



**Appropriate Assessment  
Report**

**N6 Galway City Ring  
Road**

For

**An Bord Pleanála**

ABP Ref. ABP-302848-18, ABP-  
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## 1. Summary

- 1.1.1** The N6 Galway City Ring Road (N6 GCRR) is a proposed road to the north of Galway, extending for approximately 18km from the R336 west of Bearna to a junction with the N6 at Briarhill, with a new crossing of the River Corrib. The proposed road is part Protected Road and part Motorway, and the subject of a single planning application. To inform the application, the proposed road is the topic of an Environmental Impact Assessment and Natura Impact Assessment, as required by the EIA Directive and the Habitats Directive, respectively. My brief, and the topic of this report, is to complete an independent assessment of the N6GCRR under the Habitats Directive, both screening and appropriate assessment stages, to facilitate the final assessment which will be undertaken by the Board of An Bord Pleanála.
- 1.1.2** There are 18 Natura 2000 sites within 15km of the proposed road, one of which, the Lough Corrib cSAC, would be crossed by the proposed road. Therefore, a screening assessment is required under the Habitats Directive (and associated national legislation). Galway County Council, on behalf of itself and Galway City Council, (the applicant) undertook its own screening assessment and concluded that “likely significant effects” could not be ruled out for two Natura 2000 sites; these were Lough Corrib, which is designated as a candidate Special Area of Conservation (cSAC) and a Special Protection Area (SPA), and Galway Bay which is also designated as a cSAC and SPA. In both cases, the areas covered by the two designations substantially overlap but differ.
- 1.1.3** I agree with the applicant’s conclusions in its screening assessment for these two Natura 2000 sites. However, I identified an additional three possible pathways for impact on these and other Natura 2000 sites, primarily in relation to potential cumulative or “in combination” effects. These pathways were (i) spillage/leakage of fluids and materials from construction related traffic when travelling along older roads immediately adjacent to Natura 2000 sites; (ii) loss and decline of populations of certain species outside the Natura 2000 network reducing the resilience of populations of the same or different species inside the Natura 2000 network; and (iii) increasing recreational pressure on certain Natura 2000 sites due to increased mobility of an expanding human population. Therefore, I concluded that “likely significant effects” could not be ruled out for 16 other Natura 2000 designations in the locality.
- 1.1.4** The applicant’s full assessment of the impact of the proposed road on Lough Corrib and Galway Bay is set out in the Natura Impact Statement (NIS) and subsequent documents. Eight types of potential impact were identified by the applicant which could affect the qualifying interest features and therefore the conservation objectives for Lough Corrib cSAC, plus four types for Galway Bay Complex cSAC, three for Lough Corrib SPA and three for Inner Galway Bay SPA; eleven potential impact types in total. The potential impacts identified include, variously, direct loss and damage of habitats, reduction in groundwater quality and quantity, reduction in surface water quality, smothering of vegetation by dust, disruption of otter movements, disturbance of birds from rock blasting and direct mortality of certain qualifying species during construction and operation. No potential in combination impacts were identified by the applicant. Avoidance, design and mitigation measures have been put forward by the applicant to address all of the identified impacts, which enabled the applicant to reach the conclusion that there would not be

an adverse effect on the integrity of any European site as a result of the construction and operation of the N6 GCRR.

**1.1.5** Using the applicant's data and other sources, I have reassessed the potential effects on Natura 2000 sites. As previously mentioned, I identified a slightly broader range of potential impact pathways on a higher number of Natura 2000 sites, and the potential for in combination effects arising from the road in combination with other developments and the planned population growth for Galway. As well as the three identified in paragraph 1.1.3, those additional impact pathways are (i) habitat isolation of habitat parcels to the north and south of the proposed road and (ii) habitat degradation due to noise and light. On potential impacts associated with the reduction in groundwater quality and quantity (hydrogeology), the assessment was achieved with the support of Mr. James Dodds.

**1.1.6** Re-consideration of the impact pathways led to the identification of a further set of mitigation measures which are needed to reduce the risk of undermining the conservation objectives of any Natura 2000 site to nil. At the project level, these additional mitigation measures are relatively minor amendments to the design and ways of working to reduce the risk of degrading habitats within Natura 2000 sites during both the construction and operation phases (measures to reduce noise, light, dust, invasive species etc.). In addition, broader mitigation measures are required to reduce the risk of 'in combination' effects. Most of these have already been identified as part of the appropriate assessment of the Galway County Development Plan and the Galway City Development Plan, of which the N6 GCRR is a major component, and therefore will be completed by Galway County Council and Galway City Council during the lifetime of the plans. Implementation of these measures will ensure that the risk of in combination effects on Natura 2000 sites is reduced to nil.

**1.1.7** Of particular importance among the mitigation measures included in the Plans, are:

- Preparation and implementation of an Integrated Management Plans for Lough Corrib cSAC, Ross Lake and Woods cSAC, (Inner) Galway Bay (Complex) cSAC SPA (especially Rusheen Bay and Lough Atalia), the Twelve Bens/Garraun Complex and Maumturk Mountains cSAC;
- The development of an ecological network within Galway City, to include the protection of and the implementation of measures to control of non-native invasive species within the City; and
- Improvements in air and water quality.

**1.1.8** Taking both the applicant's avoidance, design and mitigation measures into account, including those set out in the two development plans, and the additional mitigation measures that I have identified, it can be concluded that the conservation objectives of any Natura 2000 site would not be undermined and therefore the integrity of the Natura 2000 sites will be maintained. However, it must be stressed that this conclusion is dependent on the effective implementation of all the identified mitigation measures in this appropriate assessment report.

## 2. Introduction

### 2.1 Proposed Development

**2.1.1** The N6 Galway City Ring Road is a proposed road to the north of Galway City, approximately 18km in length, extending from a new junction with the R336 at the western side of Bearna to the existing N6 to the east of Galway City at Coolagh, Briarhill. The proposed road comprises a single carriageway from the new junction with the R336 to the Ballymoneen Road (approximately 6km of the route) and a dual carriageway from the Ballymoneen Road to where it joins the existing N6 (approximately 12km of the route), including a junction with the N59 at Letteragh. The proposed road would be a Protected Road from the R336 as far as the junction with the N59 and then a motorway eastward from the N59 junction to the existing N6. The proposal includes a number of junctions, link roads, slip roads and associated infrastructure. The applicant is Galway County Council, on behalf of itself and Galway City Council.

**2.1.2** The application for the N6 Galway City Ring Road follows a previous application for a new road to the north of Galway City, the N6 Galway City Outer Bypass. This was part consented however the decision was overturned in the Irish Supreme court following a ruling by the ECJ (European Union Court of Justice Case C-258/11). This was due to its direct impact (destruction) on approximately 1.47 hectares of a qualifying interest feature of the Lough Corrib candidate Special Area of Conservation (cSAC), namely 8240\* Limestone Pavement, which is an Annex I priority habitat. The proposed N6 Galway City Ring Road follows a different route to the N6 Galway City Outer Bypass. However, it would pass through the same cSAC, with the proposed road mostly, but not completely, in a tunnel or on a bridge where it overlaps with the cSAC. The locality is rich in other sites designated for their nature conservation interest, which although not directly affected by the N6 Galway City Ring Road, could be indirectly affected.

### 2.2 Legislative Background

**2.2.1** The applicant has provided a summary of the relevant legislation in the Natura Impact Statement (NIS) p3 to p6. This sets out the circumstances in which an assessment under the Habitats Directive and The European Communities (Birds and Natural Habitats) Regulations 2011, as amended, is required.

### 2.3 Natura Impact Statement

**2.3.1** To support the planning application, the applicant has prepared a screening report and a Natura Impact Statement (NIS) for the N6 Galway City Ring Road, as follows:

- Provision of Information for Appropriate Assessment Screening for N6 Galway City Ring Road, Scott Cawley 2<sup>nd</sup> June 2017, **the “Screening Report”**; and
- N6 Galway City Ring Road Natura Impact Statement Vol. 2 Main Report, Arup September 2018, **the “NIS”**.



**2.3.2** Following the production of these two documents, additional relevant information has been provided by the applicant at various stages of the planning process (as set out in section 2.5 below). This includes:

- Request for Further Information Response Vols 1- 3 in particular, responses to items 3a through to 3o, 4a to 4c and 5a to 5b, **the “RFI response”**;
- Statement of Evidence: Responses to Appropriate Assessment Objection/Submission dated 19<sup>th</sup> February 2020, **the “AA Statement of Evidence”**;
- Statement of Evidence: Responses to Hydrogeology Objection/Submissions dated 19<sup>th</sup> February 2020, **the “Hydrogeology Statement of Evidence”**;
- A Corrigenda dated 21<sup>st</sup> February 2020, and updated 11<sup>th</sup> March 2020, which corrects some details in previously submitted documents, **the “Corrigenda”**;
- Response to Queries raised in Module 2 [sic] of the N6 Galway City Ring Road Oral Hearing dated 10<sup>th</sup> March 2020, **the “Module 1 response”**;
- AA - In-combination Assessment Addendum Update Report (Dealing with proposed and permitted projects and plans since publication of the Natura Impact Statement) dated 10<sup>th</sup> March 2020, updated on 15<sup>th</sup> October 2020 and again on 3<sup>rd</sup> November 2020 and supplemented on 4<sup>th</sup> November, with the last two forming the complete assessment, **the “in-combination assessment update”**; and
- Additional Polygon 1f Data submitted as (i) 2017 Field Notes relating to Polygon 1f together with map and photograph; (ii) Soil Depth measurements of various transects in Polygon 1.f, dated 10 March 2020 and (iii) Composite Map of all Relevé Locations in Polygon 1.f, **the “Area 1.f update”**.

**2.3.3** These documents together are taken to be information provided by the applicant in support of the appropriate assessment under the Habitats Directive and The European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Additional information is provided in other planning documents including the Environmental Impact Assessment Report **the “EIAR report”** and **the “Design Report”** (submitted as part of the FIR response, Volume 4).

## **2.4 Submissions**

**2.4.1** The applicant refers to 17 submissions which relate to the NIS or appropriate assessment for the proposed N6 Galway City Ring Road prior to the oral hearing, of which nine are addressed by the applicant in the AA Statement of Evidence. In summary:

- The Department of Culture, heritage and the Gaeltacht/ National Parks and Wildlife Service (NPWS) made several detailed points over two submissions (21<sup>st</sup> December 2019 applicant’s reference S\_018.1 **“NPWS1”**; 24<sup>th</sup> January 2020 S\_018.2 **“NPWS2”**, see Appendix 1 of my report), the first of these submissions, *inter alia*, (i) advised detailed attention to be paid to mitigation from an early stage, (ii) asked for a clearer account of effects on the Lough Corrib cSAC (than presented in the NIS), (iii) asked for a clearer depiction of groundwater flows, (iv) asked for greater reference to the Conservation Objectives, (v) stressed the importance of effective mitigation for otter, (vi) identified the proposed River Corrib bridge as a potential

threat to Special Conservation Interest (SCI)<sup>1</sup> bird populations and (vii) made a procedural point on the appropriate assessment, while the second of these submissions, *inter alia*, (i) acknowledges the additional information provided, (ii) confirms that the Department no longer considers the proposed River Corrib bridge a threat to SCI bird populations, (iii) accepts that habitat loss and fragmentation for SCI bird species has been satisfactorily addressed but (iv) again seeks further clarification on the hydrogeology model;

- An Taisce (S\_006) observed that the appropriate assessment must comply with recent case law, etc;
- Brian Burton (S\_010) followed An Taisce with more detail, referencing Case-461/14 and specifically the need to consider species and habitats outside the designated site boundaries;
- Peter Sweetman and others (S\_058), and Mary Nestor (Ob\_451\_489) state that the proposed road does not comply with the Habitats Directive, while Linda Rabitte (Ob584.2) and the Menlo Residents Association (S\_048) imply the same; and
- Menlo and Ballindooley Residents (S\_074) refer to impacts of tunnelling, blasting and pollution on the Lough Corrib cSAC, contrary to the Habitats Directive, and the loss of Annex I habitats generally.

**2.4.2** These submissions were responded to by the applicant in the AA Statement of Evidence dated 19<sup>th</sup> February 2020. These submissions and those received at the oral hearing are addressed directly in Appendix 2 of my report.

## **2.5 Further Information Request and Oral Hearing**

**2.5.1** Following the submission of the screening report and the NIS, a request for further information (FIR) was made by An Bord Pleanála in April 2019 with a response received from the applicant on 30<sup>th</sup> August 2019.

**2.5.2** An oral hearing for the proposed road took place between 18<sup>th</sup> February 2020 and 4<sup>th</sup> November 2020, the hearing having been interrupted by the Covid-19 pandemic. The applicant responded to written submissions on ecology and hydrology/geohydrology on 19<sup>th</sup> and 20<sup>th</sup> February 2020, respectively, as set out in its statements of evidence. Oral submissions from the prescribed bodies including the Department of Culture, Heritage and the Gaeltacht (NPWS), pertaining to ecology and hydrology/ geohydrology were made on 21<sup>st</sup> February 2020, while Module 1, which dealt specifically with ecology and hydrology/geohydrology, took place on 24<sup>th</sup> and 25<sup>th</sup> February 2020 and 10<sup>th</sup> and 11<sup>th</sup> March 2020. Module 1 was completed prior to the interruption caused by the pandemic. At the oral hearing, six submissions related to the AA assessment, or referred to potential effects on Natura 2000 sites. In summary these were:

- The Department of Culture, Heritage and the Gaeltacht on 21<sup>st</sup> February **NPWS3** which sought further clarification from the applicant on several points relevant, or potentially

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<sup>1</sup> The bird species populations that are the reason for designation of a Special Protection Area are its Special Conservation Interest while the habitats and species that are the reason for the designation of a Special Area of Conservation are its Qualifying Interest; for convenience the term qualifying interest is generally applied to both types of designated site in this report.

relevant, to the appropriate assessment (a) the groundwater regime operating in the vicinity of the proposed Lackagh tunnel, (b) catchment areas and groundwater flow regimes of Ground Water Dependent Terrestrial Ecosystems (GWDTEs) in the Lough Corrib cSAC, (d) proposed mitigation for Marsh Fritillary and (e) further detail on the provision of compensatory Annex I habitat, the NPWS making clear that (e) is in relation to the general environmental impact assessment rather than the appropriate assessment<sup>2</sup>. The statement goes on to note that the conclusions of the NIS are reliant on mitigation measures, supported by monitoring, and stresses the importance of making sure these are effective, timely, encompass the lifetime of the development and safeguarded from future development.

- Ms. Deidre Goggin who raised concerns about the tunnelling elements of the road, understanding this to be cut and cover construction, within the Lough Corrib cSAC. She also observed that the boundaries of the cSAC seem to have been drawn to accommodate the road development, with karst continuing beneath the road, and that the rulings of the ECJ have been ignored. She raised concerns about hydrogeology and the links provided by homes and gardens which would be lost to the development, she questioned whether a longer tunnel would be more appropriate.
- Mr McDonagh raised concerns about the potential for water quality effects on the River Corrib resulting from road discharges and existing pollution within Lackagh Quarry, stating that oil already leaks into the cSAC from here. He also made points about the loss of petrifying springs within the Lackagh Quarry including the difficulty of recreating these within the quarry (which are on the boundary of the cSAC and as possible Annex I habitat).
- Mr Dowds (a planning consultant) on behalf of the N6 Action Group, who challenged the applicants over the level of certainty in reaching the conclusions with the NIS, chiefly because there was a need for monitoring to inform the mitigation during construction, the need for monitoring being an indication of uncertainty. The two key areas were the monitoring of the rock mass at the western approach to the Lackagh tunnel, upon which there is limestone pavement included in the cSAC and monitoring of pollutants/contaminants during the construction process, with the potential for contaminated material entering the River Corrib and other parts of the cSAC. The remedial actions in both circumstances being unknown. In summary, Mr. Dowds questioned the credibility of applicant's case that building a motorway adjacent to an cSAC could be done without causing damage to the cSAC, due to predictable difficulties on construction sites, and therefore due to this risk, the application should be considered under Article 6(4) of the Habitats Directive, refer c641/17.
- Galway Athletics Board, which considered the project to be contrary to the Habitats Directive and prior court judgements on this topic, due to the loss of limestone pavement, and the potential impact on freshwater pearl mussels in the River Corrib,

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<sup>2</sup> I have used the letters used by the NPWS for each item, and item (c) is not relevant to the appropriate assessment, hence not given here.

based on observations of a species of mussel observed in the River, as well as concerns about an attenuation pond close to River.

- Mr Dermot A Flanagan SC (a barrister) on behalf of McHugh Property Holdings who considered the proposed road to be in accordance with the provisions of the Habitats Directive, although this was not his main area of consideration.

**2.5.3** These submissions were responded to by the applicant at the oral hearing, including a written response to the NPWS submission, which is included in the Module 1 response.

**2.5.4** Further, Mr. Dodds and I put a series of questions to both the NPWS and the applicant to seek clarification on aspects of the NIS and associated information, and to inform this report. The questions and the answers were provided by the NPWS in its submission on 10<sup>th</sup> March 2020 **NPWS4** and by the applicant in the Module 1 response. The four NPWS submissions are gathered in Appendix 1.

## **2.6 Site Visits and Scope**

**2.6.1** In addition to the information, observations and responses described above, I undertook two site visits to gain a general understanding of the receiving environment, including the relevant parts of Lough Corrib cSAC, these were on 6<sup>th</sup> and 7<sup>th</sup> March 2019 and 12<sup>th</sup> and 13<sup>th</sup> November 2019. Mr. Dodds also made a site visit.

**2.6.2** This Appropriate Assessment report provides an assessment of the N6 Galway City Ring Road (referred to by the applicant and here as ‘the proposed road (development)’) under the European Union Habitats Directive (Council Directive 92/43/EEC) and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended, which is a necessary step in the planning process. As described above, this follows an assessment under the same legislation that has been completed by the applicant, presented in the Natura Impact Statement (NIS) and subsequent documents. To reduce duplication between these assessments, I have referred to the applicant’s text where appropriate and then summarised, added to or re-assessed, as necessary. The various submissions mentioned above have also been drawn upon for the assessment.

**2.6.3** This document contains measurements of areas which are either taken from the applicants work or measured by me using basic GIS tools but without undertaking detailed GIS work or the use of specialist GIS consultants. The areas that I have measured are therefore approximate and may not reconcile fully with the areas measured by the applicant.

### 3. Screening Assessment (Stage 1)

#### 3.1 Applicant's Screening Assessment

3.1.1 As previously noted, the applicant completed a screening assessment which provides (i) a description of the project (ii) identifies potential impact pathways on European sites and those European sites which lie within the Zone of Influence of the projects; and (iii) identifies potential in-combination effects from other plans and projects. The applicants conclude that "*it is not possible to rule out the possibility of significant effects on four European sites; Lough Corrib cSAC, Lough Corrib SPA, Galway Bay Complex cSAC and Inner Galway Bay SPA*" and therefore the proposed road requires an Appropriate Assessment under the Habitats Directive. Eleven potential sources of impact on qualifying interest features were identified which can be summarised as habitat loss, fragmentation and degradation (from tunnelling, changes in hydrogeology, shading, reduction in air quality, reduction in water quality), and mortality, disturbance, displacement and disrupting the movement of fauna.

#### 3.2 Screening Assessment Methodology

3.2.1 The screening assessment methodology I have followed is based on EC guidance, in particular Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (EC, 2001).

3.2.2 Other methodological guidance referred to includes:

- National Parks and Wildlife Service 'Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities'. (DEHLG, 2010); and
- Managing Natura 2000 sites The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018).

3.2.3 The applicant has provided a brief description of the methodology in the screening assessment p3-p4 and the NIS p5.

#### 3.3 Step One: Management of the Site

3.3.1 The project is not 'directly connected with or necessary to the management of the site' and therefore it needs to be ascertained whether the development is likely to have significant effects on Natura 2000 sites, see screening assessment p3 (foot note).

#### 3.4 Step Two: Description of the Project

3.4.1 The applicant provides a description of the project in Section 2 of the NIS and elsewhere in the application documents, especially the N6 Galway City Ring Road Design Report (Arup, February 2019). In summary, the project comprises:

- New single carriageway road from a new junction with the R336 Coast Road at in An Baile Nua on the western side of Bearna eastwards for approximately 5.6km to the Ballymoneen Road, where there will be a new junction;
- New dual carriageway from the Ballymoneen Road eastwards for approximately 11.9km to a new junction (the Coolagh Junction) with the existing N6;
- A series of other junctions with the existing road network, including a junction with the N59 Moycullen Road at Letteragh, the N84 Headford Road, and the N83 Tuam Road;
- Three link Roads, the N59 Link Road North, connecting to the N59 Moycullen Road, the N59 Link Road South, connecting to Letteragh Road, the Parkmore Link Road connecting to Ballybrit Business Park and the Parkmore Industrial Estate;
- An open span bridge over the River Corrib, 620m in length with eight spans, the main span of 153m is over the river and without supports in the river, the eastern approach is on a retained embankment with five culverts passing beneath the road, with the bridge having a sealed and isolated drainage system which discharges to a new wetland/ attenuation area, Design Report p248, RFI response appendix A.1.1;
- The Menlough viaduct which carries the road over an area of limestone pavement, with the viaduct 320m in length with eight spans of approximately 40m each, with some footings within the limestone pavement, with the viaduct having a sealed and isolated drainage system which discharges to a new wetland/ attenuation area, Design Report p250, RFI response appendix A.1.3;
- The 270m Lackagh Tunnel, which takes the road under (approximately 8.6m below) an area of limestone pavement, Design Report p251 to p255, RFI response Appendix A.1.4, and the 240m Galway Racecourse Tunnel, which takes the road under the racecourse, with both tunnels having a sealed and isolated drainage system, with collected water pumped to the nearest foul sewer, Design Report p255 to p258;
- Seven overbridges to standard design, four carrying roads over the proposed road, one for wildlife and two more at the Coolagh junction, Design Report p239 - p241 and FIR response Appendix A.1.7 , plus 10 underbridges which are all for roads, Design Report p242 - 244 and FIR response Appendix A.1.6.;
- Approximately twenty-eight culverts and underpasses, with two being suitable for otter, 19 being suitable for badger and approximately 26 being suitable for bats, with eight culverts in proximity to the cSAC (five being part of the River Corrib bridge structure and also mentioned above), Design Report p245 to p248, FIR response Appendix A.1.8 and the Module 1 response p26 and Appendix A;
- Ten Retaining walls between 6m and 288m in length, plus five strengthened slopes, three of which are in proximity of the Lough Corrib cSAC, Design Report p258 to 259;
- Drainage infrastructure, with flow rate and pollution controls, to collect and discharge rainwater which falls onto the new road surface and surface water flows (interceptor ditches), which discharge into watercourses, via attenuation ponds, to the west of the River Corrib (including, indirectly and directly, the River Corrib) and a combination of discharging to watercourses (again including the River Corrib, indirectly and directly) and into the ground,

via infiltration basins, to the east of the River Corrib, reflecting the underlying geology (Design Report p265 - p301);

- Road lighting, including along the main carriageway on the western and eastern approaches of the Lackagh tunnel in proximity to the Lough Corrib cSAC, Design Report p332 - 333 and drawings GCOB-1300-D-000 to -015;
- Noise barriers at various locations, including three locations in proximity to Lough Corrib cSAC (i) between Chainage<sup>3</sup> (Ch.) 8+850 to 9+500 on both sides (this is the location of the River Corrib Bridge), (ii) between Ch. 9+990 to 10+100 on the eastbound side (this is in Area 2 (see paragraph 4.5.4), opposite side from the cSAC) and (iii) Ch. 10+420 to 10+780 on the westbound side (Area 3 (see paragraph 4.5.4), before descent to tunnel mouth), Design Report p261 - p264;
- Fencing of various types along the boundary, including timber post and rail, mammal proof fencing and palisade fencing (around ponds, etc.);
- Sign gantries, seven of which are in proximity to the Lough Corrib cSAC, Design Report p259- p260;
- Forty potential Material Deposition Areas, including one at Coolough (0.14ha) Ch. 10+675 (listed in EIAR, shown on Figure 8 of Appendix A.8.26 of EIAR but not shown on Figures 7.301 and 7.302, status unclear) and four at Lackagh Quarry (DA24, DA25, DA27 and DA28) see FIR response p13 to p15 and FIR response Appendix A1.11 (which supersedes the EIAR on this topic), the Module 1 response p38, p57-61 and ;"Responses to Queries raised in Module 2 ...Lackagh Quarry Material Deposition Areas", dated 19<sup>th</sup> Oct 2020.
- Compensatory habitat creation (or in some cases re-instatement), for lost Annex I habitats outside the cSAC, which includes:
  - *Area 6210 R1*<sup>4</sup> to the south of the proposed road at Menlo, including within the Lough Corrib cSAC at Ch. 9+400 to 9+500 partly re-instatement of the existing habitat following construction with some additional habitat creation, see EIAR p 699, EIAR Figures 8.23.1 to 8.23.14 and EIAR Appendix A.8.26;
  - *Area 6210 R2* nearby and co-incident with Compound SC09/01 at Ch. 9+600 to 9+700 essentially re-instatement of the existing habitat after use of the area as a site compound, same references as Area 6210 R1;
  - *Area \*91E0 R1*<sup>5</sup> adjacent to the Lough Corrib cSAC at Ch. 9+850 to Ch. 9+900 same references as Area 6210 R1;
  - *Area 6210 R7* proximate to the Lough Corrib cSAC at Ch. 11+850 to Ch.12+000, same references as Area 6210 R1; and

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<sup>3</sup> Chainage or Ch. Refers to the position along the route of the road from west to east in km and metres, so 8,850m from the start of the road is Ch. 8+850.

<sup>4</sup> The 6210 refers to the intended habitat to be created which in this case is the Annex I habitat type of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites)

<sup>5</sup> \*91E0 is alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*

- *Areas 6210 R5, R6 and R8* (replaces 6210 R3 and R4) within Lackagh Quarry (co-incident with the Material Deposition Areas DA24, DA25 and DA28, respectively) see FIR response Appendix A.1.11 p21 to p23 and “Responses to Queries raised in Module 2 ...Lackagh Quarry Material Deposition Areas”, dated 19<sup>th</sup> Oct 2020;
  - Other ecological mitigation areas, including an extensive area of land at Menlo (approximately 8ha) to the north of the proposed road for bat and barn owl mitigation, see EIAR p710 and EIAR Figure 8.23.7;
  - Landscaping of the soft estate to include screening planting (effectively woodland), boundary hedgerows and stone walls in specific locations and grassland sown with a low maintenance seed mix, with stones over 50mm removed or buried, potential for some exposed rock in cuttings, EIAR p1110 and p1111; and
  - (Up to) thirteen temporary construction compounds, including one at Menlo (East of River Corrib) (SC09/01) and one at Lackagh Quarry (SC11/01), with the Menlo compound approximately 100m from the River Corrib and less than 50m the Lough Corrib cSAC in general, and the Lackagh Quarry compound being adjacent to the Lough Corrib cSAC see Design Report p 387 and EIAR Figures 7.001 and 7.002.
- 3.4.2** The project will take approximately 36 months to construct, including archaeological trial trenching and ground investigation.

### 3.5 Step Three, part 1: Characteristics of the sites

#### *Development Site*

- 3.5.1** The receiving environment is described in the EIAR and the NIS, with Chapters 8 to 12, 16 and 17 of the EIAR and Chapter 5 of the NIS being of most relevance to the Appropriate Assessment. The habitats within the proposed road boundary are listed in the EIAR p495 to p497, then updated for some habitats in Appendix A.3.1. of the FIR Response, with some further corrections given in the Corrigendum p13 to p16. It is not always entirely clear from the applicant’s submission how much of each habitat is lost because sometimes the figure stated is the area within the road boundary rather than what is to be lost to the road development (with some areas potentially retained within the road boundary). In summary, and according to the applicant, the development site will directly affect approximately 280ha of land, comprising approximately the following, of which at least the majority in each case will be lost to the development (known quantities are indicated with the word ‘lost’):
- 85ha improved grassland comprising agricultural (76ha) and amenity grassland (9ha);
  - 60ha of developed land comprising buildings and artificial surfaces (32ha), spoil and bare ground (18ha) and residential properties (10ha);
  - 57.51ha of dry grassland comprising dry calcareous and neutral grassland (43.5ha), dry meadows and verges (9.50ha), dry humid acid grassland (4.51ha);



- 35.46ha (or more) of woodland and scrub comprising scrub (27.10ha), mixed broadleaved woodland (4.40ha), oak-ash-hazel woodland (3.9ha), riparian woodland (0.03ha) mixed broadleaved conifer woodland (0.03ha), hedgerows (10.2km) and treelines (5.2km);
- 15.56ha of wetland comprising wet grassland (15.23ha), poor fen and flush (0.25ha), reed and large sedge swamps (0.08ha) and calcareous springs (15no.);
- 14ha of bracken;
- 5.19ha of non-priority Annex I habitats comprising 1.89ha corrigendum p15 (with 2.47ha lost, corrigendum p13)<sup>6</sup> of wet heath, 2.32ha (with 2.22ha lost) dry heath, 0.25ha (all lost) calcareous grassland, 0.73ha (with 0.07ha lost) of Molinia meadows and 0.001ha (all lost) of blanket bog;
- 2.95ha of Priority Annex I habitats comprising a small part of a turlough 0.1ha, a single (lost) petrifying spring, 0.14ha (all lost) of residual alluvial forest and 2.71ha (with 0.94ha lost) of limestone pavement;
- Watercourses comprising the River Corrib, four streams (955m) and ditches drainage ditches 0.08ha (to be bridged over or culverted); and
- Other small areas of habitat including of exposed calcareous rock (0.02ha), artificial lakes and ponds, flower beds and borders, ornamental/non-native shrubs.

**3.5.2** The area of the development site in proximity to, and overlapping with, the Lough Corrib cSAC is between the west bank of the River Corrib and Lackagh Quarry. Here, the land along the route alignment is mainly dry neutral and calcareous grassland fields divided by hedgerows, treelines and stone walls, interspersed with woodland (mixed broadleaved, oak-ash-hazel and wet willow-alder-ash) and scrub. Other habitats present include a block of improved agricultural grassland, the river itself, wet grassland, part of a turlough and limestone pavement, some of which occurs beneath the woodland and scrub habitats already mentioned. The underlying geology is karst limestone and with surrounding habitats including ground water dependent terrestrial ecosystems (GWDTEs), see, for example, FIR response Figures 2.5.7 and 2.5.8 and 2.6.7 and 2.6.8.

### *Natura 2000 Sites*

**3.5.3** There are effectively two types of Natura 2000 site: Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). SPAs are designated for their bird interest and SACs are designated for their nature conservation interest other than birds. SACs which have not yet been fully adopted by the EC are described as candidate SACs (cSACs). The legal protection for SACs and cSACs is the same.

**3.5.4** In selecting Natura 2000 sites for consideration of likely significant effects, the applicant initially chose a buffer of 15km from the proposed road and considered only the Natura 2000 sites within that buffer. There are a number of Natura 2000 sites within 15km of the development site.

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<sup>6</sup> The assessment is based upon the higher figure of 2.47ha being lost to the development.

These are listed and described briefly by the applicant in Appendix A of the Screening Report. A summary of each of these Natura 2000 sites is provided in Table 1 overleaf.

- 3.5.5** Setting a buffer at 15km is the starting point for this process and is consistent with existing guidance (DEHLG, 2010). However, this guidance also indicates that Natura 2000 sites beyond this distance should also be included in the initial selection of sites for consideration if these may be subject to *'direct, indirect or cumulative effects, taking a precautionary approach so that a site is included if doubt exists'*. The guidance also makes clear that the selection of sites for consideration should be an iterative process. In the screening report, the applicant did not consider the potential for the proposed road to act in combination with other plans and projects to boost tourism and recreation in Connemara, where there are two further Natura 2000 sites, both beyond 15km. These are also included in Table 1 overleaf.

**Table 1: Natura 2000 sites identified for inclusion in the screening assessment.**

Site Code SPA/ SAC	Site Name & designation	Brief Description & Qualifying Features (with code)	Distance to N6 GCRR Site (closest point)
000297	Lough Corrib cSAC	<p>Comprises Lough Corrib, River Corrib, twelve or more other rivers and the land surrounding the Lough, encompassing bog, heath, woodland, grassland and limestone pavement. Supporting important populations of stoneworts in the southern basin of Lough Corrib and a population of lesser horseshoe bats at Ebor Hall.</p> <p>Qualifying Interest: Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110]; Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130]; Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140]; Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260]; Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210]; <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410]; Active raised bogs [7110]; Degraded raised bogs still capable of natural regeneration [7120]; Depressions on peat substrates of the <i>Rhynchosporion</i> [7150]; Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210]; Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]; Alkaline fens [7230]; Limestone pavements [8240]; Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]; Bog woodland [91D0]; <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029]; <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]; <i>Petromyzon marinus</i> (Sea Lamprey) [1095]; <i>Lampetra planeri</i> (Brook Lamprey) [1096]; <i>Salmo salar</i> (Salmon) [1106]; <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]; <i>Lutra lutra</i> (Otter) [1355]; <i>Drepanocladus vernicosus</i> (Slender Green Feather-moss) [1393]; <i>Najas flexilis</i> (Slender Naiad) [1833]</p>	0 km (i.e., overlapping boundaries), to north and south
000268	Galway Bay Complex cSAC	<p>Inner part of Galway Bay including shallow, inter-tidal inlets and bays, small islands, coastal cliffs, lagoons and surrounding terrestrial habitats.</p> <p>Qualifying Interest: Mudflats and sandflats not covered by seawater at low tide [1140]; Coastal lagoons [1150]; Large shallow inlets and bays [1160]; Reefs [1170]; Perennial vegetation of stony</p>	0.16km, south

Site Code SPA/ SAC	Site Name & designation	Brief Description & Qualifying Features (with code)	Distance to N6 GCRR Site (closest point)
		banks [1220]; Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; Salicornia and other annuals colonising mud and sand [1310]; Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> ) [1330]; Mediterranean salt meadows ( <i>Juncetalia maritimi</i> ) [1410]; Turloughs [3180]; <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130]; Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites) [6210]; Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210]; Alkaline fens [7230]; Limestone pavements [8240]; <i>Lutra lutra</i> (Otter) [1355]; <i>Phoca vitulina</i> (Harbour Seal) [1365]	
004042	Lough Corrib SPA	Lough Corrib. Qualifying Interest: Gadwall ( <i>Anas strepera</i> ) [A051]; Shoveler ( <i>Anas clypeata</i> ) [A056]; Pochard ( <i>Aythya ferina</i> ) [A059]; Tufted Duck ( <i>Aythya fuligula</i> ) [A061]; Common Scoter ( <i>Melanitta nigra</i> ) [A065]; Hen Harrier ( <i>Circus cyaneus</i> ) [A082]; Coot ( <i>Fulica atra</i> ) [A125]; Golden Plover ( <i>Pluvialis apricaria</i> ) [A140]; Black-headed Gull ( <i>Chroicocephalus ridibundus</i> ) [A179]; Common Gull ( <i>Larus canus</i> ) [A182]; Common Tern ( <i>Sterna hirundo</i> ) [A193]; Arctic Tern ( <i>Sterna paradisaea</i> ) [A194]; Greenland White-fronted Goose ( <i>Anser albifrons flavirostris</i> ) [A395]; Wetland and Waterbirds [A999]	0.2km
004031	Inner Galway Bay SPA	Inner Galway Bay, see description for Galway Bay Complex cSAC. Qualifying Interest: Great Northern Diver ( <i>Gavia immer</i> ) [A003]; Cormorant ( <i>Phalacrocorax carbo</i> ) [A017]; Grey Heron ( <i>Ardea cinerea</i> ) [A028]; Light-bellied Brent Goose ( <i>Branta bernicla hrota</i> ) [A046]; Wigeon ( <i>Anas penelope</i> ) [A050]; Teal ( <i>Anas crecca</i> ) [A052]; Shoveler ( <i>Anas clypeata</i> ) [A056]; Red-breasted Merganser ( <i>Mergus serrator</i> ) [A069]; Ringed Plover ( <i>Charadrius hiaticula</i> ) [A137]; Golden Plover ( <i>Pluvialis apricaria</i> ) [A140]; Lapwing ( <i>Vanellus vanellus</i> ) [A142]; Dunlin ( <i>Calidris alpina</i> ) [A149]; Bar-tailed Godwit ( <i>Limosa lapponica</i> ) [A157]; Curlew ( <i>Numerius arquata</i> ) [A160]; Redshank ( <i>Tringa totanus</i> ) [A162]; Turnstone ( <i>Arenaria interpres</i> ) [A169]; Black-headed Gull ( <i>Chroicocephalus ridibundus</i> ) [A179]; Common Gull ( <i>Larus canus</i> ) [A182]; Sandwich Tern ( <i>Sterna sandvicensis</i> ) [A191]; Common Tern ( <i>Sterna hirundo</i> ) [A193]; Wetland and Waterbirds [A999]	1.1km

Site Code SPA/ SAC	Site Name & designation	Brief Description & Qualifying Features (with code)	Distance to N6 GCRR Site (closest point)
004142	Cregganna Marsh SPA	Primarily lowland wet grassland with other habitats including limestone pavement. Qualifying Interest: Greenland White-fronted Goose ( <i>Anser albifrons flavirostris</i> ) [A395]	4km, south-east
002034	Connemara Bog Complex cSAC	A very large site encompassing the majority of the south Connemara lowlands, underlain with granite and supporting areas of deep peat, with the main habitat being Atlantic blanket bog. The blanket bog is interspersed with a variety of base-poor terrestrial habitats and lakes, supporting a number of rare plant species. Qualifying Interest: Coastal lagoons [1150]; Reefs [1170]; Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> ) [3110]; Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130]; Natural dystrophic lakes and ponds [3160]; Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260]; Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]; European dry heaths [4030]; <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> ) [6410]; Blanket bogs (* if active bog) [7130]; Transition mires and quaking bogs [7140]; Depressions on peat substrates of the <i>Rhynchosporion</i> [7150]; Alkaline fens [7230]; Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]; <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065]; <i>Salmo salar</i> (Salmon) [1106]; <i>Lutra lutra</i> (Otter) [1355]; <i>Najas flexilis</i> (Slender Naiad) [1833]	6km west
004181	Connemara Bog Complex SPA	South Connemara lowlands, see description for Connemara Bog Complex cSAC. Qualifying Interest: Cormorant ( <i>Phalacrocorax carbo</i> ) [A017]; Merlin ( <i>Falco columbarius</i> ) [A098]; Golden Plover ( <i>Pluvialis apricaria</i> ) [A140]; Common Gull ( <i>Larus canus</i> ) [A182]	9km west
000606	Lough Fingall Complex cSAC	Within an area of flat, low-lying limestone and supporting a complex of calcareous habitats including limestone pavements, calcareous grassland and s series of turloughs. The grassland supports a variety of orchids and an additional feature of the site is an internationally important population of lesser horseshoe bats. Qualifying Interest: Turloughs [3180]; Alpine and Boreal heaths [4060]; <i>Juniperus communis</i>	9.5km south east

Site Code SPA/ SAC	Site Name & designation	Brief Description & Qualifying Features (with code)	Distance to N6 GCRR Site (closest point)
		formations on heaths or calcareous grasslands [5130]; Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]; Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210]; Limestone pavements [8240]; <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]	
001312	Ross Lake and Woods cSAC	Ross Lake is a medium size lake on limestone supporting a variety of stoneworts adjoined by a conifer plantation and some broadleaved woodland. Supports otter and a breeding population of common gull. Qualifying Interest: Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140]; <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]	10km north-west
000020	Black Head-Poulsallagh cSAC	Part of the Burren, including the shoreline, sand dunes at Fanore, limestone pavement and the Caher River. Qualifying Interest: Reefs [1170]; Perennial vegetation of stony banks [1220]; Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]; Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]; Alpine and Boreal heaths [4060]; <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130]; Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) [6210]; Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> ) [6510]; Petrifying springs with tufa formation (Cratoneurion) [7220]; Limestone pavements [8240]; Submerged or partially submerged sea caves [8330]; <i>Petalophyllum ralfsii</i> (Petalwort) [1395]	11km, south
000322	Rahasane Turlough cSAC	One of only two large turloughs in the country which still functions naturally, supporting two rare plant species including Fen Violet ( <i>Viola persicifolia</i> ), and is also the most important turlough in Ireland for its birdlife. Qualifying Interest: Turloughs [3180]	11.5km south east
004089	Rahasane Turlough SPA	Large turlough, see description for cSAC. Qualifying Interest: Whooper Swan ( <i>Cygnus cygnus</i> ) [A038]; Wigeon ( <i>Anas penelope</i> ) [A050]; Golden	12km south-east

Site Code SPA/ SAC	Site Name & designation	Brief Description & Qualifying Features (with code)	Distance to N6 GCRR Site (closest point)
		Plover ( <i>Pluvialis apricaria</i> ) [A140]; Black-tailed Godwit ( <i>Limosa limosa</i> ) [A156]; Greenland White-fronted Goose ( <i>Anser albifrons flavirostris</i> ) [A395]; Wetland and Waterbirds [A999]	
001285	Kiltiernan Turlough cSAC (	A relatively dry turlough which is notable for the presence of two rare plant species; alder buckthorn ( <i>Frangula alnus</i> ) and fen violet ( <i>Viola persicifolia</i> ) Qualifying Interest: Turloughs [3180]	12km south east
000242	Castletaylor Complex cSAC	Complex of habitats on limestone including Caranavoodaun turlough, limestone pavement calcareous grassland, heath and woodland. Qualifying Interest: Turloughs [3180]; Alpine and Boreal heaths [4060]; <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130]; Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]; Limestone pavements [8240]	12km south east
001271	Gortnandarragh Limestone Pavement cSAC	Limestone pavement located on the south side of Lough Corrib, interspersed with heath, grassland and scrub, plus an area of bog, which the is only known locality for the endemic fungus <i>Entoloma jenny</i> . Qualifying Interest: Limestone pavements [8240].	12.5km north-west
002244	Ardrahan Grassland cSAC	Large flat limestone area with a mosaic of calcareous habitats plus Brackloon Lough, a small marl lake, with adjoining wetlands and two small turloughs. Qualifying Interest: Alpine and Boreal heaths [4060]; <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130]; Limestone pavements [8240]	13km south east
000054	Moneen Mountain cSAC	Part of the Burren, open limestone pavement, associated grassland and heaths, plus scrub and woodland. Qualifying Interest: Turloughs [3180]; Alpine and Boreal heaths [4060]; <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130]; Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]; Petrifying springs with tufa formation (Cratoneurion) [7220]; Limestone pavements [8240]; <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065]; <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]	13km, south

Site Code SPA/ SAC	Site Name & designation	Brief Description & Qualifying Features (with code)	Distance to N6 GCRR Site (closest point)
001926	East Burren Complex cSAC	<p>All of the high ground in the eastern Burren area, comprising limestone pavement and associated calcareous grasslands and heath, scrub and woodland together with a network of calcareous lakes and turlough.</p> <p>Qualifying Interest: Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140]; Turloughs [3180]; Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260]; Alpine and Boreal heaths [4060]; <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130]; Calaminarian grasslands of the Violetalia calaminariae [6130]; Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]; Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [6510]; Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210]; Petrifying springs with tufa formation (Cratoneurion) [7220]; Alkaline fens [7230]; Limestone pavements [8240]; Caves not open to the public [8310]; Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0]; <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065]; <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]; <i>Lutra lutra</i> (Otter) [1355]</p>	13km, south
002008	Maumturk Mountains cSAC	<p>A series of peaks over 600m above sea level and surrounding areas, with wet heath, dry heath and blanket bog.</p> <p>Qualifying Interest: Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]; Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]; Alpine and Boreal heaths [4060]; Blanket bogs (* if active bog) [7130]; Depressions on peat substrates of the Rhynchosporion [7150]; Siliceous rocky slopes with chasmophytic vegetation [8220]; <i>Salmo salar</i> (Salmon) [1106]; <i>Najas flexilis</i> (Slender Naiad) [1833]</p>	34km, northwest
002031	The Twelve Bens/Garraun Complex cSAC	<p>A series of peaks over 500m above sea level and surrounding areas with heath and blanket bog, part of the Connemara National Park.</p> <p>Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]; Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or</p>	47km, northwest



Site Code SPA/ SAC	Site Name & designation	Brief Description & Qualifying Features (with code)	Distance to N6 GCRR Site (closest point)
		Isoeto-Nanojuncetea [3130]; Alpine and Boreal heaths [4060]; Blanket bogs (* if active bog) [7130]; Depressions on peat substrates of the Rhynchosporion [7150]; Siliceous scree of the montane to snow levels ( <i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i> ) [8110]; Calcareous rocky slopes with chasmophytic vegetation [8210]; Siliceous rocky slopes with chasmophytic vegetation [8220]; Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]; <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029]; <i>Salmo salar</i> (Salmon) [1106]; <i>Lutra lutra</i> (Otter) [1355]; <i>Najas flexilis</i> (Slender Naiad) [1833]	

**3.5.6** The conservation objectives for these SPAs and SACs are, in summary, to maintain or restore the favourable conservation condition of the qualifying interest of each site. The apparent conservation condition of the qualifying features for the relevant Natura 2000 sites is set out in Section 4.3 of this appropriate assessment report.

### 3.6 Step Three, part 2: Identification of Potential Impacts

**3.6.1** As previously mentioned, the development partially overlaps the Lough Corrib cSAC and therefore it will be directly impacted by the proposed road. There is also the potential for indirect effects on this and other Natura 2000 sites. Several impact mechanisms have been identified by the applicant (p9 of its Screening Report) and the NPWS (NPWS1 and NPWS2).

**3.6.2** The potential impact mechanisms (or pathways) on Natura 2000 sites are summarised below (those in italics were not explicitly identified by the applicant in its screening report or were discounted):

- Habitat loss directly within the footprint of the proposed development
- Habitat loss indirectly through changes in hydrology/hydrogeology (water supply);
- Habitat fragmentation with larger habitat parcels divided in two by the proposed development;
- *Habitat isolation of habitat parcels to the north and south of the proposed development;*
- Habitat degradation as a result of chemical pollution, *noise*, dust, *light*, shading, spread of invasive species *including from construction traffic and site workers travelling to/from the construction site* and changes in hydrology/hydrogeology (water supply);
- Mortality, disturbance, displacement and habitat loss for species of flora and fauna, resulting in declines or local extinction;

- Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory;
- *Loss or decline of supporting populations of flora and fauna within habitats lost or degrading with knock on effects on habitats and populations that are retained; and*
- *Increase in recreational pressure resulting in damage to habitats and disturbance of wildlife if improvements to the road network bring in additional tourists or indirectly increase the resident population.*

**3.6.3** These potential impact mechanisms apply to both the proposed road and developments which are subsequently facilitated by the proposed road scheme by creating access for new developments, and other plans and projects which may act in combination with the proposed road.

### **3.7 Step four: Assessment of Significance**

**3.7.1** There are two possible conclusions for the screening assessment:

- 1. It can be objectively concluded that there are not likely to be significant effects on any Natura 2000 site; or
- 2. The information provided either suggests that significant effects are likely, or that sufficient uncertainty remains to indicate that an appropriate assessment should be carried out.

**3.7.2** If the second conclusion is reached, the project should be subject to an appropriate assessment and that assessment should include consideration of all the Natura 2000 sites that could not be objectively screened out i.e., the first conclusion above cannot be reached.

**3.7.3** The applicant reached the conclusion that an appropriate assessment was required because it was not possible to rule out the possibility of significant effects on Natura 2000 sites. I agree with the applicant that an appropriate assessment is required for the N6 Galway City Ring Road proposal. This is primarily because the proposed road will have a direct impact on the Lough Corrib cSAC, but also because of potential indirect effects on this and other Natura 2000 sites.

**3.7.4** The applicant determined that such uncertainty existed for four Natura 2000 sites; Lough Corrib cSAC, Lough Corrib SPA, Galway Bay Complex cSAC and Inner Galway Bay SPA whereas it concluded that all other Natura 2000 sites were outside the Zone of Influence of the road (including the other fourteen identified within 15km) and therefore significant effects can be ruled out. The reasons for the excluding the other sites are similar across all sites; lack of hydrological or hydrogeological link; lack of other impact pathways and “no potential ‘ex situ’ impacts relevant to the European site”.

**3.7.5** None of the Natura 2000 sites beyond Lough Corrib cSAC would suffer habitat loss or fragmentation as a result of the proposed road, equally none are isolated by the proposed road i.e., lying to the south of the route and north of Galway Bay. Further, there are no hydrological/hydrogeological links between the proposed road and the Natura 2000 sites beyond Inner Galway Bay Complex cSAC/Inner Galway Bay SPA, a point confirmed by Mr. Dodds in his Hydrogeology assessment (Dodds, 2020).

- 3.7.6** For four of the sites further away from the proposed road than Inner Galway Bay Complex cSAC/Inner Galway Bay SPA, the applicant considered in more detail whether the road development could affect species populations that are a qualifying interest. These were marsh fritillary butterfly and the Connemara Bog Complex cSAC, four bird species and the Connemara Bog Complex SPA, lesser horseshoe bat and Ross Lake and Woods cSAC and Greenland White-fronted goose and Cregganna Marsh SPA. In each case, the risk of an impact was considered by the applicant to be nil because no links were found to exist between these populations and any potentially affected by the proposed road.
- 3.7.7** There are three potential pathways which the applicant appears not to have considered fully, these are (i) the potential effects of construction traffic bringing materials and workers to and from the construction site; (ii) the loss of supporting populations of plants or animals (i.e., typical and positive indicator species of Annex I habitats) including via steppingstone populations; and (iii) increased recreational pressure created by improved transport links and a growing population. These are admittedly weak pathways when considering the proposed road alone.
- 3.7.8** The first of these pathways, effects of construction traffic, could affect Cregganna Marsh SPA Lough Fingall Complex cSAC, Lough Fingall Complex cSAC, Kiltiernan Turlough cSAC, Castletaylor Complex cSAC and Ardrahan Grassland cSAC if construction traffic takes a route from the south along the R458 and N67 or M18, since these sites are all 200m or less from the road network, Rahasane Turlough SPA also included because the same birds use this site and Cregganna Marsh SPA. The second, loss of supporting populations, could apply to all of the cSACs within 15km plus the Connemara Bog Complex SPA which share qualifying interest species with the project site. And the third, effects from tourism, could apply to Connemara Bog Complex cSAC, Connemara Bog Complex SPA, Ross Lake and Woods cSAC, Maumturk Mountains cSAC and The Twelve Bens/Garraun Complex cSAC as these include tourist or recreation destinations.
- 3.8 In combination Effects**
- 3.8.1** Since likely significant effects have been identified for the project alone, that is enough for this stage to determine whether an appropriate assessment is required.
- 3.8.2** At the oral hearing, and subsequently, the applicant provided an updated list of plans and projects for inclusion in the 'in combination' part of the appropriate assessment, which identifies 25 plans and projects with the potential for in-combination effects, see Table 3 of the applicant's November 2020 document and the Burkeway Bearna supplement. These include extensive allocations for new housing and development in Galway and it is clear from documents such as the Galway City Development Plan, Galway County Development Plan and the Regional Spatial and Economic Strategy that further growth in population, housing, economic activity, tourism and maritime activity is expected and encouraged in and around Galway City.
- 3.8.3** The combined effect of the growth and development including the proposed road could potentially exacerbate the pathways identified in paragraph 3.6.2.

### 3.9 Conclusion on Likely Significant Effects

3.9.1 There is broad agreement from all parties (the applicant, NPWS, etc.) that the project should be subject to an appropriate assessment. There is also broad agreement that the appropriate assessment should include consideration of the effects on Lough Corrib cSAC SPA, Galway Bay Complex cSAC and Inner Galway Bay SPA.

3.9.2 Considering the additional pathways and the potential for in combination effects, some further consideration should be given to all the other Natura 2000 sites identified in Table 1, as follows:

- With respect to construction traffic for the development alone and in combination with other plans and projects: Ardrahan Grassland cSAC, Kiltiernan Turlough cSAC, Lough Fingall Complex cSAC, Castletaylor Complex cSAC and Cregganna Marsh SPA, and by association Rasahane Turlough SPA.
- With respect to loss or decline of supporting populations of typical species and positive indicator species: Connemara Bog Complex cSAC, Connemara Bog Complex SPA, Lough Fingall Complex cSAC, Ross Lake and Woods cSAC, Black Head Poulsallagh cSAC, Rahasane Turlough cSAC, Kiltiernan Turlough cSAC, Castletaylor Complex cSAC, Gortnandarragh Limestone Pavement cSAC, Ardrahan Grassland cSAC, Moneen Mountain cSAC and East Burren Complex cSAC, with consideration restricted to flora and fauna affected by the proposed road and also a significant component of these sites.
- With respect to tourism and increased recreational pressure in combination with other plans and projects: Connemara Bog Complex cSAC, Ross Lake and Woods cSAC and Connemara Bog Complex SPA, Maumturk Mountains cSAC and The Twelve Bens/Garraun Complex cSAC with consideration restricted to qualifying interest which is exposed to impacts from recreation.

3.9.3 A summary of the screening assessment is provided in Table 2.

3.9.4 It is now not permissible to consider mitigation measures at the screening stage if mitigation is required specifically in relation to Natura 2000 sites. Therefore, any Natura 2000 site for which mitigation is proposed or could be required, must be screened in for appropriate assessment. This results in longer list of sites being screened in for assessment than might historically have been the case.

**Table 2 AA Screening summary matrix**

Summary Screening Matrix				
European Site	Distance to proposed development/ Source, pathway receptor	Possible effect alone?	Possible In combination effects?	Screening conclusions:
Lough Corrib cSAC	0 km (i.e., overlapping boundaries), to north and south	Yes, direct and indirect impacts will occur within the cSAC.	Yes, from other developments proposed in vicinity of cSAC.	Significant effects would occur in the absence of mitigation.
Galway Bay Complex cSAC	0.16km, south	Yes, potential for pollution to reach the cSAC via watercourses and the air.	As above.	As above.
Lough Corrib SPA	0.2km	Yes, potential to disturb and displace birds when foraging outside the SPA.	Yes, from other developments proposed in vicinity of SPA.	As above.
Inner Galway Bay SPA	1.1km	Yes, potential to disturb and displace birds when foraging outside the SPA, plus pollution.	As above.	As above.
Cregganna Marsh SPA	4km, south-east	Possible, as shares qualifying feature with Rahasane Turlough SPA (see below).	Yes, due to increasing construction traffic for development in Galway.	Possible significant effects cannot be ruled out without (simple) mitigation.
Connemara Bog Complex cSAC	6km west	Possible, due to impacts outside the cSAC on Annex I habitats and mobile Annex II species which are qualifying features of the cSAC e.g. marsh fritillary, salmon and otter and impacts within the cSAC from increased recreation resulting from improved access.	Yes, risk increased in combination with other developments to the west of Galway and within the region.	Possible significant effects cannot be ruled out without further analysis and assessment and mitigation.
Connemara Bog Complex SPA	9km west	Possible, due to impacts outside the	Yes, risk increased in combination with other	Possible significant effects cannot be

Summary Screening Matrix				
European Site	Distance to proposed development/ Source, pathway receptor	Possible effect alone?	Possible In combination effects?	Screening conclusions:
		SPA on mobile Annex I bird species (merlin, cormorant and common gull) which are qualifying features of the SPA and within the SPA with improved access for recreation/tourism.	developments around Galway.	ruled out without further analysis and assessment.
Lough Fingall Complex cSAC	9.5km south east	Very low risk of pollution from construction traffic as adjacent to main road leading to Galway.  Effects at the project site on species which may be supporting populations for typical/ qualifying interest populations in the cSAC e.g. typical species of limestone pavement and lesser horseshoe bat.	Risk increased with other developments around Galway arising from construction traffic and further development affecting typical/ qualifying interest species.	Possible significant effects cannot be ruled out without (simple) mitigation or further analysis and assessment.
Ross Lake and Woods cSAC	10km north-west	Effects at the project site on species which may be supporting populations for typical/ qualifying interest populations in the cSAC e.g. typical species of limestone pavement and lesser horseshoe bat.  Very low risk arising from increased tourism/travel associated with the proposed road.	Risk increased by further development affecting typical/ qualifying interest species and population growth leading to increases in recreational pressure.	Possible significant effects cannot be ruled out without further analysis and assessment.
Black Head-Poulsallagh cSAC	11km, south	Effects at the project site on species which may be supporting populations of typical species in the cSAC	Risk increased by further development affecting typical species.	Possible significant effects cannot be ruled out without

Summary Screening Matrix				
European Site	Distance to proposed development/ Source, pathway receptor	Possible effect alone?	Possible In combination effects?	Screening conclusions:
		e.g. typical species of limestone pavement and petrifying springs.		further analysis and assessment.
Rahasane Turlough cSAC	11.5km south east	Effects at the project site on species which may be supporting populations for typical species populations in the cSAC e.g. typical species of turloughs.	Risk increased by further development affecting typical species.	Possible significant effects cannot be ruled out without further analysis and assessment.
Rahasane Turlough SPA	12km south-east	Very low risk of pollution from construction traffic as adjacent to main road leading Galway, affecting Greenland White-fronted goose.	Risk increased with other developments around Galway arising from construction traffic.	Possible significant effects cannot be ruled out without (simple) mitigation.
Kiltiernan Turlough cSAC	12km south east	Very low risk of pollution from construction traffic as adjacent to main road leading Galway.  Effects at the project site on species which may be supporting populations for qualifying interest populations in the cSAC e.g. typical species of turloughs	Risk increased with other developments around Galway arising from construction traffic and further development affecting typical species of turloughs	Possible significant effects cannot be ruled out without (simple) mitigation or further analysis and assessment
Castletaylor Complex cSAC	12km south east	Very low risk of pollution from construction traffic as adjacent to main road leading Galway.  Effects at the project site on species which may be supporting populations for typical species populations in the cSAC e.g. typical	Risk increased with other developments around Galway arising from construction traffic and further development affecting typical species.	Possible significant effects cannot be ruled out without (simple) mitigation or further analysis and assessment.

Summary Screening Matrix				
European Site	Distance to proposed development/ Source, pathway receptor	Possible effect alone?	Possible In combination effects?	Screening conclusions:
		species of limestone pavement.		
Gortnandarragh Limestone Pavement cSAC	12.5km north-west	Effects at the project site on species which may be supporting populations of typical species in the cSAC e.g. typical species of limestone pavement.	Risk increased by further development affecting typical species.	Possible significant effects cannot be ruled out without further analysis and assessment.
Ardrahan Grassland cSAC	13km south east	Very low risk of pollution from construction traffic as adjacent to main road leading Galway.  Effects at the project site on species which may be supporting populations for typical species populations in the cSAC e.g. typical species of limestone pavement	Risk increased with other developments around Galway arising from construction traffic and further development affecting typical species.	Possible significant effects cannot be ruled out without (simple) mitigation or further analysis and assessment.
Moneen Mountain cSAC	13km, south	Effects at the project site on species which may be supporting populations for typical/qualifying interest populations in the cSAC e.g. typical species of limestone pavement, marsh fritillary, lesser horseshoe bat.	Risk increased due to increasing development around Galway.	Possible significant effects cannot be ruled out without further analysis and assessment and mitigation.
East Burren Complex cSAC	13km, south	Effects at the project site on species which may be supporting populations for typical/qualifying interest populations in the cSAC e.g. typical species of limestone pavement, marsh	Risk increased due to increasing development around Galway.	Possible significant effects cannot be ruled out without further analysis and assessment and mitigation.



Summary Screening Matrix				
European Site	Distance to proposed development/ Source, pathway receptor	Possible effect alone?	Possible In combination effects?	Screening conclusions:
		fritillary, lesser horseshoe bat, otter.		
Maumturk Mountains cSAC	34km, northwest	Very low risk that improved transport links could lead to additional recreational pressure on Annex I montane habitats within the cSAC.	Risk increased due to increased population arising from other developments in Galway City and around.	Possible significant effects cannot be ruled out without mitigation.
The Twelve Bens/Garraun Complex cSAC	47km, northwest	As for Maumturk Mountains cSAC	As for Maumturk Mountains cSAC	Possible significant effects cannot be ruled out without mitigation.

## 4. Appropriate Assessment (Stage 2)

### 4.1 Applicant's Assessment

4.1.1 In the NIS, the applicant completed a detailed assessment of the potential for the proposed road to undermine the conservation objectives for Lough Corrib and (Inner) Galway Bay Natura 2000 sites, covering nearly 400 pages in the main document, with associated mapping (16 Figures) and 15 appendices (mainly survey reports). The applicant concluded that, considering avoidance and mitigation measures, the proposed road, either alone or in combination, will not undermine the conservation objectives of any Natura 2000 site and therefore poses no risk to the integrity of any Natura 2000 site.

4.1.2 This conclusion was reached on the basis that, as a result of the N6 GCRR proposal, there is no loss of Annex I habitat within any Natura 2000 site and the potential indirect effects that have been identified are either not sufficient to undermine the conservation objectives of any Natura site or can be adequately mitigated through design and management with the same effect. In combination effects were discounted because all other plans and projects identified also include, where necessary, sufficient mitigation measures to avoid adverse effects on the integrity of any Natura 2000 site.

4.1.3 Clarification and additional information have been sought by the DCHG/National Parks and Wildlife Service, An Bord Pleanála and others which has resulted in the collection and provision of updated and new information relevant to the appropriate assessment by the applicant at various stages including during the oral hearing as listed in Section 1.3 of this report. The applicant's conclusion remains unchanged from that set out in the NIS.

### 4.2 Appropriate Assessment Methodology

4.2.1 The appropriate assessment methodology draws on the same guidance used in the screening assessment (see section 3.2 of this document).

### 4.3 Step One, part 1: Information on Natura 2000 Sites

#### *Lough Corrib cSAC 000297 and SPA 004042*

##### *Brief Description*

4.3.1 Lough Corrib cSAC and SPA is briefly described in Table 1 of this report and in more detail in the site synopsis included in Appendix 3.

##### *Qualifying Features*

4.3.2 The qualifying features and baseline reference values of the Lough Corrib cSAC and SPA are set out in Table 3 below. In many cases, the baseline data is poor or absent, with the best available presented for each qualifying interest feature.

**Table 3: Conservation Condition and Objectives of the qualifying features of the Lough Corrib SPA and SAC**

Annex I/II code	Qualifying Feature	'BRV'	Conservation Condition	Conservation Objective
3110	Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> )	497.5?	U	R
3130	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i>	11572.3?	U	R
3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.	21460.7?	U	R
3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation	252.5?	F	M
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)	252.5?	F	M
6410	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )	252.5?	F	M
7110	Active raised bogs	39.2?/ 78.8ha (CO)	U	R
7120	Degraded raised bogs still capable of natural regeneration	17.7?/ N/A (CO)	U	R to Annex I type 7110
7150	Depressions on peat substrates of the <i>Rhynchosporion</i>	1.7?/ Included in 7110 (CO)	U	R
7210	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>	252.5?	F	M
7220	Petrifying springs with tufa formation ( <i>Cratoneurion</i> )	252.5?	F	M
7230	Alkaline fens	252.5?	F	M
8240	Limestone pavements	252.5?	F	M
91A0	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	252.5?	F	M
91D0	Bog woodland	1.22ha	F	M
1029	<i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel)	1 million mussels over 9.1km in the Owenriff catchment	U	R
1092	<i>Austropotamobius pallipes</i> (White-clawed Crayfish)	Historic distribution, as mapped	F	M
1095	<i>Petromyzon marinus</i> (Sea Lamprey)	50% positive sample sites	U	R
1096	<i>Lampetra planeri</i> (Brook Lamprey)	5 ammocoetes/m <sup>2</sup> in soft sediments	F	M
1106	<i>Salmo salar</i> (Salmon)	17 salmon fry/5 mins sampling	F	M
1303	<i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat)	100 bats in roost id. no. 217 (Ebor Hall)	U	R
1355	<i>Lutra lutra</i> (Otter)	88% positive sites	F	M

Annex I/II code	Qualifying Feature	'BRV'	Conservation Condition	Conservation Objective
1393	<i>Drepanocladus vernicosus</i> (Slender Green Feather-moss)	3,725m <sup>2</sup> / 153,377,000 shoots	F	M
1833	<i>Najas flexilis</i> (Slender Naiad)	Historic distribution, as mapped	U	R
A051	<i>Anas strepera</i> (Gadwall)	48w	17w U	R
A056	<i>Anas clypeata</i> (Shoveler)	90w	8w U	R
A059	<i>Aythya ferina</i> (Pochard)	10182w	827w U	R
A061	<i>Aythya fuligula</i> (Tufted Duck)	5521w	2270w U	R
A065	<i>Melanitta nigra</i> (Common Scoter)	35pairs, r	26pairs, r U	R
A082	<i>Circus cyaneus</i> (Hen Harrier)	8 (SY)	ND	?
A125	<i>Fulica atra</i> (Coot)	14473w	1149w U	R
A140	<i>Pluvialis apricaria</i> (Golden Plover)	1727w	1996w F	M
A179	<i>Chroicocephalus ridibundus</i> (Black-headed Gull)	197w/856r	70w/? U	R
A182	<i>Larus canus</i> (Common Gull)	48w/181r	74w/? F	M
A193	<i>Sterna hirundo</i> (Common Tern)	37r	ND F (NF)	M
A194	<i>Sterna paradisaea</i> (Arctic Tern)	60r	ND F (NF)	M
A395	<i>Anser albifrons flavirostris</i> (Greenland White-fronted Goose)	62w	0 U	R
A999	Wetland and Waterbirds	ND	ND	?

BRV = Baseline Reference Value, taken from the Natura 2000 Standard Data Form, site synopsis (SY) or conservation objectives (CO) selecting the best available, see Appendix 3 for further information. ? = obviously inaccurate data, BRV is therefore unknown. w = wintering, r = reproducing/breeding.

Conservation Condition: F = Favourable, U = Unfavourable, for birds U if >25% below BRV, taken firstly from the detailed conservation objectives where available (usually habitats and species other than birds), secondly by comparison of recent data (Birdwatch Ireland 5 yr. mean) with the BRV where available (birds only) or thirdly from the data provided in the Natura 2000 Standard Data Form (NF). ND = No data

Conservation Objective: in accordance with condition M = maintain, R = restore, ? unknown assume R.

#### Conservation Condition

- 4.3.3** To summarise for the cSAC, the rivers and calcareous habitats are in favourable condition while the peatland habitats and standing waters are generally in unfavourable condition.

- 4.3.4** For the SPA, a comparison between the ‘Baseline Reference Value’ BRV and the five-year peak (Birdwatch Ireland data) mean indicates that most of the bird species populations, for example coot and black-headed gull have declined since the site was designated and are therefore likely to be in unfavourable condition, although a few remain in favourable condition, for example common gull.

#### *Conservation Objectives*

- 4.3.5** The conservation objectives, with targets for each Annex I habitat and each Annex II species for Lough Corrib cSAC set out in detail by the NPWS (NPWS, 2017), with targets for each Annex I habitat and each Annex II species. In summary the conservation objectives are to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected, as shown in Table 3.
- 4.3.6** The conservation objectives for Lough Corrib SPA are generic (without an assessment of condition or targets for each species) and are as follows (NPWS, Conservation objectives for Lough Corrib SPA [004042]. Generic Version 7.0. , 2020):
- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA, as shown in Table 3.
  - To maintain or restore the favourable conservation condition of the wetland habitat at Lough Corrib SPA as a resource for the regularly occurring migratory waterbirds that utilise it.

#### *Galway Bay Complex cSAC 000268 and Inner Galway Bay SPA 004031*

##### *Brief Description*

- 4.3.7** Galway Bay Complex cSAC and Inner Galway Bay SPA are described in outline in Table 1 of this report and in more detail in the NPWS site synopses included in Appendix 3.

##### *Qualifying Features*

- 4.3.8** The qualifying features of the Galway Bay Complex cSAC and Inner Galway Bay SPA are set out in Table 4 below.

**Table 4: Conservation Condition and Objectives for the qualifying features of the Galway Bay Complex cSAC and Inner Galway Bay SPA**

Annex I/II code	Qualifying Feature	‘BRV’	Conservation Condition	Conservation Objective
1140	Mudflats and sandflats not covered by seawater at low tide	744ha	F	M
1150	Coastal lagoons	76.7ha	U	R
1160	Large shallow inlets and bays	10,825ha	F	M
1170	Reefs	2,773ha	F	M

Annex I/II code	Qualifying Feature	'BRV'	Conservation Condition	Conservation Objective
1220	Perennial vegetation of stony banks	0.6ha?	F	M
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts <sup>7</sup>	18.85ha	F (NF)	M
1310	Salicornia and other annuals colonising mud and sand	1.35ha	F	M
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )	263.80ha	U	R
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	19.89ha	U	R
3180	Turloughs	63.3ha/ 59ha (CO)	F	M
5130	<i>Juniperus communis</i> formations on heaths or calcareous grasslands	1.41ha	U	R
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)	1440.9?	F	M
7210	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>	1440.9?	F	M
7230	Alkaline fens	1440.9?	F	M
8240	Limestone pavements	125.84	F (NF)	M
1355	<i>Lutra lutra</i> (Otter)	88% positive sites (CO)	U	R
1365	<i>Phoca vitulina</i> (Harbour Seal)	ND	F	M
A003	<i>Gavia immer</i> (Great Northern Diver)	83w	154 F	M
A017	<i>Phalacrocorax carbo</i> (Cormorant)	266w/ 300r	313w F	M
A028	<i>Ardea cinerea</i> (Grey Heron)	102 (CO)	F	M
A046	<i>Branta bernicla hrota</i> (Light-bellied Brent Goose)	676w	1130 F	M
A050	<i>Anas penelope</i> (Wigeon)	1157w	1749 F	M
A052	<i>Anas crecca</i> (Teal)	690w	999 F	M
A056	<i>Anas clypeata</i> (Shoveler)	88w	77 F (<25%)	M
A069	<i>Mergus serrator</i> (Red-breasted Merganser)	249w	200 F (<25%)	M
A137	<i>Charadrius hiaticula</i> (Ringed Plover)	335w	284 F (<25%)	M
A140	<i>Pluvialis apricaria</i> (Golden Plover)	2030w	1122 F?	M?
A142	<i>Vanellus vanellus</i> (Lapwing)	3969w	1782 F?	M?

<sup>7</sup> Not included in the conservation objectives

Annex I/II code	Qualifying Feature	'BRV'	Conservation Condition	Conservation Objective
A149	<i>Calidris alpina</i> (Dunlin)	2149w	1378 F?	M?
A157	<i>Limosa lapponica</i> (Bar-tailed Godwit)	447w	467 F	M
A160	<i>Numenius arquata</i> (Curlew)	697w	604 F (<25%)	M
A162	<i>Tringa totanus</i> (Redshank)	505w	661 F	M
A169	Turnstone ( <i>Arenaria interpres</i> )	182w	261 F	M
A179	Black-headed Gull ( <i>Chroicocephalus ridibundus</i> )	1815w	3108 F	M
A182	<i>Larus canus</i> (Common Gull)	1011w	1215 F	M
A191	<i>Sterna sandvicensis</i> (Sandwich Tern)	81r	ND F	M
A193	<i>Sterna hirundo</i> (Common Tern)	99r	ND	M
A999	Wetland and Waterbirds	13,267ha	F	M

See legend for Table 3, noting that the BRV population for the Annex I bird species of the SPA on the Natura 2000 Standard Data Form differs from that in the detailed conservation objectives supporting document, with Standard Data Form data given in the table above.

#### Conservation Condition

- 4.3.9** The sub-tidal, lower intertidal habitats and most of the terrestrial habitats within the cSAC appear to be in favourable conservation condition, while the upper intertidal habitats and juniper scrub appear to be in unfavourable condition. The seal population is favourable, while the otter population is unfavourable.
- 4.3.10** The detailed conservation objectives indicate that all the qualifying interest of the SPA is in favourable condition however more recent data indicates that three of the bird species (all waders; golden plover, lapwing and dunlin) may have declined sufficiently to be in unfavourable condition (more explanation below).

#### Conservation Objectives

- 4.3.11** The conservation objectives for Galway Bay Complex cSAC (NPWS, 2013) mirror those of Lough Corrib, except that there are also detailed supporting documents available for some Annex I habitats within Galway Bay Complex cSAC.
- 4.3.12** For Inner Galway Bay SPA, the conservation objectives are, in summary, the same as for Lough Corrib SPA, however specific conservation objectives have been produced for the Inner Galway Bay SPA (NPWS, 2013) with a detailed supporting document (NPWS, 2013b). These documents provide targets for each species and set out for each species whether the relevant objective is to maintain or restore the population. However, these documents are now seven years old and so the relevant objective may have changed for three species (golden plover, lapwing and dunlin) from maintain to restore due to population declines.

#### *Other Natura 2000 sites*

- 4.3.13** The following Natura 2000 sites are all briefly described, along with their qualifying interest, in Table 1 and the site synopses, with more details, are provided in Appendix 3.

#### *Cregganna Marsh SPA 004142 and Rahasane Turlough SPA 004089*

- 4.3.14** The only qualifying feature of Cregganna Marsh SPA is A395 Greenland White-fronted Goose (*Anser albifrons flavirostris*) with a baseline reference population of 129 wintering birds, which, according to the standard data form, is in favourable condition (Cat. B). However, there is no I-Webs data with which to make a comparison and it is the same population which is associated with Rahasane Turlough SPA; this currently stands at 58 birds versus a baseline population of 218, which suggests the population may actually be in unfavourable condition. It is therefore assumed that the relevant objective is to restore the population. The other species of qualifying interest at Rahasane Turlough SPA are not known to be linked to either Cregganna Marsh or the project site.

#### *Connemara Bog Complex cSAC 002034 and Connemara Bog Complex SPA 004181*

- 4.3.15** The Connemara Bog Complex cSAC supports many of the same Annex I habitats as Lough Corrib cSAC and Galway Bay Complex cSAC, as well as the Annex II species marsh fritillary, salmon, otter and slender naiad, the last three of these are also shared with either Lough Corrib or Galway Bay. The Connemara Bog Complex SPA supports four qualifying interest species of bird, including cormorant (also qualifying interest for Inner Galway Bay) and common gull (also qualifying interest for Lough Corrib and Inner Galway Bay).
- 4.3.16** There is a set of detailed conservation objectives, with targets, for Connemara Bog Complex cSAC which indicates the peatland habitats, fens (4010, 4030, 7130, 7140, 7150, 7230) and the salmon population are in unfavourable condition while the coastal habitats, woodland, aquatic habitats and the remaining Annex II species are in favourable condition, with the relevant objectives being to restore and maintain, respectively (NPWS, 2015). The conservation objectives for the Connemara Bog Complex SPA are generic (NPWS, 2020) and the Natura 2000 standard data form indicates that all four species are in favourable condition with the objective to maintain.

#### *Lough Fingall Complex cSAC 000606*

- 4.3.17** Lough Fingall Complex cSAC shares three of its four qualifying interest Annex I habitats with Lough Corrib and/or Galway Bay Complex, including limestone pavement. Lesser horseshoe bat is also a qualifying interest feature for both Lough Fingall Complex cSAC and Lough Corrib cSAC. All of the qualifying interest features of the Lough Fingall Complex cSAC are in favourable condition except for turloughs, with the conservation objectives being to maintain and restore, respectively (NPWS, 2019).



*Ross Lake and Woods cSAC 001312*

- 4.3.18** Ross Lake and Woods has just two qualifying interest features, both of which it shares with Lough Corrib cSAC. The Annex I habitat 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. is in unfavourable condition while the lesser horseshoe bat population is in favourable condition, with the relevant objective being to restore and maintain, respectively. (NPWS, 2018).

*Black Head-Poulsallagh cSAC 000020*

- 4.3.19** Black Head-Poulsallagh cSAC shares many of the same Annex I habitats as Lough Corrib cSAC and/or Galway Bay Complex cSAC including 8240 Limestone Pavement and 7220 Petrifying springs with tufa formation (Cratoneurion). All are in favourable condition, with the relevant objective to being to maintain (NPWS, 2014).

*Rahasane Turlough cSAC 000322 and Kiltiernan Turlough cSAC 001285*

- 4.3.20** The only qualifying feature of the Rahasane Turlough cSAC and Kiltiernan Turlough cSAC is 3180 Turloughs, which is in favourable condition (Natura 2000 Standard Data Form) at both sites and therefore the relevant objective is to maintain.

*Castletaylor Complex cSAC 000242*

- 4.3.21** Castletaylor Complex cSAC supports five qualifying interest Annex I habitats including three (3180 Turloughs, 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites) and 8240 Limestone Pavement) which it shares with Lough Corrib cSAC and Galway Bay Complex cSAC. The conservation objectives are generic (NPWS, 2020) however all Qualifying interest Annex I habitats are apparently in favourable condition (Natura 2000 Standard Data Form) and therefore the relevant objective is to maintain.

*Gortnandarragh Limestone Pavement cSAC 001271*

- 4.3.22** Gortnandarragh Limestone Pavement cSAC supports just one Annex I habitat as a qualifying interest, 8240 Limestone pavements, which it shares with Lough Corrib cSAC and Galway Bay Complex cSAC. It has detailed conservation objectives (NPWS, 2019) which indicate that the habitat is in unfavourable condition, perhaps as a result of land reclamation and quarrying which have occurred within the cSAC, and the relevant objective is to restore (NPWS, 2019).

*Ardrahan Grassland cSAC 002244*

- 4.3.23** Ardrahan Grassland cSAC has three (or four, depending on source) Annex I habitats as qualifying interest, including 8240 Limestone Pavement. There are detailed conservation objectives for this cSAC which indicate that one of the Annex I habitats is in unfavourable condition (5130 *Juniperus communis* formations on heaths or calcareous grassland) while the other two (4060 Alpine and Boreal heaths and 8240 Limestone Pavement) are in favourable condition, with the relevant objectives being to restore and to maintain, respectively.

*Moneen Mountain cSAC 000054 and East Burren Complex cSAC 001926*

**4.3.24** The Moneen Mountain cSAC 000054 and East Burren Complex cSAC 001926 share several Annex I habitat types with each other and also Lough Corrib cSAC and/or Galway Bay Complex cSAC, including 3180 Turloughs, 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites), 7220 Petrifying springs with tufa formation (Cratoneurion) and 8240 Limestone Pavement. Qualifying interest Annex II species for Moneen Mountain cSAC and East Burren Complex include lesser horseshoe bat and marsh fritillary which are again shared with Lough Corrib cSAC and/or Galway Bay Complex cSAC. The Moneen Mountain cSAC qualifying interest features are all in favourable condition (Natura 2000 Standard Data Form) and all but two (6510 and 91E0) of the East Burren Complex cSAC qualifying interest features are in favourable condition (Natura 2000 Standard Data Form), with the conservation objectives being to maintain or restore accordingly (NPWS , 2020a) (NPWS, 2020b).

*Maumturk Mountains cSAC 002008 and The Twelve Bens/Garraun Complex cSAC 002031*

**4.3.25** Maumturk Mountains cSAC and The Twelve Bens/Garraun Complex each support a variety of open water, peatland and rocky mountain Annex I habitats including 7130 Blanket Bog. For the Maumturk Mountains cSAC, the peatland and upland habitats are all in unfavourable condition (NPWS , 2017). From the associated documentation, it is not entirely clear why these habitats are in unfavourable condition, however erosion of peat soils is implied as a contributing factor (NPWS, 2017). Similarly, the peatland and upland habitats of the Twelve Bens/Garraun Complex cSAC are in unfavourable condition (NPWS, 2017b) with peat erosion implied as a contributing factor (NPWS, 2017c).

**4.4 Step One, part 2: Potential effects on Conservation Objectives**

**4.4.1** For some of the cSACs listed above, detailed conservation objectives have been produced for each qualifying interest feature. This includes Lough Corrib and Galway Bay Complex cSACs. For each qualifying interest feature a series of attributes have been selected with a target against each one, which is a threshold for favourable conservation condition.

**4.4.2** The project, either alone or in combination with other plans or projects, would undermine the conservation objectives for qualifying interest Annex I habitats within the cSACs if, for habitats in favourable condition, it resulted in either (i) a reduction of the area or distribution of an Annex I habitat within the cSAC; or (ii) reduced the quality of the habitat below the acceptable thresholds (targets), and, for habitats in unfavourable condition, it resulted in hindering the ability to restore either (i) the area and distribution of an Annex I habitat within the cSAC or (ii) the quality of the habitat to levels above the acceptable thresholds. Examples of attributes with thresholds (targets) relating to habitat quality are the number of positive indicator species, the number or cover of negative indicator species, the cover of non-native species, and the cover of scrub and bracken. It is important to note that for Annex I habitats in unfavourable condition, its past area and distribution (at the time that the site was designated) may be just as an important consideration as its current distribution.

- 4.4.3** The project, either alone or in combination with other plans or projects, would be contrary to the conservation objectives for the qualifying Annex II species within the cSACs if, for species populations in favourable condition, it (i) resulted in a reduction in the distribution of the population within the cSAC, (ii) negatively affected its population structure or ability to breed to below certain thresholds or (iii) resulted in the reduction in availability or quality of its habitat to below certain thresholds. For those classed as unfavourable, the project would be contrary to the conservation objectives if it hindered restoration of these same attributes to the level specified. Examples of thresholds (targets) include number of adults, numbers of juveniles, water quality, availability of spawning beds and levels of light pollution.
- 4.4.4** For other cSACs, detailed conservation objectives do not exist. For these sites, favourable condition is taken to be the extent and condition of the habitats and species populations when the site was designated. In these cases, the project, either alone or in combination, would be contrary to the conservation objectives if it brought the extent and condition down below these levels or hindered it from being restored to these levels.
- 4.4.5** The project could be considered contrary to the conservation objectives for the SPAs if it either (i) resulted in a reduction in the population or distribution of a qualifying species such that it fell below the 'Baseline Reference Value' at the SPA or (ii) prevented, or hindered the ability of, the population or distribution of a qualifying species returning to a level which was equal to the Baseline Reference Value. The potential mechanisms for impacts which could undermine the conservation objectives are as set out in paragraph 3.6.2.

## **4.5 Step Two, part 1: Impact Prediction 'Alone'**

### *Applicant's Assessment*

- 4.5.1** The applicant has provided an impact assessment in the NIS p74 to p277, although it is notable that much of the text is duplicated and the same information is often presented more than once in different formats. The assessment encompassed Lough Corrib cSAC SPA and Galway Bay Complex cSAC/Inner Galway Bay SPA, with the other Natura 2000 sites excluded. The potential impacts on qualifying interest features of these four designations that were identified by the applicant are summarised or replicated below. Other potential impacts were considered by the applicant but discounted.

### *Lough Corrib cSAC*

- Direct habitat loss within the cSAC totalling about 2.9ha and comprising bramble scrub, rank grassland, a block of woodland, parts of two agricultural fields, part of a treeline along the River Corrib, plus small areas of scrub, oak-ash-hazel woodland, calcareous/neutral grassland and wet grassland habitat, plus 67m<sup>2</sup> of otter habitat (within 10m of the River Corrib), with the potential to accidentally damage or destroy small areas of retained qualifying interest Annex I habitat within the cSAC which overlap with the boundary for the proposed road. Potentially affecting 6210 calcareous grassland and 8240 limestone pavements.
- Potential habitat degradation through structural effects to the overlying/adjacent limestone bedrock associated with the proposed Lackagh Tunnel and approaches, in other words, blasting and tunnelling activities have the potential to cause damage to the Qualifying

Interest Annex I habitats of calcareous grassland and limestone pavement above the tunnel and adjacent to the tunnel approaches. Potentially affecting 6210 calcareous grassland and 8240 limestone pavements.

- Potential habitat degradation as a result of the proposed road affecting the functioning and quality of the existing hydrogeological regime; the construction of the Menlough viaduct, the approaches to the Lackagh tunnel and the Lackagh tunnel itself have the potential to interfere with conduits for groundwater in the limestone karst, with the risk that this affects the water supply, via the Western Coolagh Spring, to the Coolagh Lakes (which are included in the cSAC and support three qualifying interest Annex I habitats), and, during the construction and operation of the road, there is the potential for pollutants to enter the same karst system and reach the same waterbodies. Potentially affecting 3140 hard oligo-mesotrophic waters, 7210 *Cladium* fens, 7230 alkaline fens and 6410 *Molinia* meadows.
- Habitat degradation as a result of the proposed road affecting water quality in receiving watercourses during construction (however, not during operation); accidental spillage of fluids from construction machinery could wash into the River Corrib and therefore have an impact on the qualifying interest Annex II species that it supports. Potentially affecting otter, sea lamprey, brook lamprey and salmon, with indirect effects of freshwater pearl mussel.
- Habitat degradation as a result of air quality impacts; dust from construction activities taking place in proximity to the cSAC could settle on the vegetation and affect the vegetation composition of the habitats affected. Potentially affecting 6210 calcareous grassland and 8240 limestone pavements.
- Habitat degradation as a result of introducing/spreading non-native invasive plant species to habitat areas within Lough Corrib cSAC during construction works. Potentially affecting 6410 *Molinia* meadows, 6210 calcareous grassland and 8240 limestone pavements.
- Mortality risk to aquatic species in the River Corrib during construction of the proposed River Corrib Bridge during construction works, as a result of dropping materials into the river. Potentially affecting otter, sea lamprey, brook lamprey and salmon, with indirect effects on freshwater pearl mussel.
- Mortality risk to otter during operation through collisions with road traffic during the operation of the road.

#### *Lough Corrib SPA*

- Habitat degradation as a result of hydrogeological impacts - the proposed road has the potential to affect (i.e. reduce water supply and reduce the water quality of) the existing hydrogeological regime supporting groundwater dependant wetland habitats( at potential ex-situ sites), in other words, it has the potential to reduce the water supply and quality of Coolagh Lakes and Ballindooley Lough, which could affect populations of wintering black-headed gull and coot (both sites) and shoveler and tufted duck (Ballindooley only), which may form part of the wintering populations listed as SCIs of Lough Corrib SPA.
- Habitat degradation as a result of hydrological impacts - the proposed road has the potential to affect water quality in the receiving environment supporting aquatic and wetland habitats (within the SPA and at potential ex-situ sites) during construction which in turn support bird

species listed as SCIs of Lough Corrib SPA, the same sites and species as above, plus the River Corrib downstream of the proposed bridge where common tern, black-headed gull, common gull and coot have been recorded (although these areas are all outside the Lough Corrib SPA).

- Disturbance/displacement - disturbance during construction and/or operation could result in the displacement of SCI birds from important habitat areas outside of the SPA boundary (i.e. at potential ex-situ sites) arising from blasting and other construction activity where this takes place within 300m, or 800m for blasting; such important areas include Ballinoooley Lough, the River Corrib and the NUIG playing fields, although only blasting near Ballinoooley was considered to pose a population level risk and potentially affect black-headed gull, coot, shoveler and tufted duck.
- Habitat loss/fragmentation - the proposed road passes through and will result in habitat loss at potential "ex-situ" sites where SCI bird species were recorded, these were wintering bird sites identified by the applicant as WB01, WB02, WB03, WB07, WB08, WB10, WB16, WB23 and WB45, although the scale of the loss was not deemed sufficient to risk population level effects.

#### *Galway Bay Complex cSAC*

- Habitat degradation - as a result of the proposed road affecting water quality in receiving watercourses and Galway Bay during construction. Potentially affecting all coastal and marine qualifying interest Annex I habitats.
- Habitat degradation - as a result of introducing/spreading non-native invasive plant species to habitat areas within Galway Bay Complex cSAC. Potentially affecting 6210 calcareous grassland.
- Barrier effect - the installation of new culvert structures on watercourses within the Bearna Stream catchment has the potential to present a barrier to otter movement (the lower portion of the Bearna Stream catchment lies within Galway Bay Complex cSAC).
- Mortality risk - with new watercourse crossings on watercourses within the Bearna Stream catchment, the proposed road poses a mortality risk to otter through collisions with road traffic.

#### *Inner Galway Bay SPA*

- As for Lough Corrib SPA, although with additional species potentially affected, since the SCI species differ, with cormorant, grey heron, wigeon, teal, shoveler, lapwing, bar-tailed godwit, curlew, black-headed gull potentially affected by changes in water supply, water quality and blasting at Ballinoooley Lough (WB02); cormorant, grey heron, teal, and black-headed gull potentially affected by changes in water supply and quality at Coolagh Lakes, and cormorant, grey heron, common tern, common gull, black-headed gull potentially affected by water quality changes at the River Corrib (WB12); disturbance impacts for common gull and black-headed gull at NUIG playing fields (WB45) were ruled out.

### *Methodology*

- 4.5.2** What follows is a re-examination, analysis and evaluation of the potential impacts of the proposed road on the qualifying interest features of the identified Natura 2000 sites, using the data provided by the applicant and informed by two site visits and information presented by others in written submissions and at the oral hearing. The objective is to independently identify, in the light of the best scientific knowledge in the field, all aspects of the development project which could adversely affect any Natura 2000 site in light of its Conservation Objectives. Any uncertainty in the assessment is also expressed (as a level of risk), to ensure that the conclusion is sound.

### *Lough Corrib cSAC and SPA*

#### *Construction Stage*

#### *Habitat loss directly within the Natura 2000 Sites*

- 4.5.3** Direct loss of habitat within the cSAC is addressed by the applicant in the NIS p75, p98, p121-135 and p139-142, the FIR response, the corrigendum, the Module 1 response and polygon 1f data. These documents set out the types of habitats and the areas affected, supported by mapping of vegetation and associated photographs and data, Annex 3 of Appendix A.3.1 of the FIR response. The applicant's assessment is that there would be no loss of qualifying interest Annex I habitat within the Lough Corrib cSAC.
- 4.5.4** There are four main areas (total area 4ha) where the development boundary overlaps with the cSAC (but not the SPA). These four main overlap areas are:
- Area 1 (also referred to as area 2 on plate 2.2 of the NIS p9) at the site of the proposed River Corrib Bridge between Dangan and Menlough (Ch. 9+250 to Ch. 9+550), including some adjoining land to the east of the River Corrib, NIS p11, some of which is allocated as a receptor site (Area 6210 R1), which is part re-instatement of existing habitats and part a receptor site for grassland from elsewhere, EIAR p699, EIAR Figures 8.23.1 to 8.23.14 and EIAR Appendix A.8.26;
  - Area 2 (also area 3 on plate 2.2) to the north west of the Coolagh Lakes (Ch. 9+850 to Ch. 10+100), there are four locations here where the development boundary overlaps with the cSAC, EIAR Figure 8.15.7, NIS p12;
  - Area 3 (also area 4 on plate 2.2) to the west of Lackagh Quarry (Ch. 10+620 to Ch. 11+800), there are six places of overlap here with one being above the location of the proposed Lackagh tunnel, EIAR Figure 8.15.8, NIS p13; and
  - Area 4 (also area 1 on plate 2.2) at the termination of the proposed drainage outfall from the N59 Link Road North at Kentfield, NIS p10.
- 4.5.5** The proposed road design includes measures to reduce the loss of habitats within these four areas, including, in Area 1, an open span bridge at the River Corrib Ch. 8+850 to Ch. 9+500 which has no supports in the River Corrib; in Area 2, retaining wall to reduce land take at Ch. 9+880 to Ch. 10+050 (south -side only); in Area 3, retaining walls to reduce land take at Ch.

10+850 to Ch. 11+150 (both sides) and, also in Area 3, the Lackagh Tunnel Ch. 11+150 to Ch. 11+420 which takes the route of the road directly underneath the cSAC, NIS p9.

**4.5.6** Even with these measures, loss of land to development within the cSAC will occur, as follows: 2.55ha at Area 1 (NIS p125), 0.13ha at Area 2 (p132 NIS), 0.2ha at Area 3 and 0.02ha at Area 4 (p 134 NIS), totalling 2.9ha (NIS p125). The applicant asserts that these areas do not include Annex I habitats that are qualifying interest of the Lough Corrib cSAC or indeed any Annex I habitats.

**4.5.7** Within the four main areas where the overlap occurs, the applicant has set out in the NIS p125-p135 which polygons (areas of land attributed to a particular habitat by the applicant) overlap with both the cSAC and the proposed road boundary (27 polygons in total); these are polygons 1.a - 1.g in Area 1, 2.a- 2.j in Area 2, 3.a to 3.j. in Area 3 and 4.a to 4.d in Area 4. However, 15 of these merely touch the road boundary or are included in mitigation areas; these are polygons 1.a, 1.b, 1.e, 1.g, 2.b, 2.c, 2.f, 2.h, 2.j, 3.a, 3.d, 3.e, 3.g, 3.h and 3.i. The remaining 12 polygons have a greater degree of overlap and therefore need further consideration.

**4.5.8** To further complicate matters, only part of each of the remaining 12 polygons overlap with the proposed road boundary and it is perhaps the part which overlaps or is lost/damaged which is of most relevance. I have identified the areas which overlap as areas A to M (see Table 5). Seven of these (B, F, G, H, I, J and M) appear to be directly impacted i.e., all or partly damaged or lost. Since these units are not used by the applicant there is no precise data on the areas damaged/lost in each although the total is known. It is critical to the assessment to know if any of these seven areas are Annex I habitats or could have been Annex I habitats when the site was designated for those habitats where the objective is restoration. This is assessed in Table 5 and subsequently.

**Table 5: Assessment of the areas of Lough Corrib cSAC which overlap with proposed road boundary.**

Ref. & location	Area damaged/lost	Polygon of which part	Relevés* within polygon, those in area lost in bold, those in brackets not listed by the applicant in FIR	Applicant's Assessment of polygon	My Assessment
<b>A</b> 9+250-9+400	0ha, but would experience shading	R. Corrib	None	Depositing/lowland river (FW2)	3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, on the basis that the Annex I type applies to the whole watercourse, not just the areas with the relevant vegetation.  No change since 1995/ 2000 according to aerial imagery
<b>B</b> 9+400-9+600	<b>2.55ha</b>	Area 1.c	4619_R1 <b>4619_R2</b>	Treeline (WL2)	Visited, checked relevé data and accepted.  No change since 1995/ 2000

Ref. & location	Area damaged/ lost	Polygon of which part	Relevés* within polygon, those in area lost in bold, those in brackets not listed by the applicant in FIR	Applicant's Assessment of polygon	My Assessment
		Area 1.d	<b>BEC175</b> 4400_R1 4400_R2 4400_R3 4400_R4 <b>4400_R5</b>	<i>Cynosurus cristatus</i> - <i>Trifolium repens</i> grassland vegetation community (GS1_3b)	Visited, checked relevé data and applicant's assessment accepted.  No change since 1995/ 2000
		Area 1.f	<b>BEC174</b> 3734_R1 3734_R2 3734_R3 <b>3734_R4</b> 3734_R5	Mixed broadleaved woodland (WD1) with 3734_R4 having 3% bare rock.	Visited, checked relevé data and accepted, but see discussion below.  No change since 1995/ 2000
<b>B1</b>		Area 1.e (0.3 of 0.69ha in the cSAC)	<b>4401_R1</b> <b>4401_R2</b> <b>4401_R3</b> <b>4401_R4</b> <b>4401_R5</b>	Dry calcareous neutral grassland GS1, with a tendency towards 3a <i>Briza media</i> - <i>Thymus polytrichus</i> grassland vegetation community ( <i>Briza media</i> being present in some relevés), there is also some exposed calcareous rock in this location EIAR A.8.26 p31	Checked relevé data and accepted.  Semi-improved version of this grassland type, aerial images indicate that this was less improved in 1995 and so could have been Annex I habitat at the time of designation (it almost certainly was in earlier times, there is a strong association between GS1_3a and Annex I 6210 calcareous grassland).
<b>C</b> 9+900, south	0ha?	Area 2a	4422_R1 (4422_R3) <b>(4422_R4)</b>	Oak-ash-hazel woodland WN2, with relevé 4422_R4 7% bare rock	The relevant relevé seems to be 4422_R4 (rather than R1 as stated by the applicant p15 FIR App A.3.1) but R4 is also classified as oak-ash-hazel woodland WN2 by the applicant and is supported by the data.  No change since 1995/ 2000
<b>D</b> 9+925, south	0ha?	Area 2.d	<b>3941_R1</b>	<i>Corylus avellana</i> - <i>Oxalis acetosella</i> community (WN2_2e) with relevé 3941_R1 0.3% bare rock	Checked relevé data and accepted.  No change since 1995/ 2000
<b>E</b> 10+000, south	0ha	Retained habitat area at Ch. 10+100	<b>3155_R1</b> <b>5507_R1</b> <b>3156_R1</b>	8240 Limestone pavements with relevés 3155_R1 15% limestone, 5507_R1 3% limestone and 3156_R1 3% limestone	Checked relevé data and accepted, supported by aerial imagery (not visited)  No change since 1995/ 2000
<b>F</b> 10+090, south	0ha	Area 2.e_1	<b>(3790a_R1)</b> <b>3790_R2</b>	8240 Limestone pavements, overlain with oak-ash-hazel woodland (WN2) with relevé 3790a_R1 1% limestone.	Applicant gives relevé 3790_R2 however not on maps (Figure 2.4.073) or in dataset, relevant relevé is 3790a_R1. Visited but difficult to survey, checked relevé



Ref. & location	Area damaged/ lost	Polygon of which part	Relevés* within polygon, those in area lost in bold, those in brackets not listed by the applicant in FIR	Applicant's Assessment of polygon	My Assessment
					data and accepted assessment, however, cover of limestone in relevé 3790a_R1 is lower than expected for Limestone Pavement and other areas described as oak-ash-hazel woodland (see next row)  No change since 1995/ 2000
	<0.13ha	Area 2.e_2	<b>3790b_R1</b>	oak-ash-hazel woodland (WN2) <i>Corylus avellana</i> - <i>Oxalis acetosella</i> community (WN2_2e) with relevé 3790b_R1 5% limestone	Checked relevé data and accepted, although limestone cover within the relevé 3790b_R1 is higher than in 3790a_R1, which as noted above, is in an area classified as Limestone Pavement.  No change since 1995/ 2000
	<0.13ha	Area 2.i	-	Artificial surface (BL3), road surface	Artificial surface (BL3), road surface, the Coolagh Road  No change since 1995/ 2000
<b>G</b> 10+620	<0.2ha	Area 3.b	<b>3768_R1</b> <b>3768_R2</b>	Oak-ash hazel woodland (WN2)/ scrub (WS1) with relevé 3768_R1 10% bare rock and 3768_R2 7% bare rock	Visited, checked relevé data and accepted.  No change since 1995/ 2000
<b>H</b> 10+850, south	<0.2ha	Area 3.f	4149_R1 4149_R2 4149_R3	Calcareous grassland Treeline Calcareous grassland	There is no relevé data from apparently impacted area (closest is 4149_R3). I assessed as <b>scrub</b> ; thick bramble and blackthorn on site visit.  No change since 1995/ 2000
<b>I</b> 10+925, north	<0.2ha	Area 3.c	<b>4541_R1</b> <b>4541_R2</b> <b>4541_R3</b> <b>4541_R4</b> <b>4541_R5</b>	Oak-ash hazel woodland (WN2)/ scrub (WS1) with relevé 4541_R1 7% bare rock, 4541_R2 10% 4541_R3 10%, 4541_R4 3% and 4541_R5 7%	Visited, checked relevé data and accepted.  No change since 1995/ 2000
<b>J</b> 11+000, south	<0.2ha	Area 3.h	<b>4538_R1</b> <b>4538_R2</b>	Oak-ash hazel woodland (WN2)/ scrub (WS1) with relevé 4538_R1 0.3% bare rock	Visited, checked relevé data and accepted.  No change since 1995/ 2000
<b>K</b> 11+200, north	0ha (above tunnel)	Area 3.j	4156_R1 <b>4156_R2</b> <b>4156_R3</b> <b>4156_R4</b> <b>(4156_R5)</b>	scrub (WS1)/ Oak-ash hazel woodland (WN2) with relevé 4156_R2 4% bare rock, 4156_R3 0.1%, 4156_R4 10% and 4156_R5 5%	Checked relevé data and accepted, supported by aerial imagery.  No change since 1995/ 2000

Ref. & location	Area damaged/ lost	Polygon of which part	Relevés* within polygon, those in area lost in bold, those in brackets not listed by the applicant in FIR	Applicant's Assessment of polygon	My Assessment
<b>L</b> 11+250- 11+375	0ha (above tunnel)	LP	<b>3087_R1-R5</b> <b>3088_R1-R4</b> <b>3089_R1</b> <b>3130_R1-R2</b> <b>3322_R1-R5</b> <b>3494_R1-R5</b> <b>3513_R1-R2</b> <b>3705_R1-R2</b> <b>4155_R1-R3</b>	8240 Limestone pavements, with relevé 3087_R1 70% bare rock, 3087_R2 55% bare rock etc  Scrub (WS1)	Checked relevé data and accepted, supported by aerial imagery.  No change since 1995/ 2000
<b>M</b> Outfall to R. Corrib	0.02ha	Area 4.a	<b>3815_R1</b>	Riparian woodland (WN5)	Visited, checked relevé data and accepted.  Cover of trees has arisen since site was designated, previously a type of grassland.

\* relevés (or quadrats) are used to survey vegetation, with all plant species within a given area, say 2m x 2m, recorded and assigned a level of abundance, plus other environmental characteristics also recorded. The relevés were given a unique reference code by the applicant for example 1234\_R1 or BEC123. The complete dataset was submitted by the applicant as part of the FIR response.

**4.5.9** Some further discussion is needed on the applicant's Area 1.f (included in my area B). Area 1.f is a beech woodland within which there is a limestone outcrop. Therefore, considerable attention, by the applicant, the DCHG/NPWS and myself, has been given as to whether this outcrop constitutes limestone pavement.

**4.5.10** According to the Interpretation Manual of European Habitats EUR28 (EC, 2013), limestone pavement comprises "*Regular blocks of limestone known as "clints" with loose flags separated by a network of vertical fissures known as "grykes" or "shattered pavements", containing more loose limestone rubble. The rock surface is almost devoid of overlying soils (considerably less than 50% cover) except for some patches of shallow skeletal or loessic soils, although more extensive areas of deeper soil occasionally occur; sometimes there is encroachment of peat*".

**4.5.11** The definition of limestone pavement is further explored in some detail in the "National survey of limestone pavement and associated habitats in Ireland" (Wilson & Fernández, 2013). This survey demonstrates that limestone pavements encompass a wide variety of rock structure, ranging from "massive blocks of smooth, relatively un-weathered pavement", with grykes ranging from well-defined to almost absent, to "finely fractured pavements or shattered pavements" which resemble rubble. The survey also demonstrated that a wide variety of vegetation types occurs within limestone pavement, ranging from only low growing plants in the grykes (which is referred to as exposed limestone pavement) to a low woodland canopy of species such as hazel and ash (which is referred to as wooded limestone pavement). The feature which unifies all this variety is the presence of more or less continuous cover of limestone rock with negligible soil covering. It is also implicit that this a landscape scale feature and could not apply to an individual rock or a collection of scattered rocks among, say, grassland. There is though the question of at what point does a collection of limestone rock tip

over from being not limestone pavement to being limestone pavement (akin to the bald man paradox).

- 4.5.12** This point was addressed, with respect to Area 1.f at the oral hearing which opinions sought from both the applicant and the National Parks and Wildlife Service; both were in agreement that the limestone rock outcrop in Area 1.f does not constitute Annex I limestone pavement and provided supporting evidence. To summarise, the NPWS in its statement to the oral hearing said that “the approach taken [by the applicant] to mapping and classification of limestone pavement is endorsed by the NPWS” and further clarified that “since limestone pavement is a geomorphological entity, this needs to be taken into account in applying definitions and it does not make sense to identify all areas of water-worn limestone as limestone pavement”, thereby confirming that smaller areas of water-worn limestone such as that under consideration would not qualify as limestone pavement. Moreover, the NPWS specifically agreed that classification of Area 1.f as a type of woodland, rather than limestone pavement, was appropriate. This statement is a definitive and conclusive view from the relevant statutory authority, with responsibility for designating Natura 2000 sites.
- 4.5.13** Based upon the above assessment, the seven areas (B, F, G, H, I, J and M) where direct habitat loss occurs are not Annex I habitat now.
- 4.5.14** It is also necessary to consider whether any of the areas subject to direct impacts were Annex I habitats at the time that the site was designated as a cSAC, which appears to have been 1998. This relates specifically to Annex I habitats for which the relevant objective is to restore favourable conservation condition. Examination of aerial imagery from 1995 and 2000 (<https://geohive.ie/>) which are the closest available to the year of designation was used to inform this assessment.
- 4.5.15** There are two areas where a change in the habitat type was evident or likely. The first of these is in my Area B1 which is the applicants Area 1e. This field is currently a semi-improved calcareous grassland, classified as GS1 but with some species indicating a tendency towards 3a *Briza media* - *Thymus polytrichus* grassland vegetation community (*Briza media* being present in two of five relevés). Aerial imagery indicates that this may have been unimproved grassland, and therefore potentially the Annex I type 6210, in 1995 but had been agriculturally improved, so in its current condition, by 2000. Despite this, the published conservation objectives for Lough Corrib indicate the objective is to maintain rather than restore this habitat type, which indicates there is no imperative to restore this area of grassland to the Annex I type 6210. This area is ‘lost’ as part of the proposed road but for the use as a receptor site (6210 R1) for translocated Annex I type 6210 or for creation of Annex I type 6210 from seed, a decision which is deferred by the applicant to the construction phase. It could therefore be argued that the proposed road includes the restoration of 6210 in Area 1.e.
- 4.5.16** The second area where a change in the habitat type was evident was in Area M/4.a where an increase in scrub or tree cover has occurred, replacing an unknown grassland type. This area is a disused railway embankment (the Midland Great Western Railway) and therefore most unlikely to have supported any Annex I grassland type at the time that the cSAC was designated.

- 4.5.17** The proposed road does not overlap with any part of the Lough Corrib SPA and therefore no habitat loss would occur within the SPA.

**Habitat loss in Natura 2000 sites indirectly through changes in hydrology/hydrogeology**

- 4.5.18** The Coolagh Lakes are included in the Lough Corrib cSAC (but not the SPA). These support several Annex I habitats which are qualifying interest. The lakes are fed mainly by groundwater in the Lough Corrib Fen 1 (Menlough) ground water body via the Western Coolagh Spring (NIS p59-62). Lough Corrib Fen 1 (Menlough) ground water body lies with a karst limestone system. The proposed road would be constructed above and through the karst and could therefore impact on water supply to the Lough Corrib Fen 1 (Menlough) ground water body and ultimately the Coolagh Lakes. This could result in the reduction and in the size of the lakes and therefore losses of the Annex I habitats. The potential for this to occur is assessed in detail in a separate hydrogeology report (Dodds, 2020).

- 4.5.19** The design for the proposed road includes several elements to capture, treat and then return at least most of the rainfall (the exception being water which makes its way into the Lackagh tunnel) to the ground water body to which it would have reached in the absence of the proposed road. In the karst area, this is by means of infiltration basins. This means that the water supply to the Western Coolagh Spring and the Coolagh lakes should be maintained despite the presence of the road (Dodds, 2020).

**Habitat fragmentation in Natura 2000 sites with larger habitat parcels divided in two by the proposed development.**

- 4.5.20** Habitat fragmentation of habitat parcels within the Lough Corrib cSAC was alluded to by the applicant in the NIS but not assessed directly.
- 4.5.21** The proposed road would divide just one habitat parcel within the cSAC into two separate parcels, which would combine with habitat loss to produce two smaller fragments of the existing habitat. This is the area of woodland known as Area 1.f, which is part of my area B. The likely effect of fragmentation would be to reduce the quality of retained areas of habitat, potentially reducing the numbers of woodland species present over time. The design of the proposed road however includes five culverts under the road which may partially mitigate the effects of fragmentation here. As previously assessed, Area 1.f is not considered to be Annex I habitat.

- 4.5.22** The proposed road does not fragment any part of the Lough Corrib SPA.

**Habitat isolation of habitat parcels within Natura 2000 sites to the north and south of the proposed development**

- 4.5.23** Isolation of the cSAC, or parts thereof, was not considered by the applicant in the NIS or elsewhere.
- 4.5.24** Most of Lough Corrib cSAC lies to the north of the proposed road, comprising Lough Corrib and its surroundings. However, there is an additional area to the south, which is separate from the Lough, including parts of the Menlough, Coolagh and Ballindooley Townlands and the River Corrib. Leaving aside the river, this additional area could be further subdivided into (i) an area of

limestone pavement to the north which overlaps with the Menlough and Ballindooley Townlands (the Menlough/Ballindooley area) and (ii) the Coolagh Lakes and surrounding areas, which include wetland and more limestone pavement, and overlaps the Menlough and Coolagh townlands (the Menlough/Coolagh area). The two are joined by a relatively narrow piece of designated land to the west of the Lackagh Quarry.

**4.5.25** The proposed road passes through the Menlough/ Coolagh/ Ballindooley part of the cSAC more or less at this narrow point, leaving approximately half to the north (the Menlough/Ballindooley area) and half to the south (the Menlough/Coolagh area). The potential for fragmentation of the cSAC is avoided by the proposed Lackagh Tunnel, which would bring the road under the cSAC, and therefore maintaining the connection between the Menlough/Ballindooley and Menlough/ Coolagh areas of the cSAC at this location.

**4.5.26** However, there are other potential functional connections between these two parts of the cSAC which are not included in the designated site. These most obviously include undesignated limestone pavement located between the Coolagh Road/Menlo Park and Monument Road (Bothar An Leachta) and hedgerows to the west of the Lackagh Quarry. The construction of the proposed road includes a viaduct (the Menlough viaduct) between the Coolagh Road/Menlo Park and Monument Road which passes over the limestone pavement in this location, thereby maintaining the potential connections between these two parts of the cSAC here (but see discussion on shading in paragraphs 4.5.90 to 4.5.96). However, the proposed road would result in the loss of the hedgerows to the west of the Lackagh Quarry. Of the three connections/ potential connections between these two parts of the cSAC, the hedgerows are certainly the least important, but their loss could reduce the exchange of plants with poor dispersal abilities and terrestrial (non-flying) fauna, such as ground beetles, isopods (woodlice) and molluscs, between these two parts of the cSAC. Given the differing habitats (hedgerow vs limestone pavement), any affected species could include some woodland species which also inhabit the grykes but are unlikely to be specialist species of limestone pavement or calcareous grasslands.

**4.5.27** Despite the retained connections described above, the Menlough/Coolagh element of the cSAC would experience some additional degree of isolation; it is already abounded on two sides by the existing development extending along the N59 and along the N84, with the proposed road forming the third side of the triangle, thereby encapsulating this part of the cSAC.

**4.5.28** The road development does not isolate any part of the Lough Corrib SPA from the remainder.

*Habitat degradation within Natura 2000 sites as a result of chemical pollution, noise, dust, light and spread of invasive species including from construction traffic and site workers travelling to/from the construction site.*

#### *Chemical Air pollution*

**4.5.29** Air pollution during construction works is not considered a risk to the cSAC by the applicant and therefore not assessed in the NIS.

**4.5.30** Construction machinery will result in emissions to air however the quantity of emissions would be much less than that generated by traffic during the operation of road and insufficient to result

in habitat degradation of any Annex I habitat within the Lough Corrib cSAC or habitats within the Lough Corrib SPA.

#### *Chemical and Suspended Solids Water Pollution*

- 4.5.31** Leaks from construction machinery and spillages of construction materials could result in chemical pollution of watercourses, either directly or through contamination of groundwater, and subsequent degradation of the habitat. However, this is unlikely to occur in any significant way on a well-managed construction site.
- 4.5.32** A greater risk arises from site run-off which is high in suspended solids (soil) which can enter watercourses and may smother gravels and potentially lead to eutrophication. This is addressed by the applicant in the NIS p83-84 and p149-150. The main risk for the Lough Corrib cSAC is such run-off reaching the River Corrib which is included in the cSAC. The applicant makes the case that this is not an Annex I habitat as the typical plant species are not present in this part of the river (see FIR response p41-43) however the site synopsis indicates that the River Corrib is the Annex I type of 3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation. Assuming that latter is correct, there is a risk that, without adequate mitigation, suspended solids wash into the river and cause damage to qualifying interest Annex I habitat. The risk is higher during prolonged periods of heavy rainfall in winter when the ground is saturated. This is obviously a common occurrence in Galway, which receives on average 1m of rain per annum, with September to January having average rainfall of above 100mm in each month. It is conceivable that standard mitigation measures would become overwhelmed during a wet winter resulting in discharge of insufficiently treated site run-off into the River Corrib.
- 4.5.33** The SPA is located upstream from the construction site and would therefore not be affected by water pollution.

#### *Dust*

- 4.5.34** The potential effect of dust emitted from construction activities, particularly transporting materials around the site, on habitats adjoining the road is addressed by the applicant in the NIS p151, p153, p161 and p168 in relation to limestone pavement and calcareous grassland, stating (on p168 and p184) "*Dust emissions during construction .....could result in the loss of Calcareous grassland habitat*" [and] "*reduce bryophyte cover on wooded Limestone pavement habitat, within Lough Corrib cSAC, and a reduction in [Limestone pavement] habitat distribution locally, where present adjacent to the construction works between Ch. 9+850 to Ch. 10+100*". In addition to the area stated by the applicant, the section of the cSAC between Ch.10+800 to Ch. 11+150 is also at risk from dust pollution during construction, as well as alongside haul roads (see paragraphs 4.5.41 to 4.5.43 below). With respect to calcareous grassland, habitat loss resulting from dust would be a worst-case scenario, with damage or degradation of the habitat being more likely, with likely recovery over time.
- 4.5.35** Rock blasting and the processing of rock could also generate dust. Rock blasting is to take place in proximity to the cSAC for construction of the Lackagh tunnel and a retaining wall (Ch. 9+850 to Ch.10+050). Dust from the blasting activities could make its way onto adjoining areas

of the cSAC with similar effects as described above. In addition, the Lackagh Quarry area is a construction site compound at which rock processing will take place (NIS p23), providing a further potential source of dust adjacent to the cSAC. The volume of dust generated during construction, from both blasting and processing, would most likely be considerably less than when the Lackagh Quarry was operational. The quarrying activities, which ceased 10 years ago, have apparently not resulted in any long-term detrimental effects on the flora of the cSAC, as indicated by the vegetation surveys completed by the applicant, suggesting the blasting dust etc from construction activities may be similarly benign.

- 4.5.36** The SPA is too distant from the construction area to be affected by dust.

#### *Noise and Vibration*

- 4.5.37** During construction, any noise and vibration would be of insufficient duration to result in habitat degradation with the cSAC or SPA.

#### *Light*

- 4.5.38** During construction, any lighting would be of insufficient duration to result in habitat degradation with the cSAC or SPA.

#### *Invasive Plant Species*

- 4.5.39** During construction, it is an easy matter to inadvertently spread invasive plant species around the construction site during earth moving operations, either as seeds or fragments of rhizomes. It is conceivable that such material can inadvertently be brought on site on dirty machinery. This is assessed in the NIS p156-157 and elsewhere. Japanese knotweed, Himalayan knotweed and Rhododendron are identified in the NIS as risks (as these are the species covered by the legislation). Of these, Japanese knotweed and Himalayan knotweed could affect limestone pavement and calcareous grassland in the cSAC. There are other species recorded in the locality (relevé data) such as *Buddleja davidii*, *Centranthus ruber*, *Cotoneaster horizontalis*, *Fuchsia* spp., *Petasites* spp if *fragrans*, and *Symphoricarpos albus* which may equally cause problems if introduced into semi-natural habitats. The first three of these are candidates for growing on or around limestone pavement, as is another non-native species, *Clematis vit-alba*, which was not recorded by the applicant but is known to occur locally (<https://database.bsbi.org/maps/?taxonid=2cd4p9h.8hq>). These could equally be spread during construction activity. The area of the cSAC that is most vulnerable is within 200m of the road at Ch. 9+850 to Ch. 10+150 and Ch.10+800 to Ch. 11+150.

- 4.5.40** The Lough Corrib SPA is too distant from the construction site to be at risk from invasive non-native plant species spread through construction activity.

#### *Construction Traffic*

- 4.5.41** In addition to the effects described above for the construction site, there will be vehicle movements to and from the construction site, to bring the workforce and materials and to take

away waste. These vehicle movements would create additional emissions, dust (and mud deposits), noise, vibration, light, as well as risks of spreading invasive species and accidental spillage of fluids. Haul routes will sometimes use public roads (EIAR p319), including the Coolough Road, Bother Nua and Sean Bothar between Ch. 9+400 and Ch. 11+750, known as haul road HR 09/01. Use of this route as a haul road would bring construction traffic immediately alongside the cSAC on the Coolough Road/Bother Nua but not Sean Bothar (as the haul road stops short of the cSAC). Table 7.6 of the EIAR indicates that there would be an additional 51 HGVs and a total of 110 additional vehicle movements per day in this area during the construction period of three years, although it may be that some of this takes place on the main route alignment in the later stages of construction. This would amount to c.12,800 HGVs and c.27,600 total movements per year (assuming 251 working days per annum).

- 4.5.42** The haul routes are described in the NIS p30, but the applicant only addresses the risks of spreading non-native invasive plant species NIS p89. Construction traffic would also need to cross the River Corrib on the existing bridge. As for within the construction site, air pollution, noise, vibration and light would be of insufficient duration to degrade habitats however construction traffic exposes an additional area of the cSAC (alongside HR 09/01) to risks from water pollution especially from suspended solids, dust/mud and invasive non-native plant species which could result in degradation of habitats within the cSAC.
- 4.5.43** Construction traffic in and around the construction site would generally be too distant from Lough Corrib SPA to result in negative impacts. The boundary of the SPA is adjacent to the N84 road (towards Headford) and therefore a slight risk exists here should this route be used to bring construction materials etc to the site.

Mortality, disturbance, displacement and habitat loss for species of flora and fauna which form part of the qualifying interest populations of Natura 2000, resulting in declines or local extinction.

*Typical/positive indicator species of Annex I Habitats*

- 4.5.44** Site clearance will obviously result in the loss of vegetation from within the cleared area, and as described above, this will include areas within the cSAC which are not considered to be qualifying interest Annex I habitats. Therefore, site clearance would not directly affect the occurrence of typical (as defined by the European Commission in EUR28) or positive indicator species (as defined by the NPWS) within Annex I habitats within the cSAC. However, these species are not all restricted to the relevant habitats and some will be affected by site clearance during construction, as set out below. For locally common and widespread species, small scale losses of individuals would not have a knock-on effect on the Annex I habitats however loss of individuals of a rare species might have such an effect by reducing the resilience of the population.
- 4.5.45** In EUR28, the typical species of 8240 limestone pavement, 6210 calcareous grassland, 6410 Molinia meadows and 7220 petrifying springs are all plants. There are records of seven or eight of these from within the development boundary: *Asplenium trichomanes* (8240), *Asplenium adiantum-nigrum* (8240), *Asplenium ruta-muraria* (8240), *Leontodon hispidus* (6210), *Carlina vulgaris* (6210), *Epipactus* sp. (8240), *Potentilla erecta* (6410) and *Gentiana verna* (8240). The total number depends on the (unknown) identity of the *Epipactus*.



- 4.5.46** *Asplenium trichomanes* was recorded from Area 3.c, or I, which is within the cSAC boundary and where there may be up to 0.2ha area of habitat lost. It is not clear if this loss would affect plants of this species in this locality. However, this species was recorded fairly widely by the applicant and is known to be widespread in Ireland and therefore the loss of a few plants would here not have a wider impact on the areas of limestone pavement within the cSAC. The other typical species were all recorded within the cSAC from above the location of the proposed Lackagh tunnel and so would not be directly impacted in the cSAC during construction works.
- 4.5.47** As set out in NPWS documentation, the positive indicator species are also all plants (Wilson & Fernández, 2013) (Lyons & Kelly, 2016) (O'Neill, Martin, Devaney, & Perrin, 2013). This documentation provides a much longer list of species for exposed limestone pavement (39 species), wooded limestone pavement (51 species) and calcareous grassland (59 species). The applicant's data indicates that approximately 47 of these positive indicator species occur or may occur within areas of the cSAC that will be impacted by construction works. These are *Arum maculatum*, *Asplenium trichomanes*, *Briza media*, *Calliergonella cuspidata*, *Carex flacca*, *Circea lutetiana*, *Corylus avellana*, *Cratageous monogyna*, *Eurhynchium hians*, *E. striatum*, *Fissidens bryoides*, *F. dubius*, *F. taxifolius*, *Frageria vesca*, *Fraxinus excelsior*, *Geranium robertianum*, *Geum urbanum*, *Hedera helix*, *Ilex aquifolium*, *Isothecium alopecuroides*, *Isothecium myosuroides*, *Lonicera periclymenum*, *Lotus corniculatus*, *Neckera complanata*, *Neckera crispa*, *Phyllitis (Asplenium) scolopendrium*, *Pilosella officinarum*, *Plagiomnium undulatum*, *Polystichum setiferum*, *Potentilla sterilis*, *Primula vulgaris*, *Prunus spinosa*, *Ranunculus bulbosus*, *Rhytidiadelphus squarrosus*, *Rhytidiadelphus triquetrus*, *Rosa spinosissima*, *Rubus fruticosus* ag., *Scapania aspera*, *Sesleria caerulea*, *Solidago virgaurea*, *Sorbus aucuparia*, *Thamnobryum alopecurum*, *Thuidium tamariscinum*, *Thymus polytrichus*, *Tortella tortuosa*, *Veronica chamaedrys* and *Viola* spp.. Assuming, as is most likely, that the *Viola* is one of the more common species, these species are all locally common and therefore the loss of a few plants within the affected areas would not have any effect on populations of these species within Annex I habitats within the cSAC.

#### Qualifying Interest Annex II species

- 4.5.48** The risk of direct mortality during construction of Annex II species is addressed by the applicant in the NIS, p157 to p162. All the qualifying populations of Annex II species are either aquatic (sea lamprey, brook lamprey, Atlantic Salmon), comprise few individuals (otter) or absent from the locality (freshwater pearl mussel, white-clawed crayfish, lesser horseshoe bat (qualifying population<sup>8</sup>), slender green-feather moss and slender naiad). The risk of direct mortality of these species populations during construction is near zero, and the risk of population level effects from direct mortality is even lower.
- 4.5.49** The risk of disturbance during construction of Annex II species is addressed by the applicant in the NIS p89 - 91. As described by the applicant, there is a risk of localised disturbance for sea lamprey, brook lamprey, Atlantic Salmon and otter populations associated with the cSAC when

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<sup>8</sup> As confirmed by the NPWS at the oral hearing, the relevant population of lesser horseshoe bats is associated with Ebor Hall, not the population occurring in proximity to the proposed road.

work takes place near to watercourses however this would not be of sufficient duration or extent to cause any population level effects on these species.

**4.5.50** Displacement can arise from ongoing disturbance in a given area (known as effective habitat loss), habitat degradation (as described above) or actual habitat loss. Displacement is assessed alongside disturbance by the applicant in the NIS p89 -91. As any disturbance due to construction activity will be short-lived, any consequent displacement due to construction activity would be similarly short-lived and would not have any population level effects. Displacement of the aquatic species (sea lamprey, brook lamprey, Atlantic Salmon) could occur as a result of increased pollution in the River Corrib for example from suspended solids arising from construction activity washing into the river. Given the high velocity flows in this river any such effects from construction would be short lived and would be unlikely to have population level effects unless it affected a spawning or nursery ground, of which none are known in proximity to the proposed River Corrib bridge or downstream.

**4.5.51** There is no loss of river habitat from within the Lough Corrib cSAC and no loss of otter holts or other terrestrial habitats used by otter. There would however be small scale loss of river habitat at the road crossing points of the Bearna Stream catchment (which includes the Bearna Stream, Tonabrocky Streams and An Sruthan Dubh) which may be used by the otter population associated with Lough Corrib cSAC. This would not affect food availability and would therefore have no impact on the otter population.

#### *Qualifying Interest Annex I birds*

**4.5.52** Adult birds are not vulnerable to mortality during the construction phase however birds in the nest are vulnerable if construction activity is undertaken during the nesting season. Most of the Lough Corrib SPA qualifying interest species (SCI species) nest elsewhere, in other countries or in other habitats. However, black-headed gull and coot were recorded in the route corridor in the breeding season. The black-headed gull records are not of nesting birds. Coot was recorded during the breeding season at four localities within the route of the proposed road (between the River Corrib and Bóthar Nua, and once near Ballybrit). These could be breeding pairs at small waterbodies and may remain present locally during the winter to make up a small part of the Lough Corrib wintering population (most of this population comprising winter migrants). Loss of nests during the construction stage, if it were to occur, could therefore have a very small impact on the Lough Corrib cSAC wintering population of over 11,000 birds (although this is apparently in unfavourable condition).

**4.5.53** The SPA is 700m from the main construction area but only 70m from an access road to be constructed at Menlough, as described by the applicant NIS p229. There is a small risk of short-term, construction-related disturbance of birds occurring in the vicinity of this location. There are no breeding colonies of the species which are qualifying interest for the SPA in this location, NIS p230, and so only wintering populations would be affected if the works are undertaken here during the winter. The applicant states that construction work here would take place in less than one month and therefore any disturbance/displacement of birds within the SPA would be of short duration.

- 4.5.54** Black-headed gull and coot could be displaced from the route corridor during the breeding season a result of construction activity, either through disturbance associated with construction activity or as their habitat is removed. The same applies to common gull during the winter. Susceptibility to disturbance varies from species to species, with some species affected by human activity up to 200m distant. Therefore, construction related disturbance could affect birds both inside the construction area and within a zone extending up to 200m away. However, none of the three species identified are particularly susceptible to disturbance and therefore only those within and immediately adjacent to the construction site are likely to be affected. The displacement will become permanent when the habitat is lost.
- 4.5.55** Direct loss of habitat outside the SPA could affect the qualifying interest of the SPA if the affected habitat is for some reason an important area for the birds concerned, referred to by the applicant as 'ex-situ' sites in the NIS. The applicant has addressed this in the NIS p237, with the analysis on the previous pages also relevant. Nine of the identified wintering bird areas are directly impacted by the proposed road, five in a minor way and four more significantly; WB03 (Ballymoneen), WB45 (NUIG sporting ground), WB16 (Lackagh Quarry) and WB01 (Arduan). The proposed road would divide the same wintering bird sites affected by habitat loss into two parts. Originally, it was proposed to relocate the NUIG sports pitches as part of the proposed road however this is now the subject of a separate planning application.
- 4.5.56** There were no qualifying interest bird species of the Lough Corrib SPA recorded during the winter at WB03 Ballymoneen and WB16 Lackagh Quarry. At WB01 Arduan, one such species was recorded, black-headed gull (peak count 21), while at WB45 NUIG, two such species were recorded, black-headed gull (peak count 47) and common gull (peak count 21). These populations would therefore experience direct habitat loss and fragmentation during construction of the proposed road. Losses of small waterbodies used by coot may also occur during construction of the proposed road.
- 4.5.57** Two outcomes from habit loss and fragmentation are possible, (i) the birds (and their descendants) simply relocate to other available habitat and there is no effect on the population or (ii) the birds are unable to find suitable alternative habitat and die, reducing the population. The outcome depends on whether the population is limited by the availability of habitat or another factor. The applicant makes the case that there is ample available alternative habitat for the birds, and they would simply relocate.
- 4.5.58** Black-headed gull and common gull make use of sports pitches and other short, improved grassland, while coot nests at small and large waterbodies, none of which are in short supply in the Lough Corrib/Galway area.
- 4.5.59** Black headed gull numbers have declined at Lough Corrib in line with the general decline and range contraction in Ireland and now apparently occur in numbers below the baseline value for Lough Corrib SPA. It is not known why this change has occurred, but it may be that as the population declines it is retreating from less favoured areas in the north and west of the country, and higher ground, which supports the case that there would be ample alternative habitat available for those remaining birds following construction of the proposed road.

- 4.5.60** Common gull is currently in favourable condition at Lough Corrib, the current population being comfortably above the baseline value. The population could be limited by the available habitat, however, any declines associated with losses of grassland would not be sufficient to bring the population down below the baseline level.
- 4.5.61** As noted above, the local breeding population of coot makes a marginal contribution to the qualifying wintering population, if any. Nevertheless, breeding bird populations are much more likely to be limited by available habitat than wintering birds, and a small decline in response to habitat loss is probable.
- 4.5.62** The records of all other qualifying interest species of bird of Lough Corrib SPA are more than 200m distant and are therefore unlikely to be disturbed or displaced by general construction activity, as explained by the applicant, NIS p231 to p238. The exception is those species which make use of Ballindooley Lough which would be 450m from the construction site where blasting of rock is to take place. The noise from blasting could disturb the birds and temporarily displace them from the Lough. The relevant species are black-headed gull, coot, shoveler and tufted duck which were qualifying interest species of bird of Lough Corrib SPA and have been recorded at Ballindooley Lough. The risk to the population arising from blasting would be greatest during severe winter weather.
- 4.5.63** It is also necessary to consider those populations for which the objective is 'to restore'; it is conceivable that an area of the construction corridor was important for a particular species and that its continued existence would be necessary for the restoration of the population. A review of the qualifying interest features and the habitats impacted or within 200m of the route corridor indicates that none of those species with an unfavourable population are likely to have made significant use of the construction corridor in the past (i.e., at the time the SPA was designated).

Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory and form part of the qualifying interest populations of Natura 2000.

*Typical/Positive Indicator Species of Annex I Habitats*

- 4.5.64** As set out above typical and positive indicator species of the relevant Annex I habitats are all plants. The construction period is of too short a duration to impact on plant dispersal.

*Qualifying Interest Annex II species*

- 4.5.65** Disruption of fish movement and migration up and down river could occur when construction works take place in or near the river channel. This could be when physical infrastructure is being constructed in the river, through noise and vibration from construction works or if water quality is adversely affected by e.g., suspended solid run-off. In order to affect migration, such works would obviously need to occur when fish are migrating. As described in the NIS p136, the River Corrib is an important salmonid watercourse, providing a migration route for salmon and also brook and sea lamprey. Works will be required next to and over the River Corrib during construction of the River Corrib Bridge. The potential effects are assessed in the NIS p143 p162. Given the lack of in channel construction works, the short duration of the construction works and the nature of the River Corrib crossing, the constructions work would not interfere

with fish migration in a way that would affect the population. There are other watercourses included in the cSAC however none of these are crossed by the route of the proposed road.

- 4.5.66** There are other watercourses outside the cSAC which are crossed by the proposed road, NIS p63 and p91, these are Sruthan na Libeirti, the Trusky Stream, the Bearna Stream, the Tonabrocky Stream and the Knocknacarragh stream. These are described in the EIAR p958 to p962 and shown on Figure 11.1.001. The importance for these streams for salmon is assessed in the EIAR p968 which indicates varying importance. None of these watercourses connect to Lough Corrib and therefore do not provide a migratory route for fish populations associated with the Lough Corrib cSAC.
- 4.5.67** Otter is present on the River Corrib, the adjoining Coolagh lakes and the Bearna Stream catchment (which includes the Bearna Stream, Tonabrocky Streams and An Sruthan Dubh), NIS p64. Since otter has a large home range and can move between catchments, both those occurring in the Lough Corrib cSAC and those at the Bearna Stream catchment could form part of the cSAC population or be linked populations, NPWS1. Construction works at the River Corrib is a bridge and for the other water courses the crossing will be a culvert. Since otters are mainly nocturnal, they would be moving around their home range at a time without construction activity and, in any event, may be relatively tolerant of such activity, NIS p90. The main risk therefore is from inadvertently creating barriers to otter movement with site fencing or stockpiled materials in proximity to water courses. Clearly this is not an issue at the River Corrib, but it could occur at other minor watercourses where a culvert is to be installed.

#### *Qualifying Interest Annex I birds*

- 4.5.68** Lough Corrib and other important sites for wetland birds, for example Ross Lake and WB02 Ballindooley Lough, lie to the north of the proposed development while Galway Bay lies to the south, with the River Corrib being a potential corridor connecting these sites. Several bird species which are a qualifying interest of the Lough Corrib SPA also make use of these other sites. These include teal, shoveler, lapwing, and black-headed gull which all use all three sites, and golden plover and common gull which also use Galway Bay. The degree of interchange between these sites is not known however grey heron, lapwing, black-headed gull and common gull were all recorded flying along the River Corrib in 2006 (RPS 2006). Regardless, these species would not be put off making the journey between wetland sites as a result of construction activity for the proposed road.

*Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading, with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites.*

#### *Typical/Positive Indicator Species of Annex I Habitats*

- 4.5.69** As set out in the EIAR p495, the proposed road will result in the loss of 280ha of habitat, including c.8.8ha of Annex I habitats, four of which are qualifying interest features for Lough Corrib cSAC although, as set out in paragraphs 4.5.3 to 4.5.17, none of the areas of lost Annex I habitats are within the cSAC itself. Nevertheless, site clearance for construction could theoretically result in the reduction in local populations of typical/positive indicator species of

Annex I Habitats which are qualifying interest features of the cSAC with possible knock-on effects (reduction in population resilience) for the cSAC itself. Effects on the cSAC would only be expected if it happened that a population of a locally rare species that is also a typical species of a qualifying Annex I habitat was lost or reduced during construction.

- 4.5.70** A review of the applicant's data suggests that the only candidate for limestone pavement/calcareous grassland is *Gentiana verna*, or spring gentian, which is a typical species of limestone pavement, recorded by the applicant and classified as near threatened in Ireland (Wyse Jackson, et al., 2016). It was recorded by the applicant in only three relevés and is therefore apparently uncommon locally. The records of *Gentiana verna* are (i) in the cSAC above the Lackagh tunnel location; (ii) outside the road boundary to the west of the existing N6 at Doughiska/Briarhill (EC56\_R1); and (iii) outside the road boundary to the east of the existing R446 at Doughiska (EC56\_R2). There were no records of this species in other relevés taken from areas of limestone pavement lost as a result of the road development which are all wooded limestone pavement. None would therefore be directly affected during construction and so it appears that there would be no supporting populations of *Gentiana verna* lost as a result of construction.
- 4.5.71** Species typical of petrifying springs also require consideration since this a rare habitat with distinct plant communities. Only two species typical of petrifying springs according to EUR28 were found by the applicant *Bryum pseudotriquetrum* and *Cratoneuron filicinum* both of which are classified as of least concern in Ireland (Lockhart, Hodgetts, & Holyoak, 2012) and are relatively common, occurring in a variety of habitats (not just petrifying springs). *Bryum pseudotriquetrum* was recorded in five places by the applicant (including LQ115 in Lackagh Quarry) while *Cratoneuron filicinum* was recorded in two places. The recorded populations would be directly impacted by construction (4 places and 1 place respectively) however given the widespread occurrence of these mosses, these losses are would not have indirect effects on the petrifying springs within the cSAC.
- 4.5.72** Finally, there are populations of three rare species/sub-species of peatland habitats which were recorded by the applicant and would or could be affected by the proposed road, these are *Sphagnum affine*, *Sphagnum capillifolium* s. *capillifolium* and *Rhynchospora fusca*. These species are, either as a genus or individually, included as typical species in EUR28 and included in the conservation objectives for Lough Corrib cSAC for 7110 Active raised bogs and 7150 Depressions on peat substrates of the Rhynchosporion. Specifically, *Sphagnum affine* (listed as *S. imbricatum* of which it is included as a sub-species *affine*) is a typical species of 7110 and *Rhynchospora fusca* is a typical species of 7110 and 7150. An adequate cover of *Sphagnum* mosses (encompassing *S. affine* and *S. capillifolium* s. *capillifolium*) is a conservation objective for 7110 in the raised bogs within Lough Corrib cSAC, while any species of *Rhynchospora* (counted separately) is a positive indicator for 7150 (Perrin, Barron, Roche, & O'Hanrahan, 2014). Given their rarity, the three species/sub-species listed do not make up a significant part of the flora within the Lough Corrib cSAC with perhaps only *Rhynchospora fusca* present and contributing towards the achievement of the conservation objectives (NPWS, 2013). It appears that *Rhynchospora fusca* population recorded by the applicant is outside the footprint for the road development. Ensuring this population is protected would therefore maintain any

supporting function that it may have for *Rhynchospora fusca* populations inside the Lough Corrib cSAC.

*Qualifying Interest Annex II species*

- 4.5.73** There are impacts on lesser horseshoe bats arising from the proposed road including loss of a roost and loss of foraging habitat during the construction stage, resulting in the potential loss of a colony of this species. The applicant undertook detailed bat surveys including radio-tracking and visits to roosts and found no direct link between the colonies affected by the proposed road and the relevant colony within Lough Corrib cSAC. This indicates that the affected population is not a supporting colony for that at Ebor Hall (which is the qualifying population), or at least that there is not a strong link between the two.
- 4.5.74** There would be no direct loss of any other supporting populations of the qualifying interest Annex II species of Lough Corrib cSAC during the construction stage.

*Qualifying Interest Annex I birds*

- 4.5.75** There would be no direct loss of supporting populations of qualifying interest Annex I bird species during the construction stage (it has been assumed that all populations recorded locally form part of the Lough Corrib SPA population).

Increase in recreational pressure on Natura 2000 sites if improvements to the road network bring in additional tourists and increase resident population.

- 4.5.76** There would be no increase in recreational pressure during the construction stage.

*Operation Stage - Indirect impacts*

Habitat loss directly within the Natura 2000 Sites and indirectly through changes in hydrology/hydrogeology.

- 4.5.77** There would be no further direct habitat loss during the operation phase.

Habitat fragmentation in Natura 2000 sites with larger habitat parcels within divided in two by the proposed development.

- 4.5.78** There would be no additional habitat fragmentation however the effects described for the construction phase in paragraphs 4.5.20 to 4.5.22 would endure.

Habitat isolation of habitat parcels within Natura 2000 sites to the north and south of the proposed development

- 4.5.79** As for habitat fragmentation, with the relevant paragraphs being 4.5.23 to 4.5.28.

Habitat degradation within Natura 2000 sites as a result of chemical pollution, noise, dust, light, shade and spread of invasive species.

#### *Chemical Air pollution*

- 4.5.80** It is possible that air quality in general would improve during the short term when the road becomes operational, with the same cars spending less time in queuing traffic due to the increased road space. It would however bring these cars closer to the Lough Corrib cSAC. Habitat degradation resulting from air pollution during operation is assessed in the NIS p150 to p153 and in more detail in Appendix L of the NIS. As described by the applicant, the maximum extent of such effects would be 200m, NIS p88. Most of the Lough Corrib cSAC is well beyond this distance, with only the areas of the cSAC between the eastern edge of the Lackagh Quarry and the western bank of the River Corrib within this distance, including sections where there is no separation between the proposed road boundary and the cSAC.
- 4.5.81** The traffic using the road would result in locally increased levels of contamination including compounds of nitrogen, which is the component of vehicle emissions most likely to result in changes in the vegetation. The applicant reports that according to its modelling the levels would approach the Air Quality Standard of NO<sub>x</sub> 30 micrograms/m<sup>3</sup> within 10m of the edge of the road but not exceed it, with concentrations falling with distance from the road. The applicant concludes that because the AQS will not be exceeded there will not be harmful effects on the vegetation. This is a legal critical level for the protection of vegetation generally and may not translate directly to no effect on the vegetation (Lee & Power, 2013) (Lee, Davies, & Power, 2012), indeed the no-effect level may be lower than NO<sub>x</sub> 15 micrograms/m<sup>3</sup> (WHO, 2000). However, the applicant also reports a background figure for Nitrogen dry deposition of 1 to 2.5 kg N ha<sup>-1</sup> (NIS Appendix L) and a maximum increase of approximately 1.2 kg N ha<sup>-1</sup> within 10m of the proposed road (NIS Appendix L). These figures combine to give a maximum of 3.7 kg N ha<sup>-1</sup> which is very much less than the critical load of 15 kg N ha<sup>-1</sup> (Henry & Aherne, 2014). This indicates that vehicle emissions associated with the proposed road would not be sufficient to cause an appreciable change in the vegetation within the cSAC.

#### *Chemical Water Pollution*

- 4.5.82** To the east of the River Corrib, in the vicinity of Lough Corrib cSAC, water collected in the road drainage system is proposed to be discharged in three ways (i) through infiltration basins which discharge to the groundwater body which would have received the rainwater in the absence of the road; (ii) to the River Corrib for rainwater collected on the River Corrib bridge; and (iii) to the city wastewater system for water collected in the Lackagh tunnel. The water running-off the road is likely to be contaminated with deposits derived from exhaust gases, oils, other vehicle fluids (screen wash etc), rubber particles from tyres, metals from vehicle brakes, plastic waste from litter and materials eroded from the road surface. Should an accident occur, then any material transported by road could be added to this list. Without adequate treatment, these substances would make their way into the groundwater water system which leads to the Coolagh Lakes and the River Corrib, both within the cSAC, NIS p86-87, p149-150.
- 4.5.83** The design for the proposed road includes the treatment for road run-off prior to discharge into the ground and surface water, to meet the standards set by Transport Infrastructure Ireland (TII).



Given the very sensitive nature of the receiving environment, the highest level of treatment is needed, and this requires pollution traps and a wetland system to treat the run-off, NIS p86. As with air quality, it may be that general water quality initially improves as the same cars move from old roads with no treatment of run-off onto the proposed road where the run-off would be treated. However, discharges would be directly into the groundwater and rivers in places where there is no such discharge now and the advantage gained by shifting transport patterns may be lost with subsequent traffic growth.

- 4.5.84** Moreover, to be effective these systems must be maintained with sediment removal expected every 25 years, plus other maintenance tasks required more frequently to ensure that the system is operating as it should. Mr. Dodds' assessment is that the systems proposed by the applicant will ensure that water entering the groundwater and River Corrib will not have an impact on water quality within the Lough Corrib cSAC i.e., the River Corrib and Coolagh Lakes but this conclusion is dependent on the proper maintenance of the water treatment system. It is also dependent on the dredged material from the wetland being completely removed from the locality; if placed on the ground then the collected pollutants may leach into the groundwater.

#### *Noise and Vibration*

- 4.5.85** As with air pollution, the majority of the Lough Corrib cSAC is well beyond the distance at which noise and vibration from operation of the road could have significant effects, which according to applicant's assessment is up to 150m from the road centreline. However, noise and vibration levels in parcels of qualifying habitat in proximity would increase during operation. This could influence the fauna community of these parcels by displacing species which are intolerant of such noise (and perhaps vibration), thereby favouring more tolerant species, with knock-on ecological consequences. Displacement of bird species by roads (due to noise or mortality, or both) has been well-studied (Rheindt, 2003) (Reijnen, Foppen, & Veenbaas, 1997) (Summers, Cunningham, & Fahrig, 2011), however, there is also some evidence or suggestion that species of invertebrate may be affected by traffic noise (Morley et al, 2013), plus evidence that changes in the invertebrate community can affect plant species diversity and ecosystem function (Mulder et al, 1999). There is a paucity of research on this topic however any changes in plant species composition /ecosystem function must be subtle and intertwined with other potential causes of effects on habitats in proximity to roads. The area of the cSAC that is most vulnerable is within 200m of the road at Ch. 9+850 to Ch. 10+150 and Ch. 10+800 to Ch. 11+150.
- 4.5.86** In the NIS, noise is addressed as a factor which may cause displacement/disturbance of qualifying interest species of fauna specifically otter (p90), Atlantic salmon, brook lamprey, sea lamprey (p91) and SCI birds (p91, p103 - 107), rather than a potential mechanism for habitat degradation.

#### *Light*

- 4.5.87** As with air pollution and noise, most of the Lough Corrib cSAC is well beyond the distance at which light levels would be elevated by lighting in the construction or operational stages. The proposed lighting is described in the design report (section 10.3, pages 332 - 333) and shown on drawings GCOB-1300-D-000 to -015. During operation, the mainline will be lit between the N84 Headford Road Junction and the eastern entrance of the Lackagh tunnel, meaning that the

carriageway will be lit up to the point where it reaches the boundary of the cSAC, and there is further lighting from the western entrance of the Lackagh tunnel westwards to approximately Ch. 10+920, with the cSAC immediately adjacent to the north and south. In both cases, the lighting will be on 10m high columns, with Type D (8500lm with backlight cowl) to the east and Type A to the west (9430lm). The drawings show light modelling in these localities extending out to 0.1 Lux to the east of the Lackagh Quarry and to 1.0 Lux to the west of the Lackagh Quarry. There is overlap with the light modelling and the cSAC to 1.0 Lux between Ch.10+900 to Ch. 11+025 on the south side and Ch. 10+900 to Ch. 10+690 on the north side, the 1.0 Lux isoline extends no more than 25m into the cSAC boundary in each case. There is no 0.1 Lux isoline shown so the degree of overlap is unknown, however this would also be expected to be within 25m of the road. 0.1 Lux is equivalent to illumination by the full moon, while 1.0 Lux is equivalent to candlelight.

- 4.5.88** Light from roads has been shown to affect the behaviour and distribution of invertebrates and so there is potential for this light influence invertebrate populations/distribution, with possible knock-on effects on the vegetation up to a short distance from the proposed road. This includes a small part of the cSAC.

#### *Shading etc of habitats*

- 4.5.89** As described by the applicant, NIS p88, structures included within the proposed road will create shade and therefore affect the vegetation communities beneath. The applicant identifies potential shading effects from the proposed River Corrib bridge (Ch. 9+250 to Ch. 9 + 600), around the bridge over Bothar Nua (Ch. + 850 to Ch. 10 + 150) and sections of embankment and retaining walls between the River Corrib and the proposed Menlough viaduct as locations where shading could affect land/water within the cSAC. In addition, the Menlough viaduct (Ch. 10+100 to Ch. 10+420) will shade an area of limestone pavement, which is outside of the cSAC but may provide connecting and supporting habitat for areas of the cSAC, as described in paragraphs 4.5.23- 4.5.28. As well as reducing light levels, bridges and viaducts will create drier, NIS p155, and cooler conditions, while walls and embankments could create drier or wetter and cooler or hotter conditions depending on the aspect, potentially changing the vegetation composition over a limited area.
- 4.5.90** The applicant assesses the potential effects of shading in the NIS p154 and in shading analysis study in NIS Appendix M. The diagrams included therein do not clearly show the boundary of the cSAC however it appears as though the only part of the cSAC subject to direct and significant shading (and rainfall reduction) is beneath the proposed River Corrib bridge. The Menlough viaduct would also result in direct and significant shading and rainfall reduction of an area of undesignated limestone pavement located outside but between two parts of the cSAC.
- 4.5.91** Moving east to west under the proposed River Corrib bridge, the base of the bridge deck would be approximately 4.6m above ground level in Area 1.f, increasing to 10.3m in Area 1.d (see NIS Figure 15.1) and then 13m to 15m above the River Corrib, with the bridge deck being a maximum of 24.9m wide (FIR response, Appendix A1.1). Assuming the maximum bridge width, this gives Height: Width (HW) ratios of 0.18, 0.41 and 0.52 to 0.60 (which are lower than those calculated by the applicant in the NIS). Using the applicant's reference (Broome, Craft, Struck, & San Clements, 2005), this indicates potentially the complete loss of vegetation within the

retained parts of Area 1.f and significant effects on plant growth, productivity and species composition in the retained parts of Area 1.d. However, as set out in paragraphs 4.5.3 to 4.5.16, these areas are not considered to be Annex I habitats, nor were they likely to have been when the cSAC was designated.

- 4.5.92** The applicant's view is that the River Corrib in this location is not Annex I habitat due to the lack of aquatic vegetation. This is at least debatable, with Article 17 reporting etc. indicating that it is a whole river which forms the Annex I habitat rather than just parts of the river where the listed vegetation types occur. There is limited aquatic vegetation at the location of the proposed River Corrib bridge (see NIS Appendix K, Site 5) and some fringing vegetation of trees and shrubs (as apparent from aerial imagery). The shading described could have limited effects on the little vegetation that is present, perhaps reducing its vigour. The 3260 water courses habitat within the cSAC are in favourable condition indicating that there is no requirement to restore aquatic vegetation to the River Corrib in this location but there is apparently a requirement to maintain the fringing vegetation of the river (NPWS, 2017).
- 4.5.93** The habitat/movement of qualifying Annex II species and Annex I birds would not be affected by shading of the River Corrib, as described by the applicant, NIS p155.
- 4.5.94** The base of the Menlough viaduct ranges from less than 1m above ground level to approximately 16.5m and an average of about 4.5m. It has a width of up to 26.3m (FIR response, Appendix A1.3). This gives H:W ratios of 0.3, 0.62 and 0.17 respectively, indicating large scale loss of the vegetation under this structure (Broome, Craft, Struck, & San Clements, 2005).
- 4.5.95** As mentioned previously, the typical species of the relevant Annex I habitats are all plants, some of which were recorded at the location of the Menlough viaduct (*Asplenium marinum*, *A. rutamuraraia*, *A. trichomanes* and *Leontodon hispidus*) and these individual plants could be lost here. The same is true of positive indicator species for limestone pavement/ calcareous grassland (*Asplenium trichomanes*, *Corylus avellana*, *Cratageous monogyna*, *Eurhynchium striatum*, *Fissidens dubius*, *Fissidens taxifolius*, *Frageria vesca*, *Fraxinus excelsior*, *Geranium robertanum*, *Hedera helix*, *Ilex aquifolium*, *Isoethecium myosuroides*, *Lonicera periclymenum*, *Lotus corniculatus*, *Neckera complanata*, *Phyllitis (Asplenium) scolopendrium*, *Prunus spinosa*, *Rhytidiadelphus triquetrus*, *Rosa spinosissima*, *Rubus fruticosus* ag., *Sesleria caerulea*, *Solidago virgaurea*, *Sorbus aucuparia*, *Thamnobryum alopecurum*, *Thuidium tamariscinum*, and *Tortella tortuosa*).
- 4.5.96** Since these typical and positive indicator species are locally common, loss of the plants from under the Menlough Viaduct is not expected to have any knock-on effects for populations in the Lough Corrib cSAC. The shading in this location would have similar effects on plant dispersal as if the road were built at ground level; with only populations of species that have limited seed dispersal capabilities, or which primarily spread vegetatively potentially becoming isolated by the presence of the road. The four typical species recorded in the locality disperse by means of wind-borne spores or seeds and so populations on either side of the viaduct are not likely to become isolated. Most of the positive indicator species spread by wind borne spores and seeds, or fruits and nuts which can be dispersed by animals. The exceptions are *Geranium*

*robertianum*, *Lotus corniculatus* and *Sesleria caerulea*, which disperse only by dropping seed to the ground. However, these species are common and widespread locally, so that no appreciable effect on their populations would occur because of restricted dispersal.

#### *Invasive Plant Species*

**4.5.97** During operation the seeds of non-native invasive species (and other species) can be spread in the airflow caused by passing vehicles (von der Lippe, Bullock, Kowarik, Knopp, & Wichmann, 2013). *Clematis vit-alba* seeds are windborne and are known to be susceptible to movement by vehicle airflow (von der Lippe et al, 2013), as is *Buddleia* (Von der Lippe & Kowarik, 2007). Once again, the area of the cSAC that is most vulnerable is within 200m of the road at Ch. 9+850 to Ch. 10+150 and Ch.10+800 to Ch. 11+150. The proposed road is mostly in a cutting in the latter locality which may mitigate the risk. The arrival and spread of these species in the cSAC would lead to a deterioration of the quality of the habitats over time.

Mortality, disturbance, displacement and habitat loss for species of flora and fauna which form part of the qualifying interest populations of Natura 2000, resulting in declines or local extinction.

#### *Typical/Positive Indicator Species of Annex I Habitats*

**4.5.98** As previously mentioned, the typical and positive indicator species of the relevant habitats are all plants. Theoretically, these could suffer mortality, displacement and habitat loss as a result of chemical pollution, either air- or water-borne, arising from vehicles using the road. However as set out above, air and water pollution levels are not expected to be high enough to affect the vegetation.

#### *Qualifying Interest Annex II species*

**4.5.99** The qualifying interest species most at risk during the operation of the road is otter. This is addressed in the NIS p93 and p157, with only low levels of mortality potentially resulting in population level effects. The design includes an open span bridge for the River Corrib and mammal tunnels alongside other watercourses combined with fencing, which will mitigate this risk.

**4.5.100** The other qualifying interest Annex II species that occur in the vicinity are fish, which could be at risk of mortality arising from chemical pollution of water, as set out above in paragraph 4.5.82 and 4.5.84 levels are not expected to be high enough to result in fish mortality.

#### *Qualifying Interest Annex I birds*

**4.5.101** There are three potential pathways for potential effects on bird species during the operation of the road; (i) collision with motor vehicles; (ii) collision with structures, the River Corrib bridge in particular; and (iii) displacement of birds from habitats adjacent to the new road.

**4.5.102** As set out in paragraph 4.5.68, the qualifying interest bird species may move between waterbodies located to the north and south of the proposed development. Flight heights of the

qualifying interest species are likely to be well above the road along most of its length, meaning that the risk of collision is negligible. The exception is the proposed River Corrib bridge, at which point flight heights could coincide with the traffic. The bridge design includes 2m high noise barriers along its length which are likely to force flying birds above the traffic, so once again the risk is minimal.

**4.5.103** The potential for collisions of qualifying interest bird species with the bridge itself is addressed by the applicant in the NIS p93 to p96 and in response to concerns raised by the NPWS in NPWS1. The final position of the NPWS was that the bridge would pose a minimal risk to flying birds, as it is unlit and has a low profile, NPWS2. I agree that there is little prospect of bird collisions with the bridge occurring to a level which would result in population level effects of any qualifying interest bird species.

**4.5.104** Some bird species favour open habitats, avoiding land in proximity to built structures and human activity. As set out in paragraph 4.5.56, three of the qualifying interest bird species have been recorded in proximity to the proposed road; black-headed gull, common gull and coot. These species are relatively tolerant of built structures and human activity in general. Therefore, displacement of these three species from the areas in proximity to the road is expected to be minimal and largely confined to the footprint of the road itself. The other qualifying interested species are more sensitive however the habitat in proximity to the proposed road is not suitable for these species.

Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory and form part of the qualifying interest populations of Natura 2000.

#### *Typical/Positive Indicator Species*

**4.5.105** The typical positive indicator species are all plants, which obviously do not migrate or commute. However, there is potential for the proposed road to affect plant dispersal. The only species likely to be of concern is *Gentiana verna*. This species is pollinated by bees, spreads vegetatively (when grazed) and by seed, which are dispersed over short distances (Hedley, 2015). The known position in the cSAC is above the location of the proposed Lackagh tunnel. The provision of the Lackagh tunnel should ensure continued ability to of this species to disperse within the cSAC.

#### *Qualifying Interest Annex II species*

**4.5.106** The construction of an open span bridge at the River Corrib crossing would ensure that there was no interruption to otter movements or fish migration within the cSAC, while the culvert designs include features to allow otters to pass under the road at other locations where these are provided.

#### *Qualifying Interest Annex I birds*

**4.5.107** As for construction phase, the presence of the proposed road would not affect bird movements in the locality.

Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites.

**4.5.108** As for construction phase.

Increase in recreational pressure on Natura 2000 sites if improvements to the road network bring in additional tourists and increase resident population.

**4.5.109** The road may serve to increase accessibility of Lough Corrib as a recreational destination; boating and fishing being popular activities at the Lough. The Lough condition is currently unfavourable due to mainly to agricultural activities in the lake catchment, however boating development is also cited as a current threat.

### *Galway Bay Complex cSAC 000268 and Inner Galway Bay SPA 004031*

#### *Construction Stage - Direct impacts*

- 4.5.110** There are no direct impacts on Galway Bay Complex cSAC and Inner Galway Bay SPA as a result of the construction of the proposed road, NIS p199 and p254, with the nearest point to the cSAC (Barna Woods) being 160m distant and the nearest point to the SPA (Rusheen Bay) being 1.1km distant. Therefore, direct loss of habitat and habitat fragmentation can be discounted as potential impacts on both Galway Bay Complex cSAC and Inner Galway Bay SPA.

#### *Construction Stage - Indirect impacts*

##### *Habitat loss in Natura 2000 sites indirectly through changes in hydrology/hydrogeology*

- 4.5.111** There would be no habitat loss indirectly through changes in hydrology/hydrogeology within the (Inner) Galway Bay (Complex) cSAC SPA (Dodds, 2020).

##### *Habitat isolation of habitat parcels within Natura 2000 sites to the north and south of the proposed development*

- 4.5.112** Much of the area and habitats within the Galway Bay Complex cSAC are marine and coastal and would therefore not be isolated from similar habitats by the construction of the road. There are however a few terrestrial habitat parcels which lie to the north of the coast and south of the proposed road. There is therefore the potential for these to be isolated by the proposed road from similar habitats or supporting habitats located to the north of the proposed road, with possible knock-on effects for the typical/positive indicator flora, if these are present. The principal area within the cSAC which would become more isolated as a result of the proposed road is a parcel of land to the east of Bearna, which includes the Barna Woods, a section of the Bearna Stream and an area of grassland. Barna Woods is already isolated from other areas of woodland however other semi-natural habitats occur in proximity and direct connections between these areas would be lost on construction of the road.
- 4.5.113** This area of the cSAC was not mapped by the applicant and there is no detail or assessments provided in the NIS as to whether this is Annex I habitat or what type. However, there is published detailed ecological information; Barna Woods is known to support a small area of the Annex I habitat 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) plus other types of woodland which are not of an Annex I type (Browne, et al., 2009). 91E0 Alluvial forests is not a qualifying interest feature of the Galway Bay Complex cSAC (nor Lough Corrib cSAC). This indicates that any effects of isolation would not affect a qualifying interest Annex I habitat in this location.
- 4.5.114** The proposed road would not isolate any two parts of the Inner Galway Bay SPA, nor put off qualifying interest bird species from using other sites located to the north of the proposed road.

Habitat degradation within Natura 2000 sites as a result of chemical pollution, noise, dust, light, shading and spread of invasive species including from construction traffic and site workers travelling to/from the construction site.

- 4.5.115** The road construction site is just over 100m from Galway Bay (undesigned area, at Knocknagreana) at its nearest point, with most of the construction activity occurring at a much greater distance. Therefore, additional chemical air pollution, noise, dust and light within and around Galway Bay resulting from the proposed road would be minimal during the construction phase, NIS p200. As with Lough Corrib cSAC there is a risk of potential pollution of watercourses during the construction phase, both chemical and, more likely, suspended solids due to site run-off entering the watercourses which feed into the Bay. Construction work at and near the Sruthan na Libeirti, the Trusky Stream, the Bearna Stream, the Tonabrocky Stream and the Knocknacarragh Stream, which are all crossed by the proposed road and feed into the Bay, poses a particular risk of suspended solid pollution, NIS p200. This could affect qualifying interest Annex I coastal habitats where these streams discharge into the Bay and potentially affect food availability for otter, a qualifying interest Annex II species of Galway Bay Complex cSAC.
- 4.5.116** The potential introduction and spread of non-native species into Galway Bay Complex cSAC are addressed by the applicant in the NIS p202 to p203. The majority of the Galway Bay Complex cSAC is too distant to be at risk immediately however there is a very low risk to the cSAC where construction takes place in and around the Barna Woods area (100m distant) and close to watercourses (which may transport plant material downstream to the cSAC), The main risk is Japanese knotweed, which is known to occur locally.
- 4.5.117** An assessment of construction traffic is provided in the EIAR and NIS, which is rightly focussed on the construction traffic in and around the proposed road. However, the CEMP states that the construction of the proposed road will require considerable movements of materials to, from and around the site. This is quantified in Table 7.6 of the EIAR p329 which includes all vehicle movements with deliveries to site not separated out from the total. Concrete and paving will be among the materials delivered to site however it is unclear how many vehicle movements this would entail, and which routes will be used for site deliveries. Use of a route from the south into Galway which includes the M18, R458 and N67 would bring construction traffic directly alongside parts of Galway Bay cSAC, with an increase in emissions and the risks of accidental spillage of vehicle fluids and spread of non-native invasive species on vehicle wheels, albeit that these risks are very low.
- 4.5.118** A risk of habitat degradation affecting qualifying interest bird species of the Inner Galway Bay SPA and waterbird habitat arises from suspended solid pollution, as described in paragraph 4.5.115, and NIS p257.



Mortality, disturbance, displacement and habitat loss for species of flora and fauna which form part of the qualifying interest populations of Natura 2000, resulting in declines or local extinction.

*Typical/positive indicator species of Annex I Habitats*

- 4.5.119** There is no risk of mortality, disturbance, displacement and habitat loss during construction for typical/positive indicator species of Annex I habitats within the Galway Bay Complex cSAC (supporting populations are addressed in paragraph 4.5.126).

*Qualifying Interest Annex II species*

- 4.5.120** The risk to the Annex II species is limited to otter when ranging outside of the Galway Bay Complex cSAC and potentially reaching the construction site, at the watercourse crossings, NIS p199, p203 - p204. The risks to this species population are as set out for the Lough Corrib cSAC. In summary, the risk of mortality is very low to negligible, disturbance of otter could occur, and minor habitat loss (and therefore displacement) will occur. However, any disturbance and loss of habitat would not have an impact on the otter population.

*Qualifying Interest Annex I birds*

- 4.5.121** Three of the significantly impacted wintering bird survey sites WB03 (Ballymoneen), WB45 (NUIG sporting ground), and WB01 (Arduan) supported qualifying bird species of the Inner Galway Bay SPA, with WB03 (Ballymoneen) supporting grey heron and curlew, WB45 (NUIG sporting ground) supporting black-headed gull and common gull and WB01 (Arduan) supporting black-headed gull. Recorded numbers were low in each case but nevertheless there will be a loss of habitat for these species in these locations. As already discussed for the Lough Corrib SPA, it seems likely that there is ample alternative habitat for the gulls with no risk of a population level effect (black-headed gull), or a decline which would reduce numbers below baseline levels (common gull).
- 4.5.122** For whatever reason, the applicant does not assess the impacts on grey heron and curlew at WB03 in the NIS, p259-60 and p263-264. Grey heron is associated with rivers and streams and so may have been recorded along the Tonabrocky stream which passes through WB03 and is bisected by the proposed road. The construction of the road and associated loss of stream-side habitats would not have an impact on the grey heron population as it would not alter the availability of food (fish) for this species. Curlew makes use of wet grassland in winter and there are several patches of this habitat type within WB03 and some small areas within the footprint of the proposed road. Given their small size, these would not be of importance for the curlew population. There is also potential for curlew to be displaced from other areas of wet grassland within 200m of the proposed road during construction (and then during operation), with the applicant's data indicating that a small number less than 5 would be affected. These birds may well find alternative habitat nearby, although there is evidence that displaced wading birds do not fare well. Any resulting population decline would not be appreciable in the context of the SPA population.

Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory and form part of the qualifying interest populations of Natura 2000.

*Typical/positive indicator species of Annex I Habitats*

- 4.5.123** Typical/positive indicator species of the terrestrial qualifying interest Annex I habitats are all plants and their lifecycles within the Galway Bay Complex cSAC would not be interrupted by the proposed road. The marine species would equally be unaffected.

*Qualifying Interest Annex II species*

- 4.5.124** There is potential for movement of the otter population along the watercourses crossed by the proposed road to be interrupted during construction works, especially when the culverts are being installed, but also inadvertently by fencing, NIS p203-p204. This is unlikely to be of sufficient duration to have population level effects but could temporarily exclude an otter from part of its territory outside the cSAC.

*Qualifying Interest Annex I birds*

- 4.5.125** As set out in paragraph 4.5.68, important sites for wintering birds lie to the north and south of the proposed road. Several bird species which are a qualifying interest of the Inner Galway Bay SPA also make use of these other sites. These include grey heron, cormorant, wigeon, teal, lapwing, curlew and black-headed gull which all use Galway Bay, Lough Corrib and Ballindooley Lough, bar-tailed godwit which also uses Ballindooley Lough, and golden plover, ringed plover, redshank and common gull which also use Lough Corrib (NIS Figure 9, Appendix I, Irish Wetland Bird Survey). The degree of interchange between these sites is not known however grey heron, cormorant, lapwing, curlew, black-headed gull and common gull were all recorded flying along the River Corrib in 2006 (RPS 2006). As for the Lough Corrib birds, these species would not be put off making the journey between wetland sites as a result of construction activity for the proposed road.

Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites.

*Typical/positive indicator species of Annex I Habitats*

- 4.5.126** As noted above, the typical/positive indicator species of the terrestrial Annex I habitats are all plants. The proposed road will result in the loss of plants of these species outside of the Galway Bay Complex cSAC, particularly but not exclusively due to losses of undesignated limestone pavement and calcareous grassland. However, as described for Lough Corrib cSAC, the impacted typical/positive indicator species of these habitats are locally common or not rare, and so these losses would not be expected to have an appreciable effect on the populations within

the Galway Bay Complex cSAC. There would clearly be no impact on supporting populations of marine species.

#### *Qualifying Interest Annex II species*

- 4.5.127** The otter population around Galway is assumed to be a single population spanning both the River Corrib and the southern parts of Lough Corrib cSAC and the northern parts of Galway Bay Complex cSAC, with no impacts likely on other otter populations outside this region.

#### *Qualifying Interest Annex I birds*

- 4.5.128** Similarly, the individual birds of qualifying interest species recorded outside the Inner Galway Bay SPA are assumed to be part of the Inner Galway Bay SPA. Any impacts would therefore be on the qualifying population, as described above.

#### *Operation Stage - Indirect impacts*

##### *Habitat isolation of habitat parcels within Natura 2000 sites to the north and south of the proposed development*

- 4.5.129** As for construction stage, with the conclusion that there would be no appreciable effect on qualifying interest Annex I habitats within Galway Bay Complex cSAC arising from habitat isolation.

##### *Habitat degradation as a result of chemical pollution, noise, dust, light, shading and the spread of invasive species.*

- 4.5.130** Galway Bay is too distant from the proposed road to experience negative effects from chemical air pollution, noise, dust, light, spread of invasive species during the operation of the road. However, there is the potential for road run-off containing chemical pollutants from vehicles (arising from deposits of exhaust gasses, leaking fluids, screen wash, tyre rubber, brake dust, accidental spillage and erosion of the road surface) to make its way into Galway Bay via the watercourses crossed by the proposed road. The design includes measures to control pollution and the applicant asserts that these will be adequate to prevent impacts on the qualifying interest of the Galway Bay Complex cSAC (NIS p202), and this has been independently assessed as adequate (Dodds, 2020), but the efficacy of these measures is dependent on maintenance.

##### *Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory and form part of the qualifying interest populations of Natura 2000.*

#### *Typical/positive indicator species of Annex I Habitats*

- 4.5.131** As for construction stage, with the conclusion that there would be no appreciable effect on qualifying interest Annex I habitats within Galway Bay Complex cSAC arising from disruption etc of qualifying interest populations.

*Qualifying Interest Annex II species*

- 4.5.132** The only Annex II species vulnerable to disruption is the otter, where the potential impacts would be the same as set out for Lough Corrib cSAC as assessed by the applicant NIS p204.

*Qualifying Interest Annex I birds*

- 4.5.133** As for construction stage, with the conclusion that there would be no appreciable effect on qualifying interest bird species within Inner Galway Bay SPA arising from disruption etc of qualifying interest populations.

Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites.

- 4.5.134** As for construction stage, with the conclusion that there would be no appreciable effect on qualifying interest habitats and populations of (Inner) Galway Bays (Complex) cSAC and SPA arising from loss of supporting populations.

Increase in recreational pressure if improvements to the road network bring in additional tourists and increase resident population.

- 4.5.135** The new road would improve access to parts of Galway Bay, potentially making it easier for those in the east of the city and beyond to reach the Barna Woods, Rusheen Bay and adjoining coastal areas within the cSAC and SPA. These last two areas support qualifying Annex I habitats, including 1220 perennial vegetation of stony banks (favourable condition), otter and Annex I bird species black-headed gull, common gull and redshank recorded by the applicant (NIS Appendix I WB52), and suitable habitat for others. If ease of access increases the use of these areas, on foot or on watercraft, then it could lead to greater disturbance of these habitats and species. The 1220 perennial vegetation of stony banks is perhaps the most vulnerable habitat since the vegetation is vulnerable to trampling.

### *Other Natura 2000 sites*

#### *Construction Stage - Indirect impacts*

Habitat degradation within Natura 2000 sites as a result of chemical pollution, noise, dust, light, shading and spread of invasive species including from construction traffic and site workers travelling to/from the construction site.

- 4.5.136** As set out in paragraph 4.5.117, the proposed road will require considerable movements of materials to the site. Use of a route from the south into Galway which includes the M18, R458 and N67 would bring construction traffic within 200m of Ardrahan Grassland cSAC, Kiltiernan Turlough cSAC, Lough Fingall Complex cSAC, and Cregganna Marsh SPA, while using an M18 only route would bring the traffic within 200m of Ardrahan Grassland cSAC, and Castletaylor Complex cSAC.
- 4.5.137** Construction traffic along these routes would increase emissions to air and increase the risks of spillage/leakage of fluids and materials. The air quality in the region is good (Aherne, Henry, & Wolniewicz, 2017) with low levels of nitrogen deposition, well below the critical load for the Annex I habitats in these designated sites, and therefore the additional emissions from the construction related traffic would not cause the critical load to be exceeded.
- 4.5.138** The M18 is a modern road and likely to include modern standards of pollution control which would deal with spillages either from leaking vehicles or in the event of an accident. However, the R458 and N67 are older roads which do not/may not reach the same standards of pollution control potentially leaving the Natura 2000 sites alongside at risk from pollution, albeit a very small risk that any pollution arising specifically from construction traffic would have any appreciable effect on the qualifying interest of these Natura 2000 sites.
- Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites.*
- 4.5.139** Connemara Bog Complex cSAC, Connemara Bog Complex SPA, Lough Fingall Complex cSAC, Ross Lake and Woods cSAC, Black Head Poulsallagh cSAC, Rahasane Turlough cSAC, Kiltiernan Turlough cSAC, Castletaylor Complex cSAC, Gortnandarragh Limestone Pavement cSAC, Ardrahan Grassland cSAC, Moneen Mountain cSAC and East Burren Complex cSAC all include qualifying interest features and typical/positive indicator species which are also found within the route corridor. Similarly, Connemara Bog Complex SPA has qualifying interest bird species that have been recorded in the route corridor.
- 4.5.140** Therefore, individuals and populations of these species would be negatively affected by the proposed road. Theoretically, rare or locally uncommon typical/positive indicator species, Annex II species or Annex I bird species population lost to proposed development could leave the remaining populations within the designated sites listed here more vulnerable to extinction and genetic isolation.
- 4.5.141** As set out for Lough Corrib cSAC, the candidates for typical/positive indicator species are *Gentiana verna*, *Rhynchospora fusca*, *Sphagnum affine*, *Sphagnum capillifolium* s. *capillifolium*.

The first two of these appear to be in locations not affected by road construction and the latter two do not appear to contribute towards the attainment of favourable condition at the cSACs.

- 4.5.142** For the Annex II species, the candidates are marsh fritillary and lesser horseshoe bats.
- 4.5.143** The applicant reports a direct loss of 5.2ha of Marsh fritillary habitat, all in the western part of the route corridor. A population decline commensurate with the habitat loss would be expected, with the possibility, when combined with other impacts, of losing this species from one location in which it currently occurs. The nearest cSAC to this location is Connemara Bog Complex which is approximately 6-8km away. The applicant considered potential links in the screening report p15, concluded that there is no link due to the sedentary nature of the species, nevertheless, erosion of the marsh fritillary population outside of the cSAC may eventually reduce the resilience of the population within, but this could not be attributed to the proposed road specifically.
- 4.5.144** As previously noted, there are impacts on lesser horseshoe bats arising from the proposed road including loss of a roost and loss of foraging habitat during the construction stage, resulting in the potential loss of a colony of this species. The applicant found no direct link between the colonies affected by the proposed road and any colonies in the nearest cSAC; Ross Lake and Woods (nor the relevant colony within Lough Corrib cSAC). However, as with marsh fritillary population, declines of lesser horseshoe bats outside the cSAC network may eventually result in effects on those within, although again, this could not be attributed to the road scheme specifically.
- 4.5.145** The qualifying interest species of the Connemara Bog Complex SPA are cormorant, merlin golden plover and common gull. The proposed road is either not predicted to have population level effects on any of these species, or to have an effect which would reduce the population below the baseline values for the SPAs and would therefore not affect the supporting populations for the qualifying interest populations of this SPA.

*Operation Stage - Indirect impacts*

**Increase in recreational pressure on Natura 2000 sites if improvements to the road network bring in additional tourists and increase resident population.**

- 4.5.146** As the proposed road could ease access to Natura 2000 sites located to the west of Galway which, if it resulted in an increase in tourism, or recreation could result in damage to sensitive habitats. The Connemara Bog Complex cSAC and SPA, Ross Lake and Woods cSAC, Maumturk Mountains cSAC and The Twelve Bens/Garraun Complex cSAC all have areas which are already popular with tourists or for recreation. Examples include the mountain paths in the Twelve Bens which may pass through qualifying interest Annex I habitats that are in unfavourable condition.

#### 4.6 Step Two, part 2: Impact Prediction 'In combination'

##### *Applicant's Assessment*

- 4.6.1** The applicant provided an 'in combination' assessment in the NIS p329-p380. This considered approximately 33 plans, 9 specific projects and other projects generically. The assessment in the NIS was mainly pairwise, looking at the effect of the proposed road and one other plan or project at a time, however, in section 12.2 the total effect of all plans and projects was considered and this is expanded upon in the FIR response, p62 to p64.
- 4.6.2** The applicant considered the potential for in combination effects on Lough Corrib cSAC and (Inner) Galway Bay (Complex) cSAC and SPA to arise from water pollution, air quality, disturbance of otter, disturbance of wintering birds and the introduction of invasive non-native species.
- 4.6.3** The applicant determined that the possibility of in combination effects leading to adverse effects on site integrity (or undermining the conservation objectives) is ruled out because all other plans and projects would also need to comply with the Habitats Directive, the associated Regulations and the policies designed to protect Natura 2000 sites set out in the various Development Plans in proximity to the relevant Natura 2000 sites. The applicant also makes the case that, even if this were wrong, and there were in combination effects arising from other plans and projects, the proposed road would not contribute to such effects, as when considered alone the effects arising from the proposed road are imperceptible.
- 4.6.4** The applicant's assessment was updated in the light of new projects during the oral hearing, with an updated assessment provided in the AA - In combination assessment addendum update report, dated 10<sup>th</sup> March 2020, was then replaced 3<sup>rd</sup> November 2020, with a supplement to this covering Burkeway Bearna on 4<sup>th</sup> November 2020, these last two form the "**2020 in-combination update**". This included seven new or updated plans and sixteen new projects, as set out in Table 1 and Table 2, respectively, plus the supplement. The applicant's conclusion remains unchanged despite the new information.

##### *Summary of Plans and Projects*

- 4.6.5** According to EC guidance, the in-combination effects assessment should consider existing plans and projects, extant permissions not yet completed (e.g., phases of development), extant permissions not yet started, current applications for permission under consideration, any known unregulated projects, ongoing projects subject to regulatory review, policies and proposals not yet fully implemented and draft plans being brought forward. The effects of completed plans and projects is to be considered as part of the baseline conditions. The effects of completed plans and projects were not explicitly identified by the applicant in its in-combination assessment however such effects can be inferred from the condition assessments for qualifying interest of Natura 2000 sites (e.g., poor water quality in Lough Atalia).
- 4.6.6** From the information provided by the applicant in the NIS and the 2020 in combination update, it is clear that there are substantial plans to develop the city of Galway and the surrounding area, plus projects recently completed, underway or about to start.

4.6.7 The key plans are Galway County Development Plan 2015-2021 and Galway City Council Development Plan 2017-2023. Also relevant are the associated plans of national and local authorities which sit above and below the county and city development plans, and the plans of adjoining counties where these adjoin Galway Bay and Lough Corrib, and perhaps other Natura 2000 sites. These have all been subject to an appropriate assessment and the conclusion of each must have been that the policies contained therein would not, have an adverse effect on the integrity of any Natura 2000 site including (Inner) Galway Bay (Complex) cSAC and SPA and Lough Corrib cSAC and SPA. The conclusion in each case may be subject to the implementation of mitigation measures.

#### *Galway County Development Plan 2015-2021*

4.6.8 The Galway County Development Plan sets out, for the County, strategic aims and policies and objectives for *inter alia* settlements, housing, economic, tourism and retail development, roads and transport, water, wastewater and waste management, climate change, and natural heritage and biodiversity. The strategic aims include promoting regional development and growth in a sustainable and environmentally sensitive manner. It envisages population growth of around 2,600 people per annum in Galway County, with 7% of this directed to the town of Tuam, and lists the opportunity to “position Galway as the Outdoor and Recreational Capital of Ireland”. The original development plan did not include the proposed road, however it was added to the Plan, along with the rest of the Galway Transport Strategy (GTS) with Variation No. 1, which was published April 2017.

4.6.9 The Galway County Development Plan and Variation No. 1 have been subject to an appropriate assessment with the conclusion that Plan and the Variation would not adversely affect the integrity of any European site. The conclusion on both counts is contingent on the implementation of mitigation measures, which are written into the Plan and the GTS (which are replicated in the Natura Impact Report for Variation No. 1.).

4.6.10 The same consultants prepared the Natura Impact Report for Variation No. 1 as prepared the NIS for the N6GCRR, and two documents appear consistent, thus the mitigation measures identified at the Plan level for the N6GCRR have made their way down to the project level, where these are specific to the N6GCRR. For the conclusion on in combination effects, it is essentially reliant on all other projects which come under the plan not being permitted unless it can demonstrate that they will have no adverse effect on the integrity of a European site. This appears to miss the point of an in combination or cumulative assessment. However, the assessment does make clear that the conclusion is also reliant upon “adherence to the overarching policies and objectives of the Galway County Development Plan 2015-2021” without identifying any policy or objective in particular, so this is assumed to be a reference to the mitigation measures identified in the original appropriate assessment for the Galway County Development Plan.

#### *Galway City Development Plan 2017-2023*



- 4.6.11** The Galway City Development Plan 2017-2023 sets out the strategic vision, core strategy and detailed policies for Galway City. It includes objectives for growth and development, as well as policies to protect the environment. Targets for new housing equate to approximately 770 new households (or 2,100 people, so 80% of the County target) every year from 2017 to 2023, with supporting infrastructure, including the proposed road, and employment and recreation opportunities. The plan includes, for example, new residential areas to the south of the proposed road and west of the N84, in proximity to the Lough Corrib cSAC.
- 4.6.12** The appropriate assessment of the Galway City Development Plan identified the potential for impacts on Natura 2000 sites to arise from (i) discharge of wastewater and run-off into groundwater bodies, the River Corrib and Galway Bay both during the construction and operation of new developments, adding to existing discharges (ii) recreational activities, leading to trampling in Annex I habitats and disturbance of Annex II species (ii) incremental habitat loss and fragmentation. It does not explicitly list air pollution as a potential pathway however air quality measures are identified as a mitigation requirement.
- 4.6.13** The appropriate assessment of the Galway City Development Plan reached a conclusion of no adverse effect on the integrity on any Natura 2000 site however this was subject to mitigation measures which were or have subsequently been written into the Plan. These are set out in Tables 4.1 and Table 4.2 of the AA for the Galway City Development Plan, and include various measures within policies to help protect biodiversity both inside and outside designated sites, improve coastal and freshwater quality, reduce greenhouse gas emissions and maintain air quality in line with EU standards. It follows that the development elements of the plan and the environmental protection and improvement elements of the plan listed as mitigation measures, must both be progressed equally for the conclusion of the appropriate assessment to hold.

### *Projects*

- 4.6.14** In summary, the projects identified in the NIS and subsequently by the applicant include:
- Road development schemes comprising the N6 Galway City Ring Road, M6 Motorway improvements, M17 Galway to Tuam, N18 Oranmore to Gort, N17 Tuam Bypass, N59 Maam Cross to Oughterard, N59 Moycullen Bypass and upgrades to the R336 Bearnna to Scrib;
  - A motorway service area on the M6 at Oranmore;
  - National University of Ireland Galway (NUIG) New Pitches;
  - Cycle/greenway projects with start points in Galway City;
  - Two coastal protection projects in Galway bay, plus an extension of Galway Harbour;
  - More than 962 residential units;
  - Student accommodation with a total of 1,120 student beds; and
  - Galway West Water Supply Scheme (abstraction from the River Corrib).
- 4.6.15** Also of relevance is that Irish Water have upgraded the Mutton Island Wastewater Treatment facility under the Capital Investment Plan 2014-2016 (Galway Sewerage Scheme Phase 3 -

Network Upgrade Contract No.1 Volume D). The upgrade increases the capacity of the plant from 92,000 to 170,000 population equivalent (PE)<sup>9</sup>.

**4.6.16** Of the two strategic housing developments that were refused consent during the period covered by the oral hearing, one of these (306413-19/20, Rosshill Road) was refused at least partly on the basis of potential adverse effects on the integrity of Inner Galway Bay SPA, however, this could be more to do with a lack of information (wintering bird surveys) than actual adverse effects on the integrity of the SPA.

#### *Assessment*

**4.6.17** The Plans identified above include a range of environmental objectives and policies. However, it is notable that the projects presented by the applicant all have a development focus (roads, housing and urban regeneration) although these do, where appropriate, include mitigation to avoid adverse effects on the integrity of any European site. In combination effects are relevant when a series of minor impacts arising from more than one project, and which are insufficient to result in an adverse effect on site integrity on their own, combine to have such an effect.

**4.6.18** It is clear from the Plans that the proposed road is an integrated part of wider plans to manage existing traffic issues and accommodate population growth and further development in Galway City and therefore the County. It will help people move from east to west (and vice versa) more easily and could accommodate more road users than the current network.

**4.6.19** As identified by the assessors for the appropriate assessments referred to above, there are risks of in combination effects arising from the proposed road and other projects in the Galway area. These are:

- Biodiversity loss including of Annex I habitats outside Natura 2000 sites, individuals/populations of typical/positive indicator species of Annex I habitats outside Natura 2000 sites and undesignated habitats of Annex II species, which could reduce the resilience of such habitats/populations inside Natura 2000 sites;
- Isolation of important sites for biodiversity by the road network in particular, which again could reduce the resilience of species populations inside Natura 2000 sites;
- Recreational activities, leading to trampling in terrestrial Annex I habitats, damage to marine and freshwater Annex I habitats resulting from boat traffic and disturbance of Annex II species and Annex I bird species;
- Reductions in air quality arising from increases in vehicle emissions and other sources associated with an increased population and new roads in proximity to Natura 2000 sites;
- Reductions in water quality arising from increased water use, road run-off into watercourses and construction activity; and

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<sup>9</sup> population equivalent is a measure of the pollution equivalent to that produced by one person in their household over a 24hour period

- Spread of invasive non-native species through human activity, including construction but also dumping of garden waste around new developments and inappropriate plantings.

**4.6.20** For all of these, it is possible to reduce the potential impact through mitigation measures at the project level and it is expected that this will be done in line with the policies set out in the relevant Plan. However, these measures are unlikely to have eliminated the potential impact completely and there remains, without broader mitigation measures or environmental improvements, a risk that incremental losses or worsening of environmental conditions would eventually combine to either hinder restoration or have a significant impact on qualifying interest features of a cSAC or SPA.

## 4.7 Step Three: Conservation Objectives

### *Applicant's Assessment*

4.7.1 The applicant has provided an assessment of the effect of the development in relation to the conservation objectives for the site in Tables 9.16 p163 of the NIS. This assessment identified the potential, without mitigation, for the impacts of the proposed road to undermine the conservation objectives of Lough Corrib cSAC SPA and (Inner) Galway Bay (Complex) cSAC and SPA.

### *Approach*

4.7.2 My assessment of the identified potential impact pathways is summarised Tables 6 to 9, along with consideration of the risks that conservation objectives (COs) would be undermined both for the proposed road alone and in combination with other plans and projects. I have based the assessment on the proposed road as designed including designed in or embedded mitigation but only where active management and maintenance is not required for this type of mitigation to function.

### *Lough Corrib cSAC*

**Table 6: Risks of undermining the conservation objectives of Lough Corrib cSAC in the absence of mitigation.**

Impact Pathway	Predicted without mitigation	Contravention of COs Alone?	Contravention of COs in combination
Habitat loss directly within the Natura 2000 Sites	Yes, as listed in Table 5.	Habitat loss would not change the area or distribution of any Annex I habitat, or prevent restoration where this is an objective, however, the applicant proposes removing the treeline/fringing vegetation along the River Corrib (NIS p140), whereas the COs for 3260 watercourses have a target of "Maintain the area and condition of fringing habitats necessary to support the habitat and its sub-types".	No, the other known projects would not result in direct habitat loss within the cSAC, or fringing vegetation along the River Corrib.
Habitat loss in Natura 2000 sites indirectly through changes in hydrology/hydrogeology	No, the design of the development ensures continued water supply to the Coolagh Lakes.	No	No

Impact Pathway	Predicted without mitigation	Contravention of COs Alone?	Contravention of COs in combination
Habitat fragmentation in Natura 2000 sites with larger habitat parcels within divided in two by the proposed development	Yes, in Area 1.f	No, there are no specific conservation objectives relating to habitat fragmentation, the impacted habitat parcel is not Annex I habitat and therefore any changes in species composition resulting from fragmentation would not affect the conservation objectives	No, there are no other proposed projects which result in habitat fragmentation
Habitat isolation of habitat parcels within Natura 2000 sites to the north and south of the proposed development	Yes, although this has been mitigated through design (Lackagh Tunnel)	No, there are no specific conservation objectives relating to habitat isolation, therefore habitat isolation would need to negatively affect the vegetation composition to undermine the COs and the degree of connectivity under/over the road is sufficient to avoid such an effect.	Low risk in Menlough/Coolagh area, (south N6 GCRR, from River Corrib eastwards to the cSAC boundary at Lackagh) due to increasing isolation of plant species populations, e.g., <i>Gentiana verna</i> , as a result of additional development to the west of the N84 and east of the R. Corrib, in proximity to the cSAC as shown in the GCDP
Habitat degradation within Natura 2000 sites as a result of chemical pollution, noise, dust, light, shading and spread of invasive species including from construction traffic and site workers travelling to/from the construction site	Yes, during construction and operation	Low risk, from chemical pollution of water, noise, dust (construction stage only), light, spread of invasive species, in proximity to the road there is the potential to negatively affect the vegetation composition, with a decrease in positive indicator species and an increase in negative indicator species for 8240 limestone pavement, 6210 calcareous grassland, the Coolagh Lakes (3140 lakes, 7210* fens) and 3260 watercourses within the cSAC, and	Medium risk, resulting from the additional proposed development described above, with same area of the cSAC most at risk (Menlough/Coolagh)

Impact Pathway	Predicted without mitigation	Contravention of COs Alone?	Contravention of COs in combination
		reducing fish biomass for Otter, reducing water quality for Salmon, and reducing clean gravel spawning habitat for Lampreys in the River Corrib.	
Mortality, disturbance, displacement and habitat loss for species of flora and fauna which form part of the qualifying interest populations of Natura 2000, resulting in declines or local extinction	Yes, construction would result in the loss of individual plants of typical and positive indicator species within the cSAC, and Annex II species populations could be affected by habitat degradation, if severe, during construction and operation	Loss of individual plants of typical and positive indicator species within the cSAC is outside Annex I habitats so would not undermine the COs. However, low risk of undermining the COs through a serious pollution event of the River Corrib either during construction or operation of the road, or long-term habitat degradation during operation, affecting the extent/ population structure of the three Annex II fish species and fish biomass availability for otter in the River Corrib	Other developments would not result in direct loss of typical or positive indicator species within the cSAC, however, there is potential for other developments to affect water quality in the lower reaches of the River Corrib, increasing the risk that the conservation objectives for Annex II species are undermined
Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory and form part of the qualifying interest populations of Natura 2000	No, the open span bridge over the River Corrib would ensure that passage for otter and the three Annex II fish species would be maintained	No	No
Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites	Yes, the development will result in the loss of individual plants of typical and positive indicator species outside the cSAC however none are rare enough for these losses to have an appreciable effect on the populations within the cSAC	No, as the species affected are either locally common or do not contribute to maintaining the favourable condition	Low risk arising from a greater loss from all proposed development combined, as shown on GCDP map.

Impact Pathway	Predicted without mitigation	Contravention of COs Alone?	Contravention of COs in combination
Increase in recreational pressure on Natura 2000 sites if improvements to the road network bring in additional tourists and increase resident population	Possible, if the road enables easier access to Lough Corrib	No	Low risk that increased boating activity resulting from increased population in Galway City and County on Lough Corrib and easier access provided by the N6 GCRR and other road developments could hinder the ability to restore the three Annex I habitats to favourable condition.

*Lough Corrib SPA*

**Table 7: Risks of undermining the conservation objectives of Lough Corrib SPA in the absence of mitigation.**

Impact Pathway	Predicted without mitigation	Contravention of COs	Contravention of COs in combination
Habitat loss directly within the Natura 2000 Sites	No, there would be no habitat loss within the SPA	No	No
Habitat loss in Natura 2000 sites indirectly through changes in hydrology/hydrogeology	No, there are no GWDTE within the SPA linked to the proposed road	No	No
Habitat fragmentation in Natura 2000 sites with larger habitat parcels within divided in two by the proposed development	No, there would be no habitat fragmentation within the SPA	No	No
Habitat isolation of habitat parcels within Natura 2000 sites to the north and south of the proposed development	No, movement of birds would not be interrupted by the proposed road	No	No
Habitat degradation within Natura 2000 sites as a result of chemical pollution, noise, dust, light, shading and spread of invasive species including from construction traffic and site workers travelling to/from the construction site	No, SPA lies upstream of the N6 GCRR	No	No
Mortality, disturbance, displacement and habitat loss for species of flora and fauna which form part of the qualifying interest populations of Natura 2000, resulting in declines or local extinction	There will be some loss disturbance, displacement and habitat loss for three of the qualifying interest species of bird	Very low risk of hindering restoration of wintering coot population due to potential small decline in breeding pairs, but would not hinder restoration of black-headed gull population, or reduce common gull population below baseline levels.	Low risk if further losses of breeding sites for coot occurs, and also if additional losses of short, improved grassland, including agricultural land, used for winter foraging by gulls hinders the restoration of the black-headed gull population, or reduces the common gull population below baseline levels.
Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory and form part of the qualifying interest populations of Natura 2000	No, the proposed road would not interrupt the movement of bird species	No	As above, due to loss of seasonally occupied areas outside the SPA



Impact Pathway	Predicted without mitigation	Contravention of COs	Contravention of COs in combination
Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites	Not applicable as all birds assumed to be part of the qualifying interest population	-	-
Increase in recreational pressure on Natura 2000 sites if improvements to the road network bring in additional tourists and increase resident population	Possible, if the N6 GCRR enables easier access to Lough Corrib	Low risk, disturbance from recreational activities much less likely in winter when most of the qualifying interest is present, however breeding common scoter may be more vulnerable to disturbance, and this may hinder restoration of the breeding population	Low risk, but increased by population growth in e.g., Galway City, Tuam and Bearna, which may lead to increased visits to Lough Corrib and associated recreational activity.

*Galway Bay Complex cSAC*

**Table 8: Risks of undermining the conservation objectives of Galway Bay Complex cSAC in the absence of mitigation.**

Impact Pathway	Predicted without mitigation	Contravention of COs	Contravention of COs in combination
Habitat loss directly within the Natura 2000 Sites	No, there would be no habitat loss within Galway Bay Complex cSAC	No	No
Habitat loss in Natura 2000 sites indirectly through changes in hydrology/ hydrogeology	No there are no GWDTE within the cSAC linked to the proposed road	No	No
Habitat fragmentation in Natura 2000 sites with larger habitat parcels within divided in two by the proposed development	No, the proposed road would not fragment any part of Galway Bay Complex cSAC	No	No
Habitat isolation of habitat parcels within Natura 2000 sites to the north and south of the proposed development	Yes, Barna Woods and adjoining land within the cSAC would become more isolated from undesignated terrestrial habitats to the north	No, there are no qualifying interest Annex I terrestrial habitats within Barna Woods and adjoining areas of the cSAC	No, for the same reason as 'alone' (although new residential development proposed as part of the GCDP and, to a lesser extent, the Bearna Local area Plan (part of the GCDP) may increase isolation of Barna Woods)
Habitat degradation within Natura 2000 sites as a result of chemical pollution, noise, dust, light, shading and spread of invasive species including from construction traffic and site workers travelling to/from the construction site	Yes, due to chemical water pollution and suspended solid pollution, arising from construction work, construction traffic and the operation of the road, unless trapped and treated all waterborne pollution arising from the construction and operation of the road will make its way into Galway Bay	Low risk for water quality objectives for restoration of 1150 coastal lagoon (Lough Atalia IL052 and Renmore Lough IL052A), and low risk for maintenance of community structure for 1160 large shallow inlets and bays, which applies to the whole bay, and 1170 reefs, with several located near to Galway City, and low risk for vegetation composition of 1330 and 1410 salt meadows at. Rusheen Bay (White Strand)	Medium risk, additional population growth and associated construction work and water consumption/ wastewater discharge increase the risks, particularly of the ability to restore the water quality of 1150 coastal lagoons, Lough Atalia and Renmore Lough are in unfavourable condition due to water pollution and therefore any additional pollution will hinder restoration (NPWS, 2013)

Impact Pathway	Predicted without mitigation	Contravention of COs	Contravention of COs in combination
		which is already being affected by sewage (NPWS, 2013b)	
Mortality, disturbance, displacement and habitat loss for species of flora and fauna which form part of the qualifying interest populations of Natura 2000, resulting in declines or local extinction	Possible disturbance and minor habitat loss of otter when outside the cSAC, not enough for a population decline	No, the COs apply within the cSAC only	No
Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory and form part of the qualifying interest populations of Natura 2000	Possible for otter when ranging outside the cSAC during the construction period, however crossing points will be provided along streams during operation, so migration routes will be maintained	No, as above	No
Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites	Yes, as for Lough Corrib cSAC, loss of individual plants but not enough to have an appreciable effect on the populations of Natura 2000 sites	No	Low risk, as for Lough Corrib cSAC, terrestrial Annex I habitats only
Increase in recreational pressure on Natura 2000 sites if improvements to the road network bring in additional tourists and increase resident population	Possible slight effect through trampling of vegetation if the road alone encourages more people to visit the coastline around Barna through improved access to the west of the city	Low risk, trampling could affect the maintenance of habitat area, distribution and vegetation of 1220 Vegetated stony banks at Barna and the vegetation cover, height and composition of 1330 and 1410 salt meadows at e.g., Rusheen Bay (White Strand) hindering the ability to restore these habitats, could also affect supporting habitats, and typical and positive indicator species located	Risk increased but still low with increased population and mobility, saltmarsh currently unfavourable due to over-grazing with limited or no impact due to current recreation levels, however, increased recreation in this area could hinder the ability to restore the saltmarsh in the future. Possible increase in disturbance of otter along the shoreline.

Impact Pathway	Predicted without mitigation	Contravention of COs	Contravention of COs in combination
		outside the cSAC (NPWS, 2013b).	

*Inner Galway Bay SPA*

**Table 9: Risks of undermining the conservation objectives of Inner Galway Bay SPA in the absence of mitigation.**

Impact Pathway	Predicted without mitigation	Contravention of COs alone	Contravention of Cos in combination
Habitat loss directly within the Natura 2000 Sites	No	No	No
Habitat loss in Natura 2000 sites indirectly through changes in hydrology/hydrogeology	No	No	No
Habitat fragmentation in Natura 2000 sites with larger habitat parcels within divided in two by the proposed development	No	No	No
Habitat isolation of habitat parcels within Natura 2000 sites to the north and south of the proposed development	No	No	No
Habitat degradation within Natura 2000 sites as a result of chemical pollution, noise, dust, light, shading and spread of invasive species including from construction traffic and site workers travelling to/from the construction site	As for Galway Bay Complex cSAC, water pollution only	Low risk that any pollution would have an impact on bird populations and/or distribution	Risk increased by potential in combination effects, noting that Rusheen Bay/ Lough Rusheen 0G031 and Lough Atalia 0G032 are both important foraging and roosting sites for several qualifying interest bird species, with Rusheen Bay/ Lough Rusheen being the most important sub-site in the whole of the SPA. Rusheen Bay/ Lough Rusheen is important for dunlin and Lough Atalia is important for lapwing, species for which the restore objective may apply.
Mortality, disturbance, displacement and habitat loss for species of flora and fauna which form part of the qualifying interest populations of Natura 2000, resulting in declines or local extinction	Some habitat loss, disturbance and displacement for common gull, black-headed gull, curlew and grey heron outside the SPA but not enough to	No, as no discernible effect on SPA populations or none which result in declines below the baseline population (common gull)	Risk slightly increased by potential additional losses of wintering bird site WB03 outside the SPA due to residential development to the south of the N6 GCRR,

Impact Pathway	Predicted without mitigation	Contravention of COs alone	Contravention of Cos in combination
	cause appreciable population declines		potentially affecting small numbers of wintering curlew and heron, however, not sufficient to result in discernible population level effects, see also the assessment for Lough Corrib cSAC with respect to common gull and black-headed gull
Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory and form part of the qualifying interest populations of Natura 2000	As above due to loss of seasonally occupied habitat by gulls	No, as above	As above
Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites	Not applicable, as all birds assumed to be part of the qualifying interest population	-	-
Increase in recreational pressure on Natura 2000 sites if improvements to the road network bring in additional tourists and increase resident population	Possible, as result of easier access to Barna and Rusheen Bay/Lough and associated bird disturbance (low levels of disturbance recorded here in 2009/10)	Low risk of hindering restoration of the dunlin population and possibly the maintenance of other species populations, risk lowered as birds are present in winter	Risk heightened through bird disturbance along the coast as a result of increased population of Galway City facilitated by new development, including new residential development in the west of the city (GCDP) and in Barna (Barna LAP/GCDP).

### *Other Natura 2000 Sites*

- 4.7.3** Three potential pathways have been identified for impacts on other Natura 2000 sites, these are (i) effects on qualifying interest Annex I habitats arising from recreational activities potentially affecting Ross Lake and Woods, the Maumturk Mountains, the Twelve Bens/Garraum Complex cSAC, and Connemara Bog Complex cSAC SPA; (ii) spillage/leakage of fluids and materials

from construction vehicles travelling in proximity to Natura 2000 sites; and (iii) losses of supporting populations of Annex II species such as marsh fritillary and lesser horseshoe bat. These pose a very low risk to the conservation objectives to these sites when the road is considered alone. However, the risk is elevated but still low when the road is considered in combination with other plans and projects, especially those leading to population growth and additional construction.

#### 4.7.4 Specific risks to the conservation objectives include:

- hindering the restoration of lake habitats 3140 where these are used for boating and fishing through potential impacts on water quality, although the effects arising from land management practices (use of fertilisers etc) outweigh the risks from recreation, applies to Ross Lake and Woods cSAC;
- hindering the restoration of montane habitats (4060, 8110, 8210 and 8220) as a result of trampling influences on the vegetation composition (all four montane Annex I types) and the extent of bare ground (4060), although again the effects from land management practices (over-grazing, burning etc) far outweigh the potential risk posed by recreation, applies to Twelve Bens/Garraum Complex cSAC and Maumturk Mountains cSAC;
- affecting the maintenance or restoration of water quality in turloughs (3180) as a result road run-off, including accidental spills which occur in proximity to the older road network, applies to for example Lough Fingall Complex cSAC and Kiltiernan Turlough cSAC; and
- Erosion of the populations of Annex II species outside the cSAC network may eventually reduce the resilience of the populations of those same species within the network and subsequent decline below the baseline population.

## 4.8 Step Four: Mitigation Measures

4.8.1 The applicant describes the relevant design requirements and mitigation measures in the NIS p278 to p302, which is supported by the Construction Environmental Management Plan, provided in Appendix C of the NIS, and the Schedule of Environmental Commitments (SEC) originally submitted with the EIAR, as Chapter 21, and then added to, the additions being last updated in November 2020. The relevant measures are summarised below, with references to further detail.

### *Avoidance and mitigation measures included in the Applicant's Design.*

4.8.2 Clearly, potential impacts on the Natura 2000 sites have been considered as part of the design of the proposed road, including the route alignment. Leaving that aside, designed in measures are the following with those in parentheses included in the design but not itemised by the applicant in the NIS:

- No permanent fencing within the Annex I habitats within the Lough Corrib cSAC, SEC 8.18;
- Clear span bridge over the River Corrib which will avoid direct impacts on the River Corrib and maintain connectivity up- and down-stream, including along the riverbanks;

- (Viaduct over the limestone pavement at Menlough which will help maintain connectivity between two parts of the cSAC);
- (Culverts in the retained embankments on the eastern approach to the River Corrib bridge which will also help maintain connectivity within the cSAC);
- Attenuation, flow control and pollution treatment of road run-off in accordance with TII standards, which requires maintenance to function in the medium- to long-term;
- Drainage design which delivers most rainwater to the groundwater body or watercourse which would have received it in the absence of the road, the exception being that brought into the Lackagh tunnel on vehicles;
- Construction methodology for the Lackagh tunnel which according to the applicant ensures that the structural integrity of the Limestone pavement above will not be affected; and
- No lighting along the proposed River Corrib bridge and 2m high noise barriers along the bridge sides.

#### *Mitigation at the Project Level*

4.8.3 Considering the project with the inclusion of the design features listed above in paragraph 4.8.2, the applicant identified further mitigation measures which were required to reduce the impact on the qualifying features of Natura 2000 sites. Following my assessment of the impacts of the project, I have identified some further mitigation measures which are required at the project level to reduce impacts on Natura 2000 sites, in the light of their conservation objectives, these are identified as “*additional mitigation*”. Both are listed below under the heading of the impacts that they seek to address.

#### Habitat loss directly within the Natura 2000 Sites

- Minimise habitat loss in Lough Corrib cSAC and to [completely] avoid loss of Qualifying Interest Annex I habitats within the cSAC, SEC 8.2, with the latter being fenced off during the construction period SEC 8.4, 8.6, 8.16;
- Measures to maintain the structural integrity of the bedrock in Lough Corrib cSAC included in the design and monitoring of rock movement above and around the Lackagh tunnel and the implementation of additional physical support to the rock mass if instability is detected, with an upper limit for vibration during blasting of 25mm/sec, NIS p284;
- Ongoing monitoring during the operation of the road of the rock mass in the Lough Corrib cSAC above and around the Lackagh tunnel, with additional support measures for the rock if instability is detected NIS p284; and
- *Additional mitigation*: the area fenced off from construction to include the River Corrib and its fringing vegetation, as this may also be Annex I habitat, with the fringing vegetation maintained.



#### Habitat loss in Natura 2000 sites indirectly through changes in hydrology/hydrogeology

- (Included in the design is the infiltration basins to deliver (treated) rainwater to the same groundwater body as would have received it in the absence of the road); and
- Implementation of the 'Karst Protocol, NIS Appendix C, CEMP Appendix C, which sets out measures to deal with any karst features found during the construction process, designed to prevent groundwater contamination and reduce impacts on groundwater flow paths from construction.

#### Habitat fragmentation in Natura 2000 sites with larger habitat parcels within divided in two by the proposed development.

- (Included in the design for the eastern approach to the River Corrib bridge are a series of five culverts which will provide some link between the two retained parts of the one habitat parcel within the cSAC divided into two by the proposed road.)

#### Habitat isolation of habitat parcels within Natura 2000 sites to the north and south of the proposed development

- (Included in the design is the Menlough viaduct and the Lackagh tunnel which will help reduce isolation of habitat parcels within the cSAC to the north and south of the road.)

#### Habitat degradation within Natura 2000 sites as a result of chemical pollution, noise, dust, light, shading and spread of invasive species including from construction traffic and site workers travelling to/from the construction site.

- All construction works will be carried out in accordance with best practice construction guidance and as such "will eliminate the risk of spillage to the River Corrib", SEC 11.1;
- Measures to control construction site run-off entering the River Corrib, including working areas set back a minimum of 5m from the River Corrib, "drainage ponds and interceptor ditches to collect, treat and discharge all surface water run-off during construction" and /or "reserved grass buffer areas, timber fencing with silt fences, earthen berms or similar", NIS p296 and Appendix C (CEMP);
- *Additional mitigation:* The mitigation area 6210 R1 should be restored by management, using the existing seed bank, rather topsoil stripping or translocation of turves to reduce the risk of suspended solid pollution of the River Corrib from this location;
- *Additional mitigation:* install, the highest standard of treatment facilities specified in the TII guidelines, suitable for discharge directly into an SAC watercourse, for road run-off during the operation of the road, with regular maintenance of silt traps, including dredging and removal of trapped silt for disposal in sealed landfill;
- Low noise road surface to be installed in proximity to Lough Corrib cSAC from Ch. 9+100 to Ch. 11+400 i.e., the currently specified Polymer Modified Stone Mastic Asphalt or better;
- Measures to control dust during the construction period, including a 2m high dust screen at locations adjacent to the Lough Corrib cSAC, sweeping and watering of roads, speed limits of 20kph on unsurfaced roads, wheel washing facilities at greater than 50m from a Natura 2000

site, material handling and stockpiling at least 50m a Natura 2000 site and trucks transporting materials to be covered with tarpaulin, plus monitoring to ensure the measures are followed;

- *Additional mitigation:* ensuring mud is not allowed to build up on haul roads and public roads where it could wash in to the cSAC including the River Corrib;
- *Additional mitigation:* dust control during blasting events and dust monitoring within the cSAC during construction, especially following blasting events, and with revisions to working methods/frequency of blasting if required;
- *Additional mitigation:* reduction of lighting on the western approach to the Lackagh tunnel to the absolute legal minimum to maintain existing light levels within the Lough Corrib cSAC;
- Management of invasive plant species in accordance with a non-native invasive species management plan (NISMP), covering those species listed in the Third Schedule of the EC (Birds and Natural Habitats) Regulations 2011, as amended, that occur locally: Japanese knotweed, Himalayan knotweed and Rhododendron. NIS p 292 - 294 and Appendix C. SEC 8.11, 8.12, 8.13, 8.14, 8.15;
- *Additional mitigation:* the scope of the NISMP must be broadened to include species which are a potential threat to limestone pavement and other Annex I habitats, including, cotoneaster (all species), buddleia, red valerian and wild clematis;
- *Additional mitigation:* the seed/planting mix not to include negative indicator species for limestone pavement or calcareous grassland within 250m of the cSAC including perennial rye grass, white clover, sycamore, beech and conifers, plus control of other negative indicator species within 100m of the cSAC as listed by Wilson and Fernandez (2013), such as creeping thistle and ragwort, while the vegetation is establishing on the soft estate (for two years post-seeding);
- *Additional mitigation:* monitoring and management of non-native invasive species along the route corridor in proximity to Lough Corrib cSAC between Ch. 9+100 and Ch. 11+400 during the operation of the road, including the additional species listed above;
- *Additional mitigation:* construction traffic travelling to/from Galway to primarily use recently constructed roads with a modern drainage design (pollution control) or avoiding the R458, N67 and N84 where these pass Natura 2000 sites.

**Mortality, disturbance, displacement and habitat loss for species of flora and fauna which form part of the qualifying interest populations of Natura 2000, resulting in declines or local extinction.**

- Suspended net beneath the River Corrib bridge to avoid dropping materials into the River Corrib during bridge construction NIS p 26;
- Pre-construction surveys for otters [to ensure no holts impacted during construction] SEC 8.20; and
- Blasting of rock to in the vicinity of Ballindooley Lough (Ch. 11+800 to Ch 12+100 and Ch. 12+550 to Ch. 13+650) take place between April and September, avoiding months when wintering bird numbers are at their peak. NIS p 295.
- *Additional mitigation:* add a pond within the barn owl/lesser horseshoe bat habitat enhancement area in proximity to Menlo Castle which will be suitable for breeding coot.

Disruption of migration, commuting routes or loss of seasonally occupied habitats for species with large home ranges or which are migratory and form part of the qualifying interest populations of Natura 2000.

- Raised ledges within culverts constructed in accordance with the Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (National Roads Authority, 2008) or 600mm dry culverts to facilitate otter passage will be provided at the Bearna Stream (C04/01 Ch. 4+100) and Tonabrocky Streams (C04/02 Ch. 4+950) SEC ref 8.21, plus mammal fencing either side of the Bearna Stream (Ch. 4+050 to Ch. 4+200) and either side of the Tonabrocky Stream (Ch. 4+825 to Ch. 5+300) and in proximity to the River Corrib and Coolagh Lakes (Ch. 9+750 to Ch. 10 +040, where no retaining wall) NIS p298, SEC 8.21 and 8.22.
- *Additional mitigation:* ensure that safe passage exists for otters along all watercourses bisected by the proposed road during construction, to include mammal ledges within the culvert or two dry 600mm culverts parallel to the watercourse, one each side.

Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites.

- The petrifying spring feature location 25m north of the proposed road (LQ102) will be retained SEC 8.9
- *Additional mitigation:* the population of *Rhynchospora fusca* should be identified, mapped and protected during the construction phase.

Increase in recreational pressure on Natura 2000 sites if improvements to the road network bring in additional tourists and increase resident population.

- None at the project level.

#### *Mitigation at the Plan Level*

- 4.8.4** The proposed road is a major and integrated component of the Galway City Development Plan and the Galway County Development Plan. As set out above, these Plans have also been subject to an appropriate assessment and include mitigation measures in their policies to enable the conclusion of no adverse effect on the integrity of any Natura 2000 site. These policies are, in the main, not specifically linked to any one project and are to be delivered or implemented through the Plans. It so happens that in this case the applicant is also the owner of the Plans and therefore has control of the mitigation at the both the project level and the plan level.
- 4.8.5** Relevant Plan level mitigation measures from the Galway County Development Plan are:
- It is the policy of Galway County Council to support the protection, conservation and enhancement of natural heritage and biodiversity, Policy NHB 1, and ecological connectivity within the Plan Area...., Objective NHB 2;

- Galway County Council shall seek to engage with and support the National Parks & Wildlife Service to ensure Integrated Management Plans are prepared for all Natura 2000 sites and ensure that that such plans are fully integrated with all land use and water management plans in the county Objective NHB13;
- Protect, conserve and enhance all existing and potential water resources of the County, in accordance with the EU Water Framework Directive, Objective WS 2; and
- Ensure that all wastewater generated is collected, treated and discharged after treatment in a safe and sustainable manner, having regard to the standards and requirements ...Objective WW 1.

**4.8.6** Relevant measures from the Galway City Development Plan are:

- Co-operate with the NPWS, landowners and stakeholders in the preparation of management plans for designated sites, Policy 4.1 and 4.2;
- ....support the restoration of European ..sites including Galway Bay and Lough Corrib SACs..., Policy 4.2;
- .....support the development of an ecological network throughout the city which will improve the ecological coherence of the Natura 2000 network, Policy 4.2;
- ....support and implement measures to control and manage alien/invasive species within the city boundary, Policy 4.2;
- Achieve a sustainable balance between meeting future recreational needs (both passive and active) and the protection of the city's ecological heritage, Policy 4.2;
- Protect the ecological integrity ...of Annex I habitats, Policy 4.2;
- Protect and manage water resources effectively and improve coastal and freshwater quality;
- ....promote and achieve a restoration of good status [of open waters], reduce chemical pollution and prevent deterioration of surface, coastal and groundwater quality, Policy 9.6;
- ....ensure that new developments have and are provided with satisfactory drainage systems ....to avoid the pollution of the ground and surface waters, Policy 9.7;
- maintain air quality to a satisfactory standard by regulating and monitoring atmospheric emissions in accordance with EU policy directives....by promoting and supporting initiatives to reduce air pollution, Policy 9.10; and
- ensure the design of external lighting minimises the incidence of light pollution ...into the surrounding environment, Policy 9.11.

**4.8.7** The combined effect of these measures is that background air quality, water quality, biodiversity and the management of recreation in sensitive areas will be improving or at least not worsening. Key areas for these mitigation measures in relation to the potential in combination effects of the proposed road are the Menlough/Coolagh part of the Lough Corrib cSAC, the River Corrib, Lough Atalia and Rusheen Bay and Connemara National Park.

**4.8.8** Of particular importance among the mitigation measures included in the Plans, are:

- Preparation and implementation of an Integrated Management Plans for Lough Corrib cSAC, Ross Lake and Woods cSAC, (Inner) Galway Bay (Complex) cSAC SPA (especially Rusheen Bay and Lough Atalia), the Twelve Bens/Garraun Complex and Maumturk Mountains cSAC;
- The development of an ecological network within Galway City, to include the protection of and the implementation of measures to control of non-native invasive species within the City; and
- Improvements in air and water quality, including water quality at Lough Atalia.

#### 4.9 Conclusions on Site Integrity

- 4.9.1** Without mitigation, there is a risk but not a certainty that the conservation objectives for several Natura 2000 sites would be undermined, with the highest risk being for Lough Corrib cSAC and (Inner) Galway Bay (Complex) cSAC and SPA, both during construction and operation of the proposed road. Through proper implementation of the mitigation at the project level, undermining of the conservation objectives can be avoided for the project 'alone'.
- 4.9.2** Despite the mitigation at the project level, the proposed road would still result in the loss of biodiversity, light pollution, noise pollution, emissions to air and release of other materials from vehicles into the environment in proximity to Lough Corrib cSAC and with potential for the last two to reach (Inner) Galway Bay (Complex) cSAC. These could combine with the effects from other proposed developments and associated population growth, to create a further risk that the conservation objectives would be undermined. Added to this would be the increased mobility of the enlarged population, which expose parts of the same and other Natura 2000 sites in the vicinity of Galway City to the risk of unintentional damage from recreational activities. The risk of undermining the conservation objectives is heightened because some of the Annex I habitats exposed to risk are in unfavourable condition.
- 4.9.3** The risks of undermining the conservation objectives through in combination effects can also be fully mitigated, as provisionally indicated in the appropriate assessment for the two most relevant development plans. With the implementation of the Project and Plan level mitigation, a conclusion of no adverse effect on the integrity of any Natura 2000 site can be reached with respect to the proposed road, both alone and in combination with other plans and projects.

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## Appendix 1: NPWS Submissions

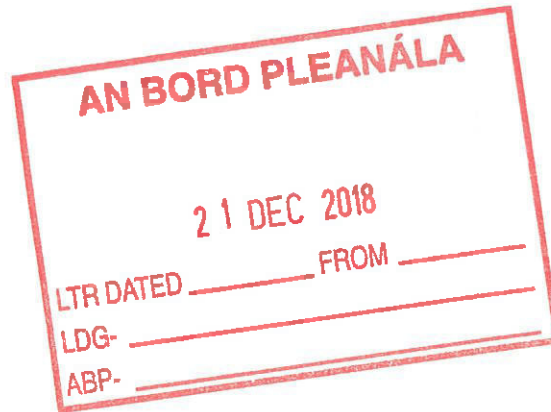


**An Roinn Cultúir,  
Oidhreacht agus Gaeltachta**  
Department of Culture,  
Heritage and the Gaeltacht

Your Ref: ABP-302885-18  
Our Ref: 177AE N6 Galway Ring Road

21 December 2018

The Secretary  
An Bord Pleanála  
64 Marlborough Street  
Dublin 1  
D01 V902  
Via email to [bord@pleanala.ie](mailto:bord@pleanala.ie)



Re: Notification to the Minister for Culture, Heritage and the Gaeltacht under the Planning and Development Act, 2000, as amended.

**Proposed Development: Section 177AE application for Galway County Council on behalf of itself and on behalf of Galway City Council is proposing to develop the N6 Galway City Ring Road (GCRR) around Galway City.**

A chara

On behalf of the Department of Culture, Heritage and the Gaeltacht, I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department under the stated heading(s).

### **Nature Conservation**

The Department refers to the current application for the proposed N6 Galway City Ring Road development (and Motorway Scheme) in Galway City and County. Reference is also made to the EIA, Natura Impact Statement (NIS), associated volumes of figures and appendices, and other documentation that accompanies the application.

#### **Context of observations**

The following observations are made by the Department in its role as a prescribed body under planning legislation and as the authority with overarching responsibility for nature conservation and the implementation of the nature directives (i.e. the Birds and Habitats Directives) in Ireland. The observations are not exhaustive and are intended to assist An Bord Pleanála in its review and evaluation of the current proposal in the context of, among other things, obligations and commitments in relation to nature conservation, European sites, biodiversity and environmental protection, proper planning and sustainable development, and the undertaking of the environmental impact assessment (EIA) and the appropriate assessment (AA).

This submission is structured under a series of headings/topics, but should be read as a whole, noting that there are substantial overlaps, as well as key distinctions, between the implications of the proposed development for the conservation objectives and integrity of a European site or sites, for biodiversity and other aspects of the environment, and for the proper planning and sustainable

development of the area, taking relevant timeframes, past and future changes, and trends into account.

#### Consultations with NPWS

The Department acknowledges the series of pre-application meetings and consultations with NPWS (2013-2017) in relation to the proposed development, including meetings with the project team and with An Bord Pleanála. Submissions made by this Department (on a non-statutory basis) at pre-application stage are included in EIAR Appendix A.8.2. Draft documentation was reviewed by NPWS as an exceptional measure and this covered only the draft NIS and draft EIAR biodiversity chapter.

Consultations with NPWS regarding the related Galway Transport Strategy 2016-2036 are also acknowledged. This strategy was produced by the City and County Councils, and the National Transport Authority, and is given effect by Galway City and Galway County Development Plans, as varied. Submissions were made by this Department in relation to the Strategy, the Development Plans and Variations, and the associated environmental assessments, including the SEA Environmental Reports, Natura Impact Reports (NIRs) and NISs.

#### Scope of surveys and integration with design

The Department acknowledges the extent and detail of the surveys carried out in connection with the planning and design of the scheme, the consideration of constraints and alternatives, and the preparation of the EIAR and NIS, including as reported in appendices to main reports. The extent to which ecological and other data and information have informed and modified aspects of the design of the scheme to minimise adverse effects on biodiversity, as part of an iterative process, is also acknowledged.

#### Project outline and setting

The proposed road development is generally routed around the outskirts of Galway City, extending from the R336 west of Bearna, in the west, to the new N6/M6 motorway at Briarhill in the east. It passes through areas of granite and limestone geology, and through areas of marginal farmland and substantial areas of natural and semi-natural habitats on the urban fringe. The road crosses the main channel of the River Corrib, and passes through one European site, and close to (within 200m of) three other European sites (see below). All but the western end of the scheme drains to surface water or groundwater bodies that are hydrologically and/or hydrogeologically connected to European sites and the water-dependent habitats and species they support. The proposed development boundary also borders part of one Natural Heritage Area (NHA).

The description of the proposed development and its construction and operation, the project drawings, and other related reports (e.g. the CEMP in EIAR Appendix A.7.5) are noted. It is understood that the mainline of the proposed road is approximately 17.5km in length, and comprises 5.6km of single carriageway and 11.9km of dual carriageway. The latter, from the N59 Letteragh junction eastwards, will be motorway. The proposed development comprises many other elements, including two tunnels with maintenance buildings, two viaducts and one large bridge, and associated link roads, side roads, junctions, structures, earth works, accommodation works, drainage, demolitions, fencing, lighting, landscaping, and ecological mitigation (EIAR, NIS) and compensation measures (EIAR). The total 'area of the development boundary' is approximately 280ha; of this, about 180ha is required for the proposed road development and its construction. Construction, including advance project stages and enabling works, will take a number of years. Some enabling works may occur or extend outside the proposed development boundary, e.g. diversion or relocation of utilities.

The construction phase elements and aspects of mitigation are set out in the CEMP. This includes an Incident Response Plan, a Sediment Erosion and Pollution Control Plan, and a Non-native Invasive Species Management Plan. Chapters 20 and 21 of the EIAR are also noted, namely the Summary of mitigation measures and Schedule of environmental commitments. It is stated that the latter is an integral element of the application for approval. It is indicated that further work in

developing the design of the proposed road development (i.e. post-consent stage) will lead to no material change in the predicted significance of the adverse effects on the environment, and that opportunities may be identified to further reduce these effects and provide the optimum solution based on available construction techniques and technologies at the time of construction.

The commitment to having a Project Ecologist as part of the Employer's team for the duration of the construction phase of the proposed development is welcomed (CEMP section 1.1). For the avoidance of any doubt, the construction phase must be understood to mean all advance contracts and enabling works, as well as the main construction phase, as substantial ecological damage and disturbance can be caused during such early phases. To be effective, the mitigation measures and environmental commitments from the EIAR and NIS must apply to all stages and aspects of the development from the time that permission is granted. Furthermore, noting the volume and complexity of application documentation and the potential for conflicts in the mitigation and other measures specified, particular care and robust systems will be required to ensure their correct and timely implementation to safeguard European sites, NHAs, natural habitats and protected species, and to protect the environment. Where any uncertainties exist regarding the likely success or deliverability of the mitigation and compensation measures, or the significance of the ecological effects that will result, these should be reflected in the EIA and AA carried out for the proposed development.

#### Receiving environment – biodiversity/ecology

The proposed development passes through and close to sites with nature conservation designations, Annex I habitats, the habitats of Annex I (Birds Directive) and Annex II and IV (Habitats Directive) species, and the habitats of other protected species, as well as through wetlands, woodlands, ecological networks, and local biodiversity areas on the margins of an area of progressively expanding urban development, population and associated pressures. The new road will interconnect with a network of recently-developed motorways and national roads between Dublin and Galway, and Limerick and Tuam.

The proposed development and/or proposed development boundary:

- passes through parts of the European site, Lough Corrib SAC (site code 000297), and will, in part, drain towards that site;
- passes through, close to, under and over Annex I habitats and the habitats of Annex II species that are qualifying interests (QIs) of Lough Corrib SAC;
- passes within 200m of three other European sites, namely Lough Corrib SPA (site code 004042), Galway Bay Complex SAC (site code 00268) and Inner Galway Bay SPA (site code 004031);
- adjoins the boundary of part of Moycullen Bogs NHA (site code 002364), and will drain or drain towards that site (selected for the conservation of 'peatlands');
- passes through twelve Annex I habitats and 43 'Fossitt' habitat types;
- passes through the habitats and/or the breeding sites and resting places of Annex II and/or IV (Habitats Directive) species, including those of Lesser Horseshoe Bat, other bats, Otter and Marsh Fritillary;
- passes through the habitats of Annex I (Birds Directive) and other regularly occurring migratory bird species;
- passes through the breeding sites and resting places (and territories) of other protected species, e.g. badger and breeding birds.

In addition to the protection afforded to most of the above receptors under the Wildlife Acts, 1976-2000, and the European Communities (Birds and Natural Habitats) Regulations, 2011, they are also subject to protective objectives and policies in the Councils' Development Plans and other land use plans for the areas through which the proposed development passes.

## 1. LIKELY EFFECTS ON EUROPEAN SITES

### Adequacy of NIS

There is a requirement to consider whether the NIS, which accompanies this application, complies with section 177T of the Planning and Development Act, 2000 as amended. Among other things, an NIS is defined as a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of the proposed development for one or more European sites in view of its conservation objectives; an NIS must include a report of a scientific examination of evidence and data to identify and classify such implications. In the event that inadequacies or gaps in the NIS are covered by data and assessments from other sources, this should be made clear in the AA carried out. The final assessment and analysis should be with respect to the implications for the conservation objectives and integrity of the European site or sites in question.

Notwithstanding the detailed surveys and assessments undertaken, some aspects of the approach and scientific analyses in the NIS, and their sequencing and findings, are complex to follow. At the same time, it is acknowledged that there are challenges in preparing an NIS for a project of this size and complexity, and that no particular format for an NIS is prescribed in law.

### Annex I habitats – QIs

The European site most affected by the proposed development is Lough Corrib SAC. Approximately 4ha of the proposed development and/or proposed development boundary overlap directly with this SAC in multiple small and mainly peripheral locations. The extent and nature of habitat impacts and/or changes within the SAC are, at present, difficult to ascertain. It could assist interpretation if a clearer account of the direct and residual effects on habitats within the SAC, with clearer drawings, was provided. Areas for the extents of the predicted effects and overlaps with i) the proposed development boundary, and ii) the proposed development, would also be beneficial in supporting interpretation and the conclusions of the NIS in relation to the absence of implications for habitats and the conservation objectives of the SAC. The relationship of the road to nearby qualifying interest Annex I habitats within the SAC is also difficult to ascertain.

### SAC – hydrogeology

The application would benefit from clarity on the changes in hydrogeological regime the Lackagh Tunnel will have on the groundwater catchment area. Boreholes were drilled in the area, and groundwater level data collected, but spatial information is absent on directions of groundwater flow and hydraulic gradients. The tunnel is adjacent to the Lough Corrib Fen 1 (Lackagh) groundwater body (GWB) which contains groundwater-fed lakes and fens in the Lough Corrib SAC. The question of whether groundwater drainage associated with tunnelling construction work, during and post development, will not have an effect in Lough Corrib Fen 1 (Lackagh), may need interrogation. Whilst it is stated that the level of the tunnel will be below the groundwater table (and that “there will be no groundwater lowering within groundwater bodies that support groundwater dependant habitats within a European site”), it is also noted that groundwater seeps at the existing quarry face and base and that there are ‘perched’ water tables in local subsoil units above the limestone. The inclusion of ‘water-tight’ barriers is necessary for the operation, and this will divert groundwater flow. It is unclear what the hydrological connectivity between the groundwater dependent terrestrial ecosystems (GWDTEs) of the SAC are, particularly the habitats south of the proposed road.

Following this, it is not clear how the GWDTEs in the Lough Corrib SAC are working ‘hydrogeologically’ and if flow paths may change post-construction. It appears that the lakes are underlain by significant thicknesses of low permeability substrate, with the fens developing on their margins, presumably due to artesian conditions and spring inputs (it is suggested the lake is fed by the Western Coolagh Spring), as indicated by the recorded alkaline conditions. The road will traverse the ‘Lough Corrib Fen 1 (Menlough)’ groundwater body. The road intercepts recharge and whilst the change in infiltration and aquifer loss is reported as minimal, it may be important considering the small catchment area(s) that appear to support the fen habitats. Further elucidation could be beneficial.

### Conservation objectives and scope of NIS

Lough Corrib SAC has site specific conservation objectives, and these specify whether the conservation objective is to maintain or to restore the favourable conservation condition of the individual qualifying interest habitats and species, as defined by certain attributes and targets that are listed, within that site. Substantial analyses in the NIS are (or appear to be) undertaken without reference to the conservation objectives, as they are detailed first in Table 9.16. In Tables 9.1 and 9.15, prior to this, the qualifying interests, Petrifying springs of the tufa formation (Cratoneurion) and Lesser Horseshoe Bat, appear not to have been recorded in the 'zone of influence' and/or are omitted from further consideration and assessment of the likely effects on European sites. The justifications for these findings are unclear in Section 9 of the NIS, but may be explained elsewhere and that should be clarified.

### Otter

The proposed development passes through mapped areas of Otter habitat in Lough Corrib SAC, and close to parts of Galway Bay Complex SAC. The two SACs are interconnected and both have been selected for the conservation of Otter. Otter were widely recorded along the River Corrib corridor. Other watercourses and lakes within and connected to these SACs, e.g. Bearna Stream, are likely to form part of Otter territories and be used as commuting and foraging habitat.

No Otter breeding sites or resting places (holts or couches) were recorded along or within 150m of the proposed development, meaning disturbance and displacement effects should not result. However, increased human presence and/or noise and vibration associated with construction works, particularly associated with the construction of the proposed River Corrib bridge, have the potential to (at least temporarily) displace commuting or foraging Otter. Bankside works are required to install the drainage outfalls on both banks of the Corrib and this will result in the severance of the bankside habitat used by Otter, at least temporarily, during construction. Blasting at some locations over extended periods (e.g. approximately 9 months in Ballagh) will cause some level of disturbance to Otter using the Bearna and Tonabrocky Streams. Operation of the road has potential to result in the mortality of Otter through the increased risk of road traffic collisions and this could affect the Otter populations of the two SACs, and the conservation objectives and integrity of these European sites. In terms of longer term potential in combination effects resulting from disturbance and displacement, the commitments to having a greenway along the western bank of the River Corrib and the current application for the proposed Galway Harbour Extension (PA0033), should be noted in particular (see below in relation to in combination effects).

The potential effects on Otter are to be avoided and reduced to insignificant by a series of design and other mitigation measures that are specified in the NIS and EIAR. The conclusions reached in the NIS in relation to Otter are contingent on i) the effective and timely implementation of these mitigation measures at or prior to construction stage, ii) their continued effective functioning (e.g. in the case of mammal passage facilities and fencing) for the lifetime of the project, and iii) their safeguarding in any future projects and development planning. Monitoring and the taking of timely and effective corrective action if problems arise are integral to their success, and to the conclusions and predictions that may be reached as part of the AA and EIA.

### Birds

The NIS determines that the River Corrib bridge is the only structure that is "of a scale to pose a collision risk to birds". The NIS subsequently concludes, having considered the design of the proposed structure and the low number of special conservation interest (SCI) species, and individuals, that pass along the river corridor, that the proposed structure is "not predicted to pose a collision risk of a magnitude that would have any long-term effects on the numbers, distribution, or the existing population trend for any SPA". The SPAs specifically mentioned in the NIS in this regard are Lough Corrib SPA and Inner Galway Bay SPA, and these SPAs are considered with the following references to SCIs. The risk of bird collisions with the bridge is given no further consideration beyond identifying potential impacts. The data considered on the number of SCI



species and individuals using the river corridor are from a previous proposal and different structure in a different location on the river (RPS report, 2006). The specifications for that structure stated the bridge height would be 6m above the river, while the current proposed bridge is a minimum of 8m above the river. Consideration of the range of flight heights for the SCI species known to use the corridor, or the potential interaction of these flight heights and the proposed bridge would be appropriate. The previous survey report did not assess the nocturnal movements of bird species, e.g. typically nocturnal species and species that are known to migrate at night, and this also needs to be considered. Therefore, the Board could consider if it is satisfied that the collision risk of birds with the proposed River Corrib bridge is adequate and complete if its Appropriate Assessment would be facilitated by further consideration and assessment.

The NIS concludes that the effects of habitat loss and fragmentation arising from the proposed development will not significantly negatively affect the SCIs for surrounding SPAs, and no mitigation measures for SCIs (breeding or wintering species) are provided. For breeding species, this is based on i) the absence of a spatial overlap between known SCI breeding sites and the proposed development area, and ii) aspects the SCI species' foraging ecology. The rationale and evidence to support the latter claim is not made clear (i.e. with respect to foraging ecology).

It is considered the above points should be addressed by presenting further information from, and rationale based upon, completed survey work, additional available data sources and published literature.

Matters relating to the AA

The AA has yet to be carried out, and should take the NIS and this submission into account. Any scientific uncertainties or discrepancies regarding the implications for the conservation objectives and integrity of European sites will need to be addressed and resolved.

## 2. LIKELY EFFECTS ON THE ENVIRONMENT

EIAR – biodiversity

The following additional matters should be taken into account and addressed in relation to the likely effects of the proposed development on biodiversity, including in the context of the EIA which has yet to be carried out. Likely significant effects on European sites are also a matter for the EIA.

NHA – hydrogeology

The location of the road adjacent to Moycullen Bogs NHA and the possible effects on bog eco-hydrology. This peatland area is underlain by the 'Galway Granite Batholith', which will be dewatered (during construction and operation) within cutting areas. This could potentially result in a lowering of the peatland water table, peatland subsidence and a potential negative impact on bog ecology. Clarity may be needed on where dewatering/drainage are proposed in relation to the NHA area, together with a demonstration of the likelihood of impact (negligible or otherwise).

Habitats – general

The detailed habitat survey and mapping for the area of the proposed development and surrounds are noted. Text and tables in EIAR chapter 8 contain details of the areas and types of habitats that will be affected by the proposed development. Of the overall 280ha of the proposed development boundary, 196ha is habitat that is deemed to be of low ecological value, and about 84ha is of higher ecological value. Some of the habitats are linear habitats. In total, it appears that 43 'Fossitt' habitat types and twelve Annex I habitats were recorded within the proposed development boundary and/or will be impacted by the proposed development. Some of the habitat losses will be compensated by habitat creation or management measures within the proposed development boundary, and will be replacing pre-existing habitats or areas subject to temporary disturbance, including some sites used as 'material deposit areas'.

The combined length of linear habitats recorded (11.8km) includes hedgerows and treelines, but not stone walls (which are not the boundaries of properties). It is unclear if the figures represent the total resource of these habitats in the area of the proposed development, or those that will be affected. Based on figures quoted, it appears that the entire linear habitat resource, which was recorded, will be lost and further clarification would be useful in this regard.

It is unclear if abandonment of grazing and/or mowing, including because of fragmentation and isolation of land holdings, has been included among the potential significant effects on habitats that were considered and assessed. The habitats of species such as Marsh Fritillary could also be affected by such changes arising in connection with the development of the road and could lead to loss of habitat in 'favourable management'.

#### Annex I habitats

The losses of Annex I habitats (outside European sites) are presented in terms of losses resulting from the proposed development, and residual or permanent effects after the implementation of mitigation and compensation measures.

Some of the losses are to be compensated by translocating habitat from one location (donor site) to another location (receptor site) within the proposed development boundary. Some of the receptor sites are also identified as 'material deposit areas' where surplus inert materials will be recovered or disposed. The steps and methods to be followed in relation to habitat compensation are set out in EIAR Appendix A.8.26. It would assist interpretation if a table with the details of donor and receptor sites, including areas and habitat types present in each, was provided to clarify, among other things, what habitats will be lost in the receptor sites as a result of the compensation measures and what habitat gains are predicted to accrue. Future management of the compensatory habitats is likely to be required, and it should be clear how this will be achieved and delivered in the short- to long-term.

#### Otter

See above.

#### Bats

The EIAR, including appendices, documents one of the most detailed and comprehensive surveys for bats ever undertaken in Ireland. The bat survey work has identified and catalogued the diversity of bat species around Galway City. In summary, a total of 88 roost sites, and all nine Irish bat species, were recorded within the study area during the field surveys. All bat species occurring in Ireland are listed on Annex IV of the Habitats Directive and are strictly protected. Lesser Horseshoe Bat is also an Annex II species and qualifying interest of Lough Corrib SAC, primarily for the maternity roost at Ebor Hall, near Cong, to the north.

The EIAR provides a comprehensive and detailed assessment of the likely effects of the proposed development on bats, including with respect to loss and disturbance of roosts, loss and fragmentation of foraging and commuting habitat, barrier effects and collision risks with traffic. There is potential for short- and long-term effects on the favourable conservation status of Lesser Horseshoe Bat arising from the proposed development. Mortalities and ecological disruptions to other bats species (e.g. pipistrelles, Leisler's and Brown Long-eared) may also occur but these species are more widespread and abundant.

On the basis of the mitigation and compensation measures specified, the EIAR concludes that the predicted residual effects for Lesser Horseshoes will reduce from national to local significance. The predicted residual effects on all other bat species are also of local significance. The broad suite of mitigation and compensation measures specified in the EIAR is noted and includes the provision of new roosting sites (i.e. new buildings, buildings retrofitted to create roost sites, and bat boxes), underpasses, a 'green' bridge and habitat enhancement measures (e.g. hedgerow planting), among other things. The conclusions in the EIAR are contingent on i) the effective and timely implementation of these mitigation and compensation measures at or prior to construction stage, ii)

their continued effective functioning for the lifetime of the project, and iii) their safeguarding in any future projects and development planning. Monitoring and the taking of timely and effective corrective action if problems arise are integral to their success, and to the conclusions and predictions that may be reached.

#### Badger

Three badger setts will be lost as a result of the proposed development (setts 9, 11 and 14), and one replacement sett is to be constructed north of the new road (close to sett 9). There will be fragmentation and isolation of lands to the south, i.e. between the new road and the Lackagh tunnel, and the N84, in an area with no mammal underpass. Clearance of scrub and resurveys prior to construction may reveal other badger setts. In the case of impacts on badgers that are not considered and assessed as part of the current application, and covered by the consent for the proposed development, a licence may be required from the Minister of this Department under the Wildlife Acts, 1976-2000.

#### Animal passage

The general locations and details of the animal underpasses and the wildlife overbridge are noted. While not always clear from the scheme drawings, underpasses must extend as far as, and integrate with the boundary fencing to be effective and fit for purpose, and to mitigate fragmentation and the barrier effects of the proposed development. All relevant details and specifications for underpasses, fencing and guide planting in relevant TII/NRA guidance should be followed, and underpasses should be confirmed (by an ecologist) to be correctly installed and fully functional before the road becomes operational. Mammal-proof fencing should be installed to the minimum extent necessary for safety and to exclude animals from the road. All other fencing provided should allow the general passage of wild animals (e.g. sheep wire or larger mesh) so that the overall extent of fragmentation and barrier effects resulting from the road are reduced. In the case of the wildlife overbridge, the general configuration and planting, including guide planting, should facilitate and encourage its use by wildlife in general, including (but not only) bats.

#### Marsh Fritillary

Comprehensive surveys carried out for the Annex II species, Marsh Fritillary, recorded extensive areas of suitable habitat for Marsh Fritillary and the presence of the species in a number of locations within the area of the proposed development, mainly in the west. Breeding sites for Marsh Fritillary are mobile and can change, and are linked to the presence of suitable habitat containing the food plant, Devil's-bit Scabious (*Succisa pratensis*).

The proposed development will result in the loss of areas of occupied habitat in four locations, as well as other areas of suitable habitat for Marsh Fritillary. Of particular concern is the habitat area where the species was recorded in three survey years at Trusky More. Much of this area will be lost as a result of the proposed development. In addition to permanent losses of suitable Marsh Fritillary habitat, including habitat patches supporting larval webs, the proposed development will cause fragmentation of individual habitat patches and of the wider network of areas of suitable habitat for the species.

Details of mitigation measures could benefit from more clarity and consideration would need to be given to the extent to which they may be deliverable. A key element of mitigation is the translocation of larval webs that occur along the proposed development. Translocation sites need to contain suitable habitats and should also have good long-term prospects. In the case of any predictions made regarding the long-term survival of Marsh Fritillary, including in relation to the areas of habitat required within a network of sites, it should be clear that any figures quoted refer to habitat in favourable management (presumably meaning good or optimal condition) and with good long-term future prospects.

Further information on mitigation measures for Marsh Fritillary is available from the English Nature and Highways Agency publication: The Butterfly Handbook: General Advice Note on Mitigating the Impacts of Roads on Butterfly Populations (<http://publications.naturalengland.org.uk/file/130004>).

## Birds

**Barn Owl:** the proposed development will reduce the extent of suitable foraging habitat for the local Barn Owl population. The Barn Owl mitigation measures proposed in the EIAR are primarily designed to reduce the risk of road traffic collision events, and include planting vegetation to deter owls from foraging alongside the proposed road margins, and installing barriers to force commuting birds to fly higher over the proposed road. These measures, which are necessary, will compound the likely reduction of foraging opportunities for the local Barn Owl population. To counterbalance this, Barn Owl foraging habitat should be conserved and enhanced in key areas close to the most suitable sites identified as active or potential nest sites for the species. The objective of such compensatory long-term habitat management would be to provide alternative foraging opportunities to the north and northwest of the proposed development, thereby further reducing the risk of road-related mortality events impacting the local population. Such long-term habitat management areas should dictate where the three Barn Owl nest boxes would be sited.

**Peregrine Falcon:** in the EIAR, there is a degree of uncertainty as to whether Lackagh Quarry will remain a suitable breeding site for Peregrine during and post-construction. No alternative breeding site for the Peregrine pair associated with this nest site is known locally. To counterbalance the potential loss of this breeding resource, a suitable alternative nest site(s) needs to be created, noting that the most recent National Peregrine Survey did not record any urban nesting pairs from Galway City. There may be opportunities to install artificial nesting platforms or boxes on other suitable features or buildings. Failing that, a bespoke nesting structure in an appropriate area should be constructed.

The EIAR could benefit from more clarity as to the efficacy of the mitigation measure to temporarily dissuade active breeding of Peregrine at Lackagh Quarry by commencing works from the Lackagh Tunnel to the N84 Headford Road Junction prior to mid-February. The appropriateness of potentially working in the vicinity of, and disturbing an active nest site to install rock bolts on the cliff face may be challenging. If an alternative suitable Peregrine nesting resource was created prior to any road development works being undertaken then the possibility of temporarily rendering the nesting ledges at Lackagh Quarry unavailable for Peregrine during the construction period as a mitigation measure to avoid the disruption of a breeding attempt could be considered.

**Mitigation measures:** as also noted below, there could be potential tensions between mitigation measures set out in the NIS and EIAR.

The NIS states that, in order to minimise disturbance to wintering birds at Ballindooley Lough, blasting at Lackagh Quarry (and Castlegar) will only be undertaken between the months of April to September (inclusive). The EIAR determines that construction activities at Lackagh Quarry, including rock breaking and rock blasting, have the potential to have long-term effects on the Peregrine population nesting in the quarry. Thus, the EIAR proposes mitigation measures specifying that works from the proposed Lackagh tunnel to the N84 Headford Road Junction commence prior to mid-February (i.e. wintering period). The EIAR does not specify whether the works proposed to begin in mid-February include blasting; if blasting was to be included in these works, this would contradict the mitigation approach outlined in the NIS for wintering birds.

It is important that the nature and extent of the proposed planting (likely to provide foraging habitat for general bird species) in close proximity to the proposed development does not act to attract foraging Barn Owl and thereby increase the risk of road collision mortality events.

It is proposed to install 20 nest boxes to further minimise the effects of breeding bird habitat loss. Post construction monitoring and reporting with regard to the rate of uptake of the boxes by birds and their breeding outcomes is recommended in order to determine the efficacy of this mitigation measure.

## Mitigation measures – general

The following general observations are made in relation to mitigation measures:

- As outlined above, it should be clear that all relevant mitigation measures and commitments must apply, from the outset, to all parts of the development as permitted, including enabling works, site preparation and advance contracts, as well as at construction stage.
- Owing to the complexity and detail of the ecological or biodiversity mitigation measures specified, and the importance of knowing where, when and how these apply, competent ecologists will need to be involved directly at all project stages. There is a commitment to having a Project Ecologist as part of the Employer's team; references to an Ecological Clerk of Works are also noted in appendices. The main contractor will also require ecologists, and ecological supervision of other contractors will be necessary.
- The timings of many ecological mitigation measures are critical and, in many cases, are specified. Among these, some of the timings seem to be conflicting or competing (examples relating to birds above, and see also Common Lizard and vegetation clearance) and it needs to be clear how these discrepancies can be managed and resolved. Measures for other environmental topics could also be conflicting or competing, and will require review.
- Resurveys in advance of works being carried out may introduce additional and new considerations, and it should be clear how these will be addressed and managed.
- The scale of the documentation pertaining to this application and the range, specificity and detail of the mitigation measures to be delivered means that robust and interactive or real-time/live mapping systems will need to be developed, possibly in conjunction with 'permits to work' and sign off by the Project Ecologist of the correct completion and functioning of the measures.
- Consideration should be given to making reports on implementation and monitoring of measures available, including to NPWS, via a dedicated website.
- Locations of key ecological mitigation measures should be mapped with records kept that are able to interface with, for example, the Councils' GIS and planning systems, so they can be taken into account and safeguarded in future projects and plans.
- Any non-performance, non-compliances or other issues that arise should be addressed in a timely manner.

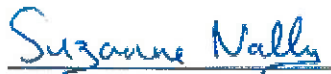
## Monitoring/corrective measures

- A clearer schedule of monitoring commitments and responsibilities, including locations, methods and frequency, may be required for biodiversity in general, and for bats in particular. It is noted, for example, that the EIAR states that monitoring of artificial roosts "may be undertaken by NPWS staff, Galway bat group or others to be decided by the local authority". It should be noted that no such agreement has been discussed or reached with NPWS.
- Monitoring of certain measures, such as the wildlife overpass and hedgerow planting, is to continue for 5 years. It should be understood that, after the monitoring period, maintenance and management of various features will be required in the long-term.

You are requested to send further communications to this Department's Development Applications Unit (DAU) at [manager.dau@chg.gov.ie](mailto:manager.dau@chg.gov.ie) (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager  
Development Applications Unit (DAU)  
Department of Culture, Heritage and the Gaeltacht  
Newtown Road  
Wexford  
Y35 AP90

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A handwritten signature in blue ink that reads "Suzanne Nally". The signature is written in a cursive style and is underlined.

Suzanne Nally  
Development Applications Unit

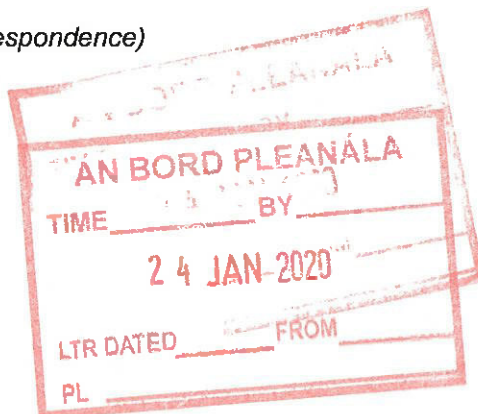
An Roinn Cultúir,  
Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht



Your Ref: ABP-302848-18  
(Please quote in all related correspondence)

24 January 2020

The Secretary  
An Bord Pleanála  
64 Marlborough Street  
Dublin 1  
D01 V902



Via email to [sids@pleanala.ie](mailto:sids@pleanala.ie)

Re: Notification to the Minister for Culture, Heritage and the Gaeltacht under the Planning and Development (Housing) and Residential Tenancies Act 2016; Planning and Development (Strategic Housing Development) Regulations 2017

**RE: Section 177AE (ABP Deciding Authority) - Galway County Council on behalf of itself and on behalf of Galway City Council is proposing to develop the N6 Galway City Ring Road (GCRR) around Galway City.**

A chara

On behalf of the Department of Culture, Heritage and the Gaeltacht, I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department under the stated heading(s).

#### **Nature Conservation**

The Department refers to the current application for the proposed N6 Galway City Ring Road development (and Motorway Scheme) in Galway City and County, and to the accompanying Environmental Impact Assessment Report (EIAR), Natura Impact Statement (NIS), and associated documentation. Reference is also made to the significant additional information submitted by the applicants and notified to the Department on 4<sup>th</sup> December 2019. This includes the Request for Further Information Response Report (Volume 1) and Appendices (Volume 2) together with the Route Selection Report (Volume 3) and Design Report (Volume 4).

#### **Context of observations**

The following observations are made by the Department in its role as a prescribed body under planning legislation and as the authority with overarching responsibility for nature conservation and the nature directives (i.e. the Birds and Habitats Directives). The observations are not exhaustive and are intended to assist An Bord Pleanála in its review



and evaluation of the current proposal in the context of, among other things, obligations and commitments in relation to nature conservation, European sites, biodiversity and environmental protection generally. These observations are structured under a series of headings/topics, but should be read as a whole, together with our previous observations dated 21<sup>st</sup> December 2018.

## 1. Likely effects on European sites

### Annex 1 habitats – Qualifying Interests (QIs)

The Department notes the significant additional information provided in relation to habitat surveying and mapping in Appendix A.3.1 (Annex 2 and Annex 3). This includes, *inter alia*, information in relation to habitats within the proposed development boundary<sup>1</sup>, including Annex 1 habitats<sup>2,3</sup> and QI habitats within Lough Corrib cSAC in close proximity to the boundary of the proposed development (Figure 2.9.01). The Department also notes the vegetation sampling (relevé data) which has been provided and which has informed the habitat mapping referred to above.

This additional information has resulted in some changes to habitat mapping which is described and evaluated in Section 4 of the Request for Further Information Response Report (Volume 1), and is noted. In particular, Section 4.1 of the Report identifies an additional small area of limestone pavement [\*8240] habitat near Menlo (see Figure 2.7.01). The boundary of Lough Corrib cSAC at this location intersects the area of limestone pavement so that some is within the cSAC and some is located outside the cSAC. The area of limestone pavement within the cSAC would have been directly affected by a proposed access route to farmland at this location. The proposed access route is now proposed to be altered to avoid any impacts to this area of limestone pavement and therefore to avoid impacts to Lough Corrib cSAC.

The Department further notes that updates to the boundary of Lough Corrib cSAC are possible pending finalization of the objections process at this site pursuant to the requirements of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). The final objections relating to the boundary of Lough Corrib cSAC are currently being processed and an updated boundary map will be notified in the coming weeks, prior to the Oral Hearing. As part of this process a mapping error, at the location near Menlo described above, is under consideration. The correction of this minor mapping error will align the boundary to a small track to reflect the original survey intention. This will result in a larger area of the limestone pavement being located outside the Lough Corrib cSAC boundary. This is the only known alteration to the boundary of Lough Corrib cSAC which will interact with the proposed motorway and road scheme.

### SAC – Hydrology

In the Department's previous observations it was noted that clarity was required in relation to changes in the hydrological regime and its impact on the groundwater catchment area as

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<sup>1</sup> Figures 2.5.01 – Figure 2.5.15 inclusive (2019 Habitat Mapping with Fossitt (Level 3) Habitat Codes indicated)

<sup>2</sup> Figures 2.6.01 – 2.6.15 inclusive (2019 Habitat Mapping with Annex 1 Habitats indicated)

<sup>3</sup> Figures 2.7.01 & 2.7.02 (Areas of limestone pavement habitat within the proposed development boundary and Lough Corrib cSAC)





a result of the Lackagh Tunnel. This matter is addressed in the Request for Further Information Response Report (Volume 1) in Section 4.12.1. The Report states that only one European Site (i.e. Lough Corrib cSAC) lies within the hydrogeological zone of influence of the proposed road development. The Department remains of the view that this statement needs more clarification. The groundwater flow map is quite general and would benefit from groundwater levels from boreholes for example being indicated together with groundwater head contours. The delineated groundwater catchment divides should also be indicated and the location/mapping of the Groundwater Dependent Terrestrial Ecosystems (GWDTEs), particularly the fen habitats within the Lough Corrib cSAC, should also be shown. The NIS and the Request for Further Information Response Report states that the GWDTEs rely on 'seasonal groundwater levels', but it is still not clear what these are (baseflows for example?), and what groundwater levels need to be maintained to avoid negatively impacting on the conservation status of all GWDTEs in the Lough Corrib cSAC complex.

The Department also sought clarification in relation to how the GWDTEs in the Lough Corrib cSAC are working hydrogeologically and if flow paths may change post-construction. This is addressed in Section 4.13.1 of the Request for Further Information Response Report. The Department remains of the view that this matter requires clarification, such as the presentation of a clearer hydrogeological conceptualisation of the groundwater regime of the GWDTEs, and the changes that may or may not occur following construction. Additional hydrogeological cross-sections would assist in this regard. The Department is of the view that without a clearer presentation of the groundwater regime of the GWDTEs, it is difficult to assess the potential impacts of the proposed scheme and the adequacy of the mitigation measures being proposed.

#### Conservation objectives and scope of NIS

The Department notes the clarification in relation to the matters raised under this heading in its previous observations in Section 4.15 of the Request for Further Information Response Report.

#### Birds

The Department raised issues in relation to the potential for the proposed River Corrib bridge to pose a collision risk to birds in its previous observations. This has been addressed in Section 5.2 of the Request for Further Information Response Report. While no nocturnal surveys were undertaken the Department considers that taking into account the fact that the bridge will not be lit, the available data from the previous and recent surveys, and the available published literature, sufficient information has been provided to assess potential impacts to SCI bird species of the adjacent SPAs. The Department is of the view that the proposed bridge is unlikely to present a threat to SCI bird species of the adjacent SPAs.

The Department also raised issues in relation to habitat loss and fragmentation and the potential for this to impact SCI bird species for surrounding SPAs. This is addressed in Section 5.1 of the Request for Further Information Response Report. The Department



notes the additional information provided and considers that the matter raised has been addressed.

## **2. Likely effects on the Environment**

### NHA – hydrology

The Department reiterates its concerns regarding Moycullen Bog NHA, that dewatering of the 'Galway Granite batholith' within cutting areas during construction and operation of the proposed scheme, may result in a lowering of the peatland water table with peat subsidence and a consequent negative impact on the ecology of the Bog. The potential for such impacts needs to be assessed and mitigation measures proposed to address this matter as appropriate.

### Habitats

As stated above, the Department notes the additional information in relation to habitat mapping provided in Section 4 of the Request for Further Information Response Report (Volume 1). This has resulted in some changes to habitat mapping which has been described and evaluated in Section 4 of the Report and associated mapping, and is noted.

It is also noted that there will be a number of habitat types of local biodiversity importance which will be permanently lost and where significant residual impacts are likely, including calcareous springs, dry-humid acid grasslands, poor fen and flush, mixed broadleaved woodland, hedgerows and treelines. The Report states that for mixed broadleaved woodland, hedgerows and treelines an area greater than that which will be permanently lost is being provided for in the landscape design (see page 30). It would be useful if the area of woodland and the length of hedgerow and treeline to be provided can be clearly set out.

It remains unclear if abandonment of grazing and/or mowing, including because of fragmentation and isolation of land holdings, has been included among the potential significant effects on habitats that were considered and assessed. Species such as Marsh Fritillary could be affected by such changes arising in connection with the development of the road and could lead to loss of habitat in 'favourable management'. Further clarification should be provided.

### Compensatory Habitat

The Department notes the summary of residual Annex 1 habitat loss after compensatory measures have been implemented which is set out in Table 4.1 of the Report and revises the information previously provided in the EIAR.

Some of these losses are to be compensated by translocating habitat from one location (donor site) to another location (receptor site) within the proposed development boundary. The Department re-iterates its view (as set out in previous observations) that it would assist interpretation if a table with the details of donor and receptor sites, including areas and habitat types present in each, was provided to clarify, among other things, what habitats will



be lost in the receptor sites as a result of the compensation measures and what habitat gains are predicted to accrue.

There have been some amendments proposed in the Request for Further Information Response Report to the Material Deposition Areas in Lackagh Quarry (areas DA23, DA24, DA25, DA28). It is noted also that a large volume of peat (52,000m<sup>3</sup>) – presumably removed from west of the River Corrib - will be deposited in this limestone quarry. While Tables 3.2 & 3.3 indicate that there will be no peat in area DA28, Table 6.2 indicates that there will 14,000m<sup>3</sup> of peat in this area. This matter needs to be clarified.

Some of the Material Deposition Areas listed above are also earmarked for habitat compensation notably for calcareous grassland. It is not clear from the documentation how this habitat will be created and how the proposed alterations to the material deposition areas will impinge on the habitat compensatory areas. It appears that the major horizontal portions of the depositional areas will consist of peat. For example, area DA24 was identified as an area for calcareous grassland but yet its entire area appears to be covered in peat (see Annex 2, Figure 1.8.6). It is not clear from the documentation if it is intended to create peatland habitat here or whether the peat is simply being stored in this area. Clarity is required in relation to these matters.

The Department notes the information provided in Section 4.11 of the Request for Further Information Response Report in relation to the time required to establish compensatory habitats. Because the timeline in the Report for Alluvial forest [\*91E0] is expressed as a worst case scenario, the Department considers that the lower limit of the range should be increased from 20 to 30 years. More generally the Department notes the long time periods required for the establishment of all the Annex 1 habitat-types as set out in Section 4.11 of the Report, and notes that donor and receptor sites should be well matched in terms of their environmental conditions (e.g. geology, soils, altitude, slope, aspect) in order to enhance the prospects of success in a reasonable time-frame. In all cases future management will be required and it should be clear how this will be achieved and delivered in the short- to long-term.

#### Birds

The Department re-iterates the matters raised in its previous observations in relation to the need for compensatory long-term habitat management for Barn Owls.

The Department also raised issues in relation to the potential for impacts to Peregrine Falcon and to wintering birds at Ballindooley Lough arising from blasting activity at Lackagh Quarry (and Castle gar), and the mitigation measures proposed to address such impacts. These matters are addressed in Section 5.3 of the Request for Further Information Response Report. In relation to Ballindooley Lough it is clear that there is no risk of disturbance to waterbirds because blasting will not take place during the wintering period. In relation to Peregrine the Department is of the view that in addition to the mitigation measure proposed (i.e. blasting to commence prior to mid-February) there need to be suitable high ledges for prospecting pairs available, and that any active Peregrine nest site/ledge must be left undisturbed. If these conditions are met then the proposed works should not prohibit Peregrine breeding at the



site. Peregrine are regarded as being able to withstand significant disturbance at active quarry sites. However, the frequency, the location and intensity of the blasting could influence the outcome in terms of success/failure. Therefore monitoring of Peregrine breeding activity at the site through the season should ideally be carried out to ascertain any nest success/failure of the pair and to determine if blasting is also affecting numbers of common prey species for Peregrine (i.e. Feral Pigeon).

#### Marsh Fritillary

The Department reiterates its concerns in relation to the mitigation measures proposed for this Annex II species which, as set out in the Department's previous observations, lacked sufficient detail. This matter needs to be addressed to ensure that the mitigation measures proposed are realisable.

#### Bats

The Department notes the clarification in relation to Lesser Horseshoe Bat populations set out in Section 6.1 of the Request for Further Information Response Report, and the information provided in relation to core sustenance zones (CSZ) for bats in Section 6.2 of the Report. As stated previously, the conclusions in the EIAR in relation to bats are contingent on i) the effective and timely implementation of these mitigation and compensation measures at or prior to construction stage, ii) their continued effective functioning for the lifetime of the project, and iii) their safeguarding in any future projects and development planning. Monitoring and the taking of timely and effective corrective action if problems arise are integral to their success, and to the conclusions and predictions that may be reached. Any uncertainties in any of these regards should be taken into account in the context of the EIA.

#### Habitat Connectivity

The Department notes the clarification in relation to habitat connectivity for pine martens, squirrels and common lizard set out in Section 7.1 of the Request for Further Information Response Report.

Drawing GCOB-1700-D-S12-02-001 shows the overpass/green bridge. Clarification is required in relation to the proposed planting for the overpass setting out what species are proposed to be planted. It would appear that there will be a bank at each side of the metaled route and perhaps an area of soil cover outside of this. In order for the overpass to function correctly it must be clear that a sufficient depth of soil cover will be in place to support an appropriate planting regime.

There does not appear to be provision for ledges for passage by mammals in the drawings for culverts (see drawing GCOB-1700-D-GEN-011). The Department recommends that where culverts are designed to allow water flows through them, provision for mammal ledges should be included.



You are requested to send further communications to this Department's Development Applications Unit (DAU) at [manager.dau@chg.gov.ie](mailto:manager.dau@chg.gov.ie) (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager  
Development Applications Unit (DAU)  
Department of Culture, Heritage and the Gaeltacht  
Newtown Road  
Wexford  
Y35 AP90

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Connor Rooney  
Development Applications Unit



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**N6 Galway City Ring Road**  
**Application for consent to An Bord Pleanála**

**Oral Hearing**

**Statement of Evidence**

Gerry Clabby

National Parks and Wildlife Service

Department of Culture, Heritage and the Gaeltacht

21 February 2020

1. My name is Gerry Clabby and I am Head of Ecological Assessment, with the National Parks and Wildlife Service of the Department of Culture, Heritage and the Gaeltacht. I hold a BSc in Botany and a PhD in ecology from University College Dublin. In my current role I am responsible, among other things, for providing advice and guidance to the Department in relation to the discharge of its function as a statutory consultee in the planning code and in this regard I manage a team of ten Divisional Ecologists. Prior to this I was Heritage Officer with Fingal County Council for 15 years based in the Planning and Strategic Infrastructure Department of the Council. In this role I contributed to the development of natural heritage policy for statutory land-use plans and to the consideration of a wide range of planning applications by providing advice and guidance in relation to environmental assessment. I was also previously Heritage Officer with Westmeath and Longford Councils and a Lecturer in Botany at University College Dublin.
2. The Department has previously made observations dated 21<sup>st</sup> December 2018 and 24<sup>th</sup> January 2020 in relation to the proposed motorway and road scheme. These observations were made by the Department in its role as a prescribed body under planning legislation and as the authority with overarching responsibility for nature conservation and the nature directives (i.e. the Birds and Habitats Directives). The observations are intended to assist An Bord Pleanála in its review and evaluation of the current proposal in the context of Ireland's obligations and commitments in relation to nature conservation, European sites, biodiversity and environmental protection generally.
3. The Department wishes to acknowledge the series of pre-application meetings and consultations held by the applicants with the National Parks and Wildlife Service between 2013 and 2017 inclusive. Three submissions made by the Department (on a non-statutory basis) at pre-application stage are included in the Environmental Impact Assessment Report (EIAR) at Appendix A.8.2. This included review of draft documentation by NPWS, as an exceptional measure, which included the draft Natura Impact Statement (NIS) and the biodiversity chapter of the EIAR biodiversity chapter, only.
4. The Department also acknowledges the extent and detail of the surveys carried out in connection with the planning and design of the scheme and acknowledges the extent to which ecological and other data and information have informed and modified aspects of the design of the scheme in order to minimise adverse impacts on biodiversity.



5. The Department has recently revised the boundary of Lough Corrib SAC, following the finalization of the objections process at this site, pursuant to the requirements of the European Communities (Birds and Natural Habitats) Regulations, 2011. Revised Irish Grid maps (Map Version 1.33) were notified to An Bord Pleanála and other public authorities on Monday 17<sup>th</sup> February 2020. These updated maps include a correction of a minor mapping error near Menlo as described in the Department's observations dated 24<sup>th</sup> January 2020.
6. The applicants have submitted a number of briefs of evidence to the Oral Hearing including the following in relation to ecology and hydrogeology:
  - Responses to EIA Biodiversity Objection/Submissions
  - Responses to AA Objection/Submissions
  - Responses to Hydrology Objection/Submissions

*je*
7. The Department has only had time to undertake an initial review of this new information and in light of the complex nature of this proposed motorway and road scheme, and the extensive documentation involved, would welcome the opportunity to put some questions to the applicants this morning. The Department is willing to provide further inputs to the Oral Hearing at a later date, should this be helpful to the Inspector and the Board.
8. While not wishing to repeat its previous observations, which are to be taken as read, I wish to highlight a number of areas where, in the Department's view, further clarification is required to ensure that sufficient information is available to the Board in its decision making in this case:
  - a. Further clarification is required in relation to the groundwater regime operating in the vicinity of the proposed Lackagh Tunnel. This is necessary in order to enable a full assessment of the potential impacts to Lough Corrib SAC, particularly Coolagh Lakes and Annex 1 Alkaline and Cladium fen habitats, as a result of the construction of the Tunnel and in order to ensure that the mitigation measures proposed will fully address potential impacts. ✓  
*7230. 7210.*
  - b. Clarification is needed in relation to the catchment areas and groundwater flow regimes of the dependency of Ground Water Dependent Terrestrial Ecosystems (GWDTes) in the Lough Corrib cSAC; and whether groundwater flow paths may

change post-construction. Without this, it is difficult to assess the potential impacts of the proposed scheme and the adequacy of the mitigation measures being proposed.

- c. In relation to Moycullen Bog Natural Heritage Area (NHA) there remain concerns that dewatering of the 'Galway Granite Batholith' as a result of the construction and operation of the scheme may result in a lowering of the peatland water table, resulting in a negative impact on the ecology of the Bog. This matter needs to be addressed.
- d. Proposed mitigation measures for Marsh Fritillary should be clarified as set out in the Department's previous observations.
- e. The Department is of the view that further detail is required in order to ensure that the provision of Annex 1 compensatory habitat is successfully achieved. This includes i) further detail in relation to how such habitat is to be provided including the steps involved in the process, particularly in relation to dry heath habitat; ii) further provision for monitoring; and iii) clarification in relation to the measures in place should habitat provision be unsuccessful and the steps needed to be repeated until success is achieved.

- GA not AA.
- 9. The conclusions reached in the Natura Impact Statement (NIS) and the Environmental Impact Assessment Report (EIAR) with regard to the proposed scheme are contingent on mitigation measures and the provision of compensatory habitat. It is essential that provision is made for the effective and timely implementation of these measures at, or prior to, construction stage and, where applicable, during the operational stage. It is also essential that these measures are effective over the operational lifetime of the scheme and that they are safeguarded in any future project and development planning in the city and county. Monitoring and the making of provision for timely and corrective action should problems arise in relation to mitigation measures or compensatory habitat provision, is also a key element in ensuring success in this case. Any grant of permission in this case should ensure that these matters are fully addressed.

10. I am joined by my colleagues Dr Shane Regan, Dr David Tierney, Dr Ferdia Marnell and Dr Enda Mooney who wish to put some questions to the applicants with a view to clarifying some of the matters raised above.

a + b - AA + EIA

c - EIA

d + e less important.

Comp. = focus - capable of being implemented

## **N6 Galway City Ring Road**

### **Application for consent to An Bord Pleanála**

#### **Oral Hearing**

#### **Statement of Evidence**

**Gerry Clabby**

**National Parks and Wildlife Service**

**Department of Culture, Heritage and the Gaeltacht**

**11<sup>th</sup> March 2020**

1. My name is Gerry Clabby and I am Head of Ecological Assessment, with the National Parks and Wildlife Service (NPWS) of the Department of Culture, Heritage and the Gaeltacht. I am responsible, among other things, for providing advice and guidance to the Department in relation to the discharge of its function as a statutory consultee in the planning code. I am joined today by my colleagues Dr Shane Regan and Dr Enda Mooney.
2. The Department made a Statement of Evidence to the Oral Hearing on 21<sup>st</sup> February 2020 and also put some questions in relation to the proposed development to the applicants which sought further information in relation to a number of matters. The Department indicated at the Hearing that a meeting with the applicants might be useful in relation to the matters raised by the Department and this course of action was agreed with the Inspector. The Department agreed that it would return to the Oral Hearing subsequent to such a meeting with the applicants.
3. Since 21<sup>st</sup> February 2020, the Department met with the applicants on 27<sup>th</sup> February 2020 and again, at the applicant's request, on 9<sup>th</sup> March 2020. The Minutes of these meetings are provided in an Appendix to this Statement of Evidence.
4. At the first meeting on 27<sup>th</sup> February the following matters were discussed:
  - a. Hydrogeological matters arising in relation to Lough Corrib cSAC
  - b. Hydrogeological matters arising in relation to Moycullen Bogs NHA
  - c. Compensatory habitat provision – calcareous grassland and dry heath
  - d. Mitigation measures in relation to Barn Owl and Peregrine Falcon
  - e. Mitigation measures in relation to Marsh Fritillary.
5. At the second meeting on 9<sup>th</sup> March the only matter discussed was the provision of compensatory dry heath habitat.
6. The Department is of the view that the additional information contained in the Statement of Evidence made to the Oral Hearing on 10<sup>th</sup> March 2020 by the applicants provides further relevant information to An Bord Pleanála which will assist it, in its assessment of the current proposal.
7. In addition, the Board's ecological advisor Mr Richard Arnold put a series of questions to the Department at the Hearing on 21<sup>st</sup> February to which I will now provide responses.

## Question 1

**As stated by the applicant, there will be a loss of c.1ha of 8240 LP outside the cSAC. In the department's view, is the direct loss of limestone pavement (*and other Annex 1 habitats*), outside the cSAC consistent with the objectives of the Habitats Directive?**

This question addresses the protection afforded to Annex I habitats that occur outside Special Areas of Conservation (SACs). One of the objectives of the Habitats Directive is to designate Special Areas of Conservation (SACs) which are defined in Article 1(l) of the Directive as follows:

“special area of conservation means a site of Community importance designated by the Member States through a statutory, administrative and/or contractual act where the necessary conservation measures are applied for the maintenance or restoration, at a favourable conservation status, of the natural habitats and/or the populations of the species for which the site is designated;” [underlining added].

Annex I to the Directive lists natural habitat types whose conservation requires the designation of special areas of conservation. Limestone pavement is included in Annex I as a priority natural habitat, which means it is in danger of disappearance and is a habitat for which the European Union has a particular responsibility.

Article 6(2) requires that:

“Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive.” [underlining added].

The European Commission guidance<sup>1</sup> advises that measures implemented under Article 6(2) are only required to target species and habitats located in the SACs, unless external events may have an impact on the species and the habitats inside the SAC.

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<sup>1</sup> Commission notice "Managing Natura 2000 sites The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC" (page 27-28):  
[https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/Provisions\\_Art\\_6\\_nov\\_2018\\_en.pdf](https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/Provisions_Art_6_nov_2018_en.pdf)

While the general provision, under Article 6(2), to conserve habitats for which a site has been designated applies at all times, Article 6(3) of the Directive applies only to plans and projects. Article 6(3) requires that:

“Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site’s conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.”

In *Holohan*<sup>2</sup>, the Court of Justice of the European Union (CJEU) ruled that an appropriate assessment under Article 6(3) of the Habitats Directive must identify and examine the implications of the proposed project for habitat types to be found outside the boundaries of a SAC provided that those implications are liable to affect the conservation objectives of the site.

In summary, the Department is of the view that any proposals which involve the loss of Annex 1 habitat outside Special Areas of Conservation, must take fully into account the findings of the CJEU in the *Holohan* case cited above. In proposals where the loss of Annex 1 habitat does not affect habitats and/or species within SACs, the Department is of the view that while such habitat loss is undesirable and to be avoided wherever possible, it is not inconsistent with the requirements of the Habitats Directive. In such cases the Department expects, among other things, the requirements of the EIA Directive to be applied in relation to the assessment of potential impacts to biodiversity including the assessment of impacts to Annex 1 habitats.

I would hasten to add that this view does not in any way purport to be a legal opinion.

Should the subject matter of the question raised by the Board be considered by the Board to

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<sup>2</sup> Case C-461/17, *Brian Holohan and ors. V. An Bord Pleanála* (para 70) <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62017CJ0461&qid=1583427673419&from=EN>

be critical to its decision making in this case, it is respectfully suggested that the Board may wish to obtain legal advice in relation to this matter.

## Question 2

With reference to the FIR response, section 4.3 and Figure 2.6.07 of the same; Why was the boundary of the cSAC drawn to include the woodland adjacent to Menlo Castle, Area 1f, in the applicant's mapping? To further clarify, this area lies immediately to the east of the proposed River Corrib bridge. Was this area considered in the recent revision to the cSAC boundary?

The reference to Figure 2.6.07 in this question is presumed to be a reference to Drawing 2.6.07 of the FIR. The area in question is also shown in Drawing 2.5.07 of the FIR which identifies the Fossitt habitat at this location as woodland (WD1). The boundary of the cSAC was surveyed in 1997 (see Figure 1 below). The rationale at the time was, *inter alia*, to include areas of semi-natural habitat within the boundary of the cSAC.

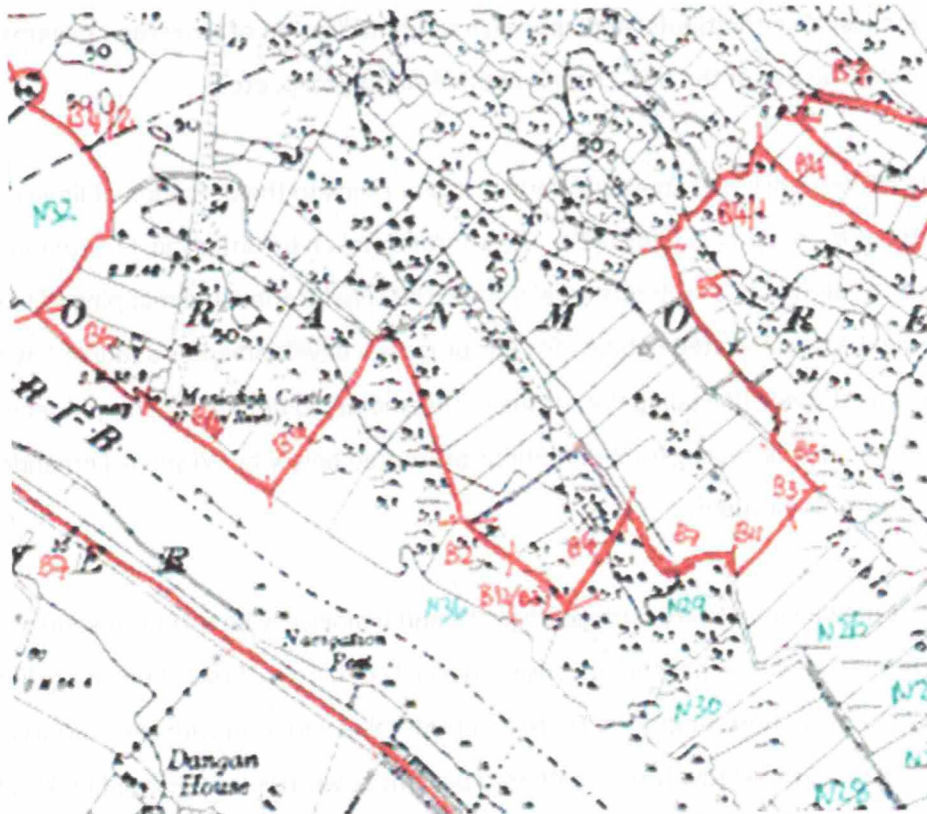


Figure 1: Scan of the 1997 surveyed boundary of the cSAC



While there are no specific target notes in the NPWS site file for the woodland area referred to as Area 1f, it is clear that this area was included on the basis that it was semi-natural woodland.

The boundary of the site was reviewed in 2003 but no amendments were proposed along this section of boundary and the woodland was retained within the cSAC. The Department has recently revised the Lough Corrib cSAC boundary. A revised boundary map for Lough Corrib cSAC was issued on Monday 17<sup>th</sup> February 2020 - Map Version 1.33. The revised map was issued following boundary changes recommended by the Designated Area Appeals Advisory Board (DAAAB) and approved by the Minister for Culture, Heritage and the Gaeltacht. A minor mapping error was also corrected on Map Version 1.33. None of the boundary changes to Map Version 1.33 related to the woodland south of Menlo Castle and this area was not assessed by the DAAAB in the recent revision of the cSAC boundary (i.e. this area was not subject to a formal appeal assessed by the DAAAB).

### Question 3

**With reference to the FIR response, section 4.5; What is the Department's impression of the applicant's definition(s) and approach to identification of limestone pavement in particular the use of the 50% criteria applied to polygons, etc?**

In the FIR response, the applicant clarifies its approach to the definition of limestone pavement in Section 4.5 (page 32). The approach taken by Botanical, Environmental & Conservation (BEC) Consultants in relation to the classification and mapping of limestone pavement and associated habitats for this proposed development is endorsed by NPWS. It follows a rationale (including the setting of thresholds) to define this complex ecological mosaic and draws heavily from definitions presented below by Wilson & Fernandez (2013)<sup>3</sup>, on page 7 of their report:

“Limestone pavements are both geologically and biologically important resources. The structure of limestone pavement consists typically of blocks of rock, known as clints, separated by fissures, or grykes. There is considerable variation with some areas of massive blocks of smooth, relatively un-weathered pavement with well-developed grykes, to areas

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<sup>3</sup> Wilson, S & Fernández, F (2013) National Survey of limestone pavement and associated habitats in Ireland. Irish Wildlife Manuals, No 73. National Parks and Wildlife Service.  
<https://www.npws.ie/sites/default/files/publications/pdf/IWM73%20Limestone%20pavement.pdf>

where the grykes are very narrow and shallow. Finely fractured pavements or shattered pavements where grykes are almost absent can also occur. The rock surface is almost devoid of overlying soils (considerably less than 50% cover) except for some patches of shallow skeletal soils, although more extensive areas of deeper soil occasionally occur (Anon. 2007). This morphology offers a variety of microclimates allowing the establishment of complex vegetation consisting of a mosaic of different communities. The vegetation in grykes is unusual as it is composed of woodland and shade species along with plants of rocky habitats (Osborne *et al.* 2003; Ward *et al.* 1976)."

The scale in terms of area at which the definition of limestone pavement is applied needs to be practical and common sense needs to be applied. Since limestone pavement is a geomorphological entity, this needs to be taken into account in applying definitions and it does not make sense to identify all areas that contain elements of water-worn limestone as limestone pavement. The Department's view is that the applicants have applied a justifiable approach to the mapping of limestone pavement and that the use of the 50% criteria relating to polygons is valid.

#### Question 4.

**With reference to the FIR response, section 4.4, Figure 2.4-072, Figure 2.3.03 and Photograph for relevé 3734\_R1 in Area. What is the Department's view on the habitat type, in accordance with EUR28? The photo is attached. In addition, it would helpful to have the same view for Relevé 1883\_R1 also attached, refer to Figures 2.4-076 and Figure 2.3.04"**

To assist with providing a response in relation to relevé 3734\_R1, data for this relevé was inputted into ERICA (the Irish Vegetation Classification tool). ERICA is a web application which can be used to assign vegetation data to communities as defined by the Irish Vegetation Classification. Data can be uploaded, checked for errors and analysed and the results can then be downloaded. Further information in relation to this tool is available at the following link: <https://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/erica/>. Relevé 3734\_R1 was identified as WL2A *Quercus robur* – *Circea lutetiana* woodland by ERICA. A full description of this community type is available at the following link for reference:

<https://www.biodiversityireland.ie/wordpress/wp-content/uploads/WL2A.pdf>. This describes a fairly species-poor woodland community with a very limited bryophyte flora. A small proportion of these stands (10.7%) may qualify as EU Annex I habitat 91A0 Old Oak Woodlands. Therefore the lack of assignment of this relevé to an Annex 1 habitat category appears appropriate.

ERICA identified relevé 1883\_R1 as WL2E *Corylus avellana* – *Potentilla sterilis* woodland. A full description of this community type is available at the following link for reference: <https://www.biodiversityireland.ie/wordpress/wp-content/uploads/WL2E.pdf>. This is quite a species-rich woodland community with a fairly diverse bryophyte flora. Stands of this community-type do not qualify as any of the EU Annex I woodland habitats, but stands on thin soils occurring in association with karst limestone can be considered to be Annex 1 habitat 8240\* Limestone pavement. In the case of relevé 1883\_R1 the soil layer is thin, and blocky limestone has also been identified for this relevé. Therefore the assignment of this relevé to 8420\* appears appropriate.

#### Question 5.

**With reference to the FIR response, section 2.3, I understand that the Menlough viaduct will pass over 8240 Limestone Pavement outside the cSAC. In the Department's view, does the shading of limestone pavement under structures, for example beneath the Menlough viaduct, affect the conservation status of the Limestone Pavement?**

In relation to shading, limestone pavement and its associated habitats and species occur across a spectrum of light levels, from open pavement to shaded grykes, through to scrub and woodland. As the proposed viaduct is generally orientated East -West, the impact of shading will be lessened. In addition, the main orientation of the grykes is North-South, meaning plants growing in grykes are already shaded in an East-West direction. The Department does not perceive there to be an issue with shading from the proposed viaduct.

## APPENDIX

# Minutes

## Meeting between NPWS and N6 Galway City Ring Road Project Team

Location NPWS Office, 90 North King Street, Smithfield, Dublin 7. Time and date 11.00 am 27 February 2020

Purpose of meeting Clarifications sought by NPWS at N6GCRR Oral Hearing

Attendance	Gerry Clabby	NPWS
	Caitriona Douglas	NPWS
	Enda Mooney	NPWS
	Brian Nelson	NPWS
	Shane Regan	NPWS
	Enda Mullen	NPWS
	John Fitzgerald	NPWS
	Ciaran O’Keeffe	NPWS
	David Tierney	NPWS
	Aebhin Cawley	Scott Cawley (SC)
	Andrew Speer	Scott Cawley (SC)
	Catherine Buckley	Arup
	Les Brown	Arup
	Mary Hurley	Arup
	Eileen McCarthy	Arup

Apologies

Circulation Those present

		Action
<b>1.</b>	<b>Overview</b>	
<b>1.1</b>	NPWS outlined that the purpose of the meeting is to identify to the applicant for the N6 Galway City Ring Road what NPWS consider would be required in terms of additional clarification to be provided to An Bord Pleanála (ABP) so that ABP can undertake a full assessment of the scheme in possession of relevant information.	Note
<b>1.2</b>	The matters discussed related to the following topics: <ul style="list-style-type: none"> <li>• Birds</li> <li>• Hydrogeological matters arising in relation to Lough Corrib cSAC</li> <li>• Hydrogeological matters arising in relation to Moycullen Bogs NHA</li> <li>• Marsh Fritillary</li> <li>• Compensatory habitat provision – calcareous grassland and dry heath</li> </ul>	
<b>2.</b>	<b>Birds</b>	
<b>2.1</b>	NPWS fully understand the principle of dissuading barn owls from foraging near the proposed road development for the	Note

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	majority of the scheme. However, NPWS queried the net loss/gain of habitat versus habitat provided for Barn owl around Menlo Castle.	
2.2	SC confirmed that the resultant loss of suitable Barn owl foraging habitat within a 5km radius of Menlo Castle is approximately 9.9ha, and the provision of replacement habitat in this same area is approximately 11.76ha.	Note
2.3	Confirmation that the grazing regime required to maintain the habitat will be implemented into the future is required.	Design Team
2.4	Clarification is required on what level of protection is provided for the existing two Peregrine falcon nests in Lackagh Quarry.	Design Team
2.5	SC have spoken with John Lusby (Bird Watch Ireland) following the NPWS query with respect to the existing Peregrine falcon nests sites in Lackagh Quarry and proposed that artificial nest boxes will be provided on the existing ledges in Lackagh Quarry. This will be added to the Schedule of Environmental Commitments and will be presented to ABP.	Design Team
3.	<b>Hydrogeology at Lough Corrib</b>	
3.1	Arup gave an overview of the hydrogeology of the 2km section from River Corrib to Ballindooley Lough using data as presented in various reports within the EIAR/NIS with a groundwater contour map and hydrogeological cross-section (Lackagh to Coolagh lakes) as had been requested by NPWS at the N6 GCRR oral hearing on 21 February 2020.	Note
3.2	<p>NPWS believe that the following clarifications should be made available to ABP:</p> <ul style="list-style-type: none"> <li>• An additional hydrogeological cross-section through the Fens adjacent to Coolagh Lake following the groundwater path that supports these Fens and include piezometric heads in the limestone aquifer.</li> <li>• There is a significant amount of ecology and hydrogeology data in the EIAR and NIS but the reports are voluminous. NPWS request a concise integrated eco-hydrogeology response note that links together the ecology and hydrogeology aspects with an assessment of the potential impacts on the Lough Corrib cSAC conservation objectives with specific reference to the following qualifying interests - Alkaline Fen [7230] and Calcareous fen with <i>Cladium mariscus</i> and species of the <i>Caricion davalliana</i> [7210*]; and with a clear conclusion to inform the Appropriate Assessment being undertaken by ABP.</li> </ul>	Design Team
4.	<b>Hydrogeology at Moycullen Bogs NHA</b>	
4.1	NPWS noted that their main concern arose from a potential hydraulic connection via fractures in the granite between cuttings	Note

# Minutes

<p>4.2</p> <p>4.3</p>	<p>of the proposed road development and Moycullen Bog NHA (Letteragh).</p> <p>Arup gave an overview of the hydrogeology in the area of the proposed road development relative to Moycullen Bog. The geophysical data presented (included in the EIAR) indicated that there are no fractures in the granite which may connect the bog to the proposed road development. The NPWS acknowledged that detailed mitigation measures were included in the EIAR to provide for remediation should any unforeseen fracture arise in the granite during construction.</p> <p>NPWS believe that the following clarifications should be made available to ABP:</p> <ul style="list-style-type: none"> <li>• A hydrogeological cross-section from the proposed road development to Moycullen Bogs NHA (Letteragh). This should show groundwater table levels, geophysical information, bog water tables and an indication of likely bog depth.</li> <li>• Provide an eco-hydrogeological response for Moycullen Bogs NHA at Letteragh that links all ecology and hydrogeology assessments undertaken, with supporting information from hydrology and geology assessments. This should include relevant excerpts from the contingency measures outlined in the Construction Environmental Management Plan included within the EIAR. This summary report is requested by NPWS to assist ABP in assessing potential impacts to Moycullen Bogs NHA.</li> </ul>	<p>Design Team</p>
<p>5.</p> <p>5.1</p>	<p><b>Marsh Fritillary Butterfly</b></p> <p>NPWS request that the following clarifications to be made available to ABP:</p> <ul style="list-style-type: none"> <li>• Detail the purpose of the mitigation for the Marsh fritillary</li> <li>• Provide detail on the proposed translocation site(s) and on the methodology for translocation</li> <li>• Provide detail on the timing of when these measures would be implemented with respect to the construction activities</li> <li>• Clarify how the new sites will be managed for the years ahead</li> </ul>	<p>Design Team</p>
<p>6.</p> <p>6.1</p>	<p><b>Compensatory Habitat: Dry Heath</b></p> <p>NPWS request that the following clarifications to be made available to ABP:</p> <ul style="list-style-type: none"> <li>• Specific proposals for translocation of <i>Arctostaphylos uvi-ursi</i> and <i>Daboecia cantabrica</i>.</li> <li>• Confirmation that Annex 1 Dry heath habitat [4030] can be successfully re-created using the donor and receptor sites as set out in the EIAR and supporting documentation. In this regard NPWS noted that Appendix A.8.26 of the EIAR contained, within the Compensatory Habitat Management Plan, a</li> </ul>	<p>Design Team</p>

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<p>7. <b>Compensatory Habitat: Calcareous Grassland</b></p> <p>7.1 NPWS request that the following clarifications to be made available to ABP:</p> <ul style="list-style-type: none"> <li>• Confirmation of confidence in the ability to recreate Calcareous grassland on the MDAs in Lackagh Quarry including clarification in relation to the proposals for peat to be deposited in these MDAs.</li> </ul>	<p>Design Team</p>



# Minutes

## Meeting between NPWS and N6 Galway City Ring Road Project Team

Location NPWS Office, 90 North King Street, Smithfield, Dublin 7. Time and date 11.00 am 9 March 2020

Purpose of meeting Clarifications sought by NPWS at N6GCRR Oral Hearing

Attendance	Gerry Clabby	NPWS
	Caitriona Douglas	NPWS
	Enda Mullen	NPWS
	John Fitzgerald	NPWS
	Derek Pender	Galway County Council
	Aebhin Cawley	Scott Cawley (SC)
	Andrew Speer	Scott Cawley (SC)
	Mary Hurley	Arup
	Eileen McCarthy	Arup

Apologies

Circulation Those present

		Action
<b>1. Overview</b>		
<b>1.1</b>	The purpose of the meeting is to allow the applicant for the N6 Galway City Ring Road to report back on what NPWS considered would be required in terms of additional clarification to be provided to An Bord Pleanála (ABP) in respect of the compensatory habitat provision – dry heath – so that ABP can undertake a full assessment of the scheme in possession of relevant information.	Note
<b>2. Compensatory Habitat: Dry Heath</b>		
<b>2.1</b>	NPWS does not disagree with the concept of dry heath recreation. It was requested that the full bibliography citing examples of successful dry heath creation be made available to ABP.	Design Team
<b>2.2</b>	The following additional clarifications will be made available to ABP: <ul style="list-style-type: none"> <li>• Specific proposals for translocation of <i>Daboecia cantabrica</i>.</li> <li>• Detailed information providing confirmation that Annex 1 Dry heath habitat [4030] can be successfully re-created using the proposed donor and receptor sites.</li> <li>• The information to be contained in the Ecology Site Management Plans referenced in the Compensatory Habitat Management Plan to be set out in the documentation to be provided to ABP.</li> <li>• Proposals for temporary storage of turves as part of the proposed compensatory habitat provision to ensure that turves</li> </ul>	

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are only watered with rainwater and are stored for as short a time as possible...

As part of proposed dry heath compensatory habitat provision:

- Monitoring to be undertaken after the turves are placed in the receptor sites every three weeks **and** after any heavy rainfall event(s) until such time as the dry heath is established, with adaptive management plans to be put in place on an ongoing basis as necessary if monitoring shows that establishment is not successful.
- Monitoring to be undertaken post establishment of the dry heath habitat by Galway County Council for the lifetime of the project.
- Steel Pegs of 500mm to be utilised to secure the geogrid, as part of habitat creation works.
- The top 400mm of all MDAs on top of which dry heath is to be created will have a pH of less than 6.5. A root barrier is required at DA 18 which is the only MDA which may have material of a higher pH beneath the upper 400mm layer.

2.3

NPWS expressed reservation about the use of bare peat at the receptor sites in addition to turves. Given the high rainfall amounts in the area, the use of bare peat increases the risks of erosion at the receptor sites and also creates a risk that undesirable plant species will be introduced to the receptor sites. The NPWS emphasised the need to create high quality dry heath habitat as compensatory habitat and queried whether proposals to create c. 7 ha of such habitat risked a reduction in the quality of the habitat created due to the need to use bare peat as part of compensatory habitat provision proposals.

## Appendix 2: Responses to Submissions

Table A2.1. Submissions received prior to the oral hearing.

NO.	Applicants Reference	Party	Summary of submission	Response
1	S_018.2	DCHG/NPWS	Observed that detailed attention to be paid to mitigation from an early stage, asked for a clearer account of effects on the Lough Corrib cSAC (than presented in the NIS), asked for a clearer depiction of groundwater flows, asked for greater reference to the Conservation Objectives, stressed the importance of effective mitigation for otter, identified the proposed River Corrib bridge as a potential threat to Special Conservation Interest (SCI) bird populations and made a procedural point on the appropriate assessment.	<p>The point on timely and effective mitigation is understood and agreed with, with emphasis on this also given in my appropriate assessment report.</p> <p>The effects on Lough Corrib cSAC were subsequently explored in the FIR and response, as well as at the oral hearing, which has led to a clearer understanding than that presented in the NIS and therefore enabled a conclusion to be reached. This applies to both Annex I habitats and groundwater flows.</p> <p>My assessment in Table 6 provides a summary comparison of the effects of the proposed road and the detailed conservation objectives, where these are available, considering whether the objective is to maintain or restore the qualifying interest feature.</p> <p>There is agreement between the applicant, the NPWS and I that there needs to be adequate mitigation to protect the otter population during the construction and operation stages; to that effect I identified some additional mitigation which I believe is required to achieve this outcome.</p> <p>In subsequent correspondence, DCHG/NPWS reached a conclusion that the bridge did not pose a threat to SCI bird populations and I agree with this conclusion.</p>
2	S_018.1	DCHG/NPWS	Acknowledges the additional information provided following the FIR, confirms that the Department no longer considers the proposed River Corrib bridge a threat to SCI bird populations, accepts that habitat loss and	Further clarification of the effects of the proposed road on hydrogeology was made at the oral hearing, with responses from the applicant, including further data, to queries raised by both DCHG/NPWS and Mr. Dodds. This topic is addressed by Mr. Dodds in his report, with the conclusion that enough information was received to confidently assess the impacts with mitigation.

NO.	Applicants Reference	Party	Summary of submission	Response
			fragmentation for SCI bird species has been satisfactorily addressed but again seeks further clarification on the hydrogeology model.	
3	S_058	Peter Sweetman and others	The proposed road does not comply with the Habitats Directive.	No express reason is given for non-compliance; however, an assessment of compliance is set out in my report with the conclusion that the proposed road could comply with the Directive subject to the effective implementation of the mitigation proposed by the applicant and the additional mitigation set out in my report.
4	S_006	An Taisce	The appropriate assessment must comply with recent case law, etc.	I agree compliance with recent case law is essential, and this has been considered in my report, including Case-461/14 (see below).
5	S_010	Brian Burton	The appropriate assessment must comply with recent case law, etc; referencing Case-461/14 and specifically the need to consider (i) species and habitats other than those for which the site is designated and (ii) species and habitats outside the site boundary, if impacts on these species and habitats could undermine the conservation objectives of a site.	The effect on these species and habitats has been expressly examined in my report, under the headings of <i>Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites</i>
6	Ob_451_489	Mary Nestor	The proposed road does not comply with the Habitats Directive.	As for Peter Sweetman and others
7	S_074	Menlo and Ballindooley Residents	The impacts of tunnelling, blasting and pollution on the Lough Corrib cSAC would be contrary to the Habitats	The Lackagh tunnel would take the road under the cSAC and is therefore a measure to avoid impacts on the cSAC. There is a risk that blasting from the tunnel construction generates dust and

NO.	Applicants Reference	Party	Summary of submission	Response
			<p>Directive, and there would be a loss of Annex I habitats generally.</p>	<p>consequential effects on the vegetation however this can be controlled through mitigation.</p> <p>During construction, pollution affecting the cSAC could arise from dust (from blasting and other sources), suspended solids in site run-off (affecting the River Corrib) and accidental spillage of fluids, however these can all be controlled through good construction practice to avoid undermining the conservation objectives for the cSAC.</p> <p>During operation, pollution affecting the cSAC could arise from vehicle emissions, contaminated road run-off, noise and light with all occurring closer to the cSAC than now. Modelling of air quality, light and noise confirms that their effects on the vegetation of the road alone would be too low to undermine the conservation objectives for the cSAC, while the road run-off would be treated before discharge, with the same effect, provided that these treatments are properly maintained. Background improvements in air and water quality set out in the development plans will ensure potential in combination effects are mitigated.</p> <p>The loss of Annex I habitats outside Natura 2000 sites requires consideration under Article 6 (which provides the requirement for this appropriate assessment report) only if such losses result in an effect sufficient to undermine the conservation objectives for those within Natura 2000 sites. I considered this possibility but was not able to identify an effect which could be attributable to the road alone or in combination with the other plans and projects. I posed the question to DCHG/NPWS as to whether such losses would be contrary to Article 2 of the Directive and their view is that losses of undesignated Annex I habitat are not contrary to this Article. See also my ecological impact assessment report to which such losses are certainly relevant.</p>

NO.	Applicants Reference	Party	Summary of submission	Response
8	S_048	Menlo Residents Association	The proposed road does not comply with the Habitats Directive, referencing air pollution within the [Lough Corrib] Special Area of Conservation.	The potential effects of air pollution discussed for example in paragraph 4.5.81 of my report, with the conclusion that the modelled levels would not be enough to drive change in the vegetation over a wide enough area to undermine the conservation objectives and therefore result in an adverse effect on the integrity of the cSAC.
9	Ob_584 Ob_584.2	Linda Rabitte	The proposed road does not comply with the Habitats Directive.	As for Peter Sweetman and others.
10	S_068.1 S_068.2	The Galway N6 Action Group	Avoiding adverse effects on the integrity of Natura 2000 sites has been prioritised whereas the use of Article 6(4) would have enabled a better route to have been chosen.	The use of Article 6(4) for an alternative route which resulted in adverse effect on the integrity of the Lough Corrib cSAC is a possibility, however, the first consideration under Article 6(4) is whether there is a satisfactory alternative i.e., a version of the project which had the same benefits, but which did not have an adverse effect on site integrity, for which the current route of the proposed road may well have been the answer. This has not been tested as there has been no formal assessment of alternative routes under Article 6(4) (and no requirement to undertake such an assessment).
11	Ob_521_ O_517.14_ 01/02/04/05	The Kerin Family	Alternative routes have not been assessed in accordance with the Habitats Directive, as considered in case no. C-461/17 of the European Court	The question of alternatives in this judgement relates to the EIA Directive rather than the Habitats Directive i.e., it is something to be considered in the Environmental Impact Assessment under the EIA Directive rather than the appropriate assessment under the Habitats Directive. Under Article 6(3) of the Habitats Directive, it is only required to demonstrate whether the project, however defined, would have an adverse effect on the integrity of Natura 2000.
12	Ob_116.2	Peter and Michelle Connelly	Suggest that articles 6(3) and 6(4) of the Habitats Directive could be explored with respect to the provision of compensatory habitat and allow the road to follow an alternative route	The designated site lying to the north and west of Barna is a Natural Heritage Site, Moycullen Bogs, to which the Habitats Directive does not directly apply. Therefore, compensation of habitat losses here could be explored without invoking Article 6(4) of the Directive

NO.	Applicants Reference	Party	Summary of submission	Response
			further to the north and west in the locality of Forramoye West, Barna	(although any new route would still require assessment under Article 6(3) in the same way as set out in this report).  As above, it is only necessary under Article 6(3) to consider the proposed project, rather than alternatives.
13	Ob_528_541_543_557	NUI Galway	Considers the valuation of Annex I habitats on its campus to be incorrect, as each polygon/ area of Annex I habitat was simply assigned international value without proper reference to the TII guidelines and overstating the value in many cases.  Unclear why tunnelling under the Lough Corrib cSAC, the River Corrib and the NUIG campus was rejected as an option	The submission is correct in that TII guidelines were not followed in relation to the valuation of individual habitat parcels, and I put forward an alternative approach in my ecological impact assessment report. This point is relevant to the EIAR rather than the NIS, as correctly stated in the submission.  As above, it is only necessary under Article 6(3) to consider the proposed project, rather than alternatives.
14	Ob_583	McHugh Property Holdings	Raised concerns about the provision of compensatory Annex I habitat on its land holdings at Ballindooley [Lackagh] Quarry and suggested an alternative location for these at Kinvarra.	The compensatory habitat is to be provided in response to losses of Annex I habitats outside of Natura 2000 and not in response to adverse effects on the integrity of Natura 2000. It is therefore more relevant to the EIAR as correctly stated in the submission.  As above, it is only necessary under Article 6(3) to consider the proposed project, rather than alternatives.
15	Ob_648	Mary Flattery	Objects to the compulsory purchase of her land (Ref. 648) for the protection of bats given that the designated [Lough Corrib] Special Area of Conservation is more than adequate for this purpose.	The use of the land is in response to impacts on populations of bats which are not an interest feature of the Lough Corrib cSAC and therefore not in response to an adverse effect on the integrity of the cSAC. There is however an obligation under the Habitats Directive to maintain the favourable conservation status of bats when a derogation licence to allow development is issued. This means that



NO.	Applicants Reference	Party	Summary of submission	Response
				there is requirement for compensatory habitat in response to losses due to the proposed road.
16	Ob_220	Kevin Gill	Considers that ecology considerations have been given more weight than human, despite this the project is still damaging to the Lough Corrib cSAC and allows pollutants to run-off into Rusheen Bay/Galway Bay cSAC	The ecology considerations are required by law, although there are provisions to allow for over-riding public interest, these have not been invoked by the applicant with respect to an alternative route and impacts on Natura 2000 sites, and it is only the proposed project which requires consideration under Article 6(3) of the Directive. There are habitat losses within the Lough Corrib cSAC and discharges to Galway Bay however, the proposed road would not undermine the conservation objectives for these cSACs when all the mitigation and additional mitigation is properly implemented.
17	S_041	Karen McGuire and John Newell	Refers to the re-appearance of the marsh fritillary butterfly at Menlo and asserts that this EU protected species habitat must be protected from the proposed road.	The marsh fritillary butterfly is listed on Annex II of the Directive as a species for which the designation of cSACs is required. It is not a strictly protected species under Annex IV and it is also not a qualifying interest feature of the Lough Corrib cSAC. This means that its habitat in this location is not strictly protected for the presence of this species. The nearest locality to which strict protection applies to this species is in the Connemara Bog Complex cSAC.

Table A2.2 Submissions made at the Oral Hearing.

	Applicants Reference	Party	Summary of submission	Response
18		DCHG/NPWS	<p>Sought further clarification from the applicant on several points relevant, or potentially relevant, to the appropriate assessment (a) the groundwater regime operating in the vicinity of the proposed Lackagh tunnel, (b) catchment areas and groundwater flow regimes of Ground Water Dependent Terrestrial Ecosystems (GWDTEs) in the Lough Corrib cSAC, (d) proposed mitigation for Marsh Fritillary and (e) further detail on the provision of compensatory Annex I habitat, the NPWS making clear that (e) is in relation to the general environmental impact assessment rather than the appropriate assessment. The statement goes on to note that the conclusions of the NIS are reliant on mitigation measures, supported by monitoring, and stresses the importance of making sure these are effective, timely, encompass the lifetime of the development and safeguarded from future development.</p>	<p>The clarifications were responded to by the applicant in the oral hearing in its module 1 response, and further at meetings between the applicant and DCHG/NPWS. It is understood that a point of sufficient clarity was achieved between these two parties. Moreover, the information provided in response has been considered by Mr. Dodds in his report and informed his conclusion, and therefore my conclusion, on the effect of the project on site integrity with respect to hydrogeology.</p>
19		Ms Deidre Goggin	<p>Raised concerns about the tunnelling elements of the road, understanding this to be cut and cover construction, within the Lough Corrib cSAC. She also</p>	<p>The new tunnel will be of bored construction, underneath a part of the cSAC so would not result in loss of Annex I limestone pavement from within the CSAC.</p>

	Applicants Reference	Party	Summary of submission	Response
			<p>observed that the boundaries of the cSAC seem to have been drawn to accommodate the road development, with karst continuing beneath the road, and that the rulings of the ECJ have been ignored. She raised concerns about hydrogeology and the links provided by homes and gardens which would be lost to the development, she questioned whether a longer tunnel would be more appropriate;</p>	<p>The boundaries of the CSAC were drawn before the road was conceived and so they could not have taken the proposed road in to account. Rather the applicants have taken the route which would impact on the cSAC the least, taking advantage of a gap between two areas of limestone pavement etc provided by a prehistoric valley which has been filled over geological time with clay and soil. The karst does continue beneath the road in this locality, however.</p> <p>There is one recent ruling Case-461/14 which the applicant's may not have fully addressed, however, I considered it in my assessment under the headings of <i>Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites</i>. I could not find an effect on populations within Natura 2000 sites which would be attributable to the road alone and mitigation measures in the Development Plan would deal with potential in combination effects.</p> <p>A longer tunnel would reduce impacts on the environment, including the cSAC, however, it is not necessary to achieve compliance with Article 6 of the Habitats Directive.</p>
20		Mr McDonagh	<p>Raised concerns about the potential for water quality effects on the River Corrib resulting from road discharges and existing pollution within Lackagh Quarry, stating that oil already leaks into the cSAC from here. He also made points about the loss of petrifying springs within the Lackagh Quarry including the difficulty of recreating these within the quarry (which are on</p>	<p>The discharges from the completed road will be treated in line with TII standards, which require maintenance to remain effective, Due to the maintenance requirement, the highest standard of water treatment specified in the TII guidelines is recommended to give certainty that water discharged to the River Corrib has been adequately treated. In the short term, water quality in the river would be expected to improve, as the same cars divert from old roads with no treatment of run-off to the new one.</p> <p>There is no evidence that oil leaking from the quarry is having a significant effect on the cSAC, or impacting its conservation</p>

	Applicants Reference	Party	Summary of submission	Response
			the boundary of the cSAC and a possible Annex I habitat);	<p>objectives, with both the groundwater body and the River Corrib have a good status. It may be that the leaking oil is of insufficient quantity to have an appreciable effect.</p> <p>I agree that proposals to recreate springs are not well thought through, however, the springs in this location are not a qualifying interest feature of the cSAC, nor do they provide a supporting function for those that are, and therefore recreation of these springs is not required for compliance with the Habitats Directive.</p>
21	N/A	Mr Dowds (a planning consultant) on behalf of the N6 Action Group	<p>Challenged the applicants over the level of certainty in reaching the conclusions with the NIS, chiefly because there was a need for monitoring to inform the mitigation during construction, the need for monitoring being an indication of uncertainty. The two key areas were the monitoring of the rock mass at the western approach to the Lackagh tunnel, upon which there is limestone pavement included in the cSAC and monitoring of pollutants/ contaminants during the construction process, with the potential for contaminated material entering the River Corrib and other parts of the cSAC. The remedial actions in both circumstances being unknown. In summary, Mr. Dowds questioned the credibility of applicant's case that building a motorway adjacent to an cSAC could be done without causing damage to the cSAC, due to predictable</p>	<p>To not comply with Article 6 of the Habitats Directive, the proposed road would need to bring about a change that could undermine the conservation objectives for the cSAC, meaning that it is either certain or uncertain the change would undermine the objectives. Changes, either certain or uncertain, which would not undermine the conservation objectives are permissible. In the key areas given by Mr. Dowds, the mitigated potential change would not be sufficient to undermine the conservation objectives, with or without the proposed monitoring. To undermine the conservation objectives for the limestone pavement, there would need to be a collapse of the pavement or part thereof, so as to cause its loss, whereas there is no doubt that this can be avoided. For the pollutants affecting the River Corrib, the discharge can be mitigated through good construction practice however in the event of a mitigated accidental release of, for example, suspended solids, it would be a temporary discharge which would not be of sufficient quantity or duration to have population level effects on the relevant fish populations or otter, so again, there is no doubt. Notwithstanding, the conclusion that the project would not undermine the conservation objectives are dependent on the effective implementation of the applicant's mitigation and my additional mitigation during the construction stage; this is not an ordinary</p>

	Applicants Reference	Party	Summary of submission	Response
			difficulties on construction sites, and therefore due to this risk, the application should be considered under Article 6(4) of the Habitats Directive, refer c641/17.	environment and therefore more than the usual amount of care is required to implement the mitigation measures.
22	N/A	Galway Athletics Board	Considered the project to be contrary to the Habitats Directive and prior court judgements on this topic, due to the loss of limestone pavement, and the potential impact on freshwater pearl mussels in the River Corrib, based on observations of a species of mussel observed in the River, as well as concerns about an attenuation pond close to River.	<p>The proposed road will result in the loss of Annex I limestone pavement outside of Natura 2000 sites. An assessment under Article 6 of the Directive will only consider such habitats outside of Natura 2000 sites if they provide a supporting function to those within, and would only reach a conclusion of no adverse effect on site integrity if the loss of that supporting function was enough to undermine the conservation objectives e.g., loss of positive indicator species within Natura 2000. I have assessed this under the headings of <i>Loss or decline of supporting populations of flora and fauna (not part of the qualifying interest population) within habitats lost or degrading with knock on effects on the qualifying interest habitats and populations of Natura 2000 sites</i> and was unable to identify a loss of supporting function which would undermine the conservation objectives for any Natura 2000 site that could be attributed to the proposed road alone or in combination with the other plans and projects identified in the assessment.</p> <p>I have reviewed the environmental information on the River Corrib supplied by the applicant, the assessment provided by Dr Moorkens and the known ecological requirements of the freshwater pearl mussel and agree with the applicant that the River Corrib is not suitable habitat for freshwater pearl mussel, the most likely species present in the River Corrib is the swan mussel <i>Anodonta cygnea</i>.</p> <p>The attenuation pond is, as I understand it, a necessary measure to reduce pollution entering the River Corrib.</p>

	Applicants Reference	Party	Summary of submission	Response
23	N/A	Mr Dermot A Flanagan SC	Considered the proposed road to be in accordance with the provisions of the Habitats Directive, referring to both Article 6 and Article 2.	This is also my conclusion with respect to Article 6(3), subject to the effective implementation of mitigation measures. Article 2 considerations are beyond the scope of an appropriate assessment however I did put this question to the DCHG/NPWS who concurred that the proposed road did not have an effect that was not contrary to Article 2.

## Appendix 3: Site Synopsis

**Site Name: Lough Corrib SAC**

**Site Code: 000297**

Lough Corrib is situated to the north of Galway city and is the second largest lake in Ireland, with an area of approximately 18,240 ha (the entire site is 20,556 ha). The lake can be divided into two parts: a relatively shallow basin, underlain by Carboniferous limestone, in the south, and a larger, deeper basin, underlain by more acidic granite, schists, shales and sandstones to the north. The surrounding lands to the south and east are mostly pastoral farmland, while bog and heath predominate to the west and north. A number of rivers are included within the cSAC as they are important for Atlantic Salmon. These rivers include the Clare, Grange, Abbert, Sinking, Dalgan and Black to the east, as well as the Cong, Bealanabrack, Failmore, Cornamona, Drimneen and Owenriff to the west. In addition to the rivers and lake basin, adjoining areas of conservation interest, including raised bog, woodland, grassland and limestone pavement, have been incorporated into the site.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [3110] Oligotrophic Waters containing very few minerals
- [3130] Oligotrophic to Mesotrophic Standing Waters
- [3140] Hard Water Lakes
- [3260] Floating River Vegetation
- [6210] Orchid-rich Calcareous Grassland\*
- [6410] *Molinia* Meadows
- [7110] Raised Bog (Active)\*
- [7120] Degraded Raised Bog
- [7150] Rhynchosporion Vegetation
- [7210] *Cladium* Fens\*
- [7220] Petrifying Springs\*
- [7230] Alkaline Fens
- [8240] Limestone Pavement\*
- [91A0] Old Oak Woodlands
- [91D0] Bog Woodland\*
  
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- [1092] White-clawed Crayfish (*Austropotamobius pallipes*)
- [1095] Sea Lamprey (*Petromyzon marinus*)



- [1096] Brook Lamprey (*Lampetra planeri*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1303] Lesser Horseshoe Bat (*Rhinolophus hipposideros*)
- [1355] Otter (*Lutra lutra*)
- [1393] Slender Green Feather-moss (*Drepanocladus vernicosus*)
- [1833] Slender Naiad (*Najas flexilis*)

The shallow, lime-rich waters of the southern basin of Lough Corrib support one of the most extensive beds of stoneworts (Charophytes) in Ireland, with species such as *Chara aspera*, *C. hispida*, *C. delicatula*, *C. contraria* and *C. desmacantha* mixed with submerged pondweeds (*Potamogeton perfoliatus*, *P. gramineus* and *P. lucens*), Shoreweed (*Littorella uniflora*) and Water Lobelia (*Lobelia dortmanna*). These *Chara* beds are an important source of food for waterfowl. In contrast, the northern basin contains more oligotrophic and acidic waters, without *Chara* species, but with Shoreweed, Water Lobelia, Pipewort (*Eriocaulon aquaticum*), Quillwort (*Isoetes lacustris*), Alternate Water-milfoil (*Myriophyllum alternifolium*) and Slender Naiad (*Najas flexilis*). The last-named is listed under the Flora (Protection) Order, 2015, and is an Annex II species under the E.U. Habitats Directive.

Large areas of reedswamp vegetation, dominated by varying mixtures of Common Reed (*Phragmites australis*) and Common Club-rush (*Scirpus lacustris*), occur around the margins of the lake. Reedswamp usually grades into species-rich marsh vegetation characterised by Slender Sedge (*Carex lasiocarpa*), Water Mint (*Mentha aquatica*), Water Horsetail (*Equisetum fluviatile*) and Bogbean (*Menyanthes trifoliata*). Of particular note are the extensive beds of Great Fen-sedge (*Cladium mariscus*) that have developed over the marly peat deposits in sheltered bays, particularly in the south-east corner of the lake. Alkaline fen vegetation is more widespread around the lake margins and includes, amongst the typically diverse range of plants, the Slender Cottongrass (*Eriophorum gracile*), a species protected under the Flora (Protection) Order, 2015. Wet meadows dominated by Purple Moor-grass (*Molinia caerulea*) occur in seasonally flooded areas close to the lake shore. These support species such as Sharp-flowered Rush (*Juncus acutiflorus*), Jointed Rush (*J. articulatus*), Carnation Sedge (*Carex panicea*), Devil's-bit Scabious (*Succisa pratensis*), Creeping Bent (*Agrostis stolonifera*) and Tormentil (*Potentilla erecta*), amongst others.

This large site contains four discrete raised bog areas and is selected for active raised bog, degraded raised bog, Rhynchosporion and bog woodland. Active raised bog comprises areas of high bog that are wet and actively peat-forming, where the percentage cover of bog mosses (*Sphagnum* spp.) is high, and where some or all of the following features occur: hummocks, pools, wet flats, *Sphagnum* lawns, flushes and soaks. Degraded raised bog corresponds to those areas of high bog whose hydrology has been adversely affected by peat cutting, drainage and other land use activities, but which are capable of regeneration. The Rhynchosporion habitat occurs in wet depressions, pool edges and erosion channels where the vegetation includes White Beak-sedge (*Rhynchospora alba*) and/or Brown Beak-sedge (*R. fusca*), and at least some

of the following associated species, Bog Asphodel (*Narthecium ossifragum*), sundews (*Drosera* spp.), Deergrass (*Scirpus cespitosus*) and Carnation Sedge.

At Addergoole, on the eastern shores of Lough Corrib, there is an important area of western raised bog. This bog area is one of the most westerly, relatively intact raised bogs in the country. There are also other substantial areas of raised bog along various tributaries of the Corrib in east Co. Galway, namely Slieve Bog, Lough Tee Bog and Killaclogher bog. The active parts of these bogs mostly correspond to the wettest areas, where there are well-developed surface features with hummocks, lawns and pools. It is in such areas that Rhynchosporion vegetation is best represented. The dominant species is the aquatic bog moss *Sphagnum cuspidatum*, which is usually accompanied by Bogbean, White Beak-sedge, Bog Asphodel, Common Cottongrass (*Eriophorum angustifolium*), Bog Sedge (*Carex limosa*) and Great Sundew (*Drosera anglica*). Brown Beak-sedge, a locally rare plant of wet bog pools, has been recorded from a number of the bog areas within the site. At Addergoole a substantial bog lake or soak occurs and this is infilling with large rafts of Rhynchosporion vegetation at present. This area is associated with an important area of wet bog woodland dominated by Downy Birch (*Betula pubescens*).

The largest part of the uncut high bog comprises degraded raised bog. Degraded bog is dominated by a raised bog flora which tends to be rather species-poor because of disturbance and/or drying-out. The most conspicuous vascular plant species are usually Carnation Sedge, Heather (*Calluna vulgaris*), Cottongrasses, Cross-leaved Heath (*Erica tetralix*), Bog Asphodel and Deergrass. Bog-rosemary (*Andromeda polifolia*) and Cranberry (*Vaccinium oxycoccos*), two species indicative of raised bog habitat, are frequent on both degraded and active areas of raised bog. *Sphagnum* cover is generally low within degraded areas due to a combination of drying-out and frequent burning.

Limestone pavement occurs along much of the shoreline in the lower Corrib basin, and supports a rich and diverse flora, including Herb-Robert (*Geranium robertianum*), Bloody Crane's-bill (*G. sanguineum*), Carline Thistle (*Carlina vulgaris*), Spring Gentian (*Gentiana verna*), Wild Thyme (*Thymus praecox*), Rustyback (*Ceterach officinarum*), Wood Sage (*Teucrium scorodonia*), Slender St. John's-wort (*Hypericum pulchrum*), Quaking-grass (*Briza media*) and Blue Moor-grass (*Sesleria albicans*). Areas of Hazel (*Corylus avellana*) scrub occur in association with exposed limestone pavement and these include species such as Hawthorn (*Crataegus monogyna*), Buckthorn (*Rhamnus catharticus*), Spindle (*Euonymus europaeus*), with occasional Juniper (*Juniperus communis*). Three Red Data Book species are also found in association with limestone scrub - Alder Buckthorn (*Frangula alnus*), Shrubby Cinquefoil (*Potentilla fruticosa*) and Wood Bitter-vetch (*Vicia orobus*), the latter is also protected under the Flora (Protection) Order, 2015.

Open areas of orchid-rich calcareous grassland are also found in association with the limestone exposures. These can support a typically rich vegetation, including many orchids such as Pyramidal Orchid (*Anacamptis pyramidalis*), Common Spotted-orchid (*Dactylorhiza fuchsii*), Early-purple Orchid (*Orchis mascula*), Frog Orchid (*Coeloglossum*

*viride*), Fragrant Orchid (*Gymnadenia conopsea*), Marsh Helleborine (*Epipactis palustris*), Greater Butterfly-orchid (*Platanthera chlorantha*) and Irish Lady's-tresses (*Spiranthes romanzoffiana*). The latter is protected under the Flora (Protection) Order, 2015.

The Hill of Doon, located in the north-western corner of the lake, is a fine example of a Sessile Oak (*Quercus petraea*) woodland. The understorey is dominated by Sessile Oak, Holly (*Ilex aquifolium*) and occasional Juniper. There are occasional Yew (*Taxus baccata*) and Ash (*Fraxinus excelsior*), and a well-developed ground layer dominated by Bilberry (*Vaccinium myrtillus*), Hard Fern (*Blechnum spicant*) and Wood Rush (*Luzula sylvatica*). Woodland also occurs on some of the islands in the lake.

A number of the rivers in the site support submerged and floating vegetation of the Ranunculion fluitantis and Callitriche-Batrachion, including mosses. For example, in the River Corrib species such as Shining Pondweed (*Potamogeton lucens*), Perfoliate Pondweed (*Potamogeton perfoliatus*), Small Pondweed (*P. berchtoldii*), Yellow Water-lily (*Nuphar lutea*), White Water-lily (*Nymphaea alba*) and stoneworts (*Chara* spp.) occur.

The rare and Annex II-listed Slender Green Feather-moss (*Drepanocladus* [*Hamatocaulis*] *vernicosus*) is found at the fen at Gortachalla, north-east of Moycullen. Here it is widespread around the margins, and this constitutes a large and significant population in the national context. A very large population of another rare moss, *Pseudocalliergon trifarium*, is also found in this area.

The lake is rated as an internationally important site for waterfowl. Counts from 1984 to 1987 revealed a mean annual peak total of 19,994 birds. In the past a maximum peak of 38,281 birds was recorded. The lake supports internationally important numbers of Pochard (average peak 8,600) and nationally important numbers of the following species: Coot (average peak 6,756), Mute Swan (average peak 176), Tufted Duck (average peak 1,317), Cormorant (average peak 110) and Greenland White-fronted Goose (average peak 83). The latter species is listed on Annex I of the E.U. Birds Directive. The Coot population is the largest in the country and populations of Tufted Duck and Pochard are second only to Lough Neagh. Breeding pairs of Common Scoter on the lake number 30-41 (1995 data), as well as breeding populations of Arctic Tern and Common Tern. Other bird species of note recorded from or close to the lake recently include Hen Harrier, Whooper Swan, Golden Plover and Kingfisher. All of these species are listed on Annex I of the E.U. Birds Directive.

Otter and Irish Hare have been recorded regularly within this site. Both of these species are listed in the Red Data Book and are legally protected by the Wildlife Act, 1976. Otter is also listed on Annex II of the E.U. Habitats Directive. Lough Corrib is considered one of the best sites in the country for Otter, due to the sheer size of the lake and associated rivers and streams, and also the generally high quality of the habitats. Atlantic Salmon (*Salmo salar*) use the lake and rivers as spawning grounds. Although this species is still fished commercially in Ireland, it is considered to be

endangered or locally threatened elsewhere in Europe and is listed on Annex II of the E.U. Habitats Directive. Lough Corrib is also a well-known fishing lake with a very good Trout (*Salmo trutta*) fishery. The lake has a population of Sea Lamprey (*Petromyzon marinus*), a scarce, though probably under-recorded species listed on Annex II of the E.U. Habitats Directive. Brook Lamprey (*Lampetra planeri*), also listed on Annex II, are also known from a number of areas within the site.

A population of Freshwater Pearl Mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs within the site. White-clawed Crayfish (*Austropotamobius pallipes*), also listed on Annex II, is well distributed throughout Lough Corrib and its in-flowing rivers over limestone. A summer roost of Lesser Horseshoe Bat, another Annex II species, occurs within the site - approximately 100 animals were recorded here in 1999.

The main threats to the quality of this site are from water polluting activities resulting from intensification of agricultural activities on the eastern side of the lake, uncontrolled discharge of sewage which is causing localised eutrophication of the lake, and housing and boating development, which is causing the loss of native lakeshore vegetation. The raised bog habitats are susceptible to further degradation and drying out due to drainage and peat cutting and, on occasions, burning. Peat cutting threatens Addergoole Bog and already a substantial area of it has been cut away. Fishing and shooting occur in and around the lake. Introduction of exotic crayfish species or the crayfish fungal plague (*Aphanomyces astaci*) could have a serious impact on the native crayfish population. The bat roost is susceptible to disturbance or development.

Despite these ongoing issues, however, Lough Corrib is one the best examples of a large lacustrine catchment system in Ireland, with a range of habitats and species still well represented. These include 15 habitats which are listed on Annex I of the E.U. Habitats Directive, six of which are priority habitats, and nine species which are listed on Annex II. The lake is also internationally important for birds and is designated as a Special Protection Area.

**Site Name: Galway Bay Complex SAC**

**Site Code: 000268**

Situated on the west coast of Ireland, this site comprises the inner, shallow part of a large bay which is partially sheltered by the Aran Islands. The Burren karstic limestone fringes the southern sides and extends into the sublittoral. West of Galway city the bedrock geology is granite. There are numerous shallow and intertidal inlets on the eastern and southern sides, notably Muckinish, Aughinish and Kinvarra Bays. A number of small islands composed of glacial deposits are located along the eastern side. These include Eddy Island, Deer Island and Tawin Island. A diverse range of marine, coastal and terrestrial habitats, including several listed on Annex I of the E.U. Habitats Directive, occur within the site, making the area of high scientific importance.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [1140] Tidal Mudflats and Sandflats
- [1150] Coastal Lagoons\*
- [1160] Large Shallow Inlets and Bays
- [1170] Reefs
- [1220] Perennial Vegetation of Stony Banks
- [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts
- [1310] *Salicornia* Mud
- [1330] Atlantic Salt Meadows
- [1410] Mediterranean Salt Meadows
- [3180] Turloughs\*
- [5130] Juniper Scrub
- [6210] Orchid-rich Calcareous Grassland\*
- [7210] *Cladium* Fens\*
- [7230] Alkaline Fens
- [8240] Limestone Pavement\*
- [1355] Otter (*Lutra lutra*)
- [1365] Common (Harbour) Seal (*Phoca vitulina*)

Galway Bay South holds a very high number of littoral communities (12). They range from rocky terraces, to sandy beaches with rock or sand dunes behind. The intertidal sediments of Galway Bay support good examples of communities that are moderately exposed to wave action. A well-defined talitrid amphipod zone in the

upper shore gives way to an intertidal, mid shore zone with sparse epifauna or infauna. On the lower, flat part of the shore, the tubes of the deposit-feeding terebellid worm, *Lanice conchilega*, are common on the surface. Nereid and cirratulid polychaete worms (*Hediste diversicolor*, *Arenicola marina*), small crustaceans and bivalves (*Angulus tenuis*, *Cerastoderma edule* and *Macoma balthica*) are present. The area has the country's only recorded example of the littoral community characterized by *Fucus serratus* with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata. This community has very high species richness (85 species), as do the sublittoral fringe communities on the Finavarra reef (88 species). The rare Purple Sea Urchin *Paracentrotus lividus* and the foliose red alga *Phyllophora sicula* are present at Finavarra, whereas the red alga *Rhodomenia delicatula* and the rare brown alga, *Ascophyllum nodosum* var. *mackii*, occur in Kinvarra and Muckinish Bays. Sublittorally, the area has a number of distinctive and important communities. Of particular note is that Ireland's only reported piddock (bivalve mollusc) bed thrives in the shallows of Aughinish Bay. The rare sponge, *Mycale contarenii*, is also found here. There is further interest in an extensive maerl bed of *Phymatolithon calcareum* which occurs in the strong tidal currents of Muckinish Bay. There is also maerl off Finavarra Point and in Kinvarra Bay (*Lithothamnion corallioides*, *Lithophyllum dentatum* and *Lithophyllum fasciculatum*). An oyster bed in Kinvarra Bay and seagrass (*Zostera* spp.) beds off Finavarra Point are also important features. Other significant habitats which occur include secondary maerl beds and communities strongly influenced by tidal streams.

Saltmarshes are frequent within this extensive coastal site, with both E.U. Habitats Directive types, 'Atlantic Salt Meadow' and 'Mediterranean Salt Meadow' well represented. Most of the saltmarshes are classified as the bay type, with the substrate being mud or mud/sand. There is one lagoon type and one estuary type. Lagoon saltmarshes are the rarest type found in Ireland. The best examples of saltmarsh are located in inner Galway bay, east of a line running between Galway city and Kinvarra. In this area the coastline is highly indented, thus providing the sheltered conditions necessary for extensive saltmarsh development. Common saltmarsh species include Thrift (*Armeria maritima*), Red Fescue (*Festuca rubra*), Common Scurvygrass (*Cochlearia officinalis*), Lax-flowered Sea-lavender (*Limonium humile*), Common Saltmarsh-grass (*Puccinellia maritima*), Saltmarsh Rush (*Juncus gerardi*) and Sea Rush (*Juncus maritimus*). On the lower levels of the saltmarshes and within pans there occurs Glasswort (*Salicornia europaea* agg.). A noteworthy feature of the saltmarsh habitat within this site is the presence of dwarfed brown seaweeds in the vegetation. These are also known as "turf fucoids" and typical species include *Fucus* spp., *Ascophyllum nodosum* and *Pelvetia canaliculata*. A number of locally rare vascular plant species also grow in saltmarsh areas within the site. These include Reflexed Saltmarsh-grass (*Puccinellia distans*) and Sea-purslane (*Halimione portulacoides*), which are both relatively rare in the western half of the country.

Shingle and stony beaches can be found throughout the site, with the best examples along the more exposed shores to the south and west of Galway city and to the north and east of Finavarra, Co. Clare. In general, these shingle shorelines are sparsely vegetated and frequently occur interspersed with areas of sandy beach and/or

bedrock shore. The associated flora is dominated by plant species of frequently disturbed maritime habitats. To the south and west of Galway city, typical plants include Curled Dock (*Rumex crispus*), Common Couch (*Elymus repens*), Sea Sandwort (*Honkenya peploides*), Sea Beet (*Beta vulgaris* subsp. *maritima*), Sea Mayweed (*Matricaria maritima*), Silverweed (*Potentilla anserina*) and Oraches (*Atriplex* spp.). Two rare plant species are associated with the habitat: Henbane (*Hyoscyamus niger*), a threatened species listed in the Irish Red Data Book, grows on shingle beach to the south of Lough Atalia; there are also old records for the threatened plant species Seakale (*Crambe maritima*).

Soft coastal cliffs reaching heights in excess of 10m occur at Rusheen. These support coastal grassland with very sparse vegetation cover. Species recorded include Sea Plantain (*Plantago maritima*), Creeping Bent (*Agrostis stolonifera*), False Oat-grass (*Arrhenatherum elatius*), Cock's Foot (*Dactylis glomerata*), Red Fescue, Common Bird's-foot-trefoil (*Lotus corniculatus*), and the lichens *Ramalina* sp. and *Xanthoria parietina*. They are considered highly representative of the rarer soft type of sea cliffs in Ireland.

An excellent range of lagoons of different types, sizes and salinities occurs within the site. This habitat is given priority status on Annex I of the E.U. Habitats Directive. One unusual type of lagoon, karstic rock lagoon, is particularly well represented. This type of lagoon is common on the Aran Islands, but on mainland Ireland, all but one are confined to this site. Additionally, the best example of all karstic lagoons in the country, Lough Murree, is found at this site. The flora of the habitat is rich and diverse, reflecting the range of salinities in the different lagoons. It is typically brackish, with two species of Tasselweed (*Ruppia* spp.), two Red Data charophytes *Chara canescens* and *Lamprothamnion papulosum*, and *Chaetomorpha linum*, an alga (all lagoonal specialists). The fauna of the lagoon is also rich, diverse and lagoonal. At least 10 lagoonal specialist species were recorded in 1996 and 1998 from the combined habitat of all the lagoons, which is one of the highest number for any lagoonal habitat in the country. Many of the species appear to be rare. The lagoons within this site are excellent examples of the habitat type and of high conservation importance.

Other terrestrial habitats within this site which are of conservation importance include Great Fen-sedge (*Cladium mariscus*)-dominated fen and Black Bog-rush (*Schoenus nigricans*)-dominated alkaline fen at Oranmore, a turlough of moderate size at Ballinacourty, limestone pavement at Ballyconry, Gleninagh North and Newquay, dry calcareous grassland with orchids (best examples occurring west of Salthill), Juniper (*Juniperus communis*) scrub formations at Oranmore, wet grassland and an area of deciduous woodland at Barna. The orchid-rich grassland occurs on a series of small drumlin hills found to the west of Galway City, and is largely confined to the sides of the hills. Calcicole species such as Kidney Vetch (*Anthyllis vulneraria*), Harebell (*Campanula rotundifolia*), Spring Gentian (*Gentiana verna*), Common Spotted-orchid (*Dactylorhiza fuchsii*), Lesser Twayblade (*Listera ovata*), Pyramidal Orchid (*Anacamptis pyramidalis*), Yellow-wort (*Blackstonia perfoliata*) and Greater Knapweed (*Centaurea scabiosa*) are found here, among others. Juniper is also found in this area.

Areas of alkaline and *Cladium* fen as best represented near Oranmore, and species such as Great Fen-sedge, Common Reed (*Phragmites australis*), Purple Moor-grass (*Molinia caerulea*), Bogbean (*Menyanthes trifoliata*) and Long-stalked Yellow-sedge (*Carex lepidocarpa*) are found along with the usually dominant, Black Bog-rush. The turlough at Ballinacourty floods to about 25 ha in winter, and has vegetation with a typical zonation. Wetland species such as Amphibious Bistort (*Polygonum amphibium*), Common Marsh-bedstraw (*Galium palustre*) and Marsh Cinquefoil (*Potentilla palustris*) are found near the swallow-hole, with species of wet grassland close to the flood limit (e.g. Silverweed, *Potentilla anserina*, Water Mint, *Mentha aquatica* and Creeping Bent, *Agrostis stolonifera*). Sedges (*Carex* spp.) dominate in between.

Inner Galway Bay provides extensive good quality habitat for Common Seal (maximum count of 317 in the all-Ireland survey of 2003). This species is listed on Annex II of the E.U. Habitats Directive. The seals use a range of haul-out sites distributed through the bay - these include inner Oranmore Bay, Rabbit Island, St. Brendan's Island, Tawin Island, Kinvarra Bay, Aughinish Bay and Ballyvaughan. The site provides optimum habitat for Otter, also an Annex II-listed species.

Galway Bay is a very important ornithological site. The shallow waters provide excellent habitat for Great Northern Divers (35), Black-throated Divers (28), Scaup (39), Long-tailed Duck (27) and Red-breasted Merganser (232). (Figures given are peak average maxima over the 3 winters 1994/95 to 1996/97). All of these populations are of national importance. The intertidal areas and shoreline provides feeding and roosting habitat for wintering waterfowl, with Brent Goose (517) having a population of international importance and a further 11 species having populations of national importance. Four of the regular wintering species are listed on Annex I of the E.U. Birds Directive - Golden Plover, Bar-tailed Godwit and the two diver species. Breeding birds are also of importance, with significant populations of Sandwich Terns (81 pairs in 1995) and Common Terns (99 pairs in 1995), both also being listed on Annex I of the E.U. Birds Directive. A large Cormorant colony (approx. 300 pairs in 1989) occurs on Deer Island.

Fishing and aquaculture are the main commercial activities within the site. A concern is that sewage effluent and detritus of the aquaculture industry could be deleterious to benthic communities. Reef and sediment communities are vulnerable to disturbance or compaction from tractors accessing oyster trestles. The *Paracentrotus lividus* populations have been shown to be vulnerable to over-fishing. Extraction of maerl in Galway Bay is a threat. Owing to the proximity of Galway city, shoreline and terrestrial habitats are under pressure from urban expansion and recreational activities. Eutrophication is probably affecting some of the lagoons and is a continued threat. Drainage is a general threat to the turlough and fen habitats. Bird populations may be disturbed by aquaculture activities.

This large coastal site is of immense conservation importance, with many habitats listed on Annex I of the E.U. Habitats Directive, four of which have priority status



(lagoon, *Cladium* fen, turlough and orchid-rich calcareous grassland). The examples of shallow bays, reefs, lagoons and saltmarshes found within this site are amongst the best in the country. The site supports an important Common Seal colony and a breeding Otter population (Annex II species), and six regular Annex I E.U. Birds Directive species. The site also has four Red Data Book plant species, plus a host of rare or scarce marine and lagoonal animal and plant species.

## SITE SYNOPSIS

**SITE NAME: LOUGH CORRIB SPA**

**SITE CODE: 004042**

Lough Corrib is the largest lake in the country and is located, for the most part, in County Galway, with a small section in the north extending into County Mayo. The lake can be divided into two parts: a relatively shallow basin in the south, which is underlain by Carboniferous limestone, and a larger, deeper basin to the north, which is underlain by more acidic granite, schists, shales and sandstones. The main inflowing rivers are the Black, Clare, Dooghta, Cregg, Owenriff and the channel from Lough Mask. The main outflowing river is the Corrib, which reaches the sea at Galway City.

The shallow, lime-rich waters of the southern basin of the lake support one of the most extensive beds of Stoneworts (Charophytes) in Ireland. These *Chara* beds are a very important source of food for waterfowl. In contrast, the northern basin contains more oligotrophic and acidic waters. Large areas of reedswamp vegetation, dominated by varying mixtures of Common Reed (*Phragmites australis*) and Common Club-rush (*Scirpus lacustris*) occur around the margins of the lake. The lake has numerous islands, which range from relatively bare rocky islets to larger islands with grassland or woodland.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Greenland White-fronted Goose, Gadwall, Shoveler, Pochard, Tufted Duck, Common Scoter, Hen Harrier, Coot, Golden Plover, Black-Headed Gull, Common Gull, Common Tern and Arctic Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetlands & Waterbirds.

Lough Corrib is an internationally important site that regularly supports in excess of 20,000 wintering waterbirds including an internationally important population of wintering Pochard (10,107) – except where indicated all figures are five year mean peaks for the period 1995/96 to 1999/2000. The site also supports nationally important populations of wintering Greenland White-fronted Goose (160 - five year mean peak for the period 1994/95 to 1998/99), Gadwall (48), Shoveler (90), Tufted Duck (5,486), Coot (14,426) and Golden Plover (1,727). Other species which occur include Mute Swan (182), Whooper Swan (35), Wigeon (528), Teal (74), Mallard (155), Goldeneye (74), Lapwing (2,424) and Curlew (114).

In winter nationally important numbers of Hen Harrier (8 - four year mean peak count between 2006 and 2009) also utilise the site as a communal roost.

Lough Corrib is also a traditional breeding site for gulls and terns, with various islands being used for nesting each year. There are important colonies of Common Tern (37 pairs in 1995) and Arctic Tern (60 pairs in 1995). The site supports substantial colonies of Black-headed Gull (431 pairs in 2000) and Common Gull (186 pairs in 2000), these representing 3% and 11% of the respective all-Ireland totals. Small numbers of Lesser Black-backed Gull, Great Black-backed Gull and Herring Gull have also been recorded breeding within the site.

The site supports approximately half of the national population of nesting Common Scoter (30 pairs in 1995); Lough Corrib was colonised by this rare, Red Data Book species only as recently as the late 1970s/early 1980s.

Lough Corrib SPA is an internationally important site which supports in excess of 20,000 wintering waterbirds, including a population of Pochard that is, itself, of international importance. A further six species of wintering waterfowl have populations of national importance. The site also contains a nationally important communal roost site for Hen Harrier. Lough Corrib is the most important site in the country for breeding Common Scoter. Its populations of breeding gulls and terns are also notable, with nationally important numbers of Black-headed Gull, Common Gull, Common Tern and Arctic Tern occurring. It is of note that several species which regularly occur are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Greenland White-fronted Goose, Hen Harrier, Golden Plover, Common Tern and Arctic Tern. Lough Corrib is a Ramsar Convention site.

7.7.2014

## SITE SYNOPSIS

**SITE NAME: INNER GALWAY BAY SPA**

**SITE CODE: 004031**

Inner Galway Bay SPA is a very large, marine-dominated site situated on the west coast of Ireland. The inner bay is protected from exposure to Atlantic swells by the Aran Islands and Black Head. Subsidiary bays and inlets (e.g. Poul-na-clough, Aughinish and Kinvarra Bays) add texture to the patterns of water movement and sediment deposition, which lends variety to the marine habitats and communities. The terraced Carboniferous (Viséan) limestone platform of the Burren sweeps down to the shore and into the sublittoral. The long shoreline is noted for its diversity, and comprises complex mixtures of bedrock shore, shingle beach, sandy beach and fringing salt marshes. Intertidal sand and mud flats occur around much of the shoreline, with the largest areas being found on the sheltered eastern coast between Oranmore Bay and Kinvarra Bay. A number of small islands and rocky islets in the Bay are included within the site.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Great Northern Diver, Cormorant, Grey Heron, Light-bellied Brent Goose, Wigeon, Teal, Shoveler, Red-breasted Merganser, Ringed Plover, Golden Plover, Lapwing, Dunlin, Bar-tailed Godwit, Curlew, Redshank, Turnstone, Black-headed Gull, Common Gull, Sandwich Tern and Common Tern. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Inner Galway Bay supports an excellent diversity of wintering wetland birds, with divers, grebes, cormorants, dabbling duck, sea duck and waders all well represented. There are internationally important wintering populations of Great Northern Diver (88) and Light-Bellied Brent Goose (676) and nationally important wintering populations of an additional sixteen species i.e. Cormorant (266), Grey Heron (102), Wigeon (1,168), Teal (700), Shoveler (88), Red-breasted Merganser (249), Ringed Plover (335), Golden Plover (2,030), Lapwing (3,969), Dunlin (2,155), Bar-tailed Godwit (447), Curlew (697), Redshank (505), Turnstone (182), Black-headed Gull (1,941) and Common Gull (1,066) - all figures given are five year mean peaks for the seasons 1995/96 to 1999/2000. Of note is that the populations of Red-breasted Merganser and Ringed Plover represent 6.8% and 2.3% of the respective all-Ireland totals. Other species which occur in notable numbers include Black-throated Diver (36), Little Grebe (35), Long-tailed Duck (21), Scaup (44) and Herring Gull (216). In addition, the following species also use the site: Great Crested Grebe (16), Mallard (200), Common Scoter (87), Oystercatcher (576), Grey Plover (60), Black-tailed Godwit (46), Mute Swan (150) and Great Black-backed Gull (129). The site provides both feeding and roost sites for most of the species. Little Egret, a species which has recently colonised Ireland, also occurs at this site.

The site has several important populations of breeding birds, most notably colonies of Sandwich Tern (81 pairs in 1995) and Common Tern (98 pairs in 1995 on Green Island and 46 pairs in 2001 on Mutton Island). A large Cormorant colony occurs on Deer Island - this had 200 pairs in 1985 and 300 pairs in 1989.

Inner Galway Bay SPA is of high ornithological importance with two wintering species having populations of international importance and a further sixteen wintering species having populations of national importance. The breeding colonies of Sandwich Tern, Common Tern and Cormorant are also of national importance. Also of note is that six of the regularly occurring species are listed on Annex I of the E.U. Birds Directive, i.e. Black-throated Diver, Great Northern Diver, Golden Plover, Bar-tailed Godwit, Sandwich Tern and Common Tern. Inner Galway Bay is a Ramsar Convention site and part of the Inner Galway Bay SPA is a Wildfowl Sanctuary.

## SITE SYNOPSIS

**SITE NAME: CREGGANNA MARSH SPA**

**SITE CODE: 004142**

Cregganna Marsh is situated about 3 km south of Oranmore, to the west of the Galway - Ennis road. The predominant habitats on the site are lowland wet grassland and improved grassland, but areas of limestone pavement and other exposed rock, Hazel (*Corylus avellana*) scrub, freshwater marsh, drainage ditches and dry grassland are also represented.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Greenland White-fronted Goose.

The site is of major conservation importance as a feeding site for a nationally important flock of Greenland White-fronted Goose (157 – 5 year mean peak between 1994/95 and 1998/99). The birds using this site form part of the Rahasane flock.

Cregganna Marsh SPA is of ornithological importance because it is regularly utilised by a nationally important flock of Greenland White-fronted Goose, a species listed on Annex I of the E.U. Birds Directive.

**Site Name: Connemara Bog Complex SAC**

**Site Code: 002034**

The Connemara Bog Complex SAC is a large site encompassing the majority of the south Connemara lowlands in Co. Galway. The site is bounded to the north by the Galway–Clifden road and stretches as far east as the Moycullen–Spiddal road. The site supports a wide range of habitats, including extensive tracts of western blanket bog, which form the core interest, as well as areas of heath, fen, woodlands, lakes, rivers and coastal habitats.

The site is underlain predominantly by various Galway granites, with small areas along the northern boundary of Lakes Marble, schist and gneiss. The Roundstone Bog area has a diverse bedrock geology composed mainly of the basic intrusive rock, gabbro. An area of rock, possibly Cambrian in age, called the Delaney Dome Formation occurs in the north-west of this area. Gabbro also occurs in the Kilkieran peninsula and near Cashel. The whole area was glaciated in the last Ice Age which scoured the lowlands of Connemara.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [1150] Coastal Lagoons\*
- [1170] Reefs
- [3110] Oligotrophic Waters containing very few minerals
- [3130] Oligotrophic to Mesotrophic Standing Waters
- [3160] Dystrophic Lakes
- [3260] Floating River Vegetation
- [4010] Wet Heath
- [4030] Dry Heath
- [6410] *Molinia* Meadows
- [7130] Blanket Bogs (Active)\*
- [7140] Transition Mires
- [7150] Rhynchosporion Vegetation
- [7230] Alkaline Fens
- [91A0] Old Oak Woodlands
  
- [1065] Marsh Fritillary (*Euphydryas aurinia*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1355] Otter (*Lutra lutra*)



The Connemara Bog Complex is characterized by areas of deep peat surrounded by rocky granite outcrops covered by heath vegetation. However, the main habitat within this site is lowland Atlantic blanket bog, as most of the area is covered by blanket peat greater than 1 m in depth. A mosaic of different communities exists in association with the blanket bog, including hummock/hollow systems, inter-connecting bog pools, flushes, transition and quaking mires, freshwater marshes, lakeshore, lake and river systems. The key plant species of lowland blanket bog are Black Bog-rush (*Schoenus nigricans*), Purple Moor-grass (*Molinia caerulea*), Cross-leaved Heath (*Erica tetralix*), Deergrass (*Scirpus cespitosus*), Common Cottongrass (*Eriophorum angustifolium*), Bog Asphodel (*Narthecium ossifragum*), White Beak-sedge (*Rhynchospora alba*) and bog moss species (*Sphagnum* spp.). Rhynchosporion vegetation is found on the blanket bog by lake and pool margins, in wet hollows and in quaking areas. Species such as White Beak-sedge, Common Cottongrass, Bogbean (*Menyanthes trifoliata*), sundews (*Drosera* spp.) and bog mosses are common. Areas of wet heath are widespread throughout this site, where blanket peat becomes shallower. There is a limited amount of dry heath, with species such as Western Gorse (*Ulex gallii*), St. Dabeoc's Heath (*Daboecia cantabrica*) and Bell Heather (*Erica cinerea*) recorded.

Both oligotrophic and dystrophic lakes are found within Connemara Bog Complex SAC, with the greatest concentration in the west of the site. The latter type are generally smaller, have a mainly peaty bottom and there is generally an abrupt transition from blanket bog to open water. Oligotrophic lakes in this site typically have shallow margins, with a mixed rocky/peaty bottom. Typical plant species of the lake edges include Water Lobelia (*Lobelia dortmanna*), Pipewort (*Eriocaulon aquaticum*), Shoreweed (*Littorella uniflora*), Many-stalked Spike-rush (*Eleocharis multicaulis*) and Bulbous Rush (*Juncus bulbosus*). The rare species Slender Naiad (*Najas flexilis*) and Pillwort (*Pilularia globulifera*) have both been recorded from oligotrophic lakes at this site. Species commonly encountered in dystrophic lakes/pools include the bog mosses *Sphagnum auriculatum* var. *auriculatum* and *S. cuspidatum*, along with White Beak-sedge, Lesser Bladderwort (*Utricularia minor*), Pipewort and Bogbean.

The main river systems within the site are the Owenmore (Ballynahinch) river, the Glashanasmearany and Derrygauna rivers (to the south of Lough Bofin), the Cashla river (which flows out of Glenicmurrin Lough), the Glengawbeg river (which connects Lough Agraffard and Lettercraffoe Lough) and the Owenboliska river and its tributaries (north of Spiddal). Vegetation associated with some of these waterways includes Alternate Water-milfoil (*Myriophyllum alternifolium*), Bulbous Rush, Floating Club-rush (*Scirpus fluitans*), water-lilies, Great Fen-sedge (*Cladium mariscus*), Bog Pondweed (*Potamogeton polygonifolius*), Broad-leaved Pondweed (*P. natans*), Water Horsetail (*Equisetum fluviatile*) and the liverwort *Scapania undulata*.

Within this site, areas of transition mire occur mainly along the margins of lakes and bog streams. The surface of such areas is typically quaking and there is often evidence of base-enrichment. Typical plant species include Bog-sedge (*Carex limosa*), Slender Sedge (*C. lasiocarpa*), Bog Pondweed, Bogbean, Blunt-flowered Rush (*Juncus subnodulosus*), Common Cottongrass, Purple Moor-grass and White Beak-sedge. Locally there may be some Great Fen-sedge or Black Bog-rush. The rare and legally protected species Slender Cottongrass (*Eriophorum gracile*) occurs in this habitat. Moss cover is variable.

Areas of *Molinia* meadow at this site contain species such as Purple Moor-grass, Meadow Thistle (*Cirsium dissectum*), Sharp-flowered Rush (*Juncus acutiflorus*) and Tormentil (*Potentilla erecta*). The community occurs on wet acid soils.

There are a number of areas of old oak woodland, but the woodland at Shannawoneen, north of Spiddal, is the best known. This woodland lies in the valley of the Owenboliska river. It provides a good example of a Sessile Oak (*Quercus petraea*) dominated canopy woodland, although there is also a lot of Downy Birch (*Betula pubescens*). Other examples of this habitat at the site are found at Ballynahinch, Glendollagh, Derrywaking Lake, as well as on some of the lake islands. The invasive alien shrub Rhododendron (*Rhododendron ponticum*) is found in some areas of woodland.

There are some limited, but nonetheless well developed, examples of alkaline fen at this site. These fens are often species-rich, and support species not typically found in association with blanket bog areas - e.g. Dioecious Sedge (*C. dioica*), Black Bog-rush, Broad-leaved Cottongrass (*E. latifolium*), the moss *Campyllum stellatum* and Lesser Clubmoss (*Selaginella selaginoides*).

Four main lagoons occur within this site: Lough Ahalia, Doire Bhanbh, Lough Aconeera and Salt Lake. All four are regarded as saline lake lagoons and they range in size from 1–90 ha. The smallest (Doire Bhanbh) is quite shallow and surrounded by Common Reed (*Phragmites australis*) swamp, while the three larger lagoons are relatively deep and are surrounded by moorland and exposed granite. Salt Lake contains a serpulid worm reef. Lough Ahalia consists of a series of basins, and these are deep in places, with an unusual salinity structure. The lowest lake is relatively shallow (0–4 m) and brackish throughout, while the middle lake is deep (13 m) and permanently stratified, with water below 3 m depth measuring 14 ppt. The flora and fauna of this lagoon system are extremely diverse, with many communities found. This, along with Lough Aconeera, is the only known site in Ireland for the Red Data Book stonewort *Chara balthica*. Another Red Data Book plant, *Lamprothamnium papulosum*, also occurs, as well as *Chara aspera* and *C. virgata*. An unusual form of Fennel Pondweed (*Potamogeton pectinatus*) occurs in high salinity water. There are a number of other notable records of plant and animal from this lagoon. Lough Aconeera is less remarkable in terms of flora and fauna, but nonetheless supports a sizeable number of lagoonal specialists.

Nine species protected under the Flora (Protection) Order, 2015, occur within this site: Forked Spleenwort (*Asplenium septentrionale*), Parsley Fern (*Cryptogramma crispa*), Bog Hair-grass (*Deschampsia setacea*), Slender Cottongrass, Bog Orchid (*Hammarbya paludosa*), Slender Naiad, Heath Cudweed (*Omalotheca sylvatica*), Pillwort and Pale Dog-violet (*Viola lactea*). Rare and threatened species such as Dorset Heath (*Erica ciliaris*), Mackay's Heath (*Erica mackaiana*) and Green-winged Orchid (*Orchis morio*) also occur within this site. All of the above species are listed in the Irish Red Data Book, and Slender Naiad is listed on Annex II of the E.U. Habitats Directive.

The Annex II butterfly species, Marsh Fritillary, is known to occur at this site.

Atlantic Salmon, a species listed under Annex II of the E.U. Habitats Directive, occurs in many of the rivers within the site. The Cashla and Ballynahinch systems are good examples of western acidic spate rivers which support the species. Good spawning and nursery grounds for the species occur in these systems. Arctic Char occurs in a number of lakes within the site: Ballynahinch Lake, Glenicmurrin Lough and Lough Shindilla. The species has also been reported from Lough Oorid and Lough Glendollagh in the past, but has not been recorded from these lakes in recent years. Arctic Char is listed as threatened in the Irish Red Data Book.

Otter have been recorded as occurring in the Connemara Bog Complex. Irish Hare, another mammal listed in the Red Data Book, occurs on the site. Common Frog breeds on the site.

The site is of national importance for wintering populations of Greenland White-fronted Goose. Small flocks (up to 30) are found on Roundstone Bog and also use the bogs between Recess and Maam Cross. In April 1989 a synchronised ground and air census of the Connemara bogs located 7 flocks of Greenland White-fronted Goose, totalling 134–137 birds. In 1991/93 wintering numbers were considered to be approximately 60 birds.

There is an internationally important breeding area for Cormorants at Lough Scannive with 218 pairs present in 1985 in a colony which is known to have existed pre-1968. Golden Plover, a species listed on Annex I of the E.U. Birds Directive, nests at up to four locations in the site, with a maximum of two pairs noted at any one location. Another Annex I species known to be present in the site is Merlin. Lough Naskanniva is an important inland breeding site for Common Terns (up to 60 pairs in 1977 and 1992) and Choughs, both of which are also Annex I species under the E.U. Birds Directive.

The main damaging operations and threats in the Connemara Bog Complex are peat cutting, over-grazing and afforestation. Extensive peat extraction using 'Difco' machines has become common in the region in recent years, and cutting by excavator and hopper is also increasing. The hand-cutting of peat is less threatening as it is usually on a much smaller scale, but nonetheless it should be controlled within the site. Over-grazing and poaching by sheep and cattle is a widespread problem within the site, with erosion of peat ensuing. The above operations are the most extensive

but other threats and potentially damaging operations include land drainage and reclamation, fertilization, quarrying and dumping.

In summary, the Connemara Bog Complex encompasses a large area of relatively undamaged lowland Atlantic blanket bog of high conservation significance both in Ireland and at a European level. The site also contains good examples of at least 13 other habitats listed on Annex I of the E.U. Habitats Directive, as well as four species listed in Annex II. Further, the site supports a number of threatened and protected plant species. The site is internationally important for Cormorant and nationally important for Greenland White-fronted Goose, and contains nesting sites for Golden Plover.

## **SITE SYNOPSIS**

**SITE NAME: CONNEMARA BOG COMPLEX SPA**

**SITE CODE: 004181**

The Connemara Bog Complex SPA is a large site encompassing much of the south Connemara lowlands of Co. Galway. The site consists of three separate areas - north of Roundstone, south of Recess and north-west of Spiddal. It is underlain predominantly by a variety of igneous and metamorphic rocks including granite, schist, gneiss and gabbro. The whole area was glaciated during the last Ice Age which scoured the lowlands of Connemara.

The Connemara Bog Complex SPA is characterized by areas of deep peat surrounded by heath-covered rocky outcrops. The deeper peat areas are often bordered by river systems and the many oligotrophic lakes that occur, resulting in an intricate mosaic of various peatland/wetland habitats and vegetation communities; these include Atlantic blanket bog with hummock/hollow systems, inter-connecting pools, Atlantic blanket bog pools, flushes, transition and quaking mires, as well as freshwater marshes, lakeshore, lake and river systems.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Merlin, Golden Plover and Common Gull.

Lough Scannive, located within Roundstone Bog, supports a nationally important breeding population of Cormorant (160 breeding pairs in 2001). Other breeding birds using the site include Merlin and Golden Plover. A partial survey in 2009 recorded 8 pairs of Merlin at various locations throughout the site; 15 breeding locations for this species were recorded at the site in an earlier survey undertaken in 1985/86. A survey of upland birds in 2004 recorded 27 pairs of Golden Plover within the site. The numerous lakes scattered throughout the site provide suitable breeding locations for Common Gull (45 pairs in 2000); a survey in 2010 recorded 40 pairs of this species at the site.

The site is also utilised by a wintering population of Greenland White-fronted Goose; small flocks of up to 30 birds have been recorded at various locations within the site.

Connemara Bog Complex SPA is of high ornithological importance, in particular for its nationally important breeding populations of Cormorant, Merlin, Golden Plover and Common Gull. It is of note that three of the regularly occurring species, Greenland White-fronted Goose, Merlin and Golden Plover, are listed on Annex I of the E.U. Birds Directive.

30.11.2010

**Site Name: Lough Fingall Complex SAC**

**Site Code: 000606**

This site is situated immediately south-east of Ballindeereen in Co. Galway, and within 2-3 km of Galway Bay. It is within the stretch of flat low-lying bare limestones known as the Ardrahan limestones, which extend from the foot of the Burren hills northwards towards Craughwell. The site comprises a complex of habitats, the dominant being turloughs and limestone pavement.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[3180] Turloughs*
[4060] Alpine and Subalpine Heaths
[5130] Juniper Scrub
[6210] Orchid-rich Calcareous Grassland*
[7210] <i>Cladium</i> Fens*
[8240] Limestone Pavement*
[1303] Lesser Horseshoe Bat ( <i>Rhinolophus hipposideros</i> )

The turloughs at this site are oligotrophic (nutrient-poor) and calcareous in character. Their catchment areas are relatively small and water tends to remain in them for considerable periods of time. The surface waters usually occupy distinct separate basins in most years but during extreme floods these can be linked together as one large expanse of open water. Taken together these turloughs represent one of the largest expanses of oligotrophic turlough vegetation in the country.

Ballinderreen turlough occupies a flat limestone pavement basin and supports extensive areas of Black Bog-rush (*Schoenus nigricans*) and sedge (*Carex* spp.) fen vegetation. Marl ponds occur in the lower lying parts, with Shoreweed (*Littorella uniflora*), Bulbous Rush (*Juncus bulbosus*), Many-stalked Spike-rush (*Eleocharis multicaulis*), Alternate Water-milfoil (*Myriophyllum alternifolium*), along with a little Horned Pondweed (*Zannichellia palustris*) and stonewort (*Chara hispida* var. *major*). Rare plants found at this turlough include Fen Violet (*Viola persicifolia*), a Red Data Book species, Water Germander (*Teucrium scordium*) and Marsh Fern (*Thelypteris palustris*).

A smaller area to the south-east of Ballinderreen, Frenchpark turlough, contains a Black Bog-rush/Purple Moor-grass (*Molinia caerulea*) stand with patches of Great Fen-sedge (*Cladium mariscus*) within it. Cuiladooish turlough is of linear shape with a high

central section. It has level limestone pavement forming its eastern side and is aligned and lies parallel with Lough Fingall, which is effectively also a turlough. There is much Buckthorn (*Rhamnus catharticus*) scrub here and at the northern end of the main lake. Carraghadoo turlough has a shallow basin without standing water in summer and with less peat. Creeping Willow (*Salix repens*) and Common Sedge (*Carex nigra*) are the main species here. The shores of Tullaghnafrankagh Lough flood during winter and have a similar, if slightly more eutrophic (nutrient-rich), vegetation. Alder Buckthorn (*Frangula alnus*), a Red Data Book species, grows on sloping limestone pavement close to the limit of winter flooding in several places.

Limestone pavement occurs throughout the site. It varies from the classic bare open pavement, with little vegetation, to pavement and shattered limestone blocks interspersed with calcareous grassland, heath, turlough and scrub. A rich and diverse flora occurs, with many of the typical Burren species represented - Bloody Crane's-bill (*Geranium sanguineum*), Herb-Robert (*G. robertianum*), Rustyback (*Ceterach officinarum*), Burnet Rose (*Rosa pimpinellifolia*) and Wood Sage (*Teucrium scorodonia*), along with some rarer species such as Spring Gentian (*Gentiana verna*) and Mountain Avens (*Dryas octopetala*).

Orchid species present in areas of calcareous grassland at the site include Fly Orchid (*Ophrys insectifera*), Lesser Butterfly-orchid (*Platanthera bifolia*), Early-purple Orchid (*Orchis mascula*) and several *Dactylorhiza* species. In the past, the scarce Dense-flowered Orchid (*Neotinea maculata*) has been recorded from the site.

Lough Fingall, Cloghballymore Lough and Cahernalinsky Lough are shallow infilling lakes with stands of Great Fen-sedge and other fen and wetland vegetation such as Common Reed (*Phragmites australis*) and Tufted-sedge (*Carex elata*).

Juniper scrub and lowland alpine heath occur in close association with one another. The juniper scrub is dominated by Juniper (*Juniperus communis*), with Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*) and rose (*Rosa* spp.) species. Lowland alpine heath is characterised by Bearberry (*Arctostaphylos uva-ursi*) and Mountain Avens, a rare vegetation type known from a few areas in the Burren, the Lough Fingall area and the Moycullen area near Lough Corrib.

Cloghballymore House provides a summer breeding site for the Lesser Horseshoe Bat, a species listed on Annex II of the E.U. Habitats Directive. The bats use the large roof space, although a smaller number roost in a boiler house, gaining access by means of gaps around the pipes. The surrounding mixed woods provide suitable foraging habitat within a short radius of the day roost site. In 1993 more than 200 bats were counted at this site, which makes it of international importance.

The site is of local importance for wintering waterfowl, particularly Lapwing (max. count 381 in 1995/96), with 6 breeding pairs recorded in 1996. Some scarce invertebrate species have been recorded from the Lough Fingall area.

The main land use in the site is cattle grazing, which is mostly of light to moderate intensity. Clearance of limestone pavement and scrub has taken place in the past and burning is a threat to the heath habitats. A drainage scheme to relieve exceptional flooding has been implemented recently. There are no immediate threats facing the bat population.

This site is of great conservation importance for the presence of six E.U. Habitats Directive habitats, including four priority habitats. The transitions and gradations between habitats, for example between turloughs, lakes and limestone pavement, gives rise to a range of physical conditions that favour many uncommon species. In addition, the site supports an internationally important population of Lesser Horseshoe Bats.





**Site Name: Ross Lake and Woods SAC**

**Site Code: 001312**

Ross Lake and Woods is located approximately 4 km north-west of Moycullen on the west side of Lough Corrib in Co. Galway. The area is underlain by limestone.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[3140] Hard Water Lakes

[1303] Lesser Horseshoe Bat (*Rhinolophus hipposideros*)

The main habitat on the site is a medium-sized lake, Ross Lake, which has a limestone bed covered by deposits of precipitated marl and a shoreline of marl-encrusted limestone boulders. It is a good example of a hard water lake, and supports beds of stoneworts, including *Chara globularis* var. *virgata*, *C. pedunculata* and *C. curta*. The last two species in particular are characteristic of marl lakes. The open water also supports Yellow Water-lily (*Nuphar lutea*) and Broad-leaved Pondweed (*Potamogeton natans*).

Most of the shoreline is fringed by wetland vegetation of reedswamp, freshwater marsh, fen, wet woodland and wet grassland. Reedswamp vegetation is dominated by Common Reed (*Phragmites australis*) and Common Club-rush (*Scirpus lacustris*), with Great Fen-sedge (*Cladium mariscus*) also occurring. The rocky limestone shore mostly supports fen-type vegetation characterised by Black Bog-rush (*Schoenus nigricans*). This grades into areas of wet grassland dominated by Purple Moor-grass (*Molinia caerulea*) and species-rich marsh, characterised by species such as Slender Sedge (*Carex lasiocarpa*), Marsh Pennywort (*Hydrocotyle vulgaris*) and Water Mint (*Mentha aquatica*). Also found around the lake edge is well-developed wet woodland, with Alder (*Alnus glutinosa*) and willows (*Salix* spp.) occurring commonly, accompanied by Spindle (*Euonymus europaeus*), Buckthorn (*Rhamnus catharticus*), Guelder-rose (*Viburnum opulus*) and Bog-myrtle (*Myrica gale*).

A small lake, Lough Parkyflaherty, is separated from the main lake by an overgrown railway embankment.

The site contains a large block of coniferous plantation, consisting largely of spruce (*Picea* sp.) and larch (*Larix* sp.) species, on the site of a former mixed-deciduous woodland, Annagh Wood. There are also areas of broadleaved woodland and scrub, dominated variously by Beech (*Fagus sylvatica*), Ash (*Fraxinus excelsior*) or Hazel (*Corylus avellana*).

A breeding colony (not less than 155 individuals counted in 1994) of Lesser Horseshoe Bat occurs in an out-building beside Ross House. This species is threatened within the EU and the population at this site is rated of international importance. The woodlands and lakeside vegetation on the site provide foraging habitat within a small radius of the roost site. The woodlands in particular are very important to this species in providing shelter to reach foraging habitats and seasonal roosts as it does not fly across open areas.

The presence on the site of Otter, a species also listed on Annex II of the E.U. Habitats Directive, and of a small colony of Common Gull (10 individuals breeding in 1992) is notable.

The main land uses within the site are angling, commercial forestry, and grazing of the woodland and wetland areas.

The site is of importance because it contains a good example of a hard water lake, a habitat listed on Annex I of the E.U. Habitats Directive, and for the internationally important population of Lesser Horseshoe Bat, a species listed on Annex II of this Directive, which occurs. The presence of Otter and breeding Common Gull is also of note.

**Site Name: Black Head-Poulsallagh Complex SAC**

**Site Code: 000020**

The Black Head-Poulsallagh complex encompasses a complete range of rocky Burren habitats from coastal, glacially planed limestone pavements to high level heaths. The Caher River, the only river found in the high Burren, and Fanore dunes, one of the best dune systems in Clare, are included in the site. The shoreline, littoral and sublittoral areas are also interesting because of the rock type, physical exposure, and flora and fauna communities.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [1170] Reefs
- [1220] Perennial Vegetation of Stony Banks
- [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)
- [3260] Floating River Vegetation
- [4060] Alpine and Subalpine Heaths
- [5130] Juniper Scrub
- [6210] Orchid-rich Calcareous Grassland\*
- [6510] Lowland Hay Meadows
- [7220] Petrifying Springs\*
- [8240] Limestone Pavement\*
- [8330] Sea Caves
- [1395] Petalwort (*Petalophyllum ralfsii*)

The shoreline of this site has the best examples in Ireland of an important biogeographical variation of intertidal reefs extremely exposed to wave action, and these shores have been described as some of the most interesting open coast shores of both Britain and Ireland. The shores are gently sloping, stepped limestone pavements over most of the site, but at Black Head the shore is narrow and very steeply stepped.

There are numerous shallow rockpools on the shore. These frequently support large numbers of the Purple Sea Urchin, *Paracentrotus lividus*, that have burrowed into the limestone so that each urchin sits in a well-defined hollow. The pools also support the Beadlet Anemone *Actina equina*, the top shells *Gibbula magus*, *G. cineraria* and *G. umbilicalis*, and the coralline algae *Corallina officinalis*. A variety of algae may be found in the pools, including the red algae *Chondrus crispus*, *Plocamium cartilagineum*

and *Palmaria palmata*, and the brown algae *Dictyota dichotoma* and *Bifurcaria bifurcata* where the pools are deep enough. Of particular ecological importance is that both the Purple Sea Urchin and the brown alga *Bifurcaria bifurcata* are close to the northern limits of their distribution.

Marine caves are a feature of the site and this is probably the best known extensive network of caves that are connected to the sea in Ireland. Their occurrence on a very exposed coast with difficult access gives very limited opportunities for biological survey work. It is known, however, that the caves are well scoured and it can be assumed that they exist in a very natural state.

The limestone pavement includes smooth, blocky and shattered types, and is particularly well represented in the Poulsallagh area. Erratics of Galway granite occur within the site, especially around Black Head. The bare pavement is interspersed with fine examples of species-rich, dry calcareous grassland. Limestone heath is also well developed, particularly on the higher areas to the north and north-east, where Bearberry (*Arctostaphylos uva-ursi*) occurs.

The rare Intermediate Wintergreen (*Pyrola media*) occurs on the high heaths. Other rare plants of limestone heaths are Hoary Rock-rose (*Helianthemum canum*) and Pyramidal Bugle (*Ajuga pyramidalis*), both of which occur in the Poulsallagh area.

The Caher River is a shallow, spring-fed stream approximately 5 km long, which flows underground for some of its course during dry periods. The upper section is heavily shaded by Hazel (*Corylus avellana*) scrub, which in the vicinity of the channel bears a luxuriant lichen flora. The lower section of river is on limestone bedrock and periodically dries out. This part of the river is dominated by mosses and algal crusts, both of which are heavily calcified, and in some places form tufa deposits of considerable thickness.

Fanore dunes, located south of Black Head, are formed over limestone. The bedrock can be seen outcropping in the low-lying areas. As a result, the sand is highly calcareous in nature and the dune vegetation comprises a number of calcicolous (calcium-loving) species. These include Pyramidal Orchid (*Anacamptis pyramidalis*), Thyme-leaved Sandwort (*Arenaria serpyllifolia*), Squinancywort (*Asperula cynanchica*) and Hairy Rock-cress (*Arabis hirsuta*). The parasitic Dodder (*Cuscuta epithimum*) grows in abundance and the profusion of orchid species including Pyramidal Orchid, Fragrant Orchid (*Gymnadenia conopsea*) and a range of *Dactylorhiza* species is noteworthy. Species recorded from the high dunes include Sea-holly (*Eryngium maritimum*), Sea Spurge (*Euphorbia paralias*) and Marram Grass (*Ammophila arenaria*). A small population of the rare liverwort *Petalophyllum ralfsii*, a species is listed on Annex I of the E.U. Habitats Directive, occurs within a damp, grassy area of the dunes.

A superb and extensive example of a highly exposed vegetated shingle bank occurs at Poulsallagh, with substrate ranging from large limestone boulders to pebbles. Species present include Thrift (*Armeria maritima*), Common Scurvygrass (*Cochlearia*

*officinalis*), Sea Samphire (*Crithmum maritimum*), Red Fescue (*Festuca rubra*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Sea Plantain (*Plantago maritima*), Buck's-horn Plantain (*Plantago coronopus*) and Sea Mayweed (*Matricaria maritima*). The population of Sea Samphire is considered the best in the region. Lichen cover is particularly well developed.

The northern part of Black Head hosts approximately 25 breeding pairs of Black Guillemot while up to 15 Black-throated Divers winter there (this species is listed in Annex I of the E.U. Birds Directive).

Most of the terrestrial part of the site is grazed by cattle and sheep, particularly in winter, and by goats throughout the year, sometimes resulting in over-grazing. Scrub clearance and intensification of agriculture has caused damage to parts of the site and is a threat to the water quality of the Caher River. Some agriculturally improved areas in the Caher River catchment have been included within the site for hydrological reasons. Leisure activities, including the construction of a caravan park, in the Fanore area has led to erosion and a deterioration of the quality of the dune area.

Due to the presence of fine examples of Burren habitats, the site is of international scientific interest. The limestone pavement and heath and the marine component are particularly noteworthy, while the plant communities contain a high density of rare and interesting species.



**Site Name: Rahasane Turlough SAC**

**Site Code: 000322**

Rahasane Turlough lies in gently undulating land, approximately 2 km west of Craughwell, Co. Galway. It consists of two basins which are connected at times of flood but separated as the waters decline. The larger of these, the northern basin, takes the Dunkellin River westwards.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[3180] Turloughs*
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Rahasane Turlough was formerly the natural sink of the Dunkellin River, but now an artificial channel takes some of the water further downstream. Water escapes the artificial channel to sweep around the northern basin, and again in the west, where it flows into an active swallow-hole system. The main swallow-holes here are constantly changing, but reach 5 m in diameter and 2-3 m deep. Some minor collapses are found elsewhere in the turlough, as well as a small number of more permanent pools. Mostly, the edges of the turlough rise gradually into the surrounding land, but in places, rocks mark a more sudden transition. The southern basin is an impressive feature, with high rocky sides above an undulating base, strewn with boulders. There is a low hill on the south side of the main basin, and another on the north-east, near Shanbally Castle, where smooth limestone pavement is evident. The major part of the turlough is open, flat and grassy, with occasional depressions and dry channels. The substrate consists largely of silty clay with shell fragments, reaching over 3 m in thickness. Locally in the main basin there are signs of marl, but peat is absent everywhere. Like the southern basin, the eastern end of the main (northern) basin is distinguished by the presence of large rocks scattered over the floor.

The vegetation of Rahasane is divided between dry and wet communities. Because of its large catchment, the turlough is naturally eutrophic and this, together with a lack of peat, limits the sedges (*Carex* spp.) which are usually abundant in turlough vegetation. In places with outcropping limestone, the vegetation is predominantly dry grassland with Red Fescue (*Festuca rubra*) and Crested Dog's-tail (*Cynosurus cristatus*), among a generally calcicole community. Large areas in the drier parts of the turlough are covered by a community characterised by an abundance of Creeping Cinquefoil (*Potentilla reptans*), with Common Sedge (*Carex nigra*), Silverweed (*Potentilla anserina*) and Creeping Bent (*Agrostis stolonifera*). Where the soil is less well-drained, Creeping Cinquefoil disappears from this community and the

rare species, Fen Violet (*Viola persicifolia*), which is listed in the Irish Red Data Book, occurs. In these areas, the presence of Common Spike-rush (*Eleocharis palustris*) suggests that water is close to the surface.

Wet communities are associated with the river channels and pools. Fully aquatic communities include such species as Fan-leaved Water Crowfoot (*Ranunculus circinatus*), Fennel Pondweed (*Potamogeton pectinatus*), Lesser Pondweed (*P. pusillus*), Fat Duckweed (*Lemna gibba*), Whorled Water-milfoil (*Myriophyllum verticillatum*) and Needle Spike-rush (*Eleocharis acicularis*). Semi-aquatic communities fringe the main channel of the river and colonise muddy pools in the basin. Species such as Lesser Water-parsnip (*Berula erecta*), Fool's Water-cress (*Apium nodiflorum*), River Water-dropwort (*Oenanthe fluviatilis*) and Amphibious Bistort (*Polygonum amphibium*) occur, along with the rare species, Northern Yellow-cress (*Rorippa islandica*), which is listed in the Irish Red Data Book. There are also some narrow fields with Yellow Iris (*Iris pseudacorus*).

There are small areas of scrub on the southern and north-western sides of the turlough, but the area of flooded woodland is small. The scrub is made up of Buckthorn (*Rhamnus cathartica*), Ash (*Fraxinus excelsior*) and Hazel (*Corylus avellana*). The trees support a range of epiphytic mosses such as *Leskea polycarpa*, *Amblystegium riparium*, *Isopterygium elegans*, *Isothecium myosuroides* and *Thuidium tamariscinum*.

Rahasane Turlough is renowned for its wintering wildfowl populations, but it also supports nesting waders in summer, which include Lapwing, Redshank, Snipe and Dunlin. Figures stated in the following account represent mean (and peak) counts obtained during the three seasons, 1984/85 to 1986/87. Internationally important numbers of Whooper Swan 179, Golden Plover 17680, Wigeon 7760 and Shoveler 498 are found. The first two species, together with Bewick's Swan, below, are listed on Annex I of the E.U. Birds Directive. Species recorded in nationally important numbers are Bewick's Swan 132, Mute Swan 125, Teal 3005, Mallard 777, Pintail 102, Pochard 356, Tufted Duck 381, Coot 1289, Lapwing 3995, Dunlin 3569 (5653), Black-tailed Godwit 170 and Curlew 1205. Small numbers of the internationally important Greenland White-fronted Goose regularly overwinter at Rahasane (average count, as above, 59), but numbers have been declining over the years.

There is a small run of Atlantic Salmon (*Salmo salar*) through the Dunkellin River when it is flowing overground. The fish pass through the turlough but do not use it for spawning. This species is listed on Annex II of the E.U. Habitats Directive.

The Fairy Shrimp (*Tanymastix stagnalis*, Class Crustacea) was first recorded in Ireland from the southern basin at Rahasane, though it has since been recorded elsewhere. It requires isolation from predators to grow to reproductive age and so cannot occur in permanent waterbodies.

The turlough is closely grazed by cattle, sheep and horses. Grazing is a critical factor in maintaining a balance between open swards and woodland development at the edges of the turlough. Drainage is a major threat to turloughs, but the Dunkellin

River has not been arterially drained. The river was straightened many years ago where it crosses the turlough, and the artificial channel was dredged again in 1992, but this does not appear to have affected winter flooding. Some degree of artificial enrichment of the basin is occurring from the farming areas upstream, and local enrichment is associated with grazing practices. Eutrophication is among the major threats to turlough systems in general.

Rahasane Turlough is of major ecological significance as one of only two large turloughs in the country which still function naturally. It is the most important turlough in Ireland for birdlife. In a relatively recent national survey, it was also rated very highly for its vegetation, and supports two rare species listed in the Irish Red Data Book. Turloughs are a rare habitat type and are given priority status under Annex I of the E.U. Habitats Directive.



## SITE SYNOPSIS

**SITE NAME: RAHASANE TURLOUGH SPA**

**SITE CODE: 004089**

Rahasane Turlough lies in gently undulating land, approximately 2 km west of Craughwell, Co. Galway. It consists of two basins which are connected at times of flood but separated as the waters recede. The larger of these, the northern basin, takes the Dunkellin River westwards. Rahasane was formerly the natural sink of the Dunkellin River, but now an artificial channel takes some of the water further downstream. Water escapes the artificial channel to sweep around the northern basin, and again in the west, where it flows into an active swallowhole system. Some minor collapses are found elsewhere in the turlough, as well as a small number of more permanent pools. The substrate consists largely of silty clay.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation importance for the following species: Whooper Swan, Greenland White-fronted Goose, Wigeon, Golden Plover and Black-tailed Godwit. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Rahasane is a traditional site for Greenland White-fronted Goose, and supports a population of national importance (157 individuals - five year mean peak for the period 1994/95 to 1998/99). It is of international importance for Black-tailed Godwit (437 - all figures are five year mean peaks for the period 1995/96 to 1999/2000). It also has nationally important populations of Whooper Swan (165), Wigeon (3,430), and Golden Plover (6,613). The site has the largest inland population of Dunlin (864) in the country and also supports Mute Swan (57), Teal (307), Mallard (142), Pintail (19), Shoveler (28), Tufted Duck (32), Grey Heron (31), Lapwing (2,220), Curlew (197), Redshank (134) and Black-headed Gull (280). Little Egret, a species which has recently colonised Ireland, also occurs at this site.

Rahasane Turlough SPA is of high ornithological importance; it supports nationally important populations of four species and an internationally important population of one. The Wigeon and Golden Plover populations are of particular note as they each represent approximately 4% of the All-Ireland totals of these species. The regular occurrence of Greenland White-fronted Goose, Whooper Swan and Golden Plover is of note as these species are listed on Annex I of the E.U. Birds Directive.

9.7.2014

**Site Name: Kiltiernan Turlough SAC**

**Site Code: 001285**

Kiltiernan Turlough lies in a linear depression running south-westwards from the main Galway-Limerick road, north-west of Ardrahan in Co. Galway. It has a flattish basin which lies approximately 2 m below road level, and includes about eight further depressions which are joined in times of high water. The site includes a low ridge on the south-eastern side. Towards the west the topography becomes flatter and the basin breaks into separate hollows.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[3180] Turloughs*
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This site comprises a relatively dry turlough with a limited, though regular, flood in winter. The vegetation is mostly species-poor grassland dominated by White Clover (*Trifolium repens*), Silverweed (*Potentilla anserina*) and Creeping Bent (*Agrostis stolonifera*), with some areas of species-rich grassland found in the western half. Beside the road, the rocky outcrops support limestone grassland and there are narrow fringes of scrub along each side of the basin. The scrub is predominantly of Blackthorn (*Prunus spinosa*), but some Buckthorn (*Rhamnus catharticus*) and Alder Buckthorn (*Frangula alnus*), a rare Red Data Book species, also occur.

The grassland occurring in the main depressions of this site have been modified by trampling and over-grazing. Here the main species found are Northern Bedstraw (*Galium boreale*) and Creeping Cinquefoil (*Potentilla reptans*), which grow in clumps with much Silverweed and Greater Plantain (*Plantago major*). Hollows in this vegetation contain Common Sedge (*Carex nigra*) and Amphibious Bistort (*Polygonum amphibium*). In the less intensified eastern section of the site the Red Data Book species Fen Violet (*Viola persicifolia*) occurs.

Lapwing, Pochard, Teal and Wigeon have been recorded at the site, and other bird species may visit from the nearby Tullaghnafrankagh Lough.

Land use on the site comprises grazing, particularly in the eastern half, with some areas of tillage found in the west.

Kiltiernan Turlough is an example of a partly modified, relatively dry turlough, without any accumulation of peat. It includes a variety of typical dry turlough vegetation types and is notable for the presence of the rare plant species, Alder

Buckthorn and Fen Violet. Turloughs are important habitats that are listed with priority status on Annex I of the E.U. Habitats Directive and, as such, are of considerable conservation significance.

**Site Name: Castletaylor Complex SAC**

**Site Code: 000242**

The Castletaylor Complex is situated approximately 4 km south-east of Kilcolgan in Co. Galway and lies in a gently undulating limestone topography. Although relatively small in area, the site contains a diverse range of habitats.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[3180] Turloughs*
[4060] Alpine and Subalpine Heaths
[5130] Juniper Scrub
[6210] Orchid-rich Calcareous Grassland*
[8240] Limestone Pavement*

Caranavoodaun turlough dominates the north-western half of the site. It occupies a shallow basin set among ridges of limestone outcrop and thin glacial drift and is an excellent example of a calcareous and extremely oligotrophic (nutrient-poor) turlough. It has a limited throughput of water, with a considerable precipitation of marl and some accumulation of peat. Some stands of Black Bog-rush (*Schoenus nigricans*), with sparse Variegated Horsetail (*Equisetum variegatum*), occur at the upper levels, surrounded by patches of Buckthorn (*Rhamnus catharticus*) and Hawthorn (*Crataegus monogyna*) scrub. To the south-east the scrub includes Ash (*Fraxinus excelsior*), Yew (*Taxus baccata*), Whitebeam (*Sorbus aria*) and Irish Whitebeam (*Sorbus hibernica*). Below this there is an extensive area of sedge fen vegetation with species such as Tawny Sedge (*Carex hostiana*), Carnation Sedge (*C. panicea*), Purple Moor-grass (*Molinia caerulea*), Meadow Thistle (*Cirsium dissectum*) and Devil's-bit Scabious (*Succisa pratensis*). Along the western and south-western sides the low-lying ground supports a community of Shoreweed (*Littorella uniflora*), Spike-rushes (*Eleocharis palustris* and *E. multiflora*) and Bulbous Rush (*Juncus bulbosus*) growing in shallow water that persists into June. The deeper pools are colonised by Pondweeds (*Potamogeton gramineus*, *P. polygonifolius* and *P. coloratus*).

North of the turlough and to the south of the site there is a mosaic of other habitats. The limestone pavement occurs mainly as scattered boulders with no extensive areas of flat pavement. It has a rich flora with species such as Bloody Crane's-bill (*Geranium sanguinum*), Herb-Robert (*G. robertianum*), Burnet Rose (*Rosa pimpinellifolia*), Wood Sage (*Teucrium scordonia*), Quaking-grass (*Briza media*) and the scarce species Spring Gentian (*Gentiana verna*) and Mountain Avens (*Dryas*

*octopetala*). Limestone pavement breaks through the turlough floor in places, and supports scrub vegetation with Dewberry (*Rubus caesius*), Dog Rose (*Rosa canina*), stunted Ash and Blackthorn (*Prunus spinosa*). The Red Data book species Alder Buckthorn (*Frangula alnus*) occurs amongst this community. Limestone outcrops also occur within the wooded area of the site.

The dry calcareous grassland that occurs amongst the limestone pavement and heath is species-rich, particularly with orchids, including Autumn Lady's tresses (*Spiranthes spiralis*), Early Marsh-orchid (*Dactylorhiza incarnata*), Lesser Butterfly-orchid (*Platanthera bifolia*), Fragrant Orchid (*Gymnadenia conopsea*), Broad-leaved Helleborine (*Epipactis helleborine*) and the scarce Dense-flowered Orchid (*Neotinea maculata*).

The heath at this site is characterised by the presence of Juniper (*Juniperus communis*) and Mountain Avens. The presence of Bearberry (*Arctostaphylos uva-ursi*) indicates that some of the heath is similar to the Arctostaphylos-Dryas vegetation of the Burren limestone area, a rare lowland alpine type heath.

The eastern and much of the southern parts of the site are dominated by dry broadleaved woodland. Species present include Downy Birch (*Betula pubescens*), Ash, Yew, Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*) and Spindle (*Euonymus europaeus*). Some mature planted conifers are found to the south of the road.

The turlough does not hold any significant wintering populations of birds, owing to the extreme oligotrophic conditions. Three pairs of Lapwing bred at the site in 1996.

The main land use within the open areas of the site is light grazing by cattle. Some clearance of scrub within parts of the woodland has caused some damage and is a further threat. This site is of high conservation interest, in particular for the presence in a relatively small area of good examples of five habitats that are listed on Annex I of the E.U. Habitats Directive. The transition from the wetland to the surrounding habitats is particularly well shown.

**Site Name: Gortnandarragh Limestone Pavement SAC**

**Site Code: 001271**

Gortnandarragh Limestone Pavement is located on the southern side of Lough Corrib, about 7 km south-east of Oughterard in Co. Galway. The site consists of an exposed limestone plateau which slopes down on its eastern side to cut-over fen and bog. Parts of the pavement exhibit a well-developed system of clints and grykes, while other parts are shattered, with much loose rock. The pavement forms a mosaic with heath, grassland and scrub. Much of the central part is open but the eastern side contains enclosures and is grazed by cattle.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[8240] Limestone Pavement*
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The limestone pavement at the site supports a typical flora, including Blue Moor-grass (*Sesleria albicans*), Burnet Rose (*Rosa pimpinellifolia*), Wood Sage (*Teucrium scorodonia*), Wild Thyme (*Thymus praecox*), Spring Gentian (*Gentiana verna*), Carline Thistle (*Carlina vulgaris*), Mouse-ear Hawkweed (*Hieracium pilosella*) and ferns (*Asplenium ruta-muraria*, *A. trichomanes* and *Ceterach officinarum*). Scattered Juniper (*Juniperus communis*), Yew (*Taxus baccata*), Blackthorn (*Prunus spinosa*), Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*) and Rowan (*Sorbus aucuparia*) occur but most are browsed, and the Yew in particular exhibits the effects of severe browsing pressure.

The heath at the site is species-rich and is dominated by a mixture of Heather (*Calluna vulgaris*), Bell Heather (*Erica cinerea*) and Bracken (*Pteridium aquilinum*). Other species present include Blue Moor-grass, Sweet Vernal-grass (*Anthoxanthum odoratum*), Common Bent (*Agrostis capillaris*), Quaking-grass (*Briza media*), Purple Moor-grass (*Molinia caerulea*), fescue (*Festuca* sp.), Devil's-bit Scabious (*Succisa pratensis*), Juniper, Tormentil (*Potentilla erecta*), Wood Sage *Teucrium scorodonia*, Cat's-ear (*Hypochoeris radicata*), St. John's-wort (*Hypericum* sp.), eyebrights (*Euphrasia* spp.), Common Knapweed (*Centaurea nigra*), Meadow Vetchling (*Lathyrus pratensis*), Lady's Bedstraw (*Galium verum*), Goldenrod (*Solidago virgaurea*), Wild Strawberry (*Fragaria vesca*), Harebell (*Campanula rotundifolia*) and Wild Madder (*Rubia peregrina*). There are numerous ant hills which are characterised by the presence of Wild Thyme and Fairy Flax (*Linum catharticum*). The heath appears to be under-grazed and scrub is invading. However, there are signs of goats present (droppings and skull noted).

The grassland is dominated by Blue Moor-grass, with many of the same species present as in the heath, but with additional species such as Mountain Everlasting

(*Antennaria dioica*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Primrose (*Primula vulgaris*), Ribwort Plantain (*Plantago lanceolata*), violet (*Viola* sp). On the eastern side the land is grazed by cattle and here there are additional species such as Oxeye Daisy (*Leucanthemum vulgare*), Red Clover (*Trifolium pratense*), Yarrow (*Achillea millefolium*) and Wild Carrot (*Daucus carota*). Juniper is particularly abundant here, especially on the area sloping to the bog and this is likely to correspond to the E.U. Habitats Directive category 'Juniper formations'. Small wet patches also occur here with fen species, e.g. Lesser Spearwort (*Ranunculus flammula*), Water Mint (*Mentha aquatica*), and Silverweed (*Potentilla anserina*). Where the habitats grade into peatland, Purple Moor-grass, Grass-of-parnassus (*Parnassia palustris*), Meadow Thistle (*Cirsium dissectum*), Black Bog-rush (*Schoenus nigricans*) and Bog Asphodel (*Narthecium ossifragum*) occur, and this community grades into cut-away blanket-bog type vegetation.

There is a large area of oak-Ash-Hazel woodland and scrub on rocky limestone on the south side of the site. Small stature Hazel dominates the woodland canopy, overtopped frequently by Ash. Mature Hawthorn (*Crataegus monogyna*) is abundant. The field layer is particularly species-rich, composed chiefly of Wild Strawberry, Wood Anemone (*Anemone nemorosa*), Lords-and-ladies (*Arum maculatum*), Pignut (*Conopodium majus*), Wood-sorrel (*Oxalis acetosella*), Lesser Celandine (*Ranunculus ficaria*), Glaucous Sedge (*Carex flacca*) and False Brome (*Brachypodium sylvaticum*). The rocks are covered mainly by the mosses *Hylocomium brevirostre* and *Thuidium tamariscinum*. *Rhytidiadelphus triquetrus* is abundant on the soil whilst *Neckera crispa* clothes many of the tree boles.

An area of cut-away bog to the east contrasts with the limestone habitats dominating the rest of the site. This is the only known locality for the endemic fungus *Entoloma jennyi*.

The main land use on the site is extensive grazing by cattle and goats. Threats to the site include over-grazing, land reclamation and quarrying, the latter two already occurring to a small extent within the site.

Gortnandarragh is valuable as an example of limestone pavement, an internationally important habitat which is listed with priority status, on Annex I of the E.U. Habitats Directive. It is also notable because the bog on the site is the type locality and only known station for *Entoloma jennyi*. Furthermore, there are interesting and diverse areas of heath, grassland, scrub and woodland, all contributing to a valuable site of considerable conservation interest.



**Site Name: Ardrahan Grassland SAC**

**Site Code: 002244**

This site lies immediately west and north of Ardrahan in south Co. Galway. It is dominated by a large flat limestone area with a mosaic of calcareous habitats including limestone pavement, alpine heath, Juniper scrub and species rich dry grasslands. In contrast, the south-west of the site consists of a small marl lake and adjoining fens and marshes, with Juniper heath frequent on the higher ground. Soils associated with limestone pavement are generally thin rendzina; deeper pockets are more mineral rich and support limestone grassland and scrub in places.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- |  |
|--|
| [4060] Alpine and Subalpine Heaths       |
| [5130] Juniper Scrub                     |
| [6210] Orchid-rich Calcareous Grassland* |
| [8240] Limestone Pavement*               |

The site contains a good example of limestone pavement, a priority habitat listed on Annex I of the E.U. Habitats Directive, a small though excellent example of the Annex I habitat alpine heath, areas of the Annex I priority habitat orchid-rich calcareous grassland, along with one other Annex I habitat, Juniper scrub. Of particular note is the abundance of Bearberry (*Arctostaphylos uva-ursi*) and Juniper (*Juniperus communis*) in association with a typical Burren flora including species such as Mountain Avens (*Dryas octopetala*), Spring Gentian (*Gentiana verna*) and various orchid species including Fly Orchid (*Ophrys insectifera*). The southern and western part of the area is of significant interest due to the low intensity of management in the area. Both Mountain Avens and Bearberry alpine heaths occur at this site, where they form a mosaic with Juniper scrub, limestone pavement and calcareous grasslands.

This site contains a relatively small but fine example of limestone pavement, which occurs in a mosaic with other habitats. Common species include Blue Moor-grass (*Sesleria albicans*), Wild Thyme (*Thymus praecox*), Flea Sedge (*Carex pulicaris*), Quaking-grass (*Briza media*), Devil's-bit Scabious (*Succisa pratensis*) and Heather (*Calluna vulgaris*). Pockets of Hazel (*Corylus avellana*) scrub have developed, and there are lesser amounts of Blackthorn (*Prunus spinosa*), Bracken (*Pteridium aquilinum*) and Hawthorn (*Crataegus monogyna*).



At the north of the site Juniper scrub forms a dense mat over limestone pavement along with Bearberry and Mountain Avens. Further south it occurs on higher undulating ground over a species rich calcareous heath with Wild Thyme, Carlina Thistle (*Carlina vulgaris*), Tormentil (*Potentilla erecta*), Bloody Cranesbill (*Geranium sanguineum*), Black Bog-rush (*Schoenus nigricans*), Heather and occasional Bearberry.

Areas of orchid-rich calcareous grassland are found across the site, interspersed with areas of scrub, pavement and less species-rich grassland. At least eleven orchid species have been recorded from the site, many in good numbers. The best areas of grassland are very species rich, and support an excellent suite of calcareous indicators. Species such as Kidney Vetch (*Anthyllis vulneraria*), Squinancywort (*Asperula cynanchica*), Spring-sedge (*Carex caryophyllea*), Glaucus Sedge (*Carex flacca*), Common Knapweed (*Centaurea nigra*), Eyebright (*Euphrasia officinalis* agg.), Lady's Bedstraw (*Galium verum*), Juniper, Rough Hawkbit (*Leontodon hispidus*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Sea Plantain (*Plantago maritima*), Yellow-rattle (*Rhinanthus minor*), Blue Moor-grass, Devil's-bit Scabious and Red Clover (*Trifolium pratense*) have been commonly recorded. Species such as Mountain Avens and Spring Gentian are also present, and the Flora (Protection) Order, 2015 species Wood Bitter-vetch (*Vicia orobus*), has been recently documented. Many areas of orchid-rich grassland are however becoming swamped and overtaken by Purple Moor-grass (*Molinia caerulea*).

Brackloon Lough occurs in the south of the site and is a fine example of a small shallow marl lake, one of very few in this locality. This open lake has a pronounced whitish appearance and a flora of lime-encrusted Thread-leaved Water-crowfoot (*Ranunculus trichophyllus*) and a little Curled Pondweed (*Potamogeton crispus*) occurs. Shoreweed (*Littorella uniflora*) is locally abundant on the shoreline, where it grows with Many-stalked Spike-rush (*Eleocharis multicaulis*), Pink Water-speedwell (*Veronica catenata*), Lesser Water-plantain (*Baldellia ranunculoides*) and some Amphibious Bistort (*Polygonum amphibium*). Although small, the lake seems in a relatively natural state.

There are two small turloughs present within the site. Both are well grazed and consist of a short-turf peaty vegetation with Common Sedge (*Carex nigra*), Lesser Spearwort (*Ranunculus flammula*), Creeping Buttercup (*Ranunculus repens*) (turlough form), Lesser Marshwort (*Apium inundatum*), Cuckooflower (*Cardamine pratensis*), Marsh Pennywort (*Hydrocotyle vulgaris*) and Water Mint (*Mentha aquatica*), along with Common Marsh-bedstraw (*Galium palustre*), Creeping Bent (*Agrostis stolonifera*), Jointed Rush (*Juncus articulatus*) and Common Spike-rush (*Eleocharis palustris*).

Bird species recorded from the site include Snipe, Mute Swan and Curlew.

Land use at this site consists mainly of the traditional practise of winter grazing by cattle. This is a low intensity farming practise generally confined to the Burren in Ireland and one that is vital to the maintenance of the high scientific interest of this site. However, recent agricultural improvement has damaged the scientific interest of part of the site through loss of habitat in the turlough and limestone pavement areas.

Intensification of the land usage around Brackloon Lough could lead to a deterioration in the water quality of the lake. A modification of the current grazing regime is needed to help deal with the spread of Purple Moor-grass in the best of the grassland areas of the site.

Ardrahan Grassland contains a mosaic of calcareous habitats including good examples of four habitats listed on Annex I of the E.U. Habitats Directive - limestone pavement, alpine heath, orchid-rich calcareous grassland and Juniper scrub. The presence of a relatively unpolluted marl lake adds further diversity and interest of this important site.

**Site Name: Moneen Mountain SAC**

**Site Code: 000054**

Moneen Mountain is a large, composite site situated in north County Clare. It encompasses a complete range of inland Burren habitats, from open limestone pavement and its associated calcareous grasslands and heaths, to dense Hazel (*Corylus avellana*) scrub and patches of Ash (*Fraxinus excelsior*) woodland. The site extends inland from Muckinish Point and includes all of the higher ground between Ballyvaughan and Bell Harbour in a southerly direction for approximately 20 km. The underlying rock type is Carboniferous limestone, which rises into a series of rounded hills, intersected by deep and often steep-sided valleys to the north of the site (max. altitude 307 m) before levelling out towards the south. Traces of Galway Granite are found within the site, particularly to the north. Soil cover is shallow and the soil type most common in the area is rendzina.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- |   |
|---|
| [3180] Turloughs*   |
| [4060] Alpine and Subalpine Heaths                              |
| [5130] Juniper Scrub  |
| [6210] Orchid-rich Calcareous Grassland*                        |
| [7220] Petrifying Springs*                                      |
| [8240] Limestone Pavement*                                      |
| [1065] Marsh Fritillary ( <i>Euphydryas aurinia</i> )           |
| [1303] Lesser Horseshoe Bat ( <i>Rhinolophus hipposideros</i> ) |

The bulk of the site is made up of limestone pavement, a priority habitat listed on Annex I of the E.U. Habitats Directive and its associated calcareous grasslands, juniper scrub and heaths. The limestone pavement includes smooth, blocky and shattered types. Common species typically associated with the shattered type include Burnet Rose (*Rosa pimpinellifolia*), Wood Sage (*Teucrium scorodonia*), Blue Moor-grass (*Sesleria albicans*), Blackthorn (*Prunus spinosa*) and Wild Thyme (*Thymus praecox*). The smooth, blocky type is deeply fissured and provides a good habitat for a variety of ferns and mosses. The bare pavement is interspersed with fine examples of species-rich dry calcareous grassland. On the higher ground of the uplands to the north and north-east of the site, heath with Bearberry (*Arctostaphylos uva-ursi*) is well developed. The main plants of the heath communities are Mountain Avens (*Dryas octopetala*), Heather (*Calluna vulgaris*), Crowberry (*Empetrum nigrum*), Blue Moor-grass, Juniper (*Juniperus communis*) and sedges (*Carex* spp.).

Petrifying springs, a priority habitat listed on Annex I of the E.U. Habitats Directive, occurs within the site. Although the area covered by the petrifying springs is relatively small, the habitat is nonetheless important. The springs are generally intact in nature at this site, and often support a rich bryophyte community. They are often found in secluded and inaccessible areas such as inland cliffs, where disturbance is minimal.

Expanses of low Hazel scrub interspersed with bare limestone pavement and calcareous grasslands dominate much of the southern part of the site. Along the lower slopes of some of the hills to the north, Hazel and Ash have reached a sufficiently significant height to be considered as woodland, a rare habitat in the context of the Burren.

Many inland cliffs occur throughout the site, generally unvegetated but in places supporting a thick scrub cover with Hazel, Ivy (*Hedera helix*), Blackthorn and wild roses (*Rosa* spp.). These provide good sites for small breeding birds. Exposed outcrops of granite support a rich lichen flora.

Muckinish Lough, which occurs close to Pooldoody Bay, is a small but important example of a turlough. This appears to be a transitional system from a turlough to a natural rock lagoon in karst. It receives seawater that probably enters through fissures in the limestone. The lake becomes very shallow in summer and may dry out completely at times. Aquatic vegetation includes Tassleweed (*Ruppia* spp.) and Fennel Pondweed (*Potamogeton pectinatus*). This is considered an extreme in the range of turlough types in Ireland

The rare plant species, Intermediate Wintergreen (*Pyrola media*), occurs among heath vegetation on higher ground within the site. This species is listed in the Irish Red Data Book.

A breeding colony of Lesser Horseshoe Bats occurs within the site. More than 60 individuals were counted in 1998. The bats inhabit a semi-derelict cottage and a nearby out-building. Lesser Horseshoe Bat is listed on Annex II of the E.U. Habitats Directive. The dense hazel scrub provides ideal cover for mammals. Both Pine Marten and Badger have been recorded from this site. Both species are listed in the Red Data Book as threatened in Europe.

The scarce butterfly, Marsh Fritillary (*Euphydryas aurinia*), has been reported from the site; this species is mostly found in areas where its food plant, Devil's-bit Scabious (*Succisa pratensis*), occurs commonly. Marsh Fritillary is listed on Annex II of the E.U. Habitats Directive.

Breeding Cuckoo and Whitethroat are plentiful in this area, as are Yellowhammer, Stonechat and Wheatear. The area is very rich in entomological terms, with a number of species of butterfly and moth which are known in Ireland only from the Burren.

Most of the site is grazed by cattle (particularly in the winter) and also by sheep and goats. The effects of both over-grazing and under-grazing are visible in places. Intensification of agriculture has caused damage to parts of the site, while clearance of scrub and limestone pavement represent the main threat to the remainder. The practice of winter grazing at appropriate stocking levels and of suitable duration must be maintained to preserve the species richness and diversity of these grasslands. Large silage pits and cattle feeding rings situated in sensitive areas directly on the pavement pose a threat to the water quality of the area.

This site is of international scientific importance owing to the presence of fine examples of typical Burren habitats, including several habitats listed on Annex I of the E.U. Habitats Directive. The limestone pavement and heath are particularly noteworthy. The presence of a substantial summer colony of Lesser Horseshoe Bat is also of note and the site is, furthermore, of high amenity and scenic value.

**Site Name: East Burren Complex SAC**

**Site Code: 001926**

This large site incorporates all of the high ground in the east Burren in Counties Clare and Galway, and extends south-eastwards to include a complex of calcareous wetlands. The area encompasses a range of limestone habitats that include limestone pavement and associated calcareous grasslands and heath, scrub and woodland together with a network of calcareous lakes and turloughs. The site exhibits some of the best and most extensive areas of oligotrophic limestone wetlands to be found in the Burren and in Europe.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [3140] Hard Water Lakes
- [3180] Turloughs\*
- [3260] Floating River Vegetation
- [4060] Alpine and Subalpine Heaths
- [5130] Juniper Scrub
- [6130] Calaminarian Grassland
- [6210] Orchid-rich Calcareous Grassland\*
- [6510] Lowland Hay Meadows
- [7210] *Cladium* Fens\*
- [7220] Petrifying Springs\*
- [7230] Alkaline Fens
- [8240] Limestone Pavement\*
- [8310] Caves
- [91E0] Alluvial Forests\*
  
- [1065] Marsh Fritillary (*Euphydryas aurinia*)
- [1303] Lesser Horseshoe Bat (*Rhinolophus hipposideros*)
- [1355] Otter (*Lutra lutra*)

The limestone pavement at this site includes smooth blocky and shattered types. The bare pavement is interspersed with species-rich calcareous vegetation communities. Typical grassland species found on or near the pavement include Blue Moor-grass (*Sesleria albicans*), Mountain Everlasting (*Antennaria dioica*), Bloody Crane's-bill (*Geranium sanguineum*) and Wild Thyme (*Thymus praecox*). Where soil cover is more

extensive purer grassland communities are found, and these are often orchid-rich. Species such as Pyramidal Orchid (*Anacamptis pyramidalis*), Frog Orchid (*Coeloglossum viride*), Fragrant Orchid (*Gymnadenia conopsea*), Bee Orchid (*Ophrys apifera*), Fly Orchid (*Ophrys insectifera*), Butterfly Orchid (*Platathera chlorantha*) and Dense-flowered Orchid (*Neotinea maculata*) have all been recorded.

Limestone heath is well developed in parts of the uplands where Heather (*Calluna vulgaris*) and Bell Heather (*Erica cinerea*) are common, along with St. John's-wort species (*Hypericum* spp.) and Tormentil (*Potentilla erecta*). Two rare plant species found in this habitat are the Hoary Rock-rose (*Helianthemum canum*) and Pyramidal Bugle (*Ajuga pyramidalis*); both species are listed in the Red Data Book. To the south-east around the western shores of Lough Bunny an interesting alpine heath community occurs. Here Bearberry (*Arctostaphylos uva-ursi*) is found at one of its few inland, lowland locations in the Burren. Juniper scrub is sometimes found associated with areas of heath at this site, with Juniper (*Juniperus communis*) and Crowberry (*Empetrum nigrum*) both found here.

Ballyeighter Loughs complex to the east is a large network of calcareous hardwater lakes and turloughs with associated fen, cut-away bog and calcareous marsh habitats. The complex contains many species of plant and animal that are found in areas of fluctuating water levels. The alkaline fen flora is well developed and large areas of Great Fen-sedge (*Cladium mariscus*) and Black Bog-rush (*Schoenus nigricans*) occur, along with a diverse complement of associated species. Some of the best and most extensive calcareous swamp fen communities in the country occur within this complex and further north-east around the shores of Lough Bunny. Between this lake and the Coole-Garryland turlough complex to the north-east of the site, another area of oligotrophic limestone wetlands occurs. This type of ecosystem is now very rare in Europe and many of the habitats found are listed on Annex I of the E.U. Habitats Directive.

The site has an excellent array of turloughs, with at least eight known examples including those at Carran, Knockaunroe, Lough Mannagh, Castle Lough, Lough Aleenaun, Turloughmore, Tulla and Roo. These turloughs represent some of the best examples of this habitat type found in Ireland and display a wide diversity in trophic status, water fluctuations, water retention and vegetation types. The aquatic plant communities are well developed and the rare, Red Data Book species, Mudwort (*Limosella aquatica*), occurs here. This species is listed in the Flora (Protection) Order, 1999.

Most of the lakes in the southern part of this site are considered examples of hard water lakes, a type listed in Annex II of the E.U. Habitats Directive. These are classic marl lakes, often surrounded by limestone pavement and scrub. They range from extreme oligotrophic types, such as Lough Bunny, to more mesotrophic or even eutrophic systems. Stonewort (*Chara* spp.) beds are common in Lough Inchiquin (and at Lough Bunny), along with pondweeds (*Potamogeton* spp.). *Nitella tenuissima*, a rare species found in calcareous fens, has been recorded in the Ballyeighter Loughs. A

number of other interesting *Chara* species have been recorded from waterbodies in the area.

The River Fergus is the only major overground river within the site. Between Lough Inchiquin and Lough Atedaun the river is slow moving and meanders through an area with wet grassland. Here the water-crowfoot *Ranunculus peltatus-pencillatus* is found, along with the moss *Fontinalis antipyretica*.

The occurrence of petrifying springs at this site is of note. Good examples of this rare habitat type are found at the cliffs at Slieve Carran. Well developed bryophyte and lichen communities are found in association with the springs.

Another uncommon habitat type found at this site is lowland hay meadow. These grasslands typically have a low, open sward dominated by herbs and poor-yield grasses, and are mown rather than grazed. Some common species include Oxeye Daisy (*Leucanthemum vulgare*), Yellow-rattle (*Rhinanthus minor*), eyebrights (*Euphrasia* spp.) and Common Knapweed (*Centaurea nigra*). A well-developed metallophyte plant community, ascribable to the Annex I habitat type Calaminarian Grassland, is present over an area of about 180 m<sup>2</sup> at an old mine site in Shesodonnell (East), with indicator bryophytes *Cephaloziella stellulifera* and *Weissia controversa* var. *densifolia*.

Scrub cover is relatively good in this area of the Burren, with large expanses of Hazel (*Corylus avellana*) intermixed with Spindle (*Euonymus europaeus*), Guelder-rose (*Viburnum opulus*) and Blackthorn (*Prunus spinosa*). An interesting scrub community of Alder Buckthorn (*Frangula alnus*), a Red Data Book species, Buckthorn (*Rhamnus catharticus*) and Shrubby Cinquefoil (*Potentilla fruticosa*), also a Red Data Book species, fringes the shores of some of the lakes and turloughs to the east.

Ballyeighter Wood to the east is an unusual scrub community on limestone, with regenerating oak (*Quercus* sp.) amongst Hazel, Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*) and Hawthorn (*Crataegus monogyna*). This is an example of a woodland type that is rare in the Burren region. The eastern edge of Slieve Carran is dominated by steep cliffs and scree slopes over which Ash and Hazel wood is developed. This represents one of the few remaining woodland habitats in the Burren.

A narrow band of alluvial woodland occurs along the karstic stream at the north-east corner of Lough Gortlecka. This is considered to be a unique variant of this uncommon woodland type. The wood is dominated by Hazel, Ash, Wych Elm (*Ulmus glabra*) and Rusty Willow (*Salix cinerea* subsp. *oleifolia*), with Ramsons (*Allium ursinum*) and a variety of other herbs occupying the flooded areas of the woodland floor.

Caves are a feature of this site, with four known natural limestone caves showing a variety of formations and passage types. Vigo Cave has one of the best undisturbed cave entrance facies in Ireland and is considered a valuable karst heritage landform. Glencurrane Cave shows some fine phreatic solution features and one passageway, known as "Crinoid Tower" shows an abundance of crinoids which have been etched



out by splashing water. Gortlecka Cave and a series of small caves above Lough Inchiquin are other fine examples of this habitat.

In the east Burren wetlands Mute Swan and Whooper Swan occur in internationally important concentrations, while Wigeon, Lapwing, Dunlin, Black-tailed Godwit and Goldeneye are also very numerous. Also found in wetlands on the site (e.g. Lough Atedaun, Carran Turlough, Lough Aleenaun, Lough Inchiquin, Lough Bunny, Lough Cullaun, Muckanagh Lough) are Bewick's Swan, Teal, Mallard, Gadwall, Shoveler, Tufted Duck, Curlew, Golden Plover, Coot and Little Grebe. The site also supports a flock of Greenland White-fronted Goose. Several of these species are listed in the Red Data Book and on Annex I of the E.U. Birds Directive.

A nesting pair of Peregrine Falcon, a species listed on Annex I of the E.U. Birds Directive, occur on Glasgeivnagh Hill. The east Burren wetlands are frequented by Sparrowhawk, Kestrel and Hen Harrier, a rare species which is also listed on Annex I of the E.U. Birds Directive. Pine Marten and Otter have been recorded regularly within the site - both are listed in the Red Data Book as they are considered threatened in Europe, the latter also on Annex II of the E.U. Habitats Directive.

The site supports an internationally important population of Lesser Horseshoe Bat, with an estimated 400 individuals. There are two known nursery roosts, a transition roost and four known winter sites, the latter all in natural limestone caves. Pipistrelle and Brown Long-eared Bats also occur. All of these species are listed in the Red Data Book, the former also on Annex II of the E.U. Habitats Directive. The Lesser Horseshoe Bat is a small, delicate bat which is confined to six western counties, Mayo, Galway, Clare, Limerick, Kerry and Cork. It forages close to woodland and at the edges of water. The Irish population of this species is estimated to be about 12,000 individuals and may be the largest national population in Europe. The Pipistrelle Bat is the smallest bat to occur in Ireland and is the commonest and most widespread species. Pipistrelle Bats forage where small insects gather, in gardens, along hedgerows and trees, over ponds and along rivers. The Brown Long-eared Bat is the second most common bat in Ireland and is easily identified by its long ears which are nearly as long as its body. The Brown Long-eared Bat forages in and along woodland where they glean insects off foliage.

The site includes a large population of Marsh Fritillary, a species of butterfly listed on Annex II of the E.U. Habitats Directive. The site also supports the only known populations of Slow Worm (*Anguis fragilis*) in Ireland - this lizard is believed to have been introduced in about 1970. Arctic Char (*Salvelinus alpinus*), a Red Data Book fish species, has been recorded from Lough Inchiquin.

Most of the site is grazed by cattle and sheep, and in some areas, particularly the uplands, by feral goats. Slieve Carran is a Statutory Nature Reserve, while some 750 square km within the region of Mullaghmore makes up the Burren National Park. Clearance and intensification of agriculture has caused damage to some parts of the site. This threatens the heath and scrub communities and may cause eutrophication (nutrient enrichment) of the lakelands to the east. Drainage and land reclamation

have occurred in places around the edges of wetlands, while some marginal fen areas have been afforested. Areas of agriculturally-improved land have been included within the site in order to protect the hydrology and nutrient status of the wetland system.

The East Burren Complex is of international scientific interest owing to the presence of fine examples of typical Burren habitats, together with an oligotrophic wetland complex of lakes, turloughs, fen, cut-over bog and calcareous marsh. The Ballyeigher complex represents an excellent example of a nutrient-poor calcareous lake and fen system, of European significance. Some of the only remaining woodland habitats to be found in the Burren occur within the site. The site contains fourteen habitats that are listed on Annex I of the E.U. Habitats Directive (six of which have priority status) and three species of animal listed on Annex II of this Directive and, as such, is of major conservation significance. The occurrence of many rare plants and animals within the site adds considerably to its scientific and conservation value. The site is of high ornithological interest too, for the internationally and nationally important numbers of waterfowl that use it.



**Site Name: Maumturk Mountains SAC**

**Site Code: 002008**

The Maumturk Mountains are situated east of the Twelve Bens and west of the Maumtrasnas, between the Inagh Valley and the Leenaun/Maam road in Co. Galway. The site is bounded to the north by Killary Harbour and to the south by the Galway/ Clifden road. Most of the mountains exceed 600 m in height and about half of the land within the site lies above an altitude of 250 m. In addition many rivers criss-cross the site. The main bedrock is quartzite in the south, which forms impressive cliffs but little mineral soil, and shales and slates in the northern area, which weather more easily. Bands of metamorphosed limestone (Lakes Marble Formation) occur at Lissoughter, Maumeen Gap at Knocknagur and Maamturkmore.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [3110] Oligotrophic Waters containing very few minerals
- [4010] Wet Heath
- [4060] Alpine and Subalpine Heaths
- [7130] Blanket Bogs (Active)\*
- [7150] Rhynchosporion Vegetation
- [8220] Siliceous Rocky Slopes
- [1106] Atlantic Salmon (*Salmo salar*)
- [1833] Slender Naiad (*Najas flexilis*)

Wet heath is widespread within this site on the margins of areas of blanket bog and on the lower slopes of mountains where peat depth is less than 1m. The vegetation is typically dominated by Purple Moor-grass (*Molinia caerulea*), with Cross-leaved Heath (*Erica tetralix*) and Heather (*Calluna vulgaris*) locally sub-dominant. Other frequent species include Tormentil (*Potentilla erecta*), Heath Milkwort (*Polygala serpyllifolia*), Many-stalked Spike-rush (*Eleocharis multicaulis*), Bog Asphodel (*Narthecium ossifragum*) and the sedges *Carex echinata* and *C. panicea*. On drier, more steep slopes, dry heath is present with Bell Heather (*Erica cinerea*) a typical frequent species. Over-grazing by sheep has greatly modified the structure and composition of the heath communities, with a reduction in Heather cover and in places the initiation of soil erosion.

Blanket bog also occurs within this site, some of which is intact and of good quality, with a particularly good example at Caher. Typical bog species are found, including Heather, Purple Moor-grass, Black Bog-rush (*Schoenus nigricans*), Bog Asphodel,

Cross-leaved Heath, Common Cottongrass (*Eriophorum angustifolium*), Carnation Sedge (*Carex panicea*), the moss *Racomitrium lanuginosum* and locally frequent hummocks of the bog mosses *Sphagnum fuscum* and *S. imbricatum*. In addition, the lichen flora is locally luxuriant and includes the rare *Cladonia rangiferina*. Flushes occur in some areas of the bog, such as on the south slope of Knocknagur. Here, species such as Bog Pondweed (*Potamogeton polygonifolius*), Bulbous Rush (*Juncus bulbosus*), Jointed Rush (*Juncus articulatus*), Many-stalked Spike-rush (*Eleocharis multicaulis*) and various sedges (*Carex panicea*, *C. demissa* and *C. hostiana*) are found. At this location, the scarce Brown Beak-sedge (*Rhynchospora fusca*) is common in the surrounding bog.

Rhynchosporion vegetation is associated with the blanket bog in a few areas of the site. It is characterised by well developed inter-connecting pool systems with quaking carpets of *Sphagnum*. The pool areas are typically dominated by *Sphagnum cuspidatum* and *S. auriculatum*, with Common Cottongrass, Bogbean (*Menyanthes trifoliata*), and sundews (*Drosera anglica* and *D. intermedia*). The quaking flat areas are dominated by White-beaked Sedge (*Rhynchospora alba*), Bog Asphodel and Common Cottongrass.

Oligotrophic lakes are well represented in this site, occurring mainly in the south-east near Maam Cross. The principal lakes are Lough Shindilla, Loughanillaun, Lough Nambrackboy, Lough Shannagrena, Maumwee Lough and Lehanagh Lough. Most of these are small to medium sized systems and are of good quality. Typical oligotrophic aquatic species occur, including Quillwort (*Isoetes lacustris*), Pipewort (*Eriocaulon aquaticum*), Water Lobelia (*Lobelia dortmanna*), Shoreweed (*Littorella uniflora*) and Alternate Water-milfoil (*Myriophyllum alterniflorum*). Spawning salmon and trout occur in Maumwee Lough, and perhaps others.

Other habitats present include lowland blanket bog, siliceous quartzite scree, exposed rock, upland grassland on peaty and mineral substrates, river valleys and streams, lakes, and woodland on lake islands.

In areas where base-rich rocks occur at altitude, e.g. Maumeen Gap and Lissoughter, scarce plant species such as Mountain Avens (*Dryas octopetala*), Alpine Meadow-rue (*Thalictrum alpinum*) and the Red Data Book species, Purple Saxifrage (*Saxifraga oppositifolia*), are found. The site supports a range of other scarce arctic-alpine/mountain plants, including Green Spleenwort (*Asplenium viride*), Brittle Bladder-fern (*Cystopteris fragilis*), Holly Fern (*Polystichum lonchitis*), Beech Fern (*Phegopteris connectilis*), Starry Saxifrage (*Saxifraga stellaris*), Roseroot (*Rhodiola rosea*), Cowberry (*Vaccinium vitis-idaea*), Mountain Sorrel (*Oxyria digyna*), Dwarf Willow (*Salix herbacea*), Lesser Twayblade (*Listera cordata*), Stiff Sedge (*Carex bigelowii*) and Juniper (*Juniperus communis*).

Several other Red Data Book plant species are also found on the site, including Slender Cottongrass (*Eriophorum gracile*) and Slender Naiad (*Najas flexilis*), both occurring in just single locations. There is an old record from near Maam Cross for Wood Bitter-vetch (*Vicia orobus*), but this has not been seen on the site in recent years.

The threatened species Marsh Clubmoss (*Lycopodiella inundata*) also occurs within the site. All of these species are legally protected under the Flora (Protection) Order, 1999, and Slender Naiad is also listed on Annex II of the E.U. Habitats Directive.

The site is very important for salmon, a species listed on Annex II of the E.U. Habitats Directive. The rivers and lakes, and especially the Bealnabrack system, provide high quality spawning and nursery rivers.

Arctic Char has been recorded in Derrynen Lough and Lough Shindilla. However, only in Lough Shindilla are there recent records for this species. This fish species is listed in the Irish Red Data Book as being threatened in Ireland. The Irish Hare has been recorded from the site and is probably widespread; this endemic subspecies is also listed in the Red Data Book as being threatened. Common Frog, also a Red Data Book species, breeds on the site.

Bird species recorded from the site include Dipper, Heron, Kestrel, Meadow Pipit, Raven, Snipe, Stonechat, Wheatear and Woodcock. Peregrine, a species listed on Annex I of the E.U. Birds Directive, occurs within the site.

The main damaging activities and threats to the Maumturk Mountains are over-grazing, peat cutting and afforestation. Grazing, in particular by sheep, is widespread and quite severe within the site. This has resulted in the erosion of both lowland and mountain blanket bog, and in the modification and destruction of heath communities, particularly in the southern half of the site. Peat cutting, both by hand and by machine, has become more of a problem in recent years but is largely confined to areas of deep, lowland blanket bog. The above activities are the most extensive, but other threats and potentially damaging activities include land drainage and reclamation, fertilization, quarrying and dumping.

This site is of conservation interest as it is a good example of an extensive mountain landscape, containing blanket bog, large areas of heath, siliceous rocky vegetation, oligotrophic lakes and upland grassland. The areas of blanket bog at Teernakill and Caher are largely unaffected by over-grazing and are in very good condition. The presence of rare and protected plant species and of the scarce Arctic Char adds to the interest of the site.

**Site Name: The Twelve Bens/Garraun Complex SAC**

**Site Code: 002031**

This is an extensive site situated in the north-west of Connemara in Co. Galway and dominated by mountainous terrain. The site is bounded to the south by the Connemara Bog Complex, to the east by the Maumturk Mountains and to the north by Killary Harbour. Included within the site are the Twelve Bens mountain range, the mountains to the north of Kylemore (Doughruagh, Garraun and Benchoona), rivers including the Ballynahinch and Owenglin systems and an area of coastal heath and machair near Glassilaun. The site also includes some extensive tracts of lowland blanket bog which are continuous with the mountains. Most of the mountain summits reach a height in excess of 500 m, the highest being Ben Baun in the Twelve Bens which reaches 730 m. The site includes a large portion of the Connemara National Park and a Statutory Nature Reserve at Derryclare Wood.

Geologically, the site can be divided into two distinct parts. The Twelve Bens are composed of resistant quartzite with schists in the valleys, while the mountains north of Kylemore are composed of gneiss and various types of sandstones and mudstones. There are also areas of gabbro (Doughruagh and Currywongaun), mica schist (Muckanaght) and marble outcrops (south of Kylemore Lough). The main soil type within the site is peat.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- |  |
|--|
| <p>[3110] Oligotrophic Waters containing very few minerals<br/>[3130] Oligotrophic to Mesotrophic Standing Waters<br/>[4060] Alpine and Subalpine Heaths<br/>[7130] Blanket Bogs (Active)*<br/>[7150] Rhynchosporion Vegetation<br/>[8110] Siliceous Scree<br/>[8210] Calcareous Rocky Slopes<br/>[8220] Siliceous Rocky Slopes<br/>[91A0] Old Oak Woodlands</p> <p>[1029] Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>)<br/>[1106] Atlantic Salmon (<i>Salmo salar</i>)<br/>[1355] Otter (<i>Lutra lutra</i>)<br/>[1833] Slender Naiad (<i>Najas flexilis</i>)</p> |
|--|

The predominant vegetation type at this site is upland blanket bog/heath dominated by Heather (*Calluna vulgaris*), Deergrass (*Scirpus cespitosus*), Cross-leaved Heath (*Erica cinerea*) and the mosses *Racomitrium lanuginosum* and *Sphagnum capillifolium*. In places this vegetation can be rich in liverworts, with species such as *Adelanthus lindenbergianus* and *Bazzania pearsonii*. This unusual type of species-rich dwarf shrub heath is almost confined to the mountains of the west of Ireland and Scotland, and is particularly well developed in the Twelve Bens. Close to the mountain summits this blanket bog/heath is often developed on a very thin peat with a high proportion of outcropping bedrock.

Another important and widespread habitat is lowland blanket bog dominated by Purple Moor-grass (*Molinia caerulea*), Black Bog-rush (*Schoenus nigricans*), Cross-leaved Heath and the liverwort *Pleurozia purpurea*. These areas of lowland blanket bog usually occur in the valleys between the mountains, e.g. the Gleninagh Valley. Rhynchosporion vegetation is well represented around pools, in wet hollows and in quaking and flush areas associated with the lowland blanket bog. White Beak-sedge (*Rhynchospora alba*) occurs in association with such species as Common Cottongrass (*Eriophorum angustifolium*), Bogbean (*Menyanthes trifoliata*), Black Bog-rush and a range of bog mosses, including *Sphagnum auriculatum* and *S. cuspidatum*.

The site contains a large range of other habitats, including upland grassland dominated by Sheep's-fescue (*Festuca ovina*) and Mat-grass (*Nardus stricta*), oak woodland, scree, oligotrophic (nutrient-poor) lakes, rivers, reedbeds, freshwater marshes, coastal heath, machair, sand dune and saltmarsh.

A number of rare, Red Data Book plant species are found within the site, many of which are associated with rocky scree habitats. These include Alpine Saw-wort (*Saussurea alpina*), Holly Fern (*Polystichum lonchitis*), Purple Saxifrage (*Saxifraga oppositifolia*), and the legally protected (Flora (Protection) Order, 2015) Parsley Fern (*Cryptogramma crispa*). These are generally confined to mountains cliffs above 400 m, where a number of other scarce plant species are also found (for example, Alpine Meadow-rue, *Thalictrum alpinum*). Other Red Data Book species have also been recorded from the site, including Corncockle (*Agrostemma githago*) and the legally protected species Marsh Clubmoss (*Lycopodiella inundata*) and Heath Cudweed (*Omalotheca sylvatica*). St. Dabeoc's Heath (*Daboecia cantabrica*), a species which in Ireland is restricted to Connemara and south Mayo, occurs commonly within the site.

Alpine and subalpine heaths are found in association with exposed rock and scree at high altitudes at this site. Typical species include Heather, Bilberry (*Vaccinium myrtillus*), Crowberry (*Empetrum nigrum*), Juniper (*Juniperus communis* subsp. *nana*), Bearberry (*Arctostaphylos uva-ursi*), Bell Heather (*Erica cinerea*), Tormentil (*Potentilla erecta*), Great Wood-rush (*Luzula sylvatica*), Tufted Hair-grass (*Deschampsia cespitosa*) and Common Bent (*Agrostis capillaris*). The community also holds important assemblages of oceanic montane bryophytes.

The suite of lowland lakes that encircle the mountains represent some of the finest oligotrophic lakes in the country and two rare, Red Data Book plant species, Slender Naiad (*Najas flexilis*) and Pillwort (*Pilularia globulifera*), occur. Slender Naiad is rare in Europe and is listed on Annex II of the E.U. Habitats Directive. Both of these species are listed on the Flora (Protection) Order, 2015.

The site contains several small areas of Sessile Oak (*Quercus petraea*) woodland, a habitat which is particularly rare in Connemara. The best examples on the site of this habitat are found at Kylemore and on the north shore of Derryclare Lough. Derryclare Wood, a Statutory Nature Reserve, has been particularly well studied. It is composed mostly of Sessile Oak, with some Rowan (*Sorbus aucuparia*), Downy Birch (*Betula pubescens*) and occasional Ash (*Fraxinus excelsior*) forming the canopy layer. There is a well-developed lichen and fungus flora present. The fungal parasite, *Hemigrapha astericus*, a native of Australia and South America, was first recorded in the northern hemisphere from this wood. The Kylemore woods, though heavily infested by Rhododendron (*Rhododendron ponticum*), still retain a diverse flora and support interesting communities of mosses and liverworts, including such species as *Radula voluta*, *Lejeunea holtii*, *L. hibernica*, *L. flava* subsp. *moorei*, *Cephalozia hibernica*, *Teleranea nematodes*, *Campylopus setifolius*, *Oxystegus hibernicus*, *Grimmia hartmanii* and *G. funalis*.

Irish Hare, Common Frog, Otter and Freshwater Pearl Mussel and have been recorded from the site. These species are protected under the Wildlife Act, 1976, and the latter two are listed on Annex II of the E.U. Habitats Directive. The Owenglin River supports an important population of Salmon, another Annex II species. Arctic Char, a species listed in the Irish Red Data Book as threatened in Ireland, has been recorded from Lough Inagh, Kylemore Lough, Lough Muck and Lough Fee.

Bird species reported from the site include Raven, Wheatear, Stonechat, Meadow Pipit, Red Grouse (a declining species of heather moorland), Snipe, Curlew, Woodcock, Hooded Crow, Twite, Ring Ouzel (the latter two both Irish Red Data Book species) and the E.U. Birds Directive Annex I species: Peregrine, Merlin, Golden Plover and Chough. The site provides excellent habitat for Peregrine and this species has traditionally bred at several locations within it.

The upland vegetation of the site is most threatened by over-stocking with sheep and by afforestation with coniferous species.

The Twelve Bens/Garraun Complex includes a wide variety of habitat types, nine of which are listed on Annex I of the E.U. Habitats Directive (including one with priority status), and populations of many rare or scarce plant and animal species. It is one of the largest and most varied protected sites in Ireland and so is of high conservation interest.