Type	Description	Location	Comments
164	Business/ amenity	Louise Hegarty Equestrian		
165	Amenity	Carrick Glen Clay Pigeon Club	Ballyduff	
166	Amenity	Newtown GAA	South of Newtownmountkennedy	
167	Community	Corner House Kindergarten	East of Newtownmountkennedy	
168	Business	Farm / Business / Shop	Marc Michel Organic Life	
169	Footbridge	Footbridge Kilpedder	Kilpedder	
170	Amenity	Old Downs Hill / Locally known walking trail	West of Junction 10 (Delgany / Drummin)	

4.4 Summary and conclusions

There are numerous community facilities in the study area, especially within the N11/M11 corridor. These include a high concentration of schools, amenities and retail businesses, especially in the northern section. There are also residential areas and houses as well as commercial businesses providing for employment and local economic development.

In the western part of the study area there is access to attractive countryside, including to popular destinations such as Carrickgollogan, and the Sugarloaf Mountain. In the eastern part of the study area there are towns and communities such as Bray, Greystones and Kilcoole which contain a wide range of community facilities and whose populations are growing rapidly given the evidence of new residential development. This area also includes important outdoor amenities such as Bray Head and the coast.

These constraints are listed in the accompanying **Figure B4.1 to B4.6** and **Table 4.3** above. In several cases, there are junctions connecting these community facilities which possess short on/off slip roads that are below modern standards for a road carrying the speed and volume of traffic as the N11/M11.

4.5 References

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5 Air quality and climate

5.1 Introduction

This section describes the air quality and climate constraints identified within the study area for the N11/M11 Scheme.

Constraints have been identified in **Figures B5.1 - B5.6** for sensitive receptor locations, including Designated Habitats.

Section 5.2 describes the methodologies and sources of information that were used to carry out this constraints study. **Section 5.3** describes the air quality and climate constraints and the ambient air quality within the study area for the constraints study. A summary is presented in **Section 5.4** and references are listed in **Section 5.5**.

The main constraints associated with air quality are the numbers of sensitive locations in the study area and the assimilative capacity of the baseline air quality relative to limit values.

The study area consists of a mix of urban and rural environments. A number of areas such as Bray and Greystones include high density urban residential zones in addition to a number of schools, churches and hospitals. No significant variation in climatic constraints is expected which would influence the choice of options, as climate is a regional issue. Flood risk is assessed separately in **Section 14** (Hydrology) of **Volume B**. It is noted that an objective of the scheme is to *provide for more sustainable transport solutions on the N11/M11 corridor, supporting a balance of alternative modes and enabling a reduction in private car dependency and reducing the carbon intensity of travel.*

5.2 Methodology and sources of information

5.2.1 Methodology

The air quality constraints study has been prepared in accordance with the Transport Infrastructure Ireland (TII), formerly, the National Roads Authority, Guidelines¹.

Section 2.3, *Route Selection Process Stage 1 Preliminary Options Assessment*, of the above document¹ includes the initial steps to be taken to identify air quality constraints within a study area as follows:

¹ TII (2011) Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes. Available from <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf>.

“The initial step (Stage 1, i.e., Preliminary Options Assessment) in the Route Selection Process is to identify the nature and extent of significant constraints within a defined Study Area.

These constraints should be documented and mapped so that feasible route options can be designed to avoid such constraints, where possible.

The first part of this data collection should be based on deskbound research studies. All known physical constraints from an air quality perspective should be identified and recorded on suitably scaled maps.

The specific objectives of the air quality input to the Stage 1 Preliminary Options Assessment of the Route Selection Process are to characterise the existing ambient air quality in the study area and to initially identify all sensitive receptor locations within the study area likely to be impacted by a proposed scheme before feasible route options are identified...”

The above approach has been followed for this constraints study and the study area is as described in Volume B – Constraints Study, 2. Definition of the study area and shown on **Figures B5.1 - B5.6**.

In addition, Section 2.3 of the TII document¹ also describes the air quality input required for the Stage 1 Preliminary Options Assessment as follows:

- 1. “Describe existing local air quality conditions within the study corridor in relation to nitrogen dioxide (NO₂) and PM₁₀. This should take full account of any existing monitoring data from networks established by the Environmental Protection Agency (EPA) and local authorities and monitoring carried out by other organisations, as relevant. It should also identify any areas where the standards are exceeded;*
- 2. Describe any non-road sources that may significantly affect air quality within the study corridor, for example, industry, ports, areas of domestic solid fuel combustion, or powerstations;*
- 3. Identify and record all sensitive receptor locations within the study area and all sensitive receptors within 50m of the carriageway of each feasible route option that are, or have the potential to be significantly affected by a proposed scheme;*
- 4. Take full account of all previous studies, local air quality assessments or reports, and any other air quality work undertaken by the NRA, EPA or local authorities, and*
- 5. Include a review of planning permissions granted within the Study Area of relevance from an air quality perspective (e.g. significant sensitive receptors and developments likely to have a significant impact on air quality)”.*

The above information has been considered in this assessment with the exception of Item 3 in relation to feasible route options as this is detailed in **Section 6** (Noise and vibration) of **Volume B**.

Sensitive receptor locations are defined in the Guidelines¹ as residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present.

Designated habitats are also potentially sensitive receptors. Such sites include, Natural Heritage Areas (NHA), Special Areas of Conservation (SAC), Special Protection Areas (SPA), National Parks, Nature Reserves, Refuges for Fauna, Refuges for Flora, Wildfowl Sanctuaries, Ramsar Sites, Biogenetic Reserves and UNESCO Biosphere Reserves.

These receptors are detailed in **Section 12 (Biodiversity) of Volume B**. All ecologically sensitive sites identified in the study area will be considered in terms of nitrogen oxide concentrations.

5.2.2 Air Quality Standards

National and European statutory bodies have set limit values in ambient air for a range of air pollutants in order to reduce the risk of poor air quality. These limit values are set for the protection of human health and ecosystems.

On 12 April 2011 the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) came into force and transposed Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe into Irish law.

The purpose of the Air Quality Standards Regulations 2011 is;

- to establish limit values and alert thresholds for concentrations of certain pollutants;
- to provide for the assessment of certain pollutants using methods and criteria common to member states;
- to ensure that adequate information on certain pollutant concentrations is obtained and made publicly available; and
- to provide for the maintenance and improvement of ambient air quality where necessary.

The limit values established by these regulations are included in **Table 5.1**. **Table 5.2** presents the United Nations Economic Commission for Europe (UNECE, 2003) Critical Loads for Nitrogen as presented in the Guidelines¹.

Table 5.1: Air Quality Standards (AQS) from Regulations 2011 (S.I No. 180 of 2011)

Pollutant	Limit value for the protection of:	Averaging period	Limit value ($\mu\text{g}/\text{m}^3$)	Basis of application of limit value
Nitrogen Dioxide (NO_2)	Human Health	1-hour	200	≤ 18 exceedances p.a. (99.79 %ile)
		Calendar year	40	Annual mean
Nitrogen Oxides	Vegetation	Calendar year	30	Annual mean

Pollutant	Limit value for the protection of:	Averaging period	Limit value ($\mu\text{g}/\text{m}^3$)	Basis of application of limit value
(NO _x)				
Particulate Matter (PM ₁₀)	Human Health	24-hours	50	≤35 exceedances p.a. (98.1%ile)
		Calendar year	40	Annual mean
Particulate Matter (PM _{2.5})	Human Health	Calendar year	25	Annual mean
		Calendar year	20	Annual mean
Carbon Monoxide (CO)	Human Health	8-hour Annual Average	10,000	8-hour Average
Benzene	Human Health	Calendar year	5	Annual mean

Table 5.2: UNECE critical loads for nitrogen

Ecosystem type	Kg(N)/ha/yr	Reliability and indication of exceedance effects (see reliability key at end of table)
<i>Forest habitats</i>		
Temperate and boreal	10-20	# Changes in soil processes, ground vegetation, mycorrhiza, increased risk of nutrient imbalances and susceptibility to parasites
<i>Heathland, scrub and tundra habitats</i>		
Tundra	5-10 ^a	# Changes in biomass, physiological effects, changes in species composition in moss layer, decrease in lichens
Arctic, alpine and subalpine scrub habitats	5-15 ^a	(#) Decline in lichens, mosses and evergreen shrubs
Northern wet heath <ul style="list-style-type: none"> • ‘U’ Calluna dominated wet heath (upland moorland) • ‘L’ Erica tetralix dominated wet heath 	10-20	(#) Decreased heather dominance, decline in lichens and mosses
	10-25 ^{a,b}	(#) Transition heather to grass
Dry heaths	10-20 ^{a,b}	## Transition heather to grass, decline in lichens
<i>Grassland and tall forb habitats</i>		
Sub-Atlantic semi-dry calcareous grassland	15-25	## Increase tall grasses, decline in diversity, increased mineralization, N leaching
Non-Mediterranean dry acid and neutral closed grassland	10-20	# Increase in graminoids, decline typical species
Inland dune pioneer grasslands	10-20	(#) Decrease in lichens, increase biomass
Inland dune siliceous grasslands	20-30	(#) Increase in tall grasses, decrease in diversity

Ecosystem type	Kg(N)/ha/yr	Reliability and indication of exceedance effects (see reliability key at end of table)
Mountain hay meadows	10-20	(#) Increase in nitrophilous graminoids, changes in diversity
Moist and wet oligotrophic grasslands	15-25	(#) Increase in tall graminoids, decreased diversity, decrease of bryophyte
<ul style="list-style-type: none"> • <i>Molinia caerulea</i> meadows • Heath (<i>Juncus</i>) meadows and humic (<i>Nardus stricta</i>) swards 	10-20	# Increase in tall graminoids, decreased diversity, decrease of bryophytes
Alpine and subalpine grasslands	10-15	(#) Increase in nitrophilous graminoids, biodiversity change
Moss and lichen dominated mountain summits	5-10	# Effects upon bryophytes or lichens
<i>Mire, bog and fen habitats</i>		
Raised and blanket bogs	5-10 ^{a,c}	## Change in species composition, N saturation of Sphagnum
Poor fens	10-20	# Increase sedges and vascular plants, negative effects on peat mosses
Rich fens	15-35	(#) Increase tall graminoids, decrease diversity, decrease of characteristic mosses
Mountain rich fens	15-25	(#) Increase vascular plants, decrease bryophytes
<i>Inland and surface water habitats</i>		
Permanent oligotrophic waters		## Isoetid species negatively affected (#) Increased biomass and rate of succession
<ul style="list-style-type: none"> • Softwater lakes • Dune slack pools 	5-10 10-20	
<i>Coastal habitat</i>		
Shifting coastal dunes	10-20	(#) Biomass increase, increase N leaching
Coastal stable dune grassland	10-20	# Increase tall grasses, decrease prostrate plants, increased N leaching
Coastal dune heaths	10-20	(#) Increased plant production, increase N leaching, accelerated succession
Moist to wet dune slacks	10-25	(#) Increased biomass, tall graminoids
<i>Marine habitats</i>		
Pioneer and low-mid salt marshes	30-40	(#) Increased late-successional species, increase productivity

Reliability key: ## reliable, # quite reliable, (#) expert judgement

^a Use towards high end of range at phosphorus limitation, and towards lower end if phosphorus is not limiting

^b Use towards high end of range when sod cutting has been practiced, use towards lower end of range with low intensity management

^c Use towards high end of range with high precipitation and towards low end of range with low precipitation

More specific to the Glen of the Downs SAC (which contains Old Sessile oak woodland), the critical load range for Acidophilous Quercus-dominated woodland has been set as between 10 and 15kg N/ha/yr (Bobbink and Hettelingh, 2011²).

5.2.3 Climate commitments

Ireland's climate obligations

In October 2014, EU leaders agreed a 2030 policy framework to reduce greenhouse gas emissions by at least 40% compared to a 2005 baseline. Ireland has been set a reduction target of 30% for sectors outside the EU ETS for this period.

The Climate Action and Low Carbon Development Act was published by government in January 2015³. The Act sets out the national objective of transitioning to a low carbon, climate resilient and environmentally sustainable economy in the period up to 2050.

In March 2021, the Climate Action and Low Carbon Development (Amendment) Bill was published to amend the Climate Action and Low Carbon Development Act 2015. The Bill commits Ireland in law to move to a climate resilient and climate neutral economy by 2050. The Bill includes the following key elements:

- Places on a statutory basis a 'national climate objective', which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally-sustainable and climate-neutral economy;
- Embeds the process of carbon budgeting into law, Government are required to adopt a series of economy-wide five-year carbon budgets, including sectoral targets for each relevant sector, on a rolling 15-year basis, starting in 2021;
- Strengthens the role of the Climate Change Advisory Council in proposing carbon budgets;
- Actions for each sector will be detailed in the Climate Action Plan, updated annually;
- A National Long Term Climate Action Strategy will be prepared every five years; and

² Bobbink, R. and Hettelingh, J.-P., 2011. Review and Revisions of Empirical Critical Loads and Dose-Response Relationships. National Institute for Public Health and the Environment, Bilthoven, the Netherlands.

³ Climate Action and Low Carbon Development Act, 2015. Available from <http://www.irishstatutebook.ie/eli/2015/act/46/enacted/en/pdf>

- Introduces a requirement for all Local Authorities to prepare individual Climate Action Plans which will include both mitigation and adaptation measures.

National Policy on Climate Action

The objective of the Climate Action Plan 2019⁴ is to enable Ireland to meet its EU targets to reduce its carbon emissions by 30 per cent between 2021 and 2030 and lay the foundations for achieving net zero carbon emissions by 2050. In relation to transport, the Plan proposes the following:

- Ban the sale of new fossil fuel cars from 2030;
- Stop the granting of NCT certificates from 2045 to fossil fuel cars; and
- By 2030 840,000 electric vehicles will be in use on Ireland's roads.

Climate Action and Transport Sector

In 2013, an Issues Paper for Consultation on the Preparation of Low-Carbon Roadmap for Transport was prepared by the Department of Transport, Tourism and Sport⁵. This paper proposed the following relevant policy measures to contribute to a low carbon future:

- Engines and fuels (efficiencies and alternatives)
- Travel demand
- Modal shift

The document Smarter Travel - A Sustainable Transport Future, A New Transport Policy for Ireland 2009 – 2020⁶ includes several targets to reduce carbon emissions:

- Work-related commuting by car will be reduced from a current modal share of 65% to 45%, which will mean that between 500,000 and 600,000 commuters will be encouraged to take means of transport other than private car (of these 200,000 would be existing car drivers).
- Car drivers will be accommodated on other modes such as walking, cycling, public transport and car sharing (to the extent that commuting by these modes will rise to 55% by 2020) or through other measures such as e-working.
- The road freight sector will become more energy efficient, with a subsequent reduction in emissions.

⁴ Climate Action Plan 2019, Government of Ireland Available from: https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_Action_Plan_2019.pdf

⁵ Issues Paper for Consultation on the Preparation of Low-Carbon Roadmap for Transport, Department of Transport, Tourism and Sport 2013. Available from: <http://dtas.old.gov.ie/sites/default/files/publications/corporate/english/low-carbon-roadmap-transport-sector-issues-paper-december-2013/issues-paper-consultation-preparation-low-carbon-roadmap-transport.pdf>

⁶ Smarter Travel - A Sustainable Transport Future, A New Transport Policy for Ireland 2009 – 2020. Available from: http://www.smartertravel.ie/sites/default/files/uploads/2012_12_27_Smarter_Travel_english_PN_WEB%5B1%5D.pdf

- Transport will make a meaningful contribution to Ireland’s commitment under the proposed EU effort-sharing arrangement in relation to climate change and real reductions on current levels of emissions will be achieved.

Policies to reduce transport emissions include the reduction of travel demand, increase use of alternatives to the private car and improve the efficiency of motorised transport.

5.2.4 Sources of information

The existing constraints have been determined through the review of published data from the EPA^{7,8}. The EPA collates all air quality monitoring data carried out by the EPA and local authorities.

5.3 Existing environment

This section describes the existing local air quality conditions within the study area. Any non-road sources that may significantly affect air quality within the study area are also described. Finally, sensitive receptor locations within the study area are described.

5.3.1 Existing local air quality conditions within the study area

The existing air quality is determined from air quality data recorded by the EPA. The EPA divides Ireland into four zones, with air quality data recorded for each zone.

- Zone A includes Dublin City and its environs.
- Zone B includes Cork City and its environs.
- Zone C is defined by the EPA as 21 large towns in Ireland with a population greater than 15,000 and includes Bray and its environs.
- Zone D includes Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C.

Pollutants that are of concern in relation to road scheme developments have been identified and quantified in **Table 5.3** to **Table 5.5**. The data for the Zone A, C and D sites in the EPA Reports has been averaged to represent the Annual Average for the zones. They are NO₂, NO_x, CO, PM and benzene.

Table 5.3 to **Table 5.5** present baseline data for the most recent available years, 2019, 2018, and 2017 for each of these pollutants, based on EPA monitoring

⁷ EPA, Air Quality Reports. Available from: <http://www.epa.ie/pubs/reports/air/quality/> [Accessed 15 October 2020]

⁸ EPA, EPA Maps. Available at: [https://gis.epa.ie/EPA Maps](https://gis.epa.ie/EPA%20Maps) [Accessed 15 April 2019]

data^{9,10,11}.

As the study area for the proposed N11/M11 scheme covers Zone A, Zone C and Zone D, background data for all three zones have been presented. Baseline values are compared to the limit values from the Air Quality Standards.

5.3.2 Zone A

Table 5.3: Baseline concentrations of pollutants – zone A^{9,10,11}

Zone	Year	Pollutants	Time Period	Measurements µg/m ³	Air Quality Standard Limit µg/m ³	% of Air Quality Standard Limit
Zone A	2019	NO ₂	Annual Average	25.9	40	64.8
		NO _x	Annual Average	51.5	30	171.7
		CO	8-hour Annual Average	300	10,000	3.0
		PM _{2.5}	Annual Average	9.3	25	37.0
		PM ₁₀	Annual Average	14.1	40	35.3
		Benzene	Annual Average	0.1	5	2.0
	2018	NO ₂	Annual Average	21.3	40	53.3
		NO _x	Annual Average	34.7	30	115.7
		CO	8-hour Annual Average	200	10,000	2.0
		PM _{2.5}	Annual Average	7.5	25	30.0
		PM ₁₀	Annual Average	14.2	40	35.5
		Benzene	Annual Average	0.3	5	6.0
	2017	NO ₂	Annual Average	19.7	40	49.3
		NO _x	Annual Average	31.5	30	105.0
		CO	8-hour Annual Average	140	10,000	1.4
		PM _{2.5}	Annual Average	7.5	25	30.0
		PM ₁₀	Annual Average	12.3	40	30.8
		Benzene	Annual Average	0.9	5	18.0

⁹ Air Quality in Ireland 2019, EPA, 2020. Available from:
<https://www.epa.ie/pubs/reports/air/quality/epairqualityreport2019.html> [Accessed 15 October 2020]

¹⁰ Air Quality in Ireland 2018, EPA, 2019. Available from:
<https://www.epa.ie/pubs/reports/air/quality/epairqualityreport2018.html> [Accessed 15 April 2019]

¹¹ Air Quality in Ireland 2017, EPA, 2018. Available from:
<https://www.epa.ie/pubs/reports/air/quality/epairqualityreport2017.html> [Accessed 15 April 2019]

5.3.3 Zone C

Table 5.4: Baseline concentrations of pollutants – Zone C^{9,10,11}

Zone	Year	Pollutants	Time Period	Measurements µg/m ³	Air Quality Standard Limit µg/m ³	% of Air Quality Standard Limit
Zone C	2019	NO ₂	Annual Average	9.3	40	23.3
		NO _x	Annual Average	13.9	30	46.3
		CO	8-hour Annual Average	100	10,000	1.0
		PM _{2.5}	Annual Average	9.5	25	38.0
		PM ₁₀	Annual Average	14.8	40	37.0
		Benzene	Annual Average	0.1	5	2.0
	2018	NO ₂	Annual Average	8.5	40	21.3
		NO _x	Annual Average	11.5	30	38.3
		CO	8-hour Annual Average	200	10,000	2.0
		PM _{2.5}	Annual Average	-	25	-
		PM ₁₀	Annual Average	11.0	40	27.5
		Benzene	Annual Average	-	5	-
	2017	NO ₂	Annual Average	8.0	40	20.0
		NO _x	Annual Average	11.8	30	39.3
		CO	8-hour Annual Average	150.0	10,000	1.5
		PM _{2.5}	Annual Average	10.6	25	42.4
		PM ₁₀	Annual Average	15.8	40	39.5
		Benzene	Annual Average	0.2	5	3.6

5.3.4 Zone D

Table 5.5: Baseline concentrations of pollutants – zone D^{9,10,11}

Zone	Year	Pollutants	Time Period	Measurements µg/m ³	Air Quality Standard Limit µg/m ³	% of Air Quality Standard Limit
Zone D	2019	NO ₂	Annual Average	5.7	40	14.3
		NO _x	Annual Average	7.8	30	26.0
		CO	8-hour Annual Average	-	10,000	-
		PM _{2.5}	Annual Average	10.3	25	41.2
		PM ₁₀	Annual Average	12.8	40	32.0

Zone	Year	Pollutants	Time Period	Measurements µg/m ³	Air Quality Standard Limit µg/m ³	% of Air Quality Standard Limit
	2018	Benzene	Annual Average	0.1	5	2.0
		NO ₂	Annual Average	4.7	40	11.7
		NO _x	Annual Average	6.7	30	26.7
		CO	8-hour Annual Average	500	10,000	5.0
		PM _{2.5}	Annual Average	7.5	25	30.0
		PM ₁₀	Annual Average	11.0	40	27.5
		Benzene	Annual Average	-	5	-
	2017	NO ₂	Annual Average	4.4	40	10.9
		NO _x	Annual Average	5.7	30	19.0
		CO	8-hour Annual Average	-	10,000	6.2
		PM _{2.5}	Annual Average	7.4	25	29.6
		PM ₁₀	Annual Average	9.9	40	24.8
		Benzene	Annual Average	-	5	-

5.3.5 Averaged background data

Table 5.6 outlines the average background concentrations for each pollutant of concern during 2017 – 2019^{9,10,11}. These averaged values will be used as the baseline for the air quality assessment undertaken.

This approach is in accordance with EPA guidance¹² which states that air monitoring data should be averaged over the most recent 2-3 years available.

Table 5.6: Averaged Pollutant Background Concentrations 2017-2019^{9,10,11}

Zone	Pollutant	Average background concentration (µg/m ³) 2017-2019	Air Quality Standard (µg/m ³)	% of Air Quality Standard
Zone A	NO ₂	22.3	40	55.8
	PM ₁₀	13.5	40	33.8
	PM _{2.5}	8.1	25	32.4
	NO _x	39.2	30	130.7
	CO	213.3	10,000	2.1
	Benzene	0.4	5	8.0
Zone C	NO ₂	8.6	40	21.5
	PM ₁₀	13.9	40	34.8

¹² EPA Air Dispersion Modelling Guidance Note (AG4), 2020

Zone	Pollutant	Average background concentration ($\mu\text{g}/\text{m}^3$) 2017-2019	Air Quality Standard ($\mu\text{g}/\text{m}^3$)	% of Air Quality Standard
	PM _{2.5}	10.1	25	40.4
	NO _x	12.4	30	41.3
	CO	150	10,000	1.5
	Benzene	0.15	5	3.0
Zone D	NO ₂	4.9	40	12.3
	PM ₁₀	11.2	40	28.0
	PM _{2.5}	8.4	25	33.6
	NO _x	6.7	30	22.3
	CO	500	10,000	5.0
	Benzene	0.1	5	2.0

For Zone A, the highest baseline concentrations relative to the Air Quality Standards (AQS) are measured for NO_x at 130.7%. Concentrations of (NO₂) are measured at 55.8%, PM₁₀ at 33.8% and PM_{2.5} at 32.4%. Background concentrations of Benzene are measured at 8% of the AQS, and concentrations of Carbon Monoxide are 2.1%. The AQS for NO_x relates to the protection of vegetation. The section of road located in Zone A is between Junction 4 and Junction 6; no sensitive ecological sites are located adjacent to this section of road.

For Zone C, the highest baseline concentrations relative to the AQS are measured for NO_x at 41.3%, NO₂ at 21.5%, PM₁₀ at 34.8% and PM_{2.5} at 40.4%. Background concentrations of Benzene are measured at 3% of the AQS, and with Carbon Monoxide at 1.5%.

For Zone D, the highest baseline concentrations relative to the AQS are measured for NO_x at 22.3%, NO₂ at 12.3%, PM₁₀ at 28% and PM_{2.5} at 33.6%.

Background concentrations of Carbon Monoxide are 5% of the AQS and Benzene background concentrations are 2%.

These constraints will be of primary concern during the air quality assessment.

5.3.6 Ecologically sensitive areas

Nitrogen emissions will be of critical importance in instances where any option crosses, or comes in proximity to, an ecologically sensitive area due to their harmful effect on vegetation. The study area includes the following ecologically sensitive areas:

- Knocksink Wood SAC pNHA;
- Ballyman Glen SAC pNHA;
- Bray Head SAC pNHA;

- Glen of the Downs SAC pNHA;
- The Murrough Wetlands SAC pNHA;
- Kilmacanoge Marsh pNHA;
- Great Sugarloaf pNHA;
- Powerscourt Woodland pNHA;
- Dargle River Valley pNHA;
- Ballybetagh Bog pNHA;
- Dingle Glen pNHA;
- Loughlinstown Woods pNHA;
- Dalkey Coastal Zone and
- Killiney pNHA.

The closest ecologically sensitive areas to the existing N11/M11 road are the Glen of the Downs SAC and the Kilmacanoge March pNHA which adjoin the road corridor. These sites are located within Zone C which has a background NO₂ concentration level of 21.5% of the limit value. In general, the air quality concentrations recorded in Zone C by the EPA are shown to be well within Air Quality Standards and the assimilative capacity (in terms of air quality) in Zone C is considered good.

5.3.7 Existing sources of air pollution in the study area

Table 5.7 presents the major road networks and associated traffic volumes located in the study area, i.e., the N11/M11. Annual average daily traffic (AADT) volumes have been provided where obtained from TII's 'Traffic Counter Data Website'¹³.

Table 5.7: AADT for major roads within study area

Roads	Year	Location	AADT
N11	2019	N11 between Junction 8 Kilmacanoge/ Roundwood and Junction 9 Glenview	52,572
M11	2019	N11 between Junction 5 R761 Bray North and Junction 6 R918 Bray/Fassaroe	70,392
M11	2019	M11 between Junction 4 M50 and Junction 5 R761 Bray North	78,340

The emissions to air from vehicles on these routes are assumed to form part of the baseline concentration levels as presented in **Table 5.3** to **Table 5.5**.

¹³ Transport infrastructure Ireland (TII), Traffic Counter Data Website. Available from: [https://www.nratrafficdata.ie/c2/gmapbasic.asp?sgid=ZvyVmXU8jBt9PJE\\$c7UXt](https://www.nratrafficdata.ie/c2/gmapbasic.asp?sgid=ZvyVmXU8jBt9PJE$c7UXt) [Accessed: 15 October 2020]

5.3.8 Non-road emission sources in the study area

Table 5.8 presents a list of industrial facilities licensed by the EPA¹⁴ within the study area, with Industrial Emissions (IE), Integrated Pollution Control (IPC) licences in place.

Table 5.8: EPA IE/IPC licence holders within the study area

Licence No	Company	Address	IPC/IEL/ Waste
W0053-03	Starrus Eco Holdings Limited (Fassaroe)	Bray Depot, La Vallee House, Fassaroe, Bray, Wicklow	IEL
P0567-02	Nypro Limited	Corke Abbey, Bray, County Dublin, Dublin	IPC
P0366-02	Alert Packaging Limited	IDA Bray Business Park, Southern Cross Route, Bray, Wicklow	IPC

The effects of the emission sources are assumed to be reflected in the baseline air monitoring data presented in **Table 5.3** to **Table 5.5**. No significant additional sources have been determined through a review of planning permissions and draft EPA licences in the study area.

Sensitive receptor locations within the study area are defined in the guidelines as residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present. Refer to **Figures B5.1 - B5.6** for sensitive receptor locations. Designated habitats are also included. These receptors are discussed in detail in **Section 12** (Biodiversity) of **Volume B**.

¹⁴ Environmental Protection Agency, IED and IPC Licence Search. Available from: "<https://gis.epa.ie/EPAMaps/> [Accessed: 19 April 2019]

5.3.9 Climate

The latest national reporting on greenhouse gas emissions from the EPA¹⁵ state that the total national greenhouse gas emissions in 2019 were estimated to be 59.9 million tonnes carbon dioxide equivalent (Mt CO₂eq). This is 4.5% lower than emissions in 2018. Greenhouse gas emissions from the transport sector decreased by 0.3% in 2019.

In relation to EU targets, Ireland is set to miss its 2019 target under the EU's Effort Sharing Decision (Decision No 406/2009/EC).

In 2019, emissions from Ireland's non-ETS (Emissions Trading Scheme, which includes transport) emissions decreased by 3.1% or 1.46 Mt CO₂eq.

5.4 Summary and conclusions

The air quality concentrations measured by the EPA are shown to be within the Air Quality Standards apart from an exceedance of the nitrogen oxides for the protection of vegetation in Zone A. As outlined above, there are no ecological sites of concern located in proximity to the study area in Zone A (from Junction 4 M11/M50 (City Centre/Dún Laoghaire) to Junction 6 R918 (Bray/Fassaroe)).

In relation to the assimilative capacity of the air within the study area, for Zone C and D, it is considered high while for Zone A it is considered low. The main constraint associated with air quality is the statutory requirement to continue to comply with Air Quality Standards for the protection of human health and vegetation.

A number of industrial facilities are located in the study area, however, any emissions from these sources are assumed to be represented in the baseline environment.

The main climate constraint relates to the improvement of the N11/M11 without jeopardising the scheme objective to *provide for more sustainable transport solutions on the N11/M11 corridor, supporting a balance of alternative modes and enabling a reduction in private car dependency and reducing the carbon intensity of travel.*

5.5 References

Climate Action and Low Carbon Development Act, 2015. Available from: <http://www.irishstatutebook.ie/eli/2015/act/46/enacted/en/pdf>.

Climate Action Plan 2019, Government of Ireland Available from: https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_Action_Plan_2019.pdf

¹⁵ Environmental Protection Agency, Greenhouse Gas Emissions, Current Situation <http://epa.ie/ghg/currentsituation/> [Accessed: 13 October 2020]

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<http://www.epa.ie/pubs/reports/air/quality>

- EPA, 2020. Air Quality in Ireland 2019.
- EPA, 2019. Air Quality in Ireland 2018.
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https://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/Report_GHG%201990-2017%20April%202019_Website.pdf.

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Transport infrastructure Ireland (TII), Traffic Counter Data Website. Available from:
[https://www.nratrafficdata.ie/c2/gmapbasic.asp?sgid=ZvyVmXU8jBt9PJE\\$c7UXt](https://www.nratrafficdata.ie/c2/gmapbasic.asp?sgid=ZvyVmXU8jBt9PJE$c7UXt).

6 Noise and vibration

6.1 Introduction

This section describes the noise and vibration constraints identified within the study area for the N11/M11 Scheme.

The specific objective of the noise and vibration constraints study is to identify any receptors that may be deemed to be particularly sensitive to noise and/or vibration. Examples of receptors include schools, hospitals, places of worship, heritage buildings, special habitats, amenity areas in common use and designated quiet areas. Residential buildings including houses, hotels, hostels etc. are also noise sensitive (Source: *Transport Infrastructure Ireland (TII) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes*¹ and *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*²). Some commercial or industrial uses can also be noise sensitive, for example noise recording studios and research or manufacturing facilities using noise or vibration-sensitive equipment.

Whilst it is preferable to locate road alignments away from noise sensitive areas where feasible, it is not always possible, particularly for roads located close to and through urban and sub-urban settings. For the proposed N11/M11 Scheme under consideration here, there is already a high density of noise sensitive buildings and noise sensitive areas along the existing N11/M11 alignment and within the wider study area, particularly within and surrounding the towns and villages predominately located to the east of the existing N11/M11.

The objectives for road projects relate to avoidance, where possible, of new routes through built up areas with a large density of noise sensitive buildings, particularly those not already exposed to high volumes of traffic.

6.2 Methodology and sources of information

The noise and vibration constraints study has been prepared in accordance with the following guidelines:

- TII Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes – 2014¹; and

¹ Transport Infrastructure Ireland (2014) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes Available from:
https://www.tii.ie/technical-services/environment/planning/Good_Practice_Guidance_for_the_Treatment_of_Noise_during_the_Planning_of_National_Road_Schemes.pdf

² Transport Infrastructure Ireland (2004) Guidelines for the Treatment of Noise and Vibration in National Road Schemes Available from:
https://www.tii.ie/technical-services/environment/planning/Guidelines_for_the_Treatment_of_Noise_and_Vibration_in_National_Road_Schemes.pdf

- TII Guidelines for the Treatment of Noise and Vibration in National Road Schemes – 2004².

The constraints study consisted of a desk study and a preliminary site inspection of the study area.

The following information was reviewed as part of this study:

- OS Mapping;
- Satellite Mapping (Google Earth, Bing Maps);
- EPA Road Traffic Noise Maps Round 3 (2016)³;
- Dún Laoghaire-Rathdown County Council (DLRCC). Dublin Agglomeration – Environmental Noise Action Plan 2018 to 2023⁴
- Wicklow County Council. Noise Action Plan 2018 to 2023⁵.

6.3 Existing environment

This section is set out as follows:

- Review of available published data to describe the existing noise environment, and;
- Identification of noise and / or vibration sensitive receptors.

6.3.1 Review of published noise data

The scheme constraint study area comprises a mixture of rural, suburban and urban areas. The existing noise environment within towns and villages within the study area is dominated by road traffic in addition to urban sources from retail and commercial facilities etc. Further away from urban streets, road traffic is expected to be the main contributor to ambient noise levels.

The Round 3 strategic road traffic noise maps published by the EPA as part of the Environmental Noise Regulations⁶ have been reviewed to determine the range of modelled traffic noise undertaken by TII in the vicinity of the study area. As part of the noise mapping requirements, all roads with traffic flows greater than 3 million vehicle trips per annum (approximately 8,000 Annual Average Daily Traffic (AADT)) were required to be mapped. These are published and available via the EPA geo portal for Noise Maps Round 3 (2016)⁷. Within the study area under consideration here, sections of the following roads met this criterion and hence were included within the EPA noise modelling and mapping process:

³ Environmental Protection Agency (EPA) <https://gis.epa.ie/EPAMaps/> (August 2019)

⁴ Dún Laoghaire Rathdown County Council (DLRCC) (2019) Dublin Agglomeration Noise Action Plan. December 2018 – July 2023. Volume 2: Dún Laoghaire Rathdown County Council.

⁵ Wicklow County Council (2019) Noise Action Plan 2018 - 2023

⁶ S.I. No. 140/2006 – Environmental Noise Regulations 2006

⁷ Environmental Protection Agency (2016) Strategic Noise Mapping Round 3. (Environmental Protection Agency (EPA) <https://gis.epa.ie/EPAMaps/> [Accessed: August 2019])

- M50 (South Eastern Bypass);
- M11 (Junction 4 to Junction 6);
- N11 (Junction 6 to Junction 14); and
- R761, R767, R768, R762, 772 & R774 through Shankill, Bray, Greystones and Kilcoole.

Noise levels due to road traffic sources from these sections of road have been modelled and the relevant noise maps prepared. The maps are presented in noise contour bands in increments of 5 decibels starting at 55dB L_{den} and 50dB L_{night} . **Figures B6.1 to B6.6** display the noise maps for the L_{den} period (Annual 24-hour average) which is the noise parameter used to assess road traffic noise in Ireland^{1,2}. All noise maps for the study area, including noise maps for the L_{night} period are accessed via the EPA's Environmental Maps portal⁸.

These figures illustrate the key trafficked roads across the study area and their contribution to the prevailing noise environment. Reference to the maps indicates that the M50, N11 and M11 roads contribute the highest noise levels due to the traffic volumes along these routes. The highest density of noise sensitive locations along these mapped routes are within Shankill, Bray, Greystones, Delgany and Kilcoole.

Wicklow County Council has applied a threshold level above which areas may require noise mitigation or management within their Noise Action Plan (NAP)⁵. The proposed onset levels for the consideration of noise mitigation measures are:

- 70dB L_{den} ; and
- 57dB L_{night} .

The estimated population exposed to noise levels greater than 70dB L_{den} for major roads within the Action Plan Area equates to 1,169 people based on road traffic flows during the 2016 mapping exercise. This compares to a figure of 977 people in the Second Round NAP⁵ (based on traffic flows during the 2013 mapping exercise). Those properties which have been identified to be above these threshold levels are typically properties which are located immediately along the road edges.

It should be noted that noise contour maps are based on road traffic only for those routes which have been mapped. Noise from road traffic along other regional and local roads with traffic volumes less than the mapping requirement (8,000 AADT) will also contribute to the ambient noise levels at properties in the vicinity of these routes.

The Wicklow NAP⁵ has noted that the most significant major road in County Wicklow is the N11/M11. The document notes that sections of the N11/M11 completed in recent years, have to varying extents, considered the effects of noise for the relevant schemes and included noise mitigation measures as part of the schemes.

⁸ Environmental Protection Agency (EPA) <https://gis.epa.ie/EPAMaps/> (August 2019)

These mitigation measures consisted mainly of noise barriers (proprietary or masonry walling), earth bunding and the use of low noise road surfacing.

Within the Dublin Agglomeration Noise Action Plan (Volume 2 – Dún Laoghaire Rathdown County Council (DLRCC))⁴, the following values relate to noise levels which are defined as being ‘Desirable’ and ‘Undesirable Sound Levels’:

Desirable Low Sound levels:

- < 50 dB(A) L_{night}
- < 55 dB(A) L_{day}

Undesirable High Sound levels:

- >55 dB(A) L_{night}
- >70 dB(A) L_{day}

Review of the EPA noise maps referred to above confirms that noise sensitive properties located along the immediate edge of the existing N11/M11 are exposed to undesirable high sound levels defined in the DLRCC NAP⁴ and are above a threshold which may require noise mitigation or management included in the Wicklow NAP⁵. In addition, noise from other sources including industrial processes, plant noise and other urban sources are not included in the noise mapping study but will contribute to the noise environment depending on their proximity to these sources.

Within the DLRCC NAP, the section of the M50 which adjoins the M11 contributes to highest noise levels within the study area for the proposed N11/M11 Scheme. There are no specific noise mitigation measures noted within the NAP for this specific section of road, however a range of measures within the DLRCC area are set out in the NAP which include provision of public transport measures, road improvements and maintenance including low noise road surfaces, reduction in speed limits etc.

6.3.2 Identification of noise and/or vibration sensitive receptors

The study area was examined to identify the distribution of noise and/or vibration sensitive receptors and to determine the presence, if any, of significant constraints relating to noise and/or vibration.

Noise and/or vibration sensitive areas were grouped into the following categories:

- Education establishments (primary schools, secondary schools, college and university buildings);
- Hospitals;
- Amenity areas (racecourses, golf clubs, equine areas, parks etc.);
- Religious buildings; and
- Residential areas.

The OS mapping and satellite imagery mapping were reviewed in order to identify the presence of these locations.

Given that the alignment of the existing N11/M11 runs to the immediate west of the towns and villages of Shankill, Bray, Greystones, Delgany, Kilcoole, Newcastle, and to the east of the towns of Glencormack, Kilpedder and Newtownmountkennedy, there are large areas of residential development, churches, schools and amenity areas concentrated within the overall constraint study area. These are discussed in turn below.

Education establishments

The locations of schools and colleges within the study area have been identified and annotated as part of the constraint mapping process for the study. Given the high density of towns and villages to the east of the existing N11/M11, a high number of national and secondary schools have been identified, predominately within Bray and Greystones. The majority of these buildings are located along existing trafficked local and regional roads and close to busy urban areas. The presence of a school or college building does not preclude the development of an option in its vicinity, however their presence should be included for consideration to avoid encroaching in proximity thus avoiding high noise levels and potential impacts, particularly for those set back within quieter locations.

Hospitals

Two hospital buildings were identified within the constraint study area, one along the R772 south of Newtownmountkennedy and St. Columcille's in Loughlinstown. The Newtownmountkennedy hospital grounds and buildings are some 300m west of the existing N11. St. Columcille's hospital is some 30m from the N11 Road. There are a number of nursing homes identified within Bray and Greystones which are typically located within the central urban areas which are exposed to existing levels of road traffic, albeit the majority of these are set back from the existing N11/M11.

Amenity areas

The locations of amenity areas including parks, golf clubs and sporting grounds within the study area have been identified and annotated as part of the constraint mapping process for the study. The location of these areas are varied across the study area, however the majority are set back from heavily trafficked roads and associated high noise levels. Where the prevailing noise environment in these areas is considered an important part of the area's character, consideration should be taken to preserve the noise environment within defined noise thresholds.

Wicklow County Council's NAP⁵ includes proposed noise levels which are set to preserve areas where existing noise levels are defined as good. These are defined as 'onset' noise levels which feed into a decision matrix for further consideration. Onset levels for assessment of noise level preservation where they are good as defined as follows:

- 55dB L_{den} ; and
- 45dB L_{night} .

The Strategic Noise Maps⁷ have identified the noise environment in proximity to the major sources of noise in the Action Planning Area in County Wicklow and the DLRCC.

During the development of options in the constraint study area, the prevailing noise environment within amenity areas will be considered to ensure those areas with noise levels below the onset noise assessment level for the preservation of the existing noise situation are protected, as far as practicable.

Religious buildings

There are a range of religious buildings distributed within the constraint study area. Whilst these buildings are noise sensitive when in use, they are commonly located within urban and suburban settings in proximity to existing roads. The presence of a church or other religious building does not preclude the development of an option in its vicinity. The presence of these buildings should, however, be considered when developing options, particularly for those set back within quieter locations.

Residential areas

Residential areas are numerous within the constraint study area with the highest density located to the north east within Shankill, Bray and Greystones to the east of the existing N11. Residential areas are also distributed within smaller towns, villages and ribbon style development along regional and local roads. Given the density of existing residential areas, it will not be possible for any offline options to avoid passing in proximity to them. Consideration will however be given to development of options which minimise the number of residential buildings exposed to road traffic, as far as practicable. In line with other improvement and upgraded sections of the N11/M11, the EIAR assessment also provides an opportunity to incorporate noise mitigation measures to existing residents impacted by road traffic noise through the use of noise reduction at source and along the propagation path through incorporation of low noise road surfaces and barrier screening.

For the purpose of this constraints assessment, residential buildings have not been annotated in the constraint mapping due to the large proportion of these building types across the study area. Whilst these are not specifically marked on mapping, the development of any option will need to consider avoiding areas with a high density of noise sensitive locations which will include those passing through villages and urban areas.

Residential dwellings make up the majority of the noise sensitive receptors within the study area extending out to all areas of the study area boundary. Other noise sensitive receptors include hotels, educational, religious buildings etc.

These tend to be centred more towards the existing built up areas nearer the town and village centres between Shankill and Kilcoole or are significantly less distributed across the study area compared to housing and are, in turn, easier to direct options away from.

In terms of the constraint study area, the development of options needs to consider the following for residential areas:

- Areas of high density housing within areas set back from existing road traffic noise;
- Areas of high density housing in proximity to existing road traffic noise (e.g. those along the existing N11/M11);
- Residential clusters at crossroads, townlands, village centres, etc.; and
- Ribbon style residential housing along local roads.

In this instance, consideration will be given to a balance between protecting residential properties currently not exposed to high levels of road traffic noise and not increasing or generating significant negative impacts to residential properties already exposed to high levels of road traffic and other environmental sources. Where possible, options passing through or in proximity to clusters of residential estates with large populations should be avoided.

Vibration Sensitive Receptors

Vibration sensitive receptors are those occupied by people which include the noise sensitive receptors discussed above, i.e. residents, hospitals, educational facilities, etc. Other vibration sensitive receptors include those with vibration sensitive equipment (e.g. medical or manufacturing vibration sensitive equipment) and buildings or structures that are potentially vulnerable to vibration.

From an operational point of view, road traffic from well-maintained roads generate very low levels of vibration which are typically below levels that are perceptible to people within buildings and are orders of magnitude below those associated with impacts to vulnerable structures or buildings. Operational vibration levels from roads are also typically below those associated with sensitive processes and equipment such that these areas do not require special consideration once a road becomes operational.

On this basis, consideration of the receptors discussed above captures both noise and vibration sensitive receptors.

During the construction phase of a road development, there is potential for intermittent vibration impacts depending on the activities involved. Highest vibration impacts are typically associated with excavation activities e.g. rock breaking, drill and blast etc. or impact piling methods, where required. Vibration impacts during the construction phase of any route will be controlled through vibration limits which are set to protect any cosmetic damage to buildings and structures.

There are no additional vibration sensitive areas identified within the constraints study area over and above those discussed above in relation to noise. During the specific option selection process, where additional vibration sensitive receptors not included in the receptors discussed above (e.g. sensitive vibration equipment / processes) are identified or made known to the design team, these will be considered individually.

General

It is important to note that the presence of the noise and/or vibration sensitive receptors listed above are not necessarily considered to be a strict constraint which would prevent the development of an option in proximity to them. The purpose of this initial exercise is to highlight those areas which should be considered when developing options in conjunction with the other identified constraints. In this instance, where it is not possible to develop horizontal options away from identified noise and vibration sensitive locations, consideration can be given to the vertical alignment, the use of natural screening or false cuttings to act as noise buffers and mitigation measures as part of the base design.

For other noise and/or vibration sensitive areas, consideration will be given to the sensitivity of specific receptors depending on their use in addition to the existing environment in which they are located.

For all receptors, the potential for noise mitigation in the form of the horizontal and vertical alignments, natural screening and road surfaces will all be considered during the options development stage and as part of the environmental impact assessment for the emerging preferred route.

6.4 Summary and conclusions

The constraint study area for the N11/M11 Scheme is made up of a mixture of urban, suburban and rural areas. The study area towards the northeast of the existing N11/M11 in the vicinity of Shankill, Bray and Greystones contains the highest density of residential areas, schools, religious buildings and healthcare buildings. Outside of the larger town areas, the study area consists of lower density suburban and rural residential areas and amenity areas.

Whilst there is a large mix of noise and vibration sensitive areas distributed across the study area, a large proportion of these are already exposed to road traffic noise to varying degrees depending on traffic volumes, distance from the road centre line and screening.

During the development of the options for the transport project, consideration will be given to protecting existing noise and vibration sensitive areas, avoiding areas of high density noise and vibration sensitive receptors for off-line routes and incorporating noise mitigation into the base design including the use of natural topographical features and false cuttings, where feasible.

6.5 References

Dún Laoghaire Rathdown County Council (DLRCC) (2019) Dublin Agglomeration Noise Action Plan. December 2018 – July 2023. Volume 2: Dun Laoghaire Rathdown County Council.

Environmental Protection Agency (2016) Strategic Noise Mapping Round 3. (Environmental Protection Agency (EPA) <https://gis.epa.ie/EPAMaps/> [Accessed: August 2019])

S.I. No. 140/2006 – Environmental Noise Regulations 2006.

Transport Infrastructure Ireland (TII) (2013) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes.

TII (2004). Guidelines for the treatment of noise and vibration for national road schemes.

Wicklow County Council (2019) Noise Action Plan 2018 – 2023.

7 Material assets – agriculture

7.1 Introduction

This section describes the material assets that are agricultural constraints identified within the study area for the N11/M11 Scheme. This section also refers to forestry and urban land use because combined these land uses represent approximately 36% of the study area.

The study area is 9km at the widest point and extends approximately 26km from south to north and encompasses approximately 16,850 hectares (ha) of land within its boundary. The land use can be described under three broad headings;

- Agricultural land – approximately 64% of the land area;
- Forestry land (including commercial and woodland/scrub) – approximately 11% of the land area; and
- Urban/built/quarry - approximately 25% of the land area.

7.2 Methodology and sources of information

The following guidelines and legislation were referred to when writing this report:

- European Union (2018) (Planning and Development) (Environmental Impact Assessment) Regulations. (SI 296 of 2018);
- Environmental Protection Agency (EPA) (August 2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports¹; and
- Transport Infrastructure Ireland (TII) (2019) Project Management Guidelines PE-PMG-02041². In line with these TII and EPA guidelines, the constraints study seeks to identify the issues that are likely to be important at this stage of the environmental assessment process and to inform the design team so that preventative action can be pursued. This constraints study has comprised of a desktop collation and interpretation of published data and a windshield survey of the study area that was undertaken in April 2019. The purpose of this constraints study was to identify features which reflect the agricultural potential and agricultural sensitivity of the study area. The desktop study has considered the following sources of information:
- Data from the Central Statistics Office;

¹ Environmental Protection Agency (August 2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports. Available from: <http://www.epa.ie/pubs/advice/ea/EPA%20EIA%20Guidelines.pdf>

² Transport Infrastructure Ireland (2019) Project Management Guidelines PE-PMG-02041. Available from: <https://www.tiipublications.ie/library/PE-PMG-02041-02.pdf>

- The 2010 Census of Agriculture³. The Agricultural Census in 2010 publication is the only source of data which gives the number of farms for each farm enterprise at a county level. The county data is used as an indicator of the size of dairy and sheep farms within the study area. It is possible to drill down through the 2010 census data on the Central Statistics Office (CSO) website in the Agrimap⁴ part of the website to access this data at a District Electoral Division (DED) level. This data is used in **Table 7.3**. The most recent agricultural census is from 2010 and the next agricultural census will be in 2020. Some changes will be expected during this period, therefore, although a useful indicator of agricultural data relevant to County Wicklow and the study area, the 2010 census should be interpreted with caution. For example, since milk quotas were abolished in 2015, County Wicklow cow numbers have increased from 17,536 in 2010 to 24,200 in 2018. The fact that the geographical location of the DEDs is not exactly the same as the study area must also be taken into account;
- The 2016 CSO Farm Structure Survey⁵. This 2016 survey provides the most recently available data on the number of dairy farms and dairy cows on a regional basis. It does not provide a county breakdown of enterprise types and numbers. It is used to provide the most up to date average number of dairy cows per farm;
- The 2018 CSO June Crops and Livestock Survey⁶. This is the most up to date data source for the total number of dairy cows in County Wicklow (but does not provide the number of dairy farmers);
- Soil mapping data from the Teagasc Irish Soil Information System⁷ was used to identify the soil types within the study area. For example, rock, peat and low-lying alluvial soils are generally poor quality. The soil quality and type varies within a small area and the mapping data used is consistent over large areas, thus the information is indicative only;
- Bing⁸ and Google⁹ aerial maps were used to identify yards, farm facilities, forestry, scrub and rough boggy land; and

³ Central Statistics Office (December 2012), Census of Agriculture 2010 – Final Results. Available from:

<https://www.cso.ie/en/media/csoie/releasespublications/documents/agriculture/2010/full2010.pdf>
[Accessed on 11/09/2019]

⁴ Central Statistics Office (2019), Statistics, Agriculture, Census of Agriculture 2010, Agrimap. Available from: <http://census.cso.ie/agrimap/> [Accessed on 11/09/2019]

⁵ Central Statistics Office (2019), Statistics, Agriculture, Farm Structure Survey, Table 4.1. Available from: <https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/>
[Accessed on 11/09/2019]

⁶ Central Statistics Office (2019), Statistics, Agriculture, Crops and Livestock June Final Results, Table 4. Available from:

<https://www.cso.ie/en/releasesandpublications/er/clsjf/cropsandlivestocksurveyjunefinal2018/>
[Accessed on 11/09/2019]

⁷ Teagasc (2019), Irish Soil Information System. Available from <http://gis.teagasc.ie/soils/>
[Accessed on 05/04/2019]

⁸ Bing Aerial Mapping (2019). Available from: <https://www.bing.com/maps>

⁹ Google Aerial Mapping (2019). Available from: <https://www.google.com/maps>

- The Property Registration Authority of Ireland (PRAI)¹⁰ open database was used to identify folio land parcels where grazing dairy cows were noted during the windshield survey.

The following features have been identified from desktop information sources:

- Yards and farm facilities - Farm yards and other yards and facilities such as sand arenas used by horses and farm paddocks and roadways typical of dairy farms have been identified from aerial photography. Glass houses and vegetable cropped areas were also identified using aerial photography^{8 9};
- Dairy and equine farms are generally high sensitivity and equine enterprises are within the high to very high range of enterprise sensitivity (see **Table 7.1** below). Areas within the study area which have high concentrations of dairy and equine farms have been identified from national statistics. As outlined above, the PRAI open database¹⁰ has been used to identify folio land parcels;
- Areas with good quality soils generally have a higher agricultural potential than poor quality land. Good quality land was initially identified by using the Teagasc Irish Soils Information System⁷ and aerial photography^{8 9} and later verified with windshield surveying. Ordnance Survey Discovery mapping¹¹ has been used to identify upland areas; and
- Urban areas and forestry areas were mapped using aerial photography^{8 9}.

A windshield survey was conducted in April 2019. The windshield survey involved driving through the study area and recording farm enterprises, land use and land quality. The purpose of the windshield survey was to verify where possible the desktop data and identify the following:

- Farm yards and other yards - Farm yards, vegetable cropped areas, commercial orchards and facilities such as stables, glass houses, sand arenas and lounging areas were identified;
- Fields with dairy cows - Open farms and organic farms were also noted where these were sign posted;
- Fields with horses;
- Land use/cropping (e.g. vegetable cropped areas and commercial orchards); and
- Land quality - Desktop information was verified and areas with forestry were noted.

Where farm enterprises are identified, the information in **Table 7.1** is used to categorise the sensitivity. This information has been adopted based on the professional judgement of the author in the absence of any formal guidance.

¹⁰Property Registration Authority (2019). Available from <https://www.landdirect.ie/index>. [Accessed in April 2019]

¹¹ Wicklow County Council (2019), Planning Applications Enquiry System, Available from <http://wicklow.maps.arcgis.com/apps/webappviewer/index.html?id=57b22c27e7c049fbac54117da1a20f60> [Accessed in April 2019]

Table 7.1: Farm sensitivity

Farm enterprise type	Intensity / scale	Sensitivity
Stud farms, farm shops/open farms are generally high or very high sensitivity. Intensive horticulture is generally high or very high sensitivity.	High	Very High
	Medium	High
	Low	Medium
Dairy farms and equine enterprises.	High	High
	Medium	High
	Low	Medium
Non dairy grazing livestock enterprises (including beef, sheep and small non intensive equine) and grass cropping enterprise.	High	Medium
	Medium	Low
	Low	Very low
Tillage	High	Medium
	Medium	Low
	Low	Very low
Rough Grazing, Bog, Forestry, Woodland	Low	Very low

7.3 Existing environment

7.3.1 Statistical analysis of agriculture in the study area

There are no agricultural statistics for the Dún Laoghaire-Rathdown County Council area which is predominantly urban, and the majority of the agricultural land occurs in County Wicklow. Analysis of Tables 1 and 2 of the 2010 Agricultural Census³ shows that the agricultural area of County Wicklow is approximately 101,266ha. There were 2,394 farmers in County Wicklow according to Table 1 of the 2010 census. The agricultural area (as declared by farmers in the relevant DEDs in the 2010 Agricultural Census⁴ – Refer to **Table 7.2**) is approximately 8,000ha which represents 8% of the total County area.

Table 7.2: Agricultural statistical data for Wicklow County (Source CSO)

Farm/enterprise category	% of farms within each category	
	Farms in Co Wicklow	Farms nationally
Mainly Dairy	8	11
Non dairy grazing livestock (Beef/sheep) and mixed field crops	82	82.5
Mainly Tillage	6	3.5
Mixed Crops & Livestock	3	2
Other	1	1
Total	100	100

Table 7.2 shows that within County Wicklow there are fewer dairy farmers (which are generally considered to have high sensitivity) and more tillage and sheep farmers (generally considered to have medium sensitivity) when compared to national statistics.

Table 8A of the 2010 census data³ shows that there were approximately 17,500 cows in County Wicklow on 251 dairy farms in 2010 – an average of 70 dairy cows per farm. This is larger than the 2010 national average of 58 dairy cows per farm (1,070,755 cows in 18,456 dairy farms) confirming the relatively large size of dairy farms in County Wicklow. Since the lifting of milking quotas in 2015 the national average herd size has increased to approximately 76 dairy cows per farm in 2016⁵ (1,398,100 cows in 18,300 farms) and the number of cows in County Wicklow has increased to approximately 24,200⁶.

Table 8B of the 2010 agricultural census data³ shows that there were 1,256 farms in County Wicklow (52% of total farms) with 253 sheep per farm on average. This compares with an average of 148 sheep per farm on 23% of farms nationally (32,111 farms out of a total of 139,880). Therefore, sheep farming is likely to be the most common type of farming in the study area.

There are 11 DEDs within the study area (**Figures B7.1 to B7.6**). There are no agricultural statistics for five of these DEDs because of the low numbers of farmers in these largely urban DEDs - Cabinteely – Loughlinstown, Shankill – Shanaganagh, Shankill – Rathmichael, Bray and Gorey. The statistical information⁴ for the other six DEDs within the study area is presented in **Table 7.3**.

The CSO uses the ‘Other’ farm enterprise category to include equine, pigs, poultry and horticulture. It should be noted that the CSO may not record all equine enterprises in an area because many owners may not be actively engaged in farming and therefore not covered by the Agricultural Census. A high number of small equine enterprises associated with private dwellings have been noted and recorded in the windshield survey (15 in total) and these are assessed as medium sensitivity. This is typical at the fringes of large urban centres. In addition to this, 34 high – very high sensitivity equine facilities have been identified. Also, near urban centres there is a relatively high number of other enterprises such as open farms, farm shops and garden centres.

Table 7.3: 2010 Agricultural statistical data for DEDs in the study area⁴

District electoral division	Total farmers	Area farmed (ha)	Arable crops (ha)	No. sheep	No. dairy cows (per 100 hectares)	No. horses (per 100 hectares)
Cabinteely – Loughlinstown*	5	-	-	-	-	-
Shankill-Shangannagh*	0	-	-	-	-	-
Shankill - Rathmichael*	15	-	-	-	-	-
Bray*	1	-	-	-	-	-

District electoral division	Total farmers	Area farmed (ha)	Arable crops (ha)	No. sheep	No. dairy cows (per 100 hectares)	No. horses (per 100 hectares)
Kilmacanoge	26	1,343	243	5,199	42 (3)	61 (5)
Delgany	12	391	88	1,149	14 (4)	31 (8)
Greystones*	1	-	-	-	-	-
Kilcoole	34	1,505	479	5,707	0	10 (1)
Newcastle Lower	32	2,079	667	2,500	253 (12)	124 (6)
Newcastle Upper	44	1,662	44	7,918	104 (6)	56 (3)
Killisky	19	959	191	2,665	103 (11)	59 (6)
*No data available						
Totals =>	189	7,939	1,712	25,138	516	341

Number of farms

As illustrated in **Table 7.3** the 2010 DED⁴ data indicates that there were 189 farmers in the study area, but this may have changed in the intervening years. The windshield survey recorded 171 yards in the study area, however many of these were equine facilities adjoining private dwellings. The number of farm yards would not necessarily equate to the number of farms because some farms may have more than one farm yard and some smaller farms may have none.

Size of farms

Table 2 of the 2010 Agricultural Census³ shows the average size of farms in County Wicklow to be approximately 42ha. which corresponds closely to the DEDs as described in **Table 7.3**. The 2016 CSO Farm Structure Survey⁵ showed the national average size of farms has not varied significantly since 2010. The 42ha. size compares with the national average of approximately 32ha. It is also noted that dairy farms in County Wicklow are larger than the national average. Therefore, it can be expected that farms in the study area are relatively large.

Enterprise types

Referring to the total sheep numbers for the study area in **Table 7.3** above and using the 2010 Agricultural Census figure for the average number of sheep per farm in County Wicklow (i.e. 248), it can be assumed that there are approximately 100 (i.e. 25,138 ÷ 248) sheep farmers in the study area. This correlates closely to the 2010 Agricultural Census figure of 52% of total farms in County Wicklow. The windshield survey confirmed that sheep farming is the dominant farm enterprise in the study area.

Referring to **Table 7.3** above, within the relevant DEDs there were approximately 516 dairy cows in 2010 which indicates approximately 7 – 8 dairy farmers based on the County average of 70 cows per herd (approximately 4% of total farms in the study area). The windshield survey noted dairy cows and/or dairy facilities in nine different locations.

Newcastle Lower and Killisky are the DEDs with the highest concentration of dairy cows. Overall, the concentration of dairy cows in the study area is low when compared to other intensive dairying parts of the country. For example, the 2010 Agricultural Census data for an intensive dairy area such as Fermoy Rural DED is 35 cows per 100 ha compared with 6.5 cows per 100 ha in the study area [$516 \div (7,939 \div 100)$].

Referring again to **Table 7.3**, approximately 21% of the land area is tillage. This indicates a relatively high proportion of tillage in the study area compared to other parts of County Wicklow and compared to national figures (8% tillage nationally and 12% in County Wicklow – from Table 7A of the 2010 Agricultural Census).

The ‘Other’ enterprise category can include equine, pigs, poultry and horticulture. No pig or poultry farms were noted during the windshield survey. 49 equine yards were noted from the desktop and windshield surveys. 15 of these are associated with private dwellings where horses are kept for leisure purposes rather than commercial breeding or training. These enterprises are categorized as medium sensitivity. 34 equine enterprises are categorised as high – very high sensitivity due to having thoroughbred horses or significant equine facilities on their holdings.

Table 7.4: Farm enterprise sensitivity in the Study Area

Enterprise	Low - medium sensitivity	High – Very High
Equine	15	34
Dairy	0	7
Horticulture	0	8
Cattle & sheep	102	0
Other	0	5

The following has also been identified:

- Eight high to very high sensitivity horticultural enterprises including a garden centre, a nursery and two organic vegetable producers;
- Five other enterprises were categorized as high to very high sensitivity (boarding kennel, Christmas tree farm, veterinary facility, open farm and farm holiday homes); and
- A farm adjoining a film studio and used for filming purposes was categorized as high to very high sensitivity. This farm also has a significant number of horses.

Where high to very high sensitivity farm and other yards were noted, the land adjoining it was mapped using PRAI boundary data¹⁰. All farms and other yards are constraints.

7.3.2 Soils in the study area

The Irish Soils Information System (Teagasc) Soil mapping data⁷ was used to identify the soil types within the study area which are shown in **Figures B7.1 to B7.6**. These figures also illustrate poorer quality land as identified from the aerial photography and windshield survey. The main soil types are:

- **Clonroche (1100a)** - This soil association occurs throughout the study area and accounts for approximately 74% of the agricultural land area. This is generally a deep free draining brown earth with a loam texture generally occurring on the lower elevations of the topography. It is well suited to tillage and grassland. In the study area, this is generally a good quality soil type with some poorer quality associated gleys and upland areas which are wooded/planted with forestry. In the study area approximately 75% of this soil association is categorised as good quality and 25% as poor quality;
- **Borrisoleigh (0960c)** - This soil association occurs mainly in the west of the study area and accounts for approximately 9% of the agricultural land area. This is a podzolic type soil with a clay texture generally occurring at higher elevations of the topography. It is mainly suited to grassland. In the study area this is a reasonably good quality soil type with approximately 60% of it categorised as good quality (most of the poor quality land is forestry);
- **Boyne (05RIV)** - This soil association occurs along streams and rivers and accounts for approximately 5% of the agricultural land area. This is a silty river alluvium soil occurring at lower elevations of the topography. This soil may be waterlogged (or even flooded) for extended periods of time. It is mainly suited to grassland. In the study area this is generally a poor quality soil type with approximately 100% of it is categorised as poor quality;
- **Puckane (0660c)** - This soil association occurs mainly in the south east of the study area and accounts for approximately 5% of the agricultural land area. It is a loamy type soil with a high water table occurring at lower elevations of the topography and is mainly suited to grassland. In the study area this is a reasonably good quality soil type and approximately 85% of it is categorised as good quality;
- **Borrisoleigh (0900g)** - This soil association occurs mainly in the west of the study area and accounts for approximately 3% of the agricultural land area. This is a heavy type soil over shale bedrock with a clay texture. It occurs at higher elevations (the foothills of the Wicklow and Dublin Mountains) of the topography. It is mainly suited to grassland. In the study area this is generally a mixed quality soil type with approximately 65% of it categorised as poor quality. Most of the poor quality land is forestry;
- **Carrigvahanagh (0410a) (including Knocksquire 1100kq)** - This soil association extends down from the Dublin Mountains and occurs mainly in the north of the study area. It accounts for approximately 3% of the agricultural land area. This is a coarse loam type soil (and peaty in places) over acid bedrock. It occurs at higher elevations of the topography. It is mainly suited to grassland. In the study area, this is a mixed quality soil type with approximately 60% of it categorised as good quality; and

- The remaining soil associations include **Peat (1xx), Rock and Crosstown (1030a)**. These account for approximately 1% of the total agricultural area. Peat and Rock are poor quality land and Crosstown (1030a) is good quality land.

Those soils not categorised as poor quality are identified as a constraint (Refer to **Figures B7.1 and B7.6**).

7.3.3 Agricultural constraints

The main agricultural constraints as shown in **Figures B7.7 to B7.12** are identified as:

- Good quality land as identified using Teagasc data, aerial photography and windshield survey;
- Farm yards and other yards;
- Dairy enterprises where dairy cows or yards were noted, the land adjoining was mapped using PRAI data¹⁰ (the plots are constraints);
- Equine enterprises where grazing horses or equine yards were noted, the land adjoining was mapped using PRAI data¹⁰ (the plots are constraints); and
- Other high – very high sensitivity enterprises such as horticulture, open farms were also mapped (the plots are constraints).

Good quality agricultural land

From an agricultural perspective, urban or built land is a lower constraint than forestry or agricultural land. Forestry, woodland and scrub is a lower constraint than agricultural land. Urban and built on land generally has no agricultural potential use and forestry is not as intensively managed, generally grown on poorer quality land on elevated sites and is often owned by Coillte which is a semi-state body. Good quality land has a higher agricultural potential than poorer quality land.

The information provided in the soil maps in **Figures B7.1 to B7.6** enables informed decision making with regard to probable land quality. The main good quality soil occurs in a band across the middle of the study area making complete avoidance impractical during any selection of options, however any option that keeps to the west or the south east corner of the study area – will encounter more poor quality land.

Yards and equine facilities

All yards and associated facilities identified in the windshield study are identified as agricultural constraints and should be avoided. 171 yards and facilities such as glass houses, sand arenas and lounging paddocks were identified and mapped in the study area and shown in **Figures B7.7 to B7.12**.

Farm enterprises

DEDs with an above average number of dairy cows and horses are identified as a constraint (i.e. Delgany, Newcastle Lower and Killisky).

High to very high sensitivity enterprises (dairy, equine, horticulture, open farms) are also considered as agricultural constraints. 54 high to very high sensitivity enterprises were identified. The agricultural constraints are presented in **Figures B7.7 to B7.12**.

7.4 Summary and conclusions

Farm yards and other yards are identified as agricultural constraints. The statistical data presented in **Table 7.3** indicates that there are approximately 187 farms in the study area. 171 yards were identified and shown in **Figures B7.7 to B7.12**.

Good quality land is identified as an agricultural constraint. While this is recognised as a constraint, it is unavoidable that the selected option will traverse good agricultural land because approximately 70% of the land can be classified as good quality land. Generally, any option located to the west of the study area would minimise impact on the better quality land.

It is assumed that medium sensitivity enterprises (beef cattle, sheep, tillage and grass cropping such as silage and hay) cannot be avoided when new roads cross agricultural land. High – very high sensitivity farm enterprises are identified as agricultural constraints. The study area contains a relatively high number of sheep farms which are not constraints because the sheep enterprise is considered medium sensitivity. There is a relatively low number of high sensitivity farms (7 based on a windshield survey) where dairy livestock and/or dairy facilities were identified. There are a relatively high number of horses and equine yards and facilities within the study area. Of the 49 equine sites noted, 34 were assessed as high - very high sensitivity and are therefore identified as constraints. Thirteen sites were identified with high - very high sensitivity horticultural and other enterprises (e.g. open farms, garden centre, glass houses, veterinary clinic farm, organic vegetable farms, Christmas tree farm etc.). These enterprises are highlighted in **Figures B7.7 to B7.12**.

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8 Material assets – non-agriculture

8.1 Introduction

This section describes the non-agricultural material asset constraints identified within the study area for the N11/M11 Scheme. These include amenities, residential properties, commercial properties, industrial properties, utilities and service infrastructure and waste facilities.

Section 8.2 below describes the methodologies and sources of information that were used to carry out the study. **Section 8.3** describes the material assets – non-agricultural constraints within the study area. A summary is presented in **Section 8.4** and references are listed in **Section 8.5**.

8.2 Methodology and sources of information

The aim of this assessment is to highlight the non-agricultural material assets within the study area and assess these as constraints. The assessment is based on a desktop study and on information gathered during consultations with statutory organisations, service providers, landowners and the public. The desktop study included an inspection of land registry records, consultation with the statutory organisations, examination of orthophotography, and inspection of records and development plans from the both Dún Laoghaire-Rathdown County Council (DLRCC) and Wicklow County Council (WCC) Planning Departments, and An Bord Pleanála. Information gathered is listed in **Table 8.1** below.

Table 8. 1: Sources of information

Information	Data sources
Land ownership and Land Use Details	<ul style="list-style-type: none"> Landowner meetings and communications (telephone, email, letter) with landowners have taken place Wicklow County Council offices act as a project office in Wicklow Town and provide the location for landowner meetings Arup offices in Dublin 4 provided the main design team base for the collection of land ownership and land use information Public Consultations in the Glenview Hotel in December 2018 and November 2019 Property Registration Authority/Land Registry¹ Orthophotography²
Locations of Properties	<ul style="list-style-type: none"> Windshield Surveys at crossing points of the local roads and along the existing N11 to identify non-agricultural properties Orthophotography²

¹ Property Registration Authority (2019) Land Registry. Available from: <https://www.landdirect.ie/>

² Google Maps (2019) Available from: <https://www.google.com/maps>

Information	Data sources
Planning Applications	<ul style="list-style-type: none"> Searches through Dún Laoghaire-Rathdown County Council ³and Wicklow County Council Planning ⁴databases
ESB / ESBI	<ul style="list-style-type: none"> Consultations between Design Team and ESB and ESBI representatives
Gas Networks Ireland (Bord Gáis)	<ul style="list-style-type: none"> Consultations between Design Team and Gas Networks Ireland (Bord Gáis) representatives
Water and Foul Water	<ul style="list-style-type: none"> Consultations between Design Team and Irish Water
Virgin Media	<ul style="list-style-type: none"> Consultations between Design Team and Virgin Media representatives
BT Ireland	<ul style="list-style-type: none"> Consultations between Design Team and BT Ireland representatives
Eircom / EIR	<ul style="list-style-type: none"> Consultations between Design Team and Eircom representatives
Vodafone	<ul style="list-style-type: none"> Consultations between Design Team and Vodafone representatives
Three	<ul style="list-style-type: none"> Consultations between Design Team and Three representatives
E-Net	<ul style="list-style-type: none"> Consultations between Design Team and E-Net representatives
SSE Ireland	<ul style="list-style-type: none"> Consultations between Design Team and SSE Ireland representatives

The following sources of information were consulted to identify waste constraints:

- The Eastern Midlands Waste Region Waste Management Plan 2015 - 2021⁵;
- EPA Report – Focus on Landfilling in Ireland⁶;
- Dún Laoghaire-Rathdown County Council waste management⁷;
- Wicklow County Council waste management⁸;
- Local Authority Waste Facility Register⁹; and
- Repak website¹⁰.

³ Dún Laoghaire-Rathdown County Council (2019) Online Planning Search. Available from: <https://dlrcocouncil.maps.arcgis.com/apps/webappviewer/index.html?id=af21eeb123224c4c877f410139ed1e69> [Accessed: 23 May 2019]

⁴ Wicklow County Council (2018) Online Planning Search: Available from: <https://www.wicklow.ie/Living/Services/Planning/Planning-Applications/Online-Planning> [Accessed: 23 May 2019]

⁵ Eastern Midlands Waste Region (2019) Eastern Midlands Waste Region Waste Management Plan 2015-2021. Available from: <http://emwr.ie/emwr-plan/> [Accessed: 21 May 2019]

⁶ Environmental Protection Agency (2010) EPA Report – Focus on Landfilling in Ireland. Available from: http://www.epa.ie/pubs/reports/waste/stats/EPA_Focus_on_Landfilling_Ireland.pdf

⁷ Dún Laoghaire-Rathdown County Council (2019) Waste Management. Available from: <https://www.dlrcoco.ie/en/recycling-waste> [Accessed 27 May 2019]

⁸ Wicklow County Council (2019) Waste Management. Available from: <https://www.wicklow.ie/Living/Services/Environment/Recycling-Waste-Management> [Accessed 27 May 2019]

⁹ Local Authority Waste Facility Register (2019). Available from: <http://facilityregister.nwcpo.ie/> [Accessed: 27 May 2019]

¹⁰ Repak (2019) Recycling Register. Available from: <https://repak.ie/> [Accessed 27 May 2019]

8.3 Existing material assets – non-agricultural

Lands within the N11/M11 Scheme study area are zoned under two County Development Plans (CDP) and multiple Local Area Plans (LAP). Zoned lands may act as constraints to the N11/M11 Scheme as they have been identified as being lands made available for a particular type of development. These zoned lands are identified in the following plans:

- Dún Laoghaire-Rathdown County Development Plan (2016 - 2022)¹¹;
- Wicklow County Development Plan (2016 - 2022)¹²;
- Bray Municipal District Local Area Plan 2018 ¹³(Bray, Enniskerry and Kilmacanoge);
- Greystones-Delgany and Kilcoole Local Area Plan 2013 – 2019¹⁴; and
- Newtownmountkennedy Local Area Plan 2019¹⁵.

The aim of the DPs and LAPs is to establish a framework for the planned, co-ordinated and sustainable development of areas. Their objective is to enhance and facilitate the balancing of economic, social and environmental infrastructure to maintain and develop a high quality of life without compromising the protection of the environment and the needs of future generations.

For the purposes of this report, related zones have been grouped together under the following headings:

- Amenities (Open Spaces, Recreation and Tourism Related);
- Residential;
- Commercial;
- Industrial; and

¹¹ Dún Laoghaire-Rathdown County Council (2016) County Development Plan 2016 – 2022. Available from: <https://www.dlrcco.ie/en/planning/county-development-plan/county-development-plan-2016-2022>

¹² Wicklow County Council (2016) Wicklow County Development Plan 2016-2022. Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/National-Regional-County-Plans/Wicklow-County-Development-Plan/Wicklow-County-Development-Plan-2016-2022>

¹³ Wicklow County Council (2018) Bray Municipal District Local Area Plan 2018. Available from: <https://www.wicklow.ie/Portals/0/Documents/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Bray/Bray-Municipal-District-Local-Area-Plan-2018/WRITTEN%20STATEMENT%20-%20Bray%20Municipal%20District%20Local%20Area%20Plan%202018-2024.pdf>

¹⁴ Wicklow County Council (2012) Greystones-Delgany and Kilcoole Local Area Plan 2013 – 2019. Available from: https://www.wicklow.ie/Portals/0/Documents/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Greystones-Delgany/Greystones-Delgany-Kilcoole-Local-Area-Plan-2013-2019/Draft_Greystones-Delgany_and_Kilcoole_LAP_2013-2019.pdf

¹⁵ Wicklow County Council (2019) Newtownmountkennedy Local Area Plan 2019. Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Newtownmountkennedy/Newtownmountkennedy-Local-Area-Plan-2008-2018>

- Utilities and Services.

The breakdown of zones is not standard across each DP/LAP. For example, zones identified such as ‘Bray Seafront’ in the Bray LAP or ‘Agri-Tourism’ in the Greystones-Delgany and Kilcoole LAP are specific to their respective LAPs.

The extents of these planning zones are presented in **Figures B8.1 to B8.8**.

8.3.1 Amenities (open spaces, recreation and tourism related)

The study area contains a range of amenities and desirable or useful features or facilities, that may act as constraints to the development of the N11/M11 Scheme. These amenities consist of open spaces, recreation facilities and tourism related facilities. The study area also contains a rich heritage of archaeological and historical sites, manor homes and gardens, and attractive towns and villages. Coastal and Maritime amenities are also prominent along the eastern extents of the study area.

Within the southern region of Dún Laoghaire-Rathdown County Council, there are significant areas zoned for amenity related development¹¹. These reflect lands zoned ‘B’ to protect and improve rural amenities and to provide for the development of agriculture, ‘G’ to protect and improve high amenity areas, and ‘GB’ to protect and enhance the open nature of lands between urban areas. Significant amenities within the DLRCC area of the N11/M11 Scheme study area include:

- Rosedale House and Gardens;
- Shanganagh Park House and Community Centre;
- Shankill and Cuala GAA Clubs; and
- Dún Laoghaire, Old Conna, Woodbrook Golf Clubs.

County Wicklow’s tourism and recreational attractions are important assets and form the basis of the county’s tourism industry and are fundamental to the enjoyment of the county by both visitors and residents alike. Attractions include areas of outstanding scenic beauty in the Wicklow and Dublin Mountains, stretches of beaches and dunes along the coastline and many nature reserves. These assets provide attractive natural bases for outdoor pursuits.

The Bray Municipal District LAP¹³ recognises that there is a shortfall in active open space, particularly organised sports grounds, in the town and environs of the Bray municipal area. As such, the areas zoned for Active Open Space and Open Space 1 and 2 will be of greater value to the area. Significant amenity areas within the Bray Municipal Area include:

- Bray Seafront and Esplanade;
- Bray Harbour;
- Bray Head and Great and Little Sugarloaf Mountains;
- The Dargle River;

- Kilruddery House and Gardens;
- Enniskerry and Powerscourt (just outside of the study area but accessed via existing N11/M11); and
- Bray Golf Club.

Within the Greystones-Delgany and Kilcoole LAP¹⁴, there are numerous further areas zoned for Active Open Space and Open Space 1 and 2. Significant coastal amenities within the local area include the existing cliff walk between Greystones and Bray, Greystones harbour and marina, the former medieval settlement at Rathdown, and Kilcoole marshes linking the Murrough and the East Coast Nature Reserve near Newcastle. Kindlestown Wood and the Glen of the Downs Nature Reserve provide additional recreational areas. Golf Courses of note include Druids Glen Resort, Greystones Golf Club, Delgany Golf Club and Charlesland Golf Club. The Glenroe Open farm is an amenity providing for the development of agri-tourism in the local area.

The Newtownmountkennedy LAP¹⁵ acknowledges that the area is currently lacking in public parks and open spaces. Several parks and recreational walks are planned in the areas zoned as Active Open Space and Open space. Particular heritage assets include the town's built fabric, including a number of protected structures such as Newtownmountkennedy House, located on the Main Street, and Newcastle Hospital located in Killadreenan. Newtownmountkennedy GAA club and the Glen Mill Golf Club are significant recreation facilities in the area.

8.3.2 Residential properties

Residential areas are well distributed throughout the study area and vary significantly in size and density. The study area contains residential areas within both the Dún Laoghaire-Rathdown and Wicklow County Council extents.

The type of housing in the study area at present varies significantly. Large residential estates, high rise apartment complexes, linear development, small residential clusters, and one-off housing types can all be found. The type of residential development is not defined to certain areas, though the population densities are significantly higher in the residential areas closer to the Greater Dublin Area (GDA). Some student accommodation is provided to service third level institutes, predominantly within the northern extents of the study area. Each County Council and local area authority has its own core objectives within its development plan when considering future population growth strategies.

Dún Laoghaire-Rathdown County Council

The majority of the Dún Laoghaire-Rathdown (DLR) population is concentrated in an urban/suburban area between the foothills of the Dublin Mountains and the coast at Shankill and Killiney. The various suburbs in the County coalesce into one another and no clear or obvious features provide clear separation between each suburb.

Significant settlements within the N11/M11 Scheme study area under DLRCC jurisdiction include Cherrywood, Loughlinstown, Rathmichael, Shankill, Woodbrook and Old Conna. Of these settlements, Woodbrook and Old Conna have been identified in the DLR County Development Plan¹¹ as future development areas and Cherrywood as a designated Large Growth Town within the Metropolitan Area. As such, these settlements will accommodate significant new investment in transport, economic and commercial activity and in housing. Cherrywood is also a designated Strategic Development Zone and as such it will contribute to the overall competitiveness of the GDA and so assist the overall objective of promoting the GDA as an International ‘Gateway’, as set out in the National Spatial Strategy.

The full housing allocation for DLRCC from the Regional Planning Guidelines (RPG) for the GDA for the years 2006 to 2022 is 40,385¹¹. Between 2006 and 2013, approximately 9,500 units were constructed in the County, leaving an allocation of 30,885 for the remaining years 2014 to 2022¹¹. DLR’s Housing Land Availability Study estimates a zoned land supply capable of accommodating in excess of 30,000 residential units exists¹¹. Therefore, there is, in principle, sufficient zoned residential land in the County to meet this housing allocation. However, the delivery of residential zoned lands in the southern part of Dún Laoghaire-Rathdown is dependent on the co-operation of Irish Water in delivering the necessary water and drainage infrastructure and of Central Government in progressing major improvements in public transport infrastructure in the area. The very close alignment between supply of zoned land and projected demand for zoned land highlights the importance of ensuring timely servicing of DLR County’s landbank. The Old Connaught-Woodbrook Water Supply Scheme is a strategic scheme required to provide storage and distribution capacity for a wide area extending from Cherrywood into north County Wicklow to unlock the potential of major development nodes at Woodbrook, Old Conna, Ballyman, Rathmichael and Fassaroe (north Wicklow). The scheme has been included in various ‘Water Services Investment Programmes’ at planning and design stage, with a preliminary report for the Scheme having been submitted to the Department of Housing, Planning and Local Government. The scheme was included as part of, Irish Water’s ‘Emerging Investment Plan 2017 - 2021’ with a status indicated as ‘For Inclusion in the Emerging Investment Portfolio’. In relation to foul drainage, the Old Connaught-Woodbrook Sewerage Scheme will form the basis of a new drainage network for the same area and has a similar status - ‘For Inclusion in the Emerging Investment Portfolio’.

Wicklow County Council

The residential areas within the County Wicklow section of the N11/M11 Study Area are more clearly defined than those residential areas within the Dún Laoghaire-Rathdown County Council section of the N11/M11 Scheme. Typically, the residential population and density of the settlement areas is highest to the north of the study area and reduces towards the south as the proximity to the GDA decreases. Towns and settlements of note within the Wicklow section of the study area include Bray, Greystones, Delgany, Newtownmountkennedy, Kilcoole, Kilmacanoge, Newcastle and Roundwood amongst others.

The Wicklow County Development Plan 2016 - 2022¹² provides a settlement hierarchy which defines each settlement by type. The definition of these settlements (within the N11/M11 Scheme study area only) are listed in **Table 8.2** below:

Table 8.2: County Wicklow settlement hierarchy

Settlement	County Development Plan 2016 - 2020	County Development Plan level
Bray	Metropolitan Area Consolidation Town	1
Greystones-Delgany	Metropolitan Area Large Growth Town II	2
Newtownmountkennedy	Hinterland Area Moderate Growth Town	4
Kilcoole	Small Growth Town	5
Kilmacanoge	Rural Town	6
Newcastle	Rural Town	6
Roundwood	Rural Town	6

The Regional Planning Guidelines require that 42% of the total growth allocated to County Wicklow be allocated to the metropolitan area settlements and that the ‘majority’ of the remainder be allocated to the growth towns, weighted towards the large growth towns in the settlement hierarchy and also particularly towards towns with rail based public transport i.e. c. 70% of total population growth to be directed towards the ‘growth towns’.

Bray is the largest town in County Wicklow. The population of Bray is targeted to increase from 29,339 in 2011 to 40,000 by 2028¹². Further expansion of the town is severely constrained on all sides by the administrative boundary of Dún Laoghaire-Rathdown and the coast to the north and east respectively, Bray Head and the Sugarloaf mountains to the south and the N11/M11 to the west. For Bray to achieve its targeted population, lands at Fassaroe to the west of the N11/M11 are targeted for new housing and other facilities. The development of a new town centre at Fassaroe is largely dependent on the delivery of infrastructure, including upgrades to the N11/M11 and the delivery of high-quality public transport connections to Bray Town Centre and to Dublin City Centre.

Greystones - Delgany is designated a Level 3 Large Growth Town within the Settlement Hierarchy. Greystones is a strong growth town, served by high quality transport links to surrounding towns and the Dublin area. The population of the settlement is targeted to increase from 17,208 in 2011 to 24,000 in 2028¹². Areas zoned for future residential development are designated R5, R10, R17 and R22 in the LAP and include areas around Kindlestown Upper, Delgany, Killincarrig and Charlesland.

Newtownmountkennedy is designated a Level 4 Moderate Growth Town within the hinterland area. The town is to be prioritised for moderate growth. The population of the settlement is targeted to increase from 3,073 in 2011 to 6,000 in 2028¹². The town has a strategic location along the N11/M11 at the north of the county with ease of access to the Dublin metropolitan area and the M50 Motorway.

Areas zoned for future residential development are designated R1, R2 and R3 in the LAP and include areas around Seasonpark, Kilmacullagh, Moneycarroll, Monalin and Ballinahinch Lower.

Kilcoole is designated a level 5 Small Growth Town. The population of the settlement is targeted to increase from 4,063 in 2011 to 5,000 in 2028¹². The settlement is not considered as a priority for major growth under the County Development Plan.

Kilmacanoge, Newcastle and Roundwood are designated as level 6 Rural Towns. The settlements are not considered priorities for major growth under the County Development Plan.

8.3.3 Commercial properties

While Dublin is considered to be the dominant economic hub within the Eastern region and is classed as a Gateway City, a significant level of commercial activity occurs within the towns of the N11/M11 Scheme study area. The main towns within the N11/M11 study area avail of Dublin's commercial aspects and a high volume of the population of Shankill, Bray, Greystones, Delgany, Kilmacanoge, Kilcoole and Newtownmountkennedy commute to Dublin for employment.

The main commercial sectors of note within the N11/M11 Scheme study area are as follows:

Retail

The 'Wholesale, Retail Trade, Transportation and Storage' group forms the largest industrial group for those working in Wicklow (29%)¹². The town centres of Bray and Greystones are the main commercial/retail hubs within the N11/M11 Scheme study area. Several significant retail parks exist within the study area, including the Southern Cross Retail Park, Bray Retail Park, and Greystones Retail Park. Avoca Handweavers in Kilmacanoge and Fishers of Newtownmountkennedy are other retailers of note. Key retail development areas have been identified by DLRCC and include Woodbrook/Shanganagh, Kiltiernan and Old Conna.

Film

Wicklow is an important centre for film making, based largely on the presence of Ardmore Studios in Bray and Ashford Studios located on the outskirts of the town of Ashford. The film industry contributes significantly to direct and indirect employment and contributes to the international image of the county.

Maritime

Bray Harbour and Greystones Marina provide key infrastructure for the maritime industry within the study area.

Information and communications technology (ICT)

The ICT sector forms the second largest industrial group in Wicklow.

With Ireland being a technology hub of choice for many when it comes to attracting the strategic business activities of ICT companies, significant opportunities exist to develop this sector further within County Wicklow.

Residential commercial developments

Residential commercial developments have a significant function within the N11/M11 Scheme study area as a tourist destination. In 2016 Wicklow received over 270,000 overseas and over 325,000 domestic visitors.¹⁶

Some key residential commercial facilities in the study area include:

- The Martello Hotel (Bray);
- Esplanade Hotel (Bray);
- Druids Glen Hotel and Golf Resort;
- Glenview Hotel (Delgany); and
- Parkview Hotel (Newtownmountkennedy).

Medical and emergency facilities

The towns of the N11/M11 Scheme study area rely heavily on the medical and emergency facilities provided in the GDA and only smaller scale medical centres operate within each town.

Educational facilities

Similar to medical and emergency facilities, the N11/M11 Scheme study area also relies on the GDA for the provision of significant higher level educational facilities that contribute to the commercial sector. Educational facilities of note within the N11/M11 Scheme study area include:

- Bray Institute of Further Education;
- Woodbrook College; and
- Woodlands Academy (Private School).

In addition to the above higher level educational facilities, local areas within the study area are served by the breakdown of primary and secondary schools in

Table 8.3:

Table 8.3: Local area schools

Local area	Primary schools	Secondary schools
Bray	15	7
Greystones-Delgany	7	2
Kilcoole	1	1
Newtownmountkennedy	1	0

¹⁶ Wicklow County Council (2017) Wicklow Tourism Strategy and Marketing Plan. Available from:

<https://www.wicklow.ie/Portals/0/Documents/Strategy%20Documents/County%20Wicklow%20Tourism%20Strategy%20and%20Marketing%20Plan%202018%20-%202023.pdf>

Within the Kilcoole area lands have been identified and zoned north of the Holy Faith Convent to accommodate a new primary school.

8.3.4 Industrial properties

The industrial sector in Dún Laoghaire-Rathdown and County Wicklow is fed by a skilled workforce. The number of persons educated to third level or higher in Wicklow is slightly higher than the national average.^{12 17}. No specific zoned industrial areas (designated ‘LIW’ within the DLRCC) are present within the N11/M11 Scheme study area. Within the County Wicklow LAP’s, industrial lands are included under lands zoned for employment. Industrial areas of note are located near the existing N11/M11 and along Southern Cross Road (R768).

The main business parks and industrial estates included in the study area include:

- Bray Business Park;
- Southern Cross Business Park, Bray;
- Glencormick Business Park, Kilmacanoge;
- Ballywaltrim Business Park, Bray;
- Kilcoole/Woodstock Business Park, Kilcoole;
- Network Enterprise Park, Kilcoole;
- Newtown Business and Enterprise Park, Newtownmountkennedy;
- Ecologic Datacentre, Newtownmountkennedy; and
- Solus Tower Industrial Park, Bray.

8.3.5 Proposed developments (non-agricultural)

Constraints resulting from proposed developments are detailed in **Section 10** (Land Use & Planning) of **Volume B**.

8.3.6 Utilities and services

Gas Networks Ireland (Bord Gáis) gas supply

Gas Networks Ireland (Bord Gáis) gas supply lines, both transmission and distribution, are widespread throughout the study area as shown on **Figures B8.9** to **B8.14**.

High pressure transmission gas lines are present within the N11/M11 Scheme study area. An Above Ground Installation (AGI) is located at Hollybrook to the east of Junction 7 (Bray South).

A 200mm-ST-40bar transmission main connects with this AGI and travels along

¹⁷ Central Statistics Office (2016) Census of Population 2016 – Profile 10 Education, Skills and the Irish Language. Available from: <https://www.cso.ie/en/releasesandpublications/ep/p-cp10esil/p10esil/tl/> [Accessed: June 2019]

the N11 as far as the Junction 6 (Bray/Fassaroe) area where it branches off and travels briefly along the R918 towards Fassaroe.

The transmission main then continues in a northerly direction through the Glenfield, Old Connaught and Rathmichael townlands until it intersects with the M50 Motorway around M50 Junction 16. From this point, the transmission main follows the M50 northbound before exiting the N11/M11 Scheme study area in the Carrickmines area. A 300mm-ST-70bar transmission main travels south from the Hollybrook AGI. The main follows the existing N11/M11 road southwards as far as Kilmacanoge where it then deviates from the N11 and continues to the east before crossing the N11 again in the Kilmurray vicinity. The main carries on in a southerly direction to the west of the N11 before re-joining the N11 in the Kilpedder area. The main then follows the N11 as far as Killadreenan to the south of Newtownmountkennedy before again branching to the east of the N11 towards the R671 and on to the south of the N11/M11 Scheme study area.

Most of the significant residential areas within the N11/M11 Scheme study area, including Shankill, Bray, Kilmacanoge, Greystones, Kilcoole and Newtownmountkennedy, are serviced by Gas Network Ireland (Bord Gáis) distribution mains. The distribution gas mains vary both in size and pressure from 32 PE-80 4bar up to 315 PE-80 4bar. These distribution mains branch off the transmission mains to service the residential areas. The distribution gas mains typically follow local road layouts and housing estate patterns within the residential areas.

Irish Water (Water Supply and Foul Sewer Infrastructure)

There is a vast network of water supply infrastructure and foul sewer infrastructure within the N11/M11 Scheme study area as shown on **Figures B8.15 to B8.20**.

The water supply mains can be broken down further into ‘trunk mains’ and ‘distribution mains’. The larger trunk mains vary in size from 100mm to 838.2mm diameter. An 838.2mm diameter trunk main extends almost the full length of the N11/M11 Scheme study area. The main extends north from Callowhill in the southwest of the study area to Newtownmountkennedy, from where it then generally follows the N11 northwards through Kilpedder, the Glen of the Downs and Kilmacanoge. From this point it then veers west towards Enniskerry and northwards again through Fassaroe, Rathmichael and Carrickmines. 600mm diameter trunk mains are also located alongside most of the existing N11/M11. Numerous other trunk mains, ranging in diameter, are responsible for the supply of water to the main residential areas within the study area. Distribution mains branch off the trunk mains and these water mains generally follow the existing road network and housing patterns within the main residential areas.

The extent of foul sewer infrastructure is largely contained within the extents of the main residential areas. The foul sewer networks are made up of both gravity foul sewers and pumped/pressurised foul sewers with the larger sewers varying in size from 100mm diameter to 2.5m x 2.5m box pipes.

Other Irish Water assets of note, distributed within the N11/M11 Scheme study area, include:

- 12 reservoirs of varying size;
- 11 water pump stations;
- 7 wastewater treatment plants; and
- 21 sewer pump stations.

Stormwater drainage

Both Dún Laoghaire-Rathdown County Council and Wicklow County Council in conjunction with Irish Water are responsible for the management of stormwater drainage infrastructure within the N11/M11 Scheme study area.

Stormwater drainage pipes typically follow road, residential and industrial layouts. Stormwater pipes include both circular and rectangular pipes. Sizes range from 150mm diameter pipes to significant box culvert structures.

Locations of stormwater drainage are presented in **Figures B8.21 to B8.26**.

Information regarding stormwater infrastructure within the study area was issued by Wicklow County Council in pdf format. This information has been reviewed by the design team.

ESB/ESBI electricity supply

ESB Networks provide electricity supply connections throughout the study area as shown on **Figures B8.27 to B8.32**. There are significant high voltage underground lines and high voltage overhead lines of 38kV and 110kV present throughout the study area. These would be considered significant constraints in the development of scheme options as the diversion of high voltage electrical cables poses major difficulties and should be avoided where possible. The HV lines can typically be found on the outskirts of the urban towns and provide links between these towns. Medium and low voltage cables are more commonly found within the town centres and residential areas providing power to residences and business premises. However, these do not pose as significant a constraint as the HV lines.

There are 13 electrical substations present in the study area, further details are presented in **Table 8.4** below. Locations of substations can be seen in **Figures B8.27 to B8.32**.

Table 8.4: ESB electrical substations

110kV network substations	Station ID	38kV network substations	Station ID
Carrickmines	649000	Loughlinstown	199000
Cherrywood	499000	Shankill (DART)	557000
Fassaroe	678000	Little Bray	223000
		Carlisle	659000
		Bray	002000
		Boghall Road	969000
		Rathdown	660000
		Greystones	071000

110kV network substations	Station ID	38kV network substations	Station ID
		Kilcoole	498000
		Kilmartin	332000

Eirgrid

Eirgrid have confirmed that they own no assets within the study area and have no plans for future developments that might affect the N11/M11 Scheme.

Eir

Eir provide telecommunications infrastructure throughout the study area, predominantly consisting of telecommunications ducts and telecommunications access/service cabinets. While telecommunications infrastructure is widespread over the length and breadth of the study area, concentrations of infrastructure are apparent in areas of greater population and areas around the larger junctions along the N11/M11. Eir telecommunications infrastructure typically follow road, residential and industrial layouts. Eir infrastructure of note within the study area includes a significant telecommunication exchange in the vicinity of Jameson's Corner, Kilmacanoge, and a number of significant cabinets located again in the vicinity of Jameson's Corner. The need to divert or relocate telecommunications infrastructure isn't typically seen as being overly impactful but in some cases can involve some relatively significant costs. Refer to **Figures B8.33 to B8.38** for further details.

Eir/Openeir (Fibre Optic)

Eir operates a National Core Fibre Network (NCF) and Rural Fibre Network (RF) throughout Ireland. Eir fibre optic cables and fibre cabinets are widespread throughout the N11/M11 study area.

Four fibre optic cable branches of Eir's NCF network converge from the North at a hub in Shankill. Located to the east of the M11, three NCF fibre optic cables run north/south between Shankill and Bray. A branch of the NCF network runs from Bray to Enniskerry and crosses the existing M11 to the north of Fassaroe. Between Bray and Greystones, there are two NCF cable routes running north/south, one of which generally follows the R761. Both converge at a hub in eastern Greystones. Another NCF cable connects hubs in Bray and Kilmacanoge before continuing and exiting the study area along the R760 to the west. A NCF network fibre optic cable continues south from Greystones along the R762 to Delgany before continuing south along the R761 to serve Kilcoole and Newcastle before exiting the study area to the southeast of Coyne's Cross. Another fibre optic cable connects Newtownmountkennedy and Newcastle along the R772 and crosses the existing N11 in the Junction 13 (Newtownmountkennedy/Newcastle) area.

Eir's Rural Fibre network is slightly limited in the north of the N11/M11 study area. An RF cable is located to the north of Junction 4 M11/M50 (City Centre/Dún Laoghaire) running east/west.

In the area between Junction 7 (Bray South) and Junction 9 (Glenview), the RF network is more prominent, and branches are present in the Glencormack,

Kilmacanoge, Templecarrig and northern Greystones areas. Further RF network fibre optic cables exist to the south of Greystones, running along the R774 and on through the Humsbury and Kilpedder areas. Within the southern extents of the N11/M11 study area there are rural fibre routes through Newtownmountkennedy, Kilmurray South, Timore and the Coyne's Cross areas as well as an additional route crossing the existing N11 to the north of Junction 13 (Newtownmountkennedy/Newcastle).

Three/Virgin Media

Virgin Media operates on Three's network. These network ducts and lines are widespread throughout the study area serving all major residential and industrial areas. Refer to **Figures B8.33** and **B8.38** for further details.

Vodafone

Vodafone have confirmed that they own no assets within the study area.

BT

BT has limited infrastructure within the study area. BT's network is generally confined to southern Dún Laoghaire-Rathdown County Council, and limited areas within the eastern extents of the Bray and Greystones townlands. Refer to **Figures B8.33** to **B8.38** for further details.

Aurora (telecom)

Aurora have confirmed that they own no assets within study area and currently have no confirmed plans for future works that may impact the N11/M11 scheme.

ENet

Enet operates fibre optic infrastructure known as the Metropolitan Area Networks (MAN) on behalf of the Irish government. These networks are capable of delivering virtually unlimited bandwidth to 94 towns and cities throughout Ireland. An ENet MAN has been installed in and between the townlands of Newtownmountkennedy and Kilcoole. Fibre optic cables run along the R772 through Newtownmountkennedy. The fibre optics branch off from the R772 and travel towards Kilcoole along Woodstock Road, from where it extends north along the R761 until it meets the R774.

The fibre optic then follows the R774 before terminating at the 'United Caps' packaging plant to the south east of Greystones. Refer to **Figures B8.33** to **B8.38** for further details.

COLT (telecom)

Information regarding COLT telecommunications infrastructure within the study area has been requested from COLT but is yet to be received by the design team.

SIRO (telecom)

Information regarding SIRO telecommunications infrastructure within the study area has been requested from SIRO Broadband and SIRO have confirmed that much of their infrastructure almost exclusively follows ESB infrastructure, so it is highly unlikely that any SIRO assets in the study area are not concurrent with electrical assets.

SIRO Broadband are active within the N11/M11 study area but are not expected to have significant assets within the study area as the company rely on ESB infrastructure to provide service to households.

8.3.7 Waste facilities

Ireland is divided into 3 regions for the purposes of waste management planning, Connaught-Ulster, Eastern-Midlands and Southern. Each region implements a Waste Management Plan which allows for the effective and efficient delivery of waste management services for the region.

The N11/M11 Scheme study area sits within the Eastern–Midlands waste region.

The region is a relatively new region in terms of managing wastes and merges several smaller historical waste regions. The current Eastern-Midlands region waste management plan is the first waste plan to cover the geographical area of the Eastern-Midlands Region.

The region stretches from Dublin in the east to Louth in the north and Wicklow in the south and in total consists of 12 local authorities. The region has appointed Dublin City Council as the regional lead, to act on behalf of the other authorities with responsibility for the successful implementation of the plan.

The region covers 21% of the land mass of the country, with a population of over 2.2 million people. The settlement patterns in the region show that the urban/rural population split is 81% - 19%. The region is dominated by one city, Dublin, which has the largest population and the highest economic activity in the region and nationally.¹⁸ Local authorities within the EMWR are included in **Table 8.5** below:

Table 8.5: Local authorities within EMWR

Waste region	Local authorities
Eastern-Midlands Region	Dublin City Council; Dún Laoghaire-Rathdown County Council; Fingal County Council; South Dublin County Council; Kildare County Council; Louth County Council; Laois County Council; Longford County Council;

¹⁸ Eastern Midlands Waste Region (2015) Eastern-Midlands Region Waste Management Plan 2015–2021. Available from: <http://emwr.ie/emwr-plan/> [Accessed: 21 May 2019]

Waste region	Local authorities
	Meath County Council; Offaly County Council; Westmeath County Council; Wicklow County Council.

The constraints identified in relation to waste management include composting facilities, landfill sites, transfer stations, recycling plants, thermal treatment plants and bring banks.

Composting facilities

There are no licensed composting facilities located within the study area.

The only composting facility operated in close proximity to the N11/M11 Scheme study area is operated by Kings Tree Services Limited in Coolbeg County Wicklow, to the south of the study area. The facility has an authorised capacity of 40,000m³ and has been in operation since 2006^{18 19}.

Landfill sites

There is just one single municipal waste landfill in operation within County Wicklow. The landfill is privately owned and operated by Greenstar at Ballynagran, Coolbeg, Co. Wicklow (Waste Licence W0165-1) and is not open to the public but is used by the waste industry for landfilling municipal waste. This landfill is not located within the study area but in the Junction 18 vicinity to the south of the study area.²⁰

Wicklow County Council formerly operated a landfill at Rampere outside Baltinglass, Co. Wicklow (Waste Licence WW0066-02). This landfill is now closed but Wicklow County Council operates a Recycling Centre at the location of this former landfill. As per the Ballynagran Landfill, the Rampere landfill is also outside of the study area.²⁰

The public may also bring waste for landfilling to an Integrated Waste Management Facility operated by Starrus Eco-Holdings Limited at La Vallee House, Fassaroe (Waste License W0053-03). This is primarily a waste transfer and sorting station dealing with the conditioning and packaging of waste for subsequent transport and further treatment prior to disposal, where municipal waste materials are sorted for recycling and landfilling (Waste Classification D14). This facility is in proximity to Junction 6 (Bray/Fassaroe), to the west of the existing M11, and will need to be given due consideration in the development of scheme options.²¹

¹⁹ Greenking Composting Ltd (2017) 2017 Annual Environmental Report. Available from: http://www.epa.ie/licences/lic_eDMS/090151b28067cc58.pdf [Accessed: May 2019]

²⁰ Wicklow County Council (2019) Landfills. Available from: <https://www.wicklow.ie/Living/Services/Environment/Recycling-Waste-Management/Recycling-Reduction-Reuse/Landfills> [Accessed May 2019]

²¹ EPA Licence Details, Available from: <http://www.epa.ie/terminalfour/waste/waste-view.jsp?regno=W0053-03> [Accessed October 2020]

Legacy landfills

Several Legacy landfills, EPA and Local Authority Licensed, are located within the N11/M11 Scheme study area.

Within the extents of Dún Laoghaire-Rathdown County Council, Bray Landfill (Site ID S22-02625), privately owned by Woodbrook Golf Club, is located within the N11/M11 Scheme study area to the east of Junction 5 R761 (Bray North).

Within the extents of Wicklow County Council, several legacy landfills exist within the study area and these include:

- Fassaroe No.2 (Site ID S22-02639);
- Fassaroe No.3A (Site ID S22-02633);
- Fassaroe No.3B (Site ID S22-02635);
- Fassaroe No.3C (Site ID S22-02637);
- Kilcoole (Site ID S22-02626);
- Newtownmountkennedy (Site ID S22-02646); and
- Kilmullin – private (Site ID S22-02772).

An EPA licensed inert landfill site is located in Kilmurray South (Licence Reg W0048-01). The landfill is located to the west of Quill Road and the site is currently operated by Marrakesh Limited.¹⁸

Waste storage/processing and transfer facilities

The Eastern-Midlands Region contains a total of 24 licensed waste transfer stations. Many of these stations are clustered around the M50 in Dublin. Cullen Excavations operate a waste storage/processing and transfer facility (WFP-WW-13-0003-02) to the east of Ballyronan interchange and it is the only such facility within the study area.¹⁸

Recycling centres

Both Dún Laoghaire-Rathdown and Wicklow County Councils operate Recycling centres providing facilities for residential customers of their jurisdictions to bring and dispose of unwanted household or electrical items free of charge.

Dún Laoghaire-Rathdown County Council operates the following three recycling centres²²:

- Ballyogan Recycling Centre;
- Eden Park Recycling Centre; and
- Shanganagh Recycling Centre.

²² Dún Laoghaire-Rathdown County Council (2019) Recycling Centres. Available from: <https://www.dlrcoco.ie/en/recycling-waste/recycling-centres> [Accessed: May 2019]

Of these three centres, only Shanganagh Recycling Centre (Shanganagh Cemetery Car Park, Shankill, Co. Dublin) is located within the N11/M11 Scheme study area.

Wicklow County Council operates the following five recycling centres²³:

- Bray Recycling Centre;
- Avoca Recycling Centre;
- Rampere Landfill and Recycling Centre;
- Arklow Recycling Centre; and
- Wicklow Recycling Centre.

Of these five centres, only Bray Recycling Centre (Beechwood Close, Boghall Road, Bray) is located within the N11/M11 Scheme study area.

A soil recovery facility is included in the Fassaroe Waste Recovery Facility operated by Roadstone Limited (Licence No W0269-01) located to the west of Junction 6 (Bray/Fassaroe) of the existing N11/M11^{18,24}. The primary class of the facility is R05 which primarily deals with the Recycling/reclamation of other inorganic materials.

Waste electrical and electronic equipment (WEEE)/batteries

Rehab Enterprises operate a WEEE/Batteries facility in the north of the study area within the Loughlinstown/Cherrywood area¹⁸.

Refer to **Figures B8.39** to **B8.44** for further details.

8.4 Summary and conclusions

In conclusion, many differing types of constraints exist within the bounds of the N11/M11 Scheme study area. Significant non-agricultural material asset constraints within the study area include:

- Residential, Industrial, Business and Commercial Properties;
- Lands zoned for future development;
- Tourism and recreational attractions;
- Natural Constraints including The Dargle River and its associated amenities, Sugarloaf Mountain, Glen of the Downs;
- Major utility transmission lines, related infrastructure and hubs;
- Waste Facilities including current and legacy facilities; and
- Existing M50 motorway and N11/M11 road.

²³ Wicklow County Council (2019) Recycling Centres. Available from: <https://www.wicklow.ie/Living/Services/Environment/Recycling-Waste-Management/Recycling-Centres> [Accessed: May 2019]

²⁴ EPA Licence Details, Available from: <http://www.epa.ie/terminalfour/waste/waste-view.jsp?regno=W0269-01>, [Accessed October 2020]

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9 Archaeology, architectural and cultural heritage

9.1 Introduction

This section describes the archaeological, architectural and cultural heritage constraints identified within the study area for the N11/M11 Scheme.

This assessment includes all recorded archaeological, architecture and cultural heritage sites and areas of archaeological or architectural potential within the study area. Archaeology, architectural and cultural heritage constraints are presented on **Figures B9.1 – B9.17**.

Section 9.2 describes the methodologies and sources of information that were used to carry out this study. **Section 9.3** describes the archaeological, architectural and cultural heritage constraints within the study area. A summary is presented in **Section 9.4** and references are listed in **Section 9.5**.

9.2 Methodology and sources of information

This study has been carried out in accordance with a number of guidelines produced by Transport Infrastructure Ireland (TII; formerly the National Roads Authority)^{1 2}.

This constraints study was undertaken as a desktop exercise and the following sources were reviewed to identify archaeological, architectural and cultural heritage constraints:

- Record of Monuments and Places (RMP) for County Dublin and County Wicklow³;
- Sites and Monuments Record (SMR) for County Dublin and County Wicklow⁴;
- Monuments in State Care Database⁵;
- Preservation Orders⁶;
- Register of Historic Monuments⁷;

¹ Transport Infrastructure Ireland (2005) Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes

² Transport Infrastructure Ireland (2005) Guidelines for the Assessment Architectural Heritage Impacts of National Road Schemes

³ Available from: <http://webgis.archaeology.ie/historicenvironment/> [Accessed: April 2019]

⁴ Available from: <http://webgis.archaeology.ie/historicenvironment/> [Accessed: April 2019]

⁵ Available from: <https://www.archaeology.ie/national-monuments/search-by-county> [Accessed: April 2019]

⁶ National Monuments Service (June 2019) Preservation Orders, Available from <https://www.archaeology.ie/sites/default/files/media/publications/po19v1-all-counties.pdf>

⁷ Available from: <http://webgis.archaeology.ie/historicenvironment/>

- Dún Laoghaire–Rathdown County Development Plan 2016 – 2022⁸;
- Wicklow County Development Plan 2016 – 2022⁹;
- Bray Municipal District Local Area Plan 2018 – 2024¹⁰;
- Greystones–Delgany and Kilcoole Local Area Plan 2013 – 2019¹¹;
- Historic Ordnance Survey mapping (1838, 1843, 1906 - 9, 1907 - 9)¹²;
- National Inventory of Architectural Heritage (NIAH): Architectural and Garden Survey, County Dublin and County Wicklow¹³; and
- Excavations Bulletin (1970 - 2018)^{14,15}.

Once all archaeological heritage (RMP/SMR) and built heritage (Protected structures and NIAH structures) sites had been identified during the initial research, the sites were plotted onto a map of the study area (Refer to **Figures B9.1 to B9.17**). In addition, all areas of designed landscapes or demesnes, which can include the site or ruins of a former country house, were identified and mapped (Refer to **Figures B9.1 - B9.17**).

9.2.1 Definitions

National Monuments

A national monument, as recorded on the National Monuments in State Care database, receives statutory protection and is described as the following in **Section 2** of the National Monuments Act 1930, as amended:

“a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto.”

⁸ Dún Laoghaire Rathdown County Council (2016) Dún Laoghaire Rathdown County Development Plan 2016-2022, Available from:

https://www.dlrcoco.ie/sites/default/files/atoms/files/cdp2016_section6.pdf

⁹ Wicklow County Council (2016) Wicklow County Development Plan 2016-2022, Available from: https://www.wicklow.ie/Portals/0/Documents/Planning/Development-Plans-Strategies/National-Regional-County-Plans/Wicklow%20County%20Development%20Plan/Wicklow-County-Development-Plan-2016-2022/Chapter_10_-_Heritage.pdf

¹⁰ Wicklow County Council (2018) Bray Municipal District Local Area Plan, Available from: <https://www.wicklow.ie/Portals/0/Documents/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Bray/Bray-Municipal-District-Local-Area-Plan-2018/WRITTEN%20STATEMENT%20-%20Bray%20Municipal%20District%20Local%20Area%20Plan%202018-2024.pdf>

¹¹ Wicklow County Council (2013) Greystones-Delgany and Kilcoole Local Area Plan 2013-2019, Available from: https://www.wicklow.ie/Portals/0/Documents/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Greystones-Delgany/Greystones-Delgany-Kilcoole-Local-Area-Plan-2013-2019/Adopted_Written_Statement.pdf

¹² Available from: <http://webgis.archaeology.ie/historicenvironment/> [Accessed: April 2019]

¹³ Available from: <http://www.buildingsofireland.ie/> [Accessed: April 2019]

¹⁴ Available from: <https://excavations.ie/> [Accessed: April 2019]

¹⁵ It should be noted that in some instances, summaries are not lodged for excavations and as such the record cannot be considered to be entirely complete.

Preservation Orders

Preservation Orders and/or Temporary Preservation Orders can be assigned to a site or sites that are deemed to be in danger of injury or destruction. These are allocated under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Amendment of the National Monuments Act, 1930. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister of Culture, Heritage and the Gaeltacht.

Record of Monuments and Places

Section 12 (1) of the National Monuments Act 1930, as amended provides that the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for Culture, Heritage and the Gaeltacht) shall establish and maintain a RMP where it is known that such monuments exist. The record comprises a list of monuments and relevant places and supporting mapping showing each monument and relevant place in respect of each county in the State. Sites recorded on the RMP all receive statutory protection under the National Monuments Act 1930, as amended.

Protected Structures

Structures of architectural, cultural, scientific, historical or archaeological interest are protected under the Planning and Development Act, 2000 as amended, where the conditions relating to the protection of the architectural heritage are set out in Part IV of this Act. The Planning and Development Act, 2000 as amended defines a protected structure as:

“(a) a structure, or (b) a specified part of a structure which is included in a Record of Protected Structures (RPS), and, where that record so indicates, includes any specified feature which is in the attendant grounds of the structure and which would not otherwise be included in this definition.

Protection of the structure or part thereof, includes conservation, preservation, and improvement compatible with maintaining its character and interest.”

Buildings recorded in the RPS can include Recorded Monuments, structures listed in the NIAH or buildings deemed to be of architectural, archaeological or artistic importance by the Minister of Culture, Heritage and the Gaeltacht. It is noted that inclusion within the NIAH survey does not afford statutory protection. However, the structure may be added to the RPS by the relevant local authority. As such, these buildings should be considered to be constraints.

Architectural Conservation Areas

An Architectural Conservation Area (ACA) is defined as:

“A place, area, group of structures or townscape, taking account of building lines and heights, that is of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest or that contributes to the appreciation of a protected structure, and whose character it is an objective of a development plan to preserve.”

Chapter 2 of Part 4 of the Planning and Development Act 2000, as amended outlines that all development plans must now include objectives for preserving the character of ACAs. As such ACAs are subject to statutory protection and are a key constraint.

Demesne landscapes

The first edition Ordnance Survey map of Counties Dublin and Wicklow¹⁶ shows the extent of demesne landscapes across the landscape as shaded areas of land. These were established as a naturalised landscaped setting for the large houses of the landed gentry. Later early 20th century OS mapping¹⁷ can also indicate demesne extent, although they are not shaded. Not all demesne landscapes are subject to statutory protection. However, where a demesne exists in association with a protected structure (dependant on the preservation of the landscape), protection can be interpreted as extending to the limits of the curtilage and as such falls within the remit of the Planning and Development Act 2000, as amended.

9.3 Existing environment

The study area is characterised by a rural environment across the majority of the landscape to the west of the existing N11/M11, with suburban settlements such as Shankill, Bray, Greystones and Kilcoole located to the east of the existing road corridor. The rural landscape is mostly utilised for pastoral farming with some forestry also present. There are 215 townlands within or partially within the study area, that are located within 17 parishes and two baronies (Refer to **Table 9.1**). The cultural heritage resource is characterised by numerous recorded monuments from various periods, protected structures and a substantial number of designed landscapes dating to the 19th century.

Table 9.1: Townlands, parishes and baronies located in the study area

County	Barony	Parish	No. of townlands	Townland names
Dublin	Rathdown	Rathmichael	6	Barnaslingan, Shankill, Shanganagh, Glebe, Rathmichael, Ballycorus,

¹⁶ Ordnance Survey Ireland (1843 and 1838) First Edition 6-inch Available from: <http://webgis.archaeology.ie/historicenvironment/> [Accessed: April 2019]

¹⁷ Ordnance Survey Ireland (1906 and 1907-9) 25-inch Edition Available from: <http://webgis.archaeology.ie/historicenvironment/> [Accessed: April 2019]

County	Barony	Parish	No. of townlands	Townland names
Dublin	Rathdown	Kiltiernan	3	Kigstown, Kiltiernan, Ballybetagh
Dublin	Rathdown	Tully	10	Kerrymount, Carrickmines Little, Ballyogan, Brenanstown, Laughanstown, Tiknick, Kingstown, Glenamuck South, Gelnamuck North, Carrickmines Great
Dublin	Rathdown	Killiney	8	Loughlinstown, Cherrywood, Ballybrack, Killiney, Hackettsland, Kilbogget, Loughlinstown Commons
Dublin	Rathdown	Kill	1	Cabinteeley
Wicklow/ Dublin	Rathdown	Oldconnaught	10	Oldconnaught, Phrompstown, Annaghaskin, Ballyman, Aske, Cork Little, Little Bray, Cork Great, Ravenswell, Bray Commons,
Wicklow	Newcastle	Newcastle Upper	31	Keeloge Upper, Kilday, Kilquade, Altidore Demesne, Moneycarroll, Seasonpark, Mountjohn, Kilmacullagh, Callowhill Lower, Glendarragh, Ballinahinch Lower, Ballinahinch Middle, Monalin, Corsillagh, Timmore, Knockadreet, Prespect Lower, Callowhill Upper, Newtownmountkennedy, Prospect Upper, Cooladoyle, Dunranhill, Trudeer, Ballinahinch Upper, Ballygarret, Merepark, Keeloge Lower, Knockfadda, Easthill, Mount Kennedy Demesne, Kilmurry
Wicklow	Newcastle	Rathnew	2	Killoughter, Clonmannan
Wicklow	Rathdown	Kilmacanoge	25	Fasseroe, Kilcrouney, Newtown, Wingfield, Hollybrook, Barchuillia Commons, Kilmacanoge North, Kilmacanoge South, Glencormick South, Glencormick North, Carrigoona Commons East, Carrigoona Commons West, Stilebawn, Ballyorney, Charleville Demesne, Coolakay, Ballybawn Lower, Killough Lower, Glencap Commons Upper, Glencap Commons South, Kilmurry South, Kilmurry North, Killough Lower, Killough Upper, Glebe

County	Barony	Parish	No. of townlands	Townland names
Wicklow	Rathdown	Calary	6	Calary Upper, Calary Lower, Downhill, Carriggower, Ballinashinnagh, Ballinasoostia
Wicklow	Newcastle	Kilcoole	29	Ballynerrin, Kilquade, Altidore Demesne, Drummin East, Ballyhorsey, Tooman, Holywell, Woodlands, Ballygannon, Killickabawn, Cooldross Upper, Bullford, Tinnapark Demesne, Ballydonarea, Seaview, Downs, Knockroe, Kilpedder East, Kilpedder West, Ballyronan, Bromley, Johnstown, Farrankelly, Killinpark, Priestsnewtown, Drummin West, Stilebawn, Kilcoole, Charlesland
Wicklow	Rathdown	Bray	13	Bray, Killarney, Newcourt, Ballynamudagh, Kilruddery Demesne East, Kilruddery Demesne West, Old Court, Kilbride, Ballymorris, Ballywaltrin, Springfield, Giltspur, Kilruddery Deer Park.
Wicklow	Rathdown	Kilgobbin	1	Jamestown
Wicklow	Rathdown	Delgany	15	Paddock, Killincarrig, Kilruddery Deerpark, Delgany, Windgate, Rathdown Lower, Bayyldonagh, Rathdown Upper, Belmont Demesne, Coolnaskeagh, Coolagad, Templecarrig Upper, Templecarrig Lower, Kindlestown Upper, Kindlestown Lower
Wicklow	Newcastle	Killiskey	28	Carrignamuck Lower, Ballyvolan Lower, Ballyvolan Upper, Grange North, Kellystown, Castlegrange, Cullenmore, Barnacoyle Big, Ballyduff Lower, Ballyhenry, Carrowbawn, Tiglin, Courtfoyle, Blackditch, Duran Demesne, Rathmore, Carrignamuck Upper, Newtownboswell, Killiskey, Ballyduff Upper, Grange South, Kilmartin, Barnacoyle Little, Kiltimon, Moorstown, Inchanappa North, Ballybla, Tomcoyle Lower
Wicklow	Rathdown	Powerscourt	8	Cookstown, Tinnehinch, Powerscourt Demesne, Kilgarran, Enniskerry, Knocksink, Killegar, Monastery

County	Barony	Parish	No. of townlands	Townland names
Wicklow	Newcastle	Newcastle Lower	19	Slate, Leabeg Lower, Leamore Upper, Newcastle Middle, Newcastle Lower, Woodstock Demesne, Ballydonarea, Leabeg Upper, Kilmullin, Leamore Lower, Cooldross Lower, Leabeg Middle, Creowen, Ballyphilip, Newcastle Upper, Cooldross Middle, Ballycrone, Ballyloughlin, Killadreenan

9.3.1 Archaeological heritage

A total of 469 archaeological monuments and sites have been recorded within the study area, these are referred to as Archaeological Heritage (AH) sites in this assessment. A full list of these monuments and sites is included in **Appendix B9.1**.

Of these, 14 are National Monuments in State Care and a further five are subject to Preservation Orders, while one is both a National Monument in State Care and subject to a Preservation Order.

Of the remaining 449 recorded monuments, 261 are included within the RMP and are subject to statutory protection. A further 75 monuments are proposed for inclusion in the RMP at the next revision, while these monuments are not subject to statutory protection, they will be added to the RMP in the future and should be considered as constraints.

The remaining 113 monuments are recorded on the SMR and are not subject to statutory protection. These sites primarily consist of archaeological remains that have been identified through archaeological excavation during development and as such have been preserved by record. The SMRs also include 27 redundant records, however, they have been included within the assessment as constraints because in the past sites that have been made redundant, have later been found to be archaeological in nature.

A total of 313 archaeological investigations have been carried out within the study area prior to or during development. The results of many of these investigations have been added to the SMR as archaeological sites, while a large proportion did not reveal anything of archaeological significance. A full list of these investigations is given in **Appendix B9.2**.

9.3.2 Areas of Archaeological Potential

Areas of Archaeological Potential (AAPs) are defined as parts of the landscape that possess the potential to contain archaeological remains due to the presence of topographic features such as rivers, lakes, turloughs, high defendable ground and bog. Rivers and lakes, along with the coastal margins, are a focus for human habitation due to the obvious transport and food resources.

They (along with bogs) also have the potential to preserve organic archaeological deposits or artefacts such as wood or leather, which do not usually survive within the alkaline conditions associated with terrestrial archaeology. Wooden track ways dating to the Bronze Age period and later, have been excavated within bog land throughout Ireland. Rivers and lakes may have also played a role in prehistoric ritual, as significant artefacts from the prehistoric periods and into the early medieval period, are often found within river bed deposits.

All areas of bog/peat, rivers, streams and bodies of water (both fresh and salt water), and their margins, within the study area should be considered as possessing archaeological potential and are therefore considered constraints.

9.3.3 Architectural heritage

A total of 295 structures or groups of structures of architectural heritage significance have been identified within the study area. These are either listed within the RPS (in the Dún Laoghaire–Rathdown County Development Plan 2016 – 2022¹⁸ or in the Wicklow County Development Plan 2016 – 2022¹⁹) or have been identified as part of the architecture survey carried out by the NIAH¹³. The structures are listed in **Appendix B9.3** and have been identified with the prefix of Built Heritage (BH) for the purpose of this study.

All Protected Structures are subject to statutory protection under the Planning and Development Act 2000, as amended. While those buildings which have been recorded by the NIAH but are not Protected Structures are not subject to the same statutory protection, they may be added to the RPS in the future and should therefore be considered as constraints.

There are 16 structures/sites that are included within the RMP and RPS, which are subject to statutory protection under both the National Monuments 1930, as amended and the Planning and Development Act 2000, as amended.

9.3.4 Architectural Conservation Areas (ACAs)

There are six ACAs located within the study area, these are listed in **Appendix B9.3**.

9.3.5 Designed landscapes

A total of 97 designed landscapes have been identified in the study area, with each demesne identified with the prefix DL in this assessment. These are described in **Appendix B9.4**.

¹⁸ Dún Laoghaire Rathdown County Council (2016) Record of Protected Structures/Record of Monuments and Places/ Architectural Conservation Areas, Available from: <https://www.dlrcoco.ie/sites/default/files/atoms/files/appendix4.pdf>

¹⁹ Wicklow County Council (2016) Record of Protected Structures. Available from: https://www.wicklow.ie/Portals/0/Documents/Planning/Conservation%20Built%20Heritage/Protected%20Structures/Record%20of%20Protected%20Structures%20RPS/Appendix_4_-_Record_of_Protected_Structures_0.pdf

The NIAH have carried out a desktop survey of identifiable demesnes within Counties Dublin and Wicklow¹³. In total, 63 of the 88 identified are included within the survey.

9.4 Summary and conclusions

The purpose of this assessment was to analyse the archaeological, architectural and cultural heritage resources within the study area to inform the design of the N11/M11 Scheme. The study area is located within County Dublin and County Wicklow across all or part of 215 townlands. This study has shown that there are a considerable number of cultural heritage assets within the area. The sites and areas listed within **Appendices B9.1 – B9.4** and shown on **Figures B9.1 - B9.17** should be considered as constraints.

The study area is characterised as a rural environment across the majority of the landscape to the west of the existing N11/M11, with suburban settlements such as Shankill, Bray, Greystones and Kilcoole located to the east of the existing road corridor. The rural landscape is mostly utilised for pastoral farming with some forestry also present.

469 archaeological monuments and sites are located across the study area as summarised below:

- 14 of these are National Monuments in State Care (AH 1 – 2, 4 – 15);
- Five are subject to Preservation Orders (AH 16 – 20);
- One is both in State Care and subject to a Preservation Order (AH 3);
- three of these monuments (AH 4, 14 and 16) are also Protected Structures (BH 1, 141 and 178);
- Thirteen Recorded Monuments (AH 34, 53, 64, 74, 87, 151, 172, 178, 195, 267, 268, 345, 431) are also Protected Structures (BH 2, 54, 2, 29, 1, 1, 26, 42, 25, 49, 48, 177, 83); and
- A large number of prehistoric sites, particularly Bronze Age fulachtaí fíá, have been discovered through excavation in advance of development, while early medieval sites including ecclesiastical and associated remains and ringforts and enclosures also feature across the study area.

All recorded archaeological heritage sites (AH sites) should be considered as cultural heritage constraints, whilst National Monuments and sites with Preservation Orders should be considered to be key constraints.

There are a number of Areas of Archaeological Potential (AAPs) within the study area. These consist of the River Dargle and various streams and smaller rivers, small lakes, coastal margins and areas of boggy/marginal land.

All AAPs should be considered as archaeological constraints and avoided where possible by the route options.

Where avoidance is not possible, potential impacts should be minimised through design e.g., the use of clear span structures across water ways.

Analysis of the built heritage within the study area has provided a holistic view of the built heritage resource, with the later years of the post medieval period well-illustrated by the presence of a substantial number of country houses, bridges and churches. Structures that are architecturally and socially important are listed within the Dún Laoghaire–Rathdown County Development Plan 2016 – 2022⁸, Wicklow County Development Plan 2016 – 2022⁹ and NIAH survey for County Dublin and County Wicklow¹³. Protected structures receive statutory protection that helps to ensure their preservation for the future. 294 individual or groups of protected structures and/or NIAH structures are located within the study area. These should be considered as constraints with direct impacts and impacts on setting of the structures avoided where possible.

A total of 97 designed landscapes have been identified within the study area. Some of these still retain their principal building and/or outbuildings, whilst others have been lost over the course of time. Many of the landscapes in and around Shankill and Cherrywood have been largely covered in residential development. Designed landscapes, especially those still connected with a principal protected structure, should be considered as constraints. It should be noted that this has been based on a desktop analysis, and field inspection will be required as part of the Environmental Impact Assessment process to assess the surviving nature and extent of the designed landscapes within the study area.

It is evident that the study area possesses high cultural heritage value due to the number and extent of sites recorded. The settlements of Bray, Enniskerry and Greystones possess a very high number of built heritage assets and should be avoided. The remainder of the study area contains a largely even spread of both archaeological and built heritage assets which should be considered as key constraints and avoided where possible.

9.5 References

Dún Laoghaire Rathdown County Council (2016) Dún Laoghaire Rathdown County Development Plan 2016 - 2022, Available from:
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Dún Laoghaire Rathdown County Council (2016) Record of Protected Structures/Record of Monuments and Places/ Architectural Conservation Areas, Available from:
<https://www.dlrcoco.ie/sites/default/files/atoms/files/appendix4.pdf>

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Wicklow County Council (2018) Bray Municipal District Local Area Plan, Available from:

<https://www.wicklow.ie/Portals/0/Documents/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Bray/Bray-Municipal-District-Local-Area-Plan-2018/WRITTEN%20STATEMENT%20-%20Bray%20Municipal%20District%20Local%20Area%20Plan%202018-2024.pdf>

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Wicklow County Council (2013) Greystones-Delgany and Kilcoole Local Area Plan 2013-2019, Available from:

https://www.wicklow.ie/Portals/0/Documents/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Greystones-Delgany/Greystones-Delgany-Kilcoole-Local-Area-Plan-2013-2019/Adopted_Written_Statement.pdf

Websites:

Excavations Bulletin (1970-2018) Available from: <https://excavations.ie/> [Accessed: April 2019]

Monuments in State Care Database Available from: <https://www.archaeology.ie/national-monuments/search-by-county> [Accessed: April 2019]

National Inventory of Architectural Heritage (NIAH): Architectural and Garden Survey, County Dublin and County Wicklow Available from: <http://www.buildingsofireland.ie/> (Accessed: April 2019)

Record of Monuments and Places (RMP) for County Dublin and County Wicklow Available from: <http://webgis.archaeology.ie/historicenvironment/> [Accessed: April 2019]

Register of Historic Monuments Available from: <http://webgis.archaeology.ie/historicenvironment/> [Accessed: April 2019]

Sites and Monuments Record (SMR) for County Dublin and County Wicklow Available from: <http://webgis.archaeology.ie/historicenvironment/> [Accessed: April 2019]

10 Land use and planning

10.1 Introduction

This section describes the land use and planning constraints identified within the study area for the N11/M11 Scheme.

The focus of this constraints study was to collate existing information regarding existing land uses and planning designations within the study area that will influence options for the N11/M11 Scheme.

10.2 Methodology and sources of information

The methodology for existing land uses and planning involved a desk study of the relevant County Development Plans (CDPs) maps, Local Area Plans (LAPs) maps, google maps and MyPlan.ie maps to ascertain the existing land uses and potential future uses within the study area. This desk study was based on a review of the following sources:

- Dún Laoghaire-Rathdown County Development Plan 2016 - 2022¹;
- Cherrywood SDZ Planning Scheme²;
- Ballyogan and Environs Local Area Plan 2019 - 2025³;
- Kiltiernan Glenamuck Local Area Plan 2018 – 2023⁴;
- Woodbrook-Shanganagh Local Area Plan 2017 - 2023⁵
- Wicklow County Development Plan 2016 – 2022⁶
- Bray Municipal District Local Area Plan 2018 - 2024⁷ (which includes Enniskerry and Kilmacanoge);

¹ Dún Laoghaire-Rathdown County Council (2016) Dún Laoghaire-Rathdown County Development Plan 2016 – 2022. Available from: <https://www.dlrcoco.ie/en/planning/county-development-plan/county-development-plan-2016-2022>

² Cherrywood SDZ Planning Scheme. Available from: <https://www.dlrcoco.ie/en/planning/cherrywood-sdz>

³ Ballyogan and Environs Local Area Plan 2019-2025. Available from: <https://www.dlrcoco.ie/en/planning/local-area-plans/ballyogan-environs-local-area-plan>

⁴ Kiltiernan Glenamuck Local Area Plan 2018 – 2023. Available from <https://www.dlrcoco.ie/en/planning/local-area-plans/kiltiernan-local-area-plan>.

⁵ Woodbrook-Shanganagh Local Area Plan 2017-2023. Available from: <https://www.dlrcoco.ie/en/planning/local-area-plans/woodbrook-shanganagh-lap-2017-2023>

⁶ Wicklow County Council (2016) Wicklow County Development Plan 2016 – 2022. Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/National-Regional-County-Plans/Wicklow-County-Development-Plan/Wicklow-County-Development-Plan-2016-2022>

⁷ Bray Municipal District Local Area Plan 2018 – 2024: Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Bray/Bray-Municipal-District-Local-Area-Plan-2018-2024>

- Greystones-Delgany & Kilcoole Local Area Plan 2013 – 2019⁸;
- Newtownmountkennedy Local Area Plan 2008 - 2018⁹;
- Google Maps¹⁰;
- MyPlan.ie¹¹.

Note that all the Local Area Plans in Wicklow County Council listed above are valid at the time of writing. They will only be reconsidered after the review of the County Development Plan, which commenced in 2021, and is unlikely to be adopted until 2023.

10.3 Existing land use and planning

10.3.1 Dún Laoghaire-Rathdown County Development Plan 2016 - 2022

Zoning objectives

The road corridor within the Dún Laoghaire Rathdown County Council functional area has no specific zoning.

The following zoning objectives immediately adjoin the existing road corridor¹:

- A: To protect and-or improve residential amenity.
- A1: To provide for new residential communities in accordance with approved Local Area Plans.
- E: To provide for economic development and employment.
- F: To preserve and provide for open space with ancillary active recreational amenities.
- GB: To protect and enhance the open nature of lands between urban areas.
- MH: To improve, encourage and facilitate the provision and expansion of medical-hospital uses and services.
- NC: To protect, provide for and-or improve mixed-use neighbourhood centre facilities.

The following zoning objectives are within the study area¹:

⁸ Greystones-Delgany & Kilcoole Local Area Plan 2013 – 2019. Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Greystones-Delgany/Greystones-Delgany-Kilcoole-Local-Area-Plan-2013-2019>

⁹ Newtownmountkennedy Local Area Plan 2008 – 2018. Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Newtownmountkennedy/Newtownmountkennedy-Local-Area-Plan-2008-2018>

¹⁰ Google Maps (2019) Map view and aerial view. Available from: www.google.ie/maps

¹¹ MyPlan.ie (2019) Map view (Dept of Housing, Planning, Community & Local Government). Available from: <https://viewer.myplan.ie/>

- G: To protect and improve high amenity areas.
- MTC: To protect, provide for and-or improve major town centre facilities.

Roads are not specifically referred to in the Development Plan as a use which is “permitted in principle, “open for consideration” or “not permitted”. However, the Development Plan does state the following:

“Other Uses not specifically mentioned throughout the Use Tables will be considered on a case-by-case basis in relation to the general policies of the Plan and to the zoning objectives for the area in question.”

In this regard, encroachment for a new road into the F zone (Open Space) and the G zone (High Amenity Areas) would be best avoided.

Policy LHB4 is particularly relevant to the G zone:

- *Policy LHB4: High Amenity Zones - It is Council policy to conserve and enhance existing High Amenity zones and to seek to manage these and other areas to absorb further recreational uses and activity without damaging the amenities that affords them their special character.*

Landscape Character

Appendix 7 of the Dún Laoghaire-Rathdown County Development Plan identifies that there are 14 Landscape Character Areas (LCA) within the administrative area of Dún Laoghaire-Rathdown. The study area includes parts of 7 LCAs (as listed in 10.3.1 above), including sensitive locations within each LCA. There is one policy (LHB2) that relates to all 14 LCAs:

- *Policy LHB2: Preservation of Landscape Character Areas - It is Council policy to continue to preserve and enhance the character of the County’s landscapes in accordance with the recommended strategies as originally outlined in the Landscape Character Assessment...*

There is one policy (LHB5) that relates to LCAs that have areas with strategies to respect historic landscape character value:

- *Policy LHB5: Historic Landscape Character Areas - In assessing development proposals and in the preparation of plans it is Council policy to have regard to the recommendations and findings of the Historic Landscape Character Assessments (HLCA) already undertaken for a number of the urban-rural fringe areas of the County most likely to come under development pressure.*

Protected Views and Prospects

Policy LHB6 relates to protected views and prospects and states:

- *Policy LHB6: Views and Prospects - It is Council policy to protect and encourage the enjoyment of views and prospects of special amenity value or special interests.*

As outlined in **Section 16** (Landscape and Visual) of **Volume B**, the following four views and prospects occur within the study area:

- *Carrickgollogan from Bray Road (Shankill to Bray area)*
- *Carrickgollogan from Ballyman Road*
- *Carrickgollogan from the Enniskerry Road (south of Kiltiernan Village)*
- *The Scalp from Ballyman Road and part of the Enniskerry Road*

‘To preserve Views’ is applied where the objective is to protect views from a certain location; and ‘To preserve Prospects’ is where views towards a certain feature are to be protected. These locations from the Development Plan Maps (DPMs) are indicated in **Figures B16.3 - B16.8**.

Protected trees

Trees and woodlands identified for protection are also indicated on the DPMs. Trees and woodlands that occur within the study area are indicated on **Figures B16.9 - B16.14**.

Public Rights of Way and Recreation Access Routes

Public Rights of Way and Recreation Access Routes are listed in Appendix 8 of the DRLCDP and are shown on the DLRCDDP DPMs. The Public Rights of Way that occur within the study area are indicated on **Figures B16.27 - B16.32** and are outlined in **Section 16** (Landscape and Visual) of **Volume B**.

The Recreation Walking Routes that occur within the study area are indicated on **Figures B16.27 - B16.32** and are outlined in **Section 16** (Landscape and Visual) of **Volume B**.

Environmental designations

Policy LHB22 in relation to Designated Sites states that:

“It is Council policy to protect and preserve areas designated as proposed Natural Heritage Areas, candidate Special Areas of Conservation, and Special Protection Areas. It is Council policy to promote the maintenance and as appropriate, delivery of ‘favourable’ conservation status of habitats and species within these areas.”

These sites are outlined in **Table 12.1** in **Section 12** (Biodiversity) of **Volume B**, and their locations are shown on **Figures B12.1 to B12.6**.

10.3.2 Ballyogan and Environs Local Area Plan 2019 - 2022

A Local Area Plan (LAP) for Ballyogan and Environs³, an area that covers Ballyogan, Kilgobbin, The Gallops/Glencairn (Leopardstown) and parts of Carrickmines and Stepside was adopted by Dún Laoghaire Rathdown County Council in July 2019.

It is principally located to the west of the M50, in the north western quadrant of the study area.

The Local Area Plan is divided into 5 development “quarters”. The Carrickmines Quarter is located with the study area, the vision for which is:

“...the delivery of a Neighbourhood Centre for the northeast Quadrant of The Park Carrickmines, while securing the overall primary use of these lands for Employment. Pedestrian and cyclist links through this Quarter and to adjacent areas will be improved. Further infill residential development of sites within this Quarter will be facilitated while ensuring successful integration with existing development.”

It is considered that the proposed N11/M11 Scheme will not inhibit the development of these lands.

10.3.3 Cherrywood SDZ Planning Scheme

The Strategic Development Zone lands, of approximately 360 hectares are the largest undeveloped land bank in Dún Laoghaire-Rathdown County Council and one of the most sizable undeveloped areas within the Dublin Metropolitan Area. The lands are located approximately 16km south east from Dublin City Centre, 8km south of Dún Laoghaire, 3km from the coastline, and 4km from the Dublin Mountains, and are generally located west of the N11, and east of the M50.

The limited extent of lands adjoining the N11 corridor are designated as Development Area 4, Development Area 5, and Development Area 6 A. It is considered that the proposed N11/M11 Scheme will not inhibit the development of these lands.

10.3.4 Kiltiernan Glenamuck Local Area Plan 2018 – 2023

The Kiltiernan Glenamuck Local Area Plan⁴ was adopted in September 2013. In June 2018 it was extended for a further period up to and including September 2023.

It is mainly on the western edge of the study area. Given the distance from the existing N11 road corridor it is considered that the proposed N11/M11 Scheme will not inhibit the development of these lands.

10.3.5 Woodbrook-Shanganagh Local Area Plan 2017 - 2023

The Woodbrook-Shanganagh Local Area Plan 2017 - 2023⁵ was adopted by the Council in July 2017. The Local Area Plan relates to lands between the M11 and the coast, south of Shankill, north of Bray. The lands are zoned:

- A: To protect and-or improve residential amenity.
- A1: To provide for new residential communities in accordance with approved Local Area Plans.
- F: To preserve and provide for open space with ancillary active recreational amenities.
- GB: To protect and enhance the open nature of lands between urban areas.

The lands immediately adjoining the M11 corridor are zoned GB. It is considered that the proposed N11/M11 Scheme will not inhibit the objectives of these zoned lands.

10.3.6 Wicklow County Development Plan 2016 – 2022

The Wicklow County Development Plan⁶ does not include county wide zoning objectives. There are, however, a number of landscape and ecological constraints that are relevant to the N11/M11 Scheme.

Landscape Character

A Landscape Assessment is incorporated within Appendix 5 of the Wicklow County Development Plan 2016 – 2022 (WCDP), which divides the county into 6 Landscape Categories. The Landscape Categories within the study area have been mapped on **Figures B16.15 - B16.20** and are listed in **Table 16.2** in **Section 16** (Landscape and Visual) of **Volume B**, along with their respective Vulnerability ranking (extracted from Table 1.5 in the Landscape Assessment of the WCDP).

There are a number of objectives relating to landscape outlined in Chapter 10 of the WCDP, some of which are relevant including:

- *NH49 - All development proposals shall have regard to the County landscape classification hierarchy in particular the key landscape features and characteristics identified in the Wicklow Landscape Assessment (set in Volume 3 of this plan) and the 'Key Development Considerations' set out for each landscape area set out in Section 5 of the Wicklow Landscape Assessment.*
- *NH50 - Any application for permission in the AONB which may have the potential to significantly adversely impact the landscape area shall be accompanied by a Landscape/Visual Impact Assessment, which shall include, inter alia, an evaluation of visibility and prominence of the proposed development in its immediate environs and in the wider landscape, a series of photos or photomontages of the site/development from clearly identified vantage points, an evaluation of impacts on any listed views/prospects and an assessment of vegetation/land cover type in the area (with particular regard to commercial forestry plantations which may be felled thus altering character/visibility). The Assessment shall demonstrate that landscape impacts have been anticipated and avoided to a level consistent with the sensitivity of the landscape and the nature of the designation.*

Protected Scenic Routes, Views and Prospects

There are 48 designated 'Views of Special Amenity value or Special Interest' and 66 designated 'Prospects of Special Amenity value or Special Interest' listed in Chapter 10 of the WCDP⁶.

The 'Views of Special Amenity Value or Special Interest' and the 'Prospects of Special Amenity value or Special Interest' that occur within the study area have been mapped on **Figures B16.3 - B16.8**. 'Views of Special Amenity Value or

Special Interest’ within the study area are listed in **Table 16.3** in **Section 16** (Landscape and Visual) of **Volume B**.

‘Prospects of Special Amenity value or Special Interest’ within the study area are listed in **Table 16.4** in **Section 16** (Landscape and Visual) of **Volume B**.

One objective (NH52) relating to views and prospects is relevant:

- *NH52 - To protect listed views and prospects from development that would either obstruct the view/prospect from the identified vantage point or form an obtrusive or incongruous feature in that view/prospect. Due regard will be paid in assessing development applications to the span and scope of the view/prospect and the location of the development within that view/prospect.*

Protected trees

The existing Tree Protection Orders (TPOs) in County Wicklow are set out in Schedule 10.08 and Maps 10.08 A, B and C of the WCDP⁶. The TPOs that occur within the study area are indicated on **Figures B16.9 - B16.14** and detailed in **Table 16.5** in **Section 16** Landscape and Visual:

There are six objectives relating to protected woodland, trees and hedgerows in County Wicklow listed in Chapter 10:

- *NH14 To promote the preservation of trees, groups of trees or woodlands in particular native tree species, and those trees associated with demesne planting, in the interest of amenity or the environmental, as set out in Schedule 10.08 and Map 10.08 A, B & C of this plan.*
- *NH15 To consider the making of Tree Preservation Orders (TPOs) to protect trees and woodlands of high value, where it appears that they are in danger of being felled.*
- *NH16 Development that requires the felling of mature trees of environmental and/or amenity value, even though they may not have a TPO in place, will be discouraged.*
- *NH17 To discourage the felling of mature trees to facilitate development and encourage tree surgery rather than felling where possible.*
- *NH18 To encourage the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees, as part of the development management process, and require the planting of native, and appropriate local characteristic species, in all new developments.*
- *NH19 To encourage the retention, wherever possible, of hedgerows and other distinctive boundary treatment in the County.*

Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, provision of the same type of boundary will be required of similar length and set back within the site in advance of the commencement of construction works on the site (unless otherwise agreed by the Planning Authority).

Biodiversity objectives

The following objectives are relevant in relation to biodiversity:

“NH1 To ensure that the impact of new developments on biodiversity is minimised and to require measures for the protection and enhancement of biodiversity in all proposals for large developments.

NH2 No projects giving rise to significant cumulative, direct, indirect or secondary impacts on Natura 2000 sites arising from their size or scale, landtake, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this plan (either individually or in combination with other plans or projects).

NH3 To contribute, as appropriate, towards the protection of designated ecological sites including candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs); Wildlife Sites (including proposed Natural Heritage Areas); Salmonid Waters; Flora Protection Order sites; Wildfowl Sanctuaries (see S.I. 192 of 1979); Freshwater Pearl Mussel catchments; and Tree Preservation Orders (TPOs). To contribute towards compliance with relevant EU Environmental Directives and applicable National Legislation, Policies, Plans and Guidelines, including the following and any updated/superseding documents:

- *EU Directives, including the Habitats Directive (92/43/EEC, as amended)7, the Birds Directive (2009/147/EC)8, the Environmental Liability Directive (2004/35/EC)9, the Environmental Impact Assessment Directive (85/337/EEC, as amended), the Water Framework Directive (2000/60/EC) and the Strategic Environmental Assessment Directive (2001/42/EC).*
- *National legislation, including the Wildlife Act 1976, the European Communities (Environmental Impact Assessment) Regulations 1989 (SI No. 349 of 1989) (as amended), the Wildlife (Amendment) Act 2000, the European Union (Water Policy) Regulations 2003 (as amended), the Planning and Development Act 2000 (as amended), the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477 of 2011) and the European Communities (Environmental Liability) Regulations 200811.*
- *National policy guidelines (including any clarifying Circulars or superseding versions of same), including the Landscape and Landscape Assessment Draft Guidelines 2000, the Environmental Impact Assessment Sub-Threshold Development Guidelines 2003, Strategic Environmental Assessment Guidelines 2004 and the Appropriate Assessment Guidance 2010.*
- *Catchment and water resource management Plans, including Eastern and South Eastern River Basin Management Plan 2009 - 2015 (including any superseding versions of same).*
- *Biodiversity Plans and guidelines, including Actions for Biodiversity 2011 - 2016: Ireland’s 2nd National Biodiversity Plan (including any superseding version of same).*

- *Ireland’s Environment 2014 (EPA, 2014, including any superseding versions of same), and to make provision where appropriate to address the report’s goals and challenges.*

NH5 To maintain the conservation value of all proposed and future Natural Heritage Areas (NHAs) and to protect other designated ecological sites in Wicklow.”

The constraints in relation to biodiversity are fully outlined in **Section 12** (Biodiversity) of **Volume B**.

10.3.7 Bray Municipal District Local Area Plan 2018 - 2024

Zoning objectives

The Bray Municipal District Local Area Plan was adopted by Wicklow County Council to provide a land use framework to guide the future sustainable development of the Bray Municipal District, which includes the settlements of Bray, Enniskerry and Kilmacanoge.

Lands immediately adjoining the M11 corridor in the Bray area are almost exclusively zoned OS 2: Open Space - to protect and enhance existing open, undeveloped lands.

The Local Area Plan states:

“Lands identified as OS2 generally comprise open, undeveloped lands encompassing flood plains, buffer zones along watercourses, rivers and Natura 2000 sites, steep banks, green breaks between built up areas, green corridors and areas of natural biodiversity. These lands are generally not considered suitable for new development....”

Other zoning objectives within the study area are:

RE: Existing Residential: To protect, provide and improve residential amenities of existing residential areas

R-HD: New Residential – High Density: To protect, provide and improve residential amenities in a high density format.

R20: New residential: To protect, provide and improve residential amenities at a density up to 20 units/ha.

R15: New residential Low Density: To protect, provide and improve residential amenities at a lower density not exceeding 15 units/ha.

R10: New residential Rural Fringe: To protect, provide and improve residential amenities at a lower density not exceeding 10 units/ha.

R Special: Special Residential: To protect, provide and improve residential amenities in a format and a density specified in the relevant plan.

TC: Town Centre: To provide for the development and improvement of appropriate town centre uses including retail, commercial, office and civic use, and to provide for ‘Living Over the Shop’ residential accommodation, or other ancillary residential accommodation.

NC: Neighbourhood Centre: To protect, provide for, and improve a mix of neighbourhood centre services and facilities, which provide for the day-to-day needs of the local community.

LSS: Local Shops & Services: To provide for small scale local neighbourhood shops and service:

MU: Mixed Use: To provide for mixed use.

E1: Employment: To provide for the development of enterprise and employment.

E3: Retail Warehousing: To provide for enterprise and employment development in the form of retail warehousing development.

E-Special: Employment: To provide for the development of enterprise and employment at Kilruddery.

FI: Film Industry: To provide for film/TV production related development.

GTH: Bray Gateway & Transport Hub To provide for the development and improvement of appropriate gateway and transport hub use.

CE: Community & Education: To provide for civic, community and educational facilities.

AOS: Active Open Space.

OS1: Open Space: To protect and enhance existing and provide for recreational open space.

PU: Public Utility: To maintain lands providing services infrastructure.

SF: Bray Seafront: To provide for the development and improvement of appropriate seafront use.

T: Tourism: To provide for tourism related development.

KD: Kilruddery: Demesne Conservation & Tourism Zone.

PDZ: Primary Development Zone.

SDZ: Secondary Development Zone.

TDZ: Tertiary Development Zone.

Transport Objectives

Map TO1: Transport Objectives Map indicates a “M11/N11 Improvements” area along the N11/M11 corridor.¹²

Policy RO2 states:

“To support improvements to the national road by reserving corridors, as and when these are identified, of any proposed road improvements or new road construction free of development, which would interfere with the provision of such proposals. In particular, to reserve corridors along all potential route improvements/new routes identified in the 2017 Transport Infrastructure Ireland M11/N11 Corridor Study.”

The N11/M11 Scheme will not inhibit the delivery of the Bray Municipal District Local Area Plan.

10.3.8 Greystones-Delgany & Kilcoole Local Area Plan 2013 – 2019

This Local Area Plan⁸ provides a framework for the planned, co-ordinated and sustainable development of Greystones-Delgany and Kilcoole. While this plan provides for the development of the plan area for a six-year period between 2013 and 2019, it is framed within the nine year period up to 2022.

The functional area for the Local Area Plan is east of the N11/M11 corridor, west of the coast.

The zoning objectives immediately adjoining the N11/M11 scheme are:

AG/GB: Agriculture/Greenbelt: To generally protect the open nature and landscape quality of lands, to protect and enhance local biodiversity, and to maintain the primary use of the land for agricultural purposes.

R2.5: Residential To provide for the development of sustainable residential communities up to a maximum density of 2.5 units per hectare and to preserve and protect residential amenity.

Other zoning objectives within the study area are:

RE: Existing Residential To protect, provide for and improve residential amenities of adjoining properties and areas while allowing for infill residential development that reflects the established character of the area in which it is located.

R22: Residential To provide for the development of sustainable residential communities up to a maximum density of 22 units per hectare and to preserve and protect residential amenity.

12 <https://www.wicklow.ie/Portals/0/Documents/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Bray/Bray-Municipal-District-Local-Area-Plan-2018/Bray%20MD%20LAP%202018-%20TO1.%20Transport%20Objectives%20Map.pdf>

R17: Residential: To provide for the development of sustainable residential communities up to a maximum density of 17 units per hectare and to preserve and protect residential amenity.

R15: Residential: To provide for the development of sustainable residential communities up to a maximum density of 15 units per hectare and to preserve and protect residential amenity.

R10: Residential: To provide for the development of sustainable residential communities up to a maximum density of 10 units per hectare and to preserve and protect residential amenity.

R5: Residential: To provide for the development of sustainable residential communities up to a maximum density of 5 units per hectare and to preserve and protect residential amenity.

Special R: Special Residential (A, B and C): To provide for the development of a limited amount of residential development on lands where there are exceptions to the standard residential objectives of the plan.

The amount of units permitted on Special Residential Zones shall be in accordance with the objectives set out in ‘Section 3: Population and Housing’ of this plan.

TC: Town Centre: To protect, provide for, and improve the development of a mix of town centre uses including retail, commercial, office and civic use, and to provide for ‘Living Over the Shop’ residential accommodation, or other ancillary residential accommodation. To consolidate and facilitate the development of the central area, and to identify, reinforce, strengthen and promote urban design concepts and linkages between town centre activity areas.

VC: Village Centre: To protect, provide for, and improve a mix of village centre services and facilities, which provide for the day-to-day needs of the local community.

NC: Neighbourhood Centre: To protect, provide for, and improve a mix of neighbourhood centre services and facilities, which provide for the day-to-day needs of the local community. Greystones – Delgany and Kilcoole Local Area Plan 2013 - 2019 56

SLC: Small Local Centre: To protect, provide for, and improve a mix of neighbourhood centre services and facilities (between approximately three and five retail/retail service units), excluding supermarkets or premises with a gross floor area greater than approximately 150m².

E: Employment: To provide for economic development, enterprise, industry, distribution, warehousing and employment with the exception of lands zoned E in Killincarrig townland, where retail warehousing shall not be permitted.

E1: Employment: To provide for a mix of employment creating development, in accordance with objective EMP4 for this area.

E2 Option Zoning: Senior Clinical Healthcare Centre and Hotel: To provide for the development of a senior clinical healthcare centre and hotel.

CE: Community and Education: To provide for civic, community, institutional, health, educational facilities and burial grounds.

OS: Open Space: To preserve, provide for and improve public and private open space for recreational amenity and passive open space.

AOS: Active Open Space: To provide for active recreational open space.

AT: Agri-Tourism: To protect and provide for agri-tourism uses at Glenroe Open Farm.

T: Tourism: To provide for the development of an Integrated Tourism/Leisure/Recreational Complex at Druids Glen Golf Club, Woodstock Demesne.

MU: Mixed Use: To provide for the development of a mixed use area, in accordance with objective RES15 for this area, and subject to the agreement of a Master Plan.

PU: Public Utility: To provide for the development of public utilities and services, including all service installations necessarily required by electricity, gas, telephone, radio, television, drainage, water services and other statutory undertakers.

SLB: Strategic Land Bank: To provide a strategic land bank for future phases of development of the settlement after the lifetime of this plan.

It is considered that the N11/M11 scheme will not inhibit the realisation of any of these zoning objectives.

10.3.9 Newtownmountkennedy Local Area Plan 2008 - 2018

The Newtownmountkennedy Local Area Plan 2008 – 2018⁹ is the functional Local Area Plan for the town until after the review of the Wicklow County Council Development Plan 2016 - 2022⁶.

The Plan covers areas both to the east and west of the existing N11 corridor. The zoning objectives immediately adjoining the corridor are:

AG: To protect and provide for agriculture and amenity in a manner that protects the physical and visual amenity of the area and demarcates the urban and rural boundary.

AG*: To provide for agricultural uses with an option for the life of the County Development Plan 2004 - 2010 to provide for a business, office, science and technology park set in open parkland with extensive landscaping, a high architectural standard of layout and building design with low site coverage.

F: Forestry To protect and provide for forestry uses, including structures utilised by Coillte and associated forestry bodies, and to provide for amenity and nature areas/walks.

RE: Residential Existing residential: To protect, provide and improve residential amenities of adjoining properties and areas while allowing for infill residential development that reflects the established character of the area in which it is located.

MU: Mixed use: To provide for the development of mixed use areas in accordance with the policies and objectives set out for that land in the plan, including retail, commercial, office and civic use.

Other zoning objectives within the study area are:

R1: New residential: To protect, provide and improve residential amenities.

R2: Residential: Low-medium density: To protect, provide and improve residential amenities at low to medium densities of 10/ha max.

R3: Residential High Density Potential To protect, provide and improve residential amenities while allowing for increased residential densities in accordance with the standards set out in the residential density guidelines.

TC: Town Centre: To provide for the development and improvement of appropriate town centre uses including retail, commercial, office and civic use, and to provide for ‘Living Over the Shop’ residential accommodation, or other ancillary residential accommodation. To consolidate and facilitate the development of the central area, and to identify, reinforce, strengthen and promote urban design concepts and linkages between town centre activity areas.

E: Employment: To provide for economic development, enterprise, industry, distribution, warehousing and employment.

CE: Community & Education: To provide for civic, community and educational facilities. **OS: Open Space & Amenity** To preserve, provide and improve recreational amenity and passive open space.

AOS: Active Open Space & Amenity: To provide for active recreational open space

PU: Public utility: To protect and provide for public services. "Public Services" include all service installations necessarily required by electricity, gas, telephone, radio, television, drainage and other statutory undertakers

ITLR: Integrated Tourism, Leisure and Recreational Uses.

It is considered that the N11/M11 scheme will not inhibit the realisation of any of these zoning objectives.

10.4 Proposed and planned developments

The project team has been reviewing extant planning permissions and existing planning applications¹³ within the study area as part of the constraints gathering exercise.

All extant planning permissions and planning applications have been accessed in terms of their potential impact on the N11/M11 Scheme. These planning permissions are presented in **Figures B10.1 to B10.6**. The impact of each of these permissions and applications will be addressed in full when the options have been identified.

10.5 Summary and conclusions

The N11/M11 Scheme has been accessed in terms of impact on land use and planning with regards to the various Development Plans and Local Area Plans within the study area.

In general, the N11/M11 Scheme will not inhibit the realisation of the various land use objectives within the road corridor or the adjoining study area.

However, in Dún Laoghaire-Rathdown, a new road in the F zone (Open Space) and the G zone (High Amenity Areas) are considered a constraint and are best avoided.

There are a number of landscape and environmental/biodiversity designations in both Dun Laoghaire Rathdown County Council and Wicklow County Council Development Plans, with various degrees of sensitivity, detailed in **Section 12** (Biodiversity) of **Volume B** and **Section 16** (Landscape and Visual) of **Volume B**.

Any potential development within these areas will have to be carefully considered.

10.6 References

Dún Laoghaire-Rathdown County Council (2019). Ballyogan and Environs Local Area Plan 2019 - 2025. Available from: <https://www.dlrcoco.ie/en/planning/local-area-plans/ballyogan-environs-local-area-plan>

Dún Laoghaire-Rathdown County Council (2018). Cherrywood SDZ Planning Scheme. Available from: <https://www.dlrcoco.ie/en/planning/cherrywood-sdz>

Dún Laoghaire-Rathdown County Council (2016). Dún Laoghaire-Rathdown County Development Plan 2016 – 2022. Available from: <https://www.dlrcoco.ie/en/planning/county-development-plan/county-development-plan-2016-2022>.

¹³ National Planning Application Database. Available from: <https://data.gov.ie/dataset/national-planning-applications> [Accessed: Downloaded 02 April 2020]

Dún Laoghaire-Rathdown County Council (2018). Kiltiernan Glenamuck Local Area Plan 2018 – 2023. Available from <https://www.dlrcco.ie/en/planning/local-area-plans/kiltiernan-local-area-plan>

Department of Housing, Planning, Community & Local Government (2019). MyPlan.ie. Map view. Available from: <https://viewer.myplan.ie/>

Google Maps (2019) Map view and aerial view. Available from: www.google.ie/maps

Wicklow County Council (2018). Bray Municipal District Local Area Plan 2018 – 2024: Available from:

<https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Bray/Bray-Municipal-District-Local-Area-Plan-2018 - 2024>

Wicklow County Council (2013). Greystones-Delgany & Kilcoole Local Area Plan 2013 – 2019. Available from:

<https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Greystones-Delgany/Greystones-Delgany-Kilcoole-Local-Area-Plan-2013 - 2019>

Wicklow County Council (2008). Newtownmountkennedy Local Area Plan 2008 – 2018. Available from:

<https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Newtownmountkennedy/Newtownmountkennedy-Local-Area-Plan-2008 - 2018>

Wicklow County Council (2016). Wicklow County Development Plan 2016 – 2022. Available from:

<https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/National-Regional-County-Plans/Wicklow-County-Development-Plan/Wicklow-County-Development-Plan-2016 - 2022>.

Wicklow County Council (2017). Woodbrook-Shanganagh Local Area Plan 2017-2023. Available from: <https://www.dlrcco.ie/en/planning/local-area-plans/woodbrook-shanganagh-lap-2017 - 2023>

11 Engineering

11.1 Introduction

This section describes the engineering constraints identified within the study area for the N11/M11 Scheme.

The engineering constraints comprise geographical features including topography and landscape, rivers, quarries, the coastal domain and transport infrastructure including roads, railway and public transport. Major utility constraints such as gas, water, electricity and telecommunications are detailed in **Section 8** (Material assets – non-agriculture) of **Volume B**. Proposed developments are detailed in **Section 10** (Land Use and Planning) of **Volume B**.

11.2 Methodology and sources of information

Research for this constraints study was conducted via a combination of site visits and desktop studies. The following sources of information were consulted to identify the engineering constraints:

- Ordnance Survey Ireland (OSI)¹;
- Wicklow County Council²;
- Dún Laoghaire-Rathdown County Council³;
- Kilcoole Website⁴;
- Greystones Harbour Marina Website⁵;
- Office of Public Works (OPW)⁶;
- Road Safety Authority Collision Maps⁷;
- Iarnród Éireann⁸;
- Bus Éireann⁹;

¹ Ordnance Survey Ireland (2017) Geohive Map Viewer. Available from: <http://map.geohive.ie/mapviewer.html> [Accessed: 2 June 2019]

² Wicklow County Council (2019) Available from: <https://www.wicklow.ie/> [Accessed: 02 June 2019]

³ Dún Laoghaire Rathdown County Council. Available from: <https://www.dlrccoco.ie/> [Accessed: 02 June 2019]

⁴ Kilcoole, County Wicklow (2019) Available from: <http://www.kilcoole.ie/> [Accessed: 14 June 2019]

⁵ Greystones Harbour Marina: Greystones. Available from: <http://www.greystonesharbourmarina.ie/greystones/> [Accessed: 20 June 2019]

⁶ Office of Public Works. Available from: <https://www.opw.ie/en/> [Accessed: 02 June 2019]

⁷ Road Safety Authority: Online Map of Collisions in Ireland. Available from: <http://www.rsa.ie/en/RSA/Road-Safety/RSA-Statistics/Collision-Statistics/Ireland-Road-Collisions/> [Accessed: 13th May 2019]

⁸ Iarnród Éireann (2017) Available from: <http://www.irishrail.ie/> [Accessed: 05 June 2019]

⁹ Bus Éireann (2019) Available from: <https://www.buseireann.ie/> [Accessed: 05 June 2019]

- Transport Infrastructure Ireland Operating Hours and Frequencies Website;¹⁰
- Industrial Heritage Ireland Railway Archaeology Website;¹¹
- Dublin Bus Timetables;¹²
- Private Bus Operator Websites;
- Newcastle Airfield Website;¹³
- Trail and Walking Route Websites;
- Google Maps¹⁴;
- ArcGIS Online Maps¹⁵;
- Coillte Website¹⁶;
- National Parks and Wildlife Service Website¹⁷.

11.3 Existing environment

11.3.1 Topography and landscape

The greater part of the study area is located in County Wicklow and the remainder is in County Dublin. The study area stretches from Loughlinstown, Co. Dublin in the north to the townland of Killoughter, County Wicklow in the south and encompasses a total area of approximately 168km².

The study area is constrained to the east by the Irish Sea coastline and to the west by the Dublin and Wicklow mountain regions.

As such, the topography rises from east to west across the study area, gaining height from sea level to the peak of the Great Sugarloaf which is approximately 500m above sea level.¹

The topography of the study area that lies in County Wicklow is predominantly hilly terrain which has been eroded by glacial depressions. This landscape makes for vastly variable contours dominated by peaks and valleys, the variance of which are exaggerated by the terrain falling to sea level.

¹⁰ Transport Infrastructure Ireland: Operating Hours and Frequencies. Available from: <https://www.tii.ie/public-transport/operations-and-maintenance/operating-hours-and-frequencies/> [Accessed: 02nd May 2019]

¹¹ Industrial Heritage Ireland: Irelands Railway Archaeology. Available from: <http://industrialheritageireland.info/railwayarchaeology/index.php/railway-archaeology-of-ireland/chapter-10-tunnels/> [Accessed: 28th June 2019]

¹² Dublin Bus Timetables. Available from: <https://www.dublinbus.ie/Your-Journey1/Timetables/> [Accessed: 11 June 2019]

¹³ Newcastle Airfield. Airfield Information. Available from: <https://www.einc.ie/airfield> [Accessed: 30th April 2019]

¹⁴ Google Maps (2019) Available from: <https://www.google.com/maps> [Accessed: 02 May 2019]

¹⁵ ArcGIS Online (2019) ArcGIS Online. Available from: <https://www.arcgis.com/home/webmap/viewer.html> [Accessed: 02 May 2019]

¹⁶ Coillte Website. Available from: <https://www.coillte.ie/> [Accessed: 11 June 2019]

¹⁷ National Parks and Wildlife Service Website. Available from: <https://www.npws.ie/> [Accessed: 11 June 2019]

The terrain within the study area in County Dublin is broadly similar to the neighbouring region in Wicklow with the terrain rising sharply from east to west, from sea level to a height of approximately 276m at the hill of Carricklologan.¹⁸

The Glen of the Downs, located either side of the existing N11 between Junction 9 (Glenview) and Junction 10 (Delgany/Drummin), is a deep glacial valley, rising by over 100m on either side of the road along this area. The western edge of the valley has a sharper ascent from 80mOD to 230mOD.¹

There are several Special Areas of Conservation (SAC) and proposed Natural Heritage Areas (pNHA) located throughout the scheme which pose as engineering constraints. These areas are discussed in further detail in **Section 12** (Biodiversity) of **Volume B**.

11.3.2 Rivers

The rivers that are located within the study area are included on **Figures B12.25** to **B12.30**.

In the most northerly part of the study area, the Carrickmines Stream runs south easterly with its tributaries, the Barnacullia, Glenamuck, Ticknick and Cabinteeley streams. The Carrickmines Stream connects into the Loughlinstown/Shanaganagh River in the Loughlinstown Commons townland. The Loughlinstown/Shanaganagh River flows from west to east, with its tributaries, the Ballycorus and Carrickmines streams.¹⁹

Moving southwards, the Rathmichael River runs diagonally from a northwest to southeast direction and meets the Irish Sea at Shankill Beach north of Bray.

The River Dargle rises outside of the study area boundary in the Wicklow Mountains on the northern slopes of Djouce Mountain at approximately 480mOD¹ and discharges into the Irish Sea at Bray Harbour. As the river flows north-easterly from Djouce Mountain, densely wooded slopes run adjacent to the river banks. Moving eastwards, the river is joined by a number of tributaries within the study area, including the Killough River, Glencullen/Cookstown River, the Kilmacanoge River, the County Brook and the Swan River.

The River Dargle is the most sizeable river within the study area and it crosses two regional roads, the R760 and the R117 before crossing the N11 at St. Valery's Bridge between Junction 6 (Bray/Fassaroe) and Junction 7 (Bray South) at 20mOD¹. It then flows into the Irish Sea passing through Bray Town on the way.

The Three Trouts stream runs parallel and to the east of to the N11 through the Glen of the Downs before discharging into the Irish Sea just south of Greystones town.²⁰

¹⁸ Coillte: Carrickgollogan. Available from: <https://www.coillte.ie/site/carrickgollogan/> [Accessed: 11 June 2019]

¹⁹ Dun Laoghaire- Rathdown County Council. Treasuring our Wildlife. Available from: https://www.dlrcoco.ie/sites/default/files/atoms/files/biodiversity_plan.pdf

²⁰ Kilcoole Tidy Town: Ecological Assessment of the Kilcoole Stream. Available from: <http://www.kilcoole.ie/wp-content/uploads/2019/01/Kilcoole-Stream-Study-2018.pdf>

There are a number of other streams located throughout the study area, including the Kilcoole and Kilpedder streams, flowing from west to east and meeting the sea via the Murrough pHNA. The Kilcoole stream rises in the town of Kilpedder and flows to sea in a south easterly direction through the town of Kilcoole. The Ballyronan Stream, located to the south of the Kilcoole stream, flows north of Newtownmountkennedy and through Ballyphilip before flowing into the Irish Sea. The Newtownmountkennedy stream runs from west to east with a tributary named the Glendarragh, connecting into this stream before discharging into the Irish Sea just south of the Ballyronan Stream. The Newcastle stream has several tributaries connecting to it as it flows from west to east including the Kilday stream, Trudder stream and the Moneycarroll stream. It then flows through Newcastle town and into the Irish Sea.

Further south, there are a number of streams running south easterly, namely the Ballymacahara stream with the Dunranhill stream connecting to it as a tributary and the Courtfoyle stream and the Dunran Demesne with tributaries of the Cullenmore and Grange streams.

11.4 Coastal domain

The Irish coastline defines the eastern extent of the study area for a length of approximately 27km, with approximately 4km of coastline in County Dublin and 23km in County Wicklow. Shankill town is the primary coastal settlement within the local authority area of Dún Laoghaire-Rathdown at the northern end of the study area. Killiney beach is located to the northeast of Shankill town and extends for approximately 3km with some of the beach lying outside the study area¹⁵.

The Wicklow coastline within the study area includes the coastal towns of Bray, Greystones, Kilcoole and Newcastle. At Bray town, the coastline consists of a harbour and a 1.5km long pebble beach with a promenade to the south of the harbour. Further south, there is a coastal headland at Bray Head, which rises to an elevation of 240mOD, with sea cliffs and rock outcrops. South of Bray Head, there is a long shingle beach which runs to Greystones Marina and then continues along the remainder of the study area extending as far south as Wicklow town.²¹ The beach located within the study area extends as far as the townland of Castlegrange.

Bray Harbour is the outlet point for the River Dargle and is used solely for leisure activities.

Activity clubs that use this harbour include the Bray Sailing Club, Bray Sea Anglers, Bray Sea Scouts, Bray Youth services, Row-A-Round and the Bray Veteran Kayakers.²²

²¹ Wicklow Coastline. Wicklow's Wild Coastline. Available from:
https://www.wicklow.ie/Portals/0/Documents/Arts%20Heritage%20&%20Archives/Heritage/Natural%20Heritage/Biodiversity%20in%20Wicklow/Coastline/Wicklow_Coastline.pdf

²² Wicklow County Council: Bray Harbour. Available from:
<https://www.wicklow.ie/Living/Services/Environment/Harbours-Ports/Bray-Harbour> [Accessed: 20 June 2019]

Greystones Marina is the deepest marina along the Eastern coast, and it has berthing accommodation for up to 250 boats.²³ There is also an Irish Coastguard station located within Greystones.⁵ Activity clubs that are based at this marina include the Greystones Rowing Club, Greystones Sailing Club, Greystones Ridge Sea Angling Club, the Wicklow Aquanauts, and the Greystones Harbour Sea Scouts.²³

11.5 Existing road network

The existing road network within the study area includes national, regional and local roads and is illustrated on **Figures B2.1 to B2.3**.

11.5.1 National road network

The national road network within the study area consists of the M50 motorway, M11 motorway and the N11 dual carriageway and is the primary artery connecting Dublin to the south east of the country. Together, these interlinking routes form part of Trans European Transport Network (TEN-T) Route E01. The M50 motorway forms part of the Core TEN-T Network while the M11 and N11 make up part of the Comprehensive Network.

At the northern end of the study area, the M11 motorway ties into the M50 motorway at Junction 4 (City Centre/Dún Laoghaire). At the southern extent of the study area, the N11 dual carriageway ties into the M11 motorway at Junction 14 (Coynes' Cross). These two tie-in points are key road constraints as all potential road options for the scheme shall tie into these points.

The existing N11/M11 within the study area is an amalgamation of several separate construction projects and upgrades over a period of approximately 50 years. Some sections of the existing N11, for example from Kilcrouney to south of the Glen of the Downs, essentially remain on the original line of Trunk Road 7, as it was designated prior to the Declaration of National Roads Order in 1977. This extent of overlap between the present N11 and the historic route is testament to the degree of constraint the surrounding topography has had on the development of the route over time. Moreover, the piecemeal completion of the existing route over several decades is reflected in the geometric characteristics and operational effectiveness of the route. The M11 motorway commences in the northern part of the study area in Shankill, at Loughlinstown Roundabout.

The M50 merges with the M11 just to the north of Junction 5 (Bray North).

The M11 motorway then transitions back into the N11 dual carriageway immediately north of Junction 6 (Bray/Fassaroe). From Junction 6 to Junction 14 (Coynes' Cross) the N11 is a two-lane national road and at Junction 14, the southerly end of this scheme, the N11 again transitions back into the two-lane M11 motorway. The M11 then continues to the southerly extent of the study area.

²³ Wicklow County Council: Greystones Marina. Available from: <https://www.wicklow.ie/Living/Services/Environment/Harbours-Ports/Greystones-Marina> [Accessed: 30 April 2019]

There is ribbon development on both sides of the N11/M11 corridor and this results in several direct accesses and multiple left-in left-out junctions along the N11 national road sections of the route.

The number, type and location of each existing access point on the N11/M11 northbound and southbound carriageways between Junction 4 and Junction 14 is presented in **Table 11.1** and **Table 11.2**.

Table 11.1: Existing N11/M11 access locations northbound (major junctions in bold)

No.	Junction ref.	Junction/access description	Junction/access form
1	NB-4	Junction 4 M11/M50 (City Centre/Dún Laoghaire)	Freeflow interchange
2	NB-5	Junction 5 R761 (Bray North)	Grade separated junction
3	NB-6	Junction 6 R918 (Bray/Fassaroe)	Grade separated junction
4	NB-6.1	Junction 6a (Enniskerry)	Left-in/left-out junction
5	NB-6.2	Private access (Dublin Oak Academy)	Direct access
6	NB-7	Junction 7 (Bray South)	Grade separated junction
7	NB-7.1	Private access (Woodlands Academy)	Direct access
8	NB-7.2	Glencormack/Avoca	Parallel service road with merge/diverge
9	NB-8	Junction 8 (Kilmacanoge/Roundwood)	Grade separated junction
10	NB-8.1	Access to 6 residential properties	Parallel service road with merge/diverge
11	NB-8.2	Private access (Kilmurray Grove)	Direct access
11	NB-8.3	Private access (Kilmurray Grove)	Direct access
12	NB-8.4	Private access (Kilmurray Grove)	Direct access
13	NB-8.5	Quill Road	Left-in / left-out junction
14	NB-9	Junction 9 (Glenview)	Compact junction

No.	Junction ref.	Junction/access description	Junction/access form
15	NB-9.1	Private access (residential/commercial)	Direct access
16	NB-9.2	Gated access to Glen of the Downs (WCC lands)	Direct access
17	NB-9.3	One-way access road to Drummin Lane	Left turn access from N11 mainline
18	NB-10	Junction 10 (Delgany/Drummin)	Grade separated junction with diverge loop
19	NB-10.1	Killickabawn	Single left-in merge
20	11	Junction 11 (Greystones/Kilpedder/Kilcoole)	Grade separated junction
21	NB-11.1	L5046 (Kilpedder)	Single lane diverge
22	NB-11.2	Commercial access (Marc Michel Organic Life)	Direct access
23	NB-11.3	Private access (Mount Kennedy House)	Direct access
24	NB-12	Junction 12 (Newtownmountkennedy/Roundwood)	Grade separated junction
25	NB-13	Junction 13 R772 (Newtownmountkennedy/Newcastle)	Grade separated junction
26	NB-14	Junction 14 R772 (Coyne's Cross)	Grade separated junction

Table 11.2: Existing N11/M11 access locations southbound (major junctions in bold)

No.	Junction ref.	Junction/access description	Junction/access form
1	SB-4	Junction 4 M11/M50 (Wexford/Bray)	Freeflow interchange
2	SB-5	Junction 5 R761 (Bray North)	Grade separated junction
3	SB-6	Junction 6 R918 (Bray/Fassaroe)	Grade separated junction
4	SB-6.1	Access to Silverbridge Halting Site	Left-in/left-out junction
5	SB-6.2	Dargle Lane L152	Left-in/left-out junction
6	SB-6.3	Herbert Road L1956	Left-in/left-out junction
7	SB-6.4	Kilcrony Church	Direct access
8	SB-6.5	Private access (residential)	Direct access
9	SB-7	Junction 7 R767 (Bray South/Greystones/Enniskerry)	Grade separated junction
10	SB-7.1	Gated field access	Direct access
11	SB-7.2	Gated field access	Direct access
11	SB-7.3	Garden of Ireland	Direct access
12	SB-7.4	Single residential access	Direct access
13	SB-7.5	Single residential access	Direct access
14	SB-7.6	Commercial/residential/wastewater treatment plant access	Direct access
15	SB-7.7	Commercial access (Kelly Recovery/Oxygen Care)	Direct access
16	SB-7.8	Commercial access (Glen fuels/Circle K)	Direct access
17	SB-7.9	Residential access	Direct access

No.	Junction ref.	Junction/access description	Junction/access form
18	SB-8	Junction 8 R755 (Roundwood/Kilmacanoge)	Grade separated junction
19	SB-8.1	Kilmurray Cottages L5530	Left-in / left-out junction
20	SB-8.2	Gated access	Direct access
21	SB-8.3	Twin gated access	Direct access
22	SB-8.4	Commercial access (Horkens Garden & Lifestyle)	Direct access
23	SB-9	Junction 9 L1028 (Glenview)	Left-in / left-out compact junction
24	SB-9.1	Glen of the Downs Nature Reserve	Direct access
25	SB-10	Junction 10 R762 (Delgany/Drummin)	Grade separated junction
26	SB-10.1	R762	Left-in/left-out junction
27	SB-11	Junction 11 R774 (Greystones/Kilpedder/Kilcoole)	Grade separated junction
28	SB-11.1	Kilquade L1042	Left-in/left-out junction
28	SB-11.2	Private residential access	Direct access
29	SB-12	Junction 12 R722 (Newtownmountkennedy/Roundwood)	Grade separated junction
30	SB-13	Junction 13 R722 (Newtownmountkennedy/Newcastle)	Grade separated junction
31	SB-14	Junction 14 R722 (Coyne's Cross)	Grade separated junction

11.5.2 Regional road network

The M50/M11/N11 is the only national route within the study area however, there are many interconnecting regional roads. Numerous regional roads provide secondary and direct connections to the M50/M11/N11 route, including the R118, R116, R119, R761, R918, R117, R768, R767, R755, R762, R774 and R772.

Moving from North to South a summary of the regional roads located within the scheme is given below.

The R116 Regional Road runs eastward from Kiltarnan. It splits at a T-junction to form the Bride's Glen Road which crosses under the M50 between Junction 16 M50 and Junction 4 M11/M50 (City Centre/Dún Laoghaire). The R116/Rathmichael Regional Road continues southwards to an overbridge crossing the M50 route to form another link between Kiltarnan and Shankill.

The R117 Regional Road forms part of the study area boundary to the west. It enters the study area at Kiltarnan and moves southwards to Enniskerry where it turns in an easterly direction and travels to join the N11 at Kilcroun Cross, Junction 6a (Enniskerry) to the south of Junction 6.

The R837 Regional Road commences at Loughlinstown Roundabout in Shankill at the northern end of the study area and runs from here in a south-easterly direction as far as the R119 Regional Road. The R119 Regional Road runs southwards almost parallel to the M11 until the eastern roundabout of Junction 5 (Bray North) where it ends, and the R761 Regional Road begins.

The R761 Regional Road runs southwards and parallel to the east coast providing an alternative north-south route to the N11. It runs through Bray and connects with the R766, R767, and the R768 Regional Roads. Continuing southwards, it runs through Greystones, where it connects with the R762 Regional Road. Moving further southwards it connects with the R774 just south of Greystones before running through the towns of Kilcoole, Newcastle and finally exiting the study area in the townland of Killoughter.

The R766 Regional Road links to the R761 just north of the town of Bray, from where it travels eastward towards the seafront before turning to travel southwards and parallel to Bray Beach. It turns again to travel westward and ties into the R761 essentially forming a loop within the town.

The R767 Regional Road is formed at a fork with the R761 in Bray town centre. It runs southwards and connects with the N11 at the eastern roundabout of Junction 7 (Bray South).

The R768 Regional Road also forms an arm of the eastern roundabout of Junction 7 and moves eastward through a second roundabout before reconnecting to the R761 at a 3-arm roundabout south of Bray.

To the west of the N11/M11 corridor, the R760 Regional Road runs southwards from Enniskerry to Ballybawn Cottages forming another part of the western side of the study area boundary. At Ballybawn Cottages the R760 turns to travel eastwards and connects with the R755 at a T-junction.

The R755 Regional Road connects to the N11 at Junction 8 (Kilmacanoge/Roundwood). Moving westward from the T-junction with the R760, this road runs along part of the western side of the study area boundary before connecting with the L1031 Local Road and moving west outside the study area.

To the east of the existing N11/M11 towards Greystones, the R762 Regional Road begins in Greystones town and moves east towards the coast.

It turns southwards and then westwards to connect back into R761 at two mini-roundabouts. It continues through Delgany in a westerly direction to connect to the N11 at Junction 10 (Delgany/Drummin).

The R774 Regional Road begins at a roundabout where it connects to the R762. It continues in a south-westerly direction to connect with the R761 at a roundabout just south of Greystones town. Moving westwards, it joins the N11 at Junction 11 (Greystones/Kilpedder/Kilcoole).

The R772 Regional Road begins at Junction 12 (Newtownmountkennedy/Roundwood) and travels southwards. It travels through Newtownmountkennedy and connects to the N11 at Junction 13 R772 (Newtownmountkennedy/Newcastle). It connects to both the southbound and northbound diverges of this junction, albeit the northbound diverge is a distance south of the southbound diverge and accommodates T-junctions with local roads and ribbon development. The R772 terminates at the point at which it merges with the northbound diverge for Junction 13, before commencing again at the western roundabout of Junction 14 R772 (Coyne's Cross). It then travels southwards, parallel to the N11/M11, before exiting the study area boundary in the townland of Ballyhenry.

The R765 Regional Road enters the study area boundary at its western extent in the townland of Ballinahinch Lower. Moving eastward it ties into the R772 at a T-junction in Newtownmountkennedy.

The R764 Regional Road runs east to west along the southern boundary of the study area from Knockfadda towards the M11 just west of Junction 15 R772 (Ashford).

11.5.3 Local road network

There is an extensive local road network throughout the scheme as illustrated in **Figures B2.1 to B2.3**. The density of the local road network is greater along the eastern and northern parts of the study area, coincident with the larger population centres and becomes less dense in the Dublin and Wicklow mountain regions. Due to the undulating topography, the local road network has steep gradients and pronounced curves. The majority of the local road network is of sub-standard alignment and cross-section and pre-dates modern road design standards. Facilities for non-motorised users are generally absent creating a hazardous environment. During peak times when the N11/M11 and supporting regional roads are congested, the local roads are used as alternative routes to avoid congestion and consequently, some of these roads carry inappropriately high volumes of traffic for the standard of road.

11.6 Road safety characteristics of existing road network

Table 11.3 below presents the number of recorded fatalities, serious injuries and minor injuries resulting from collisions within the N11/M11 Scheme study area for the period between 1996 and 2016.

The geographical distribution of these collisions is presented in **Figures B11.1 to B11.6**. This data has been obtained from studies conducted by the Road Safety Authority.

The data aligns with the nationwide trend of a reduced number of road fatalities and serious injuries experienced in recent decades, however it is noteworthy that the number of minor injuries has remained high since 2007.

Table 11.3: Collision data within the N11/M11 Scheme study area (1996 – 2016)⁷

Year	Fatal	Seriously injured	Minor injury	Injury of unknown severity
1996	7	27	124	8
1997	3	19	137	6
1998	4	13	135	12
1999	3	13	107	12
2000	4	18	126	4
2001	6	12	122	2
2002	2	14	62	4
2003	2	12	112	9
2004	5	10	67	6
2005	3	7	69	8
2006	4	4	60	1
2007	3	11	20	0
2008	0	11	121	1
2009	1	3	129	2
2010	1	6	131	5
2011	0	3	117	3
2012	0	8	143	6
2013	0	8	110	2
2014	4	11	101	0
2015	2	15	109	0
2016	2	22	101	0
Total	56	247	2203	91

11.7 Other transport modes

11.7.1 Railways

As illustrated in **Figures B11.7 to B11.12**, both heavy and light rail infrastructure are present within the study area. The southern extent of the light rail Green Luas Line lies within the northern end of the study area, including the Luas stops of Carrickmines, Laughanstown, Cherrywood and the terminus at Brides Glen.

The Green Luas service runs every 3 - 4 minutes at peak times, extending to every 15 minutes off peak.¹⁰

The heavy rail infrastructure within the study area includes the Dublin Area Rapid Transit (DART) and the Irish Rail Rosslare Europort Route. The DART is an electric rail system that runs along the East Coast from Malahide/Howth in County Dublin to Greystones in County Wicklow.

Shankill Station, Daly Station Bray and Greystones Station which are on this railway line are located within the study area boundary. There are services operating every 10 - 15 minutes throughout the day as far as Bray.

There is a single track from Bray to Greystones which runs at a reduced frequency of 30 minutes throughout the day. Due to coastal erosion between Bray Head and Greystones there is some disused rail line located along the coast. The rail line was originally opened in 1855 and following an accident in 1867, the Brabazon Tunnel section was cut off the route. In 1889, there was another deviation due to coastal erosion between Cable Rock and Greystones. **Figure 11.1** below shows a sketch outlining the changes made to the Bray to Greystones line over the years.¹¹

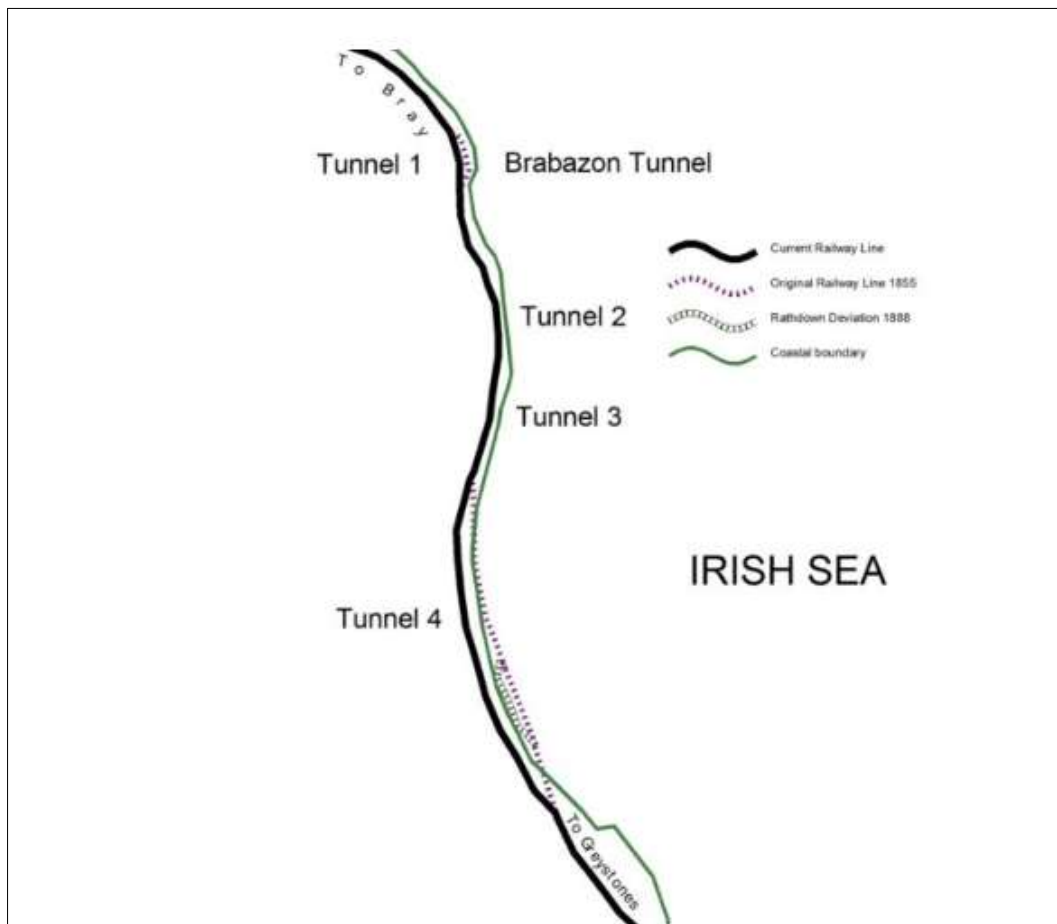


Figure 11.1: Bray to Greystones railway line

The Irish Rail Rosslare Europort Route runs from Rosslare to Dublin Connolly Station with 5 services daily Monday through Friday and 3 services daily Saturday and Sunday. This route operates partly on the DART line serving Greystones Station, Bray (Daly) Railway Station and Dublin Connolly Station.

From Greystones it merges onto the southern commuter line which serves Kilcoole station within the study area and continues on to Wicklow, Arklow, Gorey, Wexford and finally Rosslare.²⁴

Dublin Southern Commuter service also operates along the same line as the DART and Rosslare Europort train from Dublin Connolly to Gorey Station.

Stations served by this route within the study area include Bray (Daly) and Greystones along the DART line. The Dublin Southern Commuter runs 5 services daily Monday through Friday and 3 services daily Saturday and Sunday.

11.7.2 Road based public transport

Dublin Bus offers several different services along the N11/M11 Scheme study area. Services current at the time of writing are presented in **Table 11.4** to **Table 11.5**.

Table 11.4: Dublin Bus services¹²

Route No.	Service type	Destination	Frequency (at peak times)
145	City Service	Heuston Rail Station - Ballywaltrim	Every 10 minutes
84/84a	City Service	Blackrock – Newcastle	Every 30/40 minutes
84x	City Service	Hawkins Street – Kilcoole/Newcastle	Mondays to Friday only, 9/10 services per day
155	City Service	Ikea (Ballymun) – Bray Rail Station	Every 20 minutes
44	City Service	DCU – Enniskerry	Every hour
7b	City Service	Mountjoy Sq - Shankill	Mondays to Fridays only, 4/5 services per day
7d	City Service	Mountjoy Sq - Dalkey	Mondays to Fridays only 1/2 services per day

Table 11.5: Dublin Bus night time services¹²

Route No.	Service type	Destination	Frequency (at peak times)
84n	Night Service	D’Olier St – Greystones	3 services Friday & Saturday
7n	Night Service	D’Olier St. - Shankill	5 services Friday & Saturday

²⁴ Irish Rail. Rosslare Europort. Available from: <http://www.irishrail.ie/travel-information/rosslare-europort> [Accessed: 05 July 2019]

There are a number of other bus companies serving the study area (some of which are private companies) with services connecting to Dublin Airport and surrounding areas. These are listed in **Table 11.6**.

Table 11.6: Bus companies

Company	Route No.	Destination	Frequency (at peak times)
Go Ahead Ireland ²⁵	45a	Dún Laoghaire - Kilmacanoge	Every 20 minutes
Go Ahead Ireland	45b	Dún Laoghaire - Kilmacanoge	One service a day
Go Ahead Ireland	111	Dalkey – Brides Glen	Every hour
Go Ahead Ireland	184	Bray Dart Station – NewtownmountKennedy	Every 30 minutes
Go Ahead Ireland	185	Bray Dart Station – Enniskerry Golf Club	Every 30 minutes
Bus Eireann ²⁶	133	Dublin Airport - Wicklow	Every 30 minutes
Aircoach ²⁷	702	Dublin Airport - Greystones	Every hour
Wexford Bus ²⁸	740	Dublin Airport - Wexford	Every hour
Wexford Bus	740a	Dublin - Arklow	Every hour
St Kevins Bus ²⁹	181	St Stephens Green - Glendalough	2/3 services per day

Bus 45a/45b/145/133/ 185/181/ 740/740a have bus stops directly on the N11. The locations of these bus stops along the N11 mainline are shown in **Table 11.7**.

Table 11.7: Existing bus stops on N11 mainline

Ref. No	Northbound	Southbound
1	Junction 8 Kilmacanoge (Circle K Garage)	Junction 8 Kilmacanoge (Circle K Garage)
2	Kilmacanoge (North of Glencormack/Avoca Access)	Kilmacanoge (Kilmurray)
3	Kilmurray/Quill Road	Junction 9 Glenview
4	Junction 9 Glenview	Kilpedder

²⁵ Go Ahead Ireland: Routes and Timetables. Available from: <https://www.goaheadireland.ie/services> [Accessed: 14th May 2019]

²⁶ Bus Eireann: View Timetables. Available from: <https://www.buseireann.ie/inner.php?id=241> [Accessed: 14th May 2019]

²⁷ Aircoach: Route 702 Dublin Airport to Greystones/Bray. Available from: <https://www.aircoach.ie/timetables/route-702-dublin-airport-greystonesbray> [Accessed: 02nd May 2019]

²⁸ Wexford Bus: Times & Fares. Available from: <https://bookings.wexfordbus.com/Timetable.aspx?TimeTableRoute=2#> [Accessed: 02nd May 2019]

²⁹ Glendalough St Kevins Bus Services: Day Trips. Available from: <http://www.glendaloughbus.com/routes.aspx> [Accessed: 14th May 2019]

Ref. No	Northbound	Southbound
5	Timore (Between J13 and J14)	Timore (Between J13 and J14)

The locations of all bus routes and bus stops within the study area are depicted on **Figures B11.7 to B11.12**.

11.7.3 Airports

Newcastle Aerodrome is located on Sea Road, Co. Wicklow in the south east of the study area as shown on **Figure B11.10**. This aerodrome is licensed by the Aeronautical Services Department of the Irish Aviation Authority. There is a 690m grass runway located at this airfield, running north/south. This airfield is one of the most active in Ireland for private General Aviation (GA) and flight training.¹³

11.7.4 Walking routes

There are numerous walking routes located throughout the study area, a selection of which are shown on figures within this section. Being in proximity to the Wicklow mountains, this area provides a wide range of recreational opportunities. A number of the popular trails and walks located in County Wicklow include:

- Bray Head Cliff Walk;
- Great Sugarloaf;³⁰
- Delgany Heritage Trails;
- Bray Promenade/Bray Town;
- Bray to Greystones Walk;
- Little Sugar Loaf;
- Old Downs Hill;
- Glen of the Downs Nature Trail; and
- Kindlestown Trail.

³⁰ Irish Trails. Sugarloaf Way. Available from:
<https://www.irishtrails.ie/maps/Sugar%20Loaf%20Way%20Map.pdf> [Accessed: 14 May 2019]

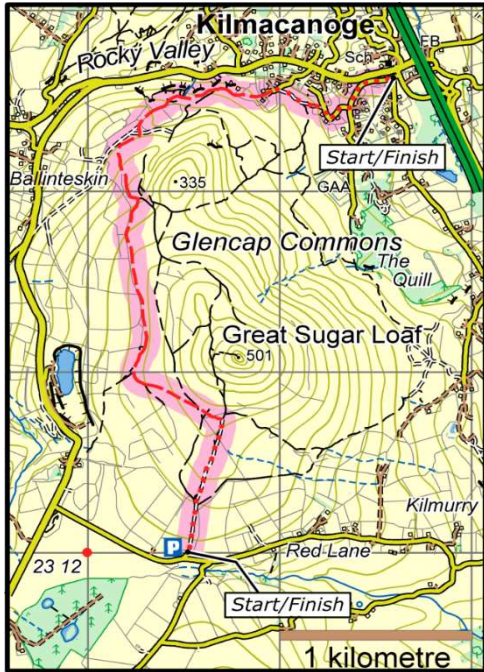


Figure 11.2: The Great Sugarloaf³⁰

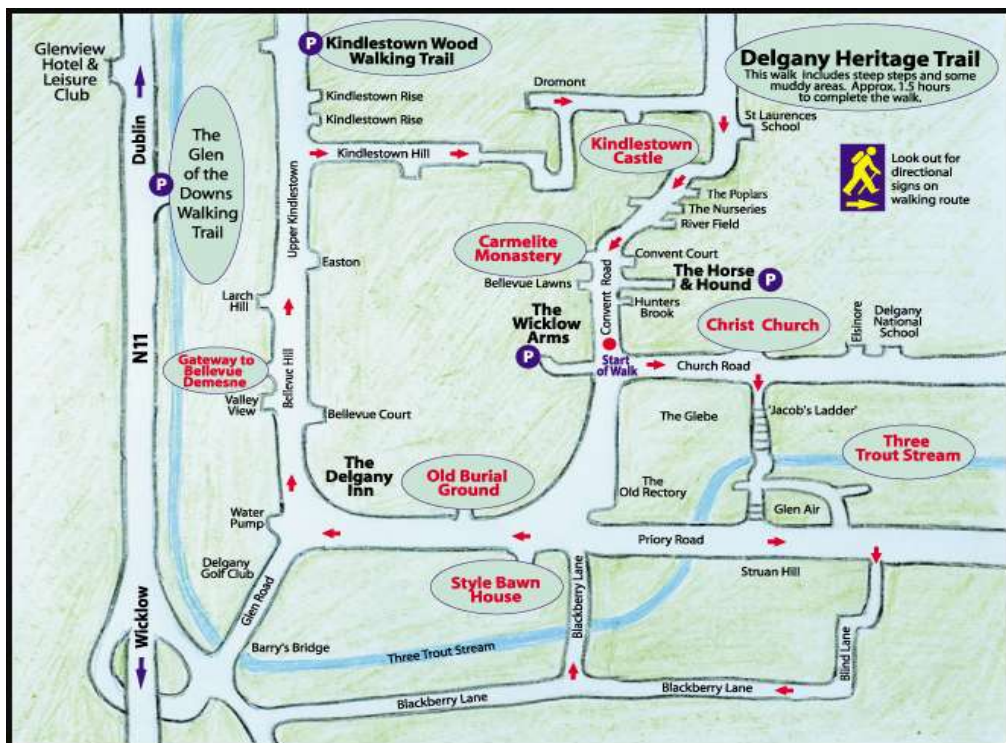


Figure 11.3: Delgany Heritage Trail³¹

³¹ Discover Ireland: The Delgany Heritage Trail. Available from: <https://www.discoverireland.ie/Activities-Adventure/the-delgany-heritage-trail/76835> [Accessed: 14th May]



Figure 11.4: Bray Promenade/Bray Town³²

³² Irish Trails. Bray Town Slí. Available from: <https://www.irishtrails.ie/trail/Bray-Town-Sli/1085/>
[Accessed: 14 May 2019]



Figure 11.5: Bray to Greystones Cliff Walk³³

³³ Irish Trails. Bray Greystones Cliff Walk. Available from:
<https://www.irishtrails.ie/maps/Bray%20to%20Greystones%20cliff%20walk%20-%20Map.pdf>
 [Accessed: 14 May 2019]

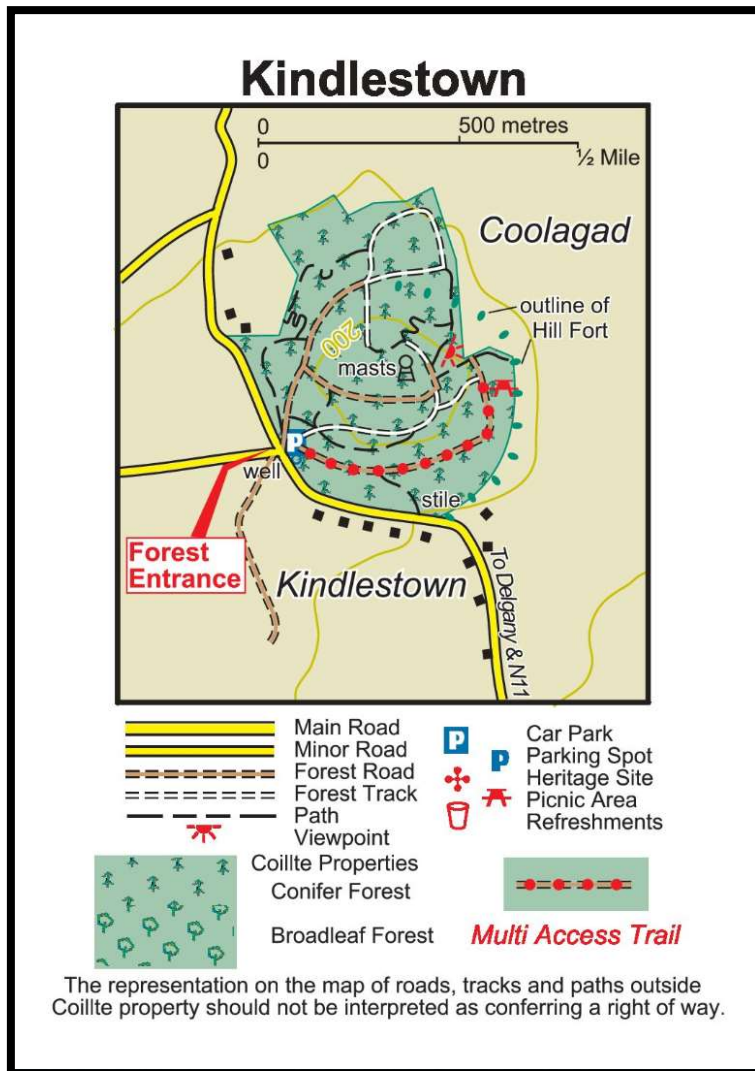


Figure 11.6: Kindlestown Trail³⁴

There are also several walks and Trails located in County Dublin within the study area. These are as follows:

- Dublin Mountains Way (Partly located within the study area);
- Carrickgollogan -Lead Mines Way;
- Carrickgollogan -Mountain Access Route;
- Barnaslingan - Pine loop trail;
- Barnaslingan - Scalp Lookout Trail; and
- Glenview Woodlands Walk.

³⁴ Irish Trails. Kindlestown Trail. Available from: https://www.coillte.ie/media/2017/01/Wicklow-Kindlestown_multi_access_trail.pdf[Accessed: 14 May 2019]

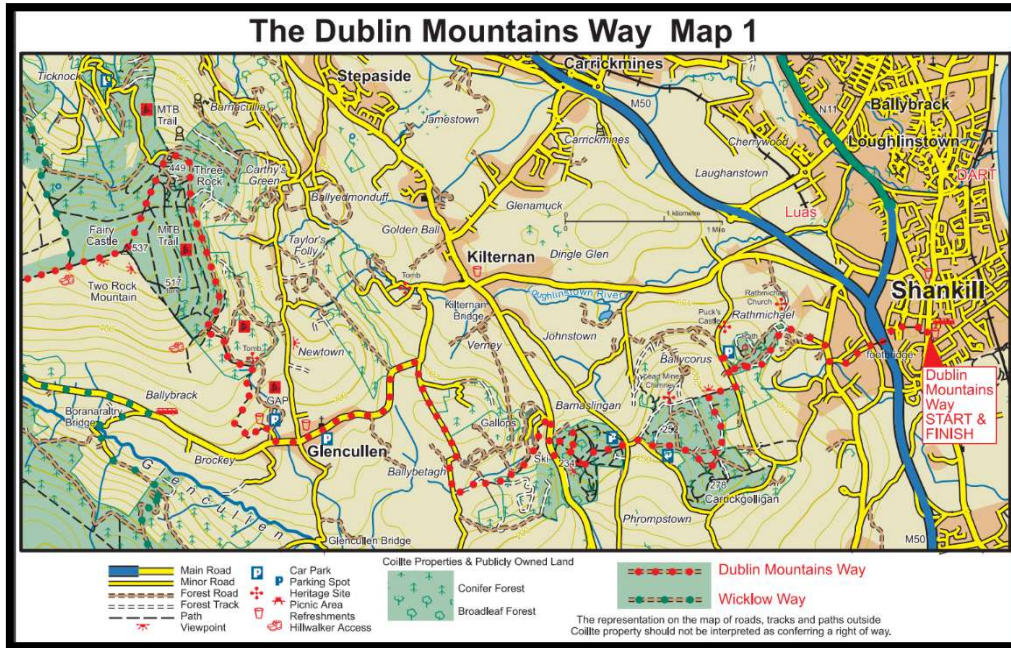


Figure 11.7: Map of Shankill to Threerock, section of the Dublin Mountains Way.³⁵

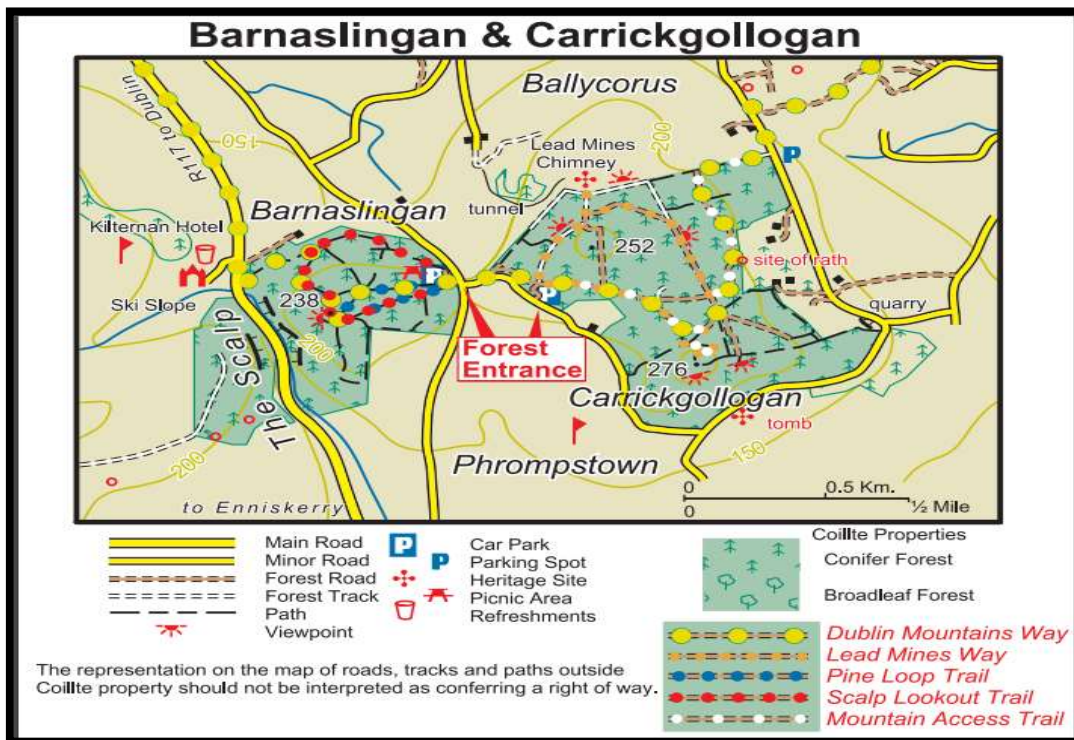


Figure 11.8: Barnaslingan & Carrickgollogan routes.³⁶

³⁵ Dublin Mountains. Dublin Mountains Way. Available from: https://www.dublinmountains.ie/dublin_mountains_way/dublin_mountains_way/ [Accessed: 11 June 2019]

³⁶ Irish Trails. Barnaslingan & Carrickgollogan. Available from: <https://www.coillte.ie/media/2017/01/Dublin-Barnaslingan.pdf> [Accessed: 11 June 2019]

11.8 Quarries

Calary Lake Quarry is a disused quarry owned by Roadstone Ltd. It is located on the western edge of the study area. This quarry covers 12 acres and is up to 28 meters deep.

Fassaroe Quarry, located to the west of Bray, is also located within the study area and is owned by Roadstone Ltd.

The quarry locations are shown on **Figures B13.19 to B13.24**.

11.9 Other amenities

11.9.1 Golf courses

There are numerous different golf clubs in County Dublin that are located within the study area. Old Conna Golf Club is located by Old Conna village just west of the M11. Woodbrook Golf Club is located along the eastern coast and is divided by the DART Railway Line. Dún Laoghaire Golf Club is located north of Enniskerry along the Dublin and Wicklow county border. The golf clubs in County Wicklow that lie within the study area are the Bray Golf Club located along the R761 south of Bray. Greystones Golf Club is located in the south of Greystones Town in the Killincarrig townland. Charlesland Golf Club is situated along the eastern coast just south of Greystones Golf Club in Ballynerrin townland. Moving west, Delgany Golf Club, is located in close proximity to the Glen of the Downs SAC within the Bellevue Demesne. The Druids Glen Golf Resort is mainly located within the Leabeg Upper townland south of Kilcoole town. The Glen Mill Golf Club is located to the east of the existing N11 in the townland of Timore. The location of all golf clubs within the study area are shown on **Figures B16.27 to B16.32**.

11.10 Summary

The purpose of this section is to present the engineering constraints located within the study area in order to inform the development of options for the scheme.

It was found that there is substantial restriction to the west by the Dublin and Wicklow mountain regions and to the east by the coastal domain. The undulating topography poses a very significant constraint to options development, particularly to the west and has to a large extent influenced the form of the existing road network over time. The existing road transportation network is dominated by the M50/M11/N11 spine, however there is also an extensive interconnecting regional and local road network providing important transportation links. The existing N11/M11 corridor is particularly constrained by the built environment to the north of the study area as well as adjacent topographical features such as the Glen of the Downs and the Great and Little Sugarloaf. There are many watercourses within the study area that represent engineering constraints. The existing railway transportation network presents a major constraint along the northern and eastern extents of the study area.

The existing bus network, both public and private covers a greater extent of the study area and also presents a significant constraint. There are numerous important engineering constraints such as the port infrastructure at Bray and Greystones, the airport at Newcastle and the numerous amenities including an extensive trails network and numerous golf clubs within the study area.

11.11 References

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Dun Laoghaire- Rathdown County Council. Treasuring our Wildlife. Available from: https://www.dlrcoco.ie/sites/default/files/atoms/files/biodiversity_plan.pdf [Accessed: 13 June 2019].

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<https://www.irishtrails.ie/maps/Bray%20to%20Greystones%20cliff%20walk%20-%20Map.pdf> [Accessed: 14 May 2019].

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https://www.coillte.ie/media/2017/01/Wicklow-Kindlestown_multi_access_trail.pdf [Accessed: 14 May 2019].

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<https://www.irishtrails.ie/maps/Sugar%20Loaf%20Way%20Map.pdf> [Accessed: 14 May 2019].

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<https://www.npws.ie/> [Accessed: 11 June 2019].

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<https://www.einc.ie/airfield> [Accessed: 30th April 2019].

Office of Public Works. Available from: <https://www.opw.ie/en/> [Accessed: 02 June 2019].

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<http://map.geohive.ie/mapviewer.html> [Accessed: 2 June 2019].

Road Safety Authority: Online Map of Collisions in Ireland. Available from:
<http://www.rsa.ie/en/RSA/Road-Safety/RSA-Statistics/Collision-Statistics/Ireland-Road-Collisions/> [Accessed: 13th May 2019].

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<https://bookings.wexfordbus.com/Timetable.aspx?TimeTableRoute=2#>
[Accessed: 02nd May 2019].

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https://www.wicklow.ie/Portals/0/Documents/Arts%20Heritage%20&%20Archives/Heritage/Natural%20Heritage/Biodiversity%20in%20Wicklow/Coastline/Wicklow_Coastline.pdf [Accessed: 17 June].

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[Accessed: 02 June 2019].

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<https://www.wicklow.ie/Living/Services/Environment/Harbours-Ports/Bray-Harbour> [Accessed: 20 June 2019].

Wicklow County Council: Greystones Marina. Available from:
<https://www.wicklow.ie/Living/Services/Environment/Harbours-Ports/Greystones-Marina> [Accessed: 30 April 2019].

Wicklow County Council: Wicklow's Wild Woodlands. Available from:
https://www.wicklow.ie/Portals/0/Documents/Arts%20Heritage%20&%20Archives/Heritage/Natural%20Heritage/About%20Natural%20Heritage/Wicklow_s_woodlands.pdf [Accessed: 13 June 2019].

12 Biodiversity

12.1 Introduction

This section describes the biodiversity constraints identified within the study area for the N11/M11 Scheme. This section also details the methodologies and results of the biodiversity constraints study that has been carried out to inform the option selection process for the N11/M11 Scheme.

The focus of this constraints study was to collate existing information regarding the existing biodiversity with respect to habitats and rare/protected species within the study area. This initially comprised a detailed desktop study and subsequent field surveys have also been undertaken in selected areas, likely to be of significant ecological interest, to support this constraints study.

Section 12.2 outlines the relevant legislation, policy and guidance documents which informed the process of collating baseline data for the study area and preparation of this study. The methodology and sources of data (including consultation) for the collation of desktop data are described in **Section 12.3**. **Section 12.4** outlines the results of the desktop study. **Section 12.4.2** details the methodologies employed in the habitats and species surveys undertaken and the results of these surveys. **Section 12.5** summarises the results of the constraints study, including desktop data and field survey results. References are provided in **Section 12.6**.

12.2 Relevant legislation, policy documents and plans, and guidance documents

The collation of baseline biodiversity data and the preparation of this study has had regard to the following legislation, policy and guidance documents.

Legislation:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as ‘the Habitats Directive’);
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (hereafter referred to as ‘the Birds Directive’);
- European Communities (Birds and Natural Habitats) Regulations, 2011 (SI No. 477 of 2011), hereafter referred to as ‘the Birds and Habitats Regulations’;
- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (hereafter referred to as ‘the EIA Directive’);
- Planning & Development Act 2000 as amended;

- Wildlife Acts 1976 to 2019 (hereafter referred to as ‘the Wildlife Acts’);
- Flora (Protection) Order, 2015 (SI No. 356 of 2015); and
- Fisheries (Consolidation) Act, 1959 as amended (hereafter referred to as ‘the Fisheries Act’).

Policies and Plans:

- National Biodiversity Action Plan 2017 - 2021¹;
- River Basin Management Plan for Ireland 2018 - 2021²;
- Dún Laoghaire-Rathdown County Development Plan 2016 - 2022³;
- Biodiversity Plan for Dún Laoghaire-Rathdown 2009 - 2013⁴;
- Wicklow County Development Plan 2016 - 2022⁵;
- County Wicklow Biodiversity Action Plan 2010 - 2015⁶; and
- Bray Municipal District Local Area Plan 2018 - 2024⁷.

Guidance Documents:

- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports⁸;
- Draft Advice Notes for Preparing Environmental Impact Statements⁹;

¹ Department of Culture, Heritage and the Gaeltacht (2017) National Biodiversity Action Plan 2017 – 2021 Available from: <https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf>

² Department of Housing, Planning and Local Government (2018) River Basin Management Plan for Ireland 2018-2021. Available from: https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_full_reportweb.pdf

³ Dún Laoghaire-Rathdown County Council (2016) Dún Laoghaire-Rathdown County Development Plan 2016-2022 Available from: <https://www.dlrcco.ie/en/planning/county-development-plan/county-development-plan-2016-2022>

⁴ Dún Laoghaire-Rathdown County Council (2009) Biodiversity Plan for Dún Laoghaire-Rathdown 2009-2013 Available from: <https://www.dlrcco.ie/en/heritage/biodiversity/biodiversity-plan>

⁵ Wicklow County Council (2016) Wicklow County Development Plan 2016-2022 Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/National-Regional-County-Plans/Wicklow-County-Development-Plan/Wicklow-County-Development-Plan-2016-2022>

⁶ Wicklow County Council (2010) County Wicklow Biodiversity Action Plan 2010-2015 Available from: http://www.countywicklowheritage.org/page/county_wicklow_biodiversity_action_plan

⁷ Wicklow County Council (2018) Bray Municipal District Local Area Plan 2018-2024 Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans/Bray/Bray-Municipal-District-Local-Area-Plan-2018-2024>

⁸ Environmental Protection Agency (2017) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017). Available from: <http://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf> [Accessed 26 April 2019]

⁹ Environmental Protection Agency (2015) Draft Advice Notes for Preparing Environmental Impact Statements. Available from: <https://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes/Draft%20Advice%20Notes%20for%20preparing%20an%20EIS.pdf>.

- Guidelines on the Information to be contained in Environmental Impact Statements¹⁰;
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements¹¹;
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine¹²;
- Environmental Impact Assessment of National Road Schemes – A Practical Guide¹³;
- Guidelines for Assessment of Ecological Impacts of National Road Schemes¹⁴;
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes¹⁵;
- Bat Surveys for Professional Ecologists: Good Practice Guidelines, Third Edition¹⁶;
- The Bat Workers’ Manual, 3rd Edition¹⁷;
- Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25.¹⁸ ;
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes¹⁹;

¹⁰ Environmental Protection Agency (2002) Guidelines on the Information to be contained in Environmental Impact Assessment Reports. Available from:
https://www.epa.ie/pubs/advice/ea/guidelines/EPA_Guidelines_EIS_2002.pdf.

¹¹ Environmental Protection Agency (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements. Available from:
https://www.epa.ie/pubs/advice/ea/guidelines/EPA_advice_on_EIS_2003.pdf.

¹² Chartered Institute of Ecology and Environmental Management (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Available from: <https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/> [Accessed 29 April 2019]

¹³ National Roads Authority (2008) Environmental Impact Assessment of National Road Schemes – A Practical Guide. Available from: <https://www.tii.ie/technical-services/environment/planning/Environmental-Impact-Assessment-of-National-Road-Schemes-Practical-Guide.pdf>

¹⁴ 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>

¹⁵ National Roads Authority (2008) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes Available from: <https://www.tii.ie/technical-services/environment/planning/Ecological-Surveying-Techniques-for-Protected-Flora-and-Fauna-during-the-Planning-of-National-Road-Schemes.pdf>

¹⁶ Bat Conservation Trust (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines, Third Edition Available from: <https://www.bats.org.uk/news/2016/02/bat-surveys-for-professional-ecologists-good-practice-guidelines-3rd-edition>

¹⁷ Mitchell-Jones & McLeish (2004) The Bat Workers’ Manual, 3rd Edition Available from: http://jncc.defra.gov.uk/pdf/batwork_manualpt1.pdf

¹⁸ Kelleher & Marnell (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25 Available from: <https://www.npws.ie/sites/default/files/publications/pdf/IWM25.pdf>

¹⁹ National Roads Authority (2006) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes Available from: <https://www.tii.ie/technical->

- Design Manual for Roads and Bridges: Volume 10: Environmental Design and Management. Section 4: Nature Conservation: Part 3, HA 80/99; Nature Conservation Advice in Relation to Bats²⁰;
- Circular NPW 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities²¹;
- Circular Letter PD 2/07 and NPWS 1/07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites²²; and
- Circular Letter NPWS 2/07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species/applications for derogation licences²³

12.3 Methodology

12.3.1 Desk study and data sources

The desktop study involved the collection and review of relevant published and unpublished sources of data, collation of existing information on the ecological environment and consultation with relevant organisations.

[services/environment/planning/Best_Practice_Guidelines_for_the_Conservation_of_Bats_in_the_Planning_of_National_Road_Schemes.pdf](#) [Accessed 29 April 2019]

²⁰ The Highways Agency (2001) Design Manual for Roads and Bridges: Volume 10: Environmental Design and Management. Section 4: Nature Conservation: Part 3, HA 80/99; Nature Conservation Advice in Relation to Bats Available from:

<http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol10/section4/ha8099.pdf>

²¹ National Parks & Wildlife Service (2010). Circular NPW 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities Available from: <https://www.npws.ie/sites/default/files/general/Circular%20NPW1-10%20%26%20PSSP2-10%20Final.pdf>

²² National Parks & Wildlife Service (2007) Circular Letter PD 2/07 and NPWS 1/07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites Available from:

<https://www.npws.ie/sites/default/files/general/circular-pd-02-07.pdf>

²³ National Parks & Wildlife Service (2007) Circular Letter NPWS 2/07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species/applications for derogation licences Available from:

<https://www.npws.ie/sites/default/files/general/circular-npws-2-07-reg-23-compliance.pdf>

The following sources were reviewed as part of this constraints study:

- Online data available from the National Parks and Wildlife Service (NPWS) on Natura 2000 sites (hereafter referred to as European sites)²⁴ and designated sites protected at the national level (i.e. Natural Heritage Areas, or NHAs, and proposed Natural Heritage Areas, or pNHAs)²⁵;
- National Biodiversity Data Centre (NBDC) Search of Online Database for 10km Grid Squares O20, O21 and O22²⁶;
- Habitat GIS datasets available to download from the NPWS website specifically the following datasets:
 - Ancient and Long-Established Woodland (updated 2012)²⁷;
 - National Survey of Native Woodlands 2003 - 2008 (updated 2012)²⁷; and
 - Article 17 Data for Annex I habitats (2012)²⁸; and
 - 2019 Article 17 Data for Annex I habitats²⁹.
- Habitat GIS datasets provided by NPWS, following submission of a data request for relevant information within the constraints study area, specifically the following datasets:
 - Article 17 Data for Annex I Woodland habitats (2019)³⁰;
 - NPWS Indicative Habitat Mapping for Glen of the Downs SAC (March 2012);
 - Sand Dunes Monitoring Project (2011/2012)/ Coastal Monitoring Project (2004-2006) combined habitat dataset;
 - NPWS 7220 records (2006) sourced from: Foss, P.J. (2007). *National Parks & Wildlife Service Study of the Extent and Conservation Status of Springs, Fens and Flushes in Ireland 2007*. Unpublished report for the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland;

²⁴ European sites, are defined under the Habitats Directive (Article 3) as a European ecological network of Special Areas of Conservation and Special Protection Areas, composed of sites which host the natural habitat types listed in Annex I and habitats of the protected species listed in Annex II. The aim of the network is to aid the long-term survival of Europe's most vulnerable and threatened species and habitats. In Ireland these sites are designated as European sites – defined under the Planning Acts and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

²⁵ NPWS (2019) Protected Sites in Ireland. Available from: www.npws.ie/protectedsites/ and <http://webgis.npws.ie/npwsviewer/> [Accessed 15 April 2019]

²⁶ NBDC (2019) Online Database. Available from: <https://maps.biodiversityireland.ie/Map> [Accessed 12 April 2019]

²⁷ NPWS (2019) GIS Datasets for Ancient and Long-Established Woodland and National Survey of Native Woodland 2003-2008 Available at <https://www.npws.ie/maps-and-data/habitat-and-species-data> [Accessed 11 April 2019]

²⁸ NPWS (2019) Article 17 Data for Annex I habitats. Available from: <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17> [Accessed 11 April 2019]

²⁹ NPWS (2019) Article 17 Data for Annex I habitats. Available at: <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17/2019/habitats> [Accessed 26 May 2020]

³⁰ Updated unpublished Article 17 Reporting Data from 2019. Received from NPWS in response to a submission of a data request (May 2020).

- Saltmarsh Quad Wymer (1984) dataset, sourced from: Wymer, E.D. (1984). *The phytosociology of Irish saltmarsh vegetation*. M.Sc. Thesis, National University of Ireland, Dublin;
- Irish Semi-natural Grasslands Survey (ISGS) 2007-2012 dataset associated with the following published report: O’Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013) *The Irish semi-natural grasslands survey 2007-2012*. Irish Wildlife Manuals, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland;
- Survey and Assessment of the Conservation Status of Irish Sea Cliffs (2011) dataset;
- Vegetation and habitat survey of Wicklow Mountains SAC (2012) dataset.
- Spatial data relating to watercourses, downloaded from the Environmental Protection Agency’s (EPA) online Geo Portal, specifically the following dataset:
 - WFD River Water Bodies-27/04/2017³¹
- Records of rare and protected species for the 10km grid squares O22, O21 and O20³²;
- National Survey of Native Woodlands 2003 - 2008³³;
- A Provisional Inventory of Ancient and Long-Established Woodland in Ireland³⁴;
- Ballywaltrim Lane Spring Survey July 2019³⁵,
- Cherrywood Planning Scheme Biodiversity Plan³⁶; and
- Orthophotography³⁷.

12.3.2 Consultation

The following organisations/individuals with relevance to collating information on ecological constraints were consulted as part of the constraints study:

³¹ EPA (2019) WFD River Water Bodies Dataset. Available from: <http://gis.epa.ie/GetData/Download> [Accessed 16 April 2019]

³² NPWS (2019) Online Map Viewer. Available from: <http://webgis.npws.ie/npwsviewer/> [Accessed 16 April 2019] updated with data provided by NPWS in May 2020 following submission of a data request for records of rare and protected species within the constraints study area

³³ Perrin, P., Martin, J., Barron, S., O’Neill, F., McNutt, K. and Delaney, A. (2008). National Survey of Native Woodlands 2003-2008. Volume I: Main Report. Available from: <http://www.botanicalenvironmental.com/wp-content/uploads/2011/03/Volume-I.pdf>

³⁴ Perrin, P.M. & Daly, O.H. (2010). A Provisional Inventory of Ancient and Long-Established Woodland in Ireland. Irish Wildlife Manuals No. 46 National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Available from: <https://www.npws.ie/sites/default/files/publications/pdf/IWM46.pdf>

³⁵ Denyer Ecology (2019). *Ballywaltrim Lane Spring Survey, July 2019*. Report prepared for Ballywaltrim Lane Residents Group

³⁶ Scott Cawley Ltd. (2012). Cherrywood Planning Scheme Biodiversity Plan Available from: https://www.dlrcoco.ie/sites/default/files/atoms/files/cherrywood_biodiversity.pdf

³⁷ Online Orthophotography available via Google Maps. Available at: <https://www.google.com/maps> [Accessed 29 April 2019]

- An Taisce
- Bat Conservation Ireland
- Birds Ireland
- BirdWatch Ireland
- Botanical Society of Britain & Ireland (BSBI)
- Coastwatch
- Coillte
- County Wicklow Environmental Network
- Dun-Laoghaire – Rathdown County Council Biodiversity Officer
- Dublin Naturalists’ Field Club (DNFC)
- East Coast Nature Reserve
- Friends of the Irish Environment
- Inland Fisheries Ireland (IFI)
- Irish Wildlife Trust
- National Botanic Gardens
- National Biodiversity Data Centre (NBDC)
- National Parks and Wildlife Service via the Development Applications Unit
- The Golden Eagle Trust
- The Heritage Council
- Wicklow County Council Heritage Officer

These organisations/individuals were issued with a consultation letter which outlined the objectives of the proposed N11/M11 Scheme and requested that they inform us of any concerns, relating to biodiversity, that they may have, with respect to the project at this stage, so that they could be considered in the Constraints Study.

12.3.3 Field surveys

Ecological field surveys were carried out, in several areas, to expand upon and enhance the results of the desktop study. Surveys of ecological sites, identified from orthophotography during the desktop study, were undertaken in order to refine the boundaries of these ecological sites and aid in their classification and valuation.

Field surveys undertaken comprise the following:

- Habitat surveys at Glen of the Downs SAC, Kilmacanogue Marsh pNHA, Druids Glen Woodland ecological site (EC24) and Ballyvolan Upper- Coynes Cross ecological site (EC29);

- Survey for rare/protected bryophyte species in Glen of the Downs SAC;
- Walkover surveys of ecological sites, identified from orthophotography during the desktop study, which were located in close proximity to, or overlap with, the corridor options;
- Multidisciplinary surveys of lands located within 250m of the existing N11/M11 road.

Habitat Surveys at Glen of the Downs SAC (000719)

Habitat surveys at Glen of the Downs SAC were undertaken by Scott Cawley Ltd. in May 2019. The aim of the surveys was to produce an accurate, up to date, habitat map for the site and to establish the extent of Old oak woodland [91A0] habitat, which is the qualifying interest (QI) of this SAC.

A threefold approach to habitat survey was employed, consisting of classifying the different habitats present as per *A Guide to Habitats in Ireland* (Fossitt, 2000)³⁸; identifying the various different vegetative communities present within each habitat type; and, establishing the extent of QI 91A0 habitat present within the study area.

Please refer to the Glen of the Downs Habitat Survey & Evaluation Report, included in **Appendix B12.1**, for detailed methodology.

Habitat Surveys at Kilmacanogue Marsh pNHA (000724)

Habitat surveys at Kilmacanogue Marsh pNHA were carried out by Scott Cawley Ltd. in August and September 2019. The aim of these surveys was to produce an accurate, up to date, habitat map for the site, including any areas of Annex I habitat which may be present.

Habitats identified were classified in accordance with the guidance and descriptions detailed in *A Guide to Habitats in Ireland* (Fossitt, 2000)³⁸. The study area in Kilmacanogue Marsh pNHA was walked and habitats, defined on the basis of their vegetative composition and physical environment/ management, were recorded and mapped. Habitat surveys were conducted in line with the *Best Practice Guidance for Habitat Survey and Mapping* (Smith et al., 2011)³⁹. Relevés were recorded in certain habitat types, to provide sufficient quantitative data to support the habitat classification.

Relevés carried out in woodland habitats were 10m² in area, as per the methodology employed in the *National Survey of Native Woodlands 2003-2008*³³.

Based on the habitats identified, and the data from the supporting relevés, the extent of any areas of Annex I habitat was established and mapped. In establishing

³⁸ Fossitt, J., A. (2000) *A Guide to Habitats in Ireland*. The Heritage Council. Available from: <https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf>

³⁹ Smith, G. F., O'Donoghue, P., O'Hara, K & Delaney, E. (2011). *Best Practice Guidance for Habitat Survey & Mapping*. The Heritage Council. Available from: https://www.heritagecouncil.ie/content/files/best_practice_guidance_habitat_survey_mapping_onscreen_version_2011_8mb.pdf

the extent of any areas of Annex I habitats the following guidance documents were consulted:

- *Interpretation Manual of European Union Habitats [EUR 28]* (European Commission, 2013)⁴⁰;
- *Results of Monitoring Survey of Old Sessile Oak Woods and Alluvial Forests* (O’Neill & Barron, 2013)⁴¹
- *The Status of EU Protected Habitats and Species in Ireland- Habitats Assessments, Volume 2* (NPWS, 2019)⁴².

Habitat Surveys at Druids Glen Woodland ecological site (EC24)

Habitat surveys at Druids Glen Woodland ecological site (EC24) were carried out by Scott Cawley Ltd. in September and October 2019. The aim of these surveys was to produce an accurate, up to date, habitat map for the site, including any areas of Annex I habitat which may be present. Habitat surveys were undertaken in a similar manner to that described above under Kilmacanogue Marsh pNHA. In establishing the extent of any areas of Annex I habitats the following guidance documents were consulted:

- *Interpretation Manual of European Union Habitats [EUR 28]* (European Commission, 2013)⁴⁰;
- *Results of Monitoring Survey of Old Sessile Oak Woods and Alluvial Forests* (O’Neill & Barron, 2013)⁴¹;
- *Monitoring Guidelines for the Assessment of Petrifying Springs in Ireland* (Lyons & Kelly, 2016)⁴³;
- *The Status of EU Protected Habitats and Species in Ireland- Habitats Assessments, Volume 2* (NPWS, 2019)⁴².

Habitat Surveys at Ballyvolan Upper - Coynes Cross ecological site (EC29)

Habitat surveys at Ballyvolan Upper - Coynes Cross- ecological site (EC29) were carried out by Scott Cawley Ltd. in June 2020. The aim of these surveys was to produce an accurate, up to date, habitat map for the site, including any areas of Annex I habitat, whose presence was indicated from desktop records.

⁴⁰ European Commission (2013). *Interpretation Manual of European Union Habitats – Version EUR28* Available from:

https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

⁴¹ O’Neill, F.H. & Barron, S.J. (2013). *Results of monitoring survey of old sessile oak woods and alluvial forests. Irish Wildlife Manuals, No. 71.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Available from:

<https://www.npws.ie/sites/default/files/publications/pdf/IWM%2071%20Oak%20and%20alluvial%20woodlands%20monitoring.pdf>

⁴² NPWS (2019). *The Status of EU Protected Species in Ireland. Volume 2: Habitat Assessments.* Available from:

https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol2_Habitats_Article17.pdf

⁴³ Lyons, M.D. & Kelly, D.L. (2016) *Monitoring guidelines for the assessment of petrifying springs in Ireland.* Irish Wildlife Manuals, No. 94. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Ireland. Available from: <https://www.npws.ie/sites/default/files/publications/pdf/IWM94.pdf>

Habitats identified were classified in accordance with the guidance and descriptions detailed in *A Guide to Habitats in Ireland* (Fossitt, 2000)^{38,38}. The study area in Ballyvolan Upper – Coynes Cross ecological site (EC29) was walked and habitats, defined on the basis of their vegetative composition and physical environment/ management, were recorded and mapped. Habitat surveys were conducted in line with the *Best Practice Guidance for Habitat Survey and Mapping* (Smith et al., 2011)³⁹. Species lists were created for each habitat type to provide supporting data for the habitat classifications made. Based on the habitats identified, the extent of any areas of Annex I habitat was established and mapped. In establishing the extent of any areas of Annex I habitats the following guidance documents were consulted:

- *Interpretation Manual of European Union Habitats [EUR 28]* (European Commission, 2013)⁴⁰;
- *Results of Monitoring Survey of Old Sessile Oak Woods and Alluvial Forests* (O’Neill & Barron, 2013)⁴¹
- *The Status of EU Protected Habitats and Species in Ireland- Habitats Assessments*, Volume 2 (NPWS, 2019)⁴².

Surveys for Rare/Protected Bryophyte Species in Glen of the Downs SAC

A bryophyte survey was conducted by Dr. Rory Hodd in Glen of the Downs SAC in May 2019. The aim of this survey was to record bryophyte species present within the various different habitat types identified within the study area, with a particular focus on recording any rare/protected species.

The study area was walked, and all bryophyte species and their relative abundances were recorded. Where rare/protected species were identified, their approximate locations were recorded using a handheld GPS unit⁴⁴.

Walkover Surveys of Ecological Sites

Several areas which may be of ecological interest were identified during the desktop study, following a review of orthophotography. A ground truthing exercise was subsequently undertaken, by means of brief site surveys, to verify the orthophotography interpretation and refine the boundaries of the ecological sites. These surveys were undertaken by Scott Cawley Ltd. in June 2020. At this time, the stage 1 preliminary options assessment was underway and only ecological sites which were located in close proximity to, or overlapped with, one of the corridor options were surveyed.

One other ecological site- Ballywaltrim (EC45), which had not been accessible in June 2020, was briefly surveyed in August 2020.

During the site survey, the surveyor walked the area of the ecological site which was located in close proximity to, or overlapped with, the corridor options, and, based on the vegetative composition, identified the habitats present in accordance with the guidance and descriptions detailed in *A Guide to Habitats in Ireland* (Fossitt, 2000)³⁸. In some cases, ecological sites were viewed from a distance or

⁴⁴ The locations of these rare/protected species are approximate only, due to impacts on the ability of a handheld GPS unit to detect satellites signals in woodland habitat, under a dense tree canopy.

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.

Multidisciplinary Surveys

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. Due to the degree of constraint on the existing corridor, adjustments to the corridor that aim to meet the scheme objectives while minimising impacts on constraints are far more limited than those for any potential offline road-based solutions. It was therefore prudent to undertake these surveys at this stage. These surveys consisted of recording habitats, any signs of protected species (including protected mammals, reptiles and amphibians) and invasive species, listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011, (S.I.) No. 477/ 2011. Data was recorded in the field on a handheld computer using prepared mapping. This handheld computer contained a “built-in” GPS unit, allowing exact locations of important ecological features to be recorded.

Surveying for habitats followed the methodology described in *Best Practice Guidance for Habitat Survey and Mapping*³⁹. All habitat types were classified using the *Guide to Habitats in Ireland*³⁸, recording the indicator species and abundance using the DAFOR scale⁴⁵ and recording any species of conservation interest. Vascular and bryophyte plant nomenclature generally follow that of *The National Vegetation Database*⁴⁶, having regard to more recent taxonomic changes to species names after the *New Flora of the British Isles*⁴⁷ and the British Bryological Society’s *Mosses and Liverworts of Britain and Ireland: A Field Guide*⁴⁸.

In surveying for protected mammal species, the presence/absence of terrestrial mammal species was surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings, as well as by direct observation. The habitats within the study area were assessed for signs of usage by protected/red-listed fauna species, and their potential to support these species. When encountered, the locations of resting/breeding places such as badger setts and otter holts were recorded using the “built-in” GPS unit contained on the handheld computer.

⁴⁵ The DAFOR scale is an ordinal or semi-quantitative scale for recording the relative abundance of plant species. The name DAFOR is an acronym for the abundance levels recorded: Dominant, Abundant, Frequent, Occasional and Rare.

⁴⁶ Weekes, L.C. & FitzPatrick, Ú. (2010) *The National Vegetation Database: Guidelines and Standards for the Collection and Storage of Vegetation Data in Ireland*. Version 1.0. Irish Wildlife Manuals, No. 49. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. Available from: <https://www.biodiversityireland.ie/wordpress/wp-content/uploads/IWM49-NVD.pdf>

⁴⁷ Stace, C. (2019) *New Flora of the British Isles*. 4th Edition. C&M Floristics.

⁴⁸ Atherton, I., Bosanquet, S. & Lawley, M. (2010) *Mosses and Liverworts of Britain and Ireland: A Field Guide*. Latimer Trend & Co., Plymouth.

All mature trees were assessed from ground level for any features which could offer potential to roosting bats. Such features include cavities, damaged limbs, peeling bark, knotholes and dense ivy. Where trees were deemed to be suitable to support roosting bats their location, species and potential roosting features were recorded. A photographic record of all suitable trees was also created.

Ad-hoc observations of birds of conservation concern and raptors were recorded over the course of the multidisciplinary survey, using the British Trust for Ornithology (BTO) species and activity codes.

With regards to invasive species, only those species which are listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011, (S.I.) No. 477/ 2011, were recorded. Where such species were noted, the location was recorded using the “built-in” GPS unit contained on the handheld computer. The approximate area of the stand of invasive species was also recorded and a photographic record was maintained of all stands of invasive species encountered.

12.4 Existing environment

12.4.1 Desktop study

Designated sites

European and Nationally Designated Sites

Several designated sites, including those protected at a European and national level, are located within the study area (see **Figures B12.1 - B12.5**). These designated sites are listed in **Table 12.1** along with a brief description of the features for which the sites are designated.

SACs and SPAs are defined under Article 3 of the Habitats Directive (1992) and are protected by the same piece of legislation. Together, SACs and SPAs form a European ecological network of sites which host the natural habitats listed in Annex I, and the habitats of the protected species listed in Annex II, of the Habitats Directive. The aim of the network is to aid the long-term survival of Europe's most vulnerable and threatened species and habitats, and these SAC and SPA sites are therefore protected at an international level.

NHAs are designations under Section 16 of the Wildlife Acts to protect habitats, species or geology of national importance. No NHAs are present within the study area.

pNHAs are also sites of significance for wildlife and habitats that were published on a non-statutory basis in 1995, however they have not since been statutorily proposed or designated. pNHAs are offered protection in the interim period under the county development plans which requires that planning authorities give due

regard to their protection in planning policies and decisions⁴⁹. Many of the pNHA sites, and some of the NHA sites, in Ireland overlap with the boundaries of European sites.

Table 12.1: Designated sites located within the study area

Site name & code	Brief description of ecological value of the site
European Sites – SACs	
Ballyman Glen SAC (000713)	Designated due to the presence of two Annex I habitats: Petrifying springs with tufa formation (Cratoneurion) [7220]; and; Alkaline fens [7230].
Knocksink Wood SAC (000725)	Designated due to the presence of three Annex I habitats: Petrifying springs with tufa formation (Cratoneurion) [7220]; and; Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]
Bray Head SAC (000714)	Designated due to the presence of two Annex I habitats: Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; and; European dry heaths [4030]
Glen of the Downs SAC (000719)	Designated due to the presence of one Annex I habitat: Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]
The Murrough SAC (002249)	Designated due to the presence of six Annex I habitats: Annual vegetation of drift lines [1210]; Perennial vegetation of stony banks [1220]; Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) [1330]; Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1330]; Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210]; and; Alkaline fens [7230]
European Sites – SPAs	
The Murrough SPA (004186)	Designated for the presence of wetlands and waterbirds [A999], including 8 bird species: Red-throated Diver (<i>Gavia stellata</i>) [A001] Greylag Goose (<i>Anser anser</i>) [A043] Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Wigeon (<i>Anas penelope</i>) [A050] Teal (<i>Anas crecca</i>) [A052] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Herring Gull (<i>Larus argentatus</i>) [A184] Little Tern (<i>Sterna albifrons</i>) [A195]
National Sites - pNHAs	

⁴⁹ For example, Biodiversity Objective NH5 of the *Wicklow County Development Plan 2016-2022* includes a commitment “To maintain the conservation value of all proposed and future Natural Heritage Areas (NHAs) and to protect other designated ecological sites in Wicklow”.

Site name & code	Brief description of ecological value of the site
Dalkey Coastal Zone & Killiney Hill pNHA (001206)	<p>This site represents a fine example of a coastal system with habitats ranging from the sub-littoral to coastal heath. The flora is well developed and includes some scarce species (e.g. Bloody Crane’s-bill (<i>Geranium sanguineum</i>), and Bee Orchid (<i>Ophrys apifera</i>)).</p> <p>The islands are important bird sites- tern species breed here annually.</p> <p>The site also has geological importance.</p>
Loughlinstown Woods pNHA (001211)	<p>The wood was originally planted but following substantial regeneration, has produced woodland of natural character in age structure and form. This site is a good example of demesne-type mixed woodland.</p>
Dingle Glen pNHA (001207)	<p>The importance in this site lies in the variety of habitats (woodland and heath) within a relatively small area.</p>
Ballyman Glen pNHA (000713)	<p>The fen vegetation at this site is well developed, with an unusually large number of sedge species present.</p> <p>The presence of alkaline fen and of Petrifying spring/seepage areas is also particularly notable, as these habitats are listed, the latter with priority status, on Annex I of the E.U. Habitats Directive.</p> <p>Fens are rare in Wicklow and Dublin, and this is one of only two sites in Wicklow for the Narrow-leaved Marsh orchid.</p>
Knocksink Wood pNHA (000725)	<p>The importance of this site lies in the diversity of woodland habitats which occur.</p> <p>Two habitats listed in Annex I of the E.U. Habitats Directive, both with priority status, occur at this site (Petrifying springs and Alluvial woodland).</p> <p>The presence of rare or threatened plants and invertebrates adds to the interest.</p>
Powerscourt Woodland pNHA (001768)	<p>Although the site includes many exotic plant species, the habitats are still of interest and support an interesting flora. The mix of semi-natural habitats and estate woodland is particularly conducive to macro-fungi. The well documented record of land management practices held by the demesnes adds to the scientific interest. The area is also of great educational value, being frequently used for teaching.</p>
Dargle River Valley pNHA (001754)	<p>The importance of this site is that it is a fine example of a wooded valley. It is likely that this valley has been wooded for a long period and such habitats are becoming rare in north County Wicklow.</p> <p>A Red Data Book species, Yellow Archangel (<i>Lamiastrum galeobdolon</i>), occurs along the river. This is a very localised species confined to eastern Ireland.</p> <p>The site is also of considerable geological importance.</p>
Bray Head pNHA (000714)	<p>Bray Head is of high conservation importance as it has good examples of two habitats (sea cliffs and dry heath) listed on Annex I of the E.U. Habitats Directive.</p> <p>It also supports a number of rare plant species and has ornithological importance- Peregrine Falcon, an Annex I species of the E.U. Birds Directive, breeds at the site, as do Raven and Kestrel. Characteristic bird species of the heath areas include Stonechat, Whitethroat, Linnets and Skylark.</p>
Great Sugarloaf pNHA (001769)	<p>The main habitats of the site are dry mountain heath and upland grassland. Other habitats present include exposed rocky outcrops or areas of scree and woodland.</p>

Site name & code	Brief description of ecological value of the site
	<p>A rare liverwort, <i>Cryptothallus mirabilis</i>, has been recorded beneath the Sphagnum layer.</p> <p>The site is of both ecological and geological interest and is also a prominent feature in the landscape of north County Wicklow.</p>
Kilmacanoge Marsh pNHA (000724)	<p>This site is important in having a diversity of species-rich wetland habitats within a relatively small area, and particularly for the presence of some rare invertebrates. The site also contains two priority Annex I habitats; Alluvial woodland [91E0*] and Orchid-rich calcareous grassland [6210*].</p>
Glen of the Downs pNHA (000719)	<p>Although exploited heavily in the past, this woodland is well developed, rich in species and is of high conservation significance.</p> <p>The site supports oak woodland of a type that is listed on Annex I of the E.U. Habitats Directive.</p> <p>The glacial overflow channel is the largest example of such a feature in the country.</p> <p>The site is notable for the presence of the rare bryophytes <i>Cephaloziella turneri</i>, <i>Pterigynandrum filiforme</i> and <i>Plagiothecium curvifolium</i>, the last named in its only Irish site. There are also several rare or scarce Myxomycete fungi species present.</p> <p>The site also boasts some rare invertebrates, including <i>Mycetobia obscura</i> (Order Diptera) which is found in only one other locality in Britain and Ireland.</p>
The Murrough pNHA (000730)	<p>This site is of importance as it is the largest coastal wetland complex on the east coast of Ireland.</p> <p>It contains a wide range of coastal and freshwater habitats, including six listed on Annex I of the E.U. Habitats Directive, some of which contain threatened plants.</p> <p>Areas on the site contain a rich invertebrate fauna, including several rarities.</p> <p>It is an important site for both wintering and breeding birds and supports a variety of species listed on Annex I of the E.U. Birds Directive.</p>

European sites such as SACs and SPAs are regarded as being of international importance from an ecological perspective, whilst pNHAs are regarded as being of national importance.

Despite being a pNHA, Kilmacanogue Marsh pNHA (000724) is valued as being of international importance due to the presence of two priority Annex I habitat types; Alluvial woodland [91E0*] and Orchid-rich calcareous grassland [6210*].

Nature Reserves

In addition to the above designated sites, two Nature Reserves, protected under the Wildlife Acts, are also found within the study area - Knocksink Woods Nature Reserve and Glen of the Downs Nature Reserve (see **Figures B12.7 - B12.12**).

Knocksink Wood Nature Reserve was established in 1994 under Statutory Instrument (S.I.) No. 58/1994 - Nature Reserve (Knocksink Wood) Establishment Order, 1994. It is located in the Glencullen river valley, just north of Enniskerry village and is state-owned. Ecological features include areas of sessile oak woodland, areas of mixed woodland, Petrifying springs and seepage areas. The site holds one of the most diverse woodland invertebrate faunas in Ireland, including organisms which are threatened internationally. An education centre

exists on site also. It should be noted that Knocksink Wood is also a designated SAC (see **Table 12.1** above).

Glen of the Downs Nature Reserve was established in 1980 under Statutory Instrument (S.I.) No. 178/1980 – Nature Reserve (Glen of the Downs) Establishment Order, 1980. It is located on either side of the N11 dual carriageway, about 8km south of Bray. It is state-owned and in terms of ecology is important in that it represents a very good example of the drier type of oak woodland characteristic of acid soils in Wicklow. It should be noted that Glen of the Downs is also a designated SAC (see **Table 12.1** above).

Nature Reserves are regarded as being of national importance from an ecological perspective.

Birdwatch Reserve

Birdwatch Ireland's East Coast Nature Reserve is located approximately 2km east of Newcastle in County Wicklow.

The reserve is situated in the Murrough Wetlands, which is the largest wetland complex on the east coast, stretching from Kilcoole to Wicklow.

Birdwatch Ireland are in the process of undertaking a number of restoration projects on site, that are necessary due to impacts of past agricultural drainage and management. The aim of the restoration projects is to restore a range of habitats on site including fen, grassland and wet woodland habitats, which will benefit several bird species and biodiversity as a whole. Bird species which are known to use the reserve lands include Little Egret (*Egretta garzetta*), Greenland White-fronted Geese (*Anser albifrons albifrons*), Whooper Swan (*Cygnus cygnus*) and Kingfisher (*Alcedo atthis*)⁵⁰.

Although this nature reserve is not legally protected, the site is regarded to be ecologically significant for conservation purposes, and as a wetland habitat, used by a range of wetland bird species, along the east coast.

Habitats

Non-designated Areas of Annex I Habitat

Based on a review of available desktop data, specifically Article 17 reporting data^{28 30 29} regarding the national distribution of Annex I habitats, several areas of non-designated Annex I habitat occur within the study area. Areas of the following Annex I habitats occur within the study area:

- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0];
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0];
- Alpine and Boreal Heaths [4060];
- European dry heaths [4030];

⁵⁰ BirdWatchIreland (2019) The East Coast Nature Reserve: Species and Habitats. Available from: <https://www.birdwatchireland.ie/OurWork/Reserves/EULIFEprojects/TheEastCoastNatureReserve/Specieshabitats/tabid/229/Default.aspx> [Accessed 15/04/2019]

- Northern Atlantic Wet Heaths with *Erica tetralix* [4010];
- Mudflats and sandflats not covered by seawater at low tide [1140];
- Calaminarian Grasslands of the *Violetalia calaminariae* [6130];
- Siliceous Rocky Slopes with chasmophytic vegetation [8220];
- Fixed Coastal Dunes with herbaceous vegetation (“grey dunes”) [2130];
- Vegetated Sea Cliffs of the Atlantic and Baltic coasts [1230]; and;
- Perennial Vegetation of Stony Banks [1220].

Annex I habitats are of high conservation value at a national and international geographic scale given the ecological value associated with them. In addition, ex-situ Annex I habitats may act as supporting features to habitats contained within Designated Sites (e.g. by acting as ecological stepping stones or corridors, providing connectivity for protected species, ensuring viable commuting and foraging routes, and providing habitats for supporting populations). Areas of non-designated Annex I habitat are displayed in **Figures B12.13 - B12.18**.

It should be noted that these known locations of Annex I habitats are based on desktop records and it is possible that other areas of Annex I habitats, not currently recorded or mapped, may be present within the study area.

Non-Annex I Woodland Habitats

A review of databases available from the NPWS²⁷ specifically data relating to surveys of Ancient and Long-Established Woodland³⁴ and the National Survey of Native Woodlands 2003 - 2008³³, revealed that several areas of woodland habitat are present within the study area. Following analysis of this data, areas of woodland within the study area have been categorised into three distinctive woodland types:

- Non-native Woodland;
- Mixed Woodland; and
- Semi-natural Woodland.

Non-native woodland comprises areas of conifer plantation and non-native broadleaf woodlands (areas dominated by Beech *Fagus sylvatica*, Rhododendron *Rhododendron ponticum* or Sycamore *Acer pseudoplatanus*)³⁴. Six areas of non-native woodland are known to occur in the study area.

Mixed woodland refers to areas which are composed of broadleaf and conifer trees, and where the proportions of these tree types were essentially equal³⁴. Mixed woodland is located in two general areas - Kilruddery Deerpark and Glen of the Downs. Eight distinctive parcels of mixed woodland are known to occur in the study area.

Semi-natural woodland comprises areas of semi-natural broadleaf woodland i.e. woodland dominated by native tree species³³. Where data was derived from the National Survey of Native Woodlands 2003 - 2008 database²⁷, more information relating to the type of semi-natural woodland was available. This revealed that of the seven parcels of semi-natural woodland which occur within the study area,

two are classified as Wet Willow-alder-ash woodland (WN6)⁵¹, one is classified as Oak-ash-hazel woodland (WN2) and one is classified as a mixture of Wet Willow-alder-ash and Mixed broadleaf woodland (WN6/WD1). No detailed data is available for the remaining three of the seven parcels.

Woodlands are ecologically valuable in their own right, due to the scarcity of woodland in Ireland, relative to other European countries, and the high degree of biodiversity found within them. In addition, woodlands provide habitats and foraging resources for a range of protected fauna species e.g. badger, red squirrel, deer, birds and bats. Woodlands also provide ecological connectivity across the wider landscape and environment, including providing habitat links between designated sites.

In general, the ecological value of areas of non-Annex I woodland Habitats ranges from local to County importance, depending on their vegetative composition.

Areas of non-Annex I woodland Habitats are shown in **Figures B12.19 - B12.24**.

Other areas of woodland exist within the study area, including those linear immature woodlands planted along the existing road edge. The information described above and illustrated in **Figures B12.19 - B12.24** should therefore not be taken as an exhaustive list of relevant woodland habitats.

Watercourses

According to the EPA data⁵², several rivers, and their associated tributaries, are located within the study area. The main rivers and their associated sub-catchments are displayed in **Table 12.2** and described in further detail in **Section 12.5**.

Table 12.2: Main watercourses and their associated sub-catchments located in the study area

Sub-catchment	River/stream name
Dargle Sub-catchment	Kill-O-The-Grange Stream; Loughlinstown/Shanganagh River; Carrickmines' Stream; Rathmichael Stream; County Brook; River Dargle; Glencullen River; Rocky Valley Stream; and; Kilmacanoge River.
Newcastle [Wicklow] Sub-catchment	Three-trouts Stream; Kilcoole Stream; Ballyronan Stream; Newtownmountkennedy River; Newcastle River; and; Moneycarrol River.

⁵¹ Refers to habitat classifications and associated codes defined in Fossitt's *A Guide to Habitats in Ireland* (2000)

⁵² Environmental Protection Agency (2019) Data available for download at <http://gis.epa.ie/GetData/Download>

Sub-catchment	River/stream name
Vartry Sub-catchment	Dunran Demesne River; Courtfoyle River; and; Cullenmore Stream.

In response to a consultation request, IFI provided desktop information regarding the watercourses which lie within the constraints study area, including any records of rare/protected species and any data regarding the fishery potential of relevant watercourses. The results of this consultation process are described in this section.

These watercourses and associated riparian habitats are of high ecological value due to the connectivity they provide to other sites of ecological importance, and by virtue of the fact that they support a range of rare and protected species. For example, watercourses contained within the Loughlinstown/Shanganagh catchment are regarded to support good fishery habitat. Fishery habitat is regarded as particularly good for all salmonid life stages throughout much of the Loughlinstown/Shanganagh River system. The Loughlinstown/Shanganagh River represents a valuable resource both in terms of biological diversity value and particularly from a native fisheries perspective. This system supports migratory Sea trout in addition to resident Brown trout (both *Salmo trutta*) populations.

Likewise, the River Dargle catchment is an important salmonid system. This system supports Brown trout, a nationally significant population of Sea trout (both *Salmo trutta*) in addition to a significant and biologically valuable population of Atlantic salmon (*Salmo salar*). European Eel (*Anguilla anguilla*) and Lamprey species (*Lampetra* spp.) are also known to be present in this system.

The Kill-O-The-Grange Stream is a non-salmonid stream. In terms of aquatic fauna, it is known to support stickleback and minnow.

The Carrickmines' Stream, Rathmichael Stream, County Brook, Rocky Valley Stream, Kilmacanoge River, Ballyronan Stream and Dunran Demesne River are all known to support Brown Trout (*Salmo trutta*). The following watercourses support Sea Trout, in addition to Brown Trout (both *Salmo trutta*); Glencullen River, Three-trout's Stream, Kilcoole Stream, Newcastle River and Moneycarroll River. The Newtownmountkennedy River supports Sea Trout, Brown Trout (both *Salmo trutta*) and European Eel (*Anguilla anguilla*).

There was very little data available regarding the fishery potential of the Courtfoyle River and Cullenmore Stream. However, IFI concluded that as both these watercourses discharge into Broad Lough Estuary, to the north of Wicklow Town, they could potentially hold populations of Brown Trout (*Salmo trutta*).

In addition to supporting rare/protected aquatic species these river systems may also support terrestrial mammals such as otter (*Lutra Lutra*), bat and bird species (e.g. Kingfisher) which use aquatic systems for foraging and commuting purposes.

Otters have been recorded in the Carrickmines' River valley and along Bride's Glen. Evidence of otters has also been found along the Shanganagh River³⁶.

The watercourses contained within the study area are deemed to range in ecological value from local to county importance, owing to the fact that they may support rare/protected species of conservation value and provide ecological

connectivity across the study area. Watercourses located within the study area are presented in **Figures B12.25 - B12.30**.

Flora

Desktop records of protected, rare or other notable plant species are listed in **Table 12.3**. Flora that was identified as part of the field surveys is detailed in **Section 12.4.2**.

Table 12.3: Records of protected, red-listed or notable flora recorded from the desk study within the study area

Common name/ scientific name	Legal status ⁵³	Red list status ⁵⁴	Source	Known locations/ habitat preferences
Wild Asparagus (<i>Asparagus prostratus</i>)	FPO	Endangered	NBDC online database	Typically found in dune habitats and sandhills or short grassy turf along the south-east coast- counties Wicklow, Wexford and Waterford ⁵⁵ .
Lesser Snapdragon (<i>Misopates orontium</i>)	FPO	Endangered	NPWS Online Map Viewer	Rare plant, found in the south-east and south-west. It usually inhabits arable fields ⁵⁶
Basil Thyme (<i>Acinos arvensis</i>)	FPO	Near Threatened	NPWS Online Map Viewer	A few plants were recorded near Tulla churchyard, Carrickmines in the past but these were never re- found ⁵⁷
Tufted Salt- marsh Grass (<i>Puccinellia fasciculata</i>)	FPO	Near Threatened	NPWS Online Map Viewer	Confined to coastal saltmarsh habitats.
Red Hemp Nettle (<i>Galeopsis angustifolia</i>)	FPO	Vulnerable	NPWS Online Map Viewer	Grows in arable fields, coastal shingle, railway ballast and limestone scree ⁵⁸ . It was recorded in the past (1943) along a roadside at Ballycorus ⁵⁷
Round Prickly- headed Poppy (<i>Papaver hybridum</i>)	FPO	Regionally Extinct	NPWS Online Map Viewer	Rarest of Co. Dublin poppies and is confined to the coast or northward of the mouth of the Liffey ⁵⁷

⁵³ HDII/IV/V = Habitats Directive Annexes II/IV/V; FPO = Flora (Protection) Order, 2015; WA = Wildlife Acts

⁵⁴ Vascular Flora from the Irish Red List No. 10 Vascular Plants (Wyse-Jackson et al., 2016); Bryophytes from the Irish Red List No. 8 Bryophytes- Mosses, Liverworts & Hornworts (Lockhart et al., 2012).

⁵⁵ Wildflowers of Ireland: Wild Asparagus Available from: http://www.wildflowersofireland.net/plant_detail.php?id_flower=314&wildflower=Asparagus,%20Wild [Accessed 16/04/2019]

⁵⁶ Parnell, J. & Curtis, T. (2012). Webb's An Irish Flora. Eighth Edition.

⁵⁷ Doogue, D., Nash, D., Parnell, J., Reynolds, S. & Jackson P.J. (1998). Flora of County Dublin. The Dublin Naturalists' Field Club.

⁵⁸ Plantlife: Red Hemp-nettle. Available from: <https://www.plantlife.org.uk/uk/discover-wild-plants-nature/plant-fungi-species/red-hemp-nettle> [Accessed 16/04/2019]

Common name/ scientific name	Legal status ⁵³	Red list status ⁵⁴	Source	Known locations/ habitat preferences
Bog Orchid (<i>Hammarbya paludosa</i>)	FPO	Near Threatened	NPWS Online Map Viewer	Very rare plant which occurs in flushes in boggy ground. It was recorded to the south-west of Glencullen Bridge in the past, but the site was destroyed in 1992 ⁵⁷
Annual Knawel (<i>Scleranthus annus</i>)	FPO	Vulnerable	NPWS Online Map Viewer	Formerly recorded on sandy or gravelly ground but has not been seen recently ⁵⁷
Killarney Fern (<i>Trichomanes speciosum</i>)	FPO, HD II, IV	Least Concern	NPWS Online Map Viewer	Grows in deeply shaded, humid situations such as dripping caves, crevices and overhangs on cliffs and rocky slopes, in stream gullies and by waterfalls. It may grow in woodlands under fallen trees and on the floor of damp woodlands. It is found in areas underlain by acidic rocks and has an altitudinal range of 50 - 380m above sea- level ⁵⁹
Penny Royal (<i>Mentha pulegium</i>)	FPO	Endangered	NPWS Online Map Viewer	Found in damp, sandy places. It is very rare and is found occasionally in counties Kerry and Cork ⁵⁶
Darnel (<i>Lolium temulentum</i>)	N/A	Endangered	NBDC online database	Formerly widespread throughout Ireland as a cornfield weed. Recently known only from the Aran Islands and east County Mayo ⁵⁶ . Not recently found in Co. Dublin and probably extinct ⁵⁷ .
River Water- crowfoot (<i>Ranunculus fluitans</i>)	N/A	Vulnerable	NBDC online database	Typically occurs in large, lowland mesotrophic to eutrophic rivers with stable, often gravel substrates however it may also occasionally be found in smaller water bodies such as streams or even ponds ⁶⁰ .
Lesser Copperwort (<i>Cephalozella massalongi</i>)	FPO	Vulnerable	NBDC online database	Typically recorded near copper and lead mines, on substrates rich in heavy metals.
Petalwort (<i>Petalophyllum ralfsii</i>)	FPO, HD II	Least Concern	NBDC online database	Coastal species.
Crisp Beardless- moss (<i>Weissia longifolia</i>)	FPO	Vulnerable	NBDC online database	Known from only a few locations in Ireland, mainly in the east, where it grows on damp, non-

⁵⁹ National Parks & Wildlife Service (2013). The Status of EU protected Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks & Wildlife Services.

⁶⁰ IUCN Red List: *Ranunculus fluitans*. Available from:
<https://www.iucnredlist.org/species/167918/6415235#habitat-ecology> [Accessed 18/04/2019]

Common name/ scientific name	Legal status ⁵³	Red list status ⁵⁴	Source	Known locations/ habitat preferences
				calcareous ground, especially stubble fields ⁴⁸
Glass-wort Feather-moss (<i>Scleropodium tourettii</i>)	FPO	Endangered	NBDC online database	Most often found in coastal locations.
Beck Pocket- moss (<i>Fissidens rufulus</i>)	FPO	Endangered	NBDC online database	Grows on rocks in clean, lowland, fast-flowing rivers and streams.
Large White- moss (<i>Leucobryum glaucum</i>)	HD V	Least Concern	NBDC online database	Occupies a broad ecological range, the most common habitats it is recorded in include acidic woodland and mires, wet heath and valley mires, raised bogs and fen ⁴⁸
Straw Bristle- moss (<i>Orthotrichum stramineum</i>)	FPO	Vulnerable	NBDC online database	Almost absent from Ireland and favours upland edge habitats ⁴⁸
Wilson's Pottia (<i>Tortula wilsonii</i>)	FPO	Regionally Extinct	NBDC online database	Most often found in coastal locations.
Lead-moss (<i>Ditrichum plumbicola</i>)	FPO	Endangered	NBDC online database	Typically recorded near copper and lead mines, on substrates rich in heavy metals.
Hedgehog Grimmia (<i>Grimmia crinita</i>)	N/A	Regionally Extinct	NBDC online database	Inhabits basic, barren substrates in sunny positions. Lowland species ⁶¹
Lance-leaved Pottia (<i>Tortula lanceola</i>)	N/A	Critically Endangered	NBDC online database	Grows on well-drained, disturbed, calcareous soils e.g. banks of shallow turf over calcareous sandstone, chalk or limestone in quarries ⁴⁸
Rigid Aloe-moss (<i>Aloina rigida</i>)	N/A	Regionally Extinct	NBDC online database	Rare species, scattered in chalk and limestone districts, preferring rather bare ground on banks and cliffs and in pits and quarries. It especially favours very thin layers of soil on limestone ledges ⁴⁸
Rounded Pygmy-moss (<i>Acaulon muticum</i>)	N/A	Regionally Extinct	NBDC online database	Grows on bare, base-deficient, well -drained soil in arable fields, gravel puts, by tracks and paths, on banks and on anthills ⁴⁸

⁶¹ Greven, H. (2011). Ecology and distribution of *Grimmia crinita* Brid. Field Bryology No. 104 June 2011: 18-21. Available at: <https://rbg-web2.rbge.org.uk/bbs/activities/field%20bryology/FB104/FB104%20Greven.pdf>

Common name/ scientific name	Legal status ⁵³	Red list status ⁵⁴	Source	Known locations/ habitat preferences
Starke's Pottia (<i>Microbryum starckeanum</i>)	N/A	Regionally Extinct	NBDC online database	Rare species. Most often encountered in coastal areas or on metal mine sites ⁴⁸
<i>Weissia longifolia</i> var. <i>angustifolia</i>	N/A	Vulnerable	NBDC online database	Favours drier, lime-rich places. Particularly calcareous grassland and disused limestone quarries and chalk pits ⁴⁸
Ghostwort (<i>Cryptothallus mirabilis</i>)	N/A	Vulnerable	NBDC online database	Found under carpets of <i>Sphagnum</i> around the base of birch trees in wet woodland ⁴⁸
Turner's Threadwort (<i>Cephaloziella turneri</i>)	N/A	Vulnerable	NBDC online database	Most frequent on steep, crumbly, acidic soil among tree roots overhanging coastal creeks. Lane banks or ditchsides, usually in light shade ⁴⁸ . Known to occur in the Glen of the Downs SAC ⁶² .
Capillary Wing- moss (<i>Pterigynandrum filiforme</i>)	N/A	Regionally Extinct	NBDC online database	Hillsides and river gorges, exposed sandstone, limestone or igneous rocks ⁴⁸ . Known to occur in the Glen of the Downs SAC ⁶²
Curved Silk- moss (<i>Plagiothecium curvifolium</i>)	N/A	Vulnerable	NBDC online database	Low lying ground, often found on leaf litter or tree stumps under conifers in plantations ⁴⁸ Known to occur in the Glen of the Downs SAC, which is the only known Irish site for this species ⁶²

Based on the known locations and preferred habitats of species listed in **Table 12.3** it is highly unlikely that the majority of these species, would occur in close proximity to the N11/M11 Scheme. Exceptions to this may include Large White Moss, which, given its habitat preferences, could possibly be found in some woodland habitats which lie in close proximity to the existing N11/M11 road, such as Glen of the Downs. In addition, records exist from Glen of the Downs SAC for three of the bryophyte species listed above (i.e. Turner's Threadwort, Capillary Wing-moss and Curved Silk-moss).

Fauna

There are several European and nationally protected mammal, bird, fish, amphibian, reptiles and invertebrate species which have been recorded within the study area. These are summarised in **Table 12.4**.

In the case of bird species, only those species listed in Annex I of the Birds Directive or on the Birds of Conservation Concern in Ireland (BoCCI) Red List are included. Evidence of fauna that was identified as part of the field surveys is detailed in **Section 12.4.2**.

⁶² National Parks & Wildlife Service (2013). Site Synopsis for Glen of the Downs SAC [000719]

Table 12.4: Records of protected, red-listed or notable fauna within the study area

Common name/ scientific name	Legal status ⁶³	Red list status ⁶⁴	source
Amphibians			
Common Frog (<i>Rana temporaria</i>)	HD V; WA	Least Concern	NBDC online database
Smooth Newt (<i>Lissotriton vulgaris</i>)	WA	Least Concern	NBDC online database
Reptiles			
Common Lizard (<i>Zootoca vivipara</i>)	WA	Least Concern	NBDC online database
Leatherback Turtle (<i>Dermochelys coriacea</i>)	HD IV; WA	Least Concern	NBDC online database
Loggerhead Turtle (<i>Caretta caretta</i>)	HD II, IV; WA	Not Assessed	NBDC online database
Invertebrates			
Marsh Fritillary (<i>Euphydryas aurinia</i>)	HD II	Vulnerable	NBDC online database
Dark Green Fritillary (<i>Argynnis aglaja</i>)	N/A	Vulnerable	NBDC online database
Small Blue (<i>Cupido minimus</i>)	N/A	Endangered	NBDC online database
Wall (<i>Lasiommata megera</i>)	N/A	Endangered	NBDC online database
<i>Andrena (Andrena) praecox</i>	N/A	Vulnerable	NBDC online database
<i>Andrena (Cnemidandrena) denticulata</i>	N/A	Vulnerable	NBDC online database
<i>Andrena (Melandrena) nigroaenea</i>	N/A	Vulnerable	NBDC online database
Field Cuckoo Bee (<i>Bombus (Psithyrus) campestris</i>)	N/A	Vulnerable	NBDC online database
Gooden's Nomad Bee (<i>Nomada goodeniana</i>)	N/A	Endangered	NBDC online database
<i>Hylaeus (Prosopis) brevicornis</i>	N/A	Endangered	NBDC online database

⁶³ HDII/IV/V = Habitats Directive Annexes II/IV/V; FPO = Flora (Protection) Order, 2015; WA = Wildlife Acts; BD I/II/III= Birds Directive Annexes I/II/III

⁶⁴ Butterflies from the Irish Red List No. 4 Butterflies (Regan et al., 2010); Amphibians, Reptiles & Fish from the Irish Red List No. 5 Amphibians, Reptiles & Freshwater Fish (King et al., 2011); Terrestrial Mammals from the Irish Red List No.3 Terrestrial Mammals (Marnell et al., 2009); Cartilaginous Fish from the Irish Red List no. 11 Cartilaginous Fish (Sharks, Skates, Rays & Chimaeras) (Clarke et al., 2016); Birds from Birds of Conservation Concern in Ireland 2014-2019 (Colhoun & Cummins, 2013); Non-Marine Molluscs from Irish Red List No. 2 Non-Marine Molluscs (Byrne et al., 2009); Water Beetles from Irish Red List No. 1 Water Beetles (Foster et al., 2009); Mayflies from Irish Red List No.7 Mayflies (Ephemeroptera) (Kelly-Quinn & Regan, 2012); Bees from Regional Red List of Irish Bees (Fitzpatrick et al., 2006).

Common name/ scientific name	Legal status ⁶³	Red list status ⁶⁴	source
<i>Hylaeus (Spatulariella) hyalinatus</i>	N/A	Vulnerable	NBDC online database
Neat Mining Bee (<i>Lasioglossum (Evyllaesus) nitidiusculum</i>)	N/A	Vulnerable	NBDC online database
Red-tailed Carder Bee (<i>Bombus (Thoracombus) ruderarius</i>)	N/A	Vulnerable	NBDC online database
Tawny Mining Bee (<i>Andrena (Andrena) fulva</i>)	N/A	Regionally Extinct	NBDC online database
<i>Andrena (Cnemidandrena) fuscipes</i>	N/A	Vulnerable	NBDC online database
<i>Andrena (Micrandrena) semilaevis</i>	N/A	Vulnerable	NBDC online database
<i>Andrena (Oreomelissa) coitana</i>	N/A	Vulnerable	NBDC online database
<i>Andrena (Ptilandrena) angustior</i>	N/A	Vulnerable	NBDC online database
Barbut's Cuckoo Bee (<i>Bombus (Psithyrus) barbutellus</i>)	N/A	Endangered	NBDC online database
Hill Cuckoo Bee (<i>Bombus (Psithyrus) rupestris</i>)	N/A	Endangered	NBDC online database
<i>Lasioglossum (Lasioglossum) lativentre</i>	N/A	Critically Endangered	NBDC online database
<i>Nomada obtusifrons</i>	N/A	Endangered	NBDC online database
<i>Nomada striata</i>	N/A	Endangered	NBDC online database
Shrill Carder Bee (<i>Bombus (Thoracombus) sylvarum</i>)	N/A	Endangered	NBDC online database
<i>Sphcodes hyalinatus</i>	N/A	Vulnerable	NBDC online database
Great Yellow Bumble Bee (<i>Bombus (Subterraneobombus) distinguendus</i>)	N/A	Endangered	NBDC online database
Northern Colletes (<i>Colletes (Colletes) floralis</i>)	N/A	Vulnerable	NBDC online database
<i>Rhithrogena germanica</i>	N/A	Vulnerable	NBDC online database
<i>Hydraena flavipes</i>	N/A	Critically Endangered	NBDC online database
<i>Enicocerus exsculptus</i>	N/A	Endangered	NBDC online database

Common name/ scientific name	Legal status ⁶³	Red list status ⁶⁴	source
<i>Hydrocaphon deflexicollis</i>	N/A	Endangered	NBDC online database
Lake Orb Mussel (<i>Musculium lacustre</i>)	N/A	Vulnerable	NBDC online database
Lesser Bulin (<i>Merdigera obscura</i>)	N/A	Endangered	NBDC online database
Marsh Whorl Snail (<i>Vertigo (Vertigo) antivertigo</i>)	N/A	Vulnerable	NBDC online database
Moss Bladder Snail (<i>Aplexa hypnorum</i>)	N/A	Vulnerable	NBDC online database
Moss Chrysalis Snail (<i>Pupilla (Pupilla) muscorum</i>)	N/A	Endangered	NBDC online database
Plaited Door Snail (<i>Cochlodina (Cochlodina) laminata</i>)	N/A	Vulnerable	NBDC online database
Plated Snail (<i>Spermodea lamellata</i>)	N/A	Endangered	NBDC online database
Point Snail (<i>Acicula fusca</i>)	N/A	Vulnerable	NBDC online database
Smooth Grass Snail (<i>Vallonia pulchella</i>)	N/A	Vulnerable	NBDC online database
Smooth Ramshorn (<i>Gyraulus (Torquis) laevis</i>)	N/A	Endangered	NBDC online database
Tree Snail (<i>Balea (Balea) perversa</i>)	N/A	Vulnerable	NBDC online database
Brown Snail (<i>Zenobiella subrufescens</i>)	N/A	Vulnerable	NBDC online database
Heath Snail (<i>Helicella itala</i>)	N/A	Vulnerable	NBDC online database
English Chrysalis Snail (<i>Leiostylia (Leiostylia) anglica</i>)	N/A	Vulnerable	NBDC online database
Ear Pond Snail (<i>Radix auricularia</i>)	N/A	Vulnerable	NBDC online database
Dog Whelk (<i>Nucella lapillus</i>)	OSPAR Convention	Not Assessed	NBDC online database
Ash-black Slug (<i>Limax cinereoniger</i>)	N/A	Vulnerable	NBDC online database
Fish			
Common Sturgeon (<i>Acipenser sturio</i>)	OSPAR Convention; HD IV; WA	Not Assessed	NBDC online database
Basking Shark (<i>Cetorhinus maximus</i>)	OSPAR Convention	Endangered	NBDC online database
European Eel (<i>Anguilla anguilla</i>)	OSPAR Convention	Critically Endangered	NBDC online database

Common name/ scientific name	Legal status ⁶³	Red list status ⁶⁴	source
Atlantic Cod (<i>Gadus morhua</i>)	OSPAR Convention	Not Assessed	NBDC online database
Thornback Ray (<i>Raja clavata</i>)	OSPAR Convention	Least Concern	NBDC online database
Terrestrial Mammals			
Eurasian Badger (<i>Meles meles</i>)	WA	Least Concern	NBDC online database
Eurasian Pygmy Shrew (<i>Sorex minutus</i>)	WA	Least Concern	NBDC online database
Eurasian Red Squirrel (<i>Sciurus vulgaris</i>)	WA	Near Threatened	NBDC online database
European Otter (<i>Lutra lutra</i>)	HD II, IV; WA	Near Threatened	NBDC online database
Red Deer (<i>Cervus elaphus</i>)	WA	Least Concern	NBDC online database
Fallow Deer (<i>Dama dama</i>)	WA	Least Concern	NBDC online database
Sika Deer (<i>Cervus nippon</i>)	WA	Not Assessed	NBDC online database
West European Hedgehog (<i>Erinaceus europaeus</i>)	WA	Least Concern	NBDC online database
Pine Marten (<i>Martes martes</i>)	HD V; WA	Least Concern	NBDC online database
Irish Hare (<i>Lepus timidus subsp. hibernicus</i>)	WA	Least Concern	NBDC online database
Irish Stoat (<i>Mustela erminea subsp. hibernica</i>)	WA	Least Concern	NBDC online database
Brown Long-eared Bat (<i>Plecotus auritus</i>)	HD IV; WA	Least Concern	NBDC online database
Daubenton's Bat (<i>Myotis daubentonii</i>)	HD IV; WA	Least Concern	NBDC online database
Leisler's Bat (<i>Nyctalus leisleri</i>)	HD IV; WA	Near Threatened	NBDC online database
Natterer's Bat (<i>Myotis nattereri</i>)	HD IV; WA	Least Concern	NBDC online database
Pipistrelle (<i>Pipistrellus pipistrellus sensu lato</i>)	HD IV; WA	Least Concern	NBDC online database
Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	HD IV; WA	Least Concern	NBDC online database
Whiskered Bat (<i>Myotis mystacinus</i>)	HD IV; WA	Least Concern	NBDC online database
Marine Mammals			
Bottle-nosed Dolphin (<i>Tursiops truncatus</i>)	HD II, IV; WA	Not Assessed	NBDC online database

Common name/ scientific name	Legal status ⁶³	Red list status ⁶⁴	source
Common Dolphin (<i>Delphinus delphis</i>)	HD IV; WA	Not Assessed	NBDC online database
Common Porpoise (<i>Phocoena phocoena</i>)	HD II, IV; WA	Not Assessed	NBDC online database
Common Seal (<i>Phoca vitulina</i>)	HD II, V; WA	Not Assessed	NBDC online database
Grey Seal (<i>Halichoerus grypus</i>)	HD II, V; WA	Not Assessed	NBDC online database
Northern Bottlenose Whale (<i>Hyperoodon ampullatus</i>)	HD IV; WA	Not Assessed	NBDC online database
Risso's Dolphin (<i>Grampus griseus</i>)	WA	Not Assessed	NBDC online database
Birds			
Arctic Tern (<i>Sterna paradisaea</i>)	BD I; WA	Amber List	NBDC online database
Balearic Shearwater (<i>Puffinus mauretanicus</i>)	WA; OSPAR Convention	Red List	NBDC online database
Barn Owl (<i>Tyto alba</i>)	WA	Red List	NBDC online database
Bar-tailed Godwit (<i>Limosa lapponica</i>)	BD I; WA	Amber List	NBDC online database
Black-headed Gull (<i>Larus ridibundus</i>)	WA	Red List	NBDC online database
Black-necked Grebe (<i>Podiceps nigricollis</i>)	WA	Red List	NBDC online database
Black-throated Diver (<i>Gavia arctica</i>)	BD I; WA	Amber List	NBDC online database
Common Goldeneye (<i>Bucephala clangula</i>)	BD II; WA	Red List	NBDC online database
Common Kingfisher (<i>Alcedo atthis</i>)	BD I; WA	Amber List	NBDC online database
Common Pochard (<i>Aythya ferina</i>)	BD II, III; WA	Red List	NBDC online database
Common Redshank (<i>Tringa totanus</i>)	WA	Red List	NBDC online database
Common Scoter (<i>Melanitta nigra</i>)	BD II, III; WA	Red List	NBDC online database
Common Tern (<i>Sterna hirundo</i>)	BD I; WA	Amber List	NBDC online database
Corn Crake (<i>Crex crex</i>)	BD I; WA	Red List	NBDC online database
Dunlin (<i>Calidris alpina</i>)	BD I; WA	Red List	NBDC online database

Common name/ scientific name	Legal status ⁶³	Red list status ⁶⁴	source
Eurasian Curlew (<i>Numenius arquata</i>)	BD II; WA	Red List	NBDC online database
Eurasian Wigeon (<i>Anas penelope</i>)	BD II, III; WA	Red List	NBDC online database
Eurasian Woodcock (<i>Scolopax rusticola</i>)	BD II, III; WA	Red List	NBDC online database
European Golden Plover (<i>Pluvialis apricaria</i>)	BD I, II, III; WA	Red List	NBDC online database
European Nightjar (<i>Caprimulgus europaeus</i>)	BD I; WA	Red List	NBDC online database
European Storm-petrel (<i>Hydrobates pelagicus</i>)	BD I; WA	Amber List	NBDC online database
Great Northern Diver (<i>Gavia immer</i>)	BD I; WA	Amber List	NBDC online database
Grey Wagtail (<i>Motacilla cinerea</i>)	WA	Red List	NBDC online database
Herring Gull (<i>Larus argentatus</i>)	WA	Red List	NBDC online database
Kentish Plover (<i>Charadrius alexandrinus</i>)	BD I; WA	Not Assessed	NBDC online database
Little Egret (<i>Egretta garzetta</i>)	BD I; WA	Green Listed	NBDC online database
Little Gull (<i>Larus minutus</i>)	BD I; WA	Amber List	NBDC online database
Little Tern (<i>Sternula albifrons</i>)	BD I; WA	Amber List	NBDC online database
Long-tailed Duck (<i>Clangula hyemalis</i>)	BD II; WA	Red List	NBDC online database
Meadow Pipit (<i>Anthus pratensis</i>)	WA	Red List	NBDC online database
Mediterranean Gull (<i>Larus melanocephalus</i>)	BD I; WA	Amber List	NBDC online database
Merlin (<i>Falco columbarius</i>)	BD I; WA	Amber List	NBDC online database
Northern Lapwing (<i>Vanellus vanellus</i>)	BD II; WA	Red List	NBDC online database
Northern Shoveler (<i>Anas clypeata</i>)	BD II, III; WA	Red List	NBDC online database
Peregrine Falcon (<i>Falco peregrinus</i>)	BD I; WA	Green List	NBDC online database
Red Grouse (<i>Lagopus lagopus</i>)	BD II, III; WA	Red List	NBDC online database
Red-necked Phalarope (<i>Phalaropus lobatus</i>)	BD I; WA	Red List	NBDC online database

Common name/ scientific name	Legal status ⁶³	Red list status ⁶⁴	source
Red-throated Diver (<i>Gavia stellata</i>)	BD I; WA	Amber List	NBDC online database
Roseate Tern (<i>Sterna dougallii</i>)	BD I; OSPAR Convention; WA	Amber List	NBDC online database
Sandwich Tern (<i>Sterna sandvicensis</i>)	BD I; WA	Amber List	NBDC online database
Short-eared Owl (<i>Asio flammeus</i>)	BD I; WA	Amber List	NBDC online database
Tufted Duck (<i>Aythya fuligula</i>)	BD II, III; WA	Red List	NBDC online database
Whooper Swan (<i>Cygnus cygnus</i>)	BD I; WA	Amber List	NBDC online database
Yellowhammer (<i>Emberiza citrinella</i>)	WA	Red List	NBDC online database
Common Quail (<i>Coturnix coturnix</i>)	WA	Red List	NBDC online database
Twite (<i>Carduelis flavirostris</i>)	WA	Red List	NBDC online database
Grey Partridge (<i>Perdix perdix</i>)	BD II, III; WA	Red List	NBDC online database
Hen Harrier (<i>Circus cyaneus</i>)	BD I; WA	Amber List	NBDC online database
Whinchat (<i>Saxicola rubetra</i>)	WA	Red List	NBDC online database

With regards bat species, the following habitat features/ areas, present within the constraints study area, are likely to be important for local populations; areas of woodland, river corridors, agricultural lands with well-developed hedgerow/ treeline network, old buildings, bridges and underground structures (e.g. ice-houses, souterrains etc). These will be examined over the course of the bat surveys to inform the EIAR.

Ecological sites

Approximately 46 ecological sites were identified following a review of orthophotography and collation of available existing habitat information. A ground truthing exercise was subsequently undertaken to verify the orthophotography interpretation and refine the boundaries of the ecological sites, where they were located in close proximity to, or overlapped with, a corridor option (see **Section 12.4.2**).

12.4.2 Field surveys

This section details the results of field surveys undertaken to inform the constraints study and subsequent options selection process.

Terrestrial habitats

Habitat Surveys at Glen of the Downs SAC (000719)

Thirteen different habitat types, as described in Fossitt (2000)³⁸, were identified over the course of the habitat surveys undertaken by Scott Cawley Ltd. in May 2019. Within the semi-natural habitat types recorded in the study area, a number of different woodland vegetative communities, as described in the Irish Vegetation Classification, were also identified.

The following semi-natural woodland habitats, as described in Fossitt³⁸, were identified in the Glen of the Downs; Oak-birch-holly woodland (WN1), Oak-ash-hazel woodland (WN2), and, Wet Willow-alder-ash woodland (WN6). **Figures B12.45-B12.50** display the range of Fossitt³⁸ habitats recorded at Glen of the Downs. Three Annex I habitats were also identified; Old oak woodland [91A0], Alluvial woodland [91E0*] and Petrifying springs [7220*]. Both Alluvial woodland [91E0*] and Petrifying springs [7220*] are priority Annex I habitats of international importance. Old oak woodland [91A0], as the qualifying interest of the SAC, is of international importance also. **Figures B12.41-B12.44** show the extent of these three Annex I habitats within Glen of the Downs. The extent of the Qualifying Interest (QI) habitat [91A0] for Glen of the Downs SAC was established and mapped (see **Figures B12.37-B12.40**).

Please refer to the Glen of the Downs Habitat Survey & Evaluation Report, included in **Appendix B12.1**, for detailed results.

Habitat Surveys at Kilmacanogue Marsh pNHA (000724)

Fourteen different habitat types, as described in Fossitt³⁸, were identified in Kilmacanogue Marsh pNHA. Semi-natural habitats recorded include wet willow-alder-ash woodland (WN6), riparian woodland (WN5), scrub (WS1), rich fen and flush (PF1), wet grassland (GS4), dry meadows and grassy verges (GS2), dry calcareous and neutral grassland (GS1), tall-herb swamps (FS2) and depositing/lowland rivers (FW2). **Figures B12.53-B12.54** displays the range of Fossitt³⁸ habitats recorded at Kilmacanogue Marsh pNHA.

Two Annex I habitats were also identified at Kilmacanogue Marsh pNHA; Alluvial woodland [91E0*] and Orchid-rich calcareous grassland [6210].

Alluvial woodland [91E0*] is a priority Annex I habitat, meaning that it is of international importance, even though it is not contained within a European designated site (e.g. SAC). The extent of these Annex I habitats within Kilmacanogue Marsh pNHA were also identified (see **Figures B12.51-B12.52**).

Habitat Surveys at Druids Glen Woodland ecological site (EC24)

A total of seventeen different habitat types were identified in this ecological site. The most ecologically important habitats included calcareous springs (FP1), wet grassland (GS4) and wet willow-alder-ash woodland (WN6).

Figures B12.58-B12.60 displays the range of Fossitt³⁸ habitats recorded at Druids Glen Woodland ecological site (EC24).

One Annex I habitat was also identified in this ecological site – Petrifying springs [7220*]. This is a priority Annex I habitat and is of international importance. The extent of this Annex I habitat type within Druids Glen Woodland ecological site is displayed on **Figures B12.55-B12.57**.

Habitat Surveys at Ballyvolan Upper - Coynes Cross ecological site (EC29)

Eight different habitat types, as described in Fossitt³⁸, were identified at this ecological site. Semi-natural habitats recorded include oak-birch-holly woodland (WN1), scrub (WS1), hedgerows (WL1) dry meadows and grassy verges (GS2), and depositing/ lowland rivers (FW2). **Figures B12.64-B12.66** displays the range of Fossitt³⁸ habitats recorded at Ballyvolan Upper- Coynes Cross ecological site (EC29).

One Annex I habitat was also identified here; Old oak woodland [91A0], which occurred over a large area of the site. Old oak woodland [91A0] is of national importance here, given that it is a habitat listed on Annex I of the Habitats Directive, but occurs outside of a designated European site in this instance. The extent of this Annex I habitat within Ballyvolan Upper- Coynes Cross ecological site was also defined (see **Figures B12.61-B12.63**). It should be noted that several invasive species were recorded in the understorey of this woodland, which has affected the quality of the Annex I woodland here. Nevertheless, this does not affect its classification as Annex I woodland, nor its ecological significance.

Surveys for Rare/Protected Bryophyte Species in Glen of the Downs SAC

Two rare bryophyte species, *Cephaloziella turneri* and *Plagiothecium curvifolium*, were recorded during the bryophyte survey conducted in the Glen of the Downs SAC. According to the British Bryological Society's *Atlas of British and Irish Bryophytes*⁶⁵, the Glen of the Downs is one of only six known Irish locations for *Cephaloziella turneri*, with the other records from Co. Donegal and south coast counties like Cork and Wexford. Similarly, the Glen is one of six known Irish locations for *Plagiothecium curvifolium*, with the other records spreading from Co. Wexford, the Leitrim- Roscommon region, to Co. Derry. This means that the Glen of the Downs is one of a handful of locations for these two rare bryophyte species on the east coast.

Please refer to the Glen of the Downs Habitat Survey & Evaluation Report, included in **Appendix B12.1**, for detailed results.

Walkover Surveys of Ecological Sites

⁶⁵ Blockeel, T.L., Bosanquet, S.D.S., Hill, M.O. and Preston, C.D. (2014). *Atlas of British and Irish bryophytes*. British Bryological Society.

The results of the walkover surveys of ecological sites have been incorporated into the descriptions detailed in **Table 12.5**.

Multidisciplinary Surveys

Multidisciplinary surveys were carried out within 250m of the existing N11/ M11 road so the Design Team is 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, for the purposes of future options selection stages.

In terms of notable flora, no protected flora species were recorded over the course of the multidisciplinary surveys undertaken.

Several invasive species, including species which are listed on the Third Schedule of the *European Communities (EC) (Birds and Natural Habitats) Regulations 2011 to 2015* (e.g. Japanese knotweed and giant hogweed), were recorded within the study area.

Regarding protected fauna species, signs of several protected mammal species were detected over the course of the multidisciplinary surveys. Signs of foraging badger were commonplace within the study area, typically occurring along hedgerow boundaries associated with agricultural lands. Potential resting places which are likely to be used by badger were recorded in the Glen of the Downs SAC and Brennanstown Riding School. Badger, and their breeding and resting places, are protected under the Wildlife Acts.

Signs of otter were recorded along the Three-trouts Stream in the Glen of the Downs. It is likely that otter use many of the watercourses in the study area for foraging and commuting purposes. Otter, and their breeding and resting places, are protected under the Wildlife Acts. Otter are also listed on Annex II and Annex IV of the EU Habitats Directive and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011.

Sika deer were observed on the west side of the Glen of the Downs SAC, and signs of deer (e.g. prints and droppings) were frequently recorded in the study area, both in woodland and agricultural fields. Sika deer, red deer and fallow deer are all afforded legal protection in Ireland, under the Wildlife Acts.

Numerous trees and several structures which could support roosting bats were also recorded during the multidisciplinary surveys. Bats, and their breeding and resting places, are protected under the Wildlife Acts.

All bat species are also listed on Annex IV of the EU Habitats Directive (with the Lesser horseshoe bat also listed on Annex II) and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011.

In terms of avian fauna recorded, the majority of birds noted comprised passerine species, typical of urban, suburban and rural landscapes. Birds of prey, including kestrel and buzzard, were recorded over agricultural lands. All wild birds, and their nests and eggs, are protected under the Wildlife Acts. Some bird species are also listed on Annex I of the EU Birds Directive.

Amphibians may be present in a small pond, near Shankill, which is known to contain a population of newts. Newts are protected under the Wildlife Acts.

Ecological sites

Ecological Sites are sites of ecological value for the habitats present: i.e. those determined to be at least of a Local Importance (higher value) (refer to National Roads Authority, 2009¹⁴ for more detail). The boundaries of the Ecological Sites have been defined based on interpretation of orthophotography. Refinement of these boundaries was completed following a ground truthing exercise at each of the ecological sites identified.

Ecological Sites identified in the study area are presented in **Table 12.5** and displayed in **Figures B12.31 - B12.36**.

Table 12.5: Ecological sites identified in the study area

Ecological site number/reference	Ecological site name	Description	Ecological valuation
EC01	Brennanstown	Broadleaf woodland along the banks of the Carrickmines Stream	Local Importance (Higher Value)
EC02	Cherrywood	Broadleaf Woodland along the banks of the Shanganagh River	Local Importance (Higher Value)
EC03	Ballycorus and Carrickgollogan	Mosaic of woodland, upland heath (Annex I) and grassland habitats.	National Importance
EC04	Barnaslingan Forest	Woodland habitat	Local Importance (Higher Value)
EC05	Woodbrook (Bray)	Wooded area along the banks of the Rathmichael River.	Local Importance (Higher Value)
EC06	Bray	Woodland along banks of Swan River	Local Importance (Higher Value)
EC07	Dargle Woodland	Mixed broadleaved woodland along Dargle River Valley.	Local Importance (Higher Value)
EC08	Glencullen Woodland	Mixed broadleaved woodland along the banks of the Glencullen River.	Local Importance (Higher Value)
EC09	Enniskerry	Broadleaf woodland including along the banks of the Killough River, which is	Local Importance (Higher Value)

Ecological site number/reference	Ecological site name	Description	Ecological valuation
		a tributary of the River Dargle.	
EC10	Hollybrook-Brennanstown Riding School	Large area of broadleaf woodland, much of which is dominated by Beech, including the banks along the Kilmacanoge River.	Local Importance (Higher Value)
EC11	Kilruddery East	Area of broadleaf woodland	Local Importance (Higher Value)
EC12	Greystones to Ballygannon	Coastal habitats (Annex I) located along the shore from Bray Head SAC to The Murrough pNHA.	National Importance
EC13	Kilruddery Centre	Large area of woodland, with areas of mixed and semi-natural woodlands.	Local Importance (Higher Value)
EC14	Kilruddery West 1	Area of broadleaf woodland	Local Importance (Higher Value)
EC15	Kilruddery West 2	Area of Woodland and scrub	Local Importance (Higher Value)
EC16	Barnacaille – Little Sugarloaf	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
EC17	Kilruddery South West	Large area of broadleaf woodland.	Local Importance (Higher Value)
EC18	Bellevue Demesne	Woodland including areas of mixed woodland and non-native conifer woodland.	Local Importance (Higher Value)
EC19	Kindlestown Woods	Woodland including areas of mixed conifer/broadleaved woodland and conifer woodland. Some areas of woodland have recently been harvested.	Local Importance (Higher Value)
EC20	Ballinashinnagh-Kilmurray	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
EC21	Kilquade	Broadleaf woodland along the banks of the Kilcoole Stream	Local Importance (Higher Value)

Ecological site number/reference	Ecological site name	Description	Ecological valuation
EC22	Newtownmountkennedy	Broadleaf woodland along the banks of the Newtownmountkennedy River.	Local Importance (Higher Value)
EC23	Ballyronan	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)
EC24	Druids Glen Woodland	Broadleaf woodland along the banks of the Newtownmountkennedy River with areas of semi-natural woodland and Petrifying springs (priority Annex I) occurring.	International Importance
EC25	Kilmurry- Merepark	Woodland habitat	Local Importance (Higher Value)
EC26	Ballinahinch-Corsillagh	Woodland and upland heath (Annex I) habitats	National Importance
EC27	Newcastle Upper	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)
EC28	Coynes Cross	Mosaic of upland heath (Annex I), woodland and grassland habitats	National Importance
EC29	Ballyvolan Upper-Coynes Cross	Woodland habitat including Annex I Old oak woodland [91A0] and modified, semi-natural and non-native woodland types.	National Importance
EC30	Tiglin West	Broadleaf woodland and scrub	Local Importance (Higher Value)
EC31	Tiglin East	Scrub habitat	Local Importance (Higher Value)
EC32	Newcastle	Scrub habitat	Local Importance (Higher Value)

Ecological site number/reference	Ecological site name	Description	Ecological valuation
EC33	Knockfadda	Woodland habitat	Local Importance (Higher Value)
EC34	Barnacoyle	Woodland habitat along the banks of the Dunran Demesne and Grange Rivers	Local Importance (Higher Value)
EC35	Kilmartin	Conifer plantation along the banks of the Cullenmore Stream. Some scrub and broadleaved woodland further west in the site.	Local Importance (Higher Value)
EC36	Rathmore	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)
EC37	Newtown Demesne	Modified mixed woodland habitats, agricultural lands and scrub.	Local Importance (Higher Value)
EC38	Tinnapark	Woodland and potentially FPO species present	National Importance
EC39	Delgany Golf Club	Mixed broadleaved woodland with occasional conifers.	Local Importance (Higher Value)
EC40	Delgany	Mixed broadleaved woodland and scrub.	Local Importance (Higher Value)
EC41	Woodlands	Broadleaved woodland, including native wet willow-alder-ash woodland, along with pockets of wet grassland and bramble/gorse scrub.	Local Importance (Higher Value)
EC42	Kilmurray South	Broadleaved woodland, hedgerows, gorse scrub and dry meadows and grassy verges.	Local Importance (Higher Value)
EC43	Dublin Oak Academy	Woodland	Local Importance (Higher Value)

Ecological site number/reference	Ecological site name	Description	Ecological valuation
EC44	Old Connaught	Broadleaved woodland and scrub, with motorway/roadside planting immediately adjacent to the existing N11/ M11.	Local Importance (Higher Value)
EC45	Ballywaltrim	Area of woodland between R767 and R768, which potentially contains pockets of the priority Annex I habitat Alluvial woodland [91E0*] and residential gardens along Kilmacanogue River corridor, known to contain the priority Annex I habitat Petrifying Springs [7220*].	International Importance
EC46	Ballydonagh	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

12.5 Summary and conclusions

In summary, there are a range of ecological constraints which occur within the study area. The level of legal protection (if any) afforded to these ecological constraints varies and the most significant constraints, from an ecological perspective, are the designated sites for nature conservation within the study area. The most notable designated site, in terms of constraint, is Glen of the Downs SAC, which lies either side of the existing N11 dual carriageway, approximately 8km south of Bray. Likewise, Kilmacanogue Marsh pNHA, which contains priority Annex I habitat (Alluvial woodland [91E0*]), lies along the western side of the existing N11 dual carriageway, with part of the pNHA actually overlapping with the existing road corridor. Glen of the Downs SAC is recognised and protected at an international level as it is designated under the Habitats Directive.

Kilmacanogue Marsh pNHA is assigned a base valuation of national ecological importance due to its designation as pNHA. However, given the presence of a priority Annex I habitat, in the form of Alluvial woodland [91E0*] within this pNHA, the level of ecological importance of Kilmacanogue Marsh has been augmented to international importance.

There are also several habitats of ecological interest in the study area (non-designated Annex I habitats, non-annex I woodland habitats and watercourses). The ecological value of these habitats, which range from local to international, both at a habitat level, but also in the ecological niches and opportunities which they offer species, are also considered as a constraint.

Watercourses, due to their linear and dynamic nature, may also act as vectors and transfer pollutants downstream. In this way they can act as potential pathways between sites of ecological importance. Several sites of biodiversity value, termed Ecological Sites, have also been identified within the study area (see **Table 12.5**) and are also considered as constraints. Their value ranges from local to international, depending on the habitats which they contain.

Finally (as portrayed in **Table 12.3** and **Table 12.4**), a range of rare/protected species of flora and fauna are known from the study area. Due to the habitat preferences associated with those species, it is unlikely that any protected flora species occur in the vicinity of the existing N11/M11 road corridor, with the exception of the liverwort *Cephaloziella turneri* and the bryophytes *Pterigynandrum filiforme* and *Plagiothecium curvifolium*, which are known to occur in Glen of the Downs SAC. Indeed, field surveys have revealed that two of the aforementioned three rare bryophyte species, *Cephaloziella turneri* and *Plagiothecium curvifolium*, occur in the Glen of the Downs SAC. In addition, *Leucobryum glaucum*, a species protected by the Habitats Directive (1992)⁶⁶, was also identified in acidic woodland during field surveys undertaken at Glen of the Downs SAC.

In terms of protected fauna species, it is possible that a range of protected mammal species such as otter, badger, red squirrel, bats and deer could inhabit adjacent land parcels to the existing road corridor. Likewise, barn owl and kingfisher, among other bird species, could occur in suitable habitats in the vicinity. It should be noted that barn owls are particularly vulnerable to collision with vehicles. A number of watercourses, contained within the study area, are known to be important salmonid rivers and it is therefore probable that protected fish species such as Atlantic Salmon (*Salmo salar*) could be present. Common Frog and Smooth Newt may occur in suitable wetland habitat.

The known biodiversity constraints are set out in this chapter. However, it is important to note that over the course of survey work, during the EIA stage, further ecological constraints may be identified and evaluated.

12.6 References

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⁶⁶ Listed on Annex V of the Habitats Directive

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13 Soils and geology

13.1 Introduction

This section describes the Soils and geology constraints identified within the study area for the N11/M11 Scheme. The study area for the N11/M11 Scheme is shown on the site location plan, **Figures B2.1 - B2.3**.

This desktop study collates information from readily available sources that will be used to inform the later stages of the Option Selection process.

The scope of this constraints study includes:

- A summary of the methodology followed to carry out this soils and geology constraints study;
- The sources of information consulted to carry out this soils and geology constraints study;
- A discussion of the existing environment in terms of geomorphology, solid geology, subsoil deposits, contaminated land, economic geology and geological heritage;
- An inventory of geological constraints; and
- Mapping of all soils and geological constraints.

13.1.1 List of figures and drawings

The study area for the purpose of this constraints study has been shown across three sheets in order to show it at a scale of 1:50,000. There are four sets of drawings:

1. Bedrock Geology Map which shows the Geological Survey Ireland (GSI) 1:100:000 scale bedrock mapping.¹
2. Subsoil Deposits Map which shows the GSI Quaternary deposits mapping and the location of available ground investigation from GSI.²
3. Soil Deposits Map which shows the Teagasc soil mapping.³

¹ McConnell, B. et al., 1994. *Geology of Kildare – Wicklow: A Geological Description, with accompanying Bedrock Geology 1:10,000 scale map, Sheet 16, Geology of Kildare – Wicklow*, s.l.: Geological Survey Ireland.

² Geological Survey Ireland, 2016. Quaternary geology of Ireland – Sediments Map. [Online] Available at: <https://secure.dccae.gov.ie/arcgis/rest/services/Quaternary/QuaternarySediments16/MapServer> [Accessed 12 April 2019].

³ Teagasc, Agency, E. P. & Ireland, G. S., 2017. *Teagasc Soils Data - Surface Soils Classification and Description*. [Online] Available at: https://secure.dccae.gov.ie/arcgis/rest/services/THIRD_PARTY/TeagascSoils/MapServer [Accessed 12 April 2019].

4. Geological Constraints Map which shows a number of relevant constraints including:
 - a. GSI active quarries database.⁴
 - b. GSI geological heritage sites.⁵
 - c. GSI Mineral Localities.⁶
 - d. GSI landslide database.⁷
 - e. GSI aggregate potential mapping final scores from granular and rock deposits^{8,9}
 - f. EPA Licensed Waste Facilities¹⁰
 - g. EPA Industrial Emissions (IE) and Integrated Pollution Control (IPC) licensed sites¹¹

Items f. and g. are shown on drawing 5.1-5.6 Air quality and climate constraints.

⁴ Geological Survey Ireland, 2014. GSI Minerals Active Quarries Database. [Online] Available at: <https://secure.dccae.gov.ie/arcgis/rest/services/Minerals/ActiveQuarries2014/FeatureServer> [Accessed 12 April 2019].

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⁶ Geological Survey Ireland, 2019. GSI Mineral Localities. [Online] Available at: <https://secure.dccae.gov.ie/arcgis/rest/services/PublicViewer/MineralLocalities/FeatureServer> [Accessed 12 April 2019].

⁷ Geological Survey Ireland, 2017. Landslide Events GSI 2017. [Online] Available at: <https://utility.arcgis.com/usrvcs/servers/6e99fe8736394f389aaf1aac5a407132/rest/services/Landslides/LandslideEvents/FeatureServer> [Accessed 12 April 2019].

⁸ Geological Survey Ireland, 2016. Aggregate Potential Mapping - GSI 2016 – Granular Aggregate Final Scores Data Collected and processed 2004-2016. [Online] Available at: https://secure.dccae.gov.ie/arcgis/rest/services/APM/APM16_FinalScoresGranularAggregate/MapServer [Accessed 12 April 2019].

⁹ Geological Survey Ireland, 2016. Aggregate Potential Mapping - GSI 2016 – Crushed Final Scores. [Online] Available at: https://secure.dccae.gov.ie/arcgis/rest/services/APM/APM16_FinalScoresCrushedRockAggregate/MapServer [Accessed 12 April 2019].

¹⁰ Environmental Protection Agency, 2010. Licensed Waste Facilities. Available at: <https://gis.epa.ie/geonetwork/srv/eng/catalog.search#/metadata/00750a6a-e2f4-451d-b41c-0f067a40c94c> [Accessed: 12 April 2019].

¹¹ Environmental Protection Agency, 2016. Industrial Emissions (IE) and Integrated Pollution Control (IPC) Facilities. Available at: <https://gis.epa.ie/geonetwork/srv/eng/catalog.search#/metadata/95acfdd0-ca39-46bd-a0ad-e5fe6e9a902c> [Accessed: 12 April 2019].

h. National Monuments Service Database¹²

A full list of the figures is given in **Table 13.1**.

Table 13.1: List of figures for the soils and geology constraints study

Figure number	Title	Sheet
Figure B2.1-B2.3	Overall Key Plan and Study Area	Sheet 1 to 3
Figure B13.1 – Figure B13.6	Bedrock Geology Map	Sheet 1 to 6
Figure B13.7 – Figure B13.12	Subsoil Deposits Map	Sheet 1 to 6
Figure B13.13 – Figure B13.18	Soil Deposits Map	Sheet 1 to 6
Figure B13.19 – Figure B13.24	Geological Constraints Map	Sheet 1 to 6

13.2 Methodology and sources of information

13.2.1 Methodology

The study has been carried out in accordance with the National Roads Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes¹³. The NRA is now known as Transport Infrastructure Ireland (TII), however for the purpose of this report the guidelines mentioned above are referred to as the NRA guidelines¹³.

The assessment is based on the results of a desk study and historical publicly available ground investigation results. The desk study included a review of the information sources listed in **Section 13.2.2** to identify the constraints associated with soils and geology within the study area.

The NRA guidelines¹³ provide useful criteria for ranking the importance of the identified soils and geological constraints which are presented in **Table 13.2**. This assessment is generally consistent with the approach presented in the NRA guidelines and is undertaken using the criteria for rating the importance of identified features. Using this, it will allow the screening of potential options for the N11/M11 Scheme with respect to potentially contaminated soils and geological constraints.

¹² Department of Culture, Heritage and the Gaeltacht, 2018. National Monuments Service - Archaeological Survey of Ireland. Available at: <https://data.gov.ie/dataset/national-monuments-service-archaeological-survey-of-ireland> [Accessed: 12 April 2019].

¹³ National Roads Authority, 2008. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, Ireland: s.n. Available at: <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

Table 13.2: Criteria for rating the importance of identified features (based on NRA Guidelines; Box 4.1 entitled ‘Criteria for Rating Site Attributes - Estimation of Importance of Soil and Geology Attributes’)¹³

Importance	Criteria	Typical example
Very High	<p>Attribute has a high quality, significance or value on a regional or national scale.</p> <p>Degree or extent of soil contamination is significant on a national or regional scale.</p> <p>Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.</p>	<p>Geological feature rare on a regional or national scale (NHA).</p> <p>Large existing quarry or pit.</p> <p>Proven economically extractable mineral resource.</p>
High	<p>Attribute has a high quality, significance or value on a local scale.</p> <p>Degree or extent of soil contamination is significant on a local scale.</p> <p>Volume of peat and/or soft organic soil underlying route is significant on a local scale.</p>	<p>Contaminated soil on site with previous heavy industrial usage.</p> <p>Large recent landfill site for mixed wastes.</p> <p>Geological feature of high value on a local scale (County Geological Site).</p> <p>Well drained and/or high fertility soils.</p>
Medium	<p>Attribute has a medium quality, significance or value on a local scale.</p> <p>Degree or extent of soil contamination is moderate on a local scale.</p> <p>Volume of peat and/or soft organic soil underlying route is moderate on a local scale.</p>	<p>Contaminated soil on site with previous light industrial usage.</p> <p>Small recent landfill site for mixed wastes.</p> <p>Moderately drained and/or moderate fertility soils.</p> <p>Small existing quarry or pit.</p>
Low	<p>Attribute has a low quality, significance or value on a local scale.</p> <p>Degree or extent of soil contamination is minor on a local scale.</p> <p>Volume of peat and/or soft organic soil underlying route is small on a local scale*.</p>	<p>Large historical and/or recent site for construction and demolition wastes.</p> <p>Small historical and/or recent landfill site for construction and demolition wastes.</p> <p>Poorly drained and/or low fertility soils.</p> <p>Uneconomically extractable mineral resource.</p>

* relative to the total volume of inert soil disposed of and/or recovered

13.2.2 Sources of information

This constraints study was undertaken as a desktop exercise. The following sources were studied in order to identify soils and geological constraints.

Topographical and geographic maps and datasets

The following mapping and geographical datasets were reviewed as part of this study:

- Discovery Sheet 50 (7th edition) and 56 (6th edition) 1:50,000 scale.¹⁴
- Bing Maps (2019) base mapping.¹⁵
- River Network Routes.¹⁶
- Corine Landcover.¹⁷

The data points extracted from the Ordnance Survey Ireland (OSi) historical mapping available on the OSi Geohive website were reviewed.¹⁸

Publications

The following publications were referenced and reviewed as part of this study:

- Geology of Kildare – Wicklow: A Geological Description to Accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 16, Kildare – Wicklow.¹
- Farrell, D. E. (2016). Geological Properties of Irish Glacial and Interglacial Soils. 1st Hanrahan Lecture, The Institution of Engineers of Ireland.¹⁹
- National Roads Authority. (2008). Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. Ireland.¹³
- Robert Meehan, M. P. (2014). The Geological Heritage of Wicklow. An audit of County Geological Sites in Wicklow. Geological Survey Ireland.²⁰

¹⁴ Ordnance Survey Ireland, 2015. Discovery Sheet 50 (7th edition) and 56 (6th edition) 1:50,000 scale, s.l.: s.n.

¹⁵ Bing Maps, 2019. Bing Maps. [Online] Available at: <https://www.bing.com/maps/> [Accessed 12 April 2019].

¹⁶ Environmental Protection Agency, 2017. River Network Routes. [Online] Available at: <https://gis.epa.ie/geonetwork/srv/eng/catalog.search#/metadata/c4043e19-38ec-4120-a588-8cd01ac94a9c> [Accessed 12 April 2019].

¹⁷ Environmental Protection Agency, 2018. Corine Landcover 2018. [Online] Available at: <https://gis.epa.ie/geonetwork/srv/eng/catalog.search#/metadata/fb5d2fa9-95fe-4d3f-8aed-e548348a40ea> [Accessed 12 April 2019].

¹⁸ Ordnance Survey Ireland, 2019. GeoHive. [Online] Available at: <http://map.geohive.ie/mapviewer.html> [Accessed 12 April 2019].

¹⁹ Farrell, D. E., 2016. Geological Properties of Irish Glacial and Interglacial Soils. 1st Hanrahan Lecture, The Institute of Engineers of Ireland.

²⁰ Meehan, R. et al., 2014. The Geological Heritage of Wicklow. An audit of County Geological Sites in Wicklow, s.l.: Geological Survey Ireland.

Solid geology

The following digital datasets and maps from the GSI were reviewed as part of this study:

- Bedrock Geology of Ireland (1:100,000 scale).²¹

Drift maps

The following drift maps were reviewed as part of this study:

- Subsoil map (Teagasc Classification) and Soil Parent Material Classification and Map Codes.³
- Quaternary Geology of Ireland (1:50,000 scale).²

Geological Survey Ireland datasets

The following GSI datasets were consulted:

- GSI active quarries database.⁴
- GSI geological heritage sites.⁵
- GSI mineral localities.⁶
- GSI landslide database.⁷
- GSI aggregate potential mapping final scores from granular and rock deposits.^{8,9}

Other datasets

The following datasets were also consulted:

- EPA Licensed Waste Facilities.¹⁰
- EPA IE and IPC licensed sites.¹¹
- National Monuments Service.¹²
- Exploration and Mining Viewer.²²

13.3 Existing environment

This section describes the soils and geological constraints identified within the study area.

²¹ Geological Survey Ireland, 2018. GSI 100k Bedrock Map. [Online] Available at: https://secure.dccae.gov.ie/arcgis/rest/services/Bedrock/Bedrock100k_Seamless_2018/MapServer [Accessed 12 April 2019].

²² Department of Communications, Energy and Natural Resources, 2019. Exploration and Mining Viewer. [Online] Available at: <http://spatial.dcenr.gov.ie/ExplorationAndMining/SpatialViewer/index.html> [Accessed 12 April 2019].

Constraints associated with geomorphology, solid geology, soils and superficial deposits, manmade geological features, landfills, contaminated land, licensed facilities and geological heritage within the study area are described herein.

13.3.1 Topographical and geomorphological study

The study area is bounded by the foothills of the Wicklow Mountains to the west, the Dublin Mountains and the suburbs of Dublin City to the north and the Irish Sea to the east. The highest point within the study area is the Great Sugarloaf (501mOD) and the lowest point is sea level (0mOD) along the coast. The topography is generally undulating hills along the west of the study area with elevations ranging from 100mOD to 300mOD.

To the east of the study area the topography is generally flat with elevations less than 100m with the exception of Bray Head (240mOD) and the Little Sugarloaf (342mOD) to the north east.¹⁴

The current alignment of the N11/M11 runs along the transition from the hills to the west to the lower coastal areas to the east. The alignment passes through a valley between Great Sugarloaf and Little Sugarloaf and then through Glen of the Downs, a narrow valley with steep sides ranging from 200mOD at the top to 100mOD at road level.¹⁴

The land use within the study area is typically agricultural land as described in detail in **Section 7** (Material assets – agriculture). However, the northern section of the study area, especially to the east of the N11/M11 between Junction 4 and Junction 7 is dominated by the urban areas of Killiney, Shankill and Bray. There are smaller urban areas to the northwest of the N11/M11 including Kiltarnan and Enniskerry. Further south, the existing alignment of the N11 dual carriageway passes through the urban areas of Kilmacanoge and Kilpedder. The Greystones and Delgany urban areas are to the east of the N11 dual carriageway along the coast. The smaller towns within the south of the study area are Kilquade, Kilcoole, Newtownmountkennedy and Newcastle.¹⁸

There are a number of water courses within the study area as detailed in **Section 14**. The river courses in the Loughlinstown area flow west to east passing the existing M50 motorway and M11 motorway either side of Cherrywood and entering the sea at Shanganagh (north of Junction 4). The River Dargle and its tributaries is the most significant river passing under the existing N11 dual carriageway just south of Junction 6 and entering the sea at Bray harbour to the east. Tributaries of the River Dargle at times flow south to north along the alignment of the current N11 dual carriageway from just north of Glen of the Downs (Junction 9) through Kilmacanoge. The Three Trout Stream flows from north to south through Glen of the Downs and then turns east entering the Irish Sea to the south of Greystones. There are at least another six further rivers and streams that flow west to east draining the south eastern section of the study area. Further, some of the study area along the western boundary is within the Varty River catchment area. The Varty River supplies the Varty Reservoir which is outside the study area to the south-west.

The topography is heavily influenced by the geomorphology of the area. Geomorphology is the study of the landforms which comprise the earth's surface, the processes which have modified and shaped it in the past and which continue to modify and shape it at the present time. The majority of Irish landforms are derived from mountain building events which occurred in the geological past and more recently during the last ice age. The geomorphic processes currently in action are erosion and deposition which are driven by ice, water and wind.

The geology to the north of study area, which the M50 motorway passes through, is dominated by shallow granite deposits (see Bedrock Geology Map on **Figure B13.1 to B13.6**).

The terrain, as the study area travels south through Kilcronee and Kilmurry North, is typically low lying glacial till over predominately greywackes with the exception of the quartzite outcrops of Bray Head, The Great Sugarloaf and the hills running north south along the western edge of the study area.

The geomorphology of east County Wicklow has been significantly affected by the last two glaciation events. Extensive ice sheets flowed from the Wicklow mountains eroding steep valleys in the mountains and rounding much of the landscape to the east. The ice sheet which covered County Wicklow had a complex flow pattern which radiated out from the centre of the mountains. Glacial till was deposited at the base of ice sheets covering most of the study area. There are also extensive sand and gravel deposits associated with the melting of the ice sheets. Other quaternary subsoils include peat, alluvium and marine beach sands along the coast. The Glen of the Downs is a significant glacial overflow channel with steep valley sides.²⁰

Since the Ice Age, during the Holocene, the modern drainage pattern was superimposed on the deglacial channel network, meaning there are some areas of haphazard drainage among the boulder clay. At this time, peat also formed across much of the Wicklow Mountains. During this time along the coast, headlands, bays and cliffs, have been eroded by the sea, while beaches, bars, spits, lagoons and windblown sand dunes have formed.²⁰

13.3.2 Solid geology

The rock formations encountered in the study area are detailed in **Table 13.3** and shown on the Bedrock Geology Map (**Figure B13.1 to B13.6**).

The GSI geological mapping for the study area indicates that Devonian granite of the Leinster Batholith underlies the start of the northern section of the study area for approximately 3km particularly under the M50 approach, transitioning to the Maulin Formation just north of Junction 4. The Maulin Formation is described by the GSI as a series of dark blue grey slates and phyllites striped with pale siltstone.¹

As the study area traverses the River Dargle, the Maulin Formation transitions into the older Cambrian Bray Head Formation with a brief section of the N11 dual carriageway passing through the Ordovician Glencullen River Formation which stretches to the western boundary of the study area along the Dargle Valley.

The Glencullen River Formation as described by the GSI consists of massive, buff-coloured sand to silt-grade tuffs interbedded with phyllites and (tuffaceous) greywacke siltstones.¹

The Bray Head Formation is the predominant rock type within the study area consisting mainly of greywacke and distinctive quartzite layers that correspond with the peaks within the area. The formation is heavily faulted to the north in the area of the Sugarloaf and Kilmacanoge, with quartzite outcrops predominately being in this area.

The Bray Head Formation is the underlying rock until the southern end of the study area where the rock formation extends slightly (from 200m at the N11 dual carriageway to 3km at the coast) into the Devils Glen and Maulin Formation again.¹

The GSI describes the Devils Glen Formation as thick-bedded greywackes and shales and this formation is indicated on the bedrock geology as protruding into the study area from the west just south of the Great Sugarloaf tapering off before reaching the N11 and appearing again along the coast just south of Bray Head.¹

The underlying bedrock within the study area is considered of low importance.

Table 13.3: Summary of bedrock geology¹

Geological period	Formation	Description	Importance
Devonian	Leinster Batholith – Granite	Granite intrusion consisting of the following units within the study area: Type 3 muscovite porphyritic Granite with muscovite phenocrysts Type 2e equigranular Type 2e consists of quartz, plagioclase, microcline, muscovite and biotite with grainsize 1 - 5mm Type 2p microcline porphyritic Granite with microcline phenocrysts	Low
Ordovician	Maulin Formation	Lithological Summary: Dark blue-grey slates and phyllites striped with pale siltstone. Penetratively cleaved dark blue grey slates and phyllites which are commonly striped with pale siltstone laminae. Bands of garnetiferous quartzite that are 20m thick occur in the granite aureole. there are also thick lenses of orthoquartzite.	Low
	Glencullen River Formation	Lithological Summary: Tuff and greywacke. The formation consists of massive, buff-coloured sand to silt-grade tuffs interbedded with phyllites and (tuffaceous) greywacke siltstones. Minor acid lavas have also been reported.	Low
Cambrian	Bray Head Formation	Slump deformation is widespread with slumped zones from 10m to 200m thick alternating with coherent undeformed sediments. The formation is dominated by greywacke and by the distinctive quartzite units which range in thickness from 10m to over 100m.	Low

Geological period	Formation	Description	Importance
	Devils Glen Formation	The formation consists of thick-bedded greywackes and shales. The thickest units and possibly higher sandstone to shale ratios are found in the south east of the area.	Low

13.3.3 Subsoils and soils

Subsoil deposits (GSI quaternary classification)

Superficial deposits (subsoil) comprise the unconsolidated geological deposits which cover the solid geology and are shown on the Subsoil Deposits Map (Figure B13.7 to B13.12). They are generally not considered an environmental constraint with the exception of soft ground and made ground which has a medium importance due to the possible excavated material produced during road construction.

During the Pleistocene epoch of the Quaternary, two glaciations covered County Wicklow. The glaciation, which gave rise to the deposition of glacial till was presumably not continuous. Local withdrawal and re-advance of the ice sheet and associated meltwater channels led to the formation of fluvioglacial sediments (gravel and sand lenses). The glacial deposits can exhibit significant lateral and vertical variations in grain size distributions over short distances.

The subsoils mapping of the region indicates that the study area is dominated by this glacial till (46% of the study area) and rock outcrops (24% of the study area). The remainder are gravels predominately glacial (17% of the study area), made ground (5%), alluvium (5%), marine beach sands (5%), peat (<1%), scree (<1%) and lacustrine sediments (<1%). The list of soil types as classified by the GSI Quaternary mapping are listed in **Table 13.4**.

The glacial till prevails throughout the study area and the thickness is likely to be variable. The Irish Sea till, which is to be found along the south east and south coast of Ireland, differs from the boulder clay type soils in both grading and effective stress parameters. The geotechnical properties of some of these soils, for example the Macamore Clay, are particularly relevant to coastal regions where sea erosion gives rise to slope failures.¹⁹ The rock outcrops are predominately contained to the north, west and south corresponding to the higher elevations. However, there are isolated outcrops throughout the study area.²

The gravels are predominately to the west of Bray surrounding the River Dargle, between Kilmacanoge and Glen of the Downs, west of Greystones and north and south of Newtownmountkennedy. The alluvium is confined to the river valleys. The alluvium is indicated on the mapping along a narrow strip (<1km) running along the coast from Kilcoole to the southern boundary of the study area and is most likely marine sediments. As the rivers enter the sea there is likely to be estuarine sediments within the tidal zones.²

The majority of the peat indicated on the GSI mapping is within the marine coastal strip west of Newcastle but there is a small pocket (~500m long) indicated in Kilmacanoge along the western edge of the N11 dual carriageway. The marine beach sands are predominately confined to the immediate coast line but as shown on the mapping they extend up to 900m inland to the south of Greystones.²

Table 13.4: List of subsoils (Quaternary) within study area²

Soil type	Description	Percentage of study area (%)	Importance
A	Alluvium	5%	Medium
AcEsk	Eskers comprised of gravels of acidic reaction	<1%	Low
As	Alluvium (sandy)	<1%	Low
BktPt	Blanket Peat	<1%	Medium
FenPt	Fen Peat	<1%	Medium
GCSsS	Gravels derived from Cambrian sandstones and shales	<1%	Low
GGr	Gravels derived from granite	<1%	Low
GLPSsS	Gravels derived from Lower Palaeozoic sandstones and shales	<1%	Low
GLs	Gravels derived from Limestones	16%	Low
IrSTCSsS	Irish Sea Till derived from Cambrian sandstones and shales	16%	Low
IrSTLs	Irish Sea Till derived from Limestones	3%	Low
L	Lacustrine sediments	<1%	Medium
Mbs	Marine beach sands	1%	Low
Rck	Bedrock outcrop or subcrop	24%	Low
Scree	Scree	<1%	Low
TCSsS	Till derived from Cambrian sandstones and shales	13%	Low
TGr	Till derived from granites	6%	Low
TLPSsS	Till derived from Lower Palaeozoic sandstones and shales	3%	Low
TLs	Till derived from limestones	2%	Low
TMp	Till derived from Metamorphic rocks	2%	Low
TQz	Till derived from quartzites	1%	Low
Urban	Urban	5%	Medium

Soils (Teagasc classification)

The surface soils are predominately a function of the underlying parent material subsoils as detailed in **Table 13.4** with their appropriate importance in accordance with **Table 4.1** of the NRA Guidelines in regards to agricultural importance, shown on the Soil Deposits Map (**Figure B13.13 to B13.18**).³

Though there are a large number of soil types, these can be summarised as follows in terms of approximate percentage of the study area:

- 63% are well drained considered high importance for agriculture;
- 16% are poorly drained soils considered low importance for agriculture;
- 11% are made ground considered low importance for agriculture;
- 5% are alluvium considered medium importance for agriculture;
- 4% are peaty considered low importance for agriculture; and
- 1% are beach sands considered medium importance for agriculture.

The ranking of soils for agricultural purposes in this section is not the ranking system used for Material assets – agriculture which is discussed in **Section 7**.

Table 13.5: List of soils within study area (Teagasc Classification)³

Soil type	Description	Percentage of study area (%)	Importance
AminDW	Deep well drained mineral (Mainly acidic)	23%	High
AminPD	Mineral poorly drained (Mainly acidic)	15%	Low
AminPDPT	Peaty poorly drained mineral (Mainly acidic)	<1%	Low
AminSW	Shallow well drained mineral (Mainly acidic)	22%	High
AminSP	Shallow poorly drained mineral (Mainly acidic)	<1%	Low
AminSRPT	Shallow, rocky, peaty/non-peaty mineral complexes (Mainly acidic)	3%	Low
BminDW	Deep well drained mineral (Mainly basic)	<1%	High
BminPD	Mineral poorly drained (Mainly basic)	<1%	Low
BminSW	Shallow well drained mineral (Mainly basic)	17%	High
BminSP	Shallow poorly drained mineral (Mainly basic)	<1%	Low
BminSPPT	Shallow peaty poorly drained mineral (Mainly basic)	<1%	High
BktPt	Blanket peat	<1%	Low
FenPt	Fen peat	<1%	Low
AlluvMIN	Alluvial (mineral)	5%	Medium
Lac	Lacustrine type soils	<1%	Medium
MarSands	Marine sand and gravel	1%	Medium
Made	Made ground	11%	Low

13.3.4 Slope stability

The GSI has developed a landslide susceptibility map for the East Coast and Greater Dublin area where the susceptibility of a landslide occurring is assessed and categorised.⁷

Generally, landslide susceptibility is correlated to the topography, so the higher areas of landslide susceptibility are in the higher, steeper elevations, coastal cliffs and valley sides. The most notable location is Glen of the Downs which has steep valley sides, where there was a recorded rockfall event in 2016. There are 21 recorded landslides by the GSI as summarised in **Table 13.6** and shown on the Geological Constraints Map (**Figure B13.19 to B13.24**).

Table 13.6: Summary of recorded landslides (GSI)⁷

Map ID	Description	Trigger	Importance
1	rock, some rockfall. Validation status: Yes (3-D)	Unknown	Medium
2	Validation status: Yes (field)	Unknown	Medium
3	Validation status: Yes (field)	Unknown	Medium
4	Bray Head rock fall	Unknown	Medium
5	Bray, same location as Bray 2003	Unknown	Medium
6	Cliff Walk, North of Greystones	Unknown	Medium
7	Rocky Valley Halting site Kilmacanoge near the Sugarloaf	Unknown	Medium
8	River Dargle Bray	Unknown	Medium
9	Bray Head, Rathdown Bray - rockfall	Unknown	Medium
10	Minor translational debris slide.	Unknown	Medium
11	Car sized block fall at The Scalp- Barnaslingan	Unknown	Medium
12	Side garden landslide out through gate onto R117	Exceptional Rainfall	Medium
13	Large Quartzite rockfall south of the trail path in Glen of the Downs	Unknown	Medium
14	River Dargle, Cookstown, Enniskerry	Unknown	Medium
15	Cookstown, Enniskerry	Exceptional Rainfall	Medium
16	Cookstown, Enniskerry	Exceptional Rainfall	Medium

Map ID	Description	Trigger	Importance
17	Monastery, Enniskerry	Exceptional Rainfall	Medium
18	Monastery, Enniskerry	Exceptional Rainfall	Medium
19	Monastery Enniskerry	Exceptional Rainfall	Medium
20	Monastery Enniskerry	Exceptional Rainfall	Medium
21	Disused landfill near a halting site	Human Factor	Medium

13.3.5 Contaminated sites and unsuitable material

Potential sources of contamination within the study area have been investigated and identified into the following four categories as described in the following sections:

- Landfills (licensed and historical);
- Pits, quarries and mines (active and historical);
- Industrial facilities (licensed and historical); and
- Historical land use contamination.

13.3.5.1 Landfills

In 1996 the EPA began licensing certain activities in the waste sector. These include landfills, transfer stations, hazardous waste disposal and other significant waste disposal and recovery activities. These are potential geological constraints as they may act as areas of contamination.

There are three EPA licensed waste facilities¹⁰ recorded within the study area as shown on the Geological Constraints Map (**Figure B13.19** to **Figure B13.24**) which are considered high importance in accordance with the NRA guidelines¹³:

- Fassaroe Waste Recovery Facility, License No. W0053 – high importance (Mineral locality Point No.851);
- Kilmurray South – high importance License No. W0048 (Mineral locality Point No. 734); and
- Calary Quarry – high importance License No. W0293 (Mineral locality Point No. 733).

According to the EPA website¹⁰ there is no known historical (or ‘legacy’) landfill within the study area.

Wicklow County Council have been consulted for their records of landfills and waste related sites. The following areas of potential fill are reported as being within the study area:

1. Fassaroe Waste Recovery Facility (**Figure B13.20**: Wicklow County Council Potential Area of Fill No. 17 - 21);
2. Kilmurry north (**Figure B13.20**: Wicklow County Council Potential Area of Fill No. 9-12)
3. Drummin Lane (**Figure B13.21**: Wicklow County Council Potential Area of Fill No. 13-16)
4. Kilpedder (**Figure B13.21**: Wicklow County Council Potential Area of Fill No. 1).
5. Kilcoole (**Figure B13.21**: Wicklow County Council Potential Area of Fill No. 8).
6. Ballygarret (**Figure B13.22**: Wicklow County Council Potential Area of Fill No. 7).
7. Newtownmountkennedy (**Figure B13.22**: Wicklow County Council Potential Area of Fill No. 5).

Dún Laoghaire Rathdown County Council have been consulted for their records of landfills and waste related sites. The following historic landfill is reported as being within the study area:

1. Bray Landfill – a landfill located on the coastline just north of the River Dargle as shown on **Figure B13.19**.

13.3.5.2 Pits, quarries and mines

Historical pits and quarries are potential sources of ground contamination or unsuitable material as the nature of backfill materials is generally highly variable and unregulated. According to the GSI records²³ there are 62 historical pits and quarries within the study area.

The historic Ballycorus Lead Mine is within the study area to the south west of the M50 and may contain contamination, voids or unclassified infilled material, it is therefore of high importance.²⁰

The GSI 2014 Quarry Directory was consulted. There is no recorded active pit, mine or quarry located within the study area.⁴ The quarries (active and inactive) known to the Local Authorities are shown on **Figures B13.19 – B13.24**.

13.3.5.3 Industrial facilities

Existing industrial sites may potentially be a source of local contamination and/or restrictions due to site activities or licence controls.

²³ Geological Survey Ireland, 2016. Aggregate Potential Mapping - GSI 2016 – Pits and Quarry Locations- Point and Area. [Online] Available at: https://secure.dccae.gov.ie/arcgis/rest/services/APM/APM16_PitsAndQuarries/MapServer [Accessed 12 April 2019].

However, these sites operate within the EPA Industrial Emissions (IE) and Integrated Pollution Control (IPC) licence framework and due to the regulated nature of their activities, the risk of contamination is low. IPC and IE licensed sites within the study area are listed in **Table 13.7** and as shown on the Geological Constraints Map (**Figure B13.19** to **Figure B13.24**).¹¹

The Local Authorities were contacted for information pertaining to industrial facilities and responded that they had no additional information over and above what is available from the EPA datasets.

Table 13.7: IE/IPC licenced industrial facilities¹¹

RegCD	Name	Licence Status	Licence Type	Address	Importance
W0053	Starrus Eco Holdings Limited (Fassaroe)	Licensed	IE	Bray Depot La Vallee House Fassaroe Bray Wicklow	Medium
P0567	Nypro Limited	Licensed	IPC	Corke Abbey Bray Co. Dublin	Medium
P0105	A. O. Smith Electric Motors (Ireland) Limited	Surrendered	IPC	Boghall Road Bray Wicklow	Medium
P0122	International Coatings Limited	Surrendered	IPC	The Enterprise Centre Kiltiernan Dublin	Medium
P0366	Alert Packaging Limited	Licensed	IPC	IDA Bray Business Park Southern Cross Route Bray Wicklow	Medium

Similarly, sites which have been granted a wastewater discharge licence may be a source of contamination or developmental restrictions. There are a number of wastewater discharge sites listed by Irish Water within the study area on their website (**Table 13.8**)²⁴. The wastewater discharge licences provided by the EPA within the study area are outlined in **Table 13.9**. **Section 15.3.4** details the groundwater discharge licences known to Wicklow County Council and **Section 14.3.5** details the surface water discharges known to Wicklow County Council.

Table 13.8: Wastewater discharge licence recorded by Irish Water within the study area

Reg No.	Name	Authorisation type	Agglomeration name	Licence status
D0005-01	Irish Water	Licence	Bray	Licensed
D0010-01	Irish Water	Licence	Greystones	Licensed

²⁴ Irish Water, 2019. Wastewater compliance. [Online] Available at: <https://www.water.ie/wastewater/compliance/> [Accessed: 10 June 2019]

Reg No.	Name	Authorisation type	Agglomeration name	Licence status
D0087-01	Irish Water	Licence	Kilcoole	Licensed
D0088-01	Irish Water	Licence	Enniskerry and Environs	Licensed
D0410-01	Irish Water	Licence	Newcastle	Licensed
D0416-01	Irish Water	Licence	Kilpedder	Licensed

Table 13.9: Wastewater discharge licence recorded by EPA within the study area²⁵²⁶

Local authority reference	Licence holder	Facility address	Local authority name	Licence status
WPL/85	Rathmore country house	Rathmore country house, Ashford	Wicklow County Council	Licensed
WPL/103	Applegreen service station, Cullenmore		Wicklow County Council	Licensed
WPL/18	Wicklow meats	Wicklow meats, Newtownmount kennedy	Wicklow County Council	Licensed
WPL/35	Druids Glen gc	Druids Glen golf club, Woodstock demense, Newtownmount kennedy	Wicklow County Council	Licensed
WPL/35	Druids Glen gc	Druids Glen golf club, Woodstock demense, Newtownmount kennedy	Wicklow County Council	Licensed
WPL/70	Coillte, Newtown	Coillte regional research building, Newtownmount kennedy	Wicklow County Council	Licensed
WPL/11	Garden village	Garden village, Ballyronan, kilpedder	Wicklow County Council	Licensed
WPL/21	Colm Cafferky, Delgany	1 Riverfield, Delgany	Wicklow County Council	Licensed
WPL/58	Glen of Downs golf club	Glen of the Downs golf club, Glen of the Downs, Delgany	Wicklow County Council	Licensed

²⁵ Environmental Protection Agency, 2019. WWDA License Search. [Online] Available at: <http://www.epa.ie/terminalfour/wwda/wwda-search.jsp?countyName=Wicklow&Submit=Search+by+County> [Accessed 12 April 2019].

²⁶ Environmental Protection Agency, 2015. Licence to discharge to water. [Accessed 13 November 2019].

Local authority reference	Licence holder	Facility address	Local authority name	Licence status
WPL/87	Calary quarry (roadstone)	Calary quarry (roadstone), Kilmac	Wicklow County Council	Licensed
WPL/40	E&o Kennedy, Bray	John Traynor, Ballywaltrim lodge, Killarney Road, Bray (just in the dip past hills garage on the Killarney road)	Wicklow County Council	Licensed
WPL/54	Dargle valley nursing home	Dargle valley nursing home, Cookstown, Enniskerry	Wicklow County Council	Licensed
WPL/51	Peter Deigan cars	Peter Deignan cars, Dargle Road, Bray	Wicklow County Council	Licensed
WPL/31	Woodlands academy	Woodlands academy, Wingfield house, Kileroney, Co. Wicklow	Wicklow County Council	Licensed
Potential licences	Dun Laoghaire golf club	Ballyman Rd, Enniskerry, Co. Wicklow	Dun Laoghaire/Rathdown CC	Potential licences
Potential licences	Old conna golf club	Ferndale Rd, Bray, county Wicklow	Dun Laoghaire/Rathdown CC	Potential licences
Potential licences	Dun Laoghaire golf club		Dun Laoghaire/Rathdown CC	Potential licences
Potential licences	Aravon school	Ferndale Rd, Bray, county Wicklow	Dun Laoghaire/Rathdown CC	Potential licences
Potential licences	Lansdowne old wesley rugby club	Ballychorus Road. Kilternan, county Dublin	Dun Laoghaire/Rathdown CC	Potential licences
Potential licences	Carrickmines golf club	Golf lane, Carrickmines, county Dublin	Dun Laoghaire/Rathdown CC	Potential licences

13.3.5.4 Historic land use contamination

Land contamination is related to site history and previous land use which can leave contaminants in the ground depending on historic site activities. The extent of soil contamination from historic land uses are typically localised. The NRA guidelines do not define specifically what is a heavy or light industry. The following categories are recommended:

Heavy industries

- Medium to large scale industries, such as power stations, wastewater treatment plants, other municipal facilities, etc. There are no current or historic power stations within the study area according to OSI mapping.¹⁸
- Industries that involve significant amounts of harmful chemicals or metals, such as dry cleaning, soap works, smithy, foundry, lime kilns etc. The OSI review of 1830's historic mapping does not indicate any of these activities occurred within the study area.¹⁸

Light industries

- Food processing industries;
- Small scale industries and factories;
- Industries that involve relatively less amounts of harmful substances, such as printing works, glass factory, textile factory, etc.

There are numerous light industries within the study area and documenting them is outside the scope of this assessment as they are not considered to be a significant constraint for soils and geology.

13.3.6 Economic geology

The economic geological features within the study area have been subdivided into the following categories:

- Crushed Rock Aggregate Potential;
- Granular Aggregate Potential;
- Active pits, mines and quarries;
- Mineral resource locations; and
- Areas containing deep, well drained soils suitable for agriculture as detailed in **Section 13.3.3**.

Crushed rock aggregate potential

GSI carried out national crushed rock aggregate potential mapping between 2007 and 2013.⁹ The maps are compiled based on the lithology, as well as existing and historic quarry activity. The final scores have five bands ranging from very low potential (blue) to very high potential (red) and have been applied to the entire area of the Republic of Ireland. The majority of the study area is considered very high potential with some pockets of high and moderate potential. The importance of the majority of the study area in terms of crushed rock aggregate potential is therefore high when rated in accordance with Box 4.1 of the NRA Guidelines.¹³

Granular aggregate potential

The GSI Granular Aggregate Potential Mapping categorises granular superficial deposits in terms of aggregate resource into five levels, from very high potential to very low potential.⁸

According to the NRA criteria, the various granular aggregate potential categories are rated in this report as shown in **Table 13.10**. There are a large number of zones of granular aggregate potential within the study areas as shown on **Figure B13.19** to **Figure B13.24**.

Table 13.10: Aggregate resource rating in accordance with NRA guidelines box 4.1

Granular Aggregate Potential	Constraints Importance Ranking
Very high to high	High
Moderate	Medium
Low to very low	Low

Active pits, mines and quarries

The GSI 2014 Quarry Directory was consulted.⁴ There is no recorded active pit, mine or quarry located within the study area.

Mineral resource locations

The locations of mineral resources are shown on the Geological Constraints Map (**Figure B13.19** to **Figure B13.24**). There are several licences held for prospecting within the study area, but these are generally reporting uneconomically extractable mineral resources which are of low importance according to **Table 4.1** of the NRA Guidelines.²²

13.3.7 Geological heritage

A database of geological heritage sites is maintained by the GSI.²⁰ There are no geological sites that are on a regional or national scale within the study area.

There are 17 County Geological Sites (CGS) within the study area, three of which have been proposed as National Heritage Areas (pNHA) and one which may be proposed as a National Heritage Site. The GSI were consulted on whether there were any imminent changes to the geological heritage sites database for County Wicklow. No imminent changes were reported. pNHAs and Geological Heritage Sites are considered Very High importance according to Box 4.1 of the NRA Guidelines. County Geological Sites are considered High importance. The 17 sites are detailed in **Table 13.11** and are shown on **Figures B13.19** to **Figure B13.24**.

Table 13.11: Country geological sites²⁰

Site name	Site code	Designation	Characteristics	Constraint importance ranking
Ballycorus	DLR002	CGS	This is a historic mine site, with opencast working and smelter chimney and flue.	High
The Scalp	DLR010	CGS (may become pNHA)	Heritage site comprises a	Very High

Site name	Site code	Designation	Characteristics	Constraint importance ranking
			deep channel that was formed by meltwater erosion.	
Carrickgollogan	DLR004	CGS	It is a small but prominent hill.	High
Killiney Bay	DLR007	CGS	A 5km long coastal section exposes a succession of several units of glacial till.	High
Bray Head	WW013	CGS, pNHA	Coastal headland with extensive natural exposure and sea cliffs, plus railway cuttings.	Very High
Dargle River Valley	WW051	CGS	A stretch of the river meandering from a wide and flat valley into cascades.	High
Great Sugarloaf	WW034	CGS	A prominent, scree covered, quartzite conical mountain peak.	High
Enniskerry Delta	WW020	CGS	A large accumulation of sands and gravels which has been quarried extensively historically.	High
Glencullen River	WW024	CGS	A narrow, steep-sided wooded valley in the northeast Wicklow mountains.	High
Greystones (Appinite)	WW035	CGS	A section of rocky coastline on the scenic and popular Greystones waterfront.	High

Site name	Site code	Designation	Characteristics	Constraint importance ranking
Greystones Beach	WW036	CGS, pNHA	A 2km long coastal section exposing several units of glacial till.	Very High
Rock Valley	WW052	CGS, pNHA	Site comprises a very small, disused quarry on side of the rocky valley.	High
Glen of the Downs	WW023	CGS	A deep channel that was formed by meltwater erosion on the northeastern flank of the mountains.	High
Wicklow-Greystones Coast	WW060	CGS	An uninterrupted shingle beach extending for over 17km long between Greystones and Wicklow Town.	High
Dunran Channel	WW019	CGS	A deep channel that was formed by meltwater erosion on the eastern flank of the Wicklow mountains.	High
Wicklow Service Area	WW061	CGS	A long cutting behind a new motorway service station.	High

13.4 Summary and conclusions

13.4.1 Geological constraints

The soils and geological features that represent constraints within the study area have been identified in this chapter. The constraints have been assessed in terms of importance so that they can be ranked for screening of potential options as shown in **Table 13.12**. The constraints include the following aspects:

- Soils: well drained of agricultural value or those potentially requiring excavation and disposal for construction activities;

- Soil stability;
- Potential contamination: landfills, dumping site, burial ground, historic pits and quarries, industrial facilities, and historic land use contamination;
- Economic geology: granular aggregate potential; and
- Geological heritage: county geological sites.

Table 13.12: Summary of constraint importance

Category	Name	Relevant characteristics	Constraint importance ranking
Soil Geology	Bedrock	Not considered an environmental constraint	Not applicable
Subsoil	Alluvium, Blanket peat, Fen Peat, Lacustrine sediments	Soft ground, possible requirement to excavate	Medium
	Urban	Soft ground, variable material requirement to excavate, potentially contaminated	Medium
Soils	Well drained soils	Importance for agriculture	High
	Poorly Drained Soils	Importance for agriculture	Low
	Made Ground	Importance for agriculture	Low
	Alluvium	Importance for agriculture	Medium
	Peaty soils	Importance for agriculture	Low
	Beach Sands	Importance for agriculture	Medium
Soil Stability	Recorded Landslides	Potential to cause landslides and destruction of the environment.	Medium
Contamination and unsuitable material	Landfills	Soft ground, variable material requirement to excavate, potentially contaminated. Importance resource for the disposal of material	High
	Historical pits and quarries	Soft ground, variable material requirement to excavate, potentially contaminated	Medium

Category	Name	Relevant characteristics	Constraint importance ranking
	Ballycorus Lead Mine	Soft ground, potential voids, variable material requirement to excavate, potentially contaminated	High
	Industrial facilities	IPC Licenced Facilities	Medium
	Wastewater Discharge Points	Medium industry	Medium
	Historic land use contamination	No major heavy industries identified in the study area	Not applicable
Aggregate Potential	Crushed Rock Aggregate Potential	The majority of the study area is considered very high potential for crushed rock aggregate.	High
	Granular Aggregate Potential	The granular aggregate potential varies from very low to very high	Low to High
	Potential mineral resources	Based on the reports associated with mineral exploration licences there is limited economically extractable mineral resources	Low
Geological Heritage	The Scalp, Bray Head, Greystones Beach,	Potential National Heritage Area	Very High
	Various	All other County Geological Sites	High

13.5 References

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14 Hydrology

14.1 Introduction

This section describes the hydrological constraints identified within the study area for the N11/M11 Scheme. Hydrogeological (i.e. groundwater) and karst constraints have been separately considered in **Section 15** (Hydrogeology) of **Volume B**.

Section 14.2 describes the methodologies and sources of information that were used to carry out the study. **Section 14.3** describes the hydrological constraints within the study area. A summary is presented in **Section 14.4** and references are listed in **Section 14.5**.

14.1.1 Study area

The study area is located within Dún Laoghaire-Rathdown County and County Wicklow, and ranges from the Dublin and Wicklow Mountains in the west to the Irish Sea coastline in the east.

The study area has a topography which varies significantly. It ranges from 501mOD¹ at Sugarloaf Mountain of the Wicklow Mountains to the coast at the eastern extent.

The study area is predominantly rural but does include areas of high-density population at the eastern extent, centred around the towns such as Shankill, Greystones and Bray.

14.2 Methodology and sources of information

This assessment was prepared taking cognisance of the requirements of the Transport Infrastructure Ireland (TII) guidance, formerly National Roads Authority (NRA) guidance, for the assessment and treatment of geology, hydrology and hydrogeology on national road schemes².

These guidelines² provide useful criteria for ranking of the identified hydrological constraints and the criteria are presented in **Table 14.1**.

¹ Ordnance Survey Ireland. Ordnance survey maps. Available from: <https://www.osi.ie> [Accessed: 10 April 2019].

² Environmental Impact Assessment of National Road Schemes – Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, NRA 2009.

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Table 14.1: Criteria for rating site attributes – estimation of the importance of hydrology attributes²

Importance	Criteria	Typical example
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes.

This desktop study collated and reviewed the following sources of information to identify hydrological constraints within the study area:

- Draft Preliminary Flood Risk Assessment (PFRA) Mapping³;
- Historic flood data⁴;
- Irish Coastal Protection Strategy Study (ICPSS) Mapping⁵;
- Catchment Flood Risk Assessment and Management (CFRAM) Flood Maps⁶;

³Office of Public Works Preliminary Flood Risk Assessment (PFRA) Mapping. Available from https://www.floodinfo.ie/about_frm/pfra/ [Accessed: 10 April 2019].

⁴Office of Public Works Historic Flood Mapping, Available from: <http://www.floodmaps.ie> [Accessed: 10 April 2019].

⁵ Office of Public Works ICPSS - Phase 2 - South East Coast, Available from: <https://www.opw.ie/en/floodriskmanagement/floodanderosionmapping/icps/wp234asc/>, [Accessed: 10 April 2019].

⁶Office of Public Works Catchment Flood Risk Assessment and Management (CFRAM), Available from: <https://www.floodinfo.ie/map/floodmaps/>, [Accessed: 10 April 2019].

- Catchment Mapping⁷;
- Sub-catchment Mapping⁷;
- River Waterbodies Risk Mapping⁷;
- River Q values Surveys⁸;
- River Waterbody WFD (Water Framework Directive) Status 2010 - 2015 Mapping⁷;
- Groundwater Wells and Springs Mapping⁹
- Ordnance Survey Discovery mapping (1:50,000)^{Error! Bookmark not defined.};
- Ordnance Survey Discovery mapping historic mapping^{Error! Bookmark not defined.};
- NPWS Natural Heritage Areas (NHA)¹⁰ Mapping;
- NPWS proposed Natural Heritage Areas (pNHA)¹⁰ Mapping
- NPWS Special Area of Conservation (SAC)¹⁰ mapping; and
- NPWS Special Protection Areas (SPA) mapping¹⁰.
- River Basin Management Plan for Ireland 2018 - 2021 (Department of Housing, Planning and Local Government, 2018);¹¹

14.3 Existing environment

The following section presents the existing environment and identifies the hydrological constraints within the study area.

14.3.1 Surface water features

The study area contains a number of surface water features including lakes, springs and primary watercourses and their associated tributaries. These are presented on **Figure B14.1**, Surface Water Features and Catchments. The rivers and their associated sub-catchments are summarised in **Table 14.2**.

⁷Environmental Protection Agency (EPA) Catchment, Sub-catchment, River Waterbodies Risk, Latest River Q values, River Waterbody WFD (Water Framework Directive) Status 2010-2015, Available from: <https://gis.epa.ie/EPAMaps/> [Accessed: 10 April 2019].

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¹⁰ National Parks and Wildlife Services Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA) Special Area of Conservation (SAC), Special Protection Areas (SPA). Available from: <https://www.npws.ie/national-parks> [Accessed: 10 April 2019].

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Table 14.2: Watercourses and their associated sub-catchments in the study area

Catchment	Sub-catchment	Associated river	Tributary	Stream	Stream
Ovoca-Vartry	Dargle	Loughlinstown/ Shanganagh River	Carrickmines Stream	Cabinteely stream	
				Laughanstown	
				Glenamuck North	Carrickmines Great
					Jamestown 10
			Barnacullia		
			Unnamed Tributary		
			Ballycorus Stream	Johnstown 10	
		Kingston 10			
		Rathmichael Stream	Unnamed Tributary		
			Unnamed Tributary		
			Unnamed Tributary		
			Unnamed Tributary		
		River Dargle	River Swan	River Swan	
				County Brook	Phrompstown
	Glencullen/ Cookstown River				
	Kilmacanoge River			Rocky Valley Stream	
	Kilough River			Glencormick	
				Charleville Demesne	Newtown 10
	Newcastle [Wicklow]	Windgate (Paddock 10)			
		Redford (Kilruddery Deerpark)			
		Backlion (Greystones)			
		Delgany/Three- trouts Stream	Kilmurray South		

Catchment	Sub-catchment	Associated river	Tributary	Stream	Stream
			Woodlands 10		
		Donarea			
		Kilcoole Stream			
		Cooldross (North)			
		Ballyronan Stream	Woodstock		
		Newtownmountkenedy River	Glendarragh		
		Cooldross (South)			
		Cooldross_Middle			
		Woodstock Demesne	Leamore Strand		
		Leabeg Middle			
		Leabeg Lower	Unnamed Tributary		
			Unnamed Tributary		
		Newcastle River	Unnamed Tributary		
			Unnamed Tributary		
			Unnamed Tributary		
			Unnamed Tributary		
			Leamore Upper		
			Moneycarroll River		
			Trudder		
			Kilday 10 (North)		
			Kilday 10 (South)		
	Vartry	Grange North	Castlegrange		
		Dunran Demesne River	Cullenmore Stream.		
			Grange_10		
			Tiglan		
	Volan				

Catchment	Sub-catchment	Associated river	Tributary	Stream	Stream
		Vartry	Ballymacahara	Courtfoyle River	Kellystown 10
				Duranhill	
				Carrignamuck Lower	
			Knockfadda 10		
			Ballinahinch Upper		

The existing N11/M11 crosses watercourses at ten locations (described from north to south):

- Junction 5 R761 (Bray North): Rathmichael Stream;
- Between Junction 6 R918 (Bray/Fassaroe) and 6a (Enniskerry): County Brook, Glencullen River, River Dargle;
- At Junction 8 (Kilmacanoge/Roundwood): Kilmacanoge, Rocky Valley Stream;
- South of Junction 9 (Glenview): Kilmacanoge, Three Trouts Stream, Woodlands tributary;
- South of Junction 11 (Greystones/Kilpedder/Kilcoole): Kilcoole Stream;
- Junction 12 (Newtownmountkennedy/Roundwood): Ballyronan Stream;
- South of Junction 12: Newtownmountkennedy Stream, Glendarragh;
- Newcastle Upper: Moneycarroll, Newcastle River;
- North of Junction 14 R772 (Coyne's Cross): Dunran Demesne; and
- Junction 14 R772 (Coyne's Cross): Cullenmore.

The lakes within the study area are summarised in **Table 14.3** and presented on **Figure B14.1**, Surface Water Features and Catchments.

Table 14.3: Lakes and their associated descriptions in the study area

ID	Location	Description
L1	Ballycorus Pond [10739]	A Former Mill Pond, it is fed by and outfalls to the Ballycorus Stream, a tributary of the Loughlinstown/Shanganagh River;
L2	Barnaslingan (Fountain Pond – Historic maps) [10724]	Historic Pond found off the county brook, tributary of the River Dargle
L3	Dún Laoghaire Golf Course (Private) [10730]	Manmade pond.
L4	Cookstown River Pond [10738]	Pond Located on the North Bank of the Cookstown Stream
L5	Tinnehinch Fishery - Tinnehinch Fly fishing centre (Private) [10729]	Spring fed lake. The lake is stocked with Rainbow trout.

ID	Location	Description
L6	Herron's Creek (Private Pond) [10733]	Pond found off the Glencormick, tributary of the River Dargle.
L7 (A&B)	Kilruddery House and Gardens (Private Pond) [10732 & 10731]	Historic Manmade ponds (circa 1682).
L8	Calary Quarry Kilmacanoge	Existing Quarry void/proposed waste recovery facility ¹² . It is situated in the on a west-facing slope in hilly terrain of the Great Sugarloaf Mountain.
L9 (A&B)	Charles land Golf club (Private Pond) [10727 & 10728]	Manmade pond.
L10	Tinnapark Demesne [10726]	Pond found north of the Newtownmountkennedy Watercourse

A number of springs were identified in the study area; however, these are thought to be groundwater fed and as such are documented in **Section 15** (Hydrogeology) of **Volume B** and are identified in the Hydrogeological Constraints Map (**Figures B15.13 to B15.18**).

Table 14.4 summarises the data for a spring thought to be surface water fed. This is presented on **Figure B14.1**. Surface Water Features and Catchments are shown on **Figures B14.4-B14.9** Hydrological Constraints.

Table 14.4: Surface water springs in the study area

Spring ID	Description
S1	East of Junction 8

14.3.2 Catchments

The study area lies in the Ovoca-Vartry Catchment which is in the Midlands and East River Basin. River Basins are the largest scale catchments and under the Water Framework Directive, Ireland is required to prepare River Basin Management Plans to ensure an integrated approach is taken to the protection, improvement and sustainable management of the water environment. This work is undertaken by the Environmental Protection Agency (EPA) and the second River Basin Management planning period, covering 2018 - 2021 is underway¹¹. The River Basin Management Plan (RBMP) 2018 - 2021 outlines the new approach that Ireland will take as it works to protect its rivers, lakes, estuaries and coastal waters over the four-year period.

The study area of approximately 168.5km² falls entirely within hydrometric area 10 (The Ovoca-Vartry Catchment) and three sub-catchments (Newcastle, Dargle and Vartry). The sub-catchments are generally low lying at the eastern extents whereas the western extents contain the Wicklow Mountains.

¹² EPA waste licences database. Available from: http://www.epa.ie/licences/lic_eDMS/090151b2805b95a9.pdf [Accessed: 09 October 2019].

The catchments and sub-catchments are presented on **Figures B14.1** and **B14.2** respectively. The details for the three sub-catchments relative to the study area are presented in **Table 14.5**.

Table 14.5: Total contributing sub-catchment area sites included in the study area

Associated river	Total contributing catchment area	Contributing catchment area included within the study area	Percentage of catchment within the study area
	km ²	km ²	%
Dargle (SC_010)	176.94	62.7	35.4
Newcastle [Wicklow] (SC_10)	81.99	76.7	93.5
Varty (SC_010)	155.95	28.4	18.2

14.3.3 Flooding

14.3.3.1 Historical fluvial/pluvial flooding

Parts of the study area have historically been prone to fluvial, pluvial and coastal flooding. A summary of the recorded flood events that have occurred within the study area is included in **Table 14.6**. The location of these historic flooding points is shown in **Figure B14.3**, Historic and Potential Flooding and in more detail on **Figures B14.4 – B14.9**, Hydrological Constraints.

Table 14.6: Summary of recorded flood events in the study area¹³

FID	Flood name	Flood mechanism
1	The Breaches, Kilcoole, Co. Wicklow Recurring	Coastal/Estuarine Water
2	Three Trouts Stream Co. Wicklow November 2003	River
3	Barry's Bridge, Glen of the Downs, Recurring	Low lying land
4	Bray Seafront Co Wicklow Recurring	Coastal/Estuarine Water
5	Greystones Harbour Recurring	Coastal/Estuarine Water
6	Monalin, Newtownmountkennedy Oct 2005	Runoff
7	Dargle Bray 1905	River
8	Briarswood Estate Co. Wicklow November 2003	Coastal
9	Greystones Carpark Recurring	Coastal/Estuarine Water
10	Flooding at Seafield Court, Killiney, Co. Dublin on 24 th Oct 2011	-
11	Flooding at N11, Loughlinstown, Co. Dublin on 24 th Oct 2011	-
12	Beechdale Estate Kilcoole Recurring	River

¹³ OPW National Flood Hazard Mapping Website. Available from: <http://www.floodinfo.ie/map/floodmaps/> [Accessed: April 2019]

FID	Flood name	Flood mechanism
13	Redford Bridge Co. Wicklow Recurring	Coastal
14	Shanganagh January 1980	River
15	Crinken Woodbrook Stream Recurring	Coastal
16	Kilcroney Lane Recurring	Runoff
17	Shanganagh August 1986	River
18	Sea Road, Newcastle, Co. Wicklow Recurring	Runoff
19	Templecarrig Co. Wicklow Recurring	Coastal
20	Glenair Delgany Recurring	River
21	Shanganagh Commons Road Nov 2002	River
22	Bray, Co. Wicklow February 2002	Coastal/Estuarine Water
23	Shanganagh Carrickmines Nov 2002	River
24	Flooding at Commons Road, Shankill, Co. Dublin. on 24 th Oct 2011	-
25	Newpark Road Holly Park Nov 1982	Runoff
26	Ferndale Road Recurring	River
27	Old Connaught Ave Recurring	Runoff
28	Shanganagh Commons Road Recurring	River
29	Redford Stream Greystones Co Wicklow 16 th August 2008	-
30	Springmount Shankill Recurring	Coastal
31	Glenamuck Stream Glenamuck Road Recurring	River
32	Deansgrange River Seafield Court Recurring	River
33	Shanganagh Commons Road Nov 1982	River
34	Shanganagh Commons Road May 1993	River
35	Shanganagh Carrickmines Nov 1982	River
36	Shanganagh Carrickmines May 1993	River
37	Shanganagh Carrickmines Dec 1997	River
38	Dargle Bray Nov 1965	River

14.3.3.2 Existing flood relief schemes

The River Dargle Flood Defence Scheme has recently been completed. The scheme provides protection to the 1 in 100 year fluvial/1 in 200 year tidal standard to properties in Bray town. The scheme works extend from a point east of the N11 to the DART Harbour Bridge (See **Figure 14.1.1**). Any proposed option which interfaces with this scheme may create a requirement to obtain consent from the OPW under Section 9 of the Arterial Drainage Act, in addition to Section 50 consent.

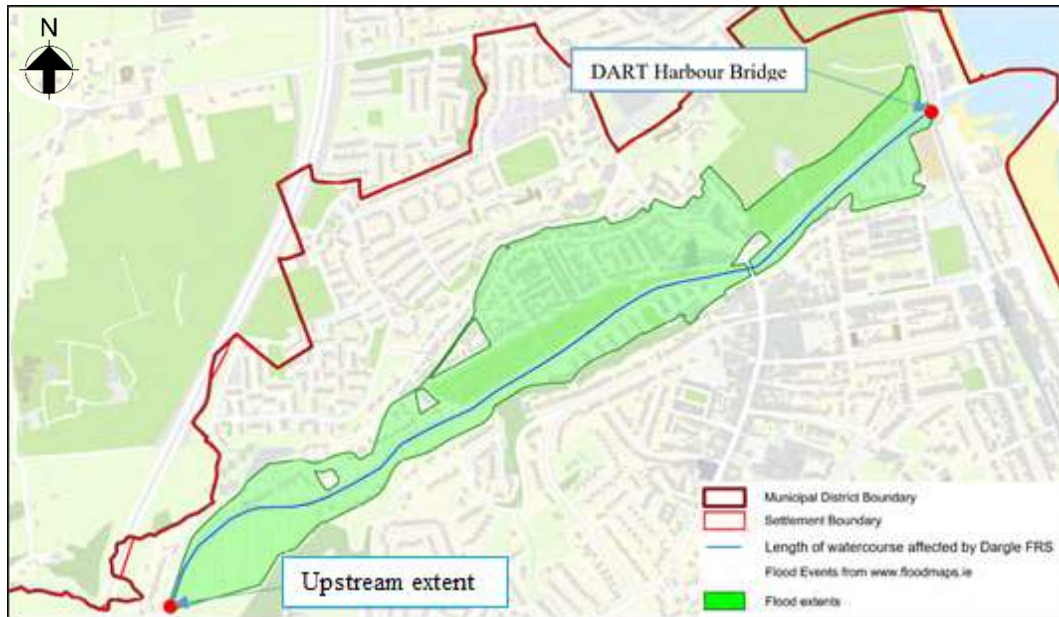


Figure 14.1.1: River Dargle Flood Relief Scheme Extents

14.3.3.3 Predicted flood risk

Fluvial/tidal flood risk

Predicted fluvial and tidal (coastal) flood risk data was obtained from the following sources:

- Eastern Catchment Flood Risk Assessment Management Study (Eastern CFRAM)⁶;
- Irish Coastal Protection Strategy Study (ICPSS)⁵; and
- Preliminary Flood Risk Assessment (PFRA)³.

The Flood Extent prediction for 10 Years (high probability), 100 Years (medium probability) and 1000 years (low probability) indicate the distribution of fluvial and tidal/coastal flood risk across the study area. These are presented on **Figure B14.3**, Historic and Potential Flooding and in more detail on **Figures B14.4 - B14.9**, Hydrological Constraints.

Note that no flood mapping for the River Dargle has been published as part of the Eastern CFRAM study. At the time of preparation of this report, the CFRAM website states that this area is under review⁶. The River Dargle flood extents shown on the Flood Extents Prediction for 10 Years figures (represented as high probability flooding on **Figures B14.3 – B14.9**) relate to the PFRA³, which predated the completion of the Dargle Flood Relief Scheme.

Based on existing mapped information, areas of predicted fluvial flood risk occur along the existing N11/M11 alignment at the following locations:

- M11, Loughlinstown, Co. Dublin;
- M11 Junction 5;
- N11 Junction 6a;
- N11 Junction 8;

- N11 south of Junction 9.

The above will need to be verified as part of a detailed flood risk assessment.

Floodplains are those sandy deposits adjacent to rivers which were deposited as the river developed. These areas represent locations that may potentially provide flood storage and are considered constraints as altering their characteristics may change flooding patterns in the future. The alluvial soils presented on **Figures B14.4 – B14.9** are potential locations of these floodplains, although as they are representative of historic deposition, their full extent is not necessarily representative of the current floodplain (i.e. the floodplains are likely to be smaller than the extent of the alluvial soils represented on the drawings).

The Irish Coastal Protection Strategy Study (ICPSS)⁵ provides information to support decision making about how best to manage the risks associated with coastal flooding and coastal erosion. The Study, commissioned in 2003 and completed in 2013, provides coastal flood hazard maps for the strategic current and future scenario (up to the year 2100) that identify flood events occurring in coastal regions.

The areas along the eastern extent of the study area (i.e. the Irish Sea coastline) subjected to coastal flooding, as extracted from the Irish Coastal Protection Strategy Study Flood Extent Map, are presented on **Figure B14.3**.

Based on existing map information, areas of predicted coastal flood risk occur in the study area at the following locations:

- Greystones;
- Bray, at the mouth of the River Dargle;
- The Murrough Wetlands; and
- Minor coastal flooding occurring in other locations indicated on **Figure B14.3, Historic and Potential Flooding**

The above will need to be verified as part of a detailed flood risk assessment.

Pluvial flood risk

Pluvial flooding occurs when extreme rainfall overwhelms drainage systems or soil infiltration capacity, causing excess rainwater to pond above ground at low points in the topography. To assess the risk of pluvial flooding in the study area, the Office of Public Works (OPW) PFRA pluvial flood mapping¹⁴ was reviewed.

Figure 14.1.2 indicates that parts of the study area would be at risk of pluvial flooding in a 1-in-100 year rainfall event. Most pluvial flood risk areas are indicated to be relatively small and localised.

Based on existing map information, areas of predicted pluvial flood risk occur along the existing N11/M11 alignment at the following locations:

- Junction 5;
- Between junction 7 and 8 (Hollybrook);
- Between junction 10 and 11 (Drummin East);
- Between junction 11 and 12 (Kilpedder);

¹⁴ OPW Draft flood mapping – Pluvial flooding data interactive mapping
Available from <https://www.myplan.ie/webapp/> [Accessed April 2019]

- Junction 12 (Newtownmountkennedy); and
- Between junction 12 and 13 (Kilmullin).

The above will need to be verified as part of a detailed flood risk assessment.

Notwithstanding the above, pluvial flooding can typically be managed with appropriate design detailing e.g. provision of appropriate surface water drainage.

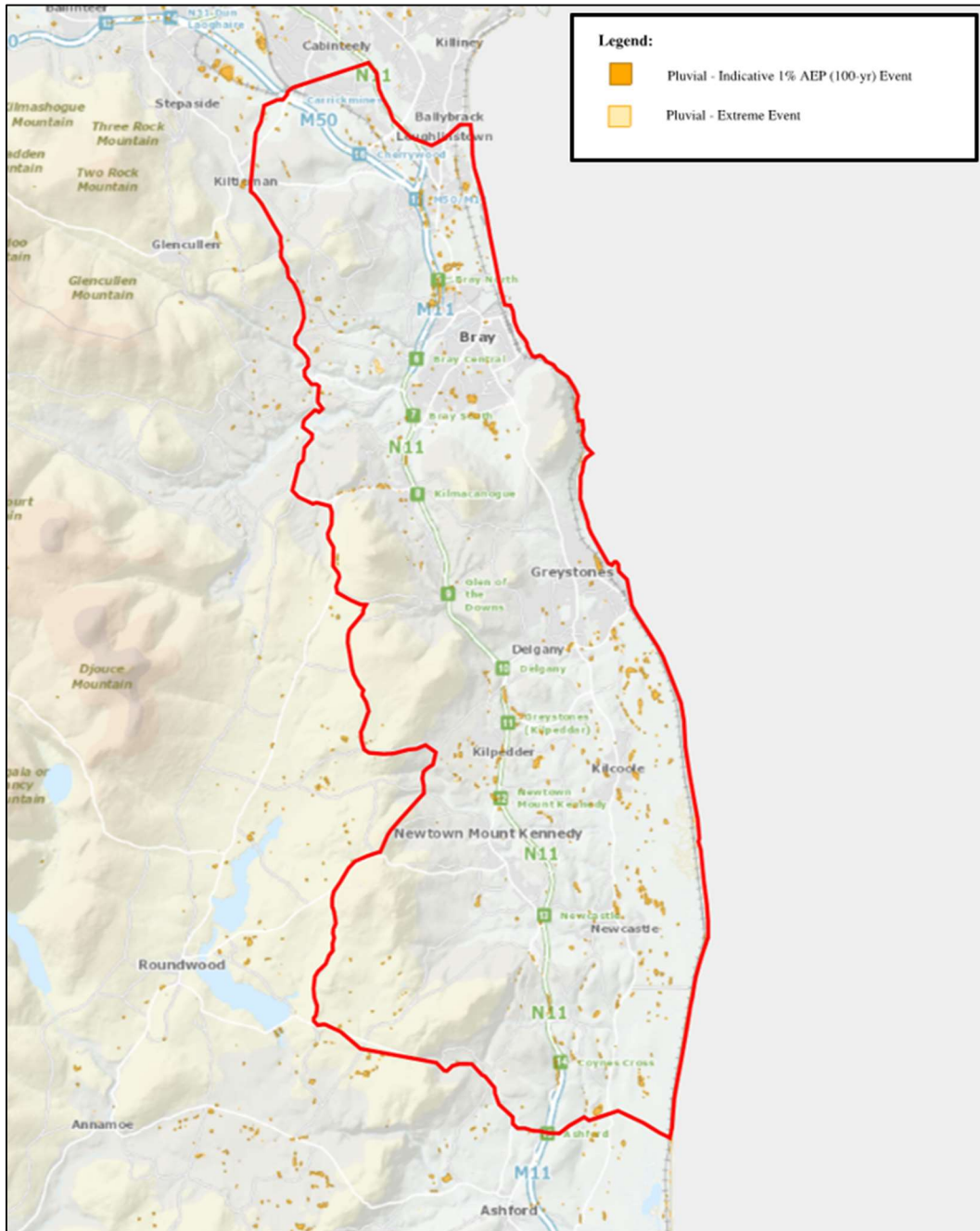


Figure 14.1.2: Pluvial flood map

14.3.4 Surface water quality

Water quality in Ireland is monitored by the EPA. Using the water quality data, the River Quality Class (Q-value)⁸ system has been used to assess the watercourses within the study area. For each watercourse, the most recent data available was used. The River Quality Class system relates the biotic index to five water quality classes.

The Q-value system describes the relationship between water quality and the macroinvertebrate community in numerical terms. Q5 waters have high diversity of macroinvertebrates and good water quality, while Q1 have little or no macroinvertebrate diversity and bad water quality. Intermediate values, Q1-2, 2-3, 3 - 4 denote transitional conditions.

The EPA scheme of Biotic Indices or Quality (Q) values and its relationship to water quality is set out in **Table 14.7**.

Table 14.7: Biotic Indices ('Q values') reflect average water quality at any location as follows:

Q value	WFD status	Pollution status	Condition	EPA quality class
Q5, Q4-5	High	Unpolluted	Satisfactory	Class A
Q4	Good	Unpolluted	Satisfactory	Class B
Q3-4	Moderate	Slightly polluted	Unsatisfactory	Class C
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory	Class D
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory	Class E

Within the study area, water quality is monitored in the River Dargle, Kilcoole and Ballyronan Streams and the Shanganagh/Loughlinstown River, Newtownmountkenedy and Newcastle watercourses and their tributaries.

The water quality in most lakes/ponds within the study area is not available from the EPA. The Ballycorus Pond, however, is fed by, and outlets to, the Ballycorus Stream, which is monitored by the EPA. For this reason, it is assumed that the Surface Water Quality values of the Ballycorus Stream, a tributary of the Shanganagh/Loughlinstown River, will be retained when referring to the Surface Water Quality values of the Ballycorus Pond.

Details of the water quality of the individual rivers in the study area are shown in **Table 14.8**.

Table 14.8: Surface water quality

Associated river	Station ID:	Year Q-value recorded:	Latest river Q-score	Latest river Q-value status	River waterbodies risk
Shanganagh/Loughlinstown River	RS10S010600	2018	3 - 4	Moderate	Not at risk

Associated river	Station ID:	Year Q-value recorded:	Latest river Q-score	Latest river Q-value status	River waterbodies risk
	RS10S010460	2018	4	Good	Not at risk
Carrickmines Stream	RS10C040350	2018	3 - 4	Moderate	At risk
Ballycorus Stream	na	2010 - 2015	na	Good	Not at risk
Rathmichael Stream	na	2010 - 2015	na	Good	Not at risk
Dargle	RS10D010270	2015	4	Good	Not at Risk
	RS10D010250	2018	3 - 4	Moderate	At risk
	RS10D010100	2018	4	Good	Not at risk
County Brook	na	2010 - 2015	na	Poor	Not at risk
Glencullen	RS10G020500	2018	4	Good	Not at risk
Kilmacanoge	RS10K030600	2000	3	Poor	At risk
	RS10K030300	2018	3 - 4	Moderate	At risk
Rocky Valley Stream	na	2010 - 2015	na	Moderate	At risk
Kilough	na	2010 - 2015	na	Good	Not at risk
Paddock	na	na	na	na	Under review
Kilruddery Deerpark	na	na	na	na	Under review
Greystones	na	na	na	na	Under review
Three Trouts Stream	na	na	na	na	Not at risk
Kilcoole Stream	RS10K010250	2015	3-4	Moderate	At risk
Cooldross	na	2010 - 2015	na	Poor	At risk
Ballyronan Stream	RS10B080600	2015	3 - 4	Moderate	At risk
Newtownmountkennedy	RS10N020600	2018	3 - 4	Moderate	At risk
	RS10N020500	2018	3	Poor	At risk
	RS10N020400	2018	4	Good	At risk
	RS10N020150	2018	4	Good	At risk

Associated river	Station ID:	Year Q-value recorded:	Latest river Q-score	Latest river Q-value status	River waterbodies risk
	RS10N020100	2018	4 - 5	High	Not at risk
Cooldross Middle	na	2010 - 2015	na	Good	Under review
Woodstock Demense	na	2010 - 2015	na	Good	Under review
Leabeg_Middle	na	2010 - 2015	na	Good	Under review
Leabeg Lower	na	2010 - 2015	na	Good	Under review
Newcastle River	RS10N010600	2018	3 - 4	Moderate	Under review
	RS10N010400	2003	3	Poor	Under review
Grange_North	na	na	na	na	Under review
Duran Demesne Channel	na	na	na	na	Under review
Ballymacahara	na	2010 - 2015	na	Good	Not at risk
Knockfadda	na	2010 - 2015	na	Good	Not at risk
Ballinahinch Upper	na	2010 - 2015	na	Good	Not at risk

The water quality of the Three Trout's Stream, Paddock, Kilruddery Deerpark, Greystones, Woodstock, Grange North and Dunran Channel is unknown as the EPA has no publicly available record of Q values monitored along these watercourses.

Stream Risk Assessments have been undertaken by the EPA to determine the risk of streams failing to meet 'Good Status' under the Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy" or, for short, the EU Water Framework Directive, 2000, as amended based on the macroinvertebrate ecology. A number of watercourses within the study area have been classified as 'at risk of not achieving Good Status'¹⁵.

14.3.5 Surface water resource/amenity value

Surface water features may hold resource or amenity value if they are used for drinking water, fishing etc. A number of these sites have been identified in the study area and these are summarised in **Table 14.9**.

¹⁵ EPA Water Framework Directive – Characterisation. Available from: <https://www.epa.ie/water/watmg/wfd/character/> [Accessed 14 October 2019]

Surface water discharge licences recorded by Wicklow County Council are listed in **Table 14.10**. Table 14.10: Surface water discharge licence recorded by Wicklow County Council within the study area

Surface water resources, discharge licences to water located in Wicklow County Council, and amenities are displayed in **Figures B14.4 - B14.9**.

Table 14.9: Surface water features with amenity or resource value

ID	Location	Description
A1	Loughlinstown/ Shanganagh River and its tributaries, Ballycorus Stream, Kingston 10 and an unnamed tributary	Designated drinking water abstraction point
A2	Ballycorus Pond (10739)	A Former Mill Pond, it is fed by and out falls to the Ballycorus Stream, a tributary of The Loughlinstown/Shanganagh River which is used to abstract drinking water;
A3	Shanganagh-Bray	Discharge licence held by Irish water for Shanganagh Bray Waste Water Treatment Plant ¹⁶
A4	Bray	Discharge licence held by Irish water for Bray Waste Water Treatment Plant ¹⁷
A5	Enniskerry	Discharge licence held by Irish water for Enniskerry Waste Water Treatment Plant ¹⁸
A6	The Tinnehinch Fishery - Tinnehinch Fly fishing (10729)	Spring fed lake. The lake is stocked with Rainbow trout
A7	Greystones	Discharge licence held by Irish water for Greystones Waste Water Treatment Plant ¹⁹
A8	Kilpedder	Discharge licence held by Irish water for Kilpedder Waste Water Treatment Plant ²⁰

¹⁶ EPA Licensing and Permitting Wastewater discharge authorisation - Waste Water Discharge for Shanganagh-Bray WWTP License Details <http://www.epa.ie/terminalfour/wwda/wwda-view.jsp?regno=D0038-01> [Accessed 14 October 2019].

¹⁷ EPA Licensing and Permitting Wastewater discharge authorisation - Waste Water Discharge for Bray WWTP License Details <http://www.epa.ie/terminalfour/wwda/wwda-view.jsp?regno=D0005-01> [Accessed 14 October 2019].

¹⁸ EPA Licensing and Permitting Wastewater discharge authorisation - Waste Water Discharge for Enniskerry WWTP License Details <http://www.epa.ie/terminalfour/wwda/wwda-view.jsp?regno=D0088-01> [Accessed 14 October 2019].

¹⁹ EPA Licensing and Permitting Wastewater discharge authorisation - Waste Water Discharge for Greystones WWTP License Details <http://www.epa.ie/licsearchdownload/CombinedFileView.aspx?regno=D0010-01&classification=Enforcement> [Accessed 14 October 2019].

²⁰ EPA Licensing and Permitting Wastewater discharge authorisation - Waste Water Discharge for Kilpeddar WWTP License Details <http://www.epa.ie/terminalfour/wwda/wwda-view.jsp?regno=D0416-01> [Accessed 14 October 2019].

ID	Location	Description
A9	Kilcoole Stream	Discharge licence held by Irish water for Kilcoole Waste Water Treatment Plant ²¹
A10	Newcastle River	Discharge licence held by Irish water for Newcastle Waste Water Treatment Plant ²²
A11	Ballinahinch_Upper	Designated drinking water abstraction point
A12	Knockfada 10	Designated drinking water abstraction point
A13	Three Trouts Stream in Glen of the Downs	Amenity value stream

Table 14.10: Surface water discharge licence recorded by Wicklow County Council within the study area

Licence No.	Size in m ³ /d	Waterbody	WB Code
11	180	Ballyronan Stream	n/a
31	48	Dargle	IE_EA_10_1275
40	1	Kilmac (Dargle Lower)	IE_EA_10_1275
51	2	Kilmac (Dargle Lower)	IE_EA_10_1275
54	12	Dargle Lower	IE_EA_10_1275

14.3.6 Ecology

Section 12 (Biodiversity) of **Volume B** documents the biodiversity constraints within the study area in detail. A conservative approach was taken regarding water dependent habitats. In advance of a detailed survey at environmental impact assessment stage, some features have been included and given an importance rating as if they are dependent on both surface water and groundwater, refer to **Section 15** (Hydrogeology) of **Volume B** for the hydrogeology constraints study.

This section specifically highlights those biodiversity features which are dependent on surface water flows, quality and water levels. They are not hydrological constraints in their own right, rather the ecological status may be dependent on some aspect of the hydrology (usually water levels, flows or quality). For this reason, they have not been assigned a hydrological Importance ranking as these are included in **Section 14.3.4. Table 14.11** summarises these features.

²¹ EPA Licensing and Permitting Wastewater discharge authorisation - Waste Water Discharge for Kilcoole WWTP License Details

<http://www.epa.ie/licsearchdownload/CombinedFileView.aspx?regno=D0087-01&classification=Enforcement> [Accessed 14 October 2019].

²² EPA Licensing and Permitting Wastewater discharge authorisation - Waste Water Discharge for Newcastle WWTP License Details

<http://www.epa.ie/licsearchdownload/CombinedFileView.aspx?regno=D0410-01&classification=Enforcement> [Accessed 14 October 2019].

Table 14.11: Designated conservation areas with hydrological characteristics

Site Code	Name	Designation
000730, 002249, 004186	<p>The Murrrough: This site is of importance as it is the largest coastal wetland complex on the east coast of Ireland.</p> <p>It contains a wide range of coastal and freshwater habitats, including six listed on Annex I of the E.U. Habitats Directive, some of which contain threatened plants.</p> <p>Areas on the site contain a rich invertebrate fauna, including several rarities.</p> <p>It is an important site for both wintering and breeding birds and supports a variety of species listed on Annex I of the E.U. Birds Directive.</p>	pNHA, SAC & SPA
000724	<p>Kilmacanogue Marsh: This site is important in having a diversity of species-rich wetland habitats within a relatively small area, and particularly for the presence of some rare invertebrates. The site also contains two priority Annex I habitats; Alluvial woodland [91E0*] and Orchid-rich calcareous grassland [6210*].</p>	pNHA
000719	<p>Glen of the Downs: An area of the priority Annex I habitat, Alluvial woodland [91E0*] was found to be present in this SAC but is not the qualifying interest of the SAC.</p>	SAC, pNHA Priority Annex I habitat [91E0*]

The Murrrough is a coastal wetland complex which stretches for 15km from Ballygannon to north of Wicklow town. It extends inland for up to 1km, in part.

It is unknown whether Kilmacanogue Marsh is dependent on groundwater or surface water, so it has been included in both the hydrology and the hydrogeology constraints studies on a conservative basis.

It is also unknown whether the Alluvial woodland [91E0*] that has been identified in the Glen of the Downs SAC is fed by groundwater or surface water so the same conservative approach was adopted. It should be noted that this is not a qualifying interest for the Glen of the Downs SAC (site code: 000719) but is of international importance in its own right and is a Priority Annex I habitat [91E0]*.

In addition to the above, there is an ecological site (EC45 in **Section 12** (Biodiversity) of **Volume B**) at Ballywaltrim Lane where Alluvial woodland [91E0*] is considered to be potentially present.

14.4 Summary and conclusions

The importance of the hydrological constraints have been summarised in **Table 14.12** based on the criteria outlined in **Table 14.1** and are presented on **Figures B14.4 - B14.9**, Hydrological constraints.

Table 14.12: Hydrological constraints

Feature	Description	Justification	Importance ranking
Shanganagh/ Loughlinstown River	River in Dargle Catchment	River Waterbody Risk Projection: Not at risk. Q value status: varies from Moderate to Good Flood Plain protecting between 5 and 50 residential or commercial properties from flooding Discharge license held by Irish water	Very High
A1	Loughlinstown/ Shanganagh River and its tributaries, Ballycorus Stream, Kingston 10 and an unnamed tributary	Designated drinking water abstraction point	Very High
Carrickmines Stream & its tributaries	Tributary of Shanganagh/ Loughlinstown River in Dargle Catchment	River Waterbody Risk Projection: At risk. Q value status: Moderate Flood Plain protecting between 5 and 50 residential or commercial properties from flooding	High
Ballycorus Stream and its tributaries	Tributary of Shanganagh/ Loughlinstown River in Dargle Catchment	River Waterbody Risk Projection: Not at risk. Q value status: Good Abstraction for Drinking water Flood Plain protecting between 1 and 5 residential or commercial properties from flooding	Very High

Feature	Description	Justification	Importance ranking
Ballycorus Pond (L1)	Pond located on the Ballycorus Stream	Q value status: Good	Very High
A2	A Former Mill Pond, it is fed by and out falls to the Ballycorus Stream, a tributary of The Loughlinstown/S hanganagh River	Abstraction for Drinking water	Very High
A3	Discharge licence held by Irish water for Shanganagh Bray Waste Water Treatment Plant ¹⁶	Discharge license held by Irish water	Very High
Rathmichael Stream and its tributaries	Stream in Dargle Catchment	River Waterbody Risk Projection: Not at risk. Q value status: Good	Very High
River Dargle	River in Dargle Catchment	River Waterbody Risk Projection: Varies Q value status: varies from Moderate to Good Registered Salmonid River Flood Plain protecting between 5 and 50 residential or commercial properties from flooding	Very High
A4	Discharge licence held by Irish water for Bray Waste Water Treatment Plant ¹⁷	Discharge license held by Irish water	Very High
Barnaslingan (Fountain Pond – Historic maps) (L2)	Historic Pond found off the county brook, tributary of the River Dargle	Locally Important amenity site for small range of leisure activities	Low

Feature	Description	Justification	Importance ranking
Dún Laoghaire Golf Courses (Private) (L3)	Manmade pond.	Locally Important amenity site for small range of leisure activities	Low
County Brook and its tributaries	Tributary of Dargle River in Dargle Catchment	River Waterbody Risk Projection: Not at Risk Q value status: Poor Designated flood plain attributed Flood Plain protecting between 1 and 5 residential or commercial properties from flooding	Medium
Cookstown River Pond (L4)	Pond Locate on the North Bank of the Cookstown/Glen cullen stream	Locally Important amenity site for small range of leisure activities	Low
A5	Discharge licence held by Irish water for Enniskerry Waste Water Treatment Plant ¹⁹ 19	Discharge license held by Irish water	Very High
Glencullen and its tributaries	Tributary of Dargle River in Dargle Catchment	River Waterbody Risk Projection: Not at risk Q value status: Good Flood Plain protecting between 1 and 5 residential or commercial properties from flooding Discharge license held by Irish water	High
Tinnehinch Fishery - Tinnehinch Fly fishing centre (L5 + A6)	Designated Fishery	Coarse Fishery Locally Important amenity site for small range of leisure activities.	Medium
Herron's Creek (Private Pond) (L6)	Pond found off the Glencormick,	Locally Important amenity site for small	Low

Feature	Description	Justification	Importance ranking
	tributary of the River Dargle.	range of leisure activities	
Kilmacanogue and its tributary Rock Valley Stream	Tributary of Dargle River in Dargle Catchment	River Waterbody Risk Projection: At risk Q value status: varies from Poor to Moderate Flood Plain protecting between 1 and 5 residential or commercial properties from flooding	Medium - High
Kilmacanogue Marsh pNHA	Ecological feature	Valued on an international scale	Extremely high
Priority Annex I habitat [91E0]* in Glen of the Downs	Ecological feature	Valued on an international scale	Extremely high
Kilruddery House and Gardens (Private Pond) (L7)	Historic Manmade ponds (circa 1682).	Locally Important amenity site for small range of leisure activities	Low
S1	Spring east of the existing Junction 8 of the N11 national Roadway.	High local conservation value	High
Kilough and its tributaries	Tributary of Dargle River in Dargle Catchment	River Waterbody Risk Projection: Not at risk Q value status: Good	Very High
Paddock/Windgate	Watercourse in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: Under review Q value status: Unavailable No amenity Value	Low
Kilruddery Deerpark/ Redford	Watercourse in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: Under review Q value status: Unavailable Flood Plain protecting between 1 and 5 residential or	Medium

Feature	Description	Justification	Importance ranking
		commercial properties from flooding	
Greystones	Watercourse in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: Under review Q value status: Unavailable Stream flows through centre of Greystones	Medium
A7	Discharge licence held by Irish water for Greystones Waste Water Treatment Plant ¹⁹	Discharge license held by Irish water	Very High
Calary Quarry Kilmacanoge (L8)	Existing Quarry void / proposed waste recovery facility. It is situated in the on a west-facing slope in hilly terrain of the Great Sugarloaf Mountain.	Locally Important amenity site for small range of leisure activities	Low
Three Trouts Stream and its tributaries (A13) Three Trout stream as an amenity value	Stream in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: Not at risk Q value status: Unavailable Stream flows through Glen of the downs SAC, amenity of high importance. Flood Plain protecting between 1 and 5 residential or commercial properties from flooding	Medium
Charles land Golf club (Private Pond) (L9)	Manmade pond.	Locally Important amenity site for small	Low

Feature	Description	Justification	Importance ranking
		range of leisure activities	
Kilcoole Stream	Stream in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: At risk Q value status: Moderate Discharge license held by Irish water Flood Plain protecting between 5 and 50 residential or commercial properties from flooding	High
A8	Discharge licence held by Irish water for Kilpedder Waste Water Treatment Plant ²⁰	Discharge license held by Irish water	Very High
A9	Discharge licence held by Irish water for Kilcoole Waste Water Treatment Plant ²¹	Discharge license held by Irish water	Very High
Tinnapark Demesne (L10)	Pond found North the Newtownmountkennedy Watercourse	Locally Important amenity site for small range of leisure activities	Low
Cooldross	Watercourse in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: At risk Q value status: Poor	Medium
Ballyronan Stream and its tributaries	Stream in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: At risk Q value status: Moderate	High
Newtownmountkennedy River and its tributaries	Watercourse in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: At risk Q value status: varies from Poor to High Flood Plain protecting between 1 and 5 residential or	Moderate - Very High

Feature	Description	Justification	Importance ranking
		commercial properties from flooding	
Newcastle River	Watercourse in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: Under review Q value status: Good Flood Plain protecting between 1 and 5 residential or commercial properties from flooding Discharge license held by Irish water	Very High
A10	Discharge licence held by Irish water for Newcastle Waste Water Treatment Plant ²²	Discharge license held by Irish water	Very High
Cooldross	Watercourse in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: Under review Q value status: Good	Very High
Woodstock Demense	Watercourse in Newcastle [Wicklow] Catchment	River Waterbody Risk Projection: Under review Q value status: Good	Very High
Grange North	Watercourse in Vartry Catchment	River Waterbody Risk Projection: Under review Q value status: Unavailable Stream flows through The Murrough Wetlands SAC, amenity of high importance.	Very High
Duran Demesne Channel	Watercourse in Vartry Catchment	River Waterbody Risk Projection: Under review Q value status: Unavailable Stream flows through The Murrough Wetlands	Very High

Feature	Description	Justification	Importance ranking
		SAC, amenity of high importance. Flood Plain protecting between 1 and 5 residential or commercial properties from flooding	
Ballymacahara	Watercourse in Vartry Catchment	River Waterbody Risk Projection: Not at risk Q value status: Good Flood Plain protecting between 1 and 5 residential or commercial properties from flooding	Very High
Knockfadda	Watercourse in Vartry Catchment	River Waterbody Risk Projection: Not at risk Q value status: Good Flood Plain protecting 0 residential or commercial properties from flooding	Very High
A12	Watercourse in Vartry Catchment	Designated drinking water abstraction point	Very High
Ballinahinch Upper	Watercourse in Vartry Catchment	River Waterbody Risk Projection: Not at risk Q value status: Good	Very High
A11	Watercourse in Vartry Catchment	Designated drinking water abstraction point	Very High
A12	Knockfadda 10	Designated drinking water abstraction point	Very High

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15 Hydrogeology

15.1 Introduction

This section describes the hydrogeological constraints identified within the study area for the N11/M11 Scheme, which are shown on **Figures B15.1 – B15.18**.

This desktop study collates information from readily available sources that will be used to inform the later stages of the N11/M11 Scheme.

The scope of this constraints study includes:

- The methodology and sources of information that were used to carry out the study as presented in **Section 15.2**;
- Identification and discussion of significant hydrogeological constraints as presented in **Section 15.3**;
- Mapping of all hydrogeological constraints as presented in **Section 15.3.6**; and
- References as listed in **Section 15.4**.

15.2 Methodology and sources of information

15.2.1 Methodology

This assessment was prepared in accordance with the requirements of the Transport Infrastructure Ireland (TII), formerly National Roads Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, NRA 2009¹. This desktop study includes a review of the information listed in **Section 15.2.2**, to identify the constraints associated with hydrogeology within the study area.

The guidelines¹ provide criteria for ranking the importance of the hydrogeological constraints identified, and these criteria are presented in **Table 15.1**.

Table 15.1: Criteria for rating the importance of identified features (based on NRA Guidelines (2009) Box 4.3: Criteria for Rating Site Attributes)¹

Importance	Criteria	Typical example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple wellfields.

¹ NRA (2009) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. Available from: <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

Importance	Criteria	Typical example
		Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status. Regionally important potable water source supplying >2500 homes. Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer. Potable water source supplying <50 homes.

The desk study includes a hydrogeological assessment of the following criteria:

- Aquifer type and classification;
- Groundwater vulnerability;
- Groundwater resources; and
- Hydro-ecology.

15.2.2 Sources of information

The following list of data sources were the main information sources consulted to identify hydrogeological constraints:

- Ordnance Survey Discovery series Mapping (1:50,000)²;
- Bedrock Geology Map (1:100,000);³
- Groundwater Resources (Aquifers);³

² Ordnance Survey Ireland. Available from: <https://www.osi.ie> (Accessed: 10/04/2019)

³ Geological Survey Ireland (GSI) Bedrock Geology 1:100,000, Groundwater Rock Units, Groundwater Aquifers, Groundwater Vulnerability, Groundwater Wells and Springs. Available from: <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=3400f393afa844538e5b81679552205d>

[Accessed: 10 April 2019, and checked: 15/07/2020]

- Groundwater Vulnerability;³
- Groundwater Rock Unit;³
- GSI Groundwater Bodies⁴
- Groundwater Source Protection Areas;³
- Groundwater Wells and Springs;³
- Karst Features and Tracer Test Database;⁵
- Licensed Facilities;⁵
- Water Quality Monitoring Database and Reports;⁶ and
- Designated ecological area maps.⁶

15.2.3 List of figures and drawings

The extents of the N11/M11 Scheme study area are shown on **Figures B2.1 to B2.3**. The hydrogeological constraints are separately presented across six sheets in order to show these at a scale of 1:25,000. The scale of 1:50,000 recommended by the NRA guidance¹ was not deemed suitable for this constraints study. There are three sets of hydrogeological constraints figures as follows:

- Aquifer Map which shows the Geological Survey of Ireland (GSI) 1:100,000 mapping;
- Aquifer Vulnerability Map which shows the GSI 50:000 scale mapping; and
- Hydrogeological Constraints Map which shows several relevant constraints including:
 - Groundwater sources (GSI wells and springs and public consultation potential wells and springs); and
 - Water dependant habitats with derived preliminary Zones of Contributions (PZOC) for tufa springs.

A full list of the figures is given in **Table 15.2**.

⁴ Geological Survey of Ireland, Groundwater Bodies:
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⁵ Environmental Protection Agency (EPA) National Heritage Areas (NHA), Special Area of Conservation (SAC), Special Protection Areas (SPA). Available from: <https://gis.epa.ie/EPAMaps/> [Accessed: 09 April 2019]

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Table 15.2: List of drawings for the hydrogeological constraints study

Figure Number	Title	Sheet
Figure B2.1 – Figure B2.3	Overall Key Plan and Study Area	Sheet 1 to 3
Figure B15.1 – Figure B15.6	Aquifer Map	Sheet 1 to 6
Figure B15.7 – Figure B15.12	Aquifer Vulnerability Map	Sheet 1 to 6
Figure B15.13 – Figure B15.18	Hydrogeological Constraints Map	Sheet 1 to 6

15.3 Existing environment

This section describes the hydrogeological constraints identified within the study area. Constraints associated with aquifer type, groundwater vulnerability, groundwater resources and water dependant terrestrial ecosystems within the study area are described herein.

15.3.1 Aquifer classification and groundwater bodies

The GSI has classified geological strata for hydrogeological purposes based on the value of the groundwater resources and the hydrogeological characteristics. There are three principal categories of aquifer, corresponding to whether they are major, minor or unproductive resources whereby:

- Regionally Important Aquifers are capable of supplying regionally important abstractions (e.g. large public water supplies), or excellent yields (>400 m³/d);
- Locally Important Aquifers are capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or good yields (100-400 m³/d); and
- Poor Aquifers are capable of supplying small abstractions (e.g. domestic supplies), or moderate to low yields (<100 m³).

The three principal aquifer categories are further subdivided into 10 aquifer sub-categories³ in **Table 15.3**.

Table 15.3: Aquifer category³

Aquifer category	Sub-category description	Code
Regionally Important (R)	Karstified Bedrock dominated by diffuse flow	(Rkd)
	Karstified Bedrock dominated by conduit flow	(Rkc)
	Fissured bedrock	(Rf)
	Extensive sand & gravel	(Rg)
Locally Important (L)	Sand & gravel	(Lg)
	Bedrock which is Generally Moderately Productive	(Lm)

Aquifer category	Sub-category description	Code
	Bedrock which is karstified to a limited degree or limited area	(Lk)
	Bedrock which is Moderately Productive only in Local zones	(Ll)
Poor (P)	Bedrock which is Generally Unproductive except for Local zones	(Pl)
	Bedrock which is Generally Unproductive	(Pu)

Examples of significant impacts to aquifers due to the construction or operation of a new Route Corridor are as follows:

- The disruption of groundwater flow paths during earthworks;
- Reduced yield and groundwater levels in groundwater supplies adjacent to earthworks or road cuttings;
- Disruption of baseflow to groundwater fed rivers or fens; or
- Contamination of the aquifer through accidental spillage.

The aquifer classification and groundwater bodies within the study area are summarised in **Table 15.4**. Five bedrock classifications are present in the study area and these have been related to the geological formations identified in **Section 13.3.1** and as shown on Aquifer Map and Bedrock Geology Map drawings (**Figure B15.1** to **Figure B15.6**).

There are three types of aquifer present within the study area:

- The Bray Head formation is mapped across the majority of the study area and is classified as Poor Aquifer (Pl);
- The Maulin Formation is located in the northern and southern part of the study area and is classified as a Locally Important Aquifer where the bedrock is moderately productive only in local zones (Ll); and
- In the very north of the study area, granites and other igneous intrusive rocks are present which are classified as a Poor Aquifer (Pl).

Additionally, the GSI³ have identified three gravel aquifers within the study area which are designated as locally important (Lg).

Table 15.4: Aquifer classification and groundwater bodies within the study area³

Aquifer classification	Rock formation	Groundwater rock unit	Groundwater body ⁴	Constraint importance ranking
Ll	Maulin Formation	Ordovician Metasediments	Wicklow	Medium
Pl	Bray Head Formation	Cambrian Metasediments	Wicklow	Low
	Devils Glen Formation			

Aquifer classification	Rock formation	Groundwater rock unit	Groundwater body ⁴	Constraint importance ranking
	Leinster Batholith - Granite	Granites and other Igneous Intrusive rocks		
	Glencullen River Formation	Ordovician Metasediments		
Lg	Sands & Gravels	Sand and gravel	Enniskerry	Medium
			Ashford	Medium
			Kilcoole	Medium

15.3.2 Aquifer vulnerability

Aquifer vulnerability is the term used to describe the intrinsic geological and hydrogeological characteristics which determine the ease with which a groundwater body may be contaminated by human activities.

Aquifer vulnerability is determined mainly by the permeability and thickness of the subsoils that underlie the topsoil. For example, bedrock with a thick, low permeability overburden is less vulnerable than bedrock with a thin, high permeability, gravel overburden. This is due to the ability of potential contaminants to reach the aquifer in a relatively short period and with little or no contaminant attenuation due to the thin or absent overburden

Aquifer vulnerability classification guidelines, as published by the GSI³, are given in **Table 15.5**.

Table 15.5: GSI vulnerability rating matrix³

Vulnerability rating	Hydrogeological conditions				
	Subsoil permeability (type) and thickness			Unsaturated zone	Karst features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	Sand/gravel aquifers only	(<30m radius)
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High (H)	>3.0m	3.0 – 10.0m	3.0 – 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable

(2) Precise permeability values cannot be given at present.

(3) Release point of contaminants is assumed to be 1-2 meters below ground surface.

Groundwater vulnerability within the study area ranges from ‘Extreme’ where bedrock is close or at the surface to ‘Low’ vulnerability in areas where thick subsoil deposit is present, refer to Aquifer Vulnerability Map drawings (**Figure B15.7** to **Figure B15.12**).

15.3.3 Groundwater sources

Groundwater sources include springs, wells or boreholes which are used for groundwater abstraction by domestic, agricultural, commercial, industrial, local authority or group water scheme users. Groundwater sources can be impacted by lowering of the water-table which may reduce the supply available and by accidental spillages or releases of contaminants which may impact the water quality.

Source Protection Zone (SPZ) reports have been produced by the GSI and the EPA. The reports aim to guide development planning and regulation to provide protection to groundwater sources. To date no SPZ reports have been produced for any location within the study area. In addition, no Group Water Scheme abstraction points are located in the study area.

216 boreholes or springs from the GSI database have been identified within the study area, however, the record does not state which wells are currently used for abstraction. It is expected that these are potable water sources supplying less than 50 homes, which is considered to be of low importance as a constraint (based on NRA Guidelines (2009) Box 4.3: Criteria for Rating Site Attributes)¹.

In terms of well accuracy (which refers to the location of a well within a defined radius, the exact location is not known), there are 128 boreholes and springs points within 10m, 20m and 50m, 30 within 100m, 7 within 200m, 6 within 500m and 45 within an accuracy of 1km. Note, wells with a 5km accuracy have not been included as knowledge of their location accuracy is considered too poor for them to be accurately assessed in relation to potential route options.

Potential domestic wells and potential spring locations were noted by members of the public and landowners during a public consultation which took place on 12th November 2019.

The boreholes, springs, potential wells and potential springs are identified in the Hydrogeological Constraints Map drawings (**Figures B15.13 to B15.18**).

15.3.4 Groundwater discharge licences

Wicklow County Council have been consulted for their records of groundwater discharge licences within the study area. The groundwater discharge licences are listed in **Table 15.6** and identified in the Hydrogeological Constraints Map drawings (**Figures B15.13 to B15.18**).

Table 15.6: Groundwater discharge licence recorded by Wicklow County Council within the study area

Licence No.	Discharge Rate (m ³ /d)	Waterbody	WB Code
35	18	Kilcoole S&G	IE_EA_G_036
70	11	Kilcoole S&G	IE_EA_G_036
77	15	Wicklow East	IE_EA_G_004
85	13.5	Wicklow East	IE_EA_G_004
103	12	Wicklow East	IE_EA_G_004

15.3.5 Groundwater dependent habitats

Groundwater dependant habitats are hydrogeological constraints as they have the potential to be impacted as a result of deterioration in groundwater levels, flows or quality through, for instance, accidental spillages, dewatering causing alteration of baseflow to the habitat causing the area to dry out. A conservative approach was taken regarding water dependent habitats. In advance of a detailed survey at environmental impact assessment stage, some features have been included and given an importance rating as if they are dependent on both surface water and groundwater, refer to **Section 14** (Hydrology) of **Volume B** for the hydrology constraints study.

The habitats in the study area include woodland, dry valley, bogs, headlands, marsh, wetland and calcareous springs (tufa springs).

Calcareous springs are lime-rich water sources rich in dissolved calcium carbonate that deposit tufa, a porous calcareous rock, as the spring water emerges. Such springs are present in Glen of the Downs, Druids Glen and Ballywaltrim⁷ Lane (Ecological Site EC45 in **Section 12** (Biodiversity) of **Volume B**). The springs at these three locations are classified by the Project Biodiversity Specialist as Annex I habitat ‘Petrifying springs with tufa formation (Cratoneurion) [7220*], are valued on an international scale and are of extremely high importance.

As part of this constraints study of these tufa springs, a preliminary zone of contribution (PZOC), which is the area that contributes water to the spring, has been delineated. A desk-based study considering the topography, geology, subsoil and aquifer and rivers in proximity to the springs was used to delineate this zone. The derived PZOCs for springs located at Glen of the Downs, Druids Glen and Ballywaltrim Lane are included in the Hydrogeological Constraints map drawings outlined below.

Water dependant habitats are listed in **Table 15.7** and presented in the Hydrogeological Constraints map drawings (**Figure B15.13 to Figure B15.18**). These habitats are further discussed in **Section 12** (Biodiversity) of **Volume B**. The constraint importance ranking shown in **Table 15.7** is only related to the hydrogeological importance ranking due to the site being a water dependant habitat.

Table 15.7: Water dependant habitats⁶

Site name	Site code	Designation	Characteristics	Constraint importance ranking
Loughlinstown Woods	001211	pNHA	Woodland occurs on the sloping ground overlooking the Loughlinstown river.	Very High
Dingle Glen	001207	pNHA	A dry valley formed as a glacial lake overflow channel.	Very High

⁷ Denyer Ecology (2019) Ballywaltrim Lane Spring Survey

Site name	Site code	Designation	Characteristics	Constraint importance ranking
Ballyman Glen	000713	pNHA, SAC, SPA	Ballyman Glen contains a small strip of alkaline fens and petrifying springs.	Extremely High
Kilmacanoge Marsh	000724	pNHA	This site is important in having a diversity of species-rich wetland habitats within a relatively small area, and particularly for the presence of some rare invertebrates. The site also contains two priority Annex I habitats; Alluvial woodland [91E0*] and Orchid-rich calcareous grassland [6210*].	Extremely High
Knocksink Wood	000725	pNHA, SAC	Woodland area situated in the valley of the Glencullen River. The steep sides of the valley are mostly covered with calcareous drift and support extensive areas of woodland. Sites includes petrifying springs and alluvial forests.	Extremely High
Dargle River Valley	001754	pNHA	A stretch of the river meandering from a wide and flat valley into cascades.	Very High
Powerscourt Woodland	001768	pNHA	Woodland area includes waterfall and river.	Very High
Carriggower Bog	000716	pNHA, SAC	Area of wet bog and poor fen, flanked by the Vartry River on the south-western side. Site includes transition mires.	Extremely High
Glen of the Downs	000719 WW023	pNHA, SAC, 2 Annex 1 Habitats	A deep channel that was formed by meltwater erosion on the northeastern flank of the mountains. There are calcareous springs which are of international importance - Annex I habitat Petrifying Springs ⁱ [7220*] found in the north-east. Alluvial Woodland of international importance ⁱ – Annex I habitat [91E0]*	Extremely High
Murrough, Murrough Wetlands, Murrough SPA	000730, 002249, 004186	pNHA, SAC, SPA	Coastal wetland complex which includes annual vegetation of drift lines, perennial vegetation of stony	Extremely High

Site name	Site code	Designation	Characteristics	Constraint importance ranking
			banks, Atlantic and Mediterranean salt meadows, Cladium and Alkaline Fens.	
Devil's Glen	000718, WW018	pNHA	A deep ravine, oriented east-west, bounded by woodland, and stretches almost 3km.	Very High
Druids Glen	n/a	Annex I habitat	Calcareous springs which are of international importance - Annex I habitat Petrifying Springs [7220*]	Extremely High
Ballywaltrim Lane	n/a	Annex I habitat	Calcareous springs which are of international importance - Annex I habitat Petrifying Springs [7220*] Potential priority Annex I Habitat [91E0*] Alluvial woodland	Extremely High
Notes:				
i. This habitat is considered groundwater dependent. The Qualifying Interest of the SAC is not considered to be groundwater dependent				

15.3.6 Summary

This section has identified the hydrogeological constraints for the study area by assessing:

- aquifer type;
- the vulnerability of groundwater;
- quantifying groundwater as a resource; and
- the presence of water dependant terrestrial ecosystems.

These hydrogeological attributes have been assessed in terms of importance so that they can be considered in the development and assessment of potential options.

The majority of the study area is underlain by a poor aquifer of low importance. There are three locally important sand and gravel aquifers of medium importance present within the study area.

The groundwater abstraction wells identified within the study area are of low importance with no group water schemes or public supply source protection areas.

There are 14 water dependant habitats within the study area which have been ranked from very high to extremely high importance.

The ranking presented in this chapter is only related to it being a water dependent habitat and further information on the importance related to biodiversity is provided in **Section 12 (Biodiversity)** of **Volume B**.

Refer to Hydrogeological Constraints Map drawings (**Figures B15.13 to Figure B15.18**) which summarise the hydrogeological constraints within the study area.

15.4 References

Geological Survey of Ireland, Groundwater Bodies:

Geological Survey Ireland, Enniskerry GWB: Summary of Initial Characterisation

Geological Survey Ireland, Kilcoole GWB: Summary of Initial Characterisation

Geological Survey Ireland, Wicklow GWB: Summary of Initial Characterisation.

Available from: <https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx> [Accessed: 09 April 2019]

Denyer Ecology (2019) Ballywaltrim Lane Spring Survey. Received via submission following Public Consultation No.2, held on 12th November 2019.

Environmental Protection Agency (EPA) National Heritage Areas (NHA), Special Area of Conservation (SAC), Special Protection Areas (SPA) Available from: <https://gis.epa.ie/EPAMaps/>, [Accessed: 09 April 2019].

Geological Survey Ireland (GSI) Bedrock Geology 1:100,000, Groundwater Rock Units, Groundwater Aquifers, Groundwater Vulnerability. Available from: <https://dcnr.maps.arcgis.com/apps/webappviewer/index.html?id=3400f393afa844538e5b81679552205d> [Accessed 10 April 2019].

Geological Survey Ireland (GSI) Groundwater wells and springs. Available from: <https://dcnr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228> [Accessed: 10 April 2019 and checked 15 July 2020]

National Parks and Wildlife Services National Heritage Areas (NHA), Special Area of Conservation (SAC), Special Protection Areas (SPA). Available from: <https://www.npws.ie/national-parks>

NRA (2009) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. Available from: <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

Scott Cawley (2011) Cherrywood Strategic Development Zone: Biodiversity Plan. Available from: https://www.dlrcoco.ie/sites/default/files/atoms/files/cherrywood_biodiversity.pdf

16 Landscape and visual

16.1 Introduction

This section describes the landscape and visual constraints within the study area for the N11/M11 Scheme including identifying potentially highly sensitive landscapes and visual receptors (the term ‘sensitivity’ is applied here in relation to how it is used in the Guidelines for Landscape and Visual Impact Assessment,¹ which may or may not align with how the term is used in the wider arena of landscape planning, such as by local authorities in their County Development Plans or Landscape Character Assessments²).

16.2 Methodology and sources of information

The methodology for Landscape and Visual involved a desk study of the relevant County Development Plans (CDPs) and Local Area Plans (LAPs) to ascertain the most valuable and sensitive landscapes and, along with a variety of other sources, to identify locations from where notable visual amenity is likely to be afforded. This desk study was based on a review of the following sources:

- Dún Laoghaire-Rathdown County Development Plan 2016 - 2022³;
- Dún Laoghaire-Rathdown Local Area Plans⁴;
- Wicklow County Development Plan 2016 – 2022⁵;
- Wicklow County Local Area Plans⁶;
- National Parks and Wildlife Service⁷;
- Ordnance Survey maps;

¹ Landscape Institute and the Institute of Environmental Management and Assessment (eds.) (2013) Guidelines for Landscape and Visual Impact Assessment. Routledge, Oxon.

² In accordance with the Landscape and Visual Impact Assessment (p88), landscape sensitivity is a function of the susceptibility of the landscape to the type of change proposed and the value placed on that landscape. Landscape value and sensitivity are determined while establishing the baseline conditions as part of an impact assessment through consideration of a number of factors highlighted in the guidelines.

³ Dún Laoghaire-Rathdown County Council (2016) Dún Laoghaire-Rathdown County Development Plan 2016 – 2022. Available from: <https://www.dlrcoco.ie/en/planning/county-development-plan/county-development-plan-2016-2022>

⁴ Dún Laoghaire-Rathdown (2019) Local Area Plans. Available from: <https://www.dlrcoco.ie/en/planning/local-area-plans> [Accessed: 07 May 2019]

⁵ Wicklow County Council (2016) Wicklow County Development Plan 2016 – 2022. Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/National-Regional-County-Plans/Wicklow-County-Development-Plan/Wicklow-County-Development-Plan-2016-2022>

⁶ Wicklow County Council (2019) Local Area, Town & Settlement Plans. Available from: <https://www.wicklow.ie/Living/Services/Planning/Development-Plans-Strategies/Local-Area-Town-Settlement-Plans> [Accessed: 07 May 2019]

⁷ National Parks and Wildlife Service (2019) Map viewer. Available from: <http://webgis.npws.ie/npwsvviewer/> [Accessed: 10 April 2019]

- Sport Ireland Trails⁸; and
- Google Maps⁹.

16.3 Existing environment

16.3.1 Policy context

Dún Laoghaire-Rathdown County Development Plan 2016 - 2022

Landscape Character

Appendix 7 of the Dún Laoghaire-Rathdown County Development Plan (DLRCDP¹⁰) identified that there are 14 Landscape Character Areas (LCA) within the administrative area of Dún Laoghaire-Rathdown. The study area includes parts of 7 LCAs (as listed in **Table 16.1**). Sensitivity weightings are not applied to the LCAs as a whole but rather to sensitive locations within each LCA or features noted in the DRLCDP¹⁰. These are also listed in **Table 16.1**.

Table 16.1: DLRCDP - Landscape Character Areas

Landscape Character Area	Relevant sensitivities/strategies
5. Kiltiernan Plain	To have regard to the recommendations and findings of the Historic Landscape Character Assessment for Kiltiernan. Protect existing hedgerows.
6. Ballycorus	Recognition of the important role of Ballycorus lead mines in the past. Dingle Glen is a sensitive landscape and shall be afforded protection due to its rarity. To have regard to the recommendations and findings of the Historic Landscape Character Assessment for Kiltiernan.
10. Rathmichael	Protection of deciduous tree belts. To have regard to the recommendations and findings of the Historic Landscape Character Assessment for Rathmichael
11. Ballyman	To have regard to the recommendations and findings of the Historic Landscape Character Assessment for Old Connaught Protect existing hedgerowsc
12. Shanganagh	The sylvan character of the Old Dublin Road shall be maintained.
13. Carrickmines	The future vision for this area offers an opportunity to enhance and restore a portion of the landscape as a public park (former Ballyogan tiphead).

⁸ Sport Ireland (2019) Sport Ireland Trails. Available from: www.irishtrails.ie [Accessed: 10 April 2019]

⁹ Google Maps (2019) Map view and aerial view. Available from: www.google.ie/maps [Accessed: 10 April 2019]

¹⁰ Dún Laoghaire-Rathdown County Council (2016) Dún Laoghaire-Rathdown County Development Plan 2016 – 2022. Available from: <https://www.dlrccoco.ie/en/planning/county-development-plan/county-development-plan-2016-2022>

Landscape Character Area	Relevant sensitivities/strategies
	To have regard to the recommendations and findings of the Historic Landscape Character Assessment for Kiltiernan.
14. Cherrywood/ Rathmichael	Development in this area will be in accordance with the adopted SDZ Planning Scheme.

There is one policy (LHB2) in the DLRCDP¹⁰ that relates to all 14 LCAs:

- *Policy LHB2: Preservation of Landscape Character Areas - It is Council policy to continue to preserve and enhance the character of the County's landscapes in accordance with the recommended strategies as originally outlined in the Landscape Character Assessment...*

There is one policy (LHB5) in the DLRCDP¹⁰ that relates to LCAs that have areas with strategies to respect historic landscape character value:

- *Policy LHB5: Historic Landscape Character Areas - In assessing development proposals and in the preparation of plans it is Council policy to have regard to the recommendations and findings of the Historic Landscape Character Assessments (HLCA) already undertaken for a number of the urban-rural fringe areas of the County most likely to come under development pressure.*

There are several Land Use Zoning Objectives listed in Table 8.3.1 of the DLRCDP¹⁰. Areas which fall under Objective F and G are considered to have higher levels of landscape sensitivity. Those areas to which Objective F and G applies are illustrated on **Figures B16.1 - B16.2** and are described in the DLRCDP as follows:

- *Objective F: To preserve and provide for open space with ancillary active recreational amenities.*
- *Objective G: To protect and improve high amenity areas.*

Objective G applies to areas that consist of landscapes of special value, where inappropriate development would be of greater consequence. There is one policy (LHB4) specifically related to these areas:

- *Policy LHB4: High Amenity Zones - It is Council policy to conserve and enhance existing High Amenity zones and to seek to manage these and other areas to absorb further recreational uses and activity without damaging the amenities that affords them their special character.*

Protected Views and Prospects

Policy LHB6 in the DLRCDP¹⁰ relates to protected views and prospects and states:

- *Policy LHB6: Views and Prospects - It is Council policy to protect and encourage the enjoyment of views and prospects of special amenity value or special interests.*

Table 4.1.1 of the DLRCDP¹⁰ lists 14 of ‘Prospects to be Preserved’. These are views towards specific features from certain roads. Of these, the following four occur within the study area:

- *Carrickgollogan from Bray Road (Shankill to Bray area)*
- *Carrickgollogan from Ballyman Road*
- *Carrickgollogan from the Enniskerry Road (south of Kiltiernan Village)*
- *The Scalp from Ballyman Road and part of the Enniskerry Road*

The DLRCDP states, ‘Roads or other public areas from which there is a View worthy of protection are graphically shown on the Development Plan Maps¹⁰’. Certain locations are identified on the DLRCDP Development Plan Maps¹⁰ (DPM) under the heading of ‘Other Objectives’ including; ‘To preserve Views’; and ‘To preserve Prospects’. ‘To preserve Views’ appears to tally with and include the roads described in the ‘Prospects to be Preserved’ list in Table 4.1.1 of the DLRCDP¹⁰. ‘To preserve Prospects’ appears to be applied where the objective is to protect views from specific fixed locations, where elevated scenic views are afforded. These details from the DPMs are indicated in **Figures B16.4 - B16.8**.

Protected Trees

Trees and woodlands identified for protection are also indicated on the DLRCDP DPMs¹⁰. Trees and woodlands that occur within the study area are indicated on **Figures B16.9 - B16.14**. There is one policy (OSR7) in the DLRCDP¹⁰ that relates to protected trees and woodlands:

- *Policy OSR7: Trees and Woodland - It is Council policy to implement the objectives and policies of the Tree Strategy for the County – ‘dlr TREES 2011 - 2015’ - to ensure that the tree cover in the County is managed and developed to optimise the environmental, climatic and educational benefits which derive from an ‘urban forest’.*

Public Rights of Way and Recreation Access Routes

Public Rights of Way and Recreation Access Routes are listed in Appendix 8 of the DLRCDP¹⁰ and are shown on the DLRCDP DPMs¹⁰. The Public Rights of Way that occur within the study area are indicated on **Figures B16.27 - B16.32** and are:

- *Laughanstown Lane to Herenford Lane.*
- *Glenamuck South; Ballycorus Road to Dingle Glen.*
- *Brides Glen Road to Rathmichael Road via Rathmichael Cemetery to Rathmichael Wood.*
- *Ferndale Road via Rathmichael Wood to Puck's Castle Lane.*
- *Barnaslingan Lane to Enniskerry Road (opposite entrance to Kiltiernan Hotel).*
- *Enniskerry Road (opposite Kiltiernan Grange) to Ballybetagh Road via Ballybetagh Wood.*

- *Mine Hill Lane to Lead Mines Chimney.*
- *Scalp Villa, Enniskerry Road to Ballybetagh Road.*
- *Ballyman Road to Barnaslingan Lane via Glenmunder.*
- *Ferndale Road to Crinken Lane.*

The Recreation Walking Routes that occur within the study area are indicated on **Figures B16.27 - B16.32** and are:

- *Barnaslingan lane to Scalp and Enniskerry Road via various routes in Barnaslingan Wood.*
- *Various routes to Carrickgollogan Hill from Lead mines Chimney, Murphy's Lane, Pucks Castle Lane via Coillte Lands in Carrickgollogan Wood. Includes access to Alcock memorial from Murphy's Lane.*

Dún Laoghaire-Rathdown County Council has the following two policies in relation to the existing walking routes:

- *Policy LHB14: Public Rights-of-Way - It is Council policy to: Preserve, protect, promote and improve for the common good all existing public rights-of-way which contribute to general amenity...*
- *Policy LHB15: Recreation Access Routes - It is Council policy to preserve all Recreation Access Routes which contribute to general amenity.*

Wicklow County Development Plan 2016 – 2022

Landscape Character

A Landscape Assessment is incorporated within Appendix 5 of the Wicklow County Development Plan 2016 – 2022⁵ (WCDP), which divides the county into 6 Landscape Categories. The Landscape Categories within the study area have been mapped on **Figures B16.15 - B16.20** and are listed in **Table 16.2** along with their respective Vulnerability ranking (extracted from Table 1.5 in the Landscape Assessment of the WCDP⁵).

Table 16.2: WCDP - Landscape Categories and Vulnerability

Landscape Type	Vulnerability
Mountain and Lakeshore Areas of Outstanding Natural Beauty (ML-AONB)	Very High
Coastal Areas Outstanding Natural Beauty (C - AONB)	Very High
Areas of Special Amenity (ASA)	High
Access Corridor Area (ACA)	Medium
Urban Areas (UA)	Low

In the Landscape Assessment in the WCDP⁵, landscape sensitivity is addressed at a much finer scale than is commonly the case in other landscape character assessments and is based on specific landscape features, topography and land cover. Landscape sensitivity is mapped in **Figure 2.1** in the Landscape Assessment in the WCDP⁵.

Landscape Sensitivity within County Wicklow is illustrated on **Figures B16.21 - B16.26**. The Landscape Sensitivity map is very intricate but when examined at a macro level it is noted that the mountains to the west and the coast to the east generally have higher sensitivity ratings. The Landscape Sensitivity map in the WCDP⁵ was used to assist with the determination of the Vulnerability rankings for the various Landscape Types in the Landscape Assessment. Vulnerability rankings are indicated in **Table 16.2**. The way Vulnerability ratings are used within the WCDP⁵ is similar to how landscape sensitivity ratings are often employed in other counties.

There are a number of objectives relating to landscape outlined in Chapter 10 of the WCDP⁵, some of which are relevant including:

- *NH49 - All development proposals shall have regard to the County landscape classification hierarchy in particular the key landscape features and characteristics identified in the Wicklow Landscape Assessment (set in Volume 3 of this plan) and the 'Key Development Considerations' set out for each landscape area set out in Section 5 of the Wicklow Landscape Assessment.*
- *NH50 - Any application for permission in the AONB which may have the potential to significantly adversely impact the landscape area shall be accompanied by a Landscape/Visual Impact Assessment, which shall include, inter alia, an evaluation of visibility and prominence of the proposed development in its immediate environs and in the wider landscape, a series of photos or photomontages of the site/development from clearly identified vantage points, an evaluation of impacts on any listed views/prospects and an assessment of vegetation/land cover type in the area (with particular regard to commercial forestry plantations which may be felled thus altering character/visibility). The Assessment shall demonstrate that landscape impacts have been anticipated and avoided to a level consistent with the sensitivity of the landscape and the nature of the designation.*

Protected Scenic Routes, Views and Prospects

There are 48 designated 'Views of Special Amenity Value or Special Interest' and 66 designated 'Prospects of Special Amenity Value or Special Interest' listed in Chapter 10 of the WCDP⁵. It should be noted that in the case of the WCDP, 'prospects' take the form of specific routes along certain roads (i.e. what some other counties designate as 'scenic routes' in their CDPs).

The 'Views of Special Amenity Value or Special Interest' and the 'Prospects of Special Amenity value or Special Interest' that occur within the study area have been mapped on **Figures B16.3 - B16.8**. 'Views of Special Amenity Value or Special Interest' within the study area are listed in **Table 16.3**.

Table 16.3: WCDP - Views of Special Amenity Value or Special Interest

ID	Origin of view	Description
1	R117 at The Scalp, Enniskerry	View of Sugarloaf Mountains and Enniskerry
3	L5507 Ballyman Road, Enniskerry	View of The Scalp and the Scalp Valley from Ballyman

ID	Origin of view	Description
4	The lands near Monastery House	View south towards Djouce Mountain
6	Summerhill House Hotel	View towards the Cookstown Valley and Ballyman Glen
7	From Cookstown Road	View towards the Great Sugarloaf Mountain
8	L1028 at Ballydonagh and Coolnaskeagh	View of Great Sugarloaf and Little Sugarloaf
9	L1031 Red Lane, Calary	View down valley towards sea
35	Glen of the Downs	View of north, west and south from the Octagon on the east side of the N11 in the Glen of the Downs Nature Reserve over Woodlands, Downs Hill, Downs, Calary and red lane areas, Views to east, south and west over Drummin hill and Stylebawn areas from the upper paths within the Nature Reserve.
36	L5529, Templecarrig, southern slopes of Little Sugarloaf	View to the south and southeast of Kindlestown Hill and the coast
39	N11 Kilmacanoge	View of Little Sugarloaf
44	Main Street, Newtownmountkennedy	View river valley
45	St. Catherine's School, (Newtownmountkennedy)	View to southwest
46	Old N11, Newtownmountkennedy	View to the northwest
47	Kilcoole Road, Newtownmountkennedy	View to the south

'Prospects of Special Amenity Value or Special Interest' within the study area are listed in **Table 16.4**.

Table 16.4: WCDP - Prospects of Special Amenity Value or Special Interest.

ID	Origin	Feature
5	Prospects of both sides of Rocky Valley, Kilmacanoge	Prospects of both sides of Rocky Valley, Kilmacanoge
6	Bray-Greystones Cliff Walk	Prospect of sea, cliffs and across southern slopes of Bray Head to R761 from Cliff Walk
7	Railway from Greystones to Wicklow town	Prospect of coast along railway line
9	L1031 Red Lane and R755 at Calary	Prospect of Great Sugarloaf at Calary
11	N11 south of Kilmacanoge	Prospect to west of Great Sugarloaf, across Kilmacanoge Marsh and Quill Road
13	N11 Glen of the Downs	Prospect of both sides of Glen of the Downs
14	N11 at Kilmullin	Prospect of Kilcoole and the coast
15	From Coynes Cross on N11 towards Wicklow	View of Wicklow Head and Coastline

ID	Origin	Feature
66	R761 East of Kilruddery Estate	Prospect of Bray Head from R761

One objective (NH52) relating to views and prospects in County Wicklow is listed in Chapter 10 of the WCDP⁵:

- *NH52 - To protect listed views and prospects from development that would either obstruct the view/prospect from the identified vantage point or form an obtrusive or incongruous feature in that view/prospect. Due regard will be paid in assessing development applications to the span and scope of the view/prospect and the location of the development within that view/prospect.*

Protected Trees

The existing Tree Protection Orders (TPOs) in County Wicklow are set out in Schedule 10.08 and Maps 10.08 A, B and C of the WCDP⁵. The TPOs that occur within the study area are indicated on **Figures B16.9 - B16.14** and detailed in **Table 16.5**:

Table 16.5: WCDP - Tree Protection Orders

ID	Description	Location
02	Trees at Avoca Handweavers	Glencormick South, Kilmacanoge
04	Oak trees	Quarry Road, Killincarrig, Greystones
41	Woodlands & trees in the Dargle Glen	Tinnahinch Newtown, Cookstown & Kilcrouney townlands
43	Roadside Beech trees	Holy Faith Convent, Kilcoole
45	Scots Pine and Spruce trees	Morepark, Newtownmountkennedy

There are six objectives relating to protected woodland, trees and hedgerows in County Wicklow listed in Chapter 10 of the WCDP⁵:

- *NH14 To promote the preservation of trees, groups of trees or woodlands in particular native tree species, and those trees associated with demesne planting, in the interest of amenity or the environmental, as set out in Schedule 10.08 and Map 10.08 A, B & C of this plan.*
- *NH15 To consider the making of Tree Preservation Orders (TPOs) to protect trees and woodlands of high value, where it appears that they are in danger of being felled.*
- *NH16 Development that requires the felling of mature trees of environmental and/or amenity value, even though they may not have a TPO in place, will be discouraged.*
- *NH17 To discourage the felling of mature trees to facilitate development and encourage tree surgery rather than felling where possible.*
- *NH18 To encourage the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees, as part of the development management process, and require the planting of native, and appropriate local characteristic species, in all new developments.*

- *NH19 To encourage the retention, wherever possible, of hedgerows and other distinctive boundary treatment in the County. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, provision of the same type of boundary will be required of similar length and set back within the site in advance of the commencement of construction works on the site (unless otherwise agreed by the Planning Authority).*

Public Rights of Way

Public Rights of Way in County Wicklow are listed in Chapter 10 of the WCDP⁵ and are shown on the map 10.12 of the WCDP⁵. The Public Rights of Way that occur within the study area are indicated on **Figures B16.27 - B16.32** and are detailed in **Table 16.6**:

Table 16.6: WCDP – Public Rights of Way

Reference	Location	Description
P.R.O.W.1	The Murrough, Wicklow Town	A coastal walkway from the public car park in the Murrough Wicklow Town to the former Wicklow Town Council boundary in Tinakelly via Bollarney Murrough, Knockrobin, Murrough, and Tinakilly Murrough.
P.R.O.W.5	From Beach Road Greystones to the coastline in Rathdown Lower and Rathdown upper, via two branches.	This section of amenity route constitutes the initial linear southern section of the Bray to Greystones Cliff Walk. From the junction of Beach Road (L- 12042)/Victoria Road (L-1204) in the Greystones harbour area via part of the new residential area of the Greystones harbour-marina development, with two separate perpendicular branches linking this route to the coastline at (a) the north beach and (b) an existing pathway to the coast in the vicinity of the site of the former Rathdown Castle. Total cumulative length of this route is circa 1.4km.
P.R.O.W.6	Tinakelly The Murrough to Blackditch Newcastle.	A continuation of the Murrough coastal walk referenced herein as P.R.O.W.1 from Tinakelly Murrough Wicklow to the beach at Newcastle in the vicinity of the former Newcastle Railway Station at Blackditch via the townlands of: Clonmannon, Ballybla, Castlegrange, Grange South and Grange North.
P.R.O.W.7	Main Street Kilcoole to the L-1042 /Kilquade Road.	Sally Walk/Kilcoole Mass Path, from the pedestrian opening on the R761/Main Street to the L-1042 in Priestsnewtown Kilquade via: a public footpath, the grounds of St. Patrick's Hall, a defined pathway, a pedestrian bridge over Saint Patrick's River and through a pathway in a field in Priestsnewtown and a laneway that opens onto the L-1042.

One relevant objective (NH46) relating to Public Rights of Way in County Wicklow is listed in Chapter 10 of the WCDP⁵:

- *NH46 The Council will utilise its relevant statutory powers for the purpose of preserving in so far as is practical, the character of the routes of the public rights of way detailed in Table 10.3 (Map 10.12) for amenity purposes.*

In this regard, the Council will, in the interests of attaining a balance between the needs of the individual owners of holdings over which these listed routes transverse and the common good, engage with such land-owners in circumstances where there are reasonable ground for giving consideration to the re-routing of sections of such means of public access within the same holding.

Local Area Plans

There are a number of LAPs within Dún Laoghaire – Rathdown³ and County Wicklow⁶ that cover sections of the study area. A review of these LAPs has revealed that all the relevant landscape and visual constraints contained within the Dún Laoghaire – Rathdown LAPs are also captured in the DLRCDP¹⁰. There are two LAPs within County Wicklow that are relevant, the Bray Municipal District LAP (BMDLAP) and the Greystones, Delgany and Kilcoole LAP (GDKLAP).

Protected Views and Prospects - Bray Municipal District LAP

‘View & Prospects Bray’ are indicated on the Heritage Objectives Map ‘H4 – Bray Settlement Natural Heritage Map’ in the BMDLAP but there are no accompanying descriptions. These are indicated in **Figures B16.3 and B16.4**.

Protected Views and Prospects - Greystones, Delgany and Kilcoole LAP

‘LAP Views’ and ‘LAP Prospects’ are illustrated on Heritage Map B GDKLAP and listed in Appendix B of same. These are indicated in **Figures B16.4 and B16.5** and are listed in **Table 16.7**.

Table 16.7: GDKLAP – Views and Prospects

Reference	Description
V1	The view of Bray Head, Little Sugarloaf and the higher reaches of the Great Sugarloaf from the eastern parts of harbour area, i.e. eastern pier and higher lands immediately south of the pier (location of anchor landmark), with the built up part of Greystones in the foreground.
V2	Views southwards at the ‘Horse and Hound’ in Delgany Village towards Drummin Hill.
V3	The views seaward from Cliff Road, RathdownUpper
V4	View from R761 north of Greystones - View northwards to Bray Head and view southwards of sea and built up area of Greystones.
V5	View from R761 Windgates Coast Road of Bray Head
V6	View from Cliff Road Windgates of coast, Greystones and foreground of Bray Head
P1	The prospect seaward from Marine Road, Greystones
P2	The prospect of the coast and sea from the R761 from the junction with the Southern Access Route northwards to the northern boundary of Glenbrook.
P3	The prospect seaward from the R761 north of Redford.

Protected Trees - Bray Municipal District LAP

Bray has additional TPOs in the BMBLAP. These are indicated in **Figures B16.9** and **B16.10**.

Protected Trees - Greystones, Delgany and Kilcoole LAP

Protected Trees are listed in Table B2.1 in Section 2 – ‘Tree Protection Objectives’ of Appendix B in the GKDLAP. The locations of these are indicated on ‘Heritage Map B’ in the GDKLAP. These ‘Tree Protection Objectives’ are shown on **Figures B16.10** and **B16.11** and are listed in **Table 16.8**.

Table 16.8: GDKLAP – Tree Protection Objectives

Reference	Description
T01	Coolagad, Trees in vicinity of farmstead
T02	Delgany, Bellevue Demesne
T03	Delgany Village, western end of village, including Stylebawn House and Hillside House
T04	Delgany Village, trees on ground of ‘Glenair’
T05	Delgany Village, the Old Rectory
T06	Delgany, Farrankelly, line of Scots Pinetrees
T07	Delgany, Stilebawn
T08	Greystones, Burnaby Park
T09	Street trees (mainly sycamore and horse chestnut), Church Road, Greystones
T10	Greystones, Church Lane; mature conifers in large private gardens
T11	Greystones, The Mill, Mill Road
T12	Greystones, Mill Road, group of Scots Pine in vicinity of GAA grounds
T13	Greystones, Mill Road, group of Scots Pine on grounds of Rugby Club
T14	Greystones, Portland Road
T15	Greystones, Quarry Road
T16	Greystones, St. Vincent Road
T17	Greystones, Whitshed Road
T18	Greystones, Burnaby, group of mature trees in private garden
T19	Killincarrig, Treeline of Scots Pine
T20	Killincarrig, trees on grounds of private dwelling
T21	Killincarrig, group of trees to edge of open space
T22	Killincarrig Village, trees on grounds of private dwelling
T23	Killincarrig, group of Scot’s Pine to the west of the park and ride facility

Special Amenity Area Order

Special Amenity Area Orders (SAAO) were designed to protect areas that are of particularly high amenity value, which are sensitive to intense development pressure and which are not adequately protected by existing planning controls. The Bray Head is subject of a SAAO. The extent of the Bray Head SAAO is indicated on Map 10.10 in Chapter 10 of the WCDP⁵ and is shown on **Figure B16.28**. There is one objective relating to the Bray Head SAAO in Chapter 10 of the WCDP⁵:

- *NH44 To implement the measures set out in the Bray Head SAAO*

16.3.2 Landscape context

Terrain in the west of the study area is higher and includes the Little Sugarloaf, the Great Sugarloaf, Downs Hill and Carrickgollogan Hill. The eastern section of the study area is low lying and includes a section of the coastline which stretches from just south of Killiney Beach, around Bray Head and along The Murragh towards Wicklow Town.

The road corridor of the N11/M11 weaves its way between the mountains and settlements in a north-south orientation. It passes immediately adjacent to Newtownmountkennedy, Kilpedder, and Kilmacanoge. The R761 regional road takes a parallel route offset to the east, directly connecting the settlements of Newcastle, Kilcoole, Delgany, Greystones, Bray and Shankill. The Dublin to Wicklow railway line lies along the coast just inside the eastern perimeter of the study area.

The northern section of the study area is more built up and includes the larger settlements of Shankill, Bray and Greystones. Outside of the towns, land use is largely agricultural with a high degree of one off residential dwellings. There are several commercial conifer plantations (mainly concentrated in the western portion of the study area) and some small areas that have retained mature broadleaved vegetation, most notably adjoining the river valleys that flow from the uplands in the west to the sea in the east. There are also several quarries, municipal dumps, industrial areas and business and retail parks scattered across the study area.

The study area hosts many locations that are important outdoor recreation destinations for the inhabitants of the greater Dublin area (which lies immediately to the north of the study area.)

National Park & Wildlife Service

There are two Nature Reserves designated by the National Parks & Wildlife Service⁷ within the study area, Glen of the Downs Woods Nature Reserve and Knocksink Woods Nature Reserve. In addition to protecting nature, these areas contribute to increased landscape sensitivity. In this instance these areas also provide high quality outdoor recreation opportunities for the public. Both of these Nature Reserves have been illustrated on **Figures B16.9 - B16.14**.

Further information on European, National and County designated sites is included in **Section 12** (Biodiversity) of **Volume B**.

16.3.3 Visual context

Views afforded from outdoor public amenities and facilities are considered to have a higher level of sensitivity, such as views from:

- walking routes;
- Public Rights of Way;
- lookout points;
- recreational woodlands (Barnaslingan and Carrickgollogan, Kindlestown, Glen of the Downs, Knocksink and Callowhill);
- golf courses; and
- other amenity features (including but not limited to; Bray Head, Shanganagh Park, The Scalp, and Kilruddery House and Gardens).

The locations of most of the above are illustrated on **Figures B16.3 - B16.14**, and **Figures B16.27 - B16.32**.

16.4 Summary and conclusions

In Dún Laoghaire-Rathdown, areas which fall under Land Use Zoning Objective G are areas with high amenity value and as such are likely to have a high degree of sensitivity.

In County Wicklow the following Landscape Categories are likely to be considered highly sensitive:

- Mountain and Lakeshore Areas of Outstanding Natural Beauty¹¹ (ML - AONB);
- Coastal Areas of Outstanding Natural Beauty (C - AONB); and
- Areas of Special Amenity (ASA).

Any potential development within these Landscape Categories and/or areas designated under Land Use Zoning Objective G would have to be carefully considered to avoid the potential to disrupt their valued landscape character.

Objectives stated in the DLRCDP³ include the preservation of views from certain locations (views) and preservation of views to and from specific locations (prospects) in the administrative area. Adverse impacts on these views and prospects should be avoided or minimised if possible.

¹¹ The WCDP describes this Landscape Category as an ‘Areas of Outstanding Natural Beauty’ or AONB but this ‘borrowed term’ and does not equate to how the term is used in the UK where it refers to a designation assigned by a national body (rather than by local authorities) that affords specific protections to an area.

It is indicated in the WCDP⁵ that views from both ‘Views of Special Amenity Value or Special Interest’ and ‘Prospects of Special Amenity Value or Special Interest’ are to be protected. Thus, adverse impacts on these views and prospects should also be avoided or minimised if possible.

There are a number of protected trees within the study area. It is not permitted to fell these trees without special prior authorisation and they should be retained wherever possible as they contribute to landscape character and often also to visual amenity.

Glen of the Downs Woods Nature Reserve and Knocksink Woods Nature Reserve are highly sensitive features in the study area. In addition to providing ecological protection, they contribute to both landscape character and afford a high degree of visual amenity. Any development within or adjoining these woods should be avoided or designed in a way that keeps potential impacts to an absolute minimum.

The study area contains a reasonable quantity of outdoor recreation opportunities including woodlands, walking routes, golf courses, sea bathing, etc. These features will influence the judgement of overall landscape sensitivity of the receiving landscape. Simultaneously, individuals or groups who engage in outdoor activities at these locations are assumed to be more attuned to their surrounding landscape context and therefore people at these locations are considered as having a heightened sensitivity as visual receptors. Potential impacts on views from these locations should be carefully considered. The most sensitive viewpoints are likely to be either designated views (identified in the CDPs) or views from outdoor recreational locations that occur within highly sensitive landscapes (i.e. the Landscape Categories from the WCDP highlighted herein and areas under Land Use Zoning Objective G in the DLRCDP).

16.5 References

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16.6 Glossary of Definitions and Abbreviations

County Development Plan ('CDP')

Dún Laoghaire-Rathdown County Development Plan ('DLRCDP')

Development Plan Maps ('DPM')

Landscape Character Area ('LCA')

Local Area Plan ('LAP')

Tree Protection Orders ('TPO')

Wicklow County Development Plan ('WCDP')

17 External parameters

17.1 Introduction

In addition to the identification of natural and artificial constraints, a number of external parameters which may impact on the development of feasible options must also be considered as part of the constraints study. These external parameters include:

- Funding and Scope;
- Construction Phasing;
- Required Levels of Service;
- Technical Standards (Design Speeds, Road Type etc.);
- Access Control;
- Policy Documents; and
- Procedural and Legal Requirements.

The external parameters which may influence the N11/M11 Scheme are described in **Sections 17.2 to 17.8** below.

17.2 Funding and scope

The planning, design and implementation of national roads projects is a matter for the Transport Infrastructure Ireland, (TII) under the Roads Acts 1993 to 2007 in conjunction with local authorities. The M11 from Junction 4 (N11/M50) to Kilmacanoge has been identified within the National Development Plan (2018 – 2027) as a section of the national road network to be progressed through pre-appraisal and early planning during 2018.

As funding is subject to change, TII continuously monitor their commitments to on-going schemes. The decision to proceed with the various phases of a scheme relies on the funding being made available by central government.

Wicklow County Council, on its own behalf and on behalf of Dún Laoghaire – Rathdown County Council, under an agreement made pursuant to Section 85 of the Local Government Act 2001, are developing a solution to the existing transportation issues along the N11/M11 corridor between Junction 4 and Junction 14. Funding has been provided to take the scheme through Stages 1 to 4 of the TII Project Management Guidelines (PMG). This includes Scheme Concept and Feasibility, Option Selection, Design and Environmental Evaluation and The Statutory Processes.

17.3 Construction phasing

Construction phasing and sequencing is a key concern with any construction project. Successful site management minimises the length of time for which land disturbing activities are undertaken; essentially one part of the site is graded and completed before construction commences on other parts of the site. As well as planning and scheduling benefits, construction sequencing seeks to minimise the environmental impacts to an area, such as excess sedimentation.

Construction phasing becomes more critical at the interfaces with existing infrastructure. At these locations, sequencing of work would also seek to minimise delay and impact on existing road users throughout the construction of the scheme. As the study area encompasses a number of urban areas within Dún Laoghaire-Rathdown and Wicklow, the potential to affect a significant number of people increases the closer an option is to existing communities. Construction phasing then becomes key in seeking to reduce the amount of delay and nuisance caused to the public and also getting the project completed in a reasonable amount of time.

The scheme may be broken down into smaller segments, each of which can be completed separately, such that benefits are realised incrementally. More precise details of exact construction sequencing will be developed at detailed design stage. Potential impacts due to any interim construction phasing arrangement will be assessed as part of the Environmental Impact Assessment Report, to be completed during Phase 3 of the process.

17.4 Required Levels of Service

The concept of a highway Level of Service originated from the US Highway Capacity Manual and is essentially a quality measure describing operational conditions within a traffic stream. This is generally in terms of service measures such as speed and travel time, freedom to manoeuvre, traffic interruptions, and comfort and convenience. Six Levels of Service are defined for various types of routes from A to F, with A representing the best operating conditions, i.e. fully free flow conditions and F the worst, i.e. flow breakdown. TII Publication DN-GEO-03031 (Rural Road Link Design) presents the approximate vehicle flow thresholds commensurate with the provision of a minimum Level of Service D, which is generally recognised as the minimum acceptable Level of Service on a national road.

More recently, the Level of Service concept has evolved to include all road users including pedestrians, cyclists and public transport users. Levels of Service in terms of pedestrians and cyclists include wait time at junctions and actual route lengths in comparison to desire lines. The Level of Service of a public transport system includes wait time, frequency of available services, ease of interchange between different modes, access locations and journey comfort. Many of the specific objectives of the scheme vis-à-vis reduced delay, improved journey time reliability and a reduction in collision frequency and severity, will ultimately be achieved if existing Levels of Service can be enhanced for all transport users.

17.5 Technical standards

The design of any new or improved national road as part of the N11/M11 Scheme will be undertaken in accordance with TII Standards. This includes the design of road geometry, drainage and outfall systems and ancillary elements. Any new public streets or urban roads will be designed in accordance with the Department of Transport, Tourism and Sport, Design Manual for Urban Roads and Streets (DMURS).

Any proposed cycle and pedestrian facilities will be designed in accordance with TII Standards, DMURS and the recommendations outlined in the NTA's National Cycle Manual.

The design of any structures required will be undertaken in accordance with TII Standards and the relevant Eurocodes.

Works involving alteration to significant rivers or streams will be subject to Section 50 approval under the Arterial Drainage Act, 1945 by the Office of Public Works.

17.6 Access control

The existing N11/M11 route between Junction 4 and Junction 14 comprises of both motorway and dual carriageway cross-sections, while also forming part of the comprehensive Trans-European Transport Network (TEN-T) providing a link between Dublin and Rosslare Europort. The northern section of the route adheres to motorway regulations and is a controlled access road as defined under the Roads Act. This controlled status regulates access to specific grade separated junctions only and places a prohibition on intermediary direct accesses. Furthermore, motorway designation places restrictions on the classes of vehicles and road user group which may use the route, with learner drivers, pedestrians, cyclists and animals not permitted to use a motorway.

At a point immediately to the north of Junction 6 (Bray / Fassaroe), the existing route transitions into a two-lane dual carriageway of varying standard but generally consistent cross-section. In terms of access control, dual carriageways are much less restrictive than motorways, with a greater degree of access provision and all road user classes permitted. TII Standards currently permit at-grade roundabouts, grade separated junctions and certain types of priority junction, including direct accesses, on type 1 dual carriageways.

Should a road component form part of the overall solution, a number of factors will influence the treatment of access provision and restriction on any improved section of the N11/M11 between Junction 4 and Junction 14. At present, the 22km section of the existing N11/M11 covered by the scheme includes 29 intermediate access points onto the mainline outside of the 11 major junctions. This proliferation of accesses, including individual residential and commercial accesses is not conducive to the safe and efficient operation of a strategic road.

While it remains unknown if any improved route would be of motorway designation, a degree of access control commensurate with design standards would support certain scheme objectives vis-à-vis improving safety, efficiency and reliability of the route.

The status of the N11/M11 as part of the Comprehensive TEN-T will also be a factor in determining the appropriate degree of access provision and control. EU Regulation No. 1315/2013 requires that high quality roads forming part of the TEN-T network shall be either motorways, express roads or conventional strategic roads. The definitions for each of these road types under Article 17(3) of the Regulations place explicit limitations on access provision in the case of motorways and express roads, and more implicit limitations in the case of a conventional strategic road such that access strategies remain consistent with the provision of a high quality road.

Other considerations relevant to the access control strategy for the N11/M11 Scheme will include any potential for the route to develop as a public transport corridor, for example via the provision of bus priority complemented by park and ride facilities. Suitable access provision may be key to the potential success and operational safety of such options for all road users.

As the scheme progresses, appropriate junction strategies and treatments will be developed in accordance with TII Standards.

17.7 Policy documents

As outlined in Chapter 2 Identification of Need, the objectives of the proposed scheme align with the framework of national, regional and local planning policies and strategies, including inter alia, the National Development Plan (2018 – 2027), the Regional Spatial and Economic Strategy (2019 – 2031), the Transport Strategy for the Greater Dublin Area (2016 – 2035), the Dún Laoghaire-Rathdown and Wicklow County Development Plans and relevant local area plans. Each of these documents outlines policy which drives the objectives of the project such that the ultimate solution proposed must support the policies therein.

17.8 Procedural and legal requirements

The 2017 TII Project Management Guidelines (PMG) outline a procedural framework for the phased approach to the development, management and delivery of Major National Road Schemes in Ireland. The guidelines outline clear steps and highlight important milestones and statutory processes which are required throughout the development of a scheme in accordance with the Roads Act 1993 (as amended).

Actions required by Local Authorities, An Bord Pleanála, TII and Consultant Design Teams are outlined in the PMG also so that phased scheduling of time and resources are allocated appropriately to the scheme.

Note that the PMGs are only a guide as to how a scheme should progress. Deviations from the guide will be agreed and discussed with TII to confirm the most appropriate action for the scheme in question.

There is a requirement that the detailed design shall comply with all relevant design standards subject to approved departures.

There is a legal requirement that detailed design of the preferred option shall comply with designing for safety in construction in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013.

There is a legal requirement to ensure compliance with the various environmental directives, most critically in this case the EU Habitats Directive, given the extensive presence of the Natura 2000 network in the study area.

18 Conclusion

The N11/M11 Junction 4 to Junction 14 Improvement Scheme aims to alleviate congestion and improve safety, journey time reliability and the strategic function of the N11/M11 corridor. The constraints information gathered and documented within this report is used to inform the development of options and alternatives for the scheme and to enable a systematic assessment of the potential impacts associated with these options and alternatives. The subsequent consideration and appraisal of options and alternatives is documented in chapters 5, 6, 7, 8 and 9 of the Option Selection Report.

Appendix B1.1

Public Consultation #1 Report

Wicklow County Council
N11/M11 Junction 4 to J14
Public Consultation #1 Report

C01 | 30 April 2021

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 265455-00

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Document verification

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1 Introduction

The section of the N11/M11 between Junction 4 and Junction 14 is a strategic 22km two-lane dual carriageway. The section is part of the corridor between Dublin and Wexford that provides one of the primary north-south means of access to the south east of the country, in addition to providing access to international markets for freight and tourist traffic through Rosslare Euro-port. The section has been for the most part in service from 1991, therefore some of the portion of the N11/M11 corridor falls short in terms of current road design standards, with the current deficiencies impacting on traffic flow conditions and resulting in significant congestion and an ineffective level of service.

In accordance with Transport Infrastructure Ireland's Project Management Guidelines (TII PMG), consultation is required with the public at key stages. The purpose of these consultations is to engage the public in the scheme delivery process, inform the public of the statutory process and likely time scales, seek the public's cooperation and understanding of the project and capture local knowledge as part of the EIA process. The public consultation comprised an information brochure with an accompanying comment sheet in combination with a public exhibition.

This report details the process and records feedback from the commentary received during the consultation.

2 Public consultation process

2.1 Extent of public consultation

This first public consultation was held at the start of Phase 1 to show the study area, and explain the existing issues with the N11/M11 route, the different Phases and the outline timeline for the project.

The public consultation can be defined as a “blank canvas” consultation due to the fact that no option or detailed constraints were shown. The desired output from this first public consultation was to get as much feedback as possible. In view of the fact that previous publicly available reports had proposed a range of road-based measures to ease N11/M11 congestion, the purpose of the consultation was also to affirm to the public that no definitive solutions have been agreed and that all alternatives will be examined as part of the appraisal process.

2.2 Advert

An advert was placed in the Bray People, Wicklow People and Wicklow Times on the 5th December. A copy of the advert is contained in Appendix A.

2.3 Brochure

A colour brochure and comment sheet were prepared, in both Irish and English. The brochure gave a brief introduction to the scheme, explaining the various existing problems with the N11/M11 and the probable examinations that would be carried out. The brochure also invited submissions from the public.

The comment sheet was also available to the public on the project website (<https://n11m11.ie>) and at the public consultation. A copy of the brochure and comment sheet is available in Appendix B.

The public was given a one-month period to submit commentary on the scheme via a dedicated project email address or by post.

2.4 Public Consultation

The public consultation session was held on Tuesday 11th December 2018 at The Glenview Hotel & Leisure Club, Glen of the Downs, Delgany from 12:00pm to 8:00pm.

Approximately 200 people signed the attendance register.

As the detailed constraints study had not yet commenced, only the high-level constraints were shown on two different types of mapping background, namely aerial photography and discovery map at a scale of 1:10,000. The maps were mounted on display boards for ease of visibility. The constraints maps and the information posters displayed at the public consultation included:

- Constraints mapping;

- SAC: Special Area of Conservation;
- SPA: Special Protection Area;
- PNHA: Proposed National Heritage Areas;
- Display boards;
 - Background to the need for the scheme, and roles of responsible authorities, project management and consultants;
 - Explanation of the known problems of the existing road;
 - Possible options to be considered;
 - Invite to the public to participate through the comment sheet in the identification of constraints and issues that need to be addressed;
 - TII Project Management Guidelines phases explanation and timelines; and
 - Outline of the next steps in the development of a solution.

2.5 Public display

The material from this public consultation is available to view on the project website, <https://n11m11.ie>.

3 Feedback from public consultation

3.1 Debriefing

Following the public consultation, a debriefing session involving the staff from the exhibition was held to capture information received from the public. Examples of general comments received are as follows:

1. Concerns about potential noise impacts of any upgrade to the road and mention that low noise surface and noise barriers should be provided.
2. Suggestion for a new link road from Wilford Roundabout to a new Park & Ride facility near Bray Dart Line to encourage public transport use.
3. Several people mentioned that existing congestion within Bray town is creating problems for the N11 as traffic is forced south to Junction 7 (Bray South) as the traffic problems in Bray prevent it being accessed from Junction 5 R761 (Bray North).
4. Five people queried if a northern relief road for Greystones was going to be constructed connecting into Ballydonagh Road.
5. A representative from Bray Cycling Club enquired if cycling facilities would be provided as part of the scheme, another person was interested in both cycling and pedestrian facilities that could be constructed as part of the scheme if it truly was going to be a transport improvement scheme.
6. Several people queried the status of the 2017 Needs Assessment Report (available on the TII website) and understood that the purpose of the public consultation was to promote/display the finding and solutions recommended in this report. This created confusion for many people when it was explained that no solutions have been developed to date.
7. A residents group on Ballywaltrim Lane (again quoting the Needs Assessment Report) queried if a parallel service road was to be constructed southbound between Junction 6 R918 (Bray/Fassaroe) and Junction 7 (Bray South), connecting Dargle Land/Herbert Road and if this road would connect into Ballywaltrim Lane. If this was the case, they were concerned about potential impacts to their properties.
8. Many people queried why the public consultation was taking place at such an early stage of the scheme development and felt they could not comment as no specific proposals were on display.
9. Two people raised concerns regarding inappropriate / dangerous driver behaviour (such as excessive speed) on the local road network in the vicinity of the N11/M11 road. They attributed these problems to the congestion on the existing N11/M11 which forces people to use alternative routes which are unsuitable. It was also noted that this situation creates an unsafe environment for pedestrians.
10. Several people were disappointed with the likely timeframe for completion of the project (e.g. 2 years to submit the planning application).

It was suggested that certain sections which are currently dangerous (e.g. Kilmacanoge) should be prioritised.

11. There was general support for the proposed parallel service road between Junction 7(Bray South) and Junction 8 (Kilmacanoge/Roundwood) through Kilmacanoge.
12. There was strong support for upgrades to the public transport systems as a solution to the problem. In this regard, the following views/issues were noted:
 - The frequency of train services from Wicklow and Greystones during peak morning hours are inadequate;
 - The Park & Ride facility in Greystones is too small and usually full by 8am. This forces some people to drive who would otherwise take the train;
 - Bus services can take too long and are too expensive (if outside Dublin Bus network);
 - LUAS extension to Bray should be progressed at the same time as the N11/M11 Scheme;
 - Make public transport free of charge;
 - Additional Park & Ride facilities should be provided, and existing facilities expanded;
 - The 145 Dublin Bus Service route changes will impact negatively and should be addressed as part of the scheme;
 - Any third lane proposed on the N11/M11 should be reserved for car-pooling or buses;
 - There are problems with the reliability of the bus services. Buses are very late or do not turn up at all. This was a prime concern;
 - Several people questioned why the Dart expansion program is improving other lines but not service to Greystones and beyond;
 - Two people noted they were making two N11 journeys past Bray every morning and evening because there was no school bus service from Kilmacanogue and Kilpeddar. They both made the point that the school run exacerbates traffic in Bray town as well forcing local journeys onto the N11;
 - General comment from two parties stressed that people will have to be incentivised out of their cars if public transport is to succeed involving several of the issues above; and
 - Two people made the comment when discussing public transport as part of the solution that they were concerned that any public transport solution would be the cheap ineffective option if not invested in i.e., just ‘political window dressing’ and wouldn’t solve the problems.

13. Four parties who lived on Quill Road noted that their private road is used as a 'rat run' and outlined associated congestion, safety and maintenance issues. They outlined that they had agreed with Wicklow County Council on the addition of signage but could not get financial support from their neighbours.
14. Several people mentioned a major development in Greystones (Charlesland) is being developed away from social infrastructure, particularly new schools that have been recently established on the opposite side of the town. This requires residents to drive through the town centre and thus contributes to further congestion during peak hours.
15. Many people noted the limited capacity of the Greystones Park and Ride facility.
16. A farmer who uses HGVs on the N11 (in both directions) noted that the islands force him out of the hard shoulder and into the lanes at points along the road corridor.
17. A number of people implied that the original alignment of the N11 should have avoided the Glen of the Downs completely and that the original corridor was not the most preferable.
18. Several people expressed their understanding that nothing could be constructed in the Glen of the Downs SAC due to its designation.
19. Many people queried the scale of residential development in the areas in terms of sustainable planning (referring to Charlesland, Cherrywood, Fassaroe etc.) and implications of cumulative effects of these on the road network.
20. Significant safety concerns were expressed by residents with direct access to the N11.
21. People pointed out the noise pollution at their property on the edge of the mainline between Junction 7 (Bray South) and Junction 8 (Kilmacanoge/Roundwood).
22. Owners of a house with direct access to the mainline between Junction 7 (Bray South) and Junction 8 (Kilmacanoge/Roundwood) noted that there has been a near miss with a family pet. They expressed concern for the safety of themselves, their children and their pets.
23. A resident of the old Kilbride Cottages noted that a railway had been constructed including track immediately to the east of the line of the existing N11, the bed of which may still be in existence.
24. A person proposed to remove the bus stop of Diamond Valley at Dargle Lane (L1522), as they do not see people using this bus stop and the position of the stop is just on the corner between the L1522 and the mainline.
25. A person noted that if public transport was improved they would still prefer to use the mainline because access is closer to their house. To use public transport, they must travel to the closest town and they have had problems finding parking at the station.

3.2 Submissions

A total of 12 submissions were received up to the 19/12/2018. A summary of these are included in Appendix C.

Appendix A

Advertisement

A1 Advertisement

N11/M11 Junction 4 to Junction 14 Improvement Scheme

Public Information Session

Scéim Feabhsaithe an N11/M11, Acomhal 4 go Acomhal 14

Seisiún Faisnéise Poiblí

Public Information Session

Wicklow County Council in conjunction with Dún Laoghaire –Rathdown County Council are progressing the development of the N11/M11 Junction 4 to Junction 14 Improvement Scheme.

The public consultation process forms an important part of advancing the project and allows involvement of the public in identifying key constraints. The public information session affords the opportunity to the public to be fully informed of the scale and extents of the project and to raise questions, concerns and comments for future consideration. A public information session will be held as follows:

Date	Time	Venue
Tuesday 11 th December 2018	12:00 – 20:00	Glenview Hotel, Glen of the Downs, A63 DC95

At the public information session, drawings of the project extents will be on display. Engineers from a range of disciplines will be available on the day to answer questions on the process to be followed and proposed timeline for the project. A comment sheet will be available and comments from the public and interested parties are welcome.

For further information please see: www.m11n11.ie

Seisiún Faisnéise Poiblí

Tá Comhairle Contae Chill Mhantáin, i bpáirtíocht le Comhairle Contae Dhún Laoghaire-Ráth an Dúin, ag dul ar aghaidh le Scéim Feabhsaithe an N11/M11, Acomhal 4 go Acomhal 14.

Is cuid tábhachtach d'fhorbairt an tionscadail é an próiseas comharliúcháin poiblí, agus ceadáíonn sé páirtíocht ón bpobal maidir le bun-iallacha a shainaithint. Tugann an seisiún faisnéise poiblí deis don phobal chun bheith ar an eolas go hiomlán faoi scála agus réimeanna an tionscadail, agus chun ceistanna, cúraimí agus barúlacha a chur, lena phlé as seo amach. Tionólfar seisiún faisnéise poiblí mar seo leanas:

Dáta	Am	Ionad
Máirt 11ú Nollaig 2018	12:00 – 20:00	Glenview Hotel, Glen of the Downs, A63 DC95

Ag an seisiún faisnéise poiblí, beidh líníochtaí de réimeanna an tionscadail á thaispeáint. Beidh innealltóirí ó raon de dhisciplíní ar fáil ar an lá, chun ceistanna faoin bpróiseas a leanfar, agus faoin amlíne atá molta don tionscadal, a fhreagairt. Beidh bileog le haghaidh barúlacha ar fáil, agus beidh fáilte roimh barúlacha ón bpobal agus ó páirtithe leasmhara.

Le haghaidh tuilleadh eolais, féach, le do thoil, ar www.m11n11.ie

Appendix B

Brochure and Comment Sheet

B1 Brochure



The Problem

- Safety: Sections of the N11/ M11 from Junction 4 to Junction 14 have collision rates that are twice the national average for the particular road type.
- There are problems with congestion and journey time reliability.
- This congestion affects strategic traffic movement of high economic value including freight and commuters on public transport and in private cars on the N11/M11 corridor.
- Congestion on the N11/M11 impedes access to the south-east, including the port of Rosslare.

It is essential at the outset to establish all of the underlying issues on the N11/M11 corridor in order to develop appropriate and effective solutions. Initial work will focus on data collection, travel surveys, traffic analysis and delay assessment on the existing network to establish the underlying causes of the problem. Our aim is to understand those issues that need to be considered in devising solutions to the problem we are considering. We will be gathering data on all constraints including human beings, archaeology and cultural heritage, agronomy, landscape and visual, hydrology, hydrogeology, ecology, geology, material assets, planning policy, noise, air and climate.

This Consultation is one of the first steps in a study to determine how best to address these

problems.

We will examine the following in considering how the problems identified can be addressed:

- Understand where people want to travel to.
- LUAS expansion.
- Improved Bus System – Bus Connects
- Do Something or Do Nothing
- Dart Expansion Plan
- Demand management
- Walking and Cycling
- Other options and alternatives

The solution devised must be compatible with Government policy at national, regional and local level, as is reflected in policies including the National Planning Framework, Project Ireland 2040, Smarter Travel, Regional Planning Guidelines and Wicklow and Dún Laoghaire—Rathdown County Development Plans.

**TELL US
YOUR VIEWS**

by returning the
comment sheet by
11 January 2019

Would a public transport solution solve the problem?

Enhancements to the N11/ M11 could be technically challenging. Detailed surveys of the existing network will be required to understand all of the constraints.

Engineering and environmental constraints identification commenced.



Develop Options



Compare Options and Recommend Solution

Determine Next Steps

Combinations of these options will also be assessed.

What Happens Next?

- Following this Constraints Study options to solve the transportation problems on the N11/M11 corridor will be developed.
- Another public consultation will be held next year to show details of the developed options.
- Options will be compared and a solution recommended.

If you are unable to attend the public consultation exhibition the proposals may be viewed by appointment, at the address below until 11 January 2019.

Wicklow County Council
County Buildings
Whitegates
Wicklow Town
A76 FW96

Website: www.N11M11.ie

B2 Comment Sheet

Appendix C

Submissions

Ref No.	Date	Form of Correspondence	Comments
001	10/12/2018	Email	<p>This upgrade should start at Coyne Cross. I have travelled this road since 2007, the main traffic congestion started in 2013 after the Celtic tiger bust . But once the upgrade on at the beehive and newlands cross -red cow was completed. That's when the major rush hour traffic started to backlog down passed Bray into Kilmacanogue. But this traffic now comes to a back lodge at Coyne Cross. I travel from Arklow Monday to Friday all year. From last September when I arrive onto the Arklow bypass I am in full flowing traffic but once I reach Coyne cross my speed can vary from 40kph to 60 bumper to bumper and it's stays at this speed til I am on the M50. I feel once the upgrade at Camolin is completed this will add to the daily misery of my daily commute as there will be even more cars in the daily route. I hope this this upgrade works starts sooner rather than later.</p>
002	11/12/2018	Email	<p>I am resident in North Wexford & work in South Dublin. Journey time in the morning to get to my desk for 8 am is now in excess of an hour and 20 minutes. It is soul destroying, day in, day out 5 days a week. Public transport is not an alternative because Bus Eireann & Wexford Bus get caught in all the same hold ups as the cars & there are no bus corridors anywhere on the N11 for them to use. It cannot continue as it is. Can whatever plans are being drawn up now take account of environmental impact & build in alternatives for people who will have to get out of their cars as carbon taxes increase & to provide a credible & viable alternative to people who want to end the single car / single driver situation we currently have.</p> <p>Can whatever plans are put in place also find a way to offset whatever habitat destruction & green field site destruction is going to take place to introduce a 3rd lane or to divert the course of the road if that's what is decided - I.E tree for tree is replanted in another location etc</p>
003	11/12/2018	Email	<p>I attended at the Glenview Hotel today expecting to be presented with your plans for the upgrade of the N11/M11. While it is disappointing to note you are only at the feasibility study, I do wish to make the following observations:</p> <ol style="list-style-type: none"> 1. Traffic heading north is typically backed up from Bray to Newtownmountkennedy from 7am to 9.30am on weekdays. A third lane would appear to be an obvious solution from Junction 12 to the M50.

Ref No.	Date	Form of Correspondence	Comments
			<p>2. The same occurs heading south from the M50/N11 merge from 4pm to 7pm. This is crying out for a 3rd lane to the Greystones turn off at Junction 11.</p> <p>3. The interchange at Bray South is a disaster. This needs to be completely revamped to allow for a free flow of traffic exiting the N11 both south and north bound.</p> <p>4. Are there any plans to put in a 2nd train line from Bray to Greystones. This would help increase the frequency of the DART and train service.</p> <p>5. The traffic heading into Bray from Greystones in the mornings is typically backed up from the Wilton Hotel roundabout, past Bray golf club to Windgates. Is there scope to extend the filter lane to the Southern Cross from the entrance to Bray Golf Club?</p> <p>6. The road from Delgany to Blacklion needs to be upgraded and realigned to cater for local traffic and with the safety of local school children in mind.</p>
004	11/12/2018	Email	<p>Would the money being spent not be better spent on initiatives to encourage more telecommuting? We lag on reducing carbon emissions, yet here we are building more roads. How about tax incentives for companies whose employees sign up for telecommuting scheme.</p> <p>https://www.inc.com/scott-mautz/a-2-year-stanford-study-shows-astonishing-productivity-boost-of-working-from-home.html</p>
005	11/12/2018	Email	<p>I don't mean to oversimplify matters but I was told this evening at your information event in the Glenview Hotel that it will be around eight years before a transport solution is implemented. You people need to get serious about this project. I understand it is more complex than the average Wicklow motorist would initially understand, but at the end of the day, there is a road that has twice the level of crashes to other roads. Build an extra lane and put in some park/rides for buses or have the additional lane for carpooling and buses. The N11 corridor has sea on one side and mountains on the other. As long as the Government will not implement de-centralisation, the jobs will be in Dublin and the houses will be in Wicklow. The Cherrywood new town at the M50 / M11 merge will destroy the traffic flow in the area. The new town will be built whilst you guys are still coming up with new qangos, who are the NRO?</p>

Ref No.	Date	Form of Correspondence	Comments
			We know two families in our circles who are giving up on Wicklow Town and moving back to Dublin, further compounding the Dublin congestion problem. With only 5 slow trains a day that are sky high expensive unless you are a 365 day a year commuter, we only have one choice, our car.
006	12/12/2018	Email	Please extend the DART to Arklow, or create a carpool lane on the M/N11 so buses and cars with 2 or more people can get into Dublin faster during peak commute times.
007	12/12/2018	Email	<p>Has a traffic census been conducted to establish the destination of traffic and the purpose of their journey? It seems to me that traffic reduction might be a cheaper option than any significant upgrade to this road.</p> <p>From conversations with locals who use this route, it would appear that most users are commuting to work. It would seem to me that upgrading public transport links and options along the route and onward to a wider range of destinations might yield a more environmentally friendly outcome.</p> <p>I would suggest tolling this route and all routes into Dublin and using the tolls to fund public transport infrastructure. Tolls could begin at a nominal sum of say €5 to enter Dublin at the canal bridges for example and over time could be increased and extended to a second perimeter so that city centre bound traffic might end up paying €25 per day and traffic to somewhere like Stillorgan/Blackrock or Donnybrook.</p> <p>The objective would be to drive people who commute onto public transport and not give them much of a choice in the matter. Those who can afford to drive can pay through the nose, while those with a need to drive for medical reasons can display a permit and business users can claim the cost back against corporation tax.</p> <p>Business vehicles must carry a GPS chip to show that they are not commuters. There is always a way to narrow the loopholes.</p>
008	14/12/2018	Email	We have been living on Ballywaltrim Lane off Killarney Road, Bray since 2008. The lane is used as a rat run mornings and evenings by commuters driving up Killarney Road to the roundabout at Circle K/Hills Garage. Motorists take a left before the garage and drive at speed down Ballywaltrim Lane to avoid the congested roundabout, and to arrive on the other side of the garage to join the road to the bridge taking traffic north onto the slip road and the N11.

Ref No.	Date	Form of Correspondence	Comments
			<p>The traffic down the lane is fast and aggressive, resulting in near misses and congested traffic trying to exit the lane at the garage to join the main road again.</p> <p>There are no road markings where the garage traffic meets the lane traffic, this has been said to the council many times (no heed paid). The garage traffic should give way to the traffic coming up Ballywaltrim Lane, but oftentimes it doesn't. There should be a STOP sign at the Garage to allow legal right of way to traffic driving up the lane.</p> <p>Further, regarding the traffic on Ballywaltrim Lane, it is fast and dangerous, we see dead badgers, squirrels and birds on this lane, all killed by speeding careless motorists. The throwing of litter out of car windows is another serious problem, also litter is thrown from vehicles parked at the garage and down the lane from the garage which blows everywhere. I pick up litter regularly on the lane. There have been cases of Illegal dumping of hospital waste, butchered animals, mattresses and other items on the lane over the years which the Litter Warden in Wicklow has helped us remove, and we are very grateful for that.</p> <p>The lane, which to all intents and purposes should be there for the residents, has been overtaken by speeding / dangerous drivers, litter louts and people involved in illegal dumping. To encourage people to stop using this lane in this manner is what we would like. I am not a road engineer, but to my mind there must be options open. There has been mention of traffic lights on the roundabout at the garage, perhaps this might ease flow of traffic to the roundabout, discouraging rat runners on the lane. Also, perhaps speed bumps on the lane might slow the traffic down.</p> <p>Regarding transport generally, it seems to me that an improved Public Transport is vital for the area. It is reported that Ireland will have a population of 9M by 2050, a mere 30 years away. The Charlie McGreevy Fianna Fail great decentralisation Plan didn't work. So are these extra people going to be living/working on the East Coast if there is no grand plan to develop the regions? More immediately, are the Cherrywood housing Plans, the ruinous housing estates in Greystones and Wicklow, and the daily commute of people from Arklow, Gorey etc to Dublin. People have to live outside Dublin simply because they cannot afford to live in Dublin. The train service along the eastern corridor is hopeless, what other European city has such a limited service from its commuter catchment?</p>

Ref No.	Date	Form of Correspondence	Comments
			<p>Any N11 M11 upgrade must be considered in tandem with an improved, upgraded, regular train service with capacity to carry 1,000s of passengers. If you simply add an extra lane south and one north to the N11 you will simply fill it with cars. It won't work and it won't help. A regular and decent train service that is accessible, with cheap and readily available parking is required.</p> <p>I also wonder about the ability of any potential road upgrade to get approval through the protected Glen of the Downs Nature Reserve. I remember the time when the build went through first time and the difficulty that ensued with the people who took it upon themselves to object. The area is protected under Natura 2000, and I believe it should stay that way, no extra lanes and no increased speed limit.</p> <p>Specifically, regarding the lane where I live, I was most alarmed to see the M11/N11 Needs Assessment Report by AECOM on line (Roughan & O' Donovan Alliance) and the proposal to join Herbert Road to our lane as a one way parallel service road to the garage and a dumb-bell roundabout. I was subsequently re-assured by the engineers at the public meeting at the Glenview Hotel on Dec 11 that this report was 'invalid' and not on the table.</p> <p>One would wonder why the report was commissioned if it is indeed invalid now and also how much it cost. In any event I would strongly OBJECT to this proposal if it is at all under consideration. Speaking for myself and my family, we don't want more traffic on the lane to the detriment of our quality of life, there would be more noise, loss of visual amenity, danger to pedestrians, CPOs (presumably), danger to wildlife, more littering and illegal dumping etc. We did not move to this lane ten years ago to be subject to this. We moved for the peace and tranquility of the place.</p> <p>Regarding any proposal to put in an extra lane(s) on the N11 specifically in the area of the J7 on the south lane and near to Ballywaltrim Lane, there are mature trees that reduce motorway noise, visual and air pollution from the point of view of the residents of Ballywaltrim Lane, and we do not want these trees jeopardized in any way, shape or fashion.</p> <p>I understand that this is the first consultation stage, absolutely nothing is decided and that there will be another consultation with the public in July 2019. I would be glad to see what proposals are brought forward at that stage for an improved public transport system.</p>

Ref No.	Date	Form of Correspondence	Comments
			That is the only 'show in town' as far as I am concerned. The Government, their representative Councillors, NRA and consultants (Ove Arup) have to step up to the mark and show some leadership and common sense on this. Merely considering the road network is short sighted and a waste of time.
009	17/12/2018	Email	<p>The traffic on the N11/M11 around Bray-Greystones area has now reached levels where it has a significant adverse impact on the quality of life and the local economy. That is before the new housing development at Cherrywood and a new Town Centre in Bray add to the problem.</p> <p>I welcome any structural solution to this, but also wonder if there are measures that could be taken in the short term to release some of the pressure. For instance, could the speed limit at Kilmac be increased to reduce the 'backwash' up the N11/M50; and/or, could the sequencing of traffic lights in Bray be changed to pull more cars through the town (North to South) in the evening?</p> <p>From a structural perspective, could a multi-story park-and-ride facility be put into the Cherrywood development and into Bray? Could Bray Wanderers be relocated to the Southern Cross Road and their current grounds be repurposed into a park-and-ride?</p>
010	17/12/2018	Email	<p>In my opinion, the worst problems on traffic on N11/M11 lies with drivers. There is absolutely no lane discipline being enforced and drivers still insist on driving in the outside lane when the inside lane is almost free of traffic. Some people I've spoken to say that 'weaving' traffic is a problem but if drivers stayed on the Inside lane except for overtaking, then weaving would be minimal. On the M50 for example, the middle lane is continuously filled with cars driving along like sheep following each other while the inside and outside lanes are free of traffic. The majority of these cars are not even reaching the speed limit of 100 kph, I know only too well, as I am an inside lane driver and doing 100 kph I am over (under) taking these cars, the drivers of which are completely oblivious to other drivers on the lanes either side of them. Education is needed to deal with these drivers.</p> <p>Whatever happened to drivers yielding to traffic approaching from the right? The On Ramps are a disgrace where drivers (who have priority) have to either slow down or move to the outside lane to let drivers in, this backs up traffic already on the N11/M11.</p>

Ref No.	Date	Form of Correspondence	Comments
			<p>There should be traffic lights (metering) at On Ramps at rush hours to filter traffic approaching the main road and there should be Yield signs on each On Ramp. It is at the On Ramps that traffic slows, sometimes to a halt, to allow traffic to merge. Again, a message needs to be made to drivers entering a main road that they do not have priority.</p> <p>A solution used in the US and some European countries is to have a median lane (the centre of the motorway) being made into a third lane, opened in the relevant direction of traffic in rush hours but unfortunately due to bad future planning, in the case where there is an overpass, the supporting pillars are in the way of this.</p> <p>I lived in the US for almost 20 years and on my return to live in Ireland, I was shocked at the terrible behaviour and lack of knowledge of drivers on our motorways. However, I have to say that on the motorways outside of the greater Dublin area, drivers, on the whole, are much better behaved. if a driver overtakes a car, that driver then returns back to the inside lane, for the most part, which keeps the traffic flowing freely, as it should do.</p>

Appendix B9.1

Archaeological heritage sites
within the study area

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 1	WI007-026002/337	Cross	Fassaroe	9.2	National Monument in State Care/RMP
AH 2	WI013-029001/267	Church	Kilcoole	9.3	National Monument in State Care/RMP
AH 3	WI007-030/417/1929-1940	Church	Kilcroney	9.2	National Monument in State Care/Preservation Order/RMP
AH 4	WI008-017/323	Kindlestown Castle	Kindlestown Upper	9.3	National Monument in State Care/RMP
AH 5	WI008-004/262	Church	Newcourt	9.2	National Monument in State Care/RMP
AH 6	WI013-003/135	Church	Woodlands	9.3	National Monument in State Care/RMP
AH 7	DU026-007/291	Portal tomb	Brenanstown	9.1 9.7	National Monument in State Care/RMP
AH 8	DU026-023003/216	High cross	Laughanstown	9.1	National Monument in State Care/RMP
AH 9	DU026-023004/216	High cross	Laughanstown	9.1	National Monument in State Care/RMP
AH 10	DU026-024/216	Wedge tomb	Laughanstown	9.1	National Monument in State Care/RMP
AH 11	DU026-023001/225	Church	Laughanstown	9.1 9.17	National Monument in State Care/RMP
AH 12	DU026-050001/162	Ecclesiastical enclosure	Rathmichael	9.1	National Monument in

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
					State Care/RMP
AH 13	DU026-050002/162	Church	Rathmichael	9.1 9.16	National Monument in State Care/RMP
AH 14	DU026-050004/162	Round tower	Rathmichael	9.1 9.16	National Monument in State Care/RMP
AH 15	DU026-050007/162	High Cross	Rathmichael	9.1 9.16	National Monument in State Care/RMP
AH 16	DU026-117/36-1976	Mining complex	Ballycorus	9.1	National Monument with Preservation Order/RMP
AH 17	WI007-027/120-1490	Fassaroe Castle	Fassaroe	9.2	National Monument with Preservation Order/RMP
AH 18	WI007-029002-04/128-1940	Three graveslabs and a cross	Kilbride (Rathdown By.)	9.2	National Monument with Preservation Order/RMP
AH 19	WI019-018001/1933-1940	Church	Kilmartin	9.6	National Monument with Preservation Order/RMP
AH 20	WI008-013002/13-1933	Graveyard	Kilmurry North (Rathdown By.)	9.2 9.3	National Monument with Preservation Order/RMP
AH 21	WI003-030----	Mound	Monastery	9.2	RMP
AH 22	WI003-031001-	Ritual site - holy well	Monastery	9.2 9.12	RMP
AH 23	WI003-031002-	Church	Monastery	9.2 9.12	RMP
AH 24	WI003-031003-	Font	Monastery	9.2 9.12	RMP
AH 25	WI003-032001-	Ecclesiastical enclosure	Monastery	9.2	RMP
AH 26	WI003-032002-	Church	Monastery	9.2	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 27	WI004-001----	Historic town	Bray, Ravenswell, Little Bray	9.2 9.11	RMP
AH 28	WI004-001001-	Cross-slab	Bray	9.1 9.2 9.10 9.11	RMP
AH 29	WI004-001002-	Redundant record	Bray	9.1 9.2 9.11	None (SMR)
AH 30	WI004-001003-	Castle - unclassified	Bray	9.2 9.11	RMP
AH 31	WI004-001004-	Church	Bray	9.2 9.11	RMP
AH 32	WI004-001006-	Castle - tower house	Little Bray	9.1 9.2 9.11	RMP
AH 33	WI004-001008-	Font	Bray	9.2 9.11	Proposed RMP
AH 34	WI004-002----	Martello tower	Bray	9.1 9.2 9.11	None (SMR)
AH 35	WI004-003----	Martello tower	Bray	9.2 9.11	None (SMR)
AH 36	WI004-004----	Burial	Bray	9.2 9.11	RMP
AH 37	WI004-005----	Linear earthwork	Ravenswell	9.1	Proposed RMP
AH 38	WI004-006----	Pier/Jetty	Killarney	9.2	None (SMR)
AH 39	WI007-023----	Mound	Monastery	9.2 9.12	RMP
AH 40	WI007-024----	Burial	Fassaroe	9.2 9.12	None (SMR)
AH 41	WI007-025----	Enclosure	Cookstown	9.2 9.12	RMP
AH 42	WI007-026001-	Font	Fassaroe	9.2	RMP
AH 43	WI007-026003-	Cross	Fassaroe	9.2	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 44	WI007-028----	Redundant record	Fassaroe	9.2	None (SMR)
AH 45	WI007-029001-	Burial ground	Kilbride (Rathdown By.)	9.2	RMP
AH 46	WI007-029005-	Cross	Kilbride (Rathdown By.)	9.2	RMP
AH 47	WI007-039001-	Cairn - unclassified	Glencap Commons North	9.2	RMP
AH 48	WI007-039002-	Cairn - unclassified	Glencap Commons North	9.2	RMP
AH 49	WI007-050----	Cist	Calary Lower	9.3	RMP
AH 50	WI007-051----	Graveyard	Kilmurry South (Rathdown By.)	9.3	RMP
AH 51	WI007-056----	Ritual site - holy well	Calary Lower	9.3	RMP
AH 52	WI007-060----	Mound	Kilcroyne	9.2	RMP
AH 53	WI007-064001-	Church	Kilmacanoge South	9.2	Proposed RMP
AH 54	WI007-064002-	Graveyard	Kilmacanoge South	9.2	Proposed RMP
AH 55	WI007-064003-	Bullaun stone	Kilmacanoge North	9.2	Proposed RMP
AH 56	WI007-066001-	House - early medieval	Kilmacanoge South	9.2	RMP
AH 57	WI007-066002-	Souterrain	Kilmacanoge South	9.2	RMP
AH 58	WI007-070----	Cairn - unclassified	Glencap Commons Upper	9.2	RMP
AH 59	WI007-070001-	Cairn - unclassified	Glencap Commons Upper	9.2	RMP
AH 60	WI007-072----	Fulacht fia	Glencormick South	9.2	Proposed RMP
AH 61	WI007-073----	Fulacht fia	Calary Lower	9.3	None (SMR)
AH 62	WI007-079----	Fulacht fia	Kilmacanoge North	9.2	None (SMR)
AH 63	WI007-085----	Standing stone	Kilmacanoge South	9.2	Proposed RMP
AH 64	WI008-001001-	Ecclesiastical enclosure	Kilbride (Rathdown By.)	9.2	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 65	WI008-001002-	Church	Kilbride (Rathdown By.)	9.2	RMP
AH 66	WI008-001003-	Cross-slab	Kilbride (Rathdown By.)	9.2	RMP
AH 67	WI008-001004-	Graveyard	Kilbride (Rathdown By.)	9.2	RMP
AH 68	WI008-002001-	House - fortified house	Oldcourt (Rathdown By.)	9.2	RMP
AH 69	WI008-002002-	Bawn	Oldcourt (Rathdown By.)	9.2	RMP
AH 70	WI008-003----	Cross - High cross (present location)	Oldcourt (Rathdown By.)	9.2	RMP
AH 71	WI008-004001-	Ecclesiastical enclosure	Newcourt	9.2	RMP
AH 72	WI008-005----	Designed landscape - tree-ring	Giltspur	9.2	RMP
AH 73	WI008-005001-	Rock art	Giltspur	9.2	RMP
AH 74	WI008-006001-	House - 16th/17th century	Kilruddery Demesne West	9.2	RMP
AH 75	WI008-006002-	Designed landscape - formal garden	Kilruddery Demesne West	9.2	RMP
AH 76	WI008-006003-	Designed landscape - ornamental canal	Kilruddery Demesne West	9.2	RMP
AH 77	WI008-006004-	Graveyard	Kilruddery Demesne West	9.2	RMP
AH 78	WI008-007----	Redundant record	Rathdown Upper	9.2	None (SMR)
AH 79	WI008-008----	Redundant record	Barchuillia Commons	9.2	None (SMR)
AH 80	WI008-009----	Ringfort - rath	Coolnaskeagh	9.2	RMP
AH 81	WI008-009001-	Souterrain	Coolnaskeagh	9.2	RMP
AH 82	WI008-010----	Redundant record	Coolagad, Templecarrig Lower	9.2	None (SMR)
AH 83	WI008-011----	Castle - unclassified	Rathdown Upper	9.2	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 84	WI008-011001-	Moated site	Rathdown Upper	9.2	RMP
AH 85	WI008-011002-	Settlement deserted - medieval	Rathdown Upper	9.2	RMP
AH 86	WI008-011003-	Midden	Rathdown Upper	9.2	RMP
AH 87	WI008-012001-	Church	Rathdown Upper	9.2	RMP
AH 88	WI008-012002-	Graveyard	Rathdown Upper	9.2	RMP
AH 89	WI008-013----	Church	Kilmurry North (Rathdown By.)	9.2 9.3	RMP
AH 90	WI008-013001-	Ecclesiastical enclosure	Kilmurry North (Rathdown By.)	9.2 9.3	RMP
AH 91	WI008-013003-	Building	Kilmurry North (Rathdown By.)	9.2 9.3	RMP
AH 92	WI008-014001-	Church	Kilmurry South (Rathdown By.)	9.3	RMP
AH 93	WI008-014002-	Bullaun stone	Kilmurry South (Rathdown By.)	9.3	RMP
AH 94	WI008-014003-	Graveyard	Kilmurry South (Rathdown By.)	9.3	RMP
AH 95	WI008-015----	Redundant record	Coolagad, Kindlestown Upper	9.3	None (SMR)
AH 96	WI008-016----	Redundant record	Coolagad	9.2 9.3	None (SMR)
AH 97	WI008-017001-	Bawn	Kindlestown Upper	9.3	RMP
AH 98	WI008-018----	Ringfort - unclassified	Rathdown Lower	9.3	None (SMR)
AH 99	WI008-019----	Redundant record	Rathdown Lower	9.3	None (SMR)
AH 100	WI008-020----	Redundant record	Rathdown Lower	9.3	None (SMR)
AH 101	WI008-041----	House - 17th century	Oldcourt (Rathdown By.)	9.2	RMP
AH 102	WI008-042001-	Fulacht fia	Giltspur	9.2	Proposed RMP
AH 103	WI008-042002-	Fulacht fia	Giltspur	9.2	Proposed RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 104	WI008-043----	Fulacht fia	Kilmurry North (Rathdown By.)	9.2	RMP
AH 105	WI008-044001-	Fulacht fia	Kilruddery Deerpark (Rathdown By., Delgany ED)	9.2	None (SMR)
AH 106	WI008-044002-	Fulacht fia	Kilruddery Deerpark (Rathdown By., Delgany ED)	9.2	None (SMR)
AH 107	WI008-045----	Redundant record	Coolagad	9.2 9.3	None (SMR)
AH 108	WI008-046----	Fulacht fia	Rathdown Upper	9.2	RMP
AH 109	WI008-048----	Excavation - miscellaneous	Newcourt	9.2	None (SMR)
AH 110	WI008-049----	Pit circle	Newcourt	9.2	None (SMR)
AH 111	WI008-050----	Hearth	Ballynamuddagh	9.2	None (SMR)
AH 112	WI008-051----	Hearth	Ballynamuddagh	9.2	None (SMR)
AH 113	WI008-052----	Excavation - miscellaneous	Ballynamuddagh	9.2	None (SMR)
AH 114	WI008-053----	Fulacht fia	Ballynamuddagh	9.2	Proposed RMP
AH 115	WI008-055----	Hearth	Kilmurry North (Rathdown By.)	9.2 9.3	None (SMR)
AH 116	WI008-056----	Burnt mound	Kilmurry North (Rathdown By.)	9.2	Proposed RMP
AH 117	WI008-057----	House - Bronze Age	Kilmurry North (Rathdown By.)	9.2	None (SMR)
AH 118	WI008-057001-	Habitation site	Kilmurry North (Rathdown By.)	9.2	Proposed RMP
AH 119	WI008-058----	Excavation - miscellaneous	Templecarrig Lower	9.2	None (SMR)
AH 120	WI008-059----	Ring-ditch	Ballynamuddagh	9.2	Proposed RMP
AH 121	WI008-060----	Habitation site	Ballynamuddagh	9.2	Proposed RMP
AH 122	WI008-061----	Cremation pit	Ballynamuddagh	9.2	None (SMR)
AH 123	WI008-062----	Road - road/trackway	Irishtown	9.2	None (SMR)
AH 124	WI008-063----	Kiln - corn-drying	Giltspur	9.2	None (SMR)
AH 125	WI008-064----	Excavation - miscellaneous	Kilmacanoge South	9.2	None (SMR)

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 126	WI008-065----	Habitation site	Newcourt	9.2	None (SMR)
AH 127	WI008-066----	Redundant record	Oldcourt (Rathdown By.)	9.2	None (SMR)
AH 128	WI008-067----	Kiln	Kilmacanoge South	9.2	None (SMR)
AH 129	WI008-068----	Excavation - miscellaneous	Templecarrig Lower	9.2	None (SMR)
AH 130	WI008-069----	Fulacht fia	Kilmurry South (Rathdown By.)	9.3	Proposed RMP
AH 131	WI008-070----	Excavation - miscellaneous	Rathdown Upper	9.2	None (SMR)
AH 132	WI008-071----	Excavation - miscellaneous	Rathdown Upper	9.2	None (SMR)
AH 133	WI008-072----	Road - hollow-way	Rathdown Upper	9.2	None (SMR)
AH 134	WI008-073----	Ringfort - rath	Rathdown Upper	9.2	RMP
AH 135	WI008-074----	Kiln - corn-drying	Rathdown Upper	9.2	None (SMR)
AH 136	WI012-038----	Ringfort - rath	Ballinahinch Upper	9.5	RMP
AH 137	WI012-039----	Ringfort - rath	Ballinahinch Upper	9.5	RMP
AH 138	WI012-052----	Standing stone	Kilmurry (Newcastle By.)	9.5	RMP
AH 139	WI012-053----	Enclosure	Tithewer	9.5	RMP
AH 140	WI012-057----	Ringfort - rath	Calary Lower	9.3	RMP
AH 141	WI012-058----	Enclosure	Kilmurry (Newcastle By.)	9.5	RMP
AH 142	WI012-059----	Hut site	Kilmurry (Newcastle By.)	9.5	RMP
AH 143	WI012-067----	Rock art	Downhill	9.3	Proposed RMP
AH 144	WI012-068----	Rock art	Downhill	9.3	Proposed RMP
AH 145	WI012-069----	Enclosure	Calary Lower	9.3	Proposed RMP
AH 146	WI012-070----	Enclosure	Calary Lower	9.3	Proposed RMP
AH 147	WI013-001----	Hillfort	Downhill	9.3	RMP
AH 148	WI013-002----	Enclosure	Woodlands	9.3	RMP
AH 149	WI013-003001-	Font	Woodlands	9.3	RMP
AH 150	WI013-004001-	Church	Delgany	9.3 9.13	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 151	WI013-004002-	Graveyard	Delgany	9.3 9.13	RMP
AH 152	WI013-004003-	Enclosure	Charlesland	9.3 9.13	None (SMR)
AH 153	WI013-004004-	Font	Delgany	9.3 9.13	RMP
AH 154	WI013-004005-	Road - hollow-way	Delgany	9.3 9.13	None (SMR)
AH 155	WI013-005----	House - 16th/17th century	Killincarrig	9.3 9.13	RMP
AH 156	WI013-006001-	Fulacht fia	Charlesland	9.3	None (SMR)
AH 157	WI013-006002-	Excavation - miscellaneous	Charlesland	9.3	None (SMR)
AH 158	WI013-007001-	Enclosure	Charlesland	9.3	None (SMR)
AH 159	WI013-007002-	Enclosure	Charlesland	9.3	None (SMR)
AH 160	WI013-009----	Enclosure	Ballynerrin (Newcastle By., Kilcoole ED)	9.3	RMP
AH 161	WI013-010----	Enclosure	Ballynerrin (Newcastle By., Kilcoole ED)	9.3	RMP
AH 162	WI013-011----	Church	Ballynerrin (Newcastle By., Kilcoole ED)	9.3	RMP
AH 163	WI013-011001-	Decorated stone	Ballynerrin (Newcastle By., Kilcoole ED)	9.3	RMP
AH 164	WI013-012----	Redundant record	Killinpark	9.3	None (SMR)
AH 165	WI013-013----	Enclosure	Tinnapark Demesne	9.3	RMP
AH 166	WI013-014-----	Burial ground	Tinnapark Demesne	9.3	RMP
AH 167	WI013-015----	Redundant record	Tinnapark Demesne	9.3	None (SMR)
AH 168	WI013-018----	Enclosure	Priestsnewtown	9.3	RMP
AH 169	WI013-019----	Enclosure	Priestsnewtown	9.3	RMP
AH 170	WI013-020----	Enclosure	Priestsnewtown	9.3	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 171	WI013-020001-	Enclosure	Priestsnewtown	9.3	RMP
AH 172	WI013-021----	Church	Kilquade	9.3	RMP
AH 173	WI013-021001-	Font	Kilquade	9.3	RMP
AH 174	WI013-021002-	Graveyard	Kilquade	9.3	RMP
AH 175	WI013-022----	Redundant record	Charlesland	9.3	None (SMR)
AH 176	WI013-023----	Redundant record	Charlesland	9.3	None (SMR)
AH 177	WI013-024----	Mound	Mount Kennedy Demesne	9.3 9.4 9.5	RMP
AH 178	WI013-025----	House - 16th/17th century	Mount Kennedy Demesne	9.3 9.4 9.5	RMP
AH 179	WI013-026----	Castle - motte	Mount Kennedy Demesne	9.3 9.4 9.5	RMP
AH 180	WI013-027----	Ritual site - holy well	Kilquade	9.3	RMP
AH 181	WI013-028----	Enclosure	Kilquade	9.3 9.4	RMP
AH 182	WI013-029002-	Graveyard	Kilcoole	9.3	RMP
AH 183	WI013-029003-	Font	Kilcoole	9.3	RMP
AH 184	WI013-029004-	Cross-slab	Kilcoole	9.3	RMP
AH 185	WI013-029005-	Furnace	Kilcoole	9.3	None (SMR)
AH 186	WI013-029006-	Excavation - miscellaneous	Kilcoole	9.3	RMP
AH 187	WI013-029007-	Burial	Kilcoole	9.3	RMP
AH 188	WI013-030----	Ritual site - holy well	Kilcoole	9.3	RMP
AH 189	WI013-031----	Redundant record	Merepark	9.4 9.5	None (SMR)
AH 190	WI013-032----	Enclosure	Monalin	9.5	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 191	WI013-033----	Redundant record	Woodstock Demesne	9.4	None (SMR)
AH 192	WI013-034----	Enclosure	Ballyloughlin	9.4	RMP
AH 193	WI013-035----	Enclosure	Leabeg Middle	9.4	RMP
AH 194	WI013-036----	Enclosure	Ballyloughlin	9.4	RMP
AH 195	WI013-051----	Church	Kilmurry (Newcastle By.)	9.5	Proposed RMP
AH 196	WI013-051001-	Graveyard	Kilmurry (Newcastle By.)	9.5	Proposed RMP
AH 197	WI013-052----	Church	Kilmurry (Newcastle By.)	9.5	Proposed RMP
AH 198	WI013-052001-	Ritual site - holy well	Kilmurry (Newcastle By.)	9.5	Proposed RMP
AH 199	WI013-061----	Font	Kilmurry (Newcastle By.)	9.5	Proposed RMP
AH 200	WI013-062001-	Bullaun stone (present location)	Kilcoole	9.3	RMP
AH 201	WI013-063001-	Redundant record	Kilcoole	9.3	None (SMR)
AH 202	WI013-063002-	Redundant record	Kilcoole	9.3	None (SMR)
AH 203	WI013-064----	Moated site	Ballycrone	9.3 9.4	Proposed RMP
AH 204	WI013-065----	Bullaun stone	Delgany	9.3 9.13	Proposed RMP
AH 205	WI013-066001-	Burnt spread	Killincarrig	9.3	RMP
AH 206	WI013-066002-	Burnt spread	Killincarrig	9.3	RMP
AH 207	WI013-067----	Burnt pit	Calary Lower	9.3	None (SMR)
AH 208	WI013-068----	Fulacht fia	Downhill	9.3	Proposed RMP
AH 209	WI013-069----	Fulacht fia	Killincarrig	9.3	None (SMR)
AH 210	WI013-071----	Fulacht fia	Charlesland	9.3	None (SMR)
AH 211	WI013-071001-	Enclosure	Charlesland	9.3	None (SMR)
AH 212	WI013-072----	Excavation - miscellaneous	Killincarrig	9.3	None (SMR)
AH 213	WI013-073----	Habitation site	Farrankelly	9.3	None (SMR)
AH 214	WI013-074----	Fulacht fia	Killincarrig	9.3	None (SMR)

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 215	WI013-075----	Habitation site	Charlesland	9.3	None (SMR)
AH 216	WI013-076----	Habitation site	Charlesland	9.3	None (SMR)
AH 217	WI013-077----	Ring-ditch	Charlesland	9.3	None (SMR)
AH 218	WI013-078----	Habitation site	Charlesland	9.3	None (SMR)
AH 219	WI013-079----	Fulacht fia	Charlesland	9.3	None (SMR)
AH 220	WI013-080----	Habitation site	Charlesland	9.3	None (SMR)
AH 221	WI013-081----	Burnt mound	Charlesland	9.3	None (SMR)
AH 222	WI013-082----	Burnt mound	Charlesland	9.3	None (SMR)
AH 223	WI013-083----	Burial	Charlesland	9.3	None (SMR)
AH 224	WI013-085----	Burnt spread	Killincarrig	9.3	None (SMR)
AH 225	WI013-086----	Burnt spread	Killincarrig	9.3	None (SMR)
AH 226	WI013-087----	Fulacht fia	Killincarrig	9.3	RMP
AH 227	WI013-088----	Excavation - miscellaneous	Killincarrig	9.3	None (SMR)
AH 228	WI013-089----	Excavation - miscellaneous	Killincarrig	9.3	None (SMR)
AH 229	WI013-090----	Enclosure	Kilmullin (Newcastle By., Newcastle Lower ED)	9.4 9.5 9.14	Proposed RMP
AH 230	WI013-091----	Standing stone	Leabeg Lower	9.4	Proposed RMP
AH 231	WI013-092----	Fulacht fia	Ballycrone	9.3 9.4	Proposed RMP
AH 232	WI013-093----	Excavation - miscellaneous	Ballycrone	9.3 9.4	None (SMR)
AH 233	WI013-094----	Excavation - miscellaneous	Ballycrone	9.3 9.4	None (SMR)
AH 234	WI013-095----	Fulacht fia	Ballycrone	9.3 9.4	Proposed RMP
AH 235	WI013-096----	Fulacht fia	Newtown Mt. Kennedy	9.4 9.5 9.14	Proposed RMP
AH 236	WI013-097----	Excavation - miscellaneous	Charlesland	9.3	None (SMR)
AH 237	WI013-098----	Kiln - corn-drying	Charlesland	9.3	None (SMR)
AH 238	WI013-099----	Fulacht fia	Priestsnewtown	9.3	Proposed RMP
AH 239	WI013-100----	Fulacht fia	Priestsnewtown	9.3	Proposed RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 240	WI013-101----	Barrow - unclassified	Priestsnewtown	9.3	RMP
AH 241	WI013-102----	Kiln - corn-drying	Priestsnewtown	9.3	None (SMR)
AH 242	WI013-103----	Excavation - miscellaneous	Priestsnewtown	9.3	RMP
AH 243	WI013-104----	Excavation - miscellaneous	Farrankelly	9.3	None (SMR)
AH 244	WI013-105----	Ring-ditch	Priestsnewtown	9.3	Proposed RMP
AH 245	WI013-106----	Burnt mound	Priestsnewtown	9.3	Proposed RMP
AH 246	WI013-107----	Burnt mound	Priestsnewtown	9.3	Proposed RMP
AH 247	WI013-108----	Fulacht fia	Bromley	9.3	Proposed RMP
AH 248	WI013-109----	Fulacht fia	Charlesland	9.3	None (SMR)
AH 249	WI013-110----	Fulacht fia	Charlesland	9.3	None (SMR)
AH 250	WI013-111----	Excavation - miscellaneous	Charlesland	9.3	None (SMR)
AH 251	WI013-112----	Urn burial	Charlesland	9.3	None (SMR)
AH 252	WI013-113----	Cremation pit	Charlesland	9.3	None (SMR)
AH 253	WI013-114----	Structure	Charlesland	9.3	None (SMR)
AH 254	WI013-115----	Structure	Charlesland	9.3	None (SMR)
AH 255	WI013-117----	Enclosure	Leabeg Lower	9.4	Proposed RMP
AH 256	WI018-004----	Ringfort - rath	Ballinahinch Upper	9.5	RMP
AH 257	WI018-011----	Enclosure	Knockfadda	9.5 9.6	RMP
AH 258	WI018-032----	Bullaun stone	Ballinahinch Upper	9.5	RMP
AH 259	WI018-053----	Rock art (present location)	Ballyduff	9.5 9.6	Proposed RMP
AH 260	WI018-055----	Mound	Knockfadda	9.5 9.6	Proposed RMP
AH 261	WI019-001----	Church	Killadreenan	9.4 9.5 9.6	RMP
AH 262	WI019-001001-	Graveyard	Killadreenan	9.4 9.5 9.6	RMP
AH 263	WI019-001002-	Cross	Killadreenan	9.4 9.5	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
				9.6	
AH 264	WI019-002----	Ritual site - holy well	Killadreenan	9.4 9.5 9.6	RMP
AH 265	WI019-003----	Burial mound	Newcastle Upper	9.4 9.6 9.15	RMP
AH 266	WI019-004----	Burial	Newcastle Upper	9.4	RMP
AH 267	WI019-005001-	Church	Newcastle Middle	9.4 9.6 9.15	RMP
AH 268	WI019-005002-	Castle - Anglo-Norman masonry castle	Newcastle Middle	9.4 9.6 9.15	RMP
AH 269	WI019-005004-	Castle - ringwork	Newcastle Middle	9.4 9.6 9.15	RMP
AH 270	WI019-005006-	Graveyard	Newcastle Middle	9.4 9.6 9.15	RMP
AH 271	WI019-005007-	Headstone	Newcastle Middle	9.4 9.6 9.15	RMP
AH 272	WI019-006----	Ringfort - rath	Newcastle Lower	9.4 9.6 9.15	RMP
AH 273	WI019-007----	Enclosure	Newcastle Lower	9.4 9.6 9.15	RMP
AH 274	WI019-008----	Cist	Blackditch (Newcastle By.)	9.4 9.6	RMP
AH 275	WI019-009----	Castle - tower house	Dunran Demesne	9.4 9.5 9.6	RMP
AH 276	WI019-010----	Enclosure	Blackditch (Newcastle By.)	9.4 9.6	RMP
AH 277	WI019-011001-	Church	Killiskey	9.6	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 278	WI019-011002-	Graveyard	Killiskey	9.6	RMP
AH 279	WI019-011003-	Font	Killiskey	9.6	RMP
AH 280	WI019-012----	Ringfort - rath	Kiltimon	9.4 9.5 9.6	RMP
AH 281	WI019-013----	Moated site	Courtfoyle	9.6	RMP
AH 282	WI019-014----	Enclosure	Courtfoyle	9.6	RMP
AH 283	WI019-015----	Ritual site - holy well	Kiltimon	9.4 9.5 9.6	RMP
AH 284	WI019-016----	Ringfort - rath	Kilmartin	9.4 9.6	RMP
AH 285	WI019-017----	Castle - ringwork	Ballyvolan Lower	9.4 9.6	RMP
AH 286	WI019-017001-	Castle - unclassified	Ballyvolan Lower	9.4 9.6	RMP
AH 287	WI019-018002-	Graveyard	Kilmartin	9.6	RMP
AH 288	WI019-018003-	Font	Kilmartin	9.6	RMP
AH 289	WI019-018004-	Architectural feature	Kilmartin	9.6	RMP
AH 290	WI019-022----	Enclosure	Rathmore	9.6	RMP
AH 291	WI019-023----	Enclosure	Killoughter	9.6	RMP
AH 292	WI019-024----	Redundant record	Killoughter	9.6	None (SMR)
AH 293	WI019-024001-	Church	Killoughter	9.6	RMP
AH 294	WI019-024002-	Graveyard	Killoughter	9.6	RMP
AH 295	WI019-024003-	Industrial site	Killoughter	9.6	RMP
AH 296	WI019-025----	Redundant record	Castlegrange	9.6	None (SMR)
AH 297	WI019-037----	Water mill - horizontal-wheeled	Newcastle Upper	9.4 9.6	RMP
AH 298	WI019-040001-	Moated site	Killoughter	9.6	Proposed RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 299	WI019-040002-	Field system	Killoughter	9.6	Proposed RMP
AH 300	WI019-041----	Enclosure	Ballybla	9.6	Proposed RMP
AH 301	WI019-042----	Field system	Killoughter	9.6	RMP
AH 302	WI019-043----	Field system	Rathmore	9.6	Proposed RMP
AH 303	WI019-044----	Field system	Barnacoyle Little	9.6	Proposed RMP
AH 304	WI019-045----	Bullaun stone	Ballyvolan Lower	9.4 9.6	Proposed RMP
AH 305	WI019-046----	Fulacht fia	Barnacoyle Big	9.4 9.6	Proposed RMP
AH 306	WI019-047----	Excavation - miscellaneous	Barnacoyle Big	9.6	None (SMR)
AH 307	WI019-048----	Fulacht fia	Barnacoyle Big	9.4 9.6	Proposed RMP
AH 308	WI019-050----	Fulacht fia	Kilmartin	9.6	Proposed RMP
AH 309	WI019-051----	Ring-ditch	Killadreenan	9.4 9.5 9.6	None (SMR)
AH 310	WI019-052----	Flat cemetery	Killadreenan	9.4 9.5 9.6	Proposed RMP
AH 311	WI019-053----	Habitation site	Kilmartin	9.6	Proposed RMP
AH 312	WI019-054----	Fulacht fia	Timmore	9.4 9.5 9.6	None (SMR)
AH 313	WI019-055----	Habitation site	Rathmore	9.6	Proposed RMP
AH 314	WI019-056----	Fulacht fia	Inchanappa North	9.6	None (SMR)
AH 315	WI019-058----	Excavation - miscellaneous	Killadreenan	9.4 9.5 9.6	Proposed RMP
AH 316	WI019-060----	Burnt mound	Ballyhenry	9.6	None (SMR)
AH 317	WI019-063----	Cairn - unclassified	Carrignamuck Lower	9.4 9.5 9.6	Proposed RMP
AH 318	WI019-064----	Standing stone	Moorstown (Newcastle By.)	9.5 9.6	Proposed RMP
AH 319	WI019-065----	Field system	Grange South	9.4	Proposed RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
				9.6	
AH 320	WI019-066----	Enclosure	Grange South	9.6	Proposed RMP
AH 321	WI019-067----	Enclosure	Courtfoyle	9.6	Proposed RMP
AH 322	WI019-068----	Enclosure	Blackditch (Newcastle By.)	9.4 9.6	Proposed RMP
AH 323	WI019-069----	Enclosure	Blackditch (Newcastle By.)	9.4 9.6	Proposed RMP
AH 324	WI019-070----	Habitation site	Kilmartin	9.6	None (SMR)
AH 325	WI019-071----	Habitation site	Kilmartin	9.6	None (SMR)
AH 326	WI019-072----	Habitation site	Kilmartin	9.5 9.6	None (SMR)
AH 327	WI019-073----	Fulacht fia	Rathmore	9.6	None (SMR)
AH 328	WI019-074----	Fulacht fia	Ballyhenry	9.6	Proposed RMP
AH 329	WI019-075----	Habitation site	Newcastle Middle	9.4 9.6	Proposed RMP
AH 330	WI019-076----	Fulacht fia	Tiglin (Newcastle By., Newcastle Lower Ed)	9.4 9.6	None (SMR)
AH 331	WI019-078----	Excavation - miscellaneous	Kilmartin	9.6	None (SMR)
AH 332	DU023-015006-	Graveslab	Kill of The Grange	9.1	None (SMR)
AH 333	DU026-005001-	Castle - unclassified	Carrickmines Great	9.1 9.7	RMP
AH 334	DU026-005002-	Bawn	Carrickmines Great	9.1 9.7	RMP
AH 335	DU026-005003-	Fortification	Carrickmines Great	9.1 9.7	RMP
AH 336	DU026-005004-	Mill - unclassified	Carrickmines Great	9.1 9.7	RMP
AH 337	DU026-005005-	Castle - ringwork	Carrickmines Great	9.1 9.7	RMP
AH 338	DU026-006----	Enclosure	Laughanstown	9.1	RMP
AH 339	DU026-018----	Cross	Carrickmines Great	9.1	RMP
AH 340	DU026-021----	Enclosure	Glenamuck South, Kingston (Rathdown By., Ballybrack Ed)	9.1	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 341	DU026-023----	Redundant record	Laughanstown	9.1 9.17	None (SMR)
AH 342	DU026-023002-	Graveyard	Laughanstown	9.1 9.17	RMP
AH 343	DU026-023006-	Graveslab	Laughanstown	9.1 9.17	None (SMR)
AH 344	DU026-023007-	Cross	Laughanstown	9.1	RMP
AH 345	DU026-023008-	Cross-inscribed stone	Laughanstown	9.1 9.17	RMP
AH 346	DU026-023009-	Ecclesiastical enclosure	Laughanstown	9.1 9.17	RMP
AH 347	DU026-023010-	Graveslab	Laughanstown	9.1 9.17	None (SMR)
AH 348	DU026-023011-	Graveslab	Laughanstown	9.1 9.17	None (SMR)
AH 349	DU026-023012-	Graveslab	Laughanstown	9.1	RMP
AH 350	DU026-023014-	Graveslab	Laughanstown	9.1 9.17	RMP
AH 351	DU026-023015-	Graveslab	Laughanstown	9.1 9.17	RMP
AH 352	DU026-023016-	Graveslab	Laughanstown	9.1 9.17	RMP
AH 353	DU026-023017-	Graveslab	Laughanstown	9.1 9.17	RMP
AH 354	DU026-023018-	Graveslab	Laughanstown	9.1 9.17	RMP
AH 355	DU026-023019-	Graveslab	Laughanstown	9.1 9.17	RMP
AH 356	DU026-023020-	Cross-inscribed stone	Laughanstown	9.1 9.17	None (SMR)
AH 357	DU026-025----	Redundant record	Glebe (Rathdown By., Rathmichael Ed)	9.1	None (SMR)
AH 358	DU026-026----	Cairn - unclassified	Laughanstown	9.1	RMP
AH 359	DU026-027----	Enclosure	Cherrywood	9.1	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 360	DU026-028----	House - 18th/19th century	Loughlinstown	9.1	RMP
AH 361	DU026-031001-	Castle - tower house	Shanganagh	9.1 9.8	RMP
AH 362	DU026-031002-	Water mill - unclassified	Shanganagh	9.1 9.8	RMP
AH 363	DU026-032----	Enclosure	Shanganagh	9.1 9.8	RMP
AH 364	DU026-033----	Enclosure	Shanganagh	9.1 9.8	RMP
AH 365	DU026-044001-	Castle - tower house	Ballycorus	9.1	RMP
AH 366	DU026-044002-	Redundant record	Ballycorus	9.1	None (SMR)
AH 367	DU026-045001-	Ringfort - unclassified	Ballycorus	9.1	RMP
AH 368	DU026-045002-	Field system	Ballycorus	9.1	RMP
AH 369	DU026-046----	Ringfort - unclassified	Rathmichael	9.1	RMP
AH 370	DU026-047----	Ringfort - unclassified	Rathmichael	9.1	RMP
AH 371	DU026-048001-	Hillfort	Rathmichael	9.1	RMP
AH 372	DU026-048002-	Ringfort - unclassified	Rathmichael	9.1	RMP
AH 373	DU026-049001-	Castle - tower house	Rathmichael	9.1	RMP
AH 374	DU026-049002-	Earthwork	Rathmichael	9.1	RMP
AH 375	DU026-050003-	Graveyard	Rathmichael	9.1 9.16	RMP
AH 376	DU026-050005-	Souterrain	Rathmichael	9.1	RMP
AH 377	DU026-050007-	Cross	Rathmichael	9.1 9.16	RMP
AH 378	DU026-050008-	Holed stone	Rathmichael	9.1 9.16	RMP
AH 379	DU026-050009-	Graveslab	Rathmichael	9.1 9.16	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 380	DU026-050010-	Bullaun stone	Rathmichael	9.1 9.16	RMP
AH 381	DU026-050011-	Inscribed stone	Rathmichael	9.1 9.16	RMP
AH 382	DU026-050012-	Inscribed stone	Rathmichael	9.1 9.16	RMP
AH 383	DU026-050013-	Gateway	Rathmichael	9.1	RMP
AH 384	DU026-050015-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 385	DU026-050016-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 386	DU026-050017-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 387	DU026-050019-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 388	DU026-050020-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 389	DU026-050021-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 390	DU026-050022-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 391	DU026-050023-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 392	DU026-050026-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 393	DU026-050027-	Graveslab	Rathmichael	9.1 9.16	RMP
AH 394	DU026-051----	Cross (present location)	Shankill	9.1 9.9	RMP
AH 395	DU026-051001-	Cross	Shankill	9.1 9.9	RMP
AH 396	DU026-052----	Settlement deserted - medieval	Shankill	9.1 9.9	RMP
AH 397	DU026-052001-	Castle - tower house	Shankill	9.1 9.9	RMP
AH 398	DU026-053----	Ringfort - unclassified	Shankill	9.1	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 399	DU026-054001-	Church	Shanganagh	9.1 9.9	RMP
AH 400	DU026-054002-	Graveyard	Shanganagh	9.1 9.9	RMP
AH 401	DU026-054003-	Cross	Shanganagh	9.1 9.9	RMP
AH 402	DU026-054004-	Cross	Shankill	9.1 9.9	RMP
AH 403	DU026-054005-	Building	Shanganagh	9.1 9.9	RMP
AH 404	DU026-055001-	Martello tower	Shanganagh	9.1 9.8	RMP
AH 405	DU026-055002-	Defensive redoubt	Shanganagh	9.1 9.8	RMP
AH 406	DU026-057----	Enclosure	Phrompstown	9.1	RMP
AH 407	DU026-058001-	Ringfort - unclassified	Phrompstown	9.1	RMP
AH 408	DU026-058002-	Field system	Phrompstown	9.1	RMP
AH 409	DU026-059----	Megalithic tomb - wedge tomb	Shankill	9.1	RMP
AH 410	DU026-060----	Enclosure	Ballyman	9.1	RMP
AH 411	DU026-061----	Enclosure	Annaghaskin	9.1	RMP
AH 412	DU026-062----	Enclosure	Phrompstown	9.1	RMP
AH 413	DU026-063----	Castle - tower house	Ballyman	9.1 9.2	RMP
AH 414	DU026-064----	Enclosure	Ballyman	9.1 9.2	RMP
AH 415	DU026-065----	Ring-ditch	Ballyman	9.2	RMP
AH 416	DU026-066001-	Church	Oldconnaught	9.1 9.10	RMP
AH 417	DU026-066002-	Graveyard	Oldconnaught	9.1 9.10	RMP
AH 418	DU026-067----	Burial	Oldconnaught	9.1 9.10	RMP
AH 419	DU026-068001-	Church	Cork Great	9.1 9.10	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 420	DU026-068002-	Graveyard	Cork Great	9.1 9.10	RMP
AH 421	DU026-069----	Ritual site - holy well	Cork Great	9.1 9.10	RMP
AH 422	DU026-070----	Martello tower	Cork Great	9.1	RMP
AH 423	DU026-071001-	Redundant record	Laughanstown, Tiknick	9.1	None (SMR)
AH 424	DU026-071002-	Field system	Laughanstown, Tiknick	9.1	RMP
AH 425	DU026-080001-	Enclosure	Brenanstown, Carrickmines Great	9.1 9.7	RMP
AH 426	DU026-080002-	Water mill - unclassified	Brenanstown, Carrickmines Great	9.1 9.7	RMP
AH 427	DU026-086001-	Mill - unclassified	Cherrywood, Shankill	9.1	RMP
AH 428	DU026-086002-	Mill - unclassified	Shankill	9.1	RMP
AH 429	DU026-093----	Castle - tower house	Laughanstown	9.1	RMP
AH 430	DU026-113----	Pit-burial	Ballyman	9.2	RMP
AH 431	DU026-114----	House - 16th/17th century	Glebe (Rathdown By., Rathmichael Ed)	9.1	RMP
AH 432	DU026-116----	Fulacht fia	Shanganagh	9.1 9.9	RMP
AH 433	DU026-118----	Standing stone	Brenanstown	9.1 9.7	RMP
AH 434	DU026-119----	Burial ground	Loughlinstown	9.1	RMP
AH 435	DU026-120----	Castle - unclassified	Shanganagh	9.1 9.9	RMP
AH 436	DU026-122----	Linear earthwork	Carrickmines Great	9.1	RMP
AH 437	DU026-124----	Linear earthwork	Cork Great	9.1	RMP
AH 438	DU026-127----	Military camp	Laughanstown	9.1	RMP
AH 439	DU026-132----	Megalithic tomb - unclassified	Shankill	9.1	Proposed RMP
AH 440	DU026-133----	Barrow - ring-barrow	Cherrywood	9.1	Proposed RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 441	DU026-135----	Fulacht fia	Carrickmines Great	9.1	Proposed RMP
AH 442	DU026-136----	Fulacht fia	Rathmichael	9.1	None (SMR)
AH 443	DU026-138----	Fulacht fia	Shankill	9.1	RMP
AH 444	DU026-139----	Fulacht fia	Shankill	9.1	Proposed RMP
AH 445	DU026-141----	Fulacht fia	Cherrywood	9.1	Proposed RMP
AH 446	DU026-142----	Fulacht fia	Cherrywood	9.1	Proposed RMP
AH 447	DU026-144----	Rock art	Laughanstown	9.1	Proposed RMP
AH 448	DU026-145----	Rock art	Carrickmines Great	9.1 9.7	RMP
AH 449	DU026-146----	Rock art	Carrickmines Great	9.1 9.7	Proposed RMP
AH 450	DU026-149----	Ringfort - unclassified	Glebe (Rathdown By., Rathmichael Ed)	9.1	RMP
AH 451	DU026-150----	Fulacht fia	Carrickmines Great	9.1	Proposed RMP
AH 452	DU026-153----	Cairn - ring-cairn	Laughanstown	9.1	RMP
AH 453	DU026-154----	Field system	Laughanstown	9.1	RMP
AH 454	DU026-155----	House - prehistoric	Cherrywood	9.1	None (SMR)
AH 455	DU026-159----	Fulacht fia	Brenanstown	9.1 9.7	Proposed RMP
AH 456	DU026-160----	Habitation site	Laughanstown	9.1	RMP
AH 457	DU026-163----	Enclosure	Laughanstown	9.1	RMP
AH 458	DU026-164----	Fulacht fia	Laughanstown	9.1	Proposed RMP
AH 459	DU026-165----	Burnt mound	Laughanstown	9.1	Proposed RMP
AH 460	DU028-001----	Redundant record	Ballyman	9.2	None (SMR)
AH 461	DU028-002001-	Ecclesiastical enclosure	Ballyman	9.2	RMP
AH 462	DU028-002002-	Church	Ballyman	9.2	RMP
AH 463	DU028-002003-	Ritual site - holy well	Ballyman	9.2	RMP
AH 464	DU028-002005-	Graveslab	Ballyman	9.2	None (SMR)
AH 465	DU028-002006-	Graveslab	Ballyman	9.2	RMP

AH No.	RMP /national monument/ preservation order No	Name	Townland	Figure ref	Statutory protection
AH 466	DU028-002007-	Kiln - corn-drying	Ballyman	9.2	RMP
AH 467	DU028-002008-	Fulacht fia	Ballyman	9.2	RMP
AH 468	DU028-002009-	Ritual site - holy tree/bush	Ballyman	9.2	None (SMR)
AH 469	DU028-002011-	Graveyard	Ballyman	9.2	RMP

Appendix B9.2

Archaeological excavations
within the study area

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2005:1693	05E0406	Ballycrone	Fulacht fia, kiln feature and large pits and post-holes, figure of 8 kiln. Features likely date to the Bronze Age and Medieval periods.
2006:561	06E0984	Ballyman	No features of archaeological significance were discovered
2002:0460	02E1864	Ballyman	No features of archaeological significance were discovered
2005:386	05E0057	Ballyman	No features of archaeological significance were discovered
n/a	E000182	Ballyman	Bronze Age to medieval activity
1977-79:0036	n/a	Ballyman	Habitation site
1985:054	n/a	Ballyman	Environs of Early Christian/Medieval Church. Corn drying kiln, cobbled layer showing evidence of iron smelting.
2000:1082	00E0696	Ballynamuddagh	Bronze Age pits and structures
2000:1080	00E0398	Ballynamuddagh	Fulacht fia, pits, hearths
2000:1081	00E0691	Ballynamuddagh	Flint scatter, ring-ditch, pits and structure
2000:1083	00E0692	Ballynamuddagh	Flint scatter including 41 cores, 60 flakes, 6 scrapers and 2 spalls.
2001:1335	01E0848	Ballynamuddagh	No features of archaeological significance were discovered
2000:1079	00E0398	Ballynamuddagh	Fieldwalking and monitoring revealing prehistoric landscape, sites excavated under separate licences
2002:1959	02E0802	Ballywaltrim	No features of archaeological significance were discovered
1996:065	96E0265	Ballyyogan	Possible house
2002:0466	02E0481	Ballyyogan	Site 70M. Pits and possible troughs with burnt stone
2001:1340	01E0822	Barnacoyle Beg	Fulacht fia
2001:1339	01E0434	Barnacoyle Beg	Early bronze age pit
2007:2005	01E0919 Ext.	Bray	No features of archaeological significance were discovered
2004:1854	04E0163	Bray	No features of archaeological significance were discovered
2012:639	12E343	Bray	No features of archaeological significance were discovered
2012:640	12R0053	Bray	No features of archaeological significance were discovered

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2001:1343	01E0919	Bray	No features of archaeological significance were discovered
2017:074	17E0035	Bray	No features of archaeological significance were discovered
2013:509	13E0121	Bray	19th century bridge
2010:835	05E0392 Ext	Bray	No features of archaeological significance were discovered
2002:1961	02E0628	Bray	No features of archaeological significance were discovered
n/a	05E0010	Brenanstown	Post hole of possible prehistoric date
2007:544	07E0095	Brenanstown	Prehistoric post-holes, pits and hearth/possible modern ditches, pits and metalled surface.
2006:570	06E0214	Brenanstown	Possible prehistoric activity
2006:668	06E0944	Brenanstown	Prehistoric pits and early modern army camp
2018:078	17E0181	Brenanstown	No features of archaeological significance were discovered
2009:293	C196; E4059	Brenanstown	Shallow pit and ditch feature
2001:1349	01E0823	Calary Lower	Small pit
2001:1347	01E0574	Calary Lower	Burnt mound and pits
2001:1348	01E0575	Calary Lower	Burnt mound and pits
2002:0618	02E1131	Carrickmines Great	Linear feature of possible medieval date
2000:0215	00E0045	Carrickmines Great	No features of archaeological significance were discovered
2002:0481	02E0115	Carrickmines Great	Possible hearth and circular pit
2002:0482	02E0116	Carrickmines Great	Irregular shaped pit
2007:438	07E1003	Carrickmines Great	No features of archaeological significance were discovered
2017:286	17E0548	Carrickmines Great	No features of archaeological significance were discovered
2002:0483	02E0272	Carrickmines Great	Circular hut of Middle-Late Bronze Age date, cooking pit and post-pits. A bowl furnace, external hearths and a series of pits and post-holes with flints of Early Bronze Age date
2007:439	C207; E3332	Carrickmines Great	No features of archaeological significance were discovered
2005:398	05E1243	Carrickmines Great	No features of archaeological significance were discovered

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2005:400 and 2006:575	05E0756	Carrickmines Great	Burnt spread
2004:0477	04E0773	Carrickmines Great	Shallow pits, hearth, fulacht fia, industrial area, cremation pit
2004:0478	04E0114	Carrickmines Great	No features of archaeological significance were discovered
2005:397	05E0459	Carrickmines Great	No features of archaeological significance were discovered
2002:0602	02E0535	Carrickmines Great	No features of archaeological significance were discovered
2012:187	09E0300	Carrickmines Great	Possible remains of the Pale ditch
n/a	02E1532	Carrickmines Great	Carrickmines Castle and associated features
2000:0216	00E0525	Carrickmines Great	Carrickmines Castle and associated features
2000:0217	00E0098	Carrickmines Great	Post-medieval ridge and furrow
n/a	01E1229	Carrickmines Great	Sites 16-20. Medieval kiln, mill, revetted fosse, human remains, industrial area and enclosures.
2002:0485	02E0117	Carrickmines Great	No features of archaeological significance were discovered
n/a	01E1229	Carrickmines Great	Site 64M. One possible pit feature
2002:0484	02E0700	Carrickmines Great	Bronze Age flint-knapping site
1998:125	98E0445	Carrickmines Great	Fulachta fiadh
2002:0483	01E1229 and 02E0272	Carrickmines Great	Site 59M-63M. Large number of pits and post holes as well as struck flint. Prehistoric settlement site with industrial area.
2014:148	14E0021	Carrickmines Great	No features of archaeological significance were discovered
2002:0480	01E1229 and 02E0428	Carrickmines Great	Site 56. Large fulacht fia
2002:0482	01E1229 and 02E0116	Carrickmines Great	Site 58. Pit feature
2002:0481	01E1229 and 02E0115	Carrickmines Great	Site 57. Hearth and pit
2002:0488	02E1130	Carrickmines Great	Site 75M. Fulacht fia
2008:375	E003284	Carrickmines Great	No features of archaeological significance were discovered
1996:066	96E0236	Carrickmines Little	No features of archaeological significance were discovered
2009:295	E003188; C194	Carrickmines Little	No features of archaeological significance were discovered

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
1977-79:0076	n/a	Carrignamuck	Excavation of two hut sites
2003:2072	02E1804	Charlesland	Monitoring exposed three burnt mounds and two large ditches. These were excavated under separate licences.
2018:366	17E0648	Charlesland	Pits with token deposits of bone, likely to date to the Bronze Age
2003:2073	03E0018	Charlesland	Site A. Bronze Age structure and burnt mound
2003:2074	03E1821	Charlesland	Site 1A. Prehistoric trough and two curvilinear ditches, possibly early medieval.
2003:2075	03E0592	Charlesland	Site CA1. Burnt mound with four troughs
2003:2076	03E0146	Charlesland	Site D. Two Bronze Age structures and an enclosing ditch
2003:2077	03E0147	Charlesland	Site F. A ring ditch, structure, cremation pit and pit complex excavated.
2003:2078	03E0196	Charlesland	Site G. Possible enclosure in the form of an unroofed structure. Sunken hearth and intercutting pits also excavated.
2003:2079	03E0908	Charlesland	Site DC1-3. Pit, posthole possible linear feature.
2003:2080	03E1028	Charlesland	Site GC4. Post holes, pits, shallow burnt spreads.
2003:2081	03E1188	Charlesland	Site I. Two charcoal spreads and pits
		Charlesland	
2004:1858	04E0387	Charlesland	Fulachta fiadh, urn burial and later medieval activity
2004:1859	04E0744	Charlesland	Excavation revealed multi-phase archaeological features ranging from a prehistoric fulacht fia to a medieval enclosure
2003:2082	03E1550	Charlesland	Charlesland development Site J. semi-circular ditch, pits and posthole. A barbed and tanged arrowhead and several crumbs of prehistoric pottery were found in these features.
2004:1856	04E0118	Charlesland	Eight areas of archaeological activity. A large number of burnt mounds and fulachta fiadh have been excavated throughout the development area in Charlesland. A

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
			possible structure was also identified. All remains are believed to date to the Bronze Age period.
2001:1350	01E1132	Charlesland	Burnt mound, linear feature containing prehistoric pottery
2001:1351	01E1133	Charlesland	No features of archaeological significance were discovered
2000:0221	00E0565	Cherrywood	No features of archaeological significance were discovered
1999:169	99E0517	Cherrywood	The area produced evidence for the use of the lands from the Neolithic onwards. The earlier evidence is mainly of settlement including Neolithic and Beaker material. From the Bronze Age we begin to get evidence of burial. This continues into the Iron Age, when a ring-barrow and a larger barrow were constructed. The use of the hilltops for burial continues into the Later Iron Age. A possible drying kiln and another structure (also within the enclosure) appear to be contemporary with this cemetery. Sometime after the cemetery went out of use the large enclosure was reused as a settlement site. A large rectangular building and then two smaller buildings were erected within the enclosure. The finds associated with this phase have strong Norse and Hiberno-Norse affinities.
1998:127	98E0526	Cherrywood	Ten archaeological features and sites were examined. Two were non-archaeological in nature. Four were isolated features, mostly of unknown date. The four other sites included two fulachta fiadh, two burials within an enclosing ditch, and a group of post-holes probably representing a structure.
1999:169	99E0518	Cherrywood	See 99E0517 and 98E0526
1999:169	99E0519	Cherrywood	See 99E0517 and 98E0526
1999:169	99E0523	Cherrywood	See 99E0517 and 98E0526
2003:470	03E1182	Cherrywood	No features of archaeological significance were discovered
2002:0493	02E0885	Cherrywood	One pit discovered
n/a	01E1229	Cherrywood	Site 74. Two pits and a possible hearth

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2003:468	03E0839	Cherrywood	Post-hole
1995:102	94E0201	Cherrywood	18th-century military camp
2018:349	18E0746	Churchlands	Three single pit features
2005:1701	05E0522	Coolgad	No features of archaeological significance were discovered
2018:356	17E0646	Cooldress	Seven pits with token bone deposits
2013:511	13E0394	Coolgad	No features of archaeological significance were discovered
2005:1703	02E1717	Cork Great	Bank material which may be part of the Pale ditch
2001:1342	01E0220	Cork Great	One ditch identified
2005:393	05E1312	Cork Great	No features of archaeological significance were discovered
2002:1960	02E1717	Cork Great	Bank material which may be part of the Pale ditch
2004:0491	04E0354	Cork Great	Possible linear earthwork associated with Ravenswell House
1991:134	n/a	Delgany	Two burnt spreads and one struck flint
1999:895	99E0231	Delgany	No features of archaeological significance were discovered
2018:225	18E0681	Delgany	No features of archaeological significance were discovered
2002:1965	02E0390	Delgany	Former hollow way
2011:638	11E0325	Delgany	Disarticulated human bones recovered during monitoring
2001:1347	01E0574	Downshill	Burnt stone and charcoal deposits
2004:1864	04E0466	Farrankelly	Archaeology consisted of a series of twelve pits, which were dispersed over a large area measuring 160m in length (east-west) and 40m in width
2002:1967	02E0084	Fassaroe	No features of archaeological significance were discovered
2017:172	17E0097	Fassaroe	No features of archaeological significance were discovered
2016:442	16E0052	Fassaroe	No features of archaeological significance were discovered
2009:859	09E0225	Fassaroe	No features of archaeological significance were discovered
2004:1852	04E1201	Giltspur	No features of archaeological significance were discovered

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2004:1853	04E1324	Giltspur	A structure, kiln, ditch, linear trench and outlying pits was uncovered
2013:205	13E0024	Glebe	No features of archaeological significance were discovered
2014:169	14E0064	Glebe	No features of archaeological significance were discovered
2016:055	15E0367	Glebe	No features of archaeological significance were discovered
2003:468	03E0839	Glebe	Six potential archaeological sites and an isolated post-hole were identified during monitoring
2003:469	03E0910	Glebe	four possible ditches (cut into natural subsoil), a small charcoal spread and an area of burning (1.2m by 1.1m), possibly indicating habitation
n/a	01E1229	Glebe	Site 43. Ringfort and attached field system
2002:0595	02E0365	Glebe	Site 68. Slot trench and hearth of medieval date
2018:397	18E0232	Glebe	Cremation burial pits
2001:1355	00E0443	Glen of the Downs	Fulacht fia, charcoal spreads and complex of hearths, pits and a linear feature.
2001:1364	01E0249	Glen of the Downs	Fulacht fia
2001:1363	01E0611	Glen of the Downs	Fulacht fia
2001:1363	01E0783	Glen of the Downs	Burnt spread
2001:1370	01E1076	Glen of the Downs	Fulacht fia
2001:1371	01E1134	Glen of the Downs	complex of hearths, pits and a linear feature.
2018:026	18E0206	Glenamuck South	No features of archaeological significance were discovered
2000:1087	00D060 and 00R085	Greystones	No features of archaeological significance were discovered
2010:845 and 2009:861	08E0457 and 08E0472	Greystones	Small number of possible medieval features north of Rathdown Castle
2006:2194	06E0091	Greystones	A Bronze Age cooking place or fulacht fia associated with a hut site; an early medieval church and graveyard associated with a medieval field system and settlement activity; and an 18th-century brick-manufacturing site
2008:1316	08E0457	Greystones	No features of archaeological significance were discovered

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2008:1315	08D011 and 08R043	Greystones	Three phases of pier construction identified.
2008:1314	08E0625	Greystones	No features of archaeological significance were discovered
2008:1313	08D010, 08R042	Greystones	Recording of 19th century bridge
1994:231	94E0152	Irishtown	Post-medieval metal working site
2013:202	13E0458	Keeloge Upper	Fulacht fia
2003:2085	02E1372	Kilcoole	No features of archaeological significance were discovered
2009:863	06E0670 Ext	Kilcoole	Pits and possible post-holes of likely Bronze Age date
2009:862	09E0554	Kilcoole	Post holes, stake holes, pits, ditches and curvilinear features identified close to a recorded ecclesiastical site. Medieval slag, pottery and a crucible were recovered
2008:1318	06E0670 ext	Kilcoole	Neolithic, Bronze Age activity
2014:104	14E0022	Kilcoole	Human burial
2002:1968	02E1372	Kilcoole	Pit with burnt stone
1998:692	98E0244	Kilcoole	Late medieval ironworking
2006:2184	06E0043	Kilcoole	Articulated human skeleton
2004:1871	04E1243	Kilcoole	No features of archaeological significance were discovered
2004:1870	04E0848	Kilcoole	Remains of a holy well were recorded
2001:1360	01E0969	Kildrennan	Prehistoric activity
2002:1969	00E0862	Killadrennan	Bronze Age activity including pits and ditches, charcoal rich clay and heat fractured stone
2004:1869	02E0735 ex	Killadrennan	This site contained a ring-ditch, numerous pits that contained prehistoric pottery, flint and burnt bone
2002:1971 and 2002:1972	02E1527 and 02E1562	Killadrennan	A series of prehistoric pits and linear features was uncovered during testing excavated under licence 02E1562
1995:289	95E0004	Killarney	Wooden structure on River Dargle
2012:641	12E123	Killarney	19th-century stone bridge and 12th-century wooden bridge
2010:841	10E0025	Killincarrig	Early Neolithic structure, a group of post-holes possible part of another

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
			structure. A Bronze Age pit and Iron Age hearth were also excavated.
2010:842	10E002 ext	Killincarrig	Testing identified similar features to those excavated under licence 10E0025
2003:2086	03E1399	Killincarrig	Site K. Fulacht fia
2010:839	n/a	Killincarrig	No features of archaeological significance were discovered
1994:230	93E0001	Killincarrig	Fulacht fia
2000:1088	00E0443	Kilmacanoge	A number of pits and a possible kiln were exposed during topsoil-stripping in Kilmacanoge marsh
2001:1363	01E0783	Kilmacanoge	Burnt spread
2001:1365	01E0571	Kilmacanoge North	Fulacht fia
2000:1088	00E0443	Kilmacanogue	A number of pits and a possible kiln were exposed during topsoil-stripping in Kilmacanogue marsh
2001:1366	01E0435	Kilmartin	Fulacht fia
2002:1974	02E0754	Kilmartin	Testing revealing potential medieval or Bronze Age features
2001:1367	01E1072	Kilmartin	Circular structure and large pits of prehistoric date.
2001:1382	01E0866	Kilmartin	Testing revealing prehistoric features. Excavated under licence 01E1072
2002:1975	01E1072	Kilmartin	Burnt mound
2002:1976	02E1351	Kilmartin	Stake holes with no structural pattern
2002:1977	02E1418	Kilmartin	Areas preserved in situ
2001:1372	01E1134	Kilmurry North	Bowl hearth and a number of pits
2007:2013	07E0441 Ext	Kilmurry North	No features of archaeological significance were discovered
2001:1368	01E0572	Kilmurry North	Round house and other settlement indicators dating to the Bronze Age. Potential Iron Age phase of activity also identified.
2007:2012	A022/050; E3236	Kilmurry North	Fulacht fia
2001:1370	01E1076	Kilmurry North	Burnt spread
2001:1372	01E0889	Kilmurry South	Charcoal spread
2000:1089	00E0508	Kilmurry South	No features of archaeological significance were discovered
2000:1091	00E0690	Kiloughter	No features of archaeological significance were discovered

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2001:1361	00E0575	Kiloughter	No features of archaeological significance were discovered
2000:1090	00E0490	Kiloughter	Environs of 17th-century graveyard which was occupied during the medieval period.
2004:1872	04E0653	Kilpeddar East	Site 17/17 A-B and 18, GSAR. Two areas of charcoal rich soil not of archaeological significance.
2005:1706	04E0128	Kilpeddar East	GSAR Site 21 comprised eleven cut features (pits of various sizes and a post-hole cut into the edge of one of the larger pits) and thirteen distinct fills/deposits associated with the cuts
2008:1319	08E0981	Kilpeddar West	No features of archaeological significance were discovered
2006:2183	04E0128	Kilpeddar East	Fulacht fia
1998:693	98E0143	Kilquade	No features of archaeological significance were discovered
2001:1373	01E0657	Kiltimon	Possible megalith
2001:1374	01E0972	Kiltimon	Fulacht fia
2002:1978	02E0605	Kiltimon	Fulacht fia
2018:215	18E0400	Kindlestown Lower	No features of archaeological significance were discovered
2018:211	18E0586	Kindlestown Upper	Possible kiln identified during testing; subsequent excavation revealed the feature to be non-archaeological.
2001:1354	00E0844	Kindlestown Upper	Excavations at the medieval castle of Kindlestown revealed a range of medieval features
1991:136	n/a	Kindlestown Upper	No features of archaeological significance were discovered
2006:2181	01E0084 ext.	Kindlestown Upper	The area resolved during this excavation programme was located in the eastern part of the castle adjacent to its northern wall. Five levels of activity were recognised during the 2006 phase of excavation, the majority of which were post-medieval in date
2001:1375	01E0531	Kindlestown Upper	No features of archaeological significance were discovered
n/a	03E0210	Laughanstown	No features of archaeological significance were discovered
2002:0616	00E0283	Laughanstown	The sites were near a wedge tomb, SMR 26:24, and the site of a cairn,

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
			SMR 26:26. They included a large, oval, stone ring cairn (Site 35D), two rock outcrops with prehistoric artefact assemblages (Sites 39I and 36E), cremations with ceramics (Site 38H), a cluster of probable post-built structures, pits containing saddle querns, probable fence-lines (Site 40), and a number of earth-cut drying kilns and a post-hole complex (Site 42) (Excavations 2001, No. 442).
2002:0594	00E0758	Laughanstown	Excavation of large ringfort and field system
n/a	03E1365	Laughanstown	Monitoring of topsoil stripping at Cherrywood Park II. Individual licences for excavation detailed below
2003:470	03E1182	Laughanstown	Cherrywood Park II. No features of archaeological significance were discovered
	03E1366	Laughanstown	Cherrywood Park II. No features of archaeological significance were discovered
	03E1370	Laughanstown	Cherrywood Park II. Two burnt mounds
	03E1145	Laughanstown	Cherrywood Park II. Cremation burial, two kilns and three areas of burnt earth dating to the Early Bronze Age
	03E1471	Laughanstown	Cherrywood Park II. The site consisted of 29 pits set in a circle and enclosed by a ditch. The site dates to the 18th century
2004:0485	04E0710	Laughanstown	No features of archaeological significance were discovered
2001:443	00E0880	Laughanstown	18th-century army camp. There would appear to be three phases of use of the site. The first seems to date from the prehistoric period. A pit, with a struck flint, was located at the extreme western edge of the site. The second phase may date from the medieval or late medieval period, with the use of the land for cultivation
2002:0619	02E1133	Laughanstown	The site consisted of three areas, 1–3 with Bronze Age fulachta fiadh
2016:042	E004640	Laughanstown	Burnt mounds, military camp features

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2015:311	15E0471	Laughanstown	Burnt Spread, pits, post-holes, prehistoric structure, token cremation burial
2015:313	15E0470	Laughanstown	20th century buildings close to site of tower house
2016:047	C000715	Laughanstown	Vegetation clearance around a wedgetomb DU026-024
2002:0489	02E1188	Laughanstown	Fulacht fia
2015:290	15E0472	Laughanstown	Post-medieval house, scattered pits/hearths
2015:362	15E0469	Laughanstown	Enclosure, kilns, burnt mound
2016:665	15E0472	Laughanstown	Post-medieval building, pits and hearths
2018:071	18E0270	Laughanstown	No features of archaeological significance were discovered
2018:072	18E0248	Laughanstown	Pits, kilns, spreads of burnt material
2001:441	98E0261	Laughanstown	A mixture of prehistoric and medieval material was recovered from the site
2000:0319	00E0100	Laughanstown	Five test-trenches were excavated to determine the date of a stone structure (labourer's cottage) demolished in the 1960s and to ensure that no earlier remains underlay the present foundations.
1997:084	97E0360	Laughanstown	One pit identified
2000:0317	00E0085	Laughanstown	No features of archaeological significance were discovered
n/a	03E1598	Laughanstown	Several pits and a ditch feature
2004:0484	04E0896	Laughanstown	Five pit features
1997:085	97E0279	Laughanstown	18th century road surface, prehistoric pits and early Christian ditch.
2006:668	06E0944	Laughanstown	Two possible prehistoric structures
2007:544	07E0095	Laughanstown	No features of archaeological significance were discovered
2002:0618	02E1131	Laughanstown	Site 76M. Ditch
2002:0489	01E1229 and 02E1188	Laughanstown	Site 79. Fulacht fia
2002:0619	02E1133	Laughanstown	Site 78. Prehistoric site with stake holes, burnt mounds, a waterhole with a spread containing a large amount of Bronze Age pottery.

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2000:0324	00E0716	Loughlinstown	No features of archaeological significance were discovered
2018:299	16E0468	Loughlinstown	No features of archaeological significance were discovered
2018:252	18E0487	Newcastle Middle	No features of archaeological significance were discovered
2007:2016	07E0568	Newcastle Middle	No features of archaeological significance were discovered
2001:1376	01E0506	Newcastle Middle	Pits and linear ditches
1997:617	96E0331	Newcastle Upper	No features of archaeological significance were discovered
2001:1346	01E0252	Newcourt	Pit circle containing flint flakes and human bone generally dated to the late Neolithic or early Bronze Age
2001:1345	01E0198	Newcourt	Pit containing animal bone
1998:687	98E0022	Newcourt	Ditch of unknown origin
2001:1344	01E0084	Newcourt	Monitoring, sites excavated in licences 01E0252 and 01E0198
2001:1376	01E0506	Newcastle Middle	Pits, linear features, a hearth, two narrow ditches. No date
2017:325	17E0356	Newport	Post-medieval occupation
2016:529	14E0132 Ext.	Newtownmountkennedy	Metalworking areas, a ring ditch and a number of dispersed pits, post-holes, stake-holes and linear features
2015:346	14E0132 Ext.	Newtownmountkennedy	Metalworking areas, a ring ditch and a number of dispersed pits, post-holes, stake-holes and linear features
2014:111	14E0132	Newtownmountkennedy	No features of archaeological significance were discovered
2006:2186	06E0529	Newtownmountkennedy	No features of archaeological significance were discovered
2018:367	18E0457	Newtownmountkennedy	The site comprised the remains of a burnt mound spread, two pits, a wood-lined trough and an L-shaped feature.
2002:1983	02E0268 Ext.	Newtownmountkennedy	Monitoring of topsoil stripping for N11 Newtownmountkennedy Ballynabarny Road Scheme. Sites identified were resolved under separate licences.
2010:286	10E0345	Old Connaught	Burnt mound
n/a	E000506	Old Connaught	Testing on site of possible moat revealed only a post-medieval ditch

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
n/a	E000506	Old Connaught	Post-medieval bank
1989:028	n/a	Old Connaught	Possible tree ring
1989:027	n/a	Old Connaught	Seven skeletons and bronze fibulae were recovered
2018:178	17E0027	Old Connaught	No features of archaeological significance were discovered
2010:286	10E0345	Old Connaught	Burnt spread
2002:0643	02E1020	Phrompstown	Ringfort - preserved in situ
2002:644	02E1022	Phrompstown	Ringfort which was levelled in the 1950s
2002:0645	02E1024	Phrompstown	Oval enclosure on historic maps but no archaeological features identified
2005:1707	04E0128 Ext	Priestsnewtown	Seventeen sites excavated in the townland of Priestsnewtown as part of the Greystones Southern Access Route. Sites included a Late Bronze Age structure
2004:1880	04E0267	Priestsnewtown	Site 1 and 2, GSAR. Fulachta fiadh
2004:1883	04E0401	Priestsnewtown	Site 6/6A-G, GSAR. Large range of pits, post-holes and linears, cremation pits, ring ditches. Features largely dated to the Bronze Age
2004:1882	04E0402	Priestsnewtown	Site 5/5A-C, GSAR. Stake-holes, deposits and an area of baked clay were discerned
2004:1881	04E0403	Priestsnewtown	Site 4 GSAR. Group of 12 postholes and 6 pits
2004:1884	04E0467	Priestsnewtown	Site 12 and 13/13A-B GSAR. Ring ditch and stone lined hearth
2004:1863	04E0128	Priestsnewtown	Sites 3, 7-11, 15, 19, 20 GSAR. Pits and features of no archaeological significance.
2003:2091	03E1183	Priestsnewtown	No features of archaeological significance were discovered
2003:2092	03E1224	Priestsnewtown	A ditch with post-medieval pottery
2003:2093	03E1225	Priestsnewtown	No features of archaeological significance were discovered
2010:289 and 2011:182	C196; E4244	Priorsland	Early medieval pit and associated stake-holes
1998:691	97E0075 Ext	Rathdown	No features of archaeological significance were discovered
1997:612	97E0075	Rathdown Lower	Prehistoric pits and ditches and medieval corn drying kiln

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
1994:233	94E0048	Rathdown Upper	Some features dating to the medieval period and some of obviously more recent date. A mill race and enclosure ditch were identified.
2008:1320	07E0985	Rathdown Upper	Fragments of lithic debitage were recovered from a highly disturbed context (plough zone)
1994:232	94E0033	Rathdown Upper	A ditch which may represent a linear earthwork.
1993:231	93E0187	Rathdown Upper	Oval pit and a number of post-holes were excavated of uncertain date
2003:2094	01E0616	Rathdown Upper	Charcoal spread, pit and hearth as well as four pits in no discernible pattern excavated under licence 03E0886
2003:2095	03E0886	Rathdown Upper	Charcoal spread, pit and hearth as well as four pits in no discernible pattern.
1998:125	98E0445	Rathmichael	Hearth site with associated post-holes. Fulacht fia
2002:1985	02E0019	Rathmore	Large prehistoric enclosure, a series of pits with Neolithic pottery, possible kiln. D-shaped enclosure to the south of the large enclosure.
2002:1987	02E0884	Rathmore	Fulacht fia
2001:1380	01E0471	Rathmore	Burnt mounds
2001:1381	01E0656	Rathmore	No features of archaeological significance were discovered
2002:1986	02E0864	Rathmore	Prehistoric pottery and arrowheads recovered from a number of deposits including ditches
2002:1988	02E0882	Rathmore	Pit with charcoal rich material
2008:1304	08E0687	Rathmore	No features of archaeological significance were discovered
2016:366	16E0340	Ravenswell	No features of archaeological significance were discovered
2014:203	14E0225	Ravenswell	No features of archaeological significance were discovered
2002:1989	01E1073	Rosanna Lower	Medieval enclosure
2006:2193	05E1423	Seasonpark	Pits and other features including fulachta fiadh
2005:530	05E0392	Shanganagh	No features of archaeological significance were discovered
2005:530	05E0392	Shanganagh	No features of archaeological significance were discovered

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2007:547	07E0033	Shanganagh	No features of archaeological significance were discovered
2006:701	06E0794	Shanganagh	No features of archaeological significance were discovered
2011:228	11E0304	Shanganagh	No features of archaeological significance were discovered
1999:257	99E0181	Shanganagh	No features of archaeological significance were discovered
2013:044	13E114	Shanganagh	19th-century demesne
2014:481	14E0341	Shanganagh	Testing around Shanganagh Castle did not reveal any evidence for enclosing features and no evidence for the castle bawn.
2001:445	01E0503	Shankill	No features of archaeological significance were discovered
2007:539	07E0701	Shankill	Excavations next to the extant east-west-aligned mill-race in the south-eastern end of the field uncovered a number of granite blocks. A large sherd of unglazed earthenware was found in fills that were probably associated with the mill-race. A jumble of granite blocks and stones were also uncovered in the north-western side of the field; they may be related to some form of demolished structure which appears to be marked on Rocque's map of 1760.
2002:0595	02E0365	Shankill	L-shaped slot trench and hearth dating to the medieval period
2008:487	08E0125	Shankill	No features of archaeological significance were discovered
n/a	01E1229	Shankill	50 sites of archaeological potential were identified during topsoil stripping for the M50. Sites framed from the Neolithic to Post-medieval periods
1998:125	98E0445	Shankill	Six archaeological sites discovered along the pipeline route, consisting of four fulachta fiadh, a hearth of unknown date and a multi-period site that saw three phases of use including one that involved the construction of a wedge tomb.
2000:1093	00E0152	Templecarrig Lower	No features of archaeological significance were discovered
2002:1990	02E0227	Templecarrig Lower	Isolated charcoal spread

Excavations.ie reference	Excavation licence No.	Townland	Summary of results
2001:1386	01E0505	Tiglin	The monitoring of topsoil-stripping and subsequent excavation revealed two related spreads of heat-shattered stone. Subsequent excavation detected approximately ten pits and several post-holes.
2014:206	14E0249	Tiknick	No features of archaeological significance were discovered
n/a	02E1252	Timore	Prehistoric pits and medieval kiln
2001:1356	01E0610	Woodlands	Burnt spread

Appendix B9.3

Built heritage assets within the study area

BH No	RPS	NIAH	Name/type	Townland	Figure ref
BH 1	65 Protected Structures	147 NIAH Structures of which 35 are also Protected Structures	Greystones/ Delgany Primarily private housing, a railway station, coast guard station, churches and a graveyard	Various across Greystones and Delgany	9.3 9.13
BH 2	217 Protected Structures	326 NIAH Structures, of which 191 are also Protected Structures	Bray Primarily private housing, a railway station, coast guard station, churches and a graveyard	Various	9.1 9.2 9.10 9.11
BH 3	22 Protected Structures	40 NIAH Structures of which 15 are Protected Structures	Enniskerry Primarily private housing, churches	Various	9.2 9.12
BH 4	03-32	n/a	Three-bay, two-storey villa, c.1820	Fassaroe Td	9.2
BH 5	19-12	n/a	Coastguard cottages.	Grange Upper Td	9.4 9.6
BH 6	13-12	16307006	Early-19th century, house. NIAH records date as 1750 - 1770	Kilmacullagh Td	9.4 9.5 9.14
BH 7	08-72	16400819	Vernacular thatched cottage, c. 1790 - 1810	Rathdown Upper Td	9.2
BH 8	07-12	16400707	Mid-18th century house. NIAH records date as 1790-1810	Wingfield Td	9.2
BH 9	13-45	16401303	Bridge, NIAH records date as 1690 - 1710	Woodstock Demesne	9.4
BH 10	13-46	16401304	c. 1760 house	Woodstock Demesne	9.4
BH 11	03-37	16400724	Modern summer house c. 1972	Newtown (Rathdown Barony)	9.2
BH 12	07-05	n/a	Small house in a Tudor-gothic revival style	Hollybrook Td	9.2
BH 13	07-06	16400706	Tudor, gothic-revival house, 1838.	Hollybrook Td	9.2
BH 14	07-07	n/a	Gated entrance	Hollybrook Td	9.2
BH 15	13-21	n/a	Small house dating to 18th century	Ballydonera Td	9.3
BH 16	13-06	n/a	19th century cottage	Kilcoole Td	9.3
BH 17	13-07	n/a	Terrace of local authority houses c. 1940	Kilcoole Td	9.3

BH No	RPS	NIAH	Name/type	Townland	Figure ref
BH 18	13-08	16401302	Late-18th century country house	Kilcoole Td	9.3
BH 19	03-33	16400703	Late-19th century church	Springfield Td	9.2
BH 20	03-35	16400704	Tudor gothic-revival house, c. 1850	Kilcrony Td	9.2
BH 21	19-07	16401908	Large house dating from c. 1800	Killoughter Td	9.6
BH 22	07-08	n/a	Ruin of small, medieval church.	Kilmacanoge Td	9.2
BH 23	07-02	16400715	House, c. 1810	Ballyorney Td	9.2
BH 24	12-03	n/a	Thatched vernacular cottage	Monalin Td	9.5
BH 25	12-02	n/a	Ruin of a T-plan, barn church, c. 18th century	Kilmurray Td	9.5
BH 26	13-13	16401312	Small, T-plan, barn church.	Kilquade Td	9.3
BH 27	13-14	16401311	Letter box	Kilquade Td	9.3
BH 28	13-15	16401306	Early-18th century house	Kilquade Td	9.3 9.4
BH 29	08-33	16400816	Early-19th century house	Kilruddery Demesne	9.2
BH 30	08-34	n/a	Gated entrance	Kilruddery Demesne	9.2
BH 31	19-14	16401906	Early-19th century house.	Kiltimon Td	9.4 9.5 9.6
BH 32	03-30	16400723	Mid-19th century house	Cookstown Td	9.2
BH 33	13-22	16401308	Late-18th century house.	Ballyronan	9.3 9.4
BH 34	13-17	n/a	Water pump	Knockroe Td	9.3
BH 35	08-05	16400820	Italianate house of c. 1860	Belmont Demesne	9.2
BH 36	13-35	n/a	Early-19th century house	Newcastle Upper Td	9.4 9.6 9.15
BH 37	13-19	n/a	Water pump	Leabeg Middle Td	9.4
BH 38	13-24	16401310	Early 19th-century house	Bromley Td	9.3
BH 39	07-10	16400716	Early 19th-century house	Stilebawn Td	9.2
BH 40	13-25	16310013	Early 19th-century house	Newcastle Middle Td	9.4 9.6 9.15
BH 41	12-04	16307012	Early 19th-century house	Monalin Td	9.4 9.5

BH No	RPS	NIAH	Name/type	Townland	Figure ref
					9.14
BH 42	13-20	n/a	18th-century house	Mount Kennedy Demesne Td	9.3 9.4 9.5
BH 43	13-26	n/a	Water pump	Newcastle Middle Td	9.4 9.6 9.15
BH 44	13-37	n/a	Foot bridge	Newcastle Upper Td	9.4 9.6 9.15
BH 45	13-27	16310001	Late 19th-century house	Newcastle Middle Td	9.4 9.6 9.15
BH 46	13-28	n/a	CoI Church	Newcastle Middle Td	9.4 9.6 9.15
BH 47	13-29	n/a	c. 1950 petrol pumps/ kiosk	Newcastle Middle Td	9.4 9.6 9.15
BH 48	13-30	n/a	Early 17th century house	Newcastle Middle Td	9.4 9.6 9.15
BH 49	13-31	16310014	T-plan, church, dated 1790	Newcastle Middle Td	9.4 9.6 9.15
BH 50	13-09	16401901	Hospital built in 1894 for the treatment of 'consumption'	Killadreenan Td	9.4 9.5
BH 51	13-10	n/a	Part of hospital BH 50	Killadreenan Td	9.4 9.5
BH 52	13-38	16401912	Small, two-storey building dated 1850-1860	Blackditch Td	9.4 9.6
BH 53	13-32	16310015	Small, three-bay cottage of c. 1830.	Newcastle Middle Td	9.4 9.6 9.15
BH 54	13-03	16307009	Small, three-bay, First Fruits church.	Mount Kennedy Demesne Td	9.4 9.5 9.14
BH 55	13-43	16307010	Early-19th century house	Season Park Td	9.4 9.5 9.14
BH 56	13-44	n/a	Early-19th century house	Season Park Td	9.4 9.5

BH No	RPS	NIAH	Name/type	Townland	Figure ref
					9.14
BH 57	13-04	n/a	National school dating from the 19th century.	Mount Kennedy Demesne Td	9.4 9.5 9.14
BH 58	13-02	n/a	Two-storey house.	Kilmacullagh Td	9.4 9.5 9.14
BH 59	13-01	16307011	Early-19th century house.	Kilmacullagh Td	9.4 9.5 9.14
BH 60	13-39	16307001	Late-19th century, gothic-revival church.	Newtownmountkenedy Td	9.4 9.5 9.14
BH 61	13-40	n/a	House	Newtownmountkenedy Td	9.4 9.5 9.14
BH 62	13-41	n/a	Early-19th century house	Newtownmountkenedy Td	9.4 9.5 9.14
BH 63	13-05	n/a	Early-19th century house	Newtown Mount Kennedy Td	9.4 9.5 9.14
BH 64	13-11	n/a	Ruins of a two-storey mill building	Kilmacullagh Td	9.4 9.5 9.14
BH 65	13-42	16307002	Early-19th century house	Newtownmountkenedy Td	9.4 9.5 9.14
BH 66	13-33	16310012	Early-19th century house	Newcastle Middle Td	9.4 9.6 9.14
BH 67	13-34	n/a	Early-19th century glebe house	Newcastle Middle Td	9.4 9.6 9.15
BH 68	19-13	n/a	Water pump	Kiltimon Td	9.4 9.5 9.6
BH 69	13-18	n/a	National School c. 1950.	Knockroe Td	9.3
BH 70	03-36	n/a	An elaborate thatched house	Cookstown Td	9.2
BH 71	07-03	16400710	Hexagonal post box with the monogram VR dated 1865-1875	Carrigoona Commons East Td	9.2

BH No	RPS	NIAH	Name/type	Townland	Figure ref
BH 72	13-16	n/a	Country house and water gardens.	Kilquade Td	9.3
BH 73	19-10	16401905	Mid-19th century, Italianate house.	Dunran Demesne Td	9.4 9.5 9.6
BH 74	07-09	16400708	Catholic church, c. 1800.	Kilmacanoge Td	9.2
BH 75	19-11	16401904	Late-medieval tower house	Dunran Demesne Td	9.4 9.5 9.6
BH 76	03-34	n/a	Early, gothic-revival house of c. 1810.	Fassaroe Td	9.2
BH 77	13-23	16401911	Early-19th century house	Newcastle Lower Td	9.4
BH 78	12-05	16401307	Early-19th century house	Tinnapark Demesne	9.3
BH 79	1782	60260119	Abingdon House	Shanganagh	9.1 9.8
BH 80	1776	60260127	Mill House	Shanganagh	9.1 9.8
BH 81	1729	60260220	Barrington Tower Former Folly only	Brenanstown	9.1 9.7
BH 82	1791	60260094	Mullinastill House	Shankill,	9.1
BH 83	1787	60260095	Glebe House Rectory (former)	Shankill,	9.1
BH 84	1788	60260096	Cherrywood House	Cherrywood	9.1
BH 85	1789	n/a	Parc na Silla House	Shanganagh	9.1
BH 86	1868	60260083	Cuilin	Old Connaught	9.1 9.10
BH 87	1786	60260105	Saint Rita's	Shanganagh	9.1 9.8
BH 88	1785	60260123	Barn Close	Shanganagh	9.1 9.8
BH 89	1832	60260029	Orange Lodge	Kilternan	9.1
BH 90	1784	60260124	Beechlands	Shanganagh	9.1 9.8
BH 91	1781	60260126	Florencevill (Millfield)	Shanganagh	9.1 9.8
BH 92	1795	60260107	Saint Brendan's	Shanganagh	9.1 9.8
BH 93	1799	n/a	Rathmichael Parish Primary School	Shankill	9.1 9.8

BH No	RPS	NIAH	Name/type	Townland	Figure ref
BH 94	1816	n/a	Wayside (formerly Clontra Lodge) House (Note: Gates also Protected Structure)	Shanganagh	9.1 9.8
BH 95	1811	60260138	Clontra House, Glass House, Out Offices, Yard and Railings	Shanganagh	9.1 9.8
BH 96	1803	60260130	Thomond	Shanganagh	9.1 9.8
BH 97	1864	n/a	Old Conna Village Old Conna Stables and Out Offices/ Houses	Old Connaught	9.1
BH 98	1797	60260129	Eaton Brae Lodge Gate Lodge (Note: House also Protected Structure)	Shanganagh	9.1 9.8
BH 99	1845	n/a	Shanganagh Castle House, Castle and Gate Lodge	Shanganagh	9.1 9.9
BH 100	1794	60260128	Eaton Brae House (Note: Gate Lodge also Protected Structure)	Shanganagh	9.1 9.8
BH 101	1780	n/a	Corn Kiln	Shanganagh	9.1 9.8
BH 102	1800	60260113	Saint Anne's	Shanganagh	9.1 9.8
BH 103	1779	n/a	Millpond	Shanganagh	9.1 9.8
BH 104	1778	n/a	Mill 1847 Mill	Shanganagh	9.1 9.8
BH 105	1801	60260122	Beechfield Manor Nursing Home	Shanganagh	9.1 9.8
BH 106	1810	60260117	Carnegie Library	Shankill	9.1 9.8
BH 107	1847	60260065	Ellerslie	Shankill	9.1 9.9
BH 108	1844	60260064	Cornerstown House	Shankill	9.1 9.9
BH 109	1770	60260098	Waterfall Cottage Thatched Dwelling	Loughlinstown	9.1
BH 110	1837	60260137	Aubrey House	Shanganagh	9.1 9.9
BH 111	1836	n/a	Locksley	Shanganagh	9.1
BH 112	1834	60260143	Rosedale House	Shanganagh	9.1
BH 113	n/a	60260144	Rosedale House gate lodge	Shanganagh	9.1
BH 114	1860	60260170	Askefield House	Aske	9.1

BH No	RPS	NIAH	Name/type	Townland	Figure ref
					9.9
BH 115	1805	60260114	Saint Anne's	Shanganagh	9.1 9.8
BH 116	1863	60260154	Saint James's Church (Original Building) (Note: Railings and Gates also Protected Structures)	Little Cork	9.1 9.9
BH 117	1862	60260168	Beauchamp House	Little Cork	9.1 9.9
BH 118	1869	60260155	Corke Lodge & The Coach House House and Out Offices/ Dwellings	Little Cork	9.1 9.10
BH 119	1871	60260160	Woodbrook Front Lodge Gate Lodge (Note: Side Lodge, Entrance Gates and Railings also Protected Structures)	Cork Great	9.1 9.10
BH 120	1874	60260162	Woodbrook Side Lodge Gate Lodge (Note: Front Lodge, Entrance Gates and Railings also Protected Structures)	Cork Great	9.1 9.10
BH 121	1873	60260164	Wilford	Old Connaught	9.1 9.10
BH 122	1885	60280001	Thornhill (Saint Gerard's School) House (in School Complex) (Note: Original Entrance Railings, Piers and Gates also Protected Structures)	Old Connaught	9.2
BH 123	1882	60260079	Graigueconna	Old Connaught	9.1 9.10
BH 124	1881	60260078	Old Bawn	Old Connaught	9.1 9.10
BH 125	1875	60260073	Old Connaght House	Old Connaught	9.1 9.10
BH 126	1884	60260086	Ballyman House	Old Connaught	9.1 9.2
BH 127	1867	60260080	Aravon School	Ballyman	9.1
BH 128	1850	60260145	Crinken Cottage (former Gate Lodge to Shanganagh Castle)	Old Connaught	9.1 9.9
BH 129	1796	60260093	Ardvarna House	Shanganagh	9.1
BH 130	1730	60260217	Glendruid Entrance Gates (Note: House also Protected Structure)	Brenanstown	9.1 9.7

BH No	RPS	NIAH	Name/type	Townland	Figure ref
BH 131	1816	60260140	Wayside (formerly Clontra Lodge) Gate (Note: Gate Lodge also Protected Structure)	Shanganagh	9.1 9.8
BH 132	1814	60260045	No's 1- 3 Ballycorus Cottages Former Smelting Workers Cottages	Ballycorus	9.1
BH 133	1812	60260046	Ledville Lead Mine Complex-House	Ballycorus	9.1
BH 134	1885	60260085	Thornhill (Saint Gerard's School) Original Entrance Railings, Pier & Gates (Note House (in School Complex) also Protected Structure)	Old Connaught	9.1 9.2
BH 135	1743	60260232	Station House (Former Carrickmines Railway Station) Railway Station (former) House	Brenanstown	9.1 9.7
BH 136	1883	60260089	Knocklinn Entrance Walls and gate lodge (Note: House and Outbuildings also Protected Structures)	Ballyman	9.1 9.2
BH 137	1852	n/a	Ballycorus Chimney and Flue Smelting Work, Chimney and Flue	Ballycorus	9.1
BH 138	1746	60260234	Priorsland House, Out Offices and Gates	Brenanstown	9.1 9.7
BH 139	1863	n/a	Saint James's Church Railings and Gates (Note: Church (Original Building also Protected Structure)	Little Cork	9.1 9.9
BH 140	1715	60260212	Brenanstown House and Out Offices	Brenanstown	9.1 9.7
BH 141	1841	n/a	Ballycorus Flue Smelting Work, Chimney and Flue	Ballycorus	9.1
BH 142	1876	60260075	Palermo Former Entrance Walls & Piers, Walled Garden at Fesina Lente	Old Connaught	9.1 9.10
BH 143	1772	60260118	Shanganagh Bridge (Over River) Bridge over Loughlinstown River	Loughlinstown	9.1 9.8
BH 144	1864	n/a	Old Conna Village Wall, Arch Way, Entrance	Old Connaught	9.1
BH 145	1804	60260060	Rathmichael Church (Note: Boundary Walls and Gate also Protected Structures)	Shankill	9.1
BH 146	1858	n/a	Shanganagh Marble and Stone Centre (formerly	Aske	9.1

BH No	RPS	NIAH	Name/type	Townland	Figure ref
			Hackett Memorial Hall Railings and Gates and Granite Milestone (Note: Hall (former) also Protected Structure)		9.9
BH 147	1835	n/a	Ferndale House and Out Offices	Shankill	9.1 9.9
BH 148	1871	60260161	Woodbrook House Lodge Entrance Gates & Railings (Note: Gate Lodges (2) also Protected Structures)	Cork Great	9.1 9.10
BH 149	1792	60260120	Shanganagh Park House	Shanganagh	9.1 9.8
BH 150	1843	60260057	Shankill Castle House, Castle and Out Offices	Shankill	9.1 9.9
BH 151	1829	60260059	Shankill House	Shankill	9.1
BH 152	1818	n/a	Graveyard	Rathmichael	9.1 9.16
BH 153	1804	n/a	Rathmichael Church Boundary Wall & Gates (Note: Church also Protected Structure)	Shankill	9.1
BH 154	1783	60260097	Viaduct	Shankill	9.1
BH 155	1842	60260037	Kiltiernan Grange or The Grange House and Lodge	Kingston	9.1
BH 156	1866	60260165	The Aske House and Lodge	Aske	9.1 9.10
BH 157	1886	60280004	Vallambrosa House, Pavilion and Out Offices	Old Connaght	9.2
BH 158	1883	60260088	Knocklinn House and Outbuildings (Note: Entrance Walls also Protected Structures)	Ballyman	9.1 9.2
BH 159	1879	60260090	Jubilee Hall (Spanish School)	Ballyman	9.1
BH 160	1849	60260050	Lead Mine Complex- House. Ballycorus Shot Manufactory	Ballycorus,	9.1
BH 161	1870	60260157	Woodbrook House House and Out Offices, Folly	Cork Great	9.1 9.10
BH 162	1846	60260051	Ballychorus House	Ballycorus,	9.1
BH 163	1773	n/a	Ford in Shanganagh River	Shanganagh River	9.1 9.8
BH 164	1838	60260135	Plaque (Opposite Shankill Post Office)	Shanganagh River	9.1 9.9

BH No	RPS	NIAH	Name/type	Townland	Figure ref
BH 165	1830	60260031	Old Post Office	Kilternan	9.1
BH 166	1880	n/a	Graveyard	Old Connaght	9.1 9.10
BH 167	1848	n/a	Mine Hill Cottages Lead Mine Complex	Ballycorus	9.1
BH 168	1858	60260173	Shanganagh Marble and Stone Centre (formerly Hackett Memorial Hall) Hall (former) (Note: Railings and Gates and Granite Milestone also Protected Structures)	Aske	9.1 9.9
BH 169	1831	60260063	Sylan Mount	Shankill	9.1
BH 170	1815	60260062	Chantilly	Shankill	9.1
BH 171	1833	n/a	Settlement	Rathmichael	9.1
BH 172	1877	60260055	Phrompstown House	Phrompstown	9.1
BH 173	1872	60260056	Doctor Nathaniel Alcock Memorial Plaque	Shankill	9.1
BH 174	1730	60260215	Glendruid House (Note: Entrance gates also Protected Structure)	Brenanstown	9.1 9.7
BH 175	1683	60260236	Cabinteely House	Brenanstown	9.1 9.7
BH 176	1682	60260244	Cabinteely Library	Loughlinstown	9.1 9.7
BH 177	1769	n/a	Cross	Laughanstown	9.1 9.17
BH 178	1820	n/a	Round Tower	Rathmichael	9.1 9.16
BH 179	1806	60260044	Kingston Grove	Glenamuck South	9.1
BH 180	1808	60260043	Lonsdale House	Glenamuck South	9.1
BH 181	n/a	60260047	Ballycorus Lead Works gates railings walls	Ballycorus	9.1
BH 182	n/a	16401301	Ballygannon Farm	Ballygannon (Ba. N. By.)	9.3
BH 183	n/a	16401305	Druids Glen Golf Club	Woodstock Demesne	9.3 9.4
BH 184	n/a	16302056	The Old Rectory	Cookstown	9.2
BH 185	n/a	16401314	Altidore Castle	Altidore Demesne	9.3
BH 186	n/a	16401902	Mount John House	Mountjohn	9.4 9.5 9.6
BH 187	n/a	16401903	Mount John House	Mountjohn	9.4

BH No	RPS	NIAH	Name/type	Townland	Figure ref
					9.5 9.6
BH 188	n/a	16401909	water pump	Blackditch (Ar. By.)	9.4 9.6
BH 189	n/a	16401910	water pump	Newcastle Upper	9.4
BH 190	n/a	16400705	Kilcronee House (Dublin Oak Academy)	Kilcronee	9.2
BH 191	n/a	16400709	Glencormick House	Kilmacanoge North	9.2
BH 192	n/a	16400714	Charleville House	Charleville Demesne	9.2
BH 193	n/a	16307003	house	Newtown Mt. Kennedy	9.4 9.5 9.14
BH 194	n/a	16307004	house	Kilmacullagh	9.4 9.5 9.14
BH 195	n/a	16400722	monument	Wingfield	9.2
BH 196	n/a	16307005	Springmount House	Kilmacullagh	9.4 9.5 9.14
BH 197	n/a	16307007	house	Newtown Mt. Kennedy	9.4 9.5 9.14
BH 198	n/a	16307008	Affordable Splendour	Mount Kennedy Demesne	9.4 9.5 9.14
BH 199	n/a	16310002	worker's house	Newcastle Middle	9.4 9.6 9.15
BH 200	n/a	16310003	Riverdale Cottage	Newcastle Middle	9.4 9.6 9.15
BH 201	n/a	16310004	worker's house	Newcastle Middle	9.4 9.6 9.15
BH 202	n/a	16310005	worker's house	Newcastle Middle	9.4 9.6 9.15
BH 203	n/a	16310006	worker's house	Newcastle Middle	9.4 9.6 9.15
BH 204	n/a	16310007	worker's house	Newcastle Middle	9.4

BH No	RPS	NIAH	Name/type	Townland	Figure ref
					9.6 9.15
BH 205	n/a	16310008	worker's house	Newcastle Middle	9.4 9.6 9.15
BH 206	n/a	16310009	worker's house	Newcastle Middle	9.4 9.6 9.15
BH 207	n/a	16310010	water pump	Newcastle Lower	9.4 9.6 9.15
BH 208	n/a	16310011	house	Newcastle Lower	9.4 9.6 9.15
BH 209	n/a	16310016	Oldfort House	Newcastle Middle	9.4 9.6 9.15
BH 210	n/a	16310017	Newcastle House	Newcastle Upper	9.4 9.6 9.15
BH 211	n/a	16310018	Lodge	Newcastle Upper	9.4 9.6 9.15
BH 212	n/a	16401317	Drummin Lodge	Drummin East	9.3
BH 213	n/a	16400814	Hollybrook House	Hollybrook	9.2
BH 214	n/a	16400818	Kilruddery House	Kilruddery Demesne West	9.2
BH 215	n/a	60260243	Saint Brigid's Catholic Church	Brenanstown	9.1 9.7
BH 216	n/a	60260242	Saint Brigid's Catholic Church	Cabinteeley	9.1 9.7
BH 217	n/a	60260241	House	Cabinteeley	9.1 9.7
BH 218	n/a	60260240	House	Cabinteeley	9.1 9.7
BH 219	n/a	60260246	Cabinteeley Garda Siochána Station	Brenanstown	9.1 9.7
BH 220	n/a	60260214	Brenanstown House gates, railings, walls	Brenanstown	9.1 9.7
BH 221	n/a	60260213	Brenanstown House gate lodge	Brenanstown	9.1 9.7

BH No	RPS	NIAH	Name/type	Townland	Figure ref
BH 222	n/a	60260245	Cabinteely Motors	Loughlinstown	9.1 9.7
BH 223	n/a	60260237	Cabinteely House stables	Cabinteely	9.1 9.7
BH 224	n/a	60260225	Coolgreen	Brenanstown	9.1 9.7
BH 225	n/a	60260227	Ingleside	Brenanstown	9.1 9.7
BH 226	n/a	60260231	Tullybeg	Brenanstown	9.1 9.7
BH 227	n/a	60260230	Hillside	Brenanstown	9.1 9.7
BH 228	n/a	60260207	post-box	Kerrymount	9.1 9.7
BH 229	n/a	60260184	Mountsandel	Kerrymount	9.1 9.7
BH 230	n/a	60260035	Kiltiernan Bridge	Kingston	9.1
BH 231	n/a	60260030	water pump	Kiltiernan	9.1
BH 232	n/a	60260038	Kiltiernan Grange gate lodge	Kingston	9.1
BH 233	n/a	60260028	Springfield gates, railings, walls	Ballybetagh	9.1
BH 234	n/a	60260048	Wall	Ballycorus	9.1
BH 235	n/a	60260052	Rusheen	Ballycorus	9.1
BH 236	n/a	60260053	Ballycorus Grange	Ballycorus	9.1
BH 237	n/a	60260049	chimney	Ballycorus	9.1
BH 238	n/a	60260054	Scalp Farm	Annaghaskin	9.1
BH 239	n/a	60280006	The Ochra	Old Connaught	9.2
BH 240	n/a	60280007	The Ochra gate lodge	Old Connaught	9.2
BH 241	n/a	60280005	Vallombrosa gate lodge	Old Connaught	9.2
BH 242	n/a	60280002	Thornhill chapel	Old Connaught	9.2
BH 243	n/a	60280003	Glenfield	Ballyman	9.2
BH 244	n/a	60260076	post box	Old Connaught	9.1 9.10
BH 245	n/a	60260077	worker's house	Old Connaught	9.1 9.10
BH 246	n/a	60260074	Old Connaught House	Old Connaught	9.1 9.10
BH 247	n/a	60260087	Ballyman House	Ballyman	9.1 9.2

BH No	RPS	NIAH	Name/type	Townland	Figure ref
BH 248	n/a	60260233	Carrickmines Railway Station water tower	Brenanstown	9.1 9.7
BH 249	n/a	60260228	water pump	Carrickmines Little	9.1 9.7
BH 250	n/a	60260219	mausoleum	Brenanstown	9.1 9.7
BH 251	n/a	60260221	water pump	Brenanstown	9.1 9.7
BH 252	n/a	60260218	post box	Brenanstown	9.1 9.7
BH 253	n/a	60260216	Glendruid gate lodge	Brenanstown	9.1 9.7
BH 254	n/a	60260102	post box	Loughlinstown Commons	9.1
BH 255	n/a	60260100	Saint Columcille's Hospital convent/nunnery	Shanganagh	9.1
BH 256	n/a	60260101	Saint Columcille's Hospital church	Shanganagh	9.1
BH 257	n/a	60260099	Saint Columcille's Hospital workhouse admin block	Shanganagh	9.1
BH 258	n/a	60260091	Falmore	Shankill	9.1 9.8
BH 259	n/a	60260092	Rathbeg	Shankill	9.1 9.8
BH 260	n/a	60260116	bridge	Shankill	9.1 9.8
BH 261	n/a	60260115	Rivendell	Shanganagh	9.1 9.8
BH 262	n/a	60260121	Shanganagh Park gate lodge	Shanganagh	9.1 9.8
BH 263	n/a	60260131	Lisnalurg	Shanganagh	9.1 9.8
BH 264	n/a	60260133	Dorney Court gates railings	Shanganagh	9.1 9.8
BH 265	n/a	60260132	Dorney Court gate lodge	Shanganagh	9.1 9.8
BH 266	n/a	60260134	Cluain-na-Greine	Shanganagh	9.1
BH 267	n/a	60260136	post box	Shanganagh	9.1
BH 268	n/a	60260139	Clontra conservatory	Shanganagh	9.1 9.8
BH 269	n/a	60260142	Locksley gate lodge	Shanganagh	9.1

BH No	RPS	NIAH	Name/type	Townland	Figure ref
BH 270	n/a	60260152	Sherrington	Shanganagh	9.1 9.9
BH 271	n/a	60260148	Shanganagh Castle gate lodge	Shanganagh	9.1 9.9
BH 272	n/a	60260153	Sherrington gates railings wall	Shanganagh	9.1 9.9
BH 273	n/a	60260151	Crinken House gates/railings/wall	Shanganagh	9.1 9.9
BH 274	n/a	60260149	gates/railings/walls	Little Cork	9.1 9.9
BH 275	n/a	60260150	Crinken House	Shanganagh	9.1 9.9
BH 276	n/a	60260175	The Orchard	Aske	9.1 9.9
BH 277	n/a	60260172	milestone/milepost	Aske	9.1 9.9
BH 278	n/a	60260171	Askefield House gate lodge	Aske	9.1 9.9
BH 279	n/a	60260169	Beauchamp gate lodge	Aske	9.1 9.10
BH 280	n/a	60260167	The Ask gates railings walls	Aske	9.1 9.10
BH 281	n/a	60260166	The Aske gate lodge	Aske	9.1 9.10
BH 282	n/a	60260156	Corke Lodge stables	Little Cork	9.1 9.10
BH 283	n/a	60260159	Woodbrook clubhouse	Cork Great	9.1 9.10
BH 284	n/a	60260158	Woodbrook walled garden	Cork Great	9.1 9.10
BH 285	n/a	60260163	post box	Little Bray	9.1 9.10
BH 286	n/a	60260084	Cuilin gates railings walls	Old Connaught	9.1 9.10
BH 287	n/a	60260082	Old Conna Hill gates railings walls	Old Connaught	9.1 9.9
BH 288	n/a	60260066	Ballybride Cottage	Shankill	9.1 9.9
BH 289	n/a	60260071	Lordello gates railings and walls	Shankill	9.1 9.9
BH 290	n/a	60260070	Lordello gate lodge	Shankill	9.1

BH No	RPS	NIAH	Name/type	Townland	Figure ref
					9.9
BH 291	n/a	60260061	rectory/glebe/vicarage/curate's house	Shankill	9.1
BH 292	n/a	60260068	Emerald	Shankill	9.1
BH 293	n/a	60260067	Woodford	Shankill	9.1
BH 294	n/a	60260042	Dingle House	Tiknick	9.1

Architectural Conservation Areas within the study area

ACA No	Name	County	Figure ref
ACA 1	Enniskerry	Wicklow	9.2 9.12
ACA 2	Greystones Harbour	Wicklow	9.2 9.3
ACA 3	Greystones Burnaby	Wicklow	9.3
ACA 4	Greystones Church Road	Wicklow	9.3
ACA 5	Greystones Blacklion	Wicklow	9.3
ACA 6	Delgany	Wicklow	9.3 9.13

Appendix B9.4

Designed landscapes within the study area

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
DL 1	Cabinteeley House	DU-50-O-226249	Main features substantially present - some loss of integrity. North western half of site covered by residential development. Gate lodge visible at north eastern entrance. Approximately half of the parkland remains. Small area of mature planting visible near the house. River flows through the parkland.	BH 175	9.1 9.7
DL 2	Marlfield House	DU-50-O-234254	Main features unrecognisable - peripheral features visible. Much of site covered by residential development. Area of mature planting visible to the east of the principal building.	Not on RPS	9.1 9.7
DL 3	Brenanstown House	DU-50-O-231244	Main features substantially present - peripheral features unrecognisable. Much of the parkland area is covered by residential development. Gate lodge visible. Mature planting visible near the principal building.	BH 139	9.1 9.7
DL 4	Meredith Lodge	n/a	No discernible features survive.	Not on RPS	9.1 9.7
DL 5	Rockville House	DU-50-O-207225	Main features unrecognisable - peripheral features visible. Degraded, now mainly arable with only hedgerow trees remaining. Small area of mature planting visible near the house.	Not on RPS	9.1
DL 6	Loughlinstown House	DU-50-O-246234	Main features substantially present - peripheral features unrecognisable. Housing development in areas to the north west and south east of the principal building. Drive	Yes, but outside of Study Area	9.1 9.8

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
			or walk through the woodland on the southern boundary. Mature planting visible near the principal building. Boundary visible, but now contains buildings. River borders site.		
DL 7	New Brighton	n/a	Dense planting around the house survives	BH 92	9.1 9.8
DL 8	Home	n/a	No discernible features survive	Not on RPS	9.1 9.8
DL 9	Air Hill	n/a	Limited features survive. Large modern house now within the demesne	BH 87	9.1 9.8
DL 10	Shanganagh House	DU-50-O-256225	Virtually no recognisable features. Much of the site is covered by residential development. Small areas remain as greenspaces amongst the housing.	BH 149	9.1 9.8
DL 11	Old Abington	n/a	Boundary at the south survives, most of the demesne is now occupied by modern housing	BH 79	9.1 9.8
DL 12	Cherrywood House	n/a	Some features survive including woodland.	BH 84	9.1
DL 13	Kingston Lodge	DU-50-O-213213	Main features unrecognisable - peripheral features visible. Farming units built around house and second dwelling built in southern half of parkland. Gate lodge visible. Now appears to be in split ownership with second dwelling built in the southern portion.	BH 155	9.1
DL 14	Springfird House	DU-50-O-213204	Main features unrecognisable - peripheral features visible. Parkland and half of woodland area covered by golf course.	Yes, but outside of Study Area	9.1
DL 15	Carrickmines	n/a	No discernible features survive	Not on RPS	9.1 9.7

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
DL 16	Shanganagh Castle	DU-50-O-256212	Main features substantially present - some loss of integrity. Area of kitchen garden and woodland to the north of the principal building covered by residential development. Driveway extended to the south new entrance created. Tree cover reduced. Bordered by the sea.	BH 99	9.1 9.9
DL 17	Sherrington	n/a	No discernible features survive	Not on RPS	9.1 9.9
DL 18	Crinken	n/a	No discernible features survive	BH 275-NIAH Structure	9.1 9.9
DL 19	Ballybridge Cottage	n/a	Some elements survive including areas of dense planting and small woodland	BH 108	9.1 9.9
DL 20	Ellenstie	n/a	Demesne now an agricultural field	BH 207	9.1 9.9
DL 21	Chantilly	n/a	Modern housing now located across the demesne	BH 170	9.1
DL 22	Silvermount	n/a	Modern housing now located across the demesne	BH 169	9.1 9.9
DL 23	Shankill House	DU-50-O-241216	Main features unrecognisable - peripheral features visible. Northern area of parkland under development into large residential properties. Small area of mature planting visible near the house.	BH 151 and 147	9.1 9.9
DL 24	Woodbrook	DU-50-O-260200	Main features substantially present - some loss of integrity. Modern buildings and a carpark have been sited alongside the core landscape. A road not shown on the 1836 - 1846 OS map has been constructed on this site. Many parkland trees	BH 161 and 284	9.1 9.2 9.10

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
			shown on the 1836 - 1846 OS map have been removed or have not been replaced.		
DL 25	Beauchamp	DU-50-O-253206	Main features substantially present - peripheral features unrecognisable. Half of parkland covered by housing development. Gate lodge visible.	BH 117	9.1 9.9 9.10
DL 26	Oak Lawn	DU-50-O-254202	Main features substantially present - some loss of integrity. Gate lodge visible. Small area of mature planting visible near the house. Enclosure visible.	BH 156	9.1 9.10
DL 27	Old Connaught House	DU-56-O-247195	Main features substantially present - peripheral features unrecognisable. Housing in south western area of site. Degraded, now mainly arable with only hedgerow trees remaining.	BH 124	9.1 9.10
DL 28	Ballyman House	DU-56-O-235189	Main features unrecognisable - peripheral features visible. Farming units built around house. Mature planting visible near the principal building	BH 126	9.1 9.2
DL 29	Sea View	n/a	Demesne now an agricultural field	BH 158	9.1 9.2
DL 30	Jubilee Hall	DU-56-O-243193	Main features unrecognisable - peripheral features visible. Gate visible on southern entrance. Enclosure visible not in use.	BH 159	9.1 9.2
DL 31	Mount Eden	DU-50-O-243203	Main features unrecognisable - peripheral features visible. Degraded, now a golf course.	BH 127	9.1 9.9 9.10

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
DL 32	Spring Mount	DU-50-O-246206	Main features substantially present - peripheral features unrecognisable. Gate lodge visible.	Not on RPS	9.1 9.9
DL 33	Shankill	n/a	Demesne now an agricultural field, boundaries visible	Not on RPS	9.1 9.9
DL 34	Shankill Castle	DU-50-O-242213	Virtually no recognisable features	BH 149	9.1 9.9
DL 35	Thorn Hill	DU-56-O-246186	Main features unrecognisable - peripheral features visible. Housing in walled garden, tennis courts and other pitches around the principal building. Area reduced inclusion of sports pitches. Enclosure visible, contains three houses and gardens.	BH 122	9.1 9.2 9.10
DL 36	Palermo	DU-56-O-252192	Virtually no recognisable features. Much of the site is covered by residential development with just the central area of parkland remaining as greenspace between the housing. Eastern shelterbelt remains as greenspace amongst the housing. Small area remains as greenspace amongst the housing.	Not on RPS	9.1 9.2 9.10 9.11
DL 37	Ravenswell House	DU-50-O-262191	Main features unrecognisable - peripheral features visible. A golf course has been constructed on part of this site.	Not on RPS	9.1 9.2 9.10 9.11
DL 38	Bray Lodge	n/a	Modern housing now located across the demesne	Not on RPS	9.1 9.2 9.10 9.11
DL 39	Tinnehinch House	WI-56-O-221163	Main features unrecognisable - peripheral features visible. A river flows alongside this site.	Not on RPS	9.2

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
DL 40	Ballyvorney	WI-56-O-221153	Main features unrecognisable - peripheral features visible. Few features of the structural footprint of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography	BH 23	9.2
DL 41	Bushy Park	WI-56-O-225157	Main features substantially present - peripheral features unrecognisable. A building not shown on the 1836 - 1846 OS map has been constructed in the walled garden.	BH 39	9.2
DL 42	Newtown Cottage	n/a	Modern housing now located across the demesne	Not on RPS	9.2
DL 43	Tinnapark Demesne	WI-56-O-258081	Main features unrecognisable - peripheral features visible. Much of the core landscape is now used for plant production. Elements of the structural footprint of the designed landscape are visible in aerial photography but features are badly degraded.	BH 78	9.3 9.4
DL 44	Tooman House	WI-56-O-257094	Main features unrecognisable - peripheral features visible. Elements of the structural footprint of the designed landscape shown on the 1836 - 1846 OS map are visible but the core landscape has undergone some changes and is unrecognisable.	Not on RPS	9.3
DL 45	Holywell House	WI-56-O-264091	Main features unrecognisable - peripheral features visible. Few features of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography.	Not on RPS	9.3

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
DL 46	Mt Kennedy Demesne	WI-56-O-263072	Main features substantially present - peripheral features unrecognisable. A road visible on the 1836 - 1846 OS map which passes through the site has been expanded into dual carriageway. Elements of the structural footprint of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography but the removal of areas of structural woodland has resulted in a loss of coherency.	BH 42	9.3 9.4 9.5 9.14
DL 47	Glendarragh	WI-56-O-243072	Main features unrecognisable - peripheral features visible	Not on RPS	9.3 9.5
DL 48	East Hill	WI-56-O-252068	Main features substantially present - peripheral features unrecognisable. Many of the features of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography. Many of the features of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography.	Not on RPS	9.3 9.5
DL 49	Monalin House	WI-56-O-257056	Main features substantially present - peripheral features unrecognisable. Most of the structural woodland shown on the 1836 - 1846 OS map is visible in aerial photography.	BH 41	9.4 9.5 9.14
DL 50	Kiltimon	WI-56-O-276024	Main features unrecognisable - peripheral features visible	BH 73	9.4 9.5 9.6
DL 51	St John House	n/a	Boundaries and some demesne features survive	NIAH Structure BH 186	9.4 9.5 9.6

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
DL 52	Prospect House	WI-56-O-266036	Main features substantially present - peripheral features unrecognisable	Not on RPS	9.4 9.5 9.6
DL 53	Killoughter	n/a	Boundaries and some demesne features survive	BH 21	9.6
DL 54	Grange	WI-56-O-298003	Main features unrecognisable - peripheral features visible.	Not on RPS	9.6
DL 55	Kilmartin	WI-56-O-285015	Main features substantially present - peripheral features unrecognisable. Some screening woodland has been lost in parts of this site. Modern agricultural buildings have been built in the core landscape.	Not on RPS	9.4 9.5 9.6
DL 56	Sweet Bank	WI-56-O-293017	Main features unrecognisable - peripheral features visible. Elements of the core landscape shown on the 1836 - 1846 OS map are visible in aerial photography but the peripheral landscape is largely indistinguishable from surrounding farmland.	Not on RPS	9.4 9.6
DL 57	Leamore	n/a	Some boundary features survive	Not on RPS	9.4 9.6 9.15
DL 58	Woodstock House	WI-56-O-287066	Main features unrecognisable - peripheral features visible. A golf course has been constructed on this site.	BH 10	9.3 9.4
DL 59	Kilquade House	WI-56-O-284076	Main features substantially present - no loss of integrity. Structural woodland has been increased. The structural footprint of the designed landscape shown on the 1836 - 1846 OS map is visible in	BH 28	9.3 9.4

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
			aerial photography and is largely unchanged. The enhancement of structural woodland is the most noticeable of the changes that have occurred.		
DL 60	Spring Farm	WI-56-O-284085	Main features substantially present - peripheral features unrecognisable. A river runs around the edge of the enclosed parkland	BH 72	9.3
DL 61	Birchville	WI-56-O-283085	Virtually no recognisable features. House have been constructed over much of this site.	Not on RPS	9.3
DL 62	Sea View	WI-56-O-273082	Main features unrecognisable - peripheral features visible. Few features of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography.	Not on RPS	9.3
DL 63	Bromley House	WI-56-O-272086	Main features unrecognisable - peripheral features visible. A road has been constructed across parkland in this site. Much of the structural footprint of the designed landscape shown on the 1836 - 1846 OS map is visible in aerial photography but features are degraded.	BH 38	9.3
DL 64	Downs Lodge	n/a	Some planting survives	Not on RPS	9.3
DL 65	Bellevue Demesne	WI-56-O-266115	Main features unrecognisable - peripheral features visible. Most of the parkland associated with this site has been converted to other uses. Parkland in the north of this site has been converted to arable use. Parkland in the south of this site has been converted into a golf course.	Gate piers BH 1 no principal structure	9.3 9.13

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
DL 66	Mount Pleasant	n/a	Modern housing on most of the demesne	BH 1	9.3 9.13
DL 67	Glenair	n/a	Modern housing on most of the demesne	BH 1	9.3 9.13
DL 68	Kindlestown House	WI-56-O-278123	Virtually no recognisable features. Modern housing has been constructed over this site.	Not on RPS	9.3
DL 69	Belmont	WI-56-O-272141	Main features substantially present - peripheral features unrecognisable. Western entrance and drive shown on the 1836 - 1846 OS map is not visible in aerial photography. The structural footprint of the designed landscape shown on the 1836 - 1846 OS map is largely unchanged. Features in the core landscape are degraded, the orchard walled garden and small lake, shown on the 1836 - 1846 OS map, are not visible in aerial photography possibly due to tree cover.	Not on RPS	9.2
DL 70	Kilruddery	WI-56-O-268163	Main features substantially present - no loss of integrity. Modern housing has been constructed in the northern parkland. A road has been rerouted through the southern parkland, to allow for this a significant section of screening woodland has been removed. The construction of modern housing in the northern parkland has resulted in the isolation of the gate lodge. A number of changes have been made to the structural woodland of the site. Large modern agricultural buildings	BH 29	9.2

DL No	Name	NAIH Ref	Description	Associated house on RPS	Figure ref
			have been constructed in the core landscape and are visible in aerial photography. The northern gate lodge and a section of structural woodland have survived amongst modern housing around 326816, 216742 and indicate the former edge of the demesne.		
DL 71	New Court	WI-56-O-266178	Main features unrecognisable - peripheral features visible. House and factories have been built over much of this site. Few features of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography	BH 2	9.2 9.11
DL 72	Old Court House	WI-56-O-262173	Virtually no recognisable features. Houses have been constructed on this site. Virtually no features of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography.	BH 2	9.2 9.11
DL 73	Ballymorris	WI-56-O-253167	Virtually no recognisable features. Factories have been built on this site	Not on RPS	9.2
DL 74	Springfield	WI-62-S-935638	Main features unrecognisable - peripheral features visible	Not on RPS	9.2
DL 75	Wingfield	WI-56-O-244159	Main features unrecognisable - peripheral features visible. House and a factory have been built on this site. A much larger building occupies the site of the principal building shown on the 1836 - 1846 OS map. Few features of the designed landscape beyond the walled garden and some sections of structural woodland are	BH 8	9.2

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
			recognisable in aerial photography.		
DL 76	Hollybrook	WI-56-O-246159	Main features substantially present - peripheral features unrecognisable. Much of the structural footprint of the designed landscape shown within the historic OS maps are visible in aerial photography but some features are degraded.	BH 13	9.2
DL 77	St Valery	WI-56-O-243174	Main features unrecognisable - peripheral features visible. Large shrubs or saplings are visible in aerial photography in parkland. Demesne has been subject to some development but main house is present along with tree belts.	BH 76	9.2
DL 78	Dargle Cottage	WI-56-O-239169	Main features substantially present - peripheral features unrecognisable. New entrance from the north. Much of the structural footprint of the designed landscape shown on the 1836 - 1846 OS map is visible in aerial photography. Diamond shaped walled garden west of principal building?	Not on RPS	9.2
DL 79	Summerhill	WI-56-O-226172	Virtually no recognisable features. Houses have been built on this site.	NIAH Structure BH 3	9.2 9.12
DL 80	Ballygannon	WI-56-O-307093	Main features substantially present - peripheral features unrecognisable. Although the principal building is a ruin, the structural footprint of the site remains well defined, notably features associated with the principal building.	NIAH BH 182	9.3

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
			There has been little modern development.		
DL 81	Darraghville	WI-56-O-294085	Main features substantially present - peripheral features unrecognisable. Southern entrance and drive have been changed. Screening woodland shown on the 1836 - 1846 OS map has been reduced in density. Two linked walled gardens	BH 18	9.3
DL 82	Ballydonarea House	WI-56-O-306081	Main features unrecognisable - peripheral features visible. Screening woodland in the south of the site has been largely removed.	Not on RPS	9.3
DL 83	Belfield House	WI-56-O-271076	Main features unrecognisable - peripheral features visible. Few features of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography.	BH 33	9.3 9.4
DL 84	Grove House	n/a	Demesne occupied largely by modern housing	Not on RPS	9.2 9.3
DL 85	Trudder House	WI-56-O-266051	Main features unrecognisable - peripheral features visible. Many of the features of the designed landscape shown on the 1836 - 1846 OS map are visible in aerial photography but are degraded. Some modern buildings have been constructed on this site.	Not on RPS	9.4 9.5 9.6
DL 86	Wilfort House	DU-56-O-255198	Main features substantially present - peripheral features unrecognisable. Major road passes through parkland area. Mature planting visible near the principal building.	BH 121	9.1 9.10

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
DL 87	Claremont	DU-50-O-152382	Main features unrecognisable - peripheral features visible. Housing estate built in parkland to the east and along the major road which goes through the south of the parkland. Entrance now closer to the house because of new road. Mature ornamental planting visible.	Not on RPS	9.1 9.8
DL 88	Beechlands	n/a	Significant amount of planting survives to the south of the House	BH 90	9.1 9.8
DL 89	Glencormick	n/a	Main house no longer present and demesne has been subject to a large amount of development, although the gate lodge and several outbuildings survive.	Not on RPS	9.2
DL 90	Kilbride Tower	n/a	The main house remains extent within a small demesne that retains its tree belts and all designed elements, including gate lodge and drive way.	BH 2 (Kilbride Tower)	9.2
DL 91	Violet Hill	n/a	The main house is extant along with mature tree belts, but the demesne has been subject to a large amount of modern development and fragmentation.	BH 2 (Violet Hill)	9.2
DL 92	Riversdale	n/a	Marked within the historic mapping, today nothing survives of the main house and small demesne. The site now contains modern apartment blocks.	Not on RPS	9.2
DL 93	La-Vellee	n/a	Marked within the historic mapping, today nothing survives of the main house and small demesne. The site now contains modern apartment blocks.	Not on RPS	9.2
DL 94	Ardmore	n/a	Whilst the trees within the western part of the	BH 2 (Ardmore)	9.2

DL No	Name	NIAH Ref	Description	Associated house on RPS	Figure ref
			demesne are present, the eastern portion of the demesne has been developed as a film studio around the main house, which remains extant.		
DL 95	Killarney Wood	n/a	The northwest portion of the demesne remains as open ground and retains its woodland. The main house has been converted into a school and the demesne has been impacted upon by residential development,	BH 2 (Brook House)	9.2
DL 96	Vallombrosa	n/a	A small demesne that retains a large amount of mature planting and the main house. The eastern section has been truncated by the existing N11.	BH 157	9.2
DL 97	Kilcronney	n/a	A large demesne not marked on first edition OS map. Today the principal structure survives, along with outbuildings and a gate lodge. Portions of green field and demesne planting also survive although the landscape has been subject to modern scattered development and the eastern edge has been truncated by the N11.	BH 20	9.2

Appendix B12.1

Glen of the Downs Habitat Report



**Habitat Identification & Evaluation for
Glen of the Downs SAC
Delgany,
Co. Wicklow**

prepared for ARUP Consulting Engineers

Project No.	Rev.	Author	Reviewed By	Approved By	Issue Date
180177	I03	CK	AS	AC	02/07/2020

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1 Introduction

Scott Cawley Ltd. were commissioned to undertake the ecological impact assessment of the proposed N11/M11 Junction 4 to Junction 14 Improvement Scheme (hereafter referred to as the N11/ M11 Scheme). As the existing N11 passes through the Glen of the Downs Special Area of Conservation (SAC) a review of available data relating to this SAC was undertaken as part of the options assessment. A key focus of this review was to identify where the Qualifying Interest (QI)¹ habitats occur in this SAC and their extent in relation to the existing N11 road. The Glen of the Downs SAC has one QI habitat, for which the site is designated; Old Sessile Oak Woodlands with *Ilex* and *Blechnum* in the British Isles [91A0], hereafter referred to as 91A0 habitat.

In May 2019, Scott Cawley Ltd. were commissioned by Arup Consulting Engineers to undertake habitat surveys of the Glen of the Downs woodlands. The aim of these surveys was to produce an accurate, up to date, habitat map for the site and to establish the extent of QI 91A0 habitat across the site.

2 Methodology

This section outlines the methodologies employed over the course of the assessment.

2.1 Desktop Study

A review of available data, including any available historical spatial data, was carried out to identify the different habitat types, including any QI habitats, which are known to occur within the boundary of Glen of the Downs SAC. The following sources of information were reviewed:

- NPWS (2013) *Site Synopsis for Glen of the Downs SAC (000719)*²
- NPWS (2018) *Conservation Objectives for Glen of the Downs SAC (000719). Generic Version 6.0*³
- NPWS (2009) *Natura 2000 Standard Data Form for Glen of the Downs SAC (000719)*⁴
- Perrin, P., Martin, J., Barron, S. O'Neill, F, McNutt, K & Delaney, A. (2008) *National Survey of Native Woodlands (NSNW) 2003-2008: Volume 3b: Site reports 508-984*⁵
- Available Habitat Mapping for Glen of the Downs SAC- indicative habitat shapefiles for Glen of the Downs SAC from the early 2000s; provided by Jochen Roller (NPWS) in February 2019, following the submission of an information request to the NPWS
- NPWS Datasets: Habitat GIS datasets available to download from the NPWS website, specifically the following datasets:
 - Ancient and Long-Established Woodland (updated 2012) (Available at: <https://www.npws.ie/maps-and-data/habitat-and-species-data>)

¹ A Qualifying Interest is an Annex I habitat or Annex II species, as detailed in the Habitats Directive (1992), for which European sites (SACs and SPAs) are designated.

² NPWS (2013) *Site Synopsis for Glen of the Downs SAC (000719)*. Available from: <https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000719.pdf> [Accessed 02/12/2019]

³ NPWS (2018) *Conservation Objectives for Glen of the Downs SAC [000719] Generic Version 6.0*. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000719.pdf [Accessed 02/12/2019]

⁴ NPWS (2009) *Natura 2000 Standard Data Form for Glen of the Downs SAC (000719)*. Available from: <https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF000719.pdf> [Accessed: 02/12/2019]

⁵ Perrin, P., Martin, J., Barron, S. O'Neill, F, McNutt, K & Delaney, A. (2008) *National Survey of Native Woodlands (NSNW) 2003-2008: Volume 3b: Site reports 508-984*. Available from: https://www.npws.ie/sites/default/files/publications/pdf/Perrin_et_al_2008_NSNW_V3b.pdf [Accessed 02/12/2019]

- National Survey of Native Woodlands 2003 - 2008 (updated 2012) (Available at: <https://www.npws.ie/maps-and-data/habitat-and-species-data>)
- Article 17 Data for Annex I habitats (Available at: <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17>)
- Ove Arup & Partners Ireland (1990) *N11 Proposed Kilmacanogue to Glen of the Downs Dual Carriageway Environmental Impact Statement (EIS)*⁶

2.2 Habitat Surveys

Habitat surveys of the Glen of the Downs woodland were carried out by Caroline Kelly (BSc.) (MSc.) of Scott Cawley Ltd. and Dr. Rory Hodd (BSc.) (PhD), an independent botanical researcher. Surveys were undertaken on the following dates - 9th, 10th, 16th and 17th May 2019.

A threefold approach to habitat survey was employed, as described below. In brief, this approach consisted of classifying the different habitats present as per *A Guide to Habitats in Ireland* (Fossitt, 2000)⁷; identifying the various different vegetative communities present within each habitat type; and, establishing the extent of QI 91A0 habitat present within the study area. Plant nomenclature follows the Checklist of the Flora of Britain & Ireland (BSBI, 2007)⁸.

A walkover survey of the study area was conducted by Caroline Kelly and Andrew Speer, both of Scott Cawley Ltd., and Orla Daly of Botanical Environmental Consultants Ltd. (BEC), on the 27th May 2020, to review the boundaries of the various different habitat types identified in 2019, with respect to the topographical survey data which had since been produced (surveyed February to March 2020). The habitat classification was also reviewed at this point, particularly in regards to the extent of Annex I habitat present.

2.2.1 Classifying Habitats as per Fossitt (2000)⁷

In classifying the habitats with respect to the habitat types outlined in Fossitt (2000)⁷, the study area in Glen of the Downs was walked and habitats, defined on the basis of their vegetative composition and physical environment/ management, were recorded and mapped. Habitat surveys were conducted in line with the *Best Practice Guidance for Habitat Survey and Mapping* (Smith et al., 2011)⁹. A targeted approach was adopted for relevé surveys. A total number of 16 representative relevés¹⁰ were undertaken in the habitat types identified, to provide sufficient quantitative data to support the habitat classification. Where multiple relevés were undertaken in the same habitat type, these were positioned to capture the variation across the habitat type¹¹. Relevés carried out in woodland habitats were 10m² in area, as per the

⁶ Ove Arup & Partners Ireland (1990) *N11 Proposed Kilmacanogue to Glen of the Downs Dual Carriageway Environmental Impact Statement (EIS)*

⁷ Fossitt, J. (2000) *A Guide to Habitats in Ireland*. The Heritage Council.

⁸ This is the most up to date Botanical Society of Britain and Ireland Checklist that is currently available.

⁹ Smith, G.F., O'Donoghue, P., O'Hara, K. & Delaney, E. (2011) *Best Practice Guidance for Habitat Survey and Mapping*. The Heritage Council.

¹⁰ A relevé is essentially a sampling plot, of a specified size, representative of the habitat type, used to collect data on the habitat present. Data collected includes the vegetative composition of the sampling plot, as well as other environmental parameters including physical features (e.g. soil depth) and management (e.g. presence/ absence of grazing etc).

¹¹ It should be noted that two species of Oak are known to occur in the Glen of the Downs - Sessile Oak *Quercus petraea* and Hybrid Oak *Quercus x rosacea*. Sessile Oak is predominantly found across the site with Hybrid Oak occurring to a lesser extent (see Kelleher et al., 2004). In many of the relevés recorded by Scott Cawley Ltd. in oak woodland in the Glen of the Downs Hybrid Oak was present, but Sessile Oak was more abundant at the overall habitat scale.

methodology employed in the National Survey of Native Woodlands 2003-2008¹². The relevé undertaken in the spring (FP1) habitat covered an area of 4m², as per the relevant monitoring guidelines¹³. This relevé was undertaken in October 2019. The locations of relevés undertaken in May and October 2019 are displayed on **Figure 1**. Relevés GOTD_01 – GOTD_15 are relevés taken in woodland habitats, while relevé GOTD_16 is associated with the calcareous spring (FP1) habitat identified. Results of relevés recorded are provided in Appendix A.

2.2.2 Identifying the Vegetative Communities Present within each Habitat Type

Following on from categorising the various different habitats as per Fossitt (2000)⁷, the different vegetative communities present in each habitat type were identified and mapped. Vegetative community classifications follow those described in the Irish Vegetation Classification (IVC)¹⁴. Different vegetative communities were identified based on the composition and relative abundances of the flora species present.

IVC communities were also assigned to each relevé recorded. This was undertaken by using the ERICA online web application¹⁵ which analysed the data collected in the relevés and used this analysis to assign IVC communities to each individual relevé. A percentage affinity for the IVC community assigned to each relevé was also provided. Results of relevés recorded, including IVC communities assigned by ERICA, are provided in Appendix A.

2.2.3 Defining and Establishing the Extent of 91A0 Habitat

Based on the habitats identified, and the data from the supporting relevés, the extent of QI 91A0 habitat was established and mapped. This extent of QI 91A0 habitat established closely followed the boundary of the corresponding Fossitt (2000)⁷ habitat type and was informed by guidance from Botanical Environmental Consultants Ltd. (BEC) and information contained in *the Interpretation Manual of European Union Habitats [EUR 28]* (European Commission, 2013)¹⁶, *Results of Monitoring Survey of Old Sessile Oak Woods and Alluvial Forests* (O'Neill & Barron, 2013)¹⁷ and *The Status of EU Protected Habitats and Species in Ireland- Habitats Assessments, Volume 2* (NPWS, 2019)¹⁸.

¹² Perrin, P., Martin, J., Barron, S. O'Neill, F., McNutt, K & Delaney, A. (2008) *National Survey of Native Woodlands 2003-2008 Volume 1: Main report*. Available at: <http://www.botanicalevironmental.com/wp-content/uploads/2011/03/Volume-I.pdf> [Accessed 02/12/2019]

¹³ Lyons, M.D. & Kelly, D.L. (2016) *Monitoring Guidelines for the Assessment of Petrifying Springs in Ireland*. Irish Wildlife Manuals, No. 94. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Ireland. Available at: <https://www.npws.ie/sites/default/files/publications/pdf/IWM94.pdf> [Accessed 02/12/2019]

¹⁴ The *Irish Vegetation Classification* (IVC). Available at: <http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/wl1a/> [Accessed 28/05/2019]

¹⁵ ERICA: *Engine for Relevés to Irish Communities Assignment*. Available at: <https://biodiversityireland.shinyapps.io/vegetation-classification/> [Accessed 27/04/2020]

¹⁶ European Commission (2013) *Interpretation Manual of European Union Habitats [28]* April 2013. DG Environment. Available at: https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf [Accessed 06/04/2020]

¹⁷ O'Neill, F.H. & Barron, S.J. (2013) *Results of monitoring survey of old sessile oak woods and alluvial forests*. Irish Wildlife Manuals, No. 71. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Available at: <https://www.npws.ie/sites/default/files/publications/pdf/IWM%2071%20Oak%20and%20alluvial%20woodlands%20monitoring.pdf> [Accessed 02/12/2019]

¹⁸ NPWS (2019). *The Status of EU Protected Species in Ireland. Volume 2: Habitat Assessments*. Available at: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol2_Habitats_Article17.pdf [Accessed 06/04/2020]

According to the *Interpretation Manual of European Union Habitats [EUR 28]* (European Commission, 2013), hereafter referred to as the Interpretation Manual, Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] are defined as “*Acidophilous Quercus petraea* woods, with low, low-branched, trees, with many ferns, mosses, lichens and evergreen bushes”. Two sub-types are described as follows:

- *Irish sessile oak woods* - *Quercus petraea* woods of Ireland, particularly rich in evergreen bushes, including *Arbutus unedo*; and;
- *British sessile oak woods* – *Acidophilous Quercus petraea* woods of western Britain, mostly found in Scotland, Wales, Northern England and South Western England.

Characteristic plant species referenced are limited to the following three species – *Quercus petraea*, *Ilex aquifolium* and *Blechnum* ssp.

- In contrast to this, the results of the national monitoring plan for this woodland habitat (*Results of Monitoring Survey of Old Sessile Oak Woods and Alluvial Forests* (O’Neill & Barron, 2013), hereafter referred to as the monitoring plan, gives a lengthy description of the characteristics of 91A0 woodlands. This document states that woodlands that conform to the Annex I 91A0 habitat, as described in the Interpretation Manual, correspond most strongly to the following three vegetation types, within the *Quercus petraea* – *Luzula sylvatica* group, as described in the National Survey of Native Woodlands (NSNW) report⁵: *Rubus fruticosus* – *Corylus avellana* type;
- *Vaccinium myrtillus* – *Ilex aquifolium* type; and;
- *Luzula sylvatica* – *Dryopteris dilatata* type.

While the Interpretation Manual lists *Quercus petraea* as the only characteristic oak species of this Annex I habitat type, O’Neill & Barron argue that other oak species, particularly Pedunculate Oak *Quercus robur* and *Quercus x rosacea*, should also be considered, given the fact that such species were often planted in Irish sessile oak woods in the past. This approach was adopted in the surveys undertaken by Scott Cawley in the Glen of the Downs.

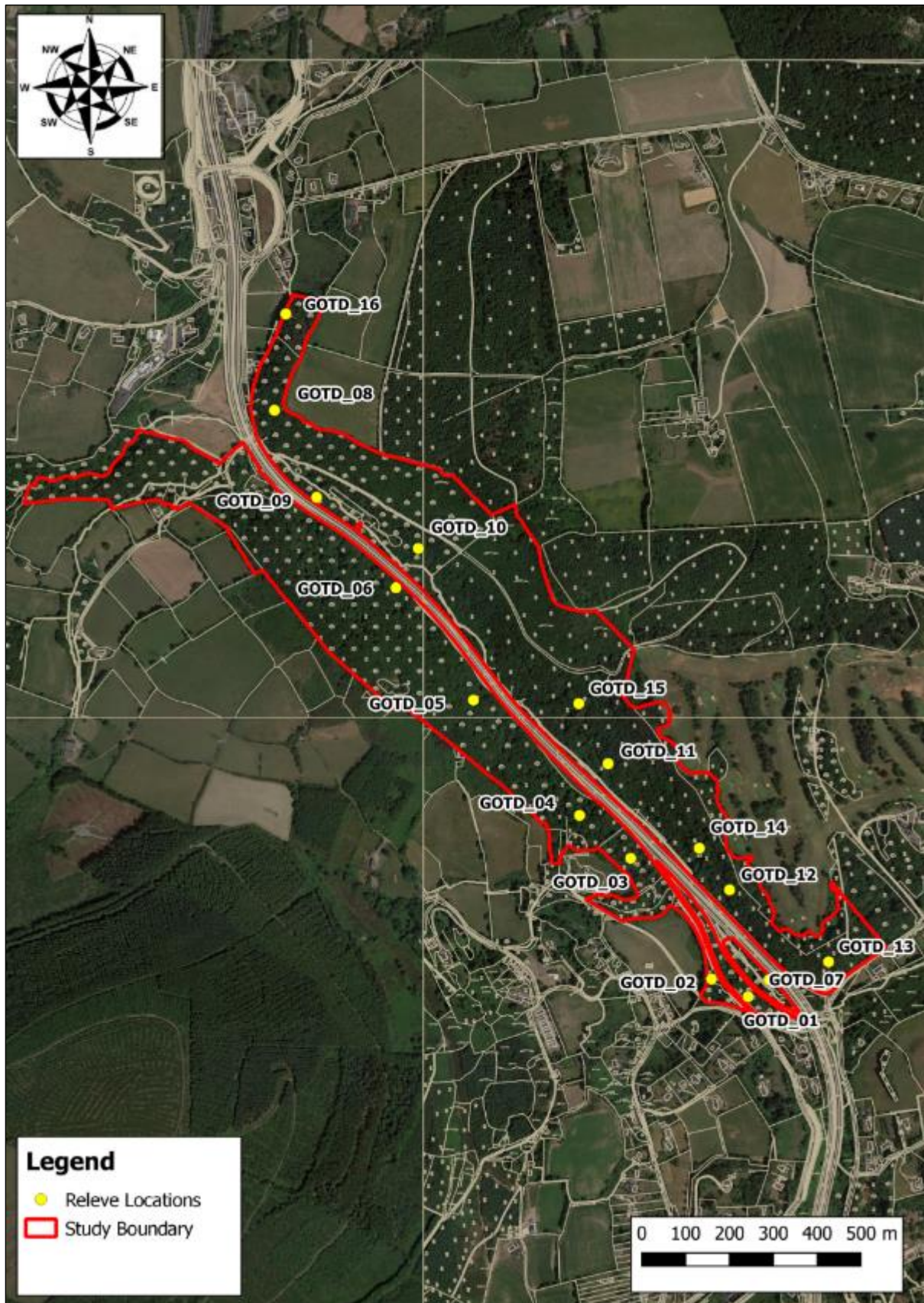
Old Sessile oak woods [91A0] are further described as multi-layered habitats with a canopy, understorey, shrub, dwarf shrub, field and ground layers. Regarding the canopy, the monitoring plan, states that a good proportion of the canopy should be composed of Sessile oak or *Quercus x rosacea*, although Birch species *Betula* spp. and Rowan *Sorbus aucuparia* may also occur. The cover of non-native species should not be greater than 10%. It is important to note however, that the approach adopted for the surveys conducted by Scott Cawley in the Glen of the Downs, following consultation with BEC, was that the presence of non-natives in the canopy is a reflection of the quality of the habitat, as opposed to indicating that it does not align with 91A0 habitat, provided that other elements of the habitat are present (e.g. understorey, shrub and field layers appear to conform to the 91A0 habitat type).

The monitoring plan also expands the number of characteristic understorey species to include younger individuals of canopy species, with Holly *Ilex aquifolium* and Hazel *Corylus avellana* being the most frequent understorey species recorded. Shrub layer species include Bilberry *Vaccinium myrtillus* and Ling *Calluna vulgaris*. Ferns typically present in the field layer include Hard Fern *Blechnum spicant*, Polypody species *Polypodium* spp. and *Dryopteris* spp. Flowering plants may include Great Wood-rush *Luzula sylvatica* and Wood Sorrel *Oxalis acetosella*. Bluebells *Hyacinthoides non-scripta* may be present on more nutrient-rich soils. Honeysuckle *Lonicera periclymenum* may be present as a climbing plant. A range of bryophytes and liverworts are referenced as potential ground layer species and include *Rhytidiadelphus* spp., *Dicranum* spp., *Polytrichastrum formosum*, *Hylocomium brevirostre*, *Mnium hornum*, *Plagiothecium undulatum*, *Pseudotaxiphyllum elegans*, *Diplophyllum albicans*, *Saccogyna viticulosa*, *Scapania* spp., *Calypogeia* spp., *Frullania* spp. *Plagiochila* spp., *Lepidozia* spp. and *Bazzania trilobata*.

Finally, *The Status of EU Protected Habitats and Species in Ireland- Habitats Assessments, Volume 2* (NPWS, 2019), interprets this habitat in a similar fashion to the monitoring plan, in that it too considers woods with *Quercus x rosacea* and locally Pedunculate Oak *Quercus robur*, provided that the ground flora is acidic in character. According to that NPWS document, the Irish Vegetation Classification¹⁴ primarily places 91A0 habitat in the WL1 *Quercus petraea* – *Luzula sylvatica* group. All vegetation communities in this group have

an affinity to the Annex I habitat: WL1A *Quercus robur* – *Luzula sylvatica* woodland (78.7% affinity), WL1B *Quercus petraea* – *Luzula sylvatica* woodland (97.9% affinity), WL1C *Quercus petraea* – *Corylus avellana* woodland (66.3% affinity) and WL1D *Quercus petraea* – *Vaccinium myrtillus* woodland (98.7% affinity). The assessment of 91A0 habitat, to inform that NPWS report, was based on the presence of at least 7 indicator species. Sessile Oak or the hybrid *Quercus x rosacea*, and 6 other indicator species, at least 2 of which had to be bryophytes, had to be present in the monitoring plot in order for it to pass the “Typical species present” criterion of the structure and functions assessment. The list of indicator species aligns with those referenced in the monitoring plan.

Figure 1: Locations of relevés undertaken in May and October 2019.



3 Results

3.1 Desktop Study Results

3.1.1 NPWS Data Regarding the Glen of the Downs SAC (000719)¹⁹

Glen of the Downs is a designated SAC (Site Code: 000719). According to the Site Synopsis, the site is protected due to the presence of the following Annex I woodland type: Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]. This woodland type is the only QI for the SAC.

The site is described as a semi-natural oak wood situated within an impressive glacial overflow channel. It is located on the N11, the main Dublin-Wexford road, about 7km south of Bray, Co. Wicklow. The various woodland habitats are described as follows:

“Much of the site comprises Sessile Oak (Quercus petraea) woodland referable to the Blechno-Quercetum petraeae association. Sessile Oak is especially dominant on the mid to upper slopes. The quality of the Oak-dominated areas is variable - the association is well developed and especially pure on the western side, while in some places it occurs as coppice scrub. The shrub layer is sparse, but Holly (Ilex aquifolium) is locally common. On the ground, Great Wood-rush (Luzula sylvatica) forms a dense carpet over much of the area, with other species such as Bilberry (Vaccinium myrtillus), Heather (Calluna vulgaris) and Wood Sage (Teucrium scorodonia) occurring occasionally. Bramble (Rubus fruticosus agg.) and ferns such as Soft Shield-fern (Polystichum setiferum) are abundant in places, especially on the south-western slopes. The site includes some areas of mixed woodland, in which Beech (Fagus sylvatica), Sycamore (Acer pseudoplatanus), Scots Pine (Pinus sylvestris) and other non-native species occur. Bryophytes are notably scarce within the valley and may reflect the dryness of the site. A narrow band of alluvium associated with a small stream occurs on the valley floor. Here, the woodland is dominated by Ash (Fraxinus excelsior) and Hazel (Corylus avellana), with a species-rich herb layer that includes Ramsons (Allium ursinum), Dog Violet (Viola riviniana) and Bluebells (Hyacinthoides non-scripta).”

The site is also known to support some rare bryophytes, fungi and invertebrates. It is the only Irish known site to support the bryophyte *Plagiothecium curvifolium*. In addition, a breeding bird census carried out in 1990 recorded a total of 21 species within the woodland, including Wood Warbler which is relatively rare. Grey Wagtail, a red-listed species, was recorded breeding along the stream.

According to the sites' Natura 2000 Standard Data Form, old oak woodland [91A0] covers 39.47ha of the 74.45ha site. This document also states that badger are known to be present within the site. High ranked threats which could result in negative impacts to the site include vandalism, invasive non-native species, burning down, missing or wrongly directed conservation measures and roads or motorways.

No detailed site-specific conservation objectives exist at the time of writing for the Glen of the Downs SAC. The overall conservation objective for the site is *“to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected”*.

3.1.2 Data from the National Survey of Native Woodlands 2003-2008

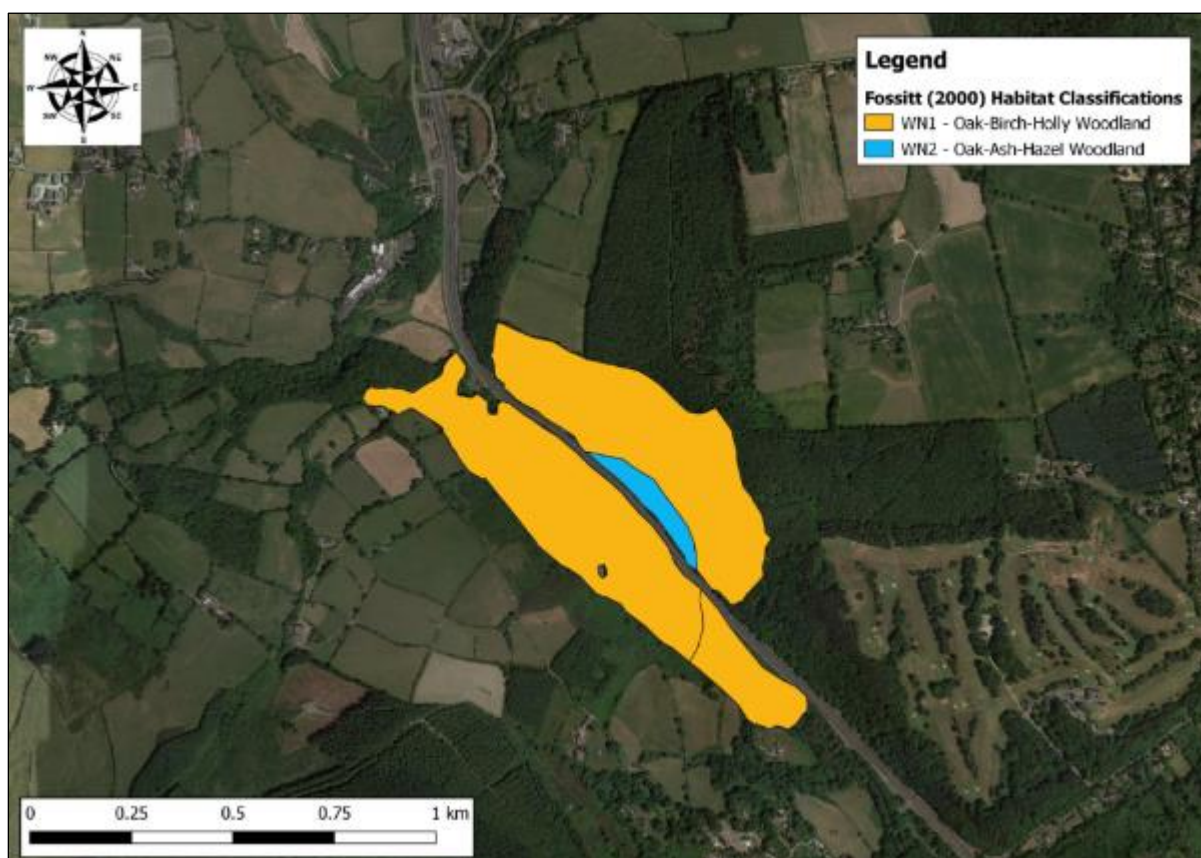
Glen of the Downs SAC was surveyed as part of the National Survey of Native Woodlands (NSNW) 2003-2008 on the 26 July 2005. According to the data collected, the woodland received a conservation rating/score of *“Excellent (88)”* and a threat rating/score of *“Low (8)”*. Woodland was noted as being present at this site in the 1840s and it was noted that the site is currently owned by Coillte²⁰. In terms of

¹⁹ The below information is taken from the following NPWS sources: NPWS (2013) *Site Synopsis for Glen of the Downs SAC (000719)*; NPWS (2018) *Conservation Objectives for Glen of the Downs SAC (000719) Generic Version 6.0.*; and; NPWS (2009) *Natura 2000 Standard Data Form for Glen of the Downs SAC (000719)*.

²⁰ Whilst Volume 3b of the *National Survey of Native Woodlands 2003-2008* claims that Glen of the Downs is owned by Coillte, it is believed that the lands are in fact under the ownership of the Minister for Arts, Heritage and Local Government.

semi-natural woodland habitat composition, 70% of the 56ha study area²¹ covered for this project was found to be composed of Oak-Birch-Holly woodland (WN1) and 30% Oak-Ash-Hazel woodland (WN2). A number of areas of mixed woodland (modified in nature) were found at the north and south ends of the Glen of the Downs, but these areas were not mapped as part of the study. On the western side *Luzula sylvatica* was the dominant ground flora species while on the east side *Vaccinium myrtillus* was more common. Areas of WN1 were variable in composition and included a number of non-native species e.g. Sycamore and Beech. The western side was less disturbed than the eastern and deer were known to be present. It is important to note that this study only recorded the semi-natural woodland habitats present within the site and therefore the resulting spatial data does not constitute a complete habitat map for the site. The study did not identify or map any Annex I habitat types. Semi-natural woodland habitats identified during the NSNW are shown on **Figure 2**.

Figure 2: Semi-Natural Woodland Habitats Recorded in Glen of the Downs during the National Survey of Native Woodlands (July 2005)²².



3.1.3 Available NPWS Glen of the Downs Habitat Mapping

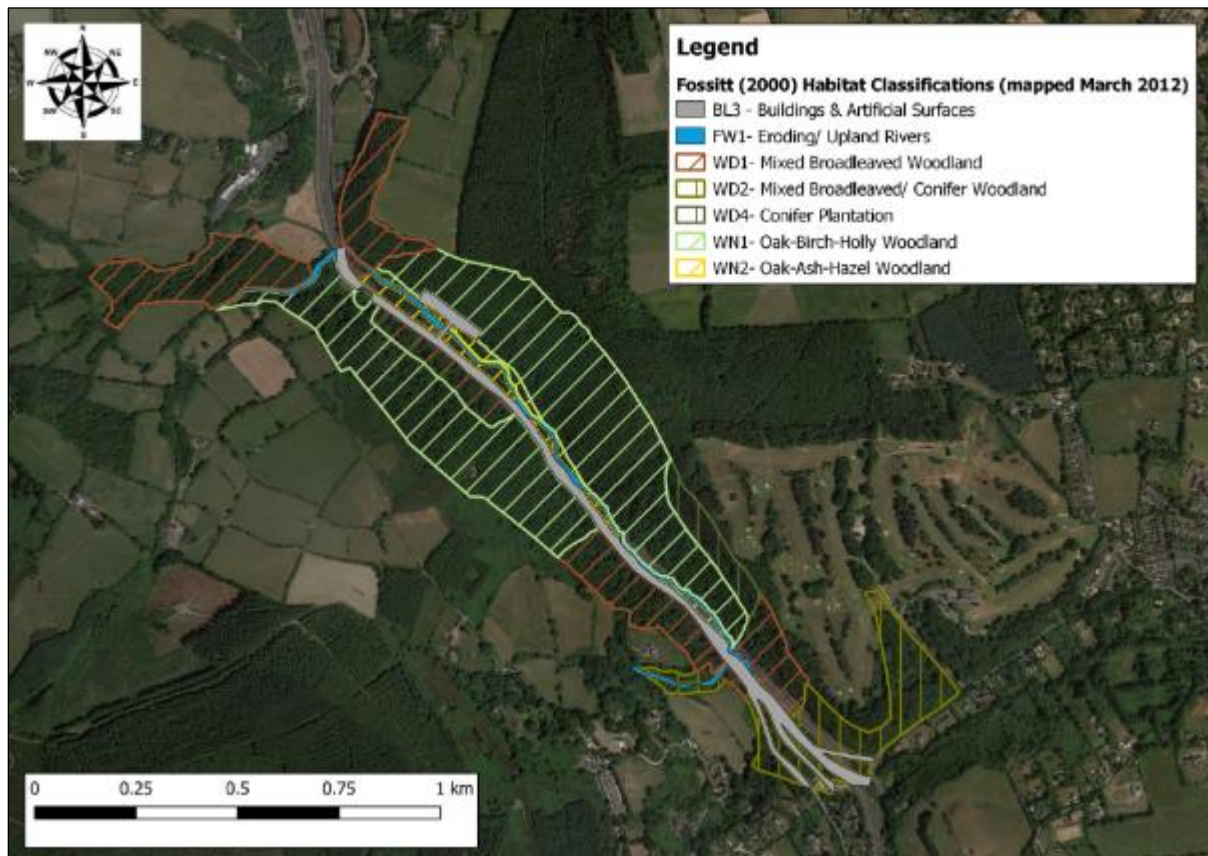
Following a data request to NPWS in February 2019, a habitat map for the Glen of the Downs SAC (based on surveys undertaken in March 2012) was received. Seven habitats were identified during this survey, the results of which are displayed on **Figure 3**. While this survey did record all habitat types present within the Glen of the Downs SAC, it does not show the extent of the QI habitat for this site. In addition, the extent of

²¹ According to the Natura 2000 Standard Data Form for the Glen of the Downs SAC, the SAC is 74.5ha in total area. The NSNW study conducted in the Glen of the Downs covered an area of 56ha, or 75% of the SACs total area.

²² Spatial data displayed in this map was sourced from the National Survey of Native Woodlands 2003-2008, accessed via the NPWS website: <https://www.npws.ie/maps-and-data/habitat-and-species-data>

semi-natural habitats recorded do not align with those recorded during the National Survey of Native Woodlands.

Figure 3: Habitats mapped in Glen of the Downs SAC by the NPWS in March 2012.

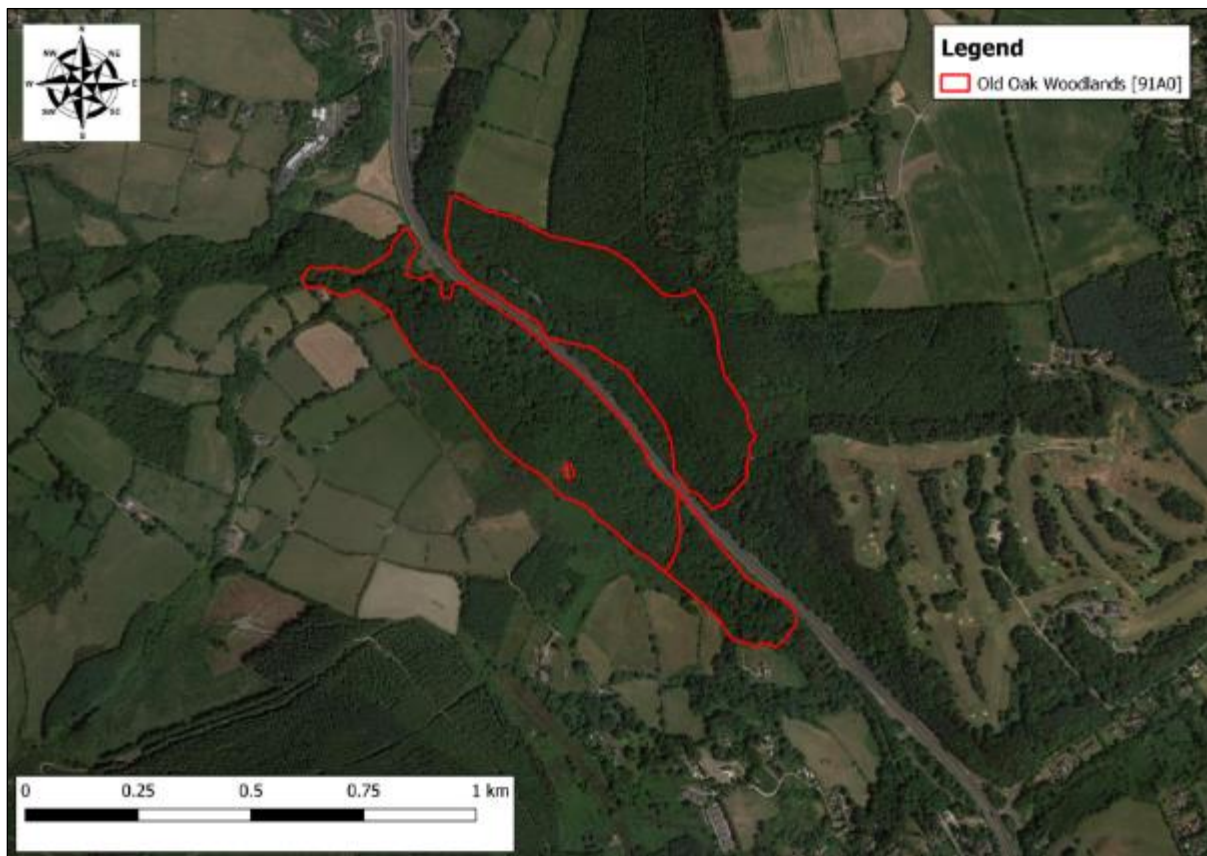


3.1.4 Qualifying Interest (QI) Annex I Woodland Mapping from the NPWS

The sole Qualifying Interest (QI) habitat for the Glen of the Downs SAC is Old Sessile Oak Woods with *Ilex* and *Blechnum* [91A0]. This is an Annex I habitat but is not regarded as a “priority”²³ Annex I habitat. The boundary of this habitat type within the Glen of the Downs SAC has been mapped previously and is freely available on the NPWS website. The extent of 91A0 habitat from this dataset is presented on **Figure 4: Old Sessile Oak Woods with *Ilex* and *Blechnum* [91A0] within Glen of the Downs SAC**. The boundary of the 91A0 habitat broadly aligns with the boundary of WN1 woodland recorded during the National Survey of Native Woodlands. However, due to the inconsistencies between the NSNW dataset (2005), from which the 91A0 dataset appears to have been derived, and the NPWS habitat map (2012) discussed previously, the actual extent of the 91A0 habitat is not clear from comparing the existing datasets.

²³ Under the Habitats Directive (1992) priority natural habitat types mean natural habitat types in danger of disappearance, and for which the Community has particular responsibility for their conservation in view of the proportion of their natural range which falls within the Communities territory. With regards to Appropriate Assessment (Article 6 (3) of the Habitats Directive), if the assessment results in a negative assessment of the implications for a European site, and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including social or economic reasons, where the site concerned hosts a priority natural habitat type the only considerations which may be raised are those relating to human health or public safety.

Figure 4: Old Sessile Oak Woods with *Ilex* and *Blechnum* [91A0] within Glen of the Downs SAC²⁴



3.1.5 Habitat Data on the Glen of the Downs from the Kilmacanogue Glen of the Downs Road Realignment EIS

The Environmental Impact Statement (EIS) prepared in 1990 for the Kilmacanogue Glen of the Downs road realignment works identified 4 types of woodland in the Glen of the Downs; Oak woodland, Beech woodland, Oak-Beech woodland and Ash-Hazel woodland (see

Figure 5). It should be noted that surveys for the Kilmacanogue Glen of the Downs road realignment works were undertaken prior to the introduction of the Habitats Directive (1992). Therefore, Annex I habitats had not been defined at that point in time and it would not have been possible to identify or map the extents of Annex I habitat types.

The Habitats Directive, which was required to be transposed in Ireland in 1994, introduced the concept of Annex I habitats and prescribed the various habitats which were considered to be Annex I. The first edition of the Interpretation Manual of European Union Habitats (EUR12), published in 1995, and the second edition (EUR15)²⁵, published in 1996, defines old oak woodlands in much the same limited way as the present-day classification (see Section 2.2.3 for details).

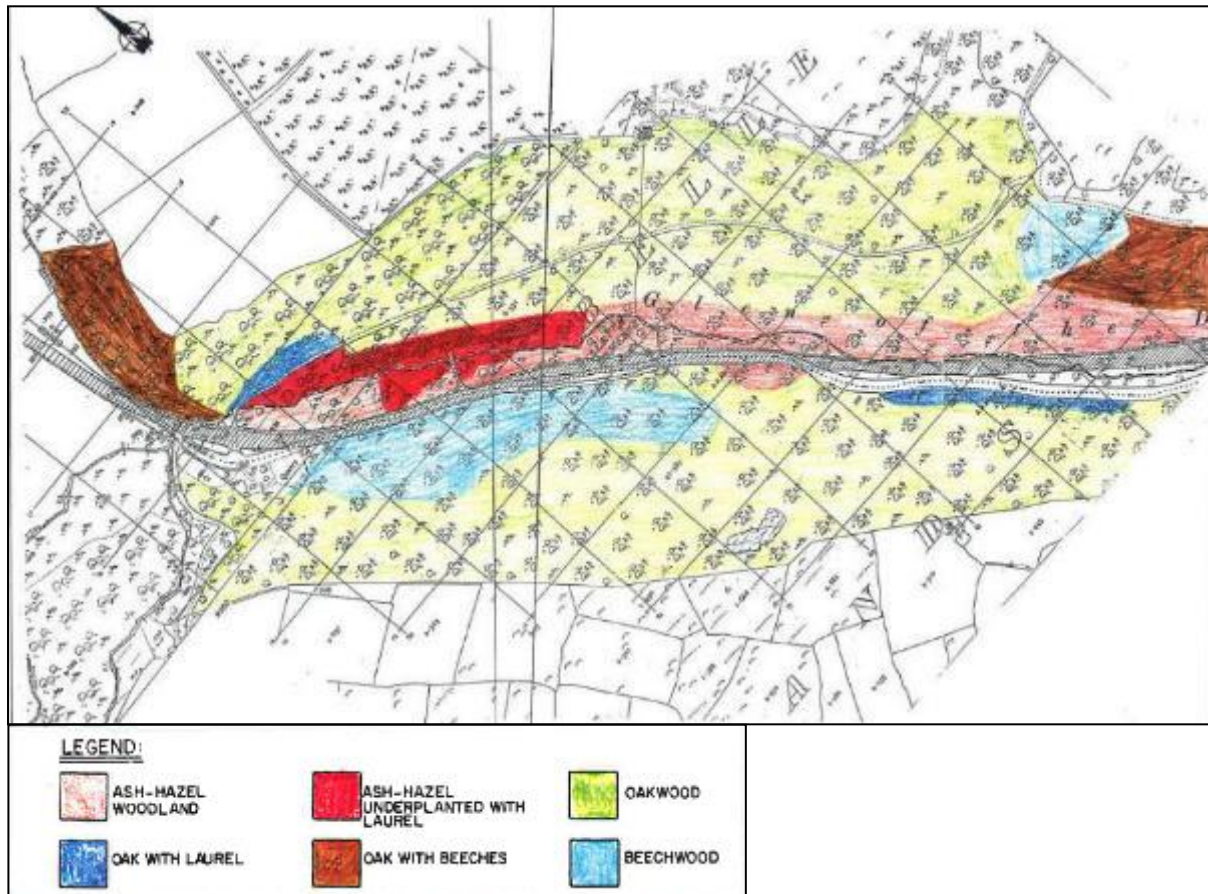
The surveys to inform this EIS were also carried out prior to the publication of *A Guide to Habitats in Ireland* (Fossitt, 2000)⁷, when there was no guidance available to ensure consistency with regards to habitat

²⁴ Spatial data displayed in this figure was sourced from relevant available Article 17 Data (2012), accessed via the NPWS website: <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17/habitats/forests>

²⁵ European Commission (1996). *Interpretation Manual of European Union Habitats- Version EUR15* (European Commission) Available at: <https://core.ac.uk/download/pdf/5090933.pdf> [Accessed 02/12/2019]

classification, such that arbitrary criteria and habitat types were used. The methodology for habitat surveys, undertaken to inform the EIS prepared in 1990, is very brief and states that “the plant communities of both of the primary study area were surveyed using a standard (Braun-Blanquet) procedure of vegetation analysis and mapping. This involved taking sample quadrats of 3m² in the woodland and 1m² in the open marsh area in typical parts of each area surveyed; listing of all plant species and their abundance within these quadrats (relevés); tabulation of these lists from which it was possible to identify different vegetation types each typified by certain characteristic plant species (vegetation table); and; mapping of these vegetation types using the positions of the original quadrats, field observations and aerial photographs to establish the extent of each plant community.”

Figure 5: Habitat Map of Glen of the Downs (taken from Kilmac Glen of the Downs Road Realignment EIS)



3.2 Habitat Survey Results

Thirteen²⁶ different habitat types, as described in Fossitt (2000)⁷, were identified over the course of the habitat surveys undertaken by Scott Cawley Ltd. in May 2019 (see **Figure 9**). Within the semi-natural habitat types recorded on study area²⁷, a number of different woodland vegetative communities, as described in the Irish Vegetation Classification¹⁴, were also identified (see

²⁶ Mosaics of different habitat types occurred in three areas within the study boundary. These are areas which are composed of multiple pockets of different habitat types, such that it would not be possible to split them up spatially.

²⁷ Vegetative communities, as described in the Irish Vegetation Classification (IVC), were assigned to semi-natural habitats and habitats with a degree of semi-naturalness only. E.g. pockets of mixed broadleaved woodland (WD1) which contained aspects of semi-natural woodland were assigned an IVC community type, whereas areas of mixed conifer woodland, which bore no resemblance to semi-natural woodland habitats were not. In addition, if semi-natural habitats could not easily be

Figure 10

Figure 10), and these are described in the paragraphs below, where relevant. Where habitats correspond to Annex I habitat types this is clearly stated and explained.

3.2.1 WN1 - Oak-birch-holly woodland

This is by far the most abundant habitat type within the study area. Across the study area, this semi-natural habitat is characterised by a canopy of Sessile Oak *Quercus petraea* or the Oak hybrid *Quercus x rosacea* and an understorey composed of Holly *Ilex aquifolium*, Hazel *Corylus avellana* and occasionally Rowan *Sorbus aucuparia*. The ground flora varies considerably in both species composition and cover. Field layer species include Great Wood-rush *Luzula sylvatica*, Bilberry *Vaccinium myrtillus*, Honeysuckle *Lonicera periclymenum*, Bluebells *Hyacinthoides non-scripta*, Ramsons *Allium ursinum*, Wood Sorrel *Oxalis acetosella* and Wood Sage *Teucrium scorodonia*. Ferns recorded included Soft Shield-fern *Polystichum setiferum* and Broad Buckler-fern *Dryopteris dilatata*. Hard Fern *Blechnum spicant* occurs in the field layer on the western side of the glen. In terms of ground flora, the following bryophyte species were most abundant: *Isoetecium myosuroides* var. *myosuroides*, *Kindbergia praelonga*, *Hypnum cupressiforme* var. *cupressiforme* and *Pseudotaxiphyllum elegans*. A number of species occurred occasionally including *Metzgeria furcata*, *Mnium hornum*, *Hypnum cupressiforme* var. *resupinatum*, *Brachythecium rutabulum*, *Frullania dilatata*, *Thamnobryum alopecurum*, *Fissidens taxifolius*, *Plagiothecium succulentum*, *Thuidium tamariscinum*, *Polytrichastrum formosum*, *Dicranum scoparium* and *Plagiothecium curvifolium*. Rarely encountered bryophyte species include, but are not limited to, the following: *Dicranella heteromalla*, *Neckera complanata*, *Atrichum undulatum*, *Rhizomnium punctatum*, *Isoetecium alopecuroides*, *Lejeunea cavifolia*, *Campylopus introflexus*, *Hypnum andoi*, *Plagiochila porelloides*, *Ulota bruchii*, *Hypnum jutlandicum*, *Orthodontium lineare*, *Didymodon insulanus*, *Frullania fragilifolia*, *Lepidozia reptans* and *Tetraphis pellucida*.

Examples of this habitat type, recorded within the study area, are displayed in **Plate 1**, **Plate 2** and **Plate 3**.

Areas identified as Oak-birch-holly woodland all correspond with the Annex I habitat "Old Sessile Oak Woods with *Ilex* and *Blechnum* in the British Isles [91A0]". In addition, one area of mixed broadleaved woodland (WD1), located on the western side of the glen, also corresponded to 91A0 Annex I habitat type. This was due to the composition of the habitats (both WN1 and relevant areas of WD1), which was typical of this Annex I habitat type e.g. canopy dominated by Oak²⁸ with an understorey largely composed of Holly and with typical field layer species such as Great Wood Rush, Bilberry, Honeysuckle and ferns. It should be noted that while all areas of Oak-birch-holly woodland are 91A0 woodland habitat, the quality of this Annex I habitat varies across the study area (e.g. areas where negative indicators species such as Beech and Sycamore, which indicate lower quality habitat, are present).

The relevé data in Appendix A, clearly outlines the variation in quality of Annex I 91A0 habitat across the study area. In relevés GOTD_08, GOTD_12 and GOTD_15, negative indicators such as Beech are present in the canopy. Despite this, these areas of WN1 woodland are classified as 91A0 Annex I habitat because, on balance, the other elements of the habitat (e.g. vegetative composition of the understorey, shrub, field and ground layers) indicate that they do correspond to Annex I 91A0 habitat. Furthermore, in accordance with guidance issued by BEC and detailed in Section 2.2.3, the presence of non-natives in the canopy, such

assigned to an IVC community, the approach taken was not to assign them to one rather than shoe-horn them into something that didn't necessarily bear a true representation to that habitat.

²⁸ It should be noted that in the area of WD1 which was deemed to correspond to 91A0 Annex I habitat type, the canopy here was not dominated by Oak species. Instead Beech dominated the canopy, with Oak occurring occasionally. Nevertheless, this area of woodland aligns with the 91A0 Annex I habitat type due to the presence of other 91A0 indicator species such as Holly and Great Wood-rush, along with the mature Oaks occasionally present in the canopy. In essence, this area constitutes degraded 91A0, due to the dominance of Beech in the canopy, although with management (e.g. removal of Beech) could easily revert back to a non-degraded state of 91A0.

as Beech, is a reflection of the degraded quality of the habitat rather than an indication that it does not constitute 91A0 habitat. The extent of Old Oak woodland Annex I habitat present within the study area is displayed on **Figure 6**.



Plate 1: Oak-Birch-Holly Woodland (WN1) recorded along the slope of the east side of the Glen of the Downs.



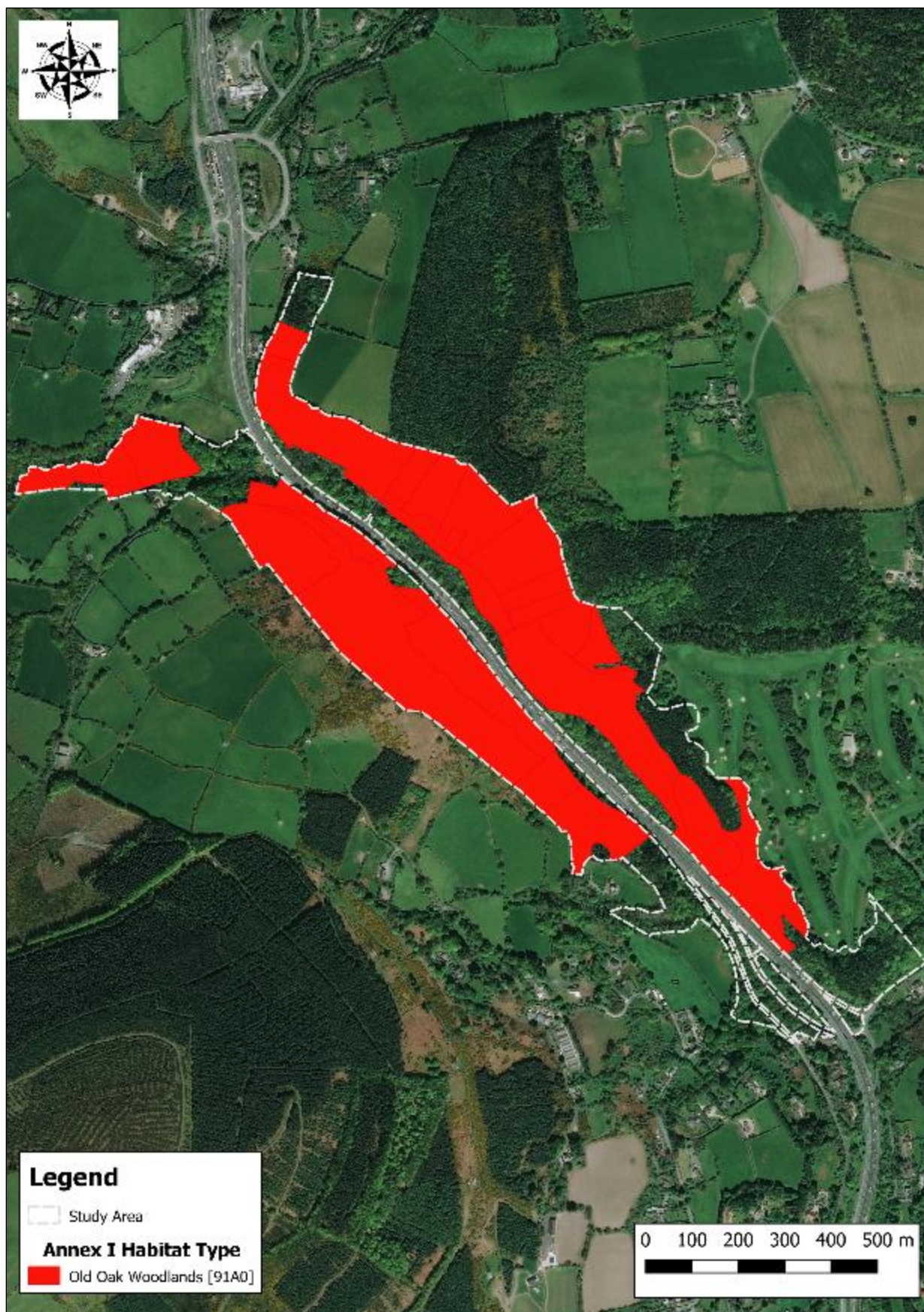
Plate 2: Oak-Birch-Holly Woodland (WN1) across the top of the east side of Glen of the Downs.



Plate 3: Oak-Birch-Holly Woodland (WN1) recorded on the east slope of Glen of the Downs.

Six relevés (GOTD_04; GOTD_05; GOTD_08; GOTD_12; GOTD_14; and GOTD_15) were recorded in this habitat area, the results of which are presented in Appendix A.

Figure 6: Extent of Old Oak Woodland [91A0] Annex I habitat within the study area²⁹.



Within the Oak-birch-holly (WN1) habitat type, three different vegetative communities, as described in the Irish Vegetation Classification Error! Bookmark not defined., were identified and are described below:

I. WL1B - Sessile Oak - Great Wood-rush Woodland

These areas are characterised by a canopy dominated by Sessile Oak, with a well-developed Holly understorey. Sometimes Beech *Fagus sylvatica* occurs in the canopy alongside Sessile Oak occasionally but generally Sessile Oak is clearly more dominant. In the understorey, along with Holly, Hazel occurs occasionally while Rowan is only encountered sporadically. The field layer here is characterised by Great Wood-rush which often forms dense carpets. Other species recorded in the field layer include Honeysuckle, Bluebells, Ramsons, Ivy *Hedera helix*, Soft Shield-fern and Broad Buckler-fern. Polypody *Polypodium vulgare* often occurs as an epiphyte on oak trees. Bryophytes frequently found in the ground layer include *Isoetium myosuroides* var. *myosuroides*, *Hypnum cupressiforme* var. *cupressiforme*, *Pseudotaxiphyllum elegans* and *Mnium hornum*. Species which occurred occasionally include *Kindbergia praelonga*, *Hypnum cupressiforme* var. *resupinatum*, *Plagiothecium succulentum* and *Thuidium tamariscinum*.

II. WL1C - Sessile Oak - Hazel Woodland

While Sessile Oak is by far the most abundant species in the canopy in these areas, a number of other species may also be present including non-natives such as Beech, Eucalyptus *Eucalyptus globulus* and conifers such as Norway Spruce *Picea abies*. Generally, the more ornamental non-natives (e.g Eucalyptus) are found in localised stands, indicating previous formal planting, perhaps typical of landscape planting within a demesne. Downy Birch *Betula pubescens* occurs in the canopy sporadically here also, while Holly forms an often-dense understorey. Hazel and Rowan may also be present in the understorey, but Holly is the most abundant of those species. In terms of field layer flora, the field layer in this community group is typically not as lush as the other groups. Often the field layer is limited to fern species (Broad Buckler-fern and Soft Shield-fern), Bramble *Rubus fruticosus*, Ivy, Honeysuckle, Herb-robert *Geranium robertianum* and Lords-and-Ladies *Arum maculatum*. Bryophytes often found in the ground flora include *Isoetium myosuroides* var. *myosuroides*, *Kindbergia praelonga*, *Hypnum cupressiforme* var. *cupressiforme*, *Hypnum cupressiforme* var. *resupinatum*, *Eurhynchium striatum*, *Thuidium tamariscinum*, *Metzgeria furcata*, *Mnium hornum*, *Pseudotaxiphyllum elegans*, *Thamnobryum alopecurum* and *Polytrichastrum formosum*.

III. WL1D - Sessile Oak - Bilberry Woodland

Sessile Oaks dominate the canopy in this woodland community, while Holly, and occasionally Rowan, form the understorey. The field layer is often dominated by Bilberry, which forms dense stands in places. Great Wood-rush is also common, although not as abundant as Bilberry. Honeysuckle is frequently encountered, as is Wood Sage. Polypody often occurs as an epiphytic species on larger trees. Bryophytes found in the ground flora include *Isoetium myosuroides* var. *myosuroides*, *Mnium hornum*, which were both frequently found, and *Dicranum majus* and *Thuidium tamariscinum*, which both occurred occasionally.

On the west side of the glen, only two of the three vegetative communities were recorded; WL1B- Sessile Oak- Great Wood-rush Woodland and WL1C- Sessile Oak- Hazel Woodland.

3.2.2 WN2 - Oak-ash-hazel woodland

This semi-natural woodland habitat type was recorded on the eastern side of the glen, running along the Three Trouts Stream, which flows along the valley floor here. This habitat is characterised by a canopy dominated by Ash *Fraxinus excelsior* while Beech is also frequent. Sycamore *Acer pseudoplatanus* occurs occasionally, along with Oak species (*Quercus petraea* and *Quercus x rosacea*). The understorey generally comprises Holly and Hazel, with Cherry Laurel *Prunus laurocerasus* forming dense stands in places. The field

²⁹ It should be noted that Old Oak Woodland [91A0] habitat is the Qualifying Interest habitat for the Glen of the Downs SAC.

layer typically comprises species such as Ramsons, Bluebells, Bramble, Hart's-tongue *Asplenium scolopendrium*, Pignut *Conopodium majus*, Cleavers *Galium aparine*, Wood Avens *Geum urbanum* and Wood Anemone *Anemone nemorosa*. In terms of ground flora, the most commonly encountered bryophyte species is *Eurhynchium striatum*. Other bryophyte species, which occur occasionally, include: *Isothecium myosuroides* var. *myosuroides*, *Kindbergia praelonga*, *Hypnum cupressiforme* var. *cupressiforme*, *Metzgeria furcata*, *Hypnum cupressiforme* var. *resupinatum*, *Brachythecium rutabulum*, *Frullania dilatata*, *Thamnobryum alopecurum*, *Fissidens taxifolius*, *Platyhypnidium riparioides* and *Rhynchostegiella tenella*. A number of bryophyte species are only rarely encountered: *Mnium hornum*, *Dicranella heteromalla*, *Plagiothecium succulentum*, *Neckera complanata*, *Thuidium tamariscinum*, *Rhizomnium punctatum*, *Conocephalum conicum*, *Isothecium alopecuroides*, *Plagiomnium undulatum*, *Brachythecium rivulare*, *Amblystegium serpens*, *Orthotrichum affine*, *Ulota bruchii*, *Pellia endiviifolia*, *Cryphaea heteromalla*, *Hygroamblystegium tenax*, *Lunularia cruciata*, *Orthotrichum cupulatum* and *Oxyrrhynchium hians*.

Where this habitat grades into oak-birch-holly woodland (WN1) elements of both habitats are found, and this is by nature regarded as a transition zone between the two. Canopy species include *Quercus x rosacea*, Ash, Elm and Beech and the understorey is composed of Holly, Rowan, Hazel, Willow species and young Ash trees. Importantly, much of the *Quercus x rosacea* present in the canopy, is from overhanging specimens located further up the slope. A dense area of Cherry Laurel also occurs. Field layer species include Ramsons, Enchanter's-nightshade *Circaea lutetiana*, Honeysuckle, Nettle *Urtica dioica*, Lesser Celandine *Ficaria verna* and ferns. Pockets of Great Wood-rush and Bilberry occur closer to the slope. This area differs to that described in WL1C under WN1, in that the most abundant field layer species is Ramsons, which forms a lush carpet in places here, particularly in close proximity to the stream, and is an indicator of more basic conditions than that typical of 91A0 habitat. Ground layer bryophyte species include the following: *Thamnobryum alopecurum* and *Eurhynchium striatum*, which occur frequently, and *Isothecium myosuroides* var. *myosuroides*, *Kindbergia praelonga*, *Metzgeria furcata*, *Pseudotaxiphyllum elegans*, *Fissidens taxifolius*, *Conocephalum conicum*, *Brachythecium rivulare*, *Hookeria lucens* and *Platyhypnidium riparioides*, all of which occur less frequently. Species which are rarely encountered include *Mnium hornum*, *Frullania dilatata*, *Plagiothecium succulentum*, *Amblystegium serpens*, *Calypogeia arguta*, *Lejeunea cavifolia*, *Rhynchostegium confertum*, *Fontinalis antipyretica* and *Hygroamblystegium tenax*. Generally, the oak-birch-holly woodland occurs on the steeper slopes as the gradient increases.

One area of this woodland type was recorded in the south-west of the study area. Here, the canopy is dominated by Oak species (including Pedunculate Oak *Quercus robur*) with Beech, Ash, Lime, Wych Elm *Ulmus glabra* and Sycamore occurring less frequently. The understorey is composed of Holly. The field layer is dominated by Ramsons which forms an extensive carpet, with Soft Shield-fern abundant and other species such as Bramble, Lords and Ladies and Broad Buckler-fern occurring occasionally. The relative abundance of Ramsons in the field layer supports its classification as WN2 as opposed to WN1 woodland. Ground flora species include the following bryophytes: *Kindbergia praelonga*, *Metzgeria furcata*, *Mnium hornum*, *Dicranella heteromalla*, *Brachythecium rutabulum*, *Fissidens taxifolius*, *Isothecium myosuroides* var. *myosuroides*, *Plagiothecium succulentum*, *Lophocolea bidentata*, *Atrichum undulatum*, *Lophocolea heterophylla*, *Pogonatum aloides*, *Rhynchostegiella tenella* and *Orthodontium lineare*.

Plate 4 displays an example of Oak-ash-hazel woodland (WN2) recorded within the study area.



Plate 4: Example of Oak-Ash-Hazel Woodland (WN2) recorded on site.

Three relevés (GOTD_02; GOTD_09; and GOTD_10) were recorded in this habitat type, the results of which are presented in Appendix A.

Within the Oak-ash-hazel woodland (WN2) habitat type only one vegetative community, as described in the Irish Vegetation Classification¹⁴, was identified and is described below:

I. WL2C - Ash-Sycamore Woodland

These areas are characterised by a canopy dominated by Ash, with Beech also frequently found in the canopy and an understorey formed mainly by Hazel and Holly. Sycamore is also present in the canopy, along with Sessile Oak, which occur occasionally. In the understorey, along with Hazel and Holly, Elder *Sambucus nigra* and Cherry Laurel are present, with Hawthorn only occurring sporadically. The field layer here is dominated by Ramsons, while fern species such as Broad Buckler-fern, Soft Shield-fern and Hart's-tongue are also frequently encountered. Other species recorded in the field layer include Honeysuckle, Bluebells, Ivy, Bramble, Cleavers, Dog Violet, Common Hogweed *Heracleum sphondylium*, Herb-robert and Lesser Celandine. Bryophyte species which are often found in the ground layer include the following; *Isoetecium myosuroides* var. *myosuroides*, *Kindbergia praelonga*, *Metzgeria furcata*, *Thamnobryum alopecurum*, *Fissidens taxifolius* and *Eurhynchium striatum*.

3.2.3 WN6 - Wet Willow-alder-ash woodland

One area of wet willow-alder-ash woodland was identified within the study area, on the west side of the existing N11 dual carriageway. It is an isolated area of woodland due to the fact that it is surrounded by the N11 dual carriageway on the east and a slip road to the west (R762 at Exit 10 northbound). The Three-trout's Stream flows through this area of woodland and the ground is very wet underfoot in places. The canopy is composed of Alder *Alnus glutinosa*, Grey Willow *Salix cinerea*, Sycamore, Ash, Horse chestnut *Aesculus hippocastanum* and Poplar species *Populus* sp.. No one species dominates in the canopy. The understorey is made up of Hazel, Elder, Himalayan Honeysuckle *Leycesteria formosa*, Grey Willow and Beech. Cotoneaster species *Cotoneaster* sp. occurs occasionally and the climbing species Traveller's-joy *Clematis vitalba* is also present here. Field layer species include Hemlock Water-dropwort *Oenanthe crocata*, Flag Iris *Iris pseudacorus*, Angelica *Angelica sylvestris*, Sanicle *Sanicula europaea*, Meadowsweet *Filipendula ulmaria*, Nettle *Urtica dioica*, Wavy Bitter-cress *Cardamine flexuosa*, Cow Parsley *Anthriscus sylvestris* and ferns. Winter Heliotrope occurs in localised areas. Tutsan *Hypericum androsaemum*, Common Hogweed, Herb-robert, Bramble, Ivy, Cleavers, Remote sedge *Carex remota* and Wood Sorrel *Oxalis*

acetosella also occur. *Kindbergia praelonga* and *Thamnobryum alopecurum* are the most abundant bryophytes. Species which occur occasionally include *Hypnum cupressiforme* var. *cupressiforme*, *Metzgeria furcata*, *Hypnum cupressiforme* var. *resupinatum*, *Brachythecium rutabulum*, *Frullania dilatata*, *Fissidens taxifolius*, *Eurhynchium striatum*, *Lophocolea bidentata*, *Rhizomnium punctatum*, *Conocephalum conicum*, *Plagiomnium undulatum*, *Brachythecium rivulare*, *Amblystegium serpens*, *Platyhypnidium riparioides*, *Orthotrichum affine*, *Bryum capillare*, *Cryphaea heteromalla*, *Pellia epiphylla*, *Pellia neesiana* and *Radula complanata*. Rarely encountered species include *Zygodon viridissimus*, *Ulota phyllantha*, *Metzgeria violacea*, *Plagiomnium rostratum*, *Orthotrichum pulchellum*, *Orthotrichum lyellii*, *Rhynchostegium confertum*, *Orthotrichum stramineum*, *Ulota bruchii*, *Hookeria lucens* and *Atrichum undulatum*. Wet willow-alder-ash woodland, as recorded on the west side of the Glen of the Downs, is displayed in **Plate 5**.

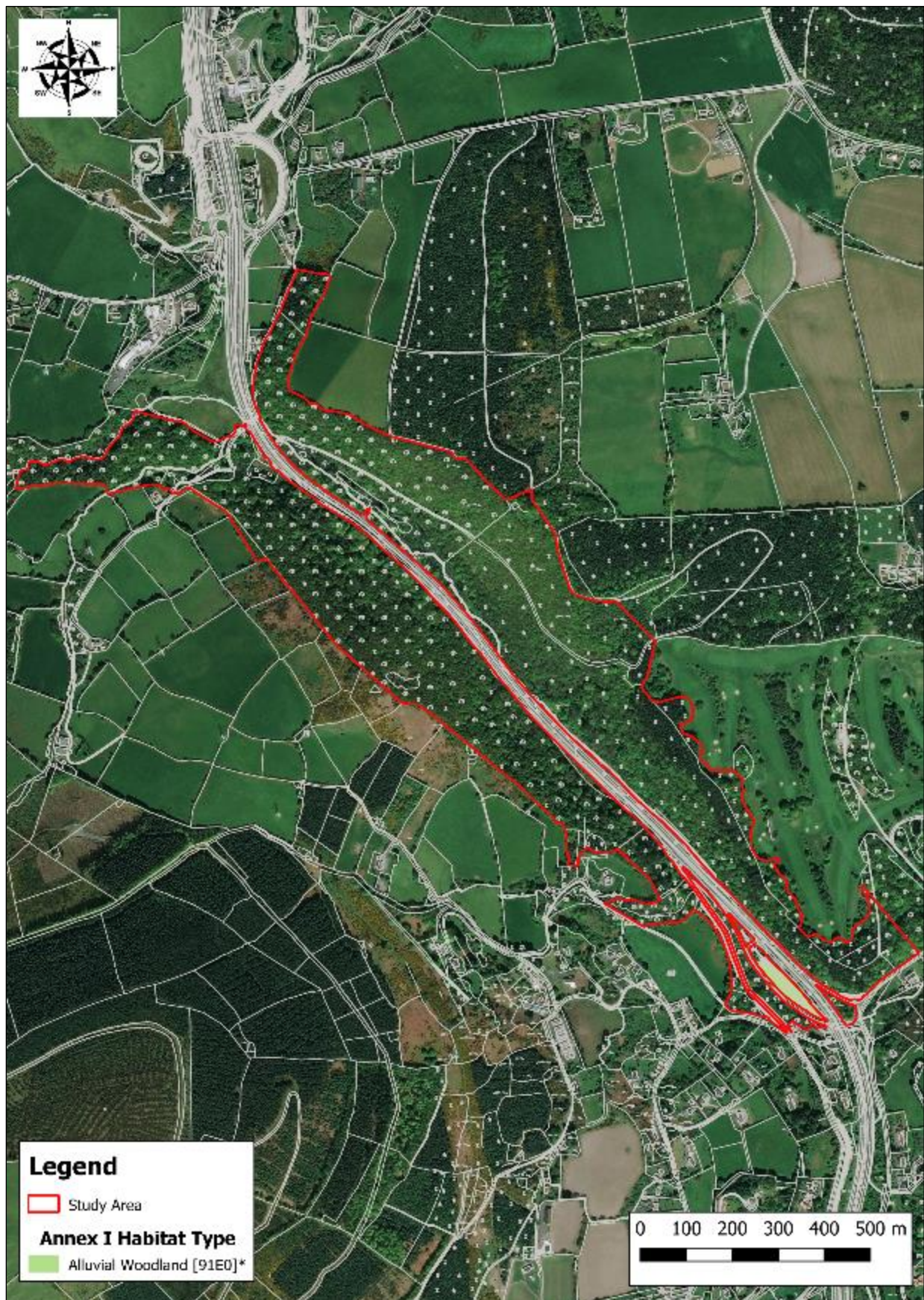
The area identified as Wet willow-alder-ash woodland was deemed to correspond to the Annex I habitat "Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]" - see **Figure 7** for location. This was due to the presence of a number of positive indicator species and the fact that the habitat has an alluvial setting, situated along the Three-trout Stream. The presence of non-native species in the canopy (e.g. Sycamore) is a reflection of the quality/ condition of the habitat, rather than indicating that it is not Annex I habitat.



Plate 5: Wet Willow-Alder-Ash Woodland (WN6) recorded in the south-west of the site.

Relevé data collected in the WN6 habitat in the south-west of the site is presented in Appendix A- see GOTD_07.

Figure 7: Extent of Alluvial Woodland [91E0]* Annex I Habitat within the Study Area



Within the Wet Willow-alder-ash woodland (WN6) habitat type one vegetative communities, as described in the Irish Vegetation Classification¹⁴, were identified. This is described below:

I. WL3C – Ash-Yellow Iris Woodland

The area of WN6 woodland falls into this vegetation community group. Characteristic species identified here include Alder, Grey Willow *Salix cinerea*, Ash, Sycamore, Bramble, Ivy, Broad-buckler fern, Nettle, Meadowsweet, Remote Sedge, Angelica and Flag Iris. Characteristic bryophyte species recorded include *Kindbergia praelonga*, *Hypnum cupressiforme* var. *cupressiforme*, *Hypnum cupressiforme* var. *resupinatum*, *Brachythecium rutabulum* and *Thamnobryum alopecurum*. Non-native species present in this area include Sycamore, Poplar species, Beech, Winter Heliotrope, Cotoneaster species, Himalayan Honeysuckle and Traveller's-joy.

3.2.4 WN2/ WN6 - Oak-ash-hazel woodland/ Wet willow-alder-ash woodland

A narrow strip of this habitat type runs along the Three-trout's Stream on the eastern side of the N11. This area is composed of elements of oak-ash-hazel woodland, along with pockets of wet willow-alder-ash woodland vegetation. Ash is present in the canopy, along with Alder, Elm *Ulmus* sp. and occasionally Beech. No one species dominates the canopy here, possibly owing to the linear and therefore limited extent of the habitat here. Ash and Alder are, on balance, more abundant than Elm and Beech. The understorey is rather sparse and is largely made up of Hazel, with Elder also present. The field layer is limited in its extent and very much associated with the stream. It includes Ramsons, Nettle *Urtica dioica* and Common Hogweed. Pockets of typically wet species such as Hemlock Water-dropwort *Oenanthe crocata*, Common Figwort *Scrophularia nodosa* and Wavy Bitter-cress *Cardamine flexuosa* occur along the stream edge. In terms of bryophyte species recorded in the ground flora, both *Hypnum cupressiforme* var. *cupressiforme* and *Fissidens taxifolius* were frequently recorded. *Isothecium myosuroides* var. *myosuroides*, *Kindbergia praelonga*, *Metzgeria furcata*, *Hypnum cupressiforme* var. *resupinatum*, *Brachythecium rutabulum*, *Pseudotaxiphyllum elegans*, *Thamnobryum alopecurum*, *Eurhynchium striatum*, *Neckera complanata*, *Rhizomnium punctatum*, *Conocephalum conicum*, *Isothecium alopecuroides*, *Plagiomnium undulatum*, *Platyhypnidium riparioides*, *Pellia endiviifolia* and *Leptodictyum riparium* all occur occasionally. Rarely encountered species include *Ulota crispa*, *Sanionia uncinata*, *Cirriphyllum piliferum*, *Lunularia cruciata*, *Fontinalis antipyretica*, *Oxyrrhynchium pumilum*, *Cryphaea heteromalla*, *Orthotrichum stramineum*, *Orthotrichum affine*, *Lejeunea cavifolia*, *Amblystegium serpens*, *Atrichum undulatum*, *Lophocolea bidentata* and *Frullania dilatata*.

No relevé was undertaken in this habitat type as it was too narrow to accommodate a relevé of 10x10m size.

This habitat type did not align with the Annex I habitat "Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]". This was due to the fact that the habitat did not contain sufficient numbers of positive indicator species to warrant classification as 91E0* habitat, and that the habitat more closely aligned with WN2 habitat, with only small pockets of WN6 vegetation occurring.

This area aligned with the following vegetative community, as described in the Irish Vegetation Classification¹⁴:

I. WL2C - Ash-Sycamore Woodland

This area was characterised by a canopy dominated by Ash, with Beech also occasionally found in the canopy and an understorey formed mainly by Hazel and Elder, with Hawthorn only occurring sporadically. The field layer here is, in places, dominated by Ramsons, while fern species such as Hart's-tongue are also frequently encountered along the banks of the stream. Other species recorded in the field layer include Ivy, Bramble, Cleavers, Common Hogweed, Herb-robert and Lesser Celandine. Bryophyte species which are often found in the ground layer include *Hypnum cupressiforme* var. *cupressiforme* and *Fissidens taxifolius*.

3.2.5 WD1 - Mixed broadleaved woodland

Several areas of mixed broadleaved woodland were identified across the site, both east and west of the existing N11 dual carriageway. The canopies of these woodland areas are comprised of several different tree species, often dominated by non-natives such as Eucalyptus, Sycamore, Beech, Norway Spruce and Pines *Pinus* spp. Native species such as Sessile Oak occur occasionally, but are often smaller specimens, not quite at canopy level. The understorey is usually dominated by Holly, with Hazel also occurring but to a lesser degree. The field layer varies considerably across the areas identified as mixed broadleaved woodland within the study area and this is often due to the species composition of the canopy and associated light penetration. Field layer species recorded in these woodland habitats include Ramsons, Bramble (which often forms dense thicket patches), Honeysuckle and ferns. On lower slopes the field layer is more diverse and includes species such as Bluebell, Great Wood-rush, Pignut, Wood Speedwell *Veronica montana* and Dog Violet *Viola riviniana*. In terms of ground flora bryophyte species, generally the most abundant species recorded in areas of this woodland type include the following: *Isothecium myosuroides* var. *myosuroides*, *Kindbergia praelonga*, *Mnium hornum* and *Brachythecium rutabulum*. Less frequently recorded species included: *Hypnum cupressiforme* var. *cupressiforme*, *Metzgeria furcata*, *Hypnum cupressiforme* var. *resupinatum*, *Frullania dilatata*, *Pseudotaxiphyllum elegans*, *Thamnobryum alopecurum*, *Fissidens taxifolius*, *Plagiothecium succulentum*, *Eurhynchium striatum*, *Neckera complanata*, *Thuidium tamariscinum*, *Isothecium alopecuroides*, *Polytrichastrum formosum* and *Hookeria lucens*.

Examples of mixed broadleaved woodland (WD1) , recorded in the Glen of the Downs, are displayed in **Plate 6** and **Plate 7**.



Plate 6: Example of Mixed Broadleaved Woodland (WD1) recorded in the north-east of the site.



Plate 7: Mixed Broadleaved Woodland (WD1), dominated by Beech, recorded along the western side of the Glen of the Downs.

Three relevés (GOTD_01; GOTD_03; GOTD_06; and GOTD_11) were recorded in this habitat type, the results of which are presented in Appendix A.

Within the areas of Mixed broadleaved woodland (WD1) habitat, three vegetative communities, as described in the Irish Vegetation Classification, were identified and are described below. Other areas of mixed broadleaved woodland do not align with any of the vegetation communities defined in the IVC at present.

I. WL2D – Beech- Ivy Woodland

Here Beech dominates the canopy, while Sessile Oak occurs occasionally, along with Sycamore and Ash. Holly, Hazel and young Beech are present in the understorey and dense areas of Cherry Laurel occur in places. Ivy is present in the field layer, along with Lords and Ladies *Arum maculatum*, Honeysuckle, ferns and occasionally Great Wood-rush and spring species. A true characteristic of this vegetative community is the presence of a blanket of beech nuts on the ground, reflecting the dominance of Beech in the canopy. Characteristic bryophyte species recorded in the ground layer include *Kindbergia praelonga*, *Thamnobryum alopecurum*, *Eurhynchium striatum* and *Thuidium tamariscinum*. Other species regularly noted include *Isothecium myosuroides* var. *myosuroides*, *Mnium hornum*, *Brachythecium rutabulum*, *Fissidens taxifolius*, *Plagiothecium succulentum*, *Isothecium alopecuroides* and *Polytrichastrum formosum*.

II. WL2C - Ash-Sycamore Woodland

This area lies in the south-west of the site, along Drummin Road. Here, Sycamore dominates the canopy, while Ash is occasional. Wych Elm, Cherry and Beech also occur. The understorey is composed of Holly, Hazel and Elder, with Holly and Elder being more frequently encountered than Hazel. The field layer is dominated by Ramsons, with Soft-shield fern frequent and Bramble, Hart's-tongue, Wood Avens and Honeysuckle occasional. Characteristic bryophyte species recorded in the ground flora include *Brachythecium rutabulum*, *Thamnobryum alopecurum* and *Neckera complanata*.

III. WL1B- Sessile Oak – Great Wood-rush Woodland

This area lies on the western side of the glen, along the existing N11. Here, Beech and Sessile Oak occur in similar proportions in the canopy, and the understorey is comprised of Holly. Great Wood-rush forms

a dense carpet in the field layer and Soft Shield-fern and Broad Buckler-fern are also found. Characteristic bryophyte species recorded in the ground layer include *Kindbergia praelonga*, *Thamnobryum alopecurum*, *Eurhynchium striatum* and *Thuidium tamariscinum*. Other species regularly noted include *Isothecium myosuroides* var. *myosuroides*, *Mnium hornum*, *Brachythecium rutabulum*, *Fissidens taxifolius*, *Plagiothecium succulentum*, *Isothecium alopecuroides* and *Polytrichastrum formosum*.

This area also corresponds with the Annex I habitat Old oak woodlands [91A0].

3.2.6 WD2 - Mixed broadleaved/conifer woodland

A number of areas of mixed broadleaved/conifer woodland were identified within the study area. One such area lies approximately half way down the eastern boundary of the study area. Here, Scot's Pine dominates the canopy, with Sessile Oak and Downy Birch occurring less frequently. The understorey is quite dense with Holly dominating and other species such as Rowan and young Beech and Oaks occurring occasionally. Honeysuckle and Ivy are the most frequently occurring field layer species, with Great Wood-rush and Bilberry encountered less often. Bracken and Dog Violet *Viola riviniana* are rarely present. In terms of bryophytes present in the ground flora, the most abundant species is *Kindbergia praelonga*. *Eurhynchium striatum* is frequently encountered. Occasionally occurring species include *Isothecium myosuroides* var. *myosuroides*, *Hypnum cupressiforme* var. *cupressiforme*, *Hypnum cupressiforme* var. *resupinatum*, *Dicranella heteromalla*, *Frullania dilatata*, *Atrichum undulatum*, *Hypnum andoi* and *Ulota bruchii*. The following species are rarely encountered: *Metzgeria furcata*, *Mnium hornum*, *Pseudotaxiphyllum elegans*, *Plagiothecium succulentum*, *Lophocolea bidentata*, *Thuidium tamariscinum*, *Polytrichastrum formosum*, *Lophocolea heterophylla*, *Fissidens bryoides*, *Leucobryum glaucum*, *Rhytidiadelphus squarrosus* and *Weissia controversa*.

The south-eastern corner of the study area is also composed of mixed broadleaved/conifer woodland. The canopy is composed of Scot's Pine, Beech and Douglas Fir, with Lime *Tilia cordata* and Sweet Chestnut *Castanea sativa* occasionally encountered. The understorey is largely composed of Holly, with Elder and Hazel occurring towards the southern extent. Field layer species include Honeysuckle, Ivy, Broad-buckler fern, Wood Sage, Bramble, Soft-shield fern and Bracken. The field layer is quite dense and scrubby as one moves eastwards. Ground flora consists of a number of bryophyte species. Additional bryophytes to those contained in the previously discussed area include the following: *Kindbergia praelonga*, *Brachythecium rutabulum*, *Frullania dilatata*, *Fissidens taxifolius*, *Conocephalum conicum*, *Plagiomnium undulatum*, *Hookeria lucens*, *Calypogeia arguta*, *Calypogeia arguta*, *Calypogeia arguta* and *Oxyrrhynchium pumilum*. This habitat type is displayed in **Plate 8**.

There are no vegetation communities described in the Irish Vegetation Classification¹⁴ which align with this habitat type and therefore vegetative communities were not assigned to this habitat type.



Plate 8: Mixed Broadleaved/ Conifer Woodland (WD2) located on the east side of the Glen of the Downs.

3.2.7 WD3 - Mixed conifer woodland

Two areas of mixed conifer woodland were identified on the eastern side of the glen. Here conifer species such as Douglas Fir *Pseudotsuga menziesii*, Scot's Pine *Pinus sylvestris* and Sitka Spruce *Picea sitchensis* dominate the canopy. Sessile Oak and Beech are present occasionally. The understory is largely composed of Holly, while Hazel and Rowan are only rarely encountered. The field layer includes fern species such as Bracken *Pteridium aquilinum* and Broad-buckler fern, Bramble, Honeysuckle, Ivy, Great Wood-rush, Wood Sage *Teucrium scorodonia* and Broom *Cytisus scoparius*. Wood Sorrel occurs occasionally. In terms of ground flora, two bryophyte species occur frequently: *Isoetes macrospora* var. *macrospora* and *Hypnum cupressiforme* var. *cupressiforme*. Other less frequently recorded bryophyte species include: *Mnium hornum*, *Lophocolea bidentata*, *Thuidium tamariscinum*, *Kindbergia praelonga*, *Hypnum cupressiforme* var. *resupinatum*, *Dicranella heteromalla*, *Pseudotaxiphyllum elegans*, *Thamnobryum alopecurum*, *Plagiothecium succulentum*, *Eurhynchium striatum*, *Calypogeia arguta*, *Dicranum scoparium*, *Lophocolea heterophylla*, *Rhynchostegiella tenella*, *Hypnum andoi*, *Fissidens bryoides*, *Hypnum jutlandicum*, *Leucobryum glaucum*, *Orthodontium lineare* and *Tortula muralis*.

One area of mixed conifer woodland lies on the western side of the study area. The canopy here comprises Scot's Pine and Norway Spruce. The understorey is made up of Holly, Elder and Hazel, while the field layer is composed of Honeysuckle, Ivy, Broad-buckler fern, Wood Sage, Bramble, Soft-shield fern, Bracken, Foxglove *Digitalis purpurea*, Navelwort *Umbilicus rupestris*, Cleavers, Herb-robert and Chickweed *Stellaria media*. In terms of ground flora, *Kindbergia praelonga* was the most abundant species present, with *Hypnum cupressiforme* var. *cupressiforme* occurring frequently. Other species, occurring occasionally include *Isoetes macrospora* var. *macrospora*, *Mnium hornum*, *Hypnum cupressiforme* var. *resupinatum* and *Brachythecium rutabulum*. The rare bryophyte species *Plagiothecium curvifolium* is located here. This species is not abundant in this area.

An example of mixed conifer woodland recorded in the Glen of the Downs is presented in **Plate 9**.

There are no vegetation communities described in the Irish Vegetation Classification¹⁴ which align with this habitat type and therefore vegetative communities were not assigned to this habitat type.

One relevé (GOTD_13) was recorded in this habitat type, the results of which are presented in Appendix A.



Plate 9: Mixed Conifer Woodland (WD3) recorded on the east side of the Glen of the Downs.

3.2.8 WS1 - Scrub

Three areas of scrub were identified within the Glen of the Downs, all in the southern half of the site. One area of scrub lies in the south-west of the study area, to the north of an isolated area of wet willow-alder-ash woodland. This area is largely composed of dense Bramble and fern species such as Broad-buckler fern and Soft-shield fern.

A second area of scrub lies along the Three-trouts stream at the northbound diverge (Delgany exit) of Junction (Delgany/ Drummin). Scrubby species identified here include dense Bramble, Butterfly Bush, and Traveller's-joy.

A second area of scrub lies in vegetation along the southbound diverge (Delgany exit) of Junction 10 (Delgany / Drummin). Here, the scrub occurs alongside immature woodland, and is composed of Gorse, Butterfly Bush *Buddleja davidii* and Hedge Bindweed *Calystegia sepium*.

Scrub also occurs in a mosaic with other habitats within the study area. Along the western side of the glen an area of scrub and dry meadows and grassy verges occurs (GS2/ WS1). The scrub elements of this habitat include pockets of dense Gorse which are scattered throughout the grassland. Scrub also occurs in a mosaic with amenity grassland (WS1/ GA2) at the Drummin Road exit. Here the scrub components include dense Bramble with Butterfly Bush, Traveller's-joy, Ash and Elm.

There are no vegetation communities described in the Irish Vegetation Classification¹⁴ which align with this habitat type and therefore vegetative communities were not assigned to this habitat type.

3.2.9 HH1 - Dry Siliceous Heath

One area of dry siliceous heath was identified within the study area- located on the eastern side on the glen, along the top of the slope. Vegetation here comprises Ling *Calluna vulgaris*, Gorse *Ulex europaea*, Bracken, Soft-shield fern, Herb-robert, Holly, Honeysuckle and Wood Sage. Bryophyte species recorded here include the following; *Isoetecium myosuroides* var. *myosuroides*, *Hypnum cupressiforme* var. *cupressiforme*, *Dicranum scoparium*, *Campylopus introflexus*, *Bryum capillare*, *Hypnum jutlandicum*, *Pseudoscleropodium purum* and *Polytrichum juniperinum*. The area of dry siliceous heath is shown in **Plate 10**.

This habitat type did not align with any of the vegetative communities described in the Irish Vegetation Classification¹⁴ and had low affinities with *Calluna vulgaris* -*Hypnum jutlandicum* heath (HE2B) or *Ulex europaeus* – *Rubus fruticosus* agg. scrub (SC1D).



Plate 10: Dry Siliceous Heath recorded in the east of Glen of the Downs.

3.2.10 BL3 - Buildings and other artificial surfaces

The existing car park on the eastern side of the Glen of the Downs and the Wicklow County Council depot which exists on the west side of the site, as well as footpaths associated with some of the nearby junctions, were classified as this habitat type. These areas are composed of hard surfaces, generally tarmacadam, and are largely devoid of any significant vegetation. In terms of bryophyte species, the following were recorded in these areas; *Kindbergia praelonga*, *Hypnum cupressiforme* var. *resupinatum*, *Brachythecium rutabulum*, *Brachythecium rivulare*, *Bryum capillare*, *Didymodon insulanus*, *Cratoneuron filicinum*, *Rhytidiadelphus squarrosus*, *Calliergonella cuspidata*, *Ceratodon purpureus*, *Schistidium crassipilum*, *Hypnum cupressiforme* var. *cupressiforme*, *Metzgeria furcata*, *Frullania dilatata*, *Rhynchostegiella tenella*, *Orthotrichum cupulatum*, *Orthotrichum lyellii*, *Barbula unguiculata*, *Bryum argenteum*, *Bryum dichotomum*, *Didymodon fallax* and *Syntrichia latifolia*.

3.2.11 GS2 - Dry Meadows and Grassy Verges

Two areas³⁰ of dry meadows and grassy verges identified within the study area are associated with the road margins. These areas are not managed intensively and are more than likely mown only once or twice a year. Grassy verges identified in the study area were dominated by tall tussocky grass species such as False Oat-grass *Arrhenatherum elatius* and Cock's-foot *Dactylis glomerata*. Herbaceous species including Creeping Thistle *Cirsium arvense*, Hedge Bindweed and Winter Heliotrope *Petasites fragrans* also occurred.

³⁰ One area occurs in a mosaic with Gorse scrub (GS2/ WS1) along the western side of the glen.

3.2.12 GA2 - Amenity Grassland

Amenity grassland occurred as part of the road margin, where grassland habitat had been mown short and was actively managed. This was most often recorded along the slip roads of junctions within the study area. It is reasonably species poor, being composed of grass species such as Red Fescue *Festuca rubra*, Cock's-foot, Yorkshire Fog *Holcus lanatus* and Perennial Ryegrass *Lolium perenne*, as well as low-growing herbaceous species including White Clover *Trifolium repens* and Ribwort Plantain *Plantago lanceolata*. This habitat was recorded in a mosaic with scrub (WS1/ GA2) at the Drummin Road exit.

3.2.13 WS2 - Immature Woodland

An area of roadside planting, categorised here as immature woodland (WS2), occurs along the southbound diverge (Delgany exit) of Junction 10 (Delgany / Drummin). It is largely composed of Sycamore and Ash trees, which are semi-mature. Bramble and Herb-robert are present in the field layer, as well as grass species from the adjacent amenity grassland (GA2). Young saplings of Sycamore and Ash comprise the understorey, which is reasonably sparse.

3.2.14 FP1 - Calcareous Spring

A calcareous spring was recorded in the north-eastern corner of the site, in an area of mixed broadleaved woodland (WD1). This habitat consists of a seepage at the top of the slope which forms a stream running down the slope and into the adjacent field. Bryophytes recorded here include *Pellia endiviifolia*, *Rhynchostegium riparioides*, *Eurhynchium hians*, *Palustriella commutata* and *Cratoneuron filicinum*. Surrounding vegetation consists of Hart's tongue, Beech, Holly, Enchanter's Nightshade and Ivy. The location of the calcareous spring habitat is shown in **Figure 8**.

The calcareous spring identified here corresponds with the priority Annex I habitat "*Petrifying Springs with Tufa Formation (Cratoneurion) [*7220]*". This is due to the large amount of tufa which is present and the presence of two positive indicator species for the priority Annex I habitat type - *Pellia endiviifolia* and *Palustriella commutata*. It is worth noting also that at the spring head, towards the top of the slope the density of *Palustriella commutata* and *Pellia endiviifolia* is greater than at the base where the relevé was taken. In addition to these two positive indicator bryophyte species, a large amount of Opposite-leaved Golden Saxifrage *Chrysosplenium oppositifolium* is present at the spring head, which is a herbaceous positive indicator species for the Petrifying Springs priority Annex I habitat type.

One relevé (GOTD_16) was recorded in this habitat type, the results of which are presented in Appendix A.

Tufa formation and indicator species for this habitat type are shown in **Plate 11** and **Plate 12**.



Plate 11: Tufa formation (Calcareous spring (FP1)) in the seepage located in the north-east of the site.



Plate 12: Vegetation at the spring head, showing lush blankets of indicator bryophyte species and Opposite-leaved Golden Saxifrage.

Figure 8: Location of priority Annex I habitat Petrifying Spring [7220]* in the north-east of the site.



Figure 9: Habitat Map (as per Fossitt 2000) of Glen of the Downs.

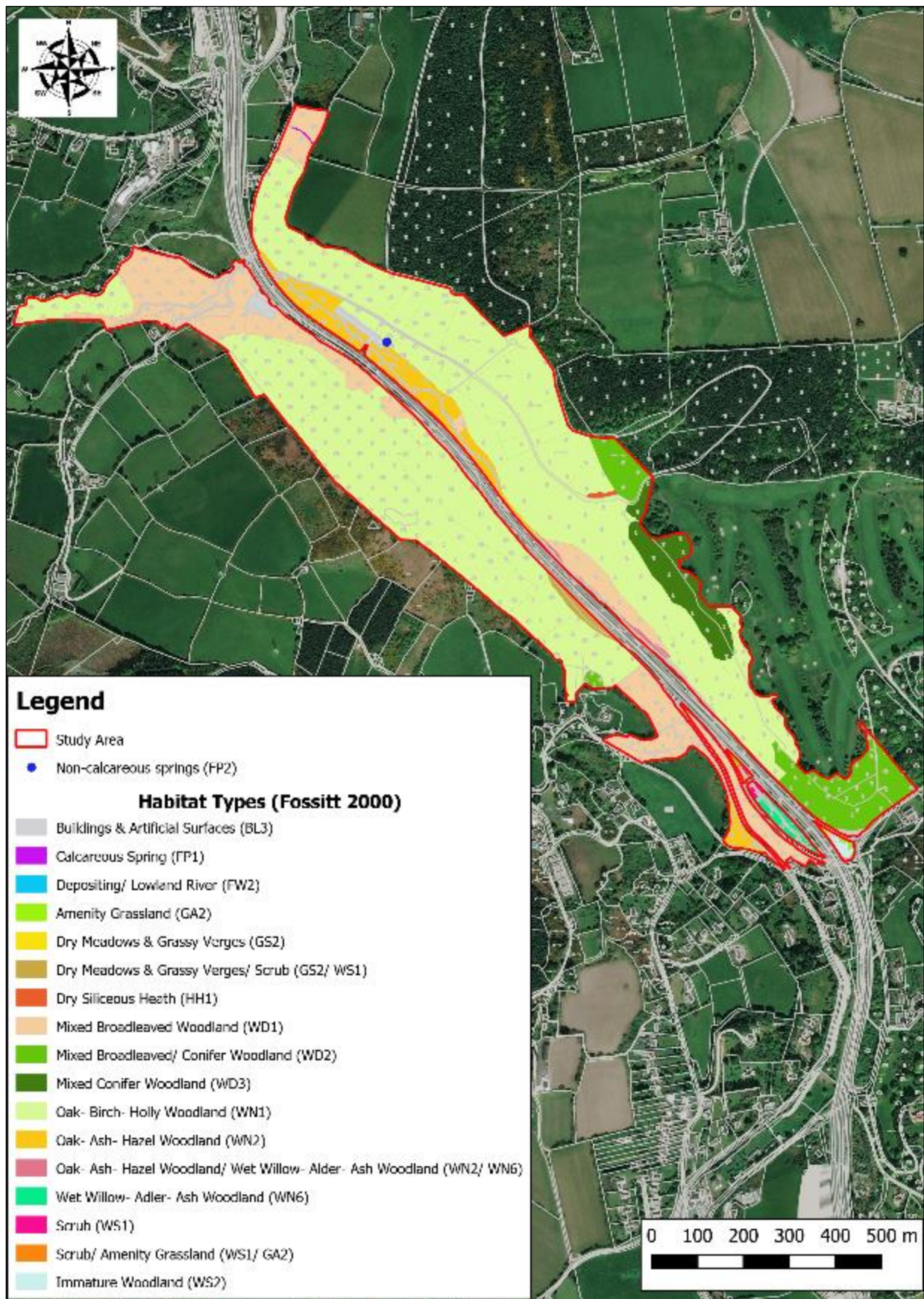
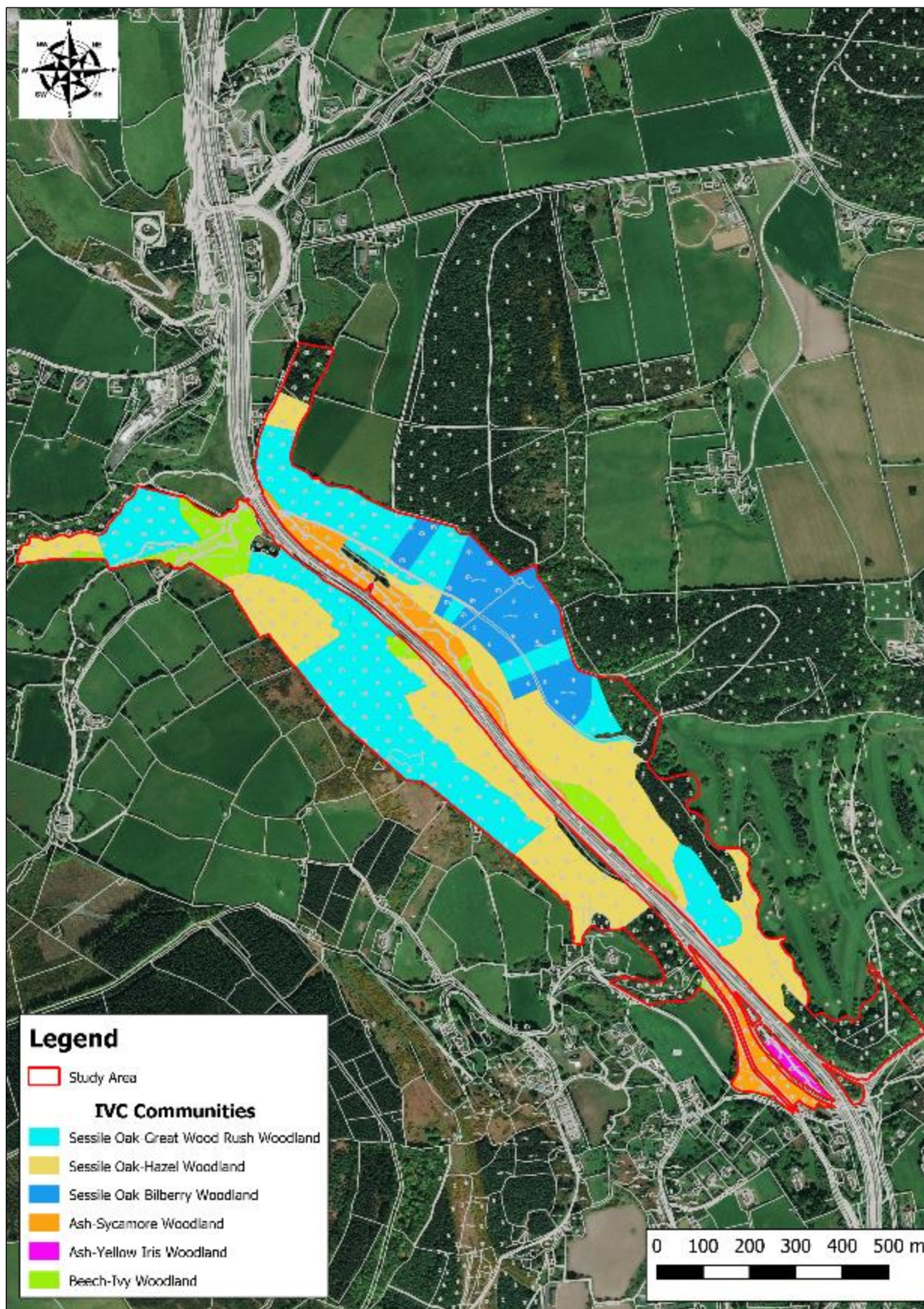


Figure 10: Vegetative Communities identified in Glen of the Downs (as per Irish Vegetation Classification).



3.3 Rare Bryophytes

As noted in the Site Synopsis for the Glen of the Downs SAC **Error! Bookmark not defined.**, the site is known to support populations of some rare bryophytes, namely *Cephaloziella turneri*, *Pterigynandrum filiforme* and *Plagiothecium curvifolium*. Two of these species, *Cephaloziella turneri* and *Plagiothecium curvifolium*, were recorded during a bryophyte survey conducted by Dr. Rory Hodd in May 2019. The locations of these bryophyte species are shown on **Figure 11** **Figure 11**. According to the British Bryological Society's *Atlas of British and Irish Bryophytes*³¹, the Glen of the Downs is one of only six known Irish locations for *Cephaloziella turneri*, with the other records from Co. Donegal and south coast counties like Cork and Wexford. Similarly, the Glen is one of six known Irish locations for *Plagiothecium curvifolium*, with the other records spreading from Co. Wexford, the Leitrim- Roscommon region, to Co. Derry. This means that the Glen of the Downs is one of a handful of locations for these two rare bryophyte species on the east coast. *Plagiothecium curvifolium* often occurs on low-lying ground and is usually found on leaf litter or tree stumps in conifer plantations³². It is typically found in woodland and is known to occur in deciduous woodland as well as conifer. It is often found growing on exposed roots, especially of trees with acid bark, such as alder, birch, oak and pine³¹. *Cephaloziella turneri* is often found on steep, crumbly, acidic soil among tree roots overhanging coastal creeks. It is also known to grow on banks of laneways or ditches, usually in light shade³².

³¹ Blockeel, T.L., Bosanquet, S.D.S., Hill, M.O. and Preston, C.D. (2014). *Atlas of British and Irish bryophytes*. British Bryological Society.

³² British Bryological Society (2010). *Mosses and Liverworts of Britain and Ireland- A Field Guide*.

Figure 11: Locations of Rare Bryophyte Species recorded in Glen of the Downs (May 2019).



4 Conclusion

The habitats present within the Glen of the Downs study area have been identified and mapped. Ten different habitat types, of varying ecological significance, have been recorded within the study area. Three semi-natural woodland habitats exist: Oak-birch-holly woodland (WN1), Oak-ash-hazel woodland (WN2) and Wet Willow-alder-ash woodland (WN6). Within the various woodland habitats identified on site, a number of different vegetative communities exist. Of particular note is the large extent of the Annex I habitat “Old Sessile Oak Woods with *Ilex* and *Blechnum* in the British Isles [91A0]” on site. This habitat type is protected under the Habitats Directive (1992) and is the Qualifying Interest (QI) habitat for the Glen of the Downs SAC. In addition, a calcareous spring (FP1), which corresponds with the priority Annex I habitat “Petrifying Springs with Tufa Formation (*Cratoneurion*) [*7220]” was recorded in the north-east of the site. This is a groundwater dependent habitat and is protected under the Habitats Directive (1992). Importantly, this habitat type is not a QI for this SAC. In addition, the areas of WN6 at the site correspond to Annex I habitat “Alluvial Forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]” but are poor examples due to the prevalence of non-native species and other invasive species. Finally, two rare bryophyte species – *Cephaloziella turneri* and *Plagiothecium curvifolium* - for which the Glen of the Downs is one of only six known sites in Ireland known to contain these species, were recorded. In conclusion, there are a number of Annex I habitat constraints to be considered in association with any proposed road improvement works in the vicinity of the Glen of the Downs.

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Appendix A

This Appendix presents the relevé data collected in the Glen of the Downs study area in May and October 2019.

The recorders referred to in the tables below are as follows:

CK	Caroline Kelly
RH	Dr. Rory Hodd
AF	Alexis Fitzgerald

The habitat codes listed in the tables below are as per Fossitt's *A Guide to Habitats in Ireland* (2000) and, where areas are deemed to align with Annex I habitat types the associated code of the Annex I habitat is provided, as per the European Commission's *Interpretation Manual of European Union Habitats [EUR 28]* (2013).

The locations of the relevés were taken using the Irish National Grid Reference coordinate system and are presented below in the same system.

Plant abundance scores were recorded as percentage cover.

Where Fossitt habitat correspond to Annex I habitat types, positive/ target indicator species appear in bold in the relevé tables, while negative indicator species are underlined.

Oak-Birch-Holly Woodland (WN1) Relevés:

Relevé Code	GOTD_04
Date	29/05/2019
Recorder	CK & RH
Grid Reference	O2633910781
Aspect	East
Slope	45°
Topography	Hillside
Habitat - Fossitt	WN1
Habitat – Annex I	91A0
ERICA Assigned IVC Community	WL1A- Quercus robur- Luzula sylvatica Community Quercus petraea – Luzula sylvatica Group (88.1% affinity)
Species Recording Scale	Percentage
Species	Percentage
Quercus x rosacea	90
Ilex aquifolium	75
<i>Hedera helix</i>	0.3
Oxalis acetosella	0.1
Luzula sylvatica	0.5
<i>Dryopteris affinis</i>	5
<i>Dryopteris dilatata</i>	0.7
Blechnum spicant	0.5
<i>Polystichum setiferum</i>	1
<i>Atrichum undulatum</i>	0.1
Hypnum cupressiforme	0.1
Pseudotaxiphyllum elegans	1
Isothecium myosuroides	0.5
<i>Kindbergia praelonga</i>	0.3
Mnium hornum	5
<i>Thuidium tamariscinum</i>	0.1
<i>Dicranella heteromalla</i>	0.3
Physical Criteria	Percentage
Bare Soil	10
Rocks	3
Litter	90
Dead Wood	0.5

Relevé Code	GOTD_04
Surface Water	0
Ground Layer	5
Field Layer	7
Shrub Layer	75
Canopy	90



Plate 13: Area of Oak-Birch-Holly Woodland (WN1) in which relevé GOTD_04 was recorded.

Relevé Code	GOTD_05
Date	29/05/2019
Recorder	CK & RH
Grid Reference	O2609711044
Aspect	East
Slope	60°
Topography	Hillside
Habitat - Fossitt	WN1
Habitat – Annex I	91A0
ERICA Assigned IVC Community	WL1A- Quercus robur- Luzula sylvatica Community Quercus petraea – Luzula sylvatica Group (68% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Quercus x rosacea</i>	75
<i>Betula pubescens</i>	3
<i>Luzula sylvatica</i>	20
<i>Polypodium vulgare</i>	0.1
<i>Metzgeria furcata</i>	0.1
<i>Dicranum scoparium</i>	0.3
<i>Hypnum cupressiforme</i>	1
<i>Pseudotaxiphyllum elegans</i>	0.5
<i>Isothecium myosuroides</i>	3
<i>Kindbergia praelonga</i>	1
<i>Mnium hornum</i>	0.3
<i>Thuidium tamariscinum</i>	3
<i>Polytrichastrum formosum</i>	3
<i>Campylopus introflexus</i>	0.1
<i>Frullania dilatata</i>	0.1
<i>Lophocolea bidentata</i>	0.3
Physical Criteria	Percentage
Bare Soil	15
Rocks	5
Litter	60
Dead Wood	1
Surface Water	0
Ground Layer	10

Relevé Code	GOTD_05
Field Layer	20
Shrub Layer	5
Canopy	75



Plate 14: Location in which relevé GOTD_05 was recorded.

Relevé Code	GOTD_08
Date	30/05/2019
Recorder	CK & RH
Grid Reference	O2564311705
Aspect	North-west
Slope	40°
Topography	Hillside
Habitat - Fossitt	WN1
Habitat – Annex I	91A0
ERICA Assigned IVC Community	WL1A- Quercus robur- Luzula sylvatica Community Quercus petraea – Luzula sylvatica Group (98.1% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Quercus x rosacea</i>	70
<i>Fagus sylvatica</i>	15
<i>Ilex aquifolium</i>	50
<i>Luzula sylvatica</i>	70
<i>Hedera helix</i>	0.5
<i>Lonicera periclymenum</i>	5
<i>Rubus fruticosus</i>	1
<i>Deschampsia flexuosa</i>	0.1
<i>Campylopus pyriformis</i>	0.1
<i>Dicranella heteromalla</i>	0.1
<i>Hypnum cupressiforme</i>	1
<i>Pseudotaxiphyllum elegans</i>	0.3
<i>Isothecium myosuroides</i>	10
<i>Kindbergia praelonga</i>	1
<i>Mnium hornum</i>	0.5
<i>Thuidium tamariscinum</i>	0.1
<i>Polytrichastrum formosum</i>	0.3
Physical Criteria	Percentage
Bare Soil	1
Rocks	0.1
Litter	25
Dead Wood	0.3
Surface Water	0

Relevé Code	GOTD_08
Ground Layer	10
Field Layer	75
Shrub Layer	70
Canopy	85



Plate 15: Relevé GOTD_08 recorded in Oak-Birch-Holly Woodland (WN1).

Relevé Code	GOTD_12
Date	30/05/2019
Recorder	CK & RH
Grid Reference	O2668110611
Aspect	South-west
Slope	45°
Topography	Steep Hillside
Habitat - Fossitt	WN1
Habitat – Annex I	91A0
ERICA Assigned IVC Community	WL1A- Quercus robur- Luzula sylvatica Community Quercus petraea – Luzula sylvatica Group (80% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Quercus x rosacea</i>	80
<i>Abies grandis</i>	0.5
<i>Fagus sylvatica</i>	25
<i>Ilex aquifolium</i>	70
<i>Lonicera periclymenum</i>	1
<i>Teucrium scorodonia</i>	0.1
<i>Deschampsia flexuosa</i>	1
<i>Hypnum cupressiforme</i>	10
<i>Isoetes myosuroides</i>	20
<i>Polytrichastrum formosum</i>	0.3
<i>Thuidium tamariscinum</i>	0.3
<i>Plagiothecium succulentum</i>	0.1
Physical Criteria	Percentage
Bare Soil	1
Rocks	0.3
Litter	70
Dead Wood	0
Surface Water	0
Ground Layer	30
Field Layer	15

Relevé Code	GOTD_12
Shrub Layer	70
Canopy	80



Plate 16: Relevé GOTD_12 in Oak-Birch-Holly Woodland (WN1).

Relevé Code	GOTD_14
Date	30/05/2019
Recorder	CK & RH
Grid Reference	O2661210706
Aspect	South-west
Slope	50°
Topography	Hillside
Habitat - Fossitt	WN1
Habitat – Annex I	91A0
ERICA Assigned IVC Community	WL1A- Quercus robur- Luzula sylvatica Community Quercus petraea – Luzula sylvatica Group (97.1% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Quercus x rosacea</i>	80
<i>Pinus sylvestris</i>	5
<i>Ilex aquifolium</i>	70
<i>Prunus laurocerasus</i>	7
<i>Sorbus aucuparia</i>	5
<i>Taxus baccata</i>	5
<i>Luzula sylvatica</i>	30
<i>Lonicera periclymenum</i>	7
<i>Rubus fruticosus</i>	0.5
<i>Teucrium scorodonia</i>	1
<i>Deschampsia flexuosa</i>	0.1
<i>Dryopteris dilatata</i>	1
<i>Polypodium vulgare</i>	0.1
<i>Hypnum cupressiforme</i>	1
<i>Tetraphis pellucida</i>	0.1
<i>Isoetes macrospora</i>	5
Physical Criteria	Percentage
Bare Soil	5
Rocks	0.1
Litter	70

Relevé Code	GOTD_14
Dead Wood	0.3
Surface Water	0
Ground Layer	5
Field Layer	40
Shrub Layer	75
Canopy	80



Plate 17: Relevé GOTD_14 recorded in Oak-Birch-Holly Woodland (WN1).

Relevé Code	GOTD_15
Date	30/05/2019
Recorder	CK & RH
Grid Reference	O2633711036
Aspect	South-west
Slope	40°
Topography	Hillside
Habitat - Fossitt	WN1
Habitat – Annex I	91A0
ERICA Assigned IVC Community	WL1A- Quercus robur- Luzula sylvatica Community Quercus petraea – Luzula sylvatica Group (53% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Quercus x rosacea</i>	70
<i>Fagus sylvatica</i>	70
<i>Ilex aquifolium</i>	60
<i>Hedera helix</i>	0.5
<i>Luzula sylvatica</i>	0.1
<i>Pseudotaxiphyllum elegans</i>	3
<i>Isothecium myosuroides</i>	0.3
<i>Leucobryum glaucum</i>	3
<i>Mnium hornum</i>	0.3
<i>Thuidium tamariscinum</i>	0.1
<i>Lepidozia reptans</i>	0.1
<i>Metzgeria furcata</i>	0.1
Physical Criteria	Percentage
Bare Soil	1
Rocks	0.3
Litter	95
Dead Wood	0.3
Surface Water	0
Ground Layer	5
Field Layer	0.5
Shrub Layer	60
Canopy	90



Plate 18: Relevé GOTD_15 as recorded in Oak-Birch-Holly Woodland (WN1).

Oak-Ash-Hazel Woodland (WN2) relevés:

Relevé Code	GOTD_02
Date	29/05/2019
Recorder	CK & RH
Grid Reference	O2665810410
Aspect	South-east
Slope	35°
Topography	Hillside
Habitat - Fossitt	WN2
Habitat – Annex I	N/A
ERICA Assigned IVC Community	WL2A- Quercus robur- Circaea lutetiana Community Fraxinus excelsior – Hedera helix Group (54.7% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Acer pseudoplatanus</i>	10
<i>Fagus sylvatica</i>	25
<i>Fraxinus excelsior</i>	15
<i>Quercus robur</i>	60
<i>Ilex aquifolium</i>	5
<i>Tilia x europaea</i>	15
<i>Ulmus glabra</i>	20
<i>Rubus fruticosus</i>	0.5
<i>Allium ursinum</i>	90
<i>Arum maculatum</i>	0.5
<i>Polystichum setiferum</i>	50
<i>Dryopteris dilatata</i>	0.1
<i>Brachythecium rutabulum</i>	0.3
<i>Isoetium myosuroides</i>	0.1
<i>Kindbergia praelonga</i>	0.5
<i>Hypnum cupressiforme</i>	0.1
<i>Lophocolea bidentata</i>	0.1
Physical Criteria	Percentage
Bare Soil	5

Relevé Code	GOTD_02
Rocks	0
Litter	10
Dead Wood	3
Surface Water	0
Ground Layer	0.5
Field Layer	95
Shrub Layer	20
Canopy	90

Relevé Code	GOTD_09
Date	30/05/2019
Recorder	CK & RH
Grid Reference	O2575011508
Aspect	N/A
Slope	0°
Topography	Flat
Habitat - Fossitt	WN2
Habitat – Annex I	N/A
ERICA Assigned IVC Community	WL2D- <i>Fagus sylvatica</i> – <i>Hedera helix</i> Community <i>Fraxinus excelsior</i> – <i>Hedera helix</i> Group (99.6% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Acer pseudoplatanus</i>	10
<i>Fagus sylvatica</i>	75
<i>Aesculus hippocastanum</i>	0.1
<i>Fraxinus excelsior</i>	50
<i>Ilex aquifolium</i>	20
<i>Hedera helix</i>	5
<i>Rubus fruticosus</i>	1
<i>Allium ursinum</i>	90
<i>Arum maculatum</i>	0.3
<i>Isoetes macrospora</i>	0.5
<i>Hypnum resupinatum</i>	0.1
<i>Kindbergia praelonga</i>	0.1
<i>Neckera complanata</i>	0.5
<i>Thamnobryum alopecurum</i>	0.1
<i>Metzgeria furcata</i>	0.1
Physical Criteria	Percentage
Bare Soil	0
Rocks	0
Litter	5
Dead Wood	5
Surface Water	0
Ground Layer	0
Field Layer	95

Relevé Code	GOTD_09
Shrub Layer	30
Canopy	95



Plate 19: Relevé GOTD_09 in Oak-Ash-Hazel Woodland (WN2).

Relevé Code	GOTD_10
Date	30/05/2019
Recorder	CK & RH
Grid Reference	O2597111390
Aspect	West
Slope	3°
Topography	Fairly flat
Habitat - Fossitt	WN2
Habitat – Annex I	N/A
ERICA Assigned IVC Community	WL2C- Fraxinus excelsior – Acer pseudoplatanus Community Fraxinus excelsior – Hedera helix Group (56.8% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Quercus x rosacea</i>	40
<i>Fraxinus excelsior</i>	50
<i>Fagus sylvatica</i>	3
<i>Corylus avellana</i>	60
<i>Prunus laurocerasus</i>	20
<i>Hedera helix</i>	15
<i>Lonicera periclymenum</i>	3
<i>Rubus fruticosus</i>	20
<i>Allium ursinum</i>	70
<i>Anemone nemorosa</i>	0.1
<i>Arum maculatum</i>	0.1
<i>Galium aparine</i>	0.1
<i>Ranunculus ficaria</i>	0.1
<i>Veronica montana</i>	0.3
<i>Asplenium scolopendrium</i>	0.5
<i>Polystichum setiferum</i>	10
<i>Brachythecium rutabulum</i>	0.3
<i>Isoetecium myosuroides</i>	0.3
<i>Kindbergia praelonga</i>	0.1
<i>Thamnobryum alopecurum</i>	3
<i>Metzgeria furcata</i>	0.1
<i>Rhynchostegium confertum</i>	0.1

Relevé Code	GOTD_10
Physical Criteria	Percentage
Bare Soil	0.5
Rocks	0.1
Litter	5
Dead Wood	0
Surface Water	0
Ground Layer	3
Field Layer	95
Shrub Layer	60
Canopy	80



Plate 20: Relevé GOTD_10 in Oak-Ash-Hazel Woodland (WN2).

Wet Willow-Alder-Ash Woodland (WN6) relevés:

Relevé Code	GOTD_07
Date	29/05/2019
Recorder	CK & RH
Grid Reference	O2677110406
Aspect	N/A
Slope	0°
Topography	Flat
Habitat - Fossitt	WN6
Habitat – Annex I	91E0
ERICA Assigned IVC Community	WL3D- Salix cinerea – Urtica dioica Community Alnus glutinosa – Filipendula ulmaria Group (67% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Acer pseudoplatanus</i>	15
<i>Fagus sylvatica</i>	1
<i>Fraxinus excelsior</i>	0.3
<i>Salix cinerea</i>	15
<i>Populus x canadensis</i>	60
<i>Hedera helix</i>	5
<i>Rubus fruticosus</i>	5
<i>Allium ursinum</i>	50
<i>Anemone nemorosa</i>	0.3
<i>Angelica sylvestris</i>	0.3
<i>Calystegia sepium</i>	0.1
<i>Clematis vitalba</i>	0.3
<i>Leycesteria formosa</i>	3
<i>Arum maculatum</i>	0.1
<i>Filipendula ulmaria</i>	0.1
<i>Galium aparine</i>	0.3
<i>Geranium robertianum</i>	0.1
<i>Geum urbanum</i>	0.1
<i>Heracleum sphondylium</i>	0.5

Relevé Code	GOTD_07
<i>Hypericum androsaemum</i>	0.5
<i>Iris pseudacorus</i>	0.1
<i>Oenanthe crocata</i>	0.3
<i>Petasites fragrans</i>	50
<i>Ranunculus repens</i>	0.1
<i>Rumex sanguineus</i>	0.1
<i>Stachys palustre</i>	0.3
<i>Urtica dioica</i>	0.3
<i>Carex remota</i>	0.5
<i>Brachypodium sylvaticum</i>	0.5
<i>Holcus lanatus</i>	0.1
<i>Athyrium filix-femina</i>	0.3
<i>Dryopteris affinis</i>	15
<i>Dryopteris dilatata</i>	3
<i>Asplenium scolopendrium</i>	3
<i>Polystichum setiferum</i>	10
<i>Cryphaea heteromalla</i>	0.1
<i>Brachythecium rutabulum</i>	0.5
<i>Orthotrichum affine</i>	0.1
<i>Kindbergia praelonga</i>	1
<i>Plagiomnium undulatum</i>	0.5
<i>Thamnobryum alopecurum</i>	0.5
<i>Frullania dilatata</i>	0.3
<i>Metzgeria furcata</i>	0.1
Physical Criteria	Percentage
Bare Soil	3
Rocks	0
Litter	3
Dead Wood	1
Surface Water	0
Ground Layer	3
Field Layer	90

Relevé Code	GOTD_07
Shrub Layer	20
Canopy	75



Plate 21: Relevé GOTD_07 in Wet Willow-Alder-Ash Woodland (WN6).

Mixed Broadleaved Woodland (WD1) relevés:

Relevé Code	GOTD_01
Date	29/05/2019
Recorder	CK & RH
Grid Reference	O2674510364
Aspect	East
Slope	Steep
Topography	Hillside
Habitat - Fossitt	WD1
Habitat – Annex I	N/A
ERICA Assigned IVC Community	WL2C- Fraxinus excelsior – Acer pseudoplatanus Community Fraxinus excelsior – Hedera helix Group (30% affinity)* *this relevé has a low affinity to this IVC group. This may be due to the fact that it is a modified habitat and therefore does not easily correspond to IVC groups, compared with semi-natural habitats. Furthermore, ERICA has identified this as a “Transitional” relevé type, meaning that whilst it falls within the scope of the current classification scheme, it does not relate to the core definition of any of the IVC communities.
Species Recording Scale	Percentage
Species	Percentage
<i>Acer pseudoplatanus</i>	90
<i>Fagus sylvatica</i>	1
<i>Hedera helix</i>	1
<i>Rubus fruticosus</i>	1
<i>Allium ursinum</i>	90
<i>Arum maculatum</i>	0.5
<i>Dryopteris affinis</i>	5
<i>Dryopteris dilatata</i>	0.5
<i>Asplenium scolopendrium</i>	1
<i>Polystichum setiferum</i>	50
<i>Clematis vitalba</i>	10
<i>Leycesteria formosa</i>	1
<i>Brachythecium rutabulum</i>	0.3
<i>Hookeria lucens</i>	0.1

Relevé Code	GOTD_01
<i>Kindbergia praelonga</i>	1
<i>Rhizomnium punctatum</i>	0.1
<i>Thamnobryum alopecurum</i>	0.5
<i>Plagiothecium succulentum</i>	0.1
<i>Metzgeria furcata</i>	0.1
<i>Plagiochila porelloides</i>	0.1
Physical Criteria	Percentage
Bare Soil	0.5
Rocks	0
Litter	10
Dead Wood	0
Surface Water	0
Ground Layer	3
Field Layer	99
Shrub Layer	1
Canopy	90



Plate 22: Location in which relevé GOTD_01 was recorded.

Relevé Code	GOTD_03
Date	29/05/2019
Recorder	CK & RH
Grid Reference	O2646410684
Aspect	East
Slope	30°
Topography	Hillside
Habitat - Fossitt	WD1
Habitat – Annex I	N/A
ERICA Assigned IVC Community	WL2D- <i>Fagus sylvatica</i> – <i>Hedera helix</i> Community <i>Fraxinus excelsior</i> – <i>Hedera helix</i> Group (81.3% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Corylus avellana</i>	25
<i>Fagus sylvatica</i>	20
<i>Fraxinus excelsior</i>	15
<i>Eucalyptus globulus</i>	60
<i>Hedera helix</i>	1
<i>Rubus fruticosus</i>	3
<i>Lonicera periclymenum</i>	15
<i>Luzula sylvatica</i>	0.5
<i>Polystichum setiferum</i>	40
<i>Dryopteris dilatata</i>	0.1
<i>Pteridium aquilinum</i>	0.5
<i>Brachythecium rutabulum</i>	0.5
<i>Isoetecium myosuroides</i>	0.1
<i>Kindbergia praelonga</i>	1
<i>Hypnum cupressiforme</i>	0.1
<i>Lophocolea bidentata</i>	0.1
Physical Criteria	Percentage
Bare Soil	3
Rocks	0
Litter	30
Dead Wood	3
Surface Water	0
Ground Layer	1

Relevé Code	GOTD_03
Field Layer	60
Shrub Layer	25
Canopy	75



Plate 23: Area of Mixed Broadleaved Woodland (WD1) in which relevé GOTD_03 was recorded.

Relevé Code	GOTD_06
Date	29/05/2019
Recorder	CK & RH
Grid Reference	O2592011300
Aspect	East
Slope	20°
Topography	Gradual slope
Habitat - Fossitt	WD1
Habitat – Annex I	N/A
ERICA Assigned IVC Community	WL2D- <i>Fagus sylvatica</i> – <i>Hedera helix</i> Community <i>Fraxinus excelsior</i> – <i>Hedera helix</i> Group (70.9% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Fagus sylvatica</i>	95
<i>Ilex aquifolium</i>	1
<i>Quercus x rosacea</i>	5
<i>Luzula sylvatica</i>	5
<i>Brachythecium rutabulum</i>	0.1
<i>Dicranum scoparium</i>	0.1
<i>Hypnum cupressiforme</i>	1
<i>Pseudotaxiphyllum elegans</i>	0.3
<i>Isothecium myosuroides</i>	1
<i>Kindbergia praelonga</i>	3
<i>Mnium hornum</i>	1
<i>Polytrichastrum formosum</i>	0.3
<i>Campylopus introflexus</i>	0.1
<i>Thuidium tamariscinum</i>	0.1
<i>Metzgeria furcata</i>	0.1
<i>Dicranella heteromalla</i>	0.1
Physical Criteria	Percentage
Bare Soil	0.5
Rocks	0.5
Litter	95
Dead Wood	1
Surface Water	0
Ground Layer	5

Relevé Code	GOTD_06
Field Layer	3
Shrub Layer	0.1
Canopy	95



Plate 24: Relevé GOTD_06 In Mixed Broadleaved Woodland (WD1) habitat.

Relevé Code	GOTD_11
Date	30/05/2019
Recorder	CK & RH
Grid Reference	O2640410899
Aspect	South-west
Slope	45°
Topography	Hillside
Habitat - Fossitt	WD1
Habitat – Annex I	N/A
ERICA Assigned IVC Community	WL2D- <i>Fagus sylvatica</i> – <i>Hedera helix</i> Community <i>Fraxinus excelsior</i> – <i>Hedera helix</i> Group (74.2% affinity)
Species Recording Scale	Percentage
Species	Percentage
<i>Acer pseudoplatanus</i>	20
<i>Fagus sylvatica</i>	90
<i>Quercus x rosacea</i>	26
<i>Eucalyptus globulus</i>	5
<i>Ilex aquifolium</i>	60
<i>Hedera helix</i>	0.3
<i>Lonicera periclymenum</i>	0.5
<i>Dryopteris dilatata</i>	0.1
<i>Polystichum setiferum</i>	1
<i>Isoetes macrospora</i>	0.1
<i>Fissidens taxifolius</i>	0.1
<i>Hypnum cupressiforme</i>	1
<i>Pseudotaxiphyllum elegans</i>	0.3
<i>Thuidium tamariscinum</i>	0.1
<i>Plagiothecium succulentum</i>	0.1
Physical Criteria	Percentage
Bare Soil	0
Rocks	0
Litter	90
Dead Wood	5
Surface Water	0
Ground Layer	1
Field Layer	5

Relevé Code	GOTD_11
Shrub Layer	60
Canopy	90



Plate 25: Relevé GOTD_11 recorded in Mixed Broadleaved Woodland (WD1).

Mixed Conifer Woodland (WD3) relevés:

Relevé Code	GOTD_13
Date	30/05/2019
Recorder	CK & RH
Grid Reference	O2690710447
Aspect	South- South-west
Slope	5°
Topography	Fairly flat
Habitat - Fossitt	WD3
Habitat – Annex I	N/A
ERICA Assigned IVC Community	WL2A- Quercus robur – Circaea lutetiana Community Fraxinus excelsior – Hedera helix Group (15.4% affinity)* * this relevé has a low affinity to this IVC group. This may be due to the fact that it is a modified habitat and therefore does not easily correspond to IVC groups, compared with semi-natural habitats. Furthermore, ERICA has identified this as a “Transitional” relevé type, meaning that whilst it falls within the scope of the current classification scheme, it does not relate to the core definition of any of the IVC communities.
Species Recording Scale	Percentage
Species	Percentage
<i>Acer pseudoplatanus</i>	5
<i>Castanea sativa</i>	0.1
<i>Fraxinus excelsior</i>	0.5
<i>Ilex aquifolium</i>	15
<i>Pseudotsuga menziesii</i>	80
<i>Hedera helix</i>	0.3
<i>Rubus fruticosus</i>	75
<i>Lonicera periclymenum</i>	5
<i>Dryopteris affinis</i>	3
<i>Dryopteris dilatata</i>	0.3
<i>Polystichum setiferum</i>	7
<i>Carex sylvatica</i>	0.1
<i>Kindbergia praelonga</i>	0.5
Physical Criteria	Percentage
Bare Soil	0
Rocks	0
Litter	10
Dead Wood	0

Relevé Code	GOTD_13
Surface Water	0
Ground Layer	0.5
Field Layer	90
Shrub Layer	15
Canopy	80



Plate 26: Relevé GOTD_13 in Mixed Conifer Woodland (WD3).

Calcareous Spring (FP1) relevé:

Relevé Code	GOTD_16
Date	09/10/2019
Recorder	CK & AF
Grid Reference	O2566911925
Aspect	West
Slope	5°
Topography	Fairly flat
Habitat - Fossitt	FP1
Habitat – Annex I	7220
ERICA Assigned IVC Community	WL2D- <i>Fagus sylvatica</i> – <i>Hedera helix</i> Community <i>Fraxinus excelsior</i> – <i>Hedera helix</i> Group (98.3% affinity)* *The IVC community assigned to this relevé by the ERICA tool, is taken from the “woodland” division of the classification, as communities for springs have not yet been established. Therefore, this does not reflect the spring habitat which occurs here. Due to the size of the relevé (4m ² compared with a typical woodland relevé of 10m ²), this community does not reflect the composition of the surrounding woodland habitat either.
Relevé Area	4m ²
Species Recording Scale	Percentage
Species	Percentage
<i>Carex sylvatica</i>	0.3
<i>Circaea lutetiana</i>	0.1
<i>Fagus sylvatica</i>	100
<i>Fraxinus excelsior</i>	0.3
<i>Geranium robertianum</i>	0.1
<i>Hedera helix</i>	10
<i>Ilex aquifolium</i>	3
<i>Polystichum setiferum</i>	0.1
<i>Rubus fruticosus</i>	5
<i>Cratoneuron filicinum</i>	0.5
<i>Oxyrrhynchium hians</i>	1
<i>Pellia endiviifolia</i>	3
<i>Rhynchostegium riparioides</i>	3
<i>Palustriella commutata</i>	1
Physical Criteria	Percentage
Bare Soil	7
Bare Rock	0

Relevé Code	GOTD_16
Cover of Litter	3
Ground Layer	8
Field Layer	15
Canopy	100
Cover of Tufa	70 (40% oncoid structure; 30% stream crust)



Plate 27: Relevé GOTD_16 as recorded in Calcareous Spring habitat (FP1).