

# HISTORIC LANDFILL AT CLAREMORRIS, CO. MAYO

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## STAGE 1 APPROPRIATE ASSESSMENT SCREENING REPORT FOR THE REMEDIATION OF HISTORIC LANDFILL SITE, CLAREMORRIS, COUNTY MAYO

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Prepared for: Mayo County Council



**Date:** April 2020

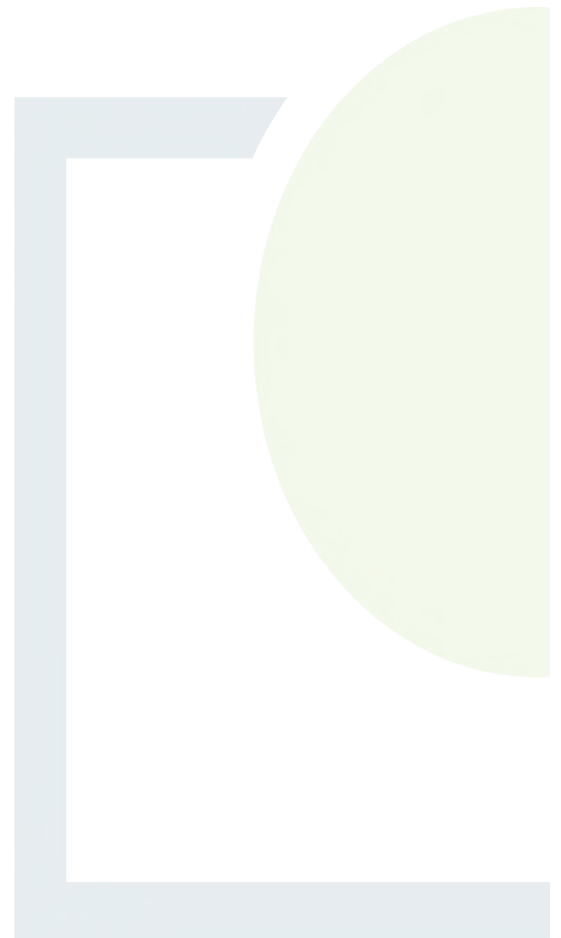
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## STAGE 1 APPROPRIATE ASSESSMENT SCREENING REPORT FOR HISTORIC LANDFILL SITE, CLAREMORRIS, COUNTY MAYO

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**Abstract:** This document comprises the Stage One: Appropriate Assessment Screening Report for the Historic Landfill at Claremorris, Co. Mayo. Appropriate Assessment is required under Article 6 (3) of the Habitats Directive for any project or plan that may give rise to significant effects on a European (Natura 2000) site.

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## 1. INTRODUCTION

Fehily Timoney and Company (FT) were commissioned by Mayo County Council to prepare a Stage 1 Appropriate Assessment Screening Report, as required by Article 6 of Council Directive 92/43/EEC (Habitats Directive). The preparation of the Appropriate Assessment Screening Report (AA Screening) follows a Tier 3 Risk Assessment (see Appendix 2) recommendation for remediation works to the Historic Landfill at Claremorris Co. Mayo (see Figure 1-1 for location). Post the remediation of the historic landfill, it is proposed that a solar farm will be developed on the site. The potential cumulative effects of a solar farm at the site have been considered in this report.

In compliance with the provisions of Article 6 of the Habitats Directive, as implemented by Part XAB of the Planning and Development Act 2000, as amended, in circumstances where a proposed plan or project is likely to have a significant effect on a European (Natura 2000) site, either individually or in combination with other plans or projects, an Appropriate Assessment (AA) must be undertaken by the competent authority, of the implications for the site in view of the site's conservation objectives.

European sites comprise both Special Protection Areas (SPAs) for birds and Special Areas of Conservation (SACs) for habitats and species. The Habitats Directive formed a basis for the designation of SACs. Similarly, SPAs are legislated for under the Birds Directive (Council Directive 79/409/EEC on the Conservation of Wild Birds). In general terms, European sites are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community.

Article 6 of the Habitats Directive envisages a two-stage process, which is implemented in some detail by the provisions of sections 177U and 177V of the Planning and Development Act. Screening for appropriate assessment in accordance with section 177U is the first stage of the AA process (Stage One), in which the possibility of there being a significant effect on a European site is considered. Plans or projects that have no appreciable effect on a European site are thereby excluded, or screened out, at this stage of the process. Where screening concludes that there is the potential for significant effects, then it is necessary to carry out an AA (Stage Two) for the purposes of Article 6(3), and a Natura Impact Statement (NIS) is produced. The NIS, which forms the basis of the AA, considers the effects of a project or plan on the integrity of a European site and on its conservation objectives, and where necessary, draws up mitigation measures to avoid/minimise negative effects.

The competent authority, in carrying out an AA, is required to make an examination, analysis, evaluation, findings, conclusions and a final determination as to whether or not the proposed works would be likely to have significant effects on the relevant European site(s) in view of their conservation objectives. To evaluate the potential effect(s) of the proposed development on the European sites, all sites located within a 15 km radius of the development or those which are ecologically linked were considered. Please note that while a 15 km buffer is recommended for plans, there is no hard and fast rule for buffer size (EPA, 2009). A 15 km buffer was used as it encompasses a distance in which the qualifying features and special conservation interests of European sites may potentially be impacted with regards to the proposed development separately and in combination with other developments. However, European sites located outside of the 15 km buffer with potential links to the proposed development were also considered (e.g. hydrological connections), one additional European site was deemed to be within the potential zone of impact/influence.

The historic landfill is not located within any European site. Eleven European sites are located within 15 km of the proposed development:

- Carrowkeel Turlough SAC (000475)
- River Moy cSAC (002298)



- Lough Corrib cSAC (000297)
- Kilglassan/Cahervoostia Turlough Complex SAC (000504)
- Balla Turlough cSAC (000463)
- Greaghans Turlough SAC (000503)
- Towerhill House SAC (002179)
- Ardkill Turlough SAC (000461)
- Ballinfad SAC (002081)
- Lough Carra/Mask Complex cSAC (001774)
- Lough Carra SPA (004051).

Outside the 15km buffer of the historic landfill site there is an indirect remote hydrological link between the historic landfill and Lough Corrib SPA (004042). As this European site is downstream of the historical landfill it is included in this screening assessment:

- Lough Corrib SPA (004042)

Lough Carra is protected under the designations Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051) is located downstream of Robe River and Lough Carra. The waters from Robe River and Lough Carra feed into Lough Corrib which is designated as Lough Corrib cSAC (000297) and Lough Corrib SPA (004042).

Kilglassan/Cahervoostia Turlough Complex SAC (000504) feeds into the Robe River downstream of the historic site. All of the European sites except for Ballinfad SAC (002081), Balla Turlough cSAC (000463) and River Moy cSAC (002298) are located within same ground water body as the historic landfill.

## 1.1 Legislative Requirements

The requirements for an AA are set out in the Habitats Directive 92/43/EEC. Articles 6(3) and 6(4) of this Directive states:

*6(3) Any plan or project not directly connected with or necessary to the management of the site (Natura 2000 sites) but likely to have 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.*

*6(4) If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*



*Where the site concerned hosts a priority natural habitat type and/or a priority species the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.*

The statutory agency responsible for European sites is the National Parks and Wildlife Service (NPWS) of the Department of Culture, Heritage and the Gaeltacht (DCHG). In December 2009 'Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities, Department of the Environment, Heritage and Local Government' was published (DoEHLG, 2009) with a minor amendment in 2010. This guidance document was prepared jointly by the NPWS and Planning Divisions of DoEHLG (now DCHG), with input from local authorities. Previously, in 2001, the European Commission issued a guidance document. This guidance document has been updated in the published European Commission (2018) "*Managing Natura 2000 sites the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*". This Appropriate Assessment Screening Report has been prepared in accordance with the relevant Irish and European Commission Guidance.

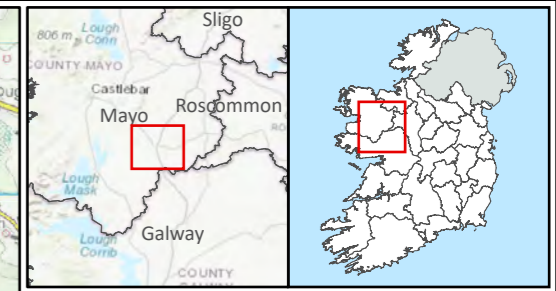
### 1.1.1 Regulatory Context

In 1997, the Habitats Directive was transposed into Irish National Law by the European Communities (Natural Habitats) Regulations, SI 94/1997 (as amended by S.I. 233/1998 & S.I. 378/2005). The European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477/2011) revoked the 1997 Regulations (and amendments) as well as the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010. The purpose of the 2011 Regulations was to address transposition failures identified in the Court of Justice of the European Union (CJEU) judgements.

Following additional amendments in 2013 (S.I. 499/2013) and 2015 (S.I. 355/2015) the regulations are now cited as the European Communities (Birds and Natural Habitats) Regulations 2011 to 2015.

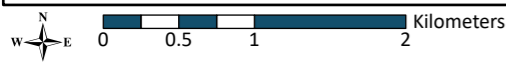
The Regulations have been prepared to address several judgments of the CJEU against Ireland, notably cases C-418/04 (*Commission v Ireland*) and C-183/05 (*Commission v Ireland*), in respect of failure to transpose elements of the Birds Directive and the Habitats Directive into Irish law.





Site Boundary

<b>TITLE:</b>	
Site Location	
<b>PROJECT:</b>	
Claremorris Tier 3 and Remediation Plan	
<b>FIGURE NO:</b>	
1.1	
<b>CLIENT:</b>	
Mayo County Council	
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## 2. METHODOLOGY

### 2.1 Stages of Appropriate Assessment

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures to be addressed in the AA process. Firstly, a project should aim to avoid any negative effects on European sites by identifying possible effects early in the project and should design the project in order to avoid such effects.

There are four stages in an AA, as outlined in the European Commission Guidance document (2001). The following is a brief summary of these steps:

- Stage One - Screening: This stage examines the likely effects of a project either alone or in combination with other projects upon a European Site and considers whether it can be objectively concluded that these effects will not be significant.
- Stage Two - Appropriate Assessment: In this stage, the effect of the project on the integrity of the European site is considered with respect to the conservation objectives of the site and to its structure and function. Mitigation measures should be applied to the point where no adverse effects on the site(s) remain.
- Stage Three - Assessment of Alternative Solutions: Should the Appropriate Assessment determine that adverse effects are likely upon a European site, this stage examines alternative ways of implementing the project that, where possible, avoid these adverse effects.
- Stage Four - Assessment where no alternative solutions exist and where adverse effects remain: Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the Natura site will be necessary. European case law highlights that consideration must be given to alternatives outside the project area in carrying out the IROPI test. It is a rigorous test which projects are generally considered unlikely to pass.

In the preparation of this assessment therefore regard has been given to the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations 2011, and with reference to the relevant 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, European Commission 2001.
- *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin 2010.
- European Commission (2018). *Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC*. Brussels, 21.11.2018 C (2018) 7621 final.

#### 2.1.1 Impact Assessment

The first step in the screening process is to develop a list of European sites potentially affected by the proposed development. Each European site is reviewed to establish whether or not the proposed development is likely to have a significant effect on the integrity of the site, as defined by its structure and function, and its conservation objectives.



The qualifying interests of each European site are identified, and the potential threats are summarised into the following categories for the screening process, and described within the screening matrix as follows:

- Direct effects refer to habitat loss or fragmentation arising from land-take requirements for development or agricultural purposes. Direct effects can be as a result of a change in land use or management, such as the removal of agricultural practices that prevent scrub encroachment.
- Indirect and secondary effects do not have a straight-line route between cause and effect, and it is potentially more challenging to ensure that all the possible indirect effects of the plan (or project) – in combination with other plans and projects - have been established. These can arise when a development alters the hydrology of a catchment area, which in turn affects the movement of groundwater to a site, and the qualifying interests that rely on the maintenance of water levels. Deterioration in water quality can occur as both an indirect or direct consequence of development, which in turn changes the aquatic environment and reduces its capacity to support certain plants and animals. The introduction of invasive species can also be defined as an indirect effect, which results in increased movement of vectors (humans, fauna, surface water), and consequently the transfer of alien species from one area to another.
- Disturbance to fauna can arise directly through the loss of habitat (e.g. bat roosts) or indirectly through noise, vibration and increased activity associated with construction and operation.

## 2.2 Desktop Study

In order to complete the Screening for Appropriate Assessment certain information on the existing environment is required. A desk study was carried out to collate available information on the site's natural environment. This comprised a review of the following publications, data and datasets:

- Mayo County Development Plan 2014-2020
- Mayo County Council Planning Enquiry System
- National Parks and Wildlife Service (NPWS) website and metadata available ([www.npws.ie](http://www.npws.ie))
- OSI Aerial photography and 1:50,000 mapping
- National Biodiversity Data Centre (NBDC) (on-line map-viewer)
- BirdWatch Ireland website
- Teagasc soil area maps (NBDC website)
- Geological Survey Ireland (GSI) area maps
- Environmental Protection Agency (EPA) (on-line map-viewer)
- River Catchment & Sub-catchment WFD datasets

## 2.3 Field Study

Characteristics and general information recorded during engineering surveys for Tier 3 Risk Assessment report of the historic landfill undertaken by Fehily Timoney and Company (FT) has been used to describe the site of the proposed works and its surroundings. A copy of the Tier 3 Risk Assessment report is included as Appendix 2.



### 3. BRIEF DESCRIPTION OF THE EXISTING SITE

The historic landfill's waste footprint (3.2 ha.) is located within a larger body of open land (approximately 9 ha.) located approximately 1 km south-east from the centre of Claremorris town. Claremorris is approximately 24 km south-east of Castlebar. The historic landfill site is located in the townland of Clare and is situated in agricultural land. The site is bounded by a railway to the north and by the Knock-Claremorris Bypass (N17) to the West. The site operated as a landfill accepting municipal waste from 1982 to March 1996. The site was capped with boulder clay, but no remediation works have been completed. It has been reported that on occasion fires have broken out on the site (see Tier 3 Risk Assessment report, Appendix 2 for more information).

Aerial imagery (EPA web viewer; dated 2020) and findings from the site survey carried out as part of the Tier 3 survey indicates that the western portion of the site (raised area) is inhabited by rough grassland and scrub. Scrub growth (bramble, gorse and the invasive species Japanese Knotweed) made access to the site difficult. The eastern half of the site forms part of an area of harvested, drained peatland. The site generally falls from south to north towards the railway and west to east towards the harvested and drained peatland and KILBEG-MALONE stream. Open drains run west to east on this section of the site and outside of site to the south, draining the land towards the KILBEG-MALONE<sup>1</sup> (EPA code: 30K37<sup>2</sup>) which travels south. The site is currently vacant with evidence of rough grazing by horses.

The trial pit excavation works carried out for the Tier 3 Risk Assessment (see Appendix 2) identified waste material tending to the western site boundary with thicknesses ranging from 0.0 (topsoil) – 6.50m BGL (base of excavation). The waste encountered was described mainly as plastic bags, paper and concrete insulation. Most of the made ground and waste material encountered comprised brown black peat mixed with municipal solid waste. Considering the depths found in the trial pitting and the lateral extent found in the slit trenches excavations the interpreted landfill extent covers an area of approx. 32,000m<sup>2</sup> and initial volume calculation estimates an interred waste volume of approximately 168,000m<sup>3</sup> at the site (see Figure 3.3, Tier 3 Risk Assessment).

The quaternary Map provided by GSI Online identifies most quaternary sediments at the site as 'Cut over raised peat' and a north-west portion as 'Gravel derived from Limestones'; 'Till derived from limestones' is found in the surroundings. During the installation of boreholes during the site investigation for Tier 3 Risk Assessment, the presence of natural-black brown peat till is described in the driller's logs to depths of approximately 5.90 m and 4.0 m. The GSI online 1:100,000 scale bedrock geology map, shows the entirety of the site and surrounding area are underlain by the Ballymore Limestone Formation. GSI mapping indicates the presence of karst aquifer located within the site. The site is located within the area of the groundwater body Cong-Robe<sup>3</sup> (Code: IE\_WE\_G\_0019<sup>4</sup>). The risk value for the Cong-Robe ground waterbody is under review by the EPA.

<sup>1</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>2</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>3</sup> Name; Ground waterbodies Risk, EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>4</sup> Code; Ground waterbodies Risk, EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20



According to the EPA map viewer, the site is located within the Corrib catchment<sup>5</sup> (hydrometric area 30<sup>6</sup>), sub catchment Robe\_SC\_010<sup>7</sup> (Code: 30\_9<sup>8</sup>) and Sub-basin Robe\_020<sup>9</sup>. The KILBEG-MALONE<sup>10</sup> (EPA code: 30K37<sup>11</sup>), a 1<sup>st</sup> order stream crosses the eastern portion of the site travelling in a southern direction.

The KILBEG-MALONE travels 156m from the historic landfill site before feeding into the LISDUFF 30<sup>12</sup> (EPA code: 30L43<sup>13</sup>). The LISDUFF 30 then travels a further 2km before feeding into the Robe<sup>14</sup> River (EPA code: 30R01<sup>15</sup>). From where the LISDUFF 30 enters the Robe River, to Lough Mask there is 21.68km (direct distance) and from where the stream leaves the historic landfill to the point which the Robe River feeds into Lough Mask there is a direct distance of 21.8km and an instream distance of 44km. Lough Mask is connected to Lough Corrib via the Cong (Canal)<sup>16</sup> (EPA code: 30C06<sup>17</sup>) and 5.1km in length (direct distance). Lough Corrib is connected to the sea via the Corrib<sup>18</sup> (EPA code: 30C02<sup>19</sup>) which travels another 5.8km before feeding into Galway Bay and is also of 'good' status.

The KILBEG-MALONE and LISDUFF 30 both have a WFD 2013-2018 status of 'good'<sup>20</sup> or Q-Value Q4. Robe River has 'good' status before it declines to 'moderate' or Q3-4, 4km downstream of the historic landfill site as it crosses under the L1509 local road, approximately 3km south of the centre of Claremorris, Co. Mayo. Robe River remains at a 'moderate' status until it reaches Ballinrobe, Co. Mayo, where it returns to 'good' status; 18.8km downstream from the historic landfill site and 15.5km downstream from the L1509 local road where its water quality status declines. The Robe River then travels a further 4.3km before feeding into Lough Mask. Both Lough Mask and Lough Corrib are both of 'good' status.

The invasive plant species, Japanese Knotweed (*Fallopia japonica*) is present on site within the western section of the site. Herbicide was applied in September 2014 and 2015, with no further treatments being carried out since. The Japanese Knotweed Company (JKC) on behalf of Mayo County Council - Claremorris & Western District Energy Co-op carried out additional inspections in August 2018 and 2019.

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<sup>5</sup> Name; WFD Catchments: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>6</sup> Hydrometric area; WFD Catchments: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>7</sup> Name; WFD Sub Catchment: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>8</sup> Sub catchment code; WFD Sub Catchment: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>9</sup> Name; WFD Sub River Basin: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>10</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>11</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>12</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>13</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>14</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>15</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>16</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>17</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>18</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>19</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20  
<sup>20</sup> River Waterbody WFD Status 2013-2018, EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20



## 4. TIER 3 RISK ASSESSMENT FINDINGS

The aim of the Tier 3 assessment was to examine (quantitatively) the potential effects of the historic landfill site on the receiving environment i.e. leachate generation/migration upon the underlying groundwater and potential vertical and lateral landfill gas migration to nearby receptors.

Site investigation and monitoring were undertaken by JS Drilling on behalf of Mayo County Council in 2010 and 2011 (see Appendix 2). Two boreholes were installed on site and converted to leachate and groundwater monitoring wells and the collection of groundwater/leachate was undertaken. There is also in-situ monitoring of landfill gas.

The examination of the potential leachate generation from the site determined that on a regional scale the site does not pose a risk to the groundwater quality of the underlying groundwater body with the site only occupying 0.001% of the groundwater body area.

The existing surface water hydrological connection to the east of the site (KILBEG-MALONE stream which is a tributary of Robe River) was not deemed to be negatively affected by the existing historic landfill (i.e. leachate) and Q-Values for the receiving waters also support these findings (see Section 3).

A review of the trial pit and borehole logs showed that the site only comprises a relatively shallow soil cap with an average thickness of 0.56m (min: 0.3m, max: 0.9m), therefore it is recommended that a more suitable cap be installed. The purpose of the cap will be twofold; to reduce the infiltration of rainfall to the underlying waste subsequently reduce leachate generation and to provide adequate physical separation between the waste mass and future receptors at the site e.g. livestock, construction personnel etc.

The output from LandGEM showed that landfill gas will continue to be generated for several years although in moderate quantities. Gas monitoring indicated the presence of gas within the waste body with carbon dioxide concentrations also being detected slightly above the trigger value for wells outside of the waste body. It is recognised that, owing to the nature of solar farms the level and frequency of human activity at the site will likely be quite low, however it is recommended that landfill gas control measures should be installed at the site to further minimise the risk of landfill gas migration and exposure to any human receptors at or close to the site.

For more information see Tier 3 Risk Assessment.

The remediation works are likely to produce some silt during landfill capping works (i.e. the placement of topsoil and subsoil) and the installation of the barrier system, drainage systems and the installation of landfill gas infrastructure. However, silt production will be limited due to the estimated duration of the works and the area to be capped. Silt is likely to be produced from the reprofiling of ca. 6,400m<sup>3</sup> (depth of 500mm) of the existing capping as well as the placement of subsoil and topsoil (It is estimated that 25,000m<sup>3</sup> of topsoil and 6,000m<sup>3</sup> subsoil will be required for capping), creation and installation of drainage and infrastructure which will be limited due to the scale and nature of works.



## 5. PROPOSED WORKS

Proposed works for the historic landfill are outlined in Section 8 Remedial Action Plan of the Tier 3 Risk Assessment report.. The proposed works comprise of the following elements::

- Landfill capping
- Lined subsurface drainage system
- Surface drainage with outfall to receiving stream
- Landfill gas and leachate interception barrier
- Under liner landfill gas collection infrastructure and vertical walls
- Above liner pipe works connecting wells to oxidisation technology
- Above liner condensation management infrastructure
- Landfill gas pumping trial,
- Environmental Monitoring of groundwater, surface water, leachate and landfill gas

Post remediation of the historic landfill it is proposed that a 5 MW solar farm will be developed on the site. The potential cumulative effects of a solar farm at the site have been considered in this report.

Limited instream works will be undertaken as part of proposed remediation works or for the proposed solar farm construction within the historic landfill site. The only instream works will involve the connection of the proposed onsite surface water drainage network outfalls to existing surface water perimeter drain(s).

### 5.1 Overview

During the preparation of the Tier 3 Risk Assessment, a modelling exercises and quantitative risk assessment was undertaken to identify the appropriate measures to mitigate the identified risks associated with leachate and landfill gas migration at the historic landfill.. The Tier 3 Risk Assessment concluded that the primary risk associated with the site at present is leachate migration into the underlying groundwater aquifer.

Regarding the risk of landfill gas migration, although the calculated Source Pathway Receptor (SPR) risk score was low, the proximity of the site to residential areas and proposed after use requires pro-active measures to mitigate the risk of landfill gas migration.

The remediation measures are proposed to mitigate the effect of the landfill on:

- The underlying aquifer and on groundwater quality.
- Landfill gas migration.

### 5.1 Landfill Capping

A fully engineered landfill cap is proposed for the site. The total extent of the cap is c. 32,000m<sup>2</sup>. The landfill cap shall be design in accordance with the EPA Landfill design manual for non-inert, non-hazardous landfills.



The capping shall typically consist of the following or equivalent:

- 200mm Topsoil Layer.
- 800mm Sub Soil.
- Sub-Surface Drainage Geocomposite.
- 1mm LLDPE Barrier Layer.
- Sub-Surface Landfill Gas Collection Geocomposite.

The capping design shall facilitate the proposed after use of the site as a solar farm providing a suitable base for the solar panel arrays. The sub soil layer shall be therefore be adequately specified to ensure it is free draining and can support any proposed infrastructure associated with the solar panel network. Construction details for respective elements of the proposed cap will be subject to detailed design and prior Agency approval.

Key design criteria recommendations for respective elements are listed below under respective section headings. Excavation requirements will be limited 6,400m<sup>3</sup> (area of 500mm) of the existing capping. It is estimated that 25,000m<sup>3</sup> of topsoil and 6,000m<sup>3</sup> subsoil will be required for the removal of existing capping.

#### 5.1.1 Topsoil

Topsoil 200 mm shall be placed on top of the subsoil. Topsoil shall be seeded with a robust pasture or similar durable grassland mix.

Topsoil shall be compliant to BS3882:2015 or equal approved and graded to ensure no localised surface depressions are present.

#### 5.1.2 Subsoil

Infill subsoil materials will be required to re-profile the landfill to fill in localised depressions.

Subsoil 800 mm thick shall be provided using a uniformly graded material with stone sizes not greater than 50 mm or equal approved.

### 5.2 Subsurface drainage on cap

A subsurface drainage layer on the cap barrier (hydraulic conductivity should be equal to or greater than 1x10<sup>-4</sup>m/s for a thickness of 500 mm) or equal approved geocomposite shall be placed between the subsoil and barrier layer.

The drainage layer shall discharge to a subsurface pipe work collection system and thence to the surface drainage system.

Sub surface drainage layout shall be subject to detailed design.





### 5.3 Surface drainage

Surface drainage layouts using grassed waterways shall collect and direct surface water runoff including subsurface drainage outfall flows to one or more dedicated surface drainage outfalls into existing surface water perimeter drain(s).

Surface drainage shall be designed to mitigate the risk of rill or gully erosion giving rise to suspended solids loading exceeding of 25 mg/l on the cap and within receiving waters.

Surface drainage layout shall be subject to detailed design.

### 5.4 Barrier System

The barrier system shall use 1.0 mm LLDPE or similar approved.

This barrier will require vertical cut-offs on all boundaries to mitigate the risk of landfill gas migration and leachate egress following secondary consolidation.

### 5.5 Landfill Gas

#### 5.5.1 Landfill Gas Pumping Trial

It is proposed that a landfill gas pumping trial be designed and conducted on site to accurately quantify the flow rate and quality of landfill gas being produced at the site to further quantify risks associated with possible landfill gas migration

Landfill gas pumping trials shall be designed and undertaken by an appropriately qualified person, the results of which shall be supported by a suitably calibrated landfill gas generation model.

It is recommended, subject to findings, that an appropriate remediation design shall be adopted. Appropriate control measures shall be selected in accordance with the EPA Guidance document: *Management of Low Levels of Landfill Gas*.

#### 5.5.2 Landfill Gas Infrastructure

Subject to landfill gas flow rates the following installations may need to be considered to collect landfill gas:

- Below liner gas collection infrastructure comprising:
  - Under liner gas collection infrastructure
  - Vertical wells
- Above liner gas collection infrastructure comprising:
  - Above liner pipework connecting wells to oxidation technology
  - Condensate management infrastructure



Subject to gas flow rates and calorific value the following oxidation technologies maybe considered:

- High Calorific gas will typically require active extraction and subsequent oxidation using a high temperature high calorific (HTHC) flare.
- Low calorific gas will typically require active extraction and subsequent oxidation using a high temperature low calorific (HTLC) flare.
- Very low calorific gas may require active extraction or passive ventilation to support oxidation in a biological filter.
- Extremely low calorific gas may require passive venting via a carbon filter to mitigate the risk of odour nuisance.

Whichever technology is used the site will require power and telemetry connections to operate and or monitor oxidation technology. Where active extraction is required power will also be required to manage condensate management infrastructure.

### 5.5.3 Landfill Gas Management

A gas management risk assessment shall be carried out prior to detailed design.

Gas management proposals shall:

- Mitigate environmental pollution in accordance with best practice.
- Mitigate risks of asphyxiation and explosion.

Gas management design proposals shall make reference to gas prediction model estimates in this report and shall to facilitate detailed design and or selection of the most appropriate landfill gas oxidation solution or venting as may be required. All gas management proposals shall be subject to detailed designs.

The underliner gas collection layer shall comprise:

- An under-liner gas collection geocomposite or similar approved stone drainage layer. e and collection pipework. The Landfill Directive does not define a thickness or permeability. The EPA Landfill Site Design manual advises equivalence should not be less than a 150 mm stone layer with a hydraulic permeability of  $1 \times 10^{-4} \text{m/s}$ .
- Provision for passive venting of landfill above the liner with methane oxidation if required.
- Management of below liner leachate breakouts.

The above liner gas collection pipework, if required, shall make provision for:

- Vertical wells and above liner collection pipework.
- Condensate management and associated infrastructure



In relation to whichever oxidation or passive venting technologies are required:

- Flare compounds shall be fenced.
- Gas vent stacks shall terminate at least 3.0 m above adjacent ground surfaces and be capped to prevent rainfall ingress and insertion of ignition sources (cigarettes or other).
- Biological filters shall be fenced and isolated from pedestrian, vehicular or animal activities.
- Equipment shall be specified to accommodate appropriate ATEX classifications.

## 5.6 Environmental Monitoring

### 5.6.1 Groundwater

It is recommended that groundwater monitoring be conducted quarterly at existing groundwater wells BH01 and BH02 to monitor changes in the leachate composition.

It is recommended that 3 No. additional combined groundwater and landfill gas monitoring wells be installed outside and downstream of the waste body to monitor effects if any of leachate migrating and potentially contaminating downstream groundwater and/or surface water receiving bodies.

### 5.6.2 Surface Water

It is recommended that surface water monitoring be conducted on a quarterly basis at 5 no. monitoring locations as follows:

- Upstream of waste body on N17 embankment toe drain.
- Upstream of waste body on drain to the railway line.
- Downstream of waste body on drain to the railway line.
- Upstream location on the Robe\_020 (Kilbeg-Malone) prior to railway line drain.
- River downstream of railway line drain.

The proposed locations should be selected for accessibility prior to establishing dedicated sampling points with appropriate access and signage.

### 5.6.3 Monitoring Parameters

The EPA Landfill Monitoring landfill manual outlines recommended, minimum monitoring requirements for surface water, groundwater and leachate. These parameters are shown in Table 8-1 in Appendix 3 and are as presented in Table C.2 of the EPA's *Landfill Manuals - Landfill Monitoring, 2<sup>nd</sup> Edition (2003)*.



## 5.7 Landfill Gas Migration Monitoring

Landfill gas migration monitoring shall be conducted in tandem with groundwater monitoring at each proposed and existing borehole location. Monitoring parameters should at a minimum include;

- Methane
- Carbon Dioxide
- Oxygen
- Balance

## 5.8 Japanese Knotweed Management

The invasive plant species, Japanese Knotweed (*Fallopia japonica*) is present within the western half of the site and on the historic landfill. Herbicide was applied in September 2014 and 2015, with no further treatments being carried out since. The Japanese Knotweed Company (JKC) on behalf of Mayo County Council - Claremorris & Western District Energy Co-op carried out additional inspections in August 2018 and 2019 and the invasive species are still present on site.

Prior to any proposed remediation works at the historical landfill, the site must be surveyed by an experienced ecologist/invasive species specialist and a management plan for the treatment and/or removal of Japanese Knotweed on the historic landfill site will have to be prepared and implemented. .

Please note that while a management plan for Japanese Knotweed is required this has not been considered in the assessment of the effects of the proposed remediation of the historic landfill site. A worst-case scenario has been taken with regards to Japanese Knotweed.

## 5.9 Future Potential After Use: Solar Farm

Post remediation of the historic landfill there is a plan for a proposed solar farm at the site.

### 5.9.1 Description of Proposed Solar Farm

Mayo County Council and the Claremorris and Western District Energy Co-operative have entered a partnership to construct a 5 MW Solar Farm on this site (see Plate 3-1). The planning boundary for the development is comprised of three subsites; the historic landfill at Claremorris (approx. 5 ha), a site leased from local farmers (4 ha) and a 3rd site west of the N17. The Partnership have secured a grid connection to ESB Networks and the proposed next stage is to seek planning permission through the Part 8 process. It is envisaged that the site will be connected to an existing substation located ca. 140m north of the site; located across a railway line and in a field.

Access to the site is via an existing railway crossing in the north east of the site as shown in Plate 3-2. The main internal access road for construction and operational phases is along the eastern boundary of the site. The 6 control cabins will be located in the south-eastern corner of the site (See Plate 3.2). The area within the red line boundary to the west of the N17 will not be developed due to the presence of overhead powerlines.



The PV panel array will be on ground mounted steel frames, and the development will include electricity control cabins, inverter units, cable ducts, hardstanding area, boundary security fence, site entrance, access track, landscaping, CCTV, together with all ancillary site works and services.

Each panel will be approximately 1925mm x 996mm and will be laid in rows and tilted so that they are south facing. The maximum height of the panels will be 3 m above ground level and they will be anchored using either a steel frame driven 1.7m below ground level or alternatively a precast concrete slab depending on ground conditions.

Gaps of 5.5m will be left between panel rows to allow for maintenance and for livestock to graze after the installation is completed.

A Stage One Screening Assessment has been carried out for the Proposed Solar Farm at Claremorris, Co. Mayo and can be found in Appendix 4.

### 5.9.2 Considerations

All remediation work proposals will be reviewed at detailed design stage with respect to the decision or otherwise to progress with the construction of the proposed solar farm development. All remediation works and solar farm works shall be cognisant of the nature of the site.

Particular attention will be required to the selection and construction of a suitable capping layer upon which the solar farm may be located. It is recommended that the solar farm developer and the remediation designer agree on the mechanism required to fix panels to the engineered cap in order to mitigate the risk of damage to the barrier liner which is normally placed 1.0m below the surface.

The solar development shall also be required to consider the risks associated with landfill gas. Suitable protection and design measures shall be employed particularly with respect to structures and or conduits installed above or within the capping. The detailed solar panel design shall consider all relevant ATEX regulations when preparing detailed designs.

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**Plate 3-1: Location of Proposed Solar Farm at Claremorris, Co. Mayo**

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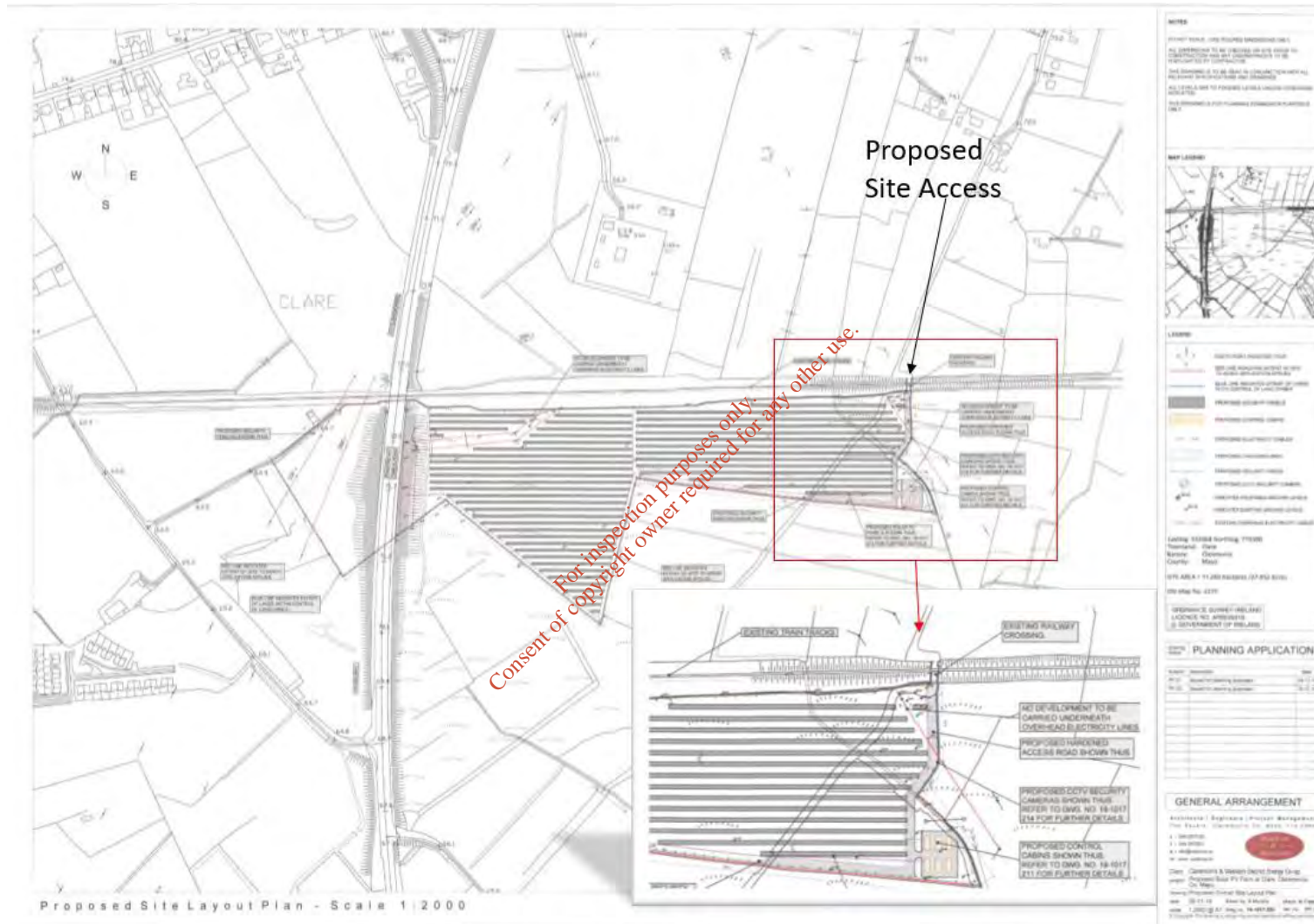


Plate 3-2: Layout of Proposed Solar Farm at Claremorris, Co. Mayo



## 6. STAGE ONE – SCREENING REPORT

### 6.1 Brief Description of the European Sites within 15km of the Development

There are 11 European sites within the zone of influence (15 km) of the project (see Figure 4-1) and one European site, Lough Corrib SPA (004042), with an indirect remote hydrological link to the historic landfill site that is outside of the 15km buffer. Of these 12 European sites, 10 are SACs and two are SPAs. Table 4-1 lists these European sites, including their qualifying interests, conservation objectives and known threats to these sites (according to information provided by the NPWS ([www.npws.ie](http://www.npws.ie))). The twelve sites are as follows:

- Carrowkeel Turlough SAC (000475) 6.8km southwest of site
- River Moy cSAC (002298) – 7km north and west of site
- Lough Corrib cSAC (000297) – 9.4km southeast of site
- Kilglassan/Cahervoostia Turlough Complex SAC (000504) – 11.6km southwest of site
- Balla Turlough cSAC (000463) – 12.2km northwest of site
- Greaghans Turlough SAC (000503) - 13km southwest of the site
- Towerhill House SAC (002179) – 13.8km west of the site
- Ardkill Turlough SAC (000461) – 14km southwest of the site
- Ballinfad SAC (002081) – 14.8km northeast of site
- Lough Carra/Mask Complex cSAC (001774) – 14.8km west of the site
- Lough Carra SPA (004051) – 14.9km west of the site
- Lough Corrib SPA (004042) – 26.7km southwest of the site

Below all direct and indirect surface water and ground waterbody links between the historic landfill site and the aforementioned European sites are described. Where no hydrological links exist between the historic landfill site and a European site this has also been described.

#### *No Hydrological Link*

The River Moy cSAC (002298) and Balla Turlough cSAC (000463) are not located within the same catchment (hydrometric area 34) and the historic landfill site and are located 7km and 12.2km respectively away. Due to there being no hydrological link as well as distance from the site, these sites are screened out.

Ballinfad SAC (002081) is not hydrologically linked to the historic landfill and located is 14.8km away from the historic landfill site. Due to there being no hydrological link as well as distance from the site Ballinfad SAC (002081) can be immediately screened out.

#### *Indirect Hydrological Link*

Kilglassan/Cahervoostia Turlough Complex SAC (000504) is located within a separate sub-catchment to the historic landfill site but the Turlough feeds into the Robe River downstream of the historic site.

#### *Same Ground Waterbody*

Carrowkeel Turlough SAC (000475) is located within the ground waterbody as the historic landfill site.

Greaghans Turlough SAC (000503) and Ardkill Turlough SAC (000461) are located in separate sub-catchments to the historic landfill but share the same ground waterbody.





### *Indirect Hydrological Link and Same Ground Waterbody*

Lough Carra/Mask Complex cSAC and Lough Carra SPA (004051) are located 14.8km and 14.9km respectively downstream of the historic landfill (direct distance). Whilst both European sites are located within a separate sub-catchment from the historic landfill they are indirectly linked to the historic landfill via the Robe River. Lough Carra/Mask Complex cSAC and Lough Carra SPA (004051) are also located within the same ground waterbody as the historic landfill.

Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) receive waters from Lough Carra via a linking stream (Cong (Canal)) and these sites are located 14.9km respectively downstream of the historic landfill (direct distance) and are also located within the same ground waterbody as the historic landfill.

Towerhill House SAC (002179) feeds into Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051) which has an indirect hydrological link within the historical site via the Robe River. Towerhill House SAC is located 1.3km and 1.6km respectively, north of the SAC and SPA European sites; 9km north of where the Robe River enters the European sites.

### *Sites Screened Out and Sites Requiring Further Assessment*

Three of the 12 European sites; River Moy cSAC (002298), Balla Turlough cSAC (000463) and Ballinfad SAC (002081) are screened out due to:

- 1.) no hydrological links,
- 2.) distance between the historic landfill site and the three aforementioned European sites.

Further details for screening out are discussed in the below in Table 4-1.

Due to hydrological links to the historic landfill site, 9 of the 12 European sites require further examination. These are:

- Carrowkeel Turlough SAC (000475)
- Lough Corrib cSAC (000297)
- Kilglassan/Cahervoostia Turlough Complex SAC (000504)
- Greaghans Turlough SAC (000503)
- Towerhill House SAC (002179)
- Ardkill Turlough SAC (000461)
- Lough Carra/Mask Complex cSAC (001774)
- Lough Carra SPA (004051)
- Lough Corrib SPA (004042)



**Table 4-1: European Sites within the zone of influence**

Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
Carrowkeel Turlough SAC (000475)	6.8 km	To maintain or restore the favourable conservation condition of the Annex I habitat for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li>Turloughs [3180]*</li> </ul>	<p><u>Medium level inside site:</u></p> <ul style="list-style-type: none"> <li>H01.05 Diffuse pollution to surface waters due to agricultural and forestry activities</li> <li>A08 Fertilisation</li> <li>J02.01.03 Infilling of ditches, dykes, ponds, pools, marshes or pits</li> <li>A04 Grazing</li> </ul>	<p>This site is screened out because:</p> <ul style="list-style-type: none"> <li>No direct hydrological link (in separate sub basin);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul> <p>No direct or indirect effect will occur on this site's qualifying interests.</p>
River Moy cSAC (002298)	7 km	To maintain <b>(M)</b> and restore <b>(R)</b> the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li>Active raised bogs [7110] <b>(R)</b></li> <li>Degraded raised bogs still capable of natural regeneration [7120] <b>(R)</b></li> <li>Depressions on peat substrates of the <i>Rhynchosporion</i> [7150] <b>(R)</b></li> <li>Alkaline fens [7230] <b>(M)</b></li> </ul>	<p><u>High level both inside and outside of the site:</u></p> <ul style="list-style-type: none"> <li>B01 Forest planting on open ground</li> <li>I01 Invasive non-native species</li> <li>H01.05 Diffuse pollution to surface waters due to agricultural and forestry activities</li> <li>A02.01 Agricultural intensification</li> </ul>	<p>This site is screened out because:</p> <ul style="list-style-type: none"> <li>No direct hydrological link (in separate catchment);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul>



Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
			<ul style="list-style-type: none"> <li>• Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] <b>(M)</b></li> <li>• Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i>. (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] <b>(M)</b></li> <li>• <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092] <b>(M)</b></li> <li>• <i>Petromyzon marinus</i> (Sea Lamprey) [1095] <b>(M)</b></li> <li>• <i>Lampetra planeri</i> (Brook Lamprey) [1096] <b>(M)</b></li> <li>• <i>Salmo salar</i> (Salmon) [1106] <b>(M)</b></li> <li>• <i>Lutra</i> (Otter) [1355] <b>(M)</b></li> </ul>	<ul style="list-style-type: none"> <li>• B05 Use of fertilizers (forestry)</li> </ul> <p><u>Medium level both inside and outside of the site:</u></p> <ul style="list-style-type: none"> <li>• D04.02 Aerodrome, heliport</li> <li>• C01.03 Peat extraction</li> </ul>	<p>No direct or indirect effect will occur on this site's qualifying interests.</p>

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Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
Lough Corrib cSAC (000297)	9.4 km	To maintain <b>(M)</b> and restore <b>(R)</b> the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li>Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] <b>(R)</b></li> <li>Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletalia uniflorae</i> and/or <i>Soetovanojuncetea</i> [3130] <b>(R)</b></li> <li>Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara spp.</i> [3140] <b>(R)</b></li> <li>Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] <b>(M)</b></li> <li>Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>)</li> </ul>	<p><u>High level both inside and outside of the site:</u></p> <ul style="list-style-type: none"> <li>A02.01 Agricultural intensification</li> </ul> <p><u>High level inside of the site:</u></p> <ul style="list-style-type: none"> <li>I01 Invasive non-native species</li> <li>G05 Other human intrusions and disturbances</li> <li>C01.03.02 Mechanical removal of peat</li> </ul> <p><u>High level outside of the site:</u></p> <ul style="list-style-type: none"> <li>H01.08 Diffuse pollution to surface waters due to household sewage and waste waters</li> </ul> <p><u>Medium level both inside and outside of the site:</u></p> <ul style="list-style-type: none"> <li>B01 Forest planting on open ground</li> </ul>	<p>This site is screened out because:</p> <ul style="list-style-type: none"> <li>No direct hydrological link (in separate subcatchment);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul> <p>No direct or indirect effect will occur on this site's qualifying interests.</p>



Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
			(* important orchid sites) [6210] <b>(M)</b> <ul style="list-style-type: none"> <li>Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinia caerulea</i>) [6410] <b>(M)</b></li> <li>Active raised bogs [7110] <b>(R)</b></li> <li>Degraded raised bogs still capable of natural regeneration [7120] <b>(R)</b></li> <li>Depressions on peat substrates of the <i>Rhynchosporion</i> [7150] <b>(R)</b></li> <li>Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210] <b>(M)</b></li> <li>Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220] <b>(M)</b></li> <li>Alkaline fens [7230] <b>(M)</b></li> <li>Limestone pavements [8240] <b>(M)</b></li> </ul>	<ul style="list-style-type: none"> <li>J02.15 Other human induced changes in hydraulic conditions</li> <li>A08 Fertilisation</li> </ul> <p><u>Medium level inside of the site:</u></p> <ul style="list-style-type: none"> <li>D03.01.02 Piers / tourist harbours or recreational piers</li> <li>J02.01.03 Infilling of ditches, dykes, ponds, pools, marshes or pits</li> <li>A04.03 Abandonment of pastoral systems, lack of grazing</li> <li>D01 Roads, paths and railroads</li> <li>A10.01 Removal of hedges and copses or scrub</li> <li>E01.03 Dispersed habitation</li> </ul> <p><u>Medium level outside of the site:</u></p>	



Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
			<ul style="list-style-type: none"> <li>• Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] <b>(M)</b></li> <li>• Bog woodland [91D0] <b>(M)</b></li> <li>• <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029] <b>(R)</b></li> <li>• <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092] <b>(M)</b></li> <li>• <i>Petromyzon marinus</i> (Sea Lamprey) [1095] <b>(R)</b></li> <li>• <i>Lampetra planeri</i> (Brook Lamprey) [1096] <b>(M)</b></li> <li>• <i>Salmo salar</i> (Salmon) [1106] <b>(M)</b></li> <li>• <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] <b>(R)</b></li> <li>• <i>Lutra</i> (Otter) [1355] <b>(M)</b></li> </ul>	<ul style="list-style-type: none"> <li>• E01.01 Continuous urbanisation</li> </ul> <p><u>Low level inside of the site:</u></p> <ul style="list-style-type: none"> <li>• E03.01 Disposal of household / recreational facility waste</li> </ul> <p><u>Low level outside of the site:</u></p> <ul style="list-style-type: none"> <li>• C01.01 Sand and gravel extraction</li> </ul>	

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Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
			<ul style="list-style-type: none"> <li><i>Drepanocladus vernicosus</i> (Slender Green Feather-moss) [1393] (M)</li> <li><i>Najas flexilis</i> (Slender Naiad) [1833] (R)</li> </ul>		
Kilglassan/Cahervoostia Turlough Complex SAC (000504)	11.6 km	To maintain or restore the favourable conservation condition of the Annex I habitat for which the SAC has been selected (further details available in Appendix 5)	<p style="color: red; transform: rotate(-45deg); opacity: 0.5;">Copy for inspection purposes only. Consent of copy right owner required for any other use.</p> <ul style="list-style-type: none"> <li>Turloughs [3180]*</li> </ul>	<p><u>High level inside site:</u></p> <ul style="list-style-type: none"> <li>A01 Cultivation</li> <li>A02.01 Agricultural intensification</li> <li>H02.06 Diffuse groundwater pollution due to agricultural and forestry activities</li> <li>H01.05 Diffuse pollution to surface waters due to agricultural and forestry activities</li> </ul> <p><u>Medium level inside site:</u></p> <ul style="list-style-type: none"> <li>A04.01.01 Intensive cattle grazing</li> <li>A08 Fertilisation</li> <li>A03 Mowing / cutting of grassland</li> </ul>	<p>This site is screened out because:</p> <ul style="list-style-type: none"> <li>No direct hydrological link (in separate subcatchment, feeds into the Robe River but does not receive waters);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul> <p>No direct or indirect effect will occur on this site's qualifying interests.</p>



Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
				<u>Low level inside site:</u> <ul style="list-style-type: none"> <li>A05.02 Stock feeding</li> </ul>	
Balla Turlough cSAC (000463)	12.2 km	To maintain or restore the favourable conservation condition of the Annex I habitat for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li>Turloughs [3180]*</li> </ul>	<u>Medium level inside site:</u> <ul style="list-style-type: none"> <li>A04 Grazing</li> </ul> <u>Medium level outside site:</u> <ul style="list-style-type: none"> <li>A08 Fertilisation</li> </ul> <u>Low level inside site:</u> <ul style="list-style-type: none"> <li>F03.01 Hunting</li> </ul>	This site is screened out because: <ul style="list-style-type: none"> <li>No direct hydrological link (in separate catchment);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul> No direct or indirect effect will occur on this site's qualifying interests.
Greaghans Turlough SAC (000503)	13 km	To maintain or restore the favourable conservation condition of the Annex I habitat for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li>Turloughs [3180]*</li> </ul>	<u>High level inside site:</u> <ul style="list-style-type: none"> <li>A02.01 Agricultural intensification</li> </ul> <u>Medium level both inside and outside site:</u> <ul style="list-style-type: none"> <li>H01.05 Diffuse pollution to surface waters due to</li> </ul>	This site is screened out because: <ul style="list-style-type: none"> <li>No direct hydrological link (in separate subcatchment);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul>





Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
				agricultural and forestry activities  <u>Medium level inside site:</u> <ul style="list-style-type: none"> <li>A05.02 Stock feeding</li> <li>A08 Fertilisation</li> </ul> <u>Low level inside site:</u> <ul style="list-style-type: none"> <li>A04 Grazing</li> </ul>	No direct or indirect effect will occur on this site's qualifying interests.
Towerhill House SAC (002179)	13.8 km	To maintain the favourable conservation condition of the Annex II species for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li><i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]</li> </ul>	<u>High level inside site:</u> <ul style="list-style-type: none"> <li>B Sylviculture, forestry</li> </ul>	This site is screened out because: <ul style="list-style-type: none"> <li>No direct hydrological link (in separate subcatchment, feeds into Lough Carra);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul> No direct or indirect effect will occur on this site's qualifying interests.



Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
Ardkill Turlough SAC (000461)	14 km	To maintain or restore the favourable conservation condition of the Annex I habitat for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li>Turloughs [3180]*</li> </ul>	<p><u>Medium level inside site:</u></p> <ul style="list-style-type: none"> <li>A04.01.01 Intensive cattle grazing</li> <li>H02.06 Diffuse groundwater pollution due to agricultural and forestry activities</li> <li>A04 Grazing</li> <li>A02.01 Agricultural intensification</li> <li>A08 Fertilisation</li> </ul>	<p>This site is screened out because:</p> <ul style="list-style-type: none"> <li>No direct hydrological link (in separate subcatchment);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul> <p>No direct or indirect effect will occur on this site's qualifying interests.</p>
Ballinfad SAC (002081)	14.8km	To maintain the favourable conservation condition of the Annex II species for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li><i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]</li> </ul>	<p><u>Low level inside site:</u></p> <ul style="list-style-type: none"> <li>K01.01 Erosion</li> </ul>	<p>This site is screened out because:</p> <ul style="list-style-type: none"> <li>No hydrological link (in separate catchment);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul> <p>No direct or indirect effect will occur on this site's qualifying interests.</p>



Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
Lough Carra/Mask Complex cSAC (001774)	14.8km	To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected (further details available in Appendix 5).	<ul style="list-style-type: none"> <li>Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110]</li> <li>Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletalia uniflorae</i> and/or <i>Soetovanojuncetea</i> [3130]</li> <li>Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara spp.</i> [3140]</li> <li>European dry heaths [4030]</li> <li>Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210]</li> <li>Calcareous fens with <i>Cladium mariscus</i> and species of the</li> </ul>	<p><u>High level inside the site:</u></p> <ul style="list-style-type: none"> <li>H01 Pollution to surface waters (limnic, terrestrial, marine &amp; brackish)</li> </ul> <p><u>Medium level inside site:</u></p> <ul style="list-style-type: none"> <li>A03.03 Abandonment / lack of mowing</li> </ul>	<p>This site is screened out because:</p> <ul style="list-style-type: none"> <li>No direct hydrological link (in separate subcatchment);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul> <p>No direct or indirect effect will occur on this site's qualifying interests.</p>



Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
			<ul style="list-style-type: none"> <li><i>Caricion davalliana</i> [7210]</li> <li>Alkaline fens [7230]</li> <li>Limestone pavements [8240]</li> <li>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i>. (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</li> <li><i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]</li> <li><i>Lutra lutra</i> (Otter) [1355]</li> <li><i>Drepanocladus vernicosus</i> (Slender Green Feather-moss) [1393]</li> </ul>		
Lough Carra SPA (004051)	14.9km	To maintain or restore the favourable conservation condition of the Annex II species for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li>Common Gull (<i>Larus canus</i>) [A182]</li> </ul>	<p><u>Medium level inside site:</u></p> <ul style="list-style-type: none"> <li>F02.03 Leisure fishing</li> </ul>	<p>This site is screened out because:</p> <ul style="list-style-type: none"> <li>No direct hydrological link (in separate subcatchment);</li> <li>Distance between the site and proposed development;</li> </ul>



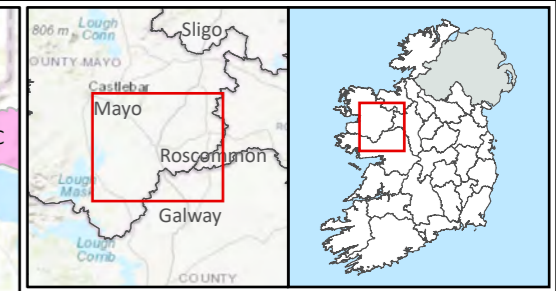
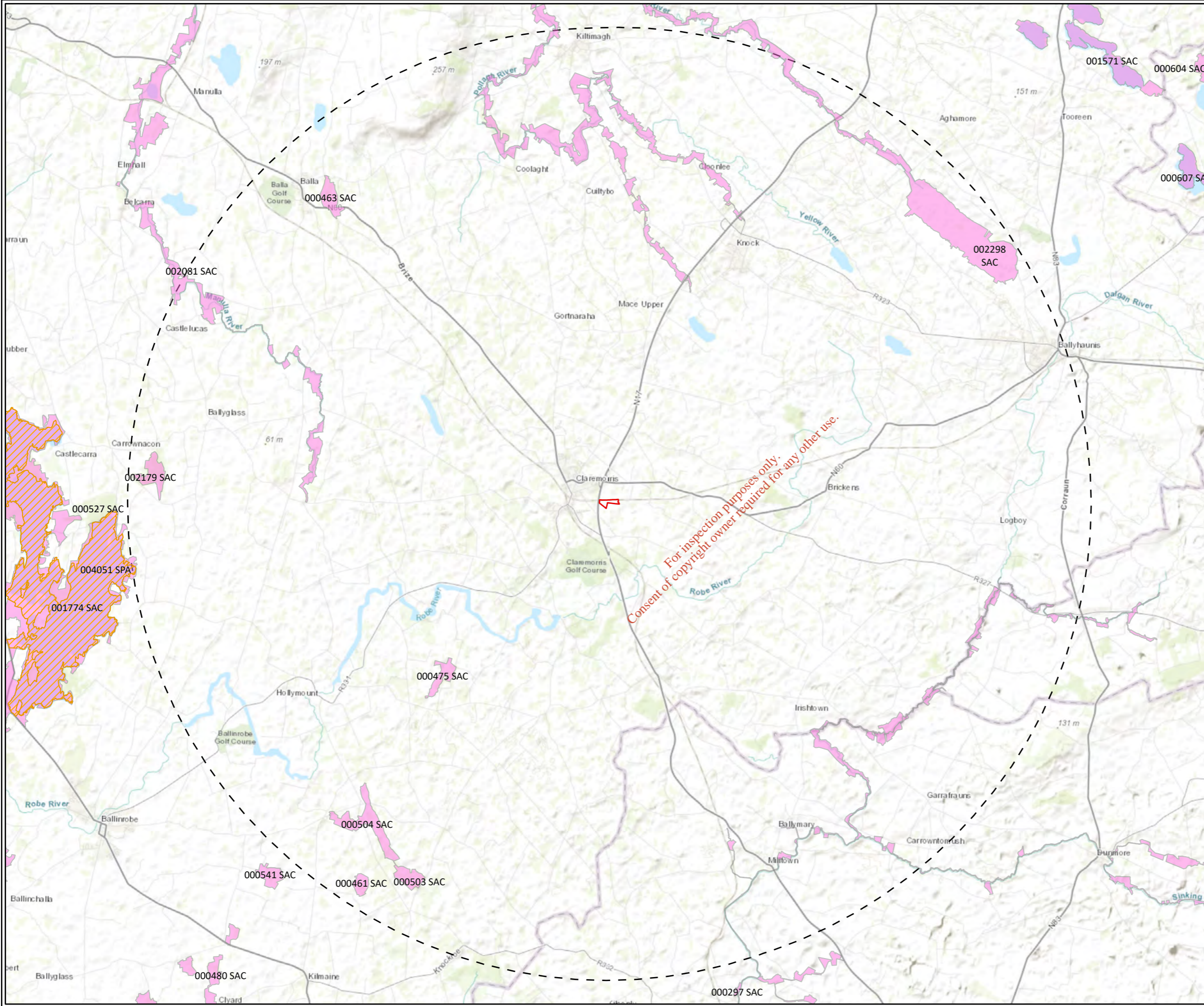
Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
				<p><u>Medium level outside site:</u></p> <ul style="list-style-type: none"> <li>A10 - Restructuring agricultural land holding</li> <li>A08 - Fertilisation</li> <li>B - Sylviculture, forestry</li> </ul>	<ul style="list-style-type: none"> <li>Works will be localised and relatively small in scale.</li> </ul> <p>No direct or indirect effect will occur on this site's qualifying interests.</p>
Lough Corrib SPA (004042).	26.7km	To maintain or restore the favourable conservation condition of the Annex II species for which the SAC has been selected (further details available in Appendix 5)	<ul style="list-style-type: none"> <li>Gadwall (<i>Anas strepera</i>) [A051]</li> <li>Shoveler (<i>Anas clypeata</i>) [A056]</li> <li>Pochard (<i>Aythya ferina</i>) [A059]</li> <li>Tufted Duck (<i>Aythya fuligula</i>) [A061]</li> <li>Common Scoter (<i>Melanitta nigra</i>) [A065]</li> <li>Hen Harrier (<i>Circus cyaneus</i>) [A082]</li> <li>Coot (<i>Fulica atra</i>) [A125]</li> <li>Golden Plover (<i>Pluvialis apricaria</i>) [A140]</li> <li>Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179]</li> </ul>	<p><u>High level inside the site:</u></p> <ul style="list-style-type: none"> <li>F03.01 Hunting</li> <li>F02.03 Leisure fishing</li> </ul> <p><u>High level outside the site:</u></p> <ul style="list-style-type: none"> <li>E01 Urbanised areas, human habitation</li> </ul> <p><u>Medium level outside site:</u></p> <ul style="list-style-type: none"> <li>B - Sylviculture, forestry</li> </ul> <p><u>Low level inside the site:</u></p> <ul style="list-style-type: none"> <li>G01.01 Nautical sports</li> </ul>	<p>This site is screened out because:</p> <ul style="list-style-type: none"> <li>No direct hydrological link (in separate subcatchment);</li> <li>Distance between the site and proposed development;</li> <li>Works will be localised and relatively small in scale.</li> </ul> <p>No direct or indirect effect will occur on this site's qualifying interests.</p>



Designated Site (Site Code)	Direct-line Distance from Proposed Development (km)	Conservation Objectives	Qualifying Interests	Threats and Pressures	Screening Rationale
			<ul style="list-style-type: none"> <li>• Common Gull (<i>Larus canus</i>) [A182]</li> <li>• Common Tern (<i>Sterna hirundo</i>) [A193]</li> <li>• Arctic Tern (<i>Sterna paradisaea</i>) [A194]</li> <li>• Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395].</li> <li>• Wetland and Waterbirds [A999]</li> </ul>	<p><u>Low level outside the site:</u></p> <ul style="list-style-type: none"> <li>• A08 Fertilisation</li> <li>• A04 Grazing</li> </ul>	

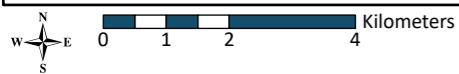
\* indicates a priority Annex I habitat.

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	Site Boundary
	15km Buffer of Site Boundary
	Special Area of Conservation (SAC)
Site Code, Site Name, Distance(m)	
000297	Lough Corrib SAC, 9407
000461	Ardkill Turlough SAC, 13959
000463	Balla Turlough SAC, 12224
000475	Carrowkeel Turlough SAC, 6813
000503	Greaghans Turlough SAC, 12973
000504	Kilglassan/Caheravoos a Turlough Complex SAC, 11596
001774	Lough Carra/Mask Complex SAC, 14824
002081	Ballinafad SAC, 14847
002179	Towerhill House SAC, 13827
002298	River Moy SAC, 6971
	Special Protection Area (SPA)
Site Code, Site Name, Distance(m)	
004051	Lough Carra SPA, 14881

<b>TITLE:</b>	European Sites within 15km of the Development Site		
<b>PROJECT:</b>	Claremorris Tier 3 and Remediation Plan		
<b>FIGURE NO.:</b>	4.1		
<b>CLIENT:</b>	Mayo County Council		
<b>SCALE:</b>	1:120,000	<b>REVISION:</b>	0
<b>DATE:</b>	18/03/2020	<b>PAGE SIZE:</b>	A3
<b>FEHILY TIMONEY</b>			
Cork   Dublin   Carlow <a href="http://www.fehilytimoney.ie">www.fehilytimoney.ie</a>			





## 6.2 Conservation Objectives

According to the Habitat's Directive, the *conservation status of a natural habitat* will be taken as 'favourable' within its biogeographic range when:

- Its natural range and areas it covers within that range are stable or increasing; and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- The conservation status of its typical species is favourable as defined below.

According to the Habitat's Directive, the conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' within its biogeographic range when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The specific conservation objectives for each site are available on [www.npws.ie](http://www.npws.ie). These have been accessed for the sites listed in Table 4-1 above on the 11th March 2020.

Generic conservation objectives only were available for:

- Carrowkeel Turlough SAC (000475); published 21/02/2018 [Version 6]
- Lough Carra/Mask Complex cSAC (001774); published 21/02/2018 [Version 6]
- Kilglassan/Cahervoostia Turlough Complex SAC (000504); published 21/02/2018 [Version 6]
- Balla Turlough cSAC (000463); published 21/02/2018 [Version 6]
- Greaghans Turlough SAC (000503); published 21/02/2018 [Version 6]
- Ardkill Turlough SAC (000461) 21/02/2018 [Version 6]
- Lough Carra SPA (004051) 21/02/2018 [Version 6]
- Lough Corrib SPA (004042) 21/02/2018 [Version 6]

Detailed site-specific conservation objectives were available for the following sites:

- River Moy cSAC (002298); published 3rd August 2016 [Version 1]
- Lough Corrib cSAC (000297); published 28th April 2017 [Version 1]
- Towerhill House SAC (002179); published 18th of September 2018 [Version 1]
- Ballinfad SAC (002081); published 27th August 2018 [Version 1]





Supporting documents for site specific conservation objectives are as follows:

- River Moy cSAC (002298):
  - Cummins, S., Bleasdale, A., Douglas, C., Newton, S., O’Halloran, J. & Wilson, H.J. (2010). The status of Red Grouse in Ireland and the effects of land use, habitat and habitat quality on their distribution. Irish Wildlife Manuals, No. 50. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
  - Cummins, S.; Fisher, J.; Gaj McKeever, R.; McNaghten, L.; Crowe, O. (2010). Assessment of the distribution and abundance of Kingfisher *Alcedo atthis* and other riparian birds on six SAC river systems in Ireland. A report commissioned by the National Parks and Wildlife Service and prepared by BirdWatch Ireland
  - NPWS (2016). River Moy SAC (002298) Conservation objectives supporting document - [Version 1]. National Parks and Wildlife Service. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
  - NPWS (2015). Raised Bog Monitoring and Assessment Survey 2013, Site Report. National Parks and Wildlife Service. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
  - NPWS (2012). Killala Bay/Moy Estuary SAC (000458) Conservation objectives supporting document - coastal habitats [Version 1.0]. National Parks and Wildlife Service. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
  - NPWS (2012). Killala Bay/Moy Estuary SAC (000458) Conservation supporting document - marine habitats [Version 1.0]. National Parks and Wildlife Service. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- Lough Corrib cSAC (000297):
  - Cummins, S.; Fisher, J.; Gaj McKeever, R.; McNaghten, L.; Crowe, O. (2010). Assessment of the distribution and abundance of Kingfisher *Alcedo atthis* and other riparian birds on six SAC river systems in Ireland. A report commissioned by the National Parks and Wildlife Service and prepared by BirdWatch Ireland
  - NPWS (2018). Conservation Objectives Supporting Document, Lesser Horseshoe Bat (*Rhinolophus hipposideros*). National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
  - NPWS (2017). Lough Corrib SAC (000297) Conservation objectives supporting document - *Najas* habitats [Version 1]. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
- Towerhill House SAC (002179):
  - NPWS (2018). Conservation Objectives Supporting Document, Lesser Horseshoe Bat (*Rhinolophus hipposideros*). National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.



- Ballinfad SAC (002081)
  - NPWS (2018). *Conservation Objectives Supporting Document, Lesser Horseshoe Bat (Rhinolophus hipposideros)*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

Conservation objectives and supporting documents for these sites are available from the NPWS through the protected sites search portal at <https://www.npws.ie/protected-sites>.

No management plans were available for any of the sites.

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## 6.3 Potential Cumulative Effects

In considering whether the proposed development, by itself or in combination with other plans and projects, has the potential to affect the conservation objectives of the designated sites within 15km of the proposed development, the following were considered:

- Mayo County Council Planning Enquiry System (<http://www.mayococo.ie/en/Planning/SearchPlanning/>)
- Permitted projects in the vicinity of the development
- Proposed projects in the vicinity of the development

A planning search limited to applications submitted within the townlands overlapping and surrounding the historic landfill site (Clare and Kilbeg-Malone) during the previous 5 years was conducted on 16<sup>th</sup> of March 2020.

No other projects of a scale or type that could act cumulatively with the proposed remediation works at the historic landfill site are proposed or permitted in the townlands overlapping and surrounding the site. Permitted and proposed developments in these townlands are mainly comprised of the construction of and extensions to retail/commercial developments within the town of Claremorris.

### 6.3.1 Future Potential Use: Solar Farm

As discussed in Section 5.9.1, following the remediation of the historic landfill it is proposed that a solar farm will be developed on site. It is proposed that the historic landfill site will be developed along with two other land parcels as a solar farm. As discussed in Section 5.9.2, both proposed remediation works and solar farm works shall be cognisant of the nature of the site. Particular attention will be required to the selection and construction of a suitable capping layer upon which the solar farm may be located. It is recommended that the solar farm developer and the remediation designer agree on the mechanism required to fix panels to the engineered cap in order to mitigate the risk of damage to the barrier liner which is normally placed 1.0m below the surface. Following the construction of the solar farm the site will continue to be grazed by livestock.

Any potential effects from the proposed remediation of the historic landfill to European sites would potentially arise from the production of silt due to the nature of works and the hydrological link between the site (via the KILBEG-MALONE stream) and the Robe River. The construction of the solar farm will produce minimal silt due to the site being remediated and the detailed design of the solar farm will be designed so as not to damage the barrier liner. Based on the layout and information provided in the Stage 1 Appropriate Assessment Screening Report for the proposed solar farm (see Appendix 4), there will be no cumulative effects to European sites from site remediation works and construction of the proposed solar farm.

Power lines transverse the historic landfill and it is envisaged that the solar farm will be connected to an existing substation located ca. 140m north of the site, located across a railway line and in an adjacent field. Based on the location of the proposed substation connection there will be no cumulative effects to European sites from the construction of the connecting cable route, the solar farm and proposed remediation works.



## 6.4 Screening Assessment Criteria

Throughout this section the line items in *italics* refer to suggested instructions for information to be contained in a screening assessment, and in an appropriate assessment from the guidance document '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', (European Commission, 2001). The standard 'Screening Matrix' and 'Finding of No Significant Effects Report Matrix' in Annex 2 of this guidance document are also followed.

As set out in NPWS guidance (DoEHLG, 2010), the task of establishing whether a plan or project is likely to have an effect on a European site(s) is based on an evaluation using available information and data (e.g. water quality data), supplemented as necessary by local site information and ecological surveys. This results in a determination by the competent authority as to whether there may be a significant effect on the designated site. A precautionary approach is required.

Some examples given in the NPWS guidance (DoEHLG, 2010) of effects that are likely to be significant are:

1. Any effect on an Annex I habitat,
2. A reduction in the area of a habitat of conservation interest in a European site or a reduction in the area of a European site,
3. Direct or indirect damage to the physical quality of the environment (e.g. water quality and supply, soil compaction) in the European site,
4. Serious or ongoing disturbance to species or habitats for which the European site is selected (e.g. increased noise, illumination and human activity),
5. Direct or indirect damage to the size, characteristics or reproductive ability of populations in the European site,
6. Interference with mitigation measures put in place for other plans or projects.

## 6.5 Screening Matrix

Assessment Criteria	Discussion of Potential Effects
<i>Brief description of project or plan</i>	<p>Proposed works for the historic landfill are in accordance with the Section 8 Remedial Action Plan from the Tier 3 Risk Assessment. The proposed works will comprise of the following elements which are described further in this section:</p> <ul style="list-style-type: none"> <li>• Landfill capping</li> <li>• Lined subsurface drainage system</li> <li>• Surface drainage with outfall to receiving stream</li> <li>• Landfill gas and leachate interception barrier</li> <li>• Under liner landfill gas collection infrastructure and vertical walls</li> <li>• Above liner pipe works connecting wells to oxidisation technology</li> <li>• Above liner condensation management infrastructure</li> <li>• Landfill gas pumping trial,</li> <li>• Environmental Monitoring of groundwater, surface water, leachate and landfill gas</li> </ul>



Assessment Criteria	Discussion of Potential Effects
	<p>Following on from the remediation of the historic landfill there is a plan for a proposed application for a 5MW solar farm at the site. The potential cumulative effects of a solar farm at the site have been considered in this report. This potential in combination effects of proposed remediation works alongside the proposed solar farm was undertaken in Section 6.3.1 and will also be discussed below.</p>
<p><i>Brief description of the Natura 2000 (European) Site Assessment criteria</i></p>	<p>There are no European Sites within or adjacent to the proposed works. There are 11 European sites within the zone of influence (15 km) of the project (see Figure 4-1) and one European site with an indirect remote hydrological link to the historic landfill site outside of the 15km buffer. The 12 sites are as follows:</p> <ul style="list-style-type: none"> <li>• Carrowkeel Turlough SAC (000475) 6.8km southwest of site</li> <li>• River Moy cSAC (002298) – 7 km north and west of site</li> <li>• Lough Corrib cSAC (000297) – 9.4km southeast of site</li> <li>• Kilglassan/Cahervoostia Turlough Complex SAC (000504) – 11.6km southwest of site</li> <li>• Balla Turlough cSAC (000463) – 12.2km northwest of site</li> <li>• Greaghans Turlough SAC (000503) - 13km southwest of the site</li> <li>• Towerhill House SAC (002179) – 13.8km west of the site</li> <li>• Ardkill Turlough SAC (000461) – 14km southwest of the site</li> <li>• Ballinfad SAC (002081) – 14.8km northeast of site</li> <li>• Lough Carra/Mask Complex cSAC (001774) – 14.8km west of the site</li> <li>• Lough Carra SPA (004051) – 14.9km west of the site</li> <li>• Lough Corrib SPA (004042) – 26.7km southwest of the site</li> </ul> <p>River Moy cSAC (002298), Balla Turlough cSAC (000463) and Ballinfad SAC (002081) are the only European listed sites with no hydrological link to the historic landfill site and are screened out.</p> <p>The historic landfill site is located within the Corrib catchment<sup>21</sup> (hydrometric area 30<sup>22</sup>). A stream, the KILBEG-MALONE<sup>23</sup> (EPA code: 30K37<sup>24</sup>), a 1<sup>st</sup> order stream crosses the eastern portion of the site and is a tributary of the Robe<sup>25</sup> River (EPA code: 30R01<sup>26</sup>). Downstream of the historic landfill site the Robe River feeds into Lough Carra which is designated as Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051); located 14.8km and 14.9km respectively downstream of the historic landfill (direct distance).</p>

<sup>21</sup> Name; WFD Catchments: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>22</sup> Hydrometric area; WFD Catchments: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>23</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>24</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>25</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>26</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20



Assessment Criteria	Discussion of Potential Effects
	<p>Lough Corrib is designated as Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) and receives waters from Lough Carra via a linking stream (Cong (Canal)). Kilglassan/Cahervoostia Turlough Complex SAC (000504) is located downstream of the historic landfill site and feeds into the Robe River but does not receive waters from the Robe River.</p> <p>Towerhill House SAC (002179) is located within the same catchment as the historic landfill site but does not feed into the Robe River and is located on a separate ground waterbody to the historic landfill site. The SAC is located 1.3km and 1.6km respectively, north of Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051) and feeds into them; 9km north of where the Robe River enters the European sites.</p> <p>There are four SACs designated solely for turlough habitat which are located within the same ground waterbody as the historic landfill. Turlough habitat can be negatively affected by changes to hydrological regime and changes to water quality. The Four European sites are Carrowkeel Turlough SAC (000475), Kilglassan/Cahervoostia Turlough Complex SAC (000504) and Greaghans Turlough SAC (000503). The closest of these SACs to the historic landfill is Carrowkeel Turlough SAC (000475), which located 6.8km away.</p>
<p><i>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts [effects] on the Natura 2000 sites.</i></p>	<p><i>Turlough habitat and shared Ground waterbodies</i></p> <p>Carrowkeel Turlough SAC (000475), Kilglassan/Cahervoostia Turlough Complex SAC (000504) and Greaghans Turlough SAC (000503) are designated for Turlough habitat and are located within the same ground waterbody as the historic landfill. At present leachate produced by the historic landfill is freely entering groundwater. Changes in hydrological regimes and changes to water quality can have negative effects on turlough habitat.</p> <p>The Tier 3 Impact Assessment report indicates that potential leachate generation from the historic landfill does not pose a risk to the groundwater quality (at a regional scale) as the historic landfill only occupies 0.0001% of the groundwater body area.</p> <p>Remediation works will prevent rain from reaching interred waste, preventing the further creation of leachate and reducing and eventually eliminating the production of leachate and release of leachate into the underlying ground waterbody.</p> <p>Following remediation works, the site's hydrological regime will be changed. Rainwater which would normally soak into the site and enter the underlying ground waterbody will be prevented from doing so. Rainwater/surface water will be collected over the 32,000m<sup>2</sup> area of remediated historic landfill via the drainage system and further filtered before being released into the stream to the east of the site. The reduction in area available to absorb rainwater is not deemed to be significant and the turloughs in question are located a minimum of 6.8km (Carrowkeel Turlough SAC (000475)). Changes to the site's hydrological regime will not affect any turlough habitat.</p> <p><i>Japanese Knotweed and downstream connections</i></p>



Assessment Criteria	Discussion of Potential Effects
	<p>Japanese Knotweed is located at the western end of the site at the opposite side of the site which contains the stream which hydrologically links the site to the Robe River is located at the eastern edge of the site.</p> <p>However, assessment of the potential effects of the invasive species on European sites is based on a worst-case scenario and a management plan/treatment/removal/ of the plant has not been taken into account. There is potential for Japanese Knotweed to enter the site stream during remediation works. Site's with downstream connections to the Robe River are Lough Carra/Mask Complex cSAC, Lough Carra SPA (004051), Corrib cSAC (000297) and Lough Corrib SPA (004042).</p> <p><i>Silt and Landfill Waste</i></p> <p>Silt will be produced during remediation works from the reprofiling of 6,400m<sup>3</sup> (area of 500mm) of the existing capping as well as the placement of subsoil and topsoil (It is estimated that 25,000m<sup>3</sup> of topsoil and 6,000m<sup>3</sup> subsoil will be required for capping), creation and installation of drainage and infrastructure which will be limited due to the scale and nature of works. Surface water drainage will collect rainwater and further filter it before it is directed to an outfall to the stream on site. There will be limited excavation works which will be undertaken above interred waste only and there will be no contamination of surface waters or groundwater during remediation works.</p> <p>Rainwater will be collected on site and further filtered by the surface water drainage system. Surface water drainage will include an outfall to the stream on site (which feeds into the Robe River). Surface drainage shall be designed to mitigate the risk of rill or gully erosion giving rise to suspended solids loading exceeding of 25 mg/l on the cap and within receiving waters. The introduction of silt or contaminates will not be introduced to the site stream from surface water drainage outfall.</p> <p>Limited works to the stream bank may be required to install the surface water drainage outfall. Works will be minor.</p> <p>Site's with downstream connections to the Robe River are Lough Carra/Mask Complex cSAC, Lough Carra SPA (004051), Corrib cSAC (000297) and Lough Corrib SPA (004042).</p> <p><i>Future land use – Solar Farm</i></p> <p>Following on from the remediation works to the historic landfill there is a plan for a proposed application for a 5MW solar farm at the site which will include two other land parcels (see Section 5.9 for further details). The historic landfill site contains power lines and it is proposed that the site will be connected to an existing substation located ca. 140m north of the site.</p> <p>The excavation requirements will be limited. Excavation depths for internal access roads will be based on ground conditions.</p> <p>Minimally invasive techniques will be used for panel installation (metal frame penetrating 1.7m into ground). The alternative of precast concrete pads as</p>



Assessment Criteria	Discussion of Potential Effects
	<p>ballast for the Solar panels will be employed where ground conditions are deemed unsuitable for installation of the metal frame. The construction of the solar farm will produce minimal silt and the detailed design of the solar farm works designed so as not to damage the barrier liner (capping). Based on the provided information there will be no significant cumulative effects to European sites from remediation works and the following proposed solar farm development.</p> <p><i>Effects on European Sites</i></p> <p>Carrowkeel Turlough SAC (000475), Greaghans Turlough SAC (000503) and Ardkill Turlough SAC (000461) are solely designated solely for turlough habitat and share the same ground waterbody as the historic landfill site (Cong-Robe ground waterbody). Turloughs can be negatively affected by changes to hydrological regimes and water quality. The Natura 2000 form for this site (downloaded from NPWS website) states that threats/pressures related to hydrology come from within the site and are related to surface water diffuse pollution from agriculture (see Table 4-1 for more information). The historic landfill is producing leachate which is freely entering groundwater. Leachate generation at the historic landfill site does not pose a risk to the groundwater quality as historic landfill site only occupies 0.001% of the groundwater body area. Remediation works will restrict the production (from rainwater) and free movement of leachate into groundwater, limiting any continued and future contribution of leachate to Cong-Robe ground waterbody. Remediation works will consist of the reprofiling of existing capping (and placement of topsoil and subsoil), drainage and landfill gas infrastructure with limited excavation. Works will occur above inferred waste only; the contamination of groundwater will not occur. Due to the lack of a direct surface water hydrological link, distance (6.8km, 13km and 14km respectively), considering that remediation works will prevent the further production of leachate and the localised scale of works, no significant effects either direct or indirect will occur to Carrowkeel Turlough SAC (000475), Greaghans Turlough SAC (000503) and Ardkill Turlough SAC (000461).</p> <p>Kilglassan/Cahervoostia Turlough Complex SAC (000504) is located within a separate subcatchment from the historic landfill site and feeds into the Robe River downstream of the historic site but does not receive water and therefore does not have a direct hydrological surface water link to the historic landfill site. The SAC is also located within the same ground waterbody as the historic landfill site and is designated solely for turlough habitat. Turloughs can be negatively affected by changes in hydrological regimes and water quality. Remediation works will restrict the free production and movement of leachate into groundwater, limiting any continued and future contribution of leachate to Cong-Robe ground waterbody (leachate generation at the historic landfill site does not pose a risk to the groundwater quality as historic landfill site only occupies 0.001% of the groundwater body area).</p> <p>Also, remediation works will consist of the reprofiling of existing capping (and placement of topsoil and subsoil), drainage and landfill gas infrastructure with limited excavation with works occurring above inferred waste only;</p>





Assessment Criteria	Discussion of Potential Effects
	<p>contamination of groundwater will not occur. Due there being no direct hydrological link, distance (11.6km) and considering that works will be localised and relatively small in scale and prevent leachate from freely entering groundwater, there will be no significant effects either direct or indirect on Kilglassan/Cahervoostia Turlough Complex SAC (000504).</p> <p>Towerhill House SAC (002179) does feed into Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051) but it does not receive waters from them (they are fed by the River Robe). This SAC is solely designated for Lesser Horseshoe Bat. Due to the lack of a direct hydrological link and distance (13.8km) no significant effects either direct or indirect will occur on Towerhill House SAC (002179).</p> <p>Lough Carra/Mask Complex cSAC, Lough Carra SPA (004051), Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) are all have an indirect remote hydrological link to the historic landfill site. Lough Carra is designated as Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051) and are fed by the Robe River, whilst Lough Corrib is designated as Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) and receives waters from Lough Carra via a linking stream (Cong (Canal)).</p> <p>Lough Carra/Mask Complex cSAC is designated for 12 qualifying interests (QI). Three of the QIs are terrestrial habitats and are not considered as only aquatic/alluvial/groundwater dependent habitats have the potential to be impacted via hydrological links. There are six aquatic/alluvial habitats/groundwater habitats and one moss species (found in fens and flushes) which could be effected by changes to hydrological regimes/changes in water quality (from silt) as well as Japanese Knotweed<sup>27</sup> spreading to the SAC. There are also two mammals (Otter and Lesser Horseshoe bats) which could be indirectly impacted by changes to hydrological regimes, water quality and the spread of Japanese Knotweed as this could result in less prey availability. However, there is a direct distance of 14.8km and an instream distance of 44km from the point that any potential discharge would leave the historic site (via a tributary of the Robe River) and the point at which the Robe River enters the SAC. Due to the lack of a direct hydrological link, remote distance, no significant effects either direct or indirect will occur on Lough Carra/Mask Complex cSAC.</p> <p>Lough Carra SPA (004051) is designated solely for Common Gull. This species could be negatively affected if there was a change in water quality or by the introduction of Japanese Knotweed to the SPA as this may affect prey availability.</p> <p>However, there is a direct distance of 14.9km and an instream distance of 45km from the point that any potential discharge would leave the historic site (via a tributary of the Robe River) and the point at which the Robe River</p>

<sup>27</sup> Please note that the purpose of proposed remediation works are to manage and control leachate and landfill gas at the historic landfill site. An invasive species management plan will be required to assist in the remediation of the historic landfill as the presence of Japanese Knotweed would be detrimental to the functioning of proposed remediation. However, assessment of the potential effects of the invasive species on European sites is based on a worst-case scenario and a management plan/treatment/removal/ of the plant has not been taken into account.



Assessment Criteria	Discussion of Potential Effects
	<p>enters the SPA. Due to the lack of a direct hydrological link, remote distance, no significant effects either direct or indirect will occur on Lough Carra SPA (004051).</p> <p>Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) are located another 11km (direct distance) from where the Robe enters Lough Carrow and there is an instream distance of 44km between the historic landfill and Lough Carrow. Lough Carrow and Lough Corrib are connected via a linking stream (Cong (Canal)); which is 4.8km (direct distance) in length and contains weirs which are likely to limit the upward migration of fish. Lough Corrib cSAC (000297) is designated for 24 QIs; three groundwater dependent habitats, four aquatic habitats, three species of salmonids, as well as freshwater pearl mussel and white clawed crayfish (neither are located within the Lough Corrib area of the SAC), Otter and Lesser Horseshoe bat. The SPA is designated for 14 wetland special conservation interest. From the point that the stream within the historic landfill leaves the site to the point where the Cong (Canal) enters Lough Corrib(links Lough Carrow to the SAC/SPA), there is a direct distance of 28.8km. Due to the lack of a direct hydrological link and the vast distance, no significant effects either direct or indirect will occur on Lough Corrib cSAC (000297) and Lough Corrib SPA (004042).</p> <p>No other individual elements of the project, either alone or in combination with other plans or projects are likely to give rise to significant effects on the European sites identified above.</p>
<p>Describe any likely direct, indirect or secondary impacts [effects] of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of:</p> <ul style="list-style-type: none"> <li>▪ Size and scale;</li> <li>▪ Land-take;</li> <li>▪ Distance from Natura 2000 site or key features of the site;</li> <li>▪ Resource requirements;</li> <li>▪ Emissions;</li> <li>▪ Excavation requirements;</li> <li>▪ Transportation requirements;</li> <li>▪ Duration of construction, operation etc.;</li> <li>▪ Other.</li> </ul>	<p><b>Size and scale, land take and distance from Natura 2000 sites</b></p> <p><b>Potential effects: None</b></p> <p>The closest European site is Carrowkeel Turlough SAC (000475) located 6.8km away from the historic landfill site and is located within the same ground water catchment area; as are Lough Corrib cSAC (000297), Kilglassan/Cahervoostia Turlough Complex SAC (000504), Greaghans Turlough SAC (000503), Towerhill House SAC (002179), Ardkill Turlough SAC (000461), Lough Carra/Mask Complex cSAC, Lough Carra SPA (004051), Lough Corrib SPA (004042).</p> <p>Turlough habitat can be effected by changes to their hydrological regimes and changes in water quality. However, the Natura 2000 forms (downloaded from NPWS website) for European sites designated for turloughs (i.e. Carrowkeel Turlough SAC (000475), Kilglassan/Cahervoostia Turlough Complex SAC (000504), Ardkill Turlough SAC (000461) and Greaghans Turlough SAC (000503)) state that threats/pressures related to hydrology come from within the SAC sites and are related to surface water diffuse pollution from agriculture and forestry (see Table 4-1 for more information). Also, remediation works will result in the restriction of the free movement of leachate into groundwater, limiting any continued and future contribution of leachate to the Cong-Robe ground waterbody. Carrowkeel Turlough SAC (000475) is the closest of these SACs to the historic landfill and is located 6.8km away. Due to distance and the result of remediation works as well as</p>



Assessment Criteria	Discussion of Potential Effects
	<p>the scale and localized nature of work, no significant direct or indirect effects to Carrowkeel Turlough SAC (000475), Kilglassan/Cahervoostia Turlough Complex SAC (000504), Ardkill Turlough SAC (000461) and Greaghans Turlough SAC (000503) from changes to groundwater. No direct or indirect effects will occur on any other European sites.</p> <p>There is a remote indirect hydrological link between Lough Carra/Mask Complex cSAC, Lough Carra SPA (004051) and Lough Corrib cSAC (000297) and Lough Corrib SPA (004042). Silt will be produced during remediation works and will be limited and there is the unlikely chance of Japanese Knotweed entering the tributary of the Robe River. Due to a minimum distance (instream distance) of ca. 44km (Lough Carra/Mask Complex cSAC), no significant effects on these European sites will occur due there being no direct hydrological link and the remote distance.</p> <p>Proposed remediation works will not take place within any European site. There will be no land-take from any European site and no direct or indirect significant effects on any European site due to the size and scale of the project.</p> <p><b>Resource requirements and Excavation requirements</b></p> <p><b>Potential Effects: None</b>                  There will be no resource requirements or excavation requirements from any European site as a result of the proposed development. Excavation requirements within the proposed site will be limited. There will be reprofiling of the existing capping which will comprise 6,400m<sup>3</sup> (area of 500mm depth). It is estimated that 25,000m<sup>3</sup> of topsoil and 6,000m<sup>3</sup> subsoil will be required for the new capping layer and this will be brought onto site.</p> <p>No additional contamination of groundworks will occur during remediation works.</p> <p><b>Emissions</b></p> <p><b>Potential Effects: None.</b></p> <p>Remediation works will require the reprofiling of existing capping of 6400m<sup>3</sup> (depth of 500mm) and the placement of 25,000m<sup>3</sup> of topsoil and 6,000m<sup>3</sup> subsoil for new capping. At present leachate produced by the historic landfill is entering ground water. According to the Tier 3 Impact Assessment Report (see Appendix 2), the historic landfill site does not pose a risk to the groundwater quality of the underlying groundwater body with the site only occupying 0.001% of the groundwater body area.</p> <p>No contamination to groundwater will occur and the production of silt will also be limited. Remediation works will result in the reduced production and movement of leachate into groundwater, limiting any continued and future contribution of pollution to Cong-Robe groundwater aquafer.</p> <p>Of the eight European sites which are located on the same groundwater aquafer as the historic landfill there are four SACS designated for turlough</p>



Assessment Criteria	Discussion of Potential Effects
	<p>habitat; turlough habitat is vulnerable to changes in hydrological regime and water quality. European sites designated for turloughs are Carrowkeel Turlough SAC (000475), Kilglassan/Cahervoostia Turlough Complex SAC (000504), Ardkill Turlough SAC (000461) and Greaghans Turlough SAC (000503). No significant effects will occur to the aforementioned European sites from remediation works due to distance and the localised nature and scale of works.</p> <p>During proposed remediation works at the historic landfill site a limited amount of silt will be produced. Lough Carra/Mask Complex cSAC, Lough Carra SPA (004051), Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) are located downstream of the Robe River. The closest European site located downstream of the historical landfill is Lough Carra/Mask Complex cSAC, located a minimum distance of ca. 44km (instream distance). Due to there being no direct hydrological link as well as the vast distance and the limited amount of silt which is likely to be produced no significant effects will occur on the aforementioned European sites.</p> <p>No direct or indirect significant effects with regards to emissions will occur to any European sites located within the same ground waterbody as the historic landfill or European sites which are fed by the Robe River.</p> <p><b>Transportation requirements</b>  <b>Potential Effects: None</b></p> <p>Site access will not traverse any European Site.</p> <p><b>Duration of Construction and Operation</b>  <b>Potential Effects: None.</b></p> <p>It is anticipated that remediation works will occur over approximately six months. Following remediation works, environmental monitoring will be ongoing for several years. It is also proposed for a solar farm to be constructed on site following the remediation works.</p> <p>Construction works for the solar farm will take approximately 12 months. Resulting bare ground (under solar panels) will be sown with grass and the grazing of animals continued. There is no set lifespan for the project, but efficiency of the solar panels does decrease over time. It is proposed that the proposed solar farm will be connected to an existing substation located ca. 140m north of the site via an underground cable route.</p> <p>At the end of the operational lifetime of the proposed solar farm, the solar array components will be dis-assembled and removed from the site and the site can continue to be grazed by livestock. The cable grid would be left in place.</p> <p><b>Cumulative Effects</b>  <b>Potential Effects: None.</b></p>



Assessment Criteria	Discussion of Potential Effects
	<p>It is proposed to construct a solar farm on the remediated historic landfill site. The construction of the solar farm will produce minimal silt due to the site being remediated and the detailed design of the solar farm works designed so as not to damage the barrier liner. The envisaged grid connection would be to a substation located 140m north of the site (located across a railway line and located in a field) via an underground cable route. Based on the proposed solar farm details provided in the Stage 1 Appropriate Assessment Screening Report (see Appendix 4) and the Tier 3 Impact Assessment Report (see Appendix 2), no significant cumulative effects to European sites will occur from remediation works and the following proposed solar farm development.</p> <p>A planning search was undertaken on 16<sup>th</sup> March 2020. No other planned or permitted projects are of a scale that could act cumulatively with the proposed development were in the local area. See Section 6.3 for further details.</p>
<p><i>Describe any likely changes to the site arising as a result of:</i></p> <ul style="list-style-type: none"> <li>▪ <i>Reduction of habitat area;</i></li> <li>▪ <i>Disturbance of key species;</i></li> <li>▪ <i>Habitat or species fragmentation;</i></li> <li>▪ <i>Reduction in species density;</i></li> <li>▪ <i>Changes in key indicators of conservation value;</i></li> <li>▪ <i>Climate change.</i></li> </ul>	<p>There will be no direct or indirect reduction in habitat area or habitat fragmentation within any European site as a result of the project due to limited scale of works, nature of works (remediation works will produce a limited amount of silt and the resulting remediation will stop the continuing release of leachate entering groundwater), distance (closest European site is 6.8km away) and lack of any direct hydrological links.</p> <p>There will be no predicted effect via disturbance of key species or reduction of key species as a result of the proposed development due to limited scale of works, nature of works (will produce a limited amount of silt during works and works will result in the limit and control of leachate which currently enters groundwater), distance (closest European site is 6.8km away) and lack of any direct hydrological links.</p> <p>There will be no predicted changes in key indicators of conservation value due to the proposed project due to limited scale of works, nature of works (will produce a limited amount of silt during works and works will stop the continuing release of leachate entering groundwater), distance (closest European site is 6.8km away) and lack of any direct hydrological links.</p>
<p><i>Describe any likely impacts [effects] on the Natura 2000 site as a whole in terms of:</i></p> <ul style="list-style-type: none"> <li>▪ <i>Interference with the key relationships that define the structure of the site;</i></li> <li>▪ <i>Interference with key relationships that define the function of the site.</i></li> </ul>	<p>There are no potential effects on the key relationships that define the structure or function of any European site considered in this Appropriate Assessment Screening due to the proposed development due to limited scale of works, nature of works (will produce a limited amount of silt during works and works will stop the continuing release of leachate entering ground water), distance (closest European site is 6.8km away) and lack of any direct hydrological link.</p>



Assessment Criteria	Discussion of Potential Effects
<p><i>Provide indicators of significance as a result of the identification of effects set out above in terms of:</i></p> <ul style="list-style-type: none"> <li>▪ <i>loss,</i></li> <li>▪ <i>fragmentation,</i></li> <li>▪ <i>disruption,</i></li> <li>▪ <i>disturbance,</i></li> <li>▪ <i>change to key elements of the site (e.g. water quality etc.).</i></li> </ul>	<p>No effects will occur; therefore, an indicator of significance is not required.</p>
<p><i>Describe from the above those elements of the project or plan, or combination of elements, where the above impacts [effects] are likely to be significant or where the scale of magnitude of impacts [effects] is not known.</i></p>	<p>No significant effects or effects of unknown scale or magnitude, either alone or in-combination with other projects or plans will occur.</p>

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## 6.6 Stage One Screening Conclusion

It is concluded beyond reasonable scientific doubt that there are not likely to be significant effects from the proposed development on the 12 European sites identified for consideration (or any other European site), either alone or in combination with other plans or projects.

No significant effects on any of the European Sites within the zone of potential influence are predicted. Therefore, the following 12 European sites have been 'screened out' within the Stage 1: Appropriate Assessment Screening Report:

- Carrowkeel Turlough SAC (000475)
- River Moy cSAC (002298)
- Lough Corrib cSAC (000297)
- Kilglassan/Cahervoostia Turlough Complex SAC (000504)
- Balla Turlough cSAC (000463)
- Greaghans Turlough SAC (000503)
- Towerhill House SAC (002179)
- Ardkill Turlough SAC (000461)
- Ballinfad SAC (002081)
- Lough Carra/Mask Complex cSAC
- Lough Carra SPA (004051)
- Lough Corrib SPA (004042)

See Appendix 1 for Findings of No Significant Effects Report.

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## 7. REFERENCES

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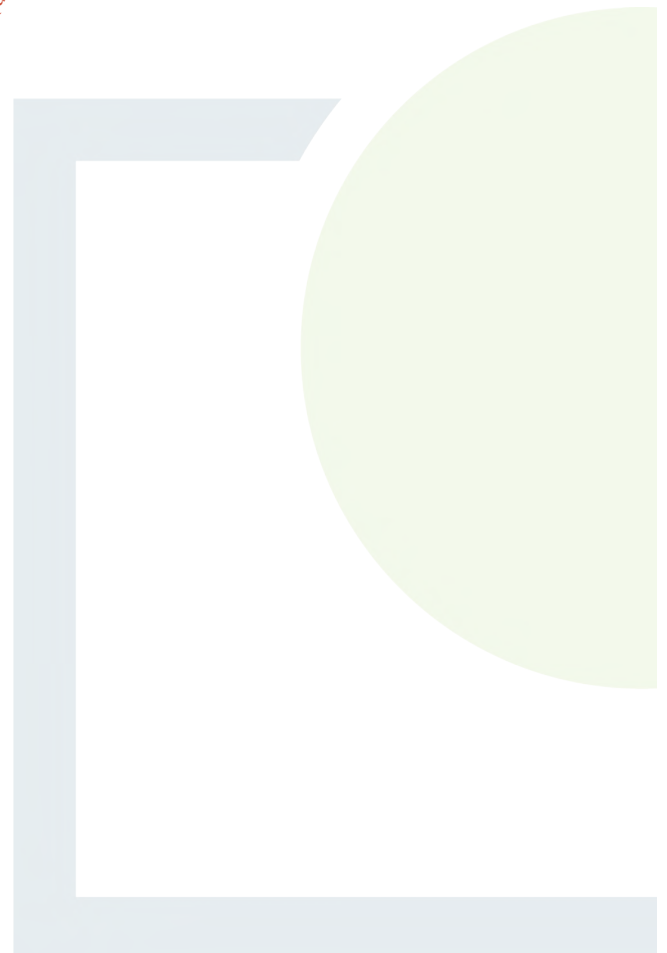
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# APPENDIX 1

## Finding of No Significant Effects Report

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## Finding of No Significant Effects Report

<p>Name and location of the Natura 2000 sites</p>	<p>There are no European Sites within or adjacent to the proposed works. There are 11 European sites within the zone of influence (15 km) of the project (see Figure 4-1) and one European site with an indirect remote hydrological link to the historic landfill site outside of the 15km buffer. The 12 sites are as follows:</p> <ul style="list-style-type: none"> <li>• Carrowkeel Turlough SAC (000475) 6.8km southwest of site</li> <li>• River Moy cSAC (002298) – 7 km north and west of site</li> <li>• Lough Corrib cSAC (000297) – 9.4km southeast of site</li> <li>• Kilglassan/Cahervoostia Turlough Complex SAC (000504) – 11.6km southwest of site</li> <li>• Balla Turlough cSAC (000463) – 12.2km northwest of site</li> <li>• Greaghans Turlough SAC (000503) - 13km southwest of the site</li> <li>• Towerhill House SAC (002179) – 13.8km west of the site</li> <li>• Ardkill Turlough SAC (000461) – 14km southwest of the site</li> <li>• Ballinfad SAC (002081) – 14.8km northeast of site</li> <li>• Lough Carra/Mask Complex cSAC (001774) – 14.8km west of the site</li> <li>• Lough Carra SPA (004051) – 14.9km west of the site</li> <li>• Lough Corrib SPA (004042) – 26.7km southwest of the site</li> </ul> <p>River Moy cSAC (002298), Balla Turlough cSAC (000463) and Ballinfad SAC (002081) are the only European listed sites with no hydrological link to the historic landfill site and are screened out.</p> <p>The historic landfill site is located within the Corrib catchment<sup>28</sup> (hydrometric area 30<sup>29</sup>). A stream, the KILBEG-MALONE<sup>30</sup> (EPA code: 30K37<sup>31</sup>), a 1<sup>st</sup> order stream crosses the eastern portion of the site and is a tributary of the Robe<sup>32</sup> River (EPA code: 30R01<sup>33</sup>). Downstream of the historic landfill site the Robe River feeds into Lough Carra which is designated as Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051); located 14.8km and 14.9km respectively downstream of the historic landfill (direct distance). Lough Corrib is designated as Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) and receives waters from Lough Carra via a linking stream (Cong (Canal)). Kilglassan/Cahervoostia Turlough Complex SAC (000504) is located downstream of the historic landfill site and feeds into the Robe River but does not receive waters from the Robe River.</p>
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<sup>28</sup> Name; WFD Catchments: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>29</sup> Hydrometric area; WFD Catchments: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>30</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>31</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>32</sup> EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

<sup>33</sup> EPA code, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 16/03/20

Finding of No Significant Effects Report	
	<p>Towerhill House SAC (002179) is located within the same catchment as the historic landfill site but does not feed into the Robe River and is located on a separate ground waterbody to the historic landfill site.</p> <p>The SAC is located 1.3km and 1.6km respectively, north of Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051) and feeds into them; 9km north of where the Robe River enters the European sites.</p> <p>There are four SACs designated solely for turlough habitat which are located within the same ground waterbody as the historic landfill. Turlough habitat can be negatively affected by changes to hydrological regime and changes to water quality. The Four European sites are Carrowkeel Turlough SAC (000475), Kilglassan/Cahervoostia Turlough Complex SAC (000504) and Greaghans Turlough SAC (000503). The closest of these SACs to the historic landfill is Carrowkeel Turlough SAC (000475), which located 6.8km away.</p>
<i>Description of the project or plan</i>	<p>Proposed works for the historic landfill are in accordance with the Section 8 Remedial Action Plan from the Tier 3 Risk Assessment report located in Appendix 2. The proposed works are comprised of the following elements which are described further in this section:</p> <ul style="list-style-type: none"> <li>• Landfill capping</li> <li>• Lined subsurface drainage system</li> <li>• Surface drainage with outfall to receiving stream</li> <li>• Landfill gas and leachate interception barrier</li> <li>• Under liner landfill gas collection infrastructure and vertical walls</li> <li>• Above liner pipe works connecting wells to oxidisation technology</li> <li>• Above liner condensation management infrastructure</li> <li>• Landfill gas pumping trial,</li> <li>• Environmental Monitoring of groundwater, surface water, leachate and landfill gas</li> </ul> <p>Following on from the remediation of the historic landfill there is a plan for a proposed application for a 5MW solar farm at the site. This potential in combination effects of proposed remediation works alongside proposed solar farm was undertaken in Section 6.3.1 and Section 6.3 and will be also discussed below.</p>
<i>Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?</i>	No.
<i>Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?</i>	It is proposed to construct a solar farm on the remediated historic landfill site. The construction of the solar farm will produce minimal silt due to the site being remediated and the detailed design of the solar farm works designed so as not to damage the barrier liner.

**Finding of No Significant Effects Report**

It is envisaged that the solar farm will be connected to an existing substation (located across a railway line and located within a field) There will be no cumulative effects to European sites from remediation works and the following proposed solar farm.

A planning search was undertaken on 16th March 2020. No other planned or permitted projects are of a scale that could act cumulatively with the proposed development were in the local area. See Section 6.3 for further details.

**Assessment of Effects**

<p><i>Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site</i></p>	<p><i>Turlough habitat and shared Ground waterbodies</i>            Carrowkeel Turlough SAC (000475), Kilglassan/Cahervoostia Turlough Complex SAC (000504) and Greaghans Turlough SAC (000503) are designated for Turlough habitat and are located within the same ground waterbody as the historic landfill. At present leachate produced by the historic landfill is freely entering groundwater. Changes in hydrological regimes and changes to water quality can have negative effects on turlough habitat.</p> <p>The Tier 3 Impact Assessment report indicates that potential leachate generation from the historic landfill does not pose a risk to the groundwater quality (at a regional scale) as the historic landfill only occupies 0.0001% of the groundwater body area.</p> <p>Remediation works will prevent rain from reaching interred waste, preventing the further creation of leachate and reducing and eventually eliminating the production of leachate and release of leachate into the underlying ground waterbody.</p> <p>Following remediation works, the site's hydrological regime will be changed. Rainwater which would normally soak into the site and enter the underlying ground waterbody will be prevented from doing so. Rainwater/surface water will be collected over the 32,000m<sup>2</sup> area of remediated historic landfill via the drainage system and further filtered before being released into the stream to the east of the site. The reduction in area available to absorb rainwater is not deemed to be significant and the turloughs in question are located a minimum of 6.8km (Carrowkeel Turlough SAC (000475)). Changes to the site's hydrological regime will not affect any turlough habitat.</p> <p><i>Japanese Knotweed and downstream connections</i>            Japanese Knotweed is located at the western end of the site at the opposite side of the site which contains the stream which hydrologically links the site to the Robe River is located at the eastern edge of the site.</p> <p>However, assessment of the potential effects of the invasive species on European sites is based on a worst-case scenario and a management plan/treatment/removal/ of the plant has not been taken into account. There is potential for Japanese Knotweed to enter the site stream during remediation works. Site's with downstream connections to the Robe River are Lough Carra/Mask Complex cSAC, Lough Carra SPA (004051), Corrib cSAC (000297) and Lough Corrib SPA (004042).</p>
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## Finding of No Significant Effects Report

### *Silt and Landfill Waste*

Silt will be produced during remediation works from the reprofiling of 6,400m<sup>3</sup> (area of 500mm) of the existing capping as well as the placement of subsoil and topsoil (It is estimated that 25,000m<sup>3</sup> of topsoil and 6,000m<sup>3</sup> subsoil will be required for capping), creation and installation of drainage and infrastructure which will be limited due to the scale and nature of works. Surface water drainage will collect rainwater and further filter it before it is directed to an outfall to the stream on site. There will be limited excavation works which will be undertaken above interred waste only and there will be no contamination of surface waters or groundwater during remediation works.

Rainwater will be collected on site and further filtered by the surface water drainage system. Surface water drainage will include an outfall to the stream on site (which feeds into the Robe River). Surface drainage shall be designed to mitigate the risk of rill or gully erosion giving rise to suspended solids loading exceeding of 25 mg/l on the cap and within receiving waters. The introduction of silt or contaminates will not be introduced to the site stream from surface water drainage outfall.

Limited works to the stream bank may be required to install the surface water drainage outfall. Works will be minor.

Site's with downstream connections to the Robe River are Lough Carra/Mask Complex cSAC, Lough Carra SPA (004051), Corrib cSAC (000297) and Lough Corrib SPA (004042).

### *Future land use - Solar Farm*

Following on from the remediation works to the historic landfill there is a plan for a proposed application for a 5MW solar farm at the site which will include two other land parcels (see Section 5.9 for further details). The historic landfill site contains power lines and it is proposed that the site will be connected to an existing substation located ca. 140m north of the site.

The excavation requirements will be limited. Excavation depths for internal access roads will be based on ground conditions. Minimally invasive techniques will be used for panel installation (metal frame penetrating 1.7m into ground). The alternative of precast concrete pads as ballast for the Solar panels will be employed where ground conditions are deemed unsuitable for installation of the metal frame. The construction of the solar farm will produce minimal silt and the detailed design of the solar farm works designed so as not to damage the barrier liner (capping). Based on the provided information there will be no significant cumulative effects to European sites from remediation works and the following proposed solar farm development.

## Finding of No Significant Effects Report

### *Effects on European Sites*

Carrowkeel Turlough SAC (000475), Greaghans Turlough SAC (000503) and Ardkill Turlough SAC (000461) are solely designated solely for turlough habitat and share the same ground waterbody as the historic landfill site (Cong-Robe ground waterbody). Turloughs can be negatively affected by changes to hydrological regimes and water quality. The Natura 2000 form for this site (downloaded from NPWS website) states that threats/pressures related to hydrology come from within the site and are related to surface water diffuse pollution from agriculture (see Table 4-1 for more information). The historic landfill is producing leachate which is freely entering groundwater. Leachate generation at the historic landfill site does not pose a risk to the groundwater quality as historic landfill site only occupies 0.001% of the groundwater body area. Remediation works will restrict the production (from rainwater) and free movement of leachate into groundwater, limiting any continued and future contribution of leachate to Cong-Robe ground waterbody. Remediation works will consist of the reprofiling of existing capping (and placement of topsoil and subsoil), drainage and landfill gas infrastructure with limited excavation. Works will occur above inferred waste only; the contamination of groundwater will not occur. Due to the lack of a direct surface water hydrological link, distance (6.8km, 13km and 14km respectively), considering that remediation works will prevent the further production of leachate and the localised scale of works, no significant effects either direct or indirect will occur to Carrowkeel Turlough SAC (000475), Greaghans Turlough SAC (000503) and Ardkill Turlough SAC (000461).

Kilglassan/Cahervoostia Turlough Complex SAC (000504) is located within a separate subcatchment from the historic landfill site and feeds into the Robe River downstream of the historic site but does not receive water and therefore does not have a direct hydrological surface water link to the historic landfill site. The SAC is also located within the same ground waterbody as the historic landfill site and is designated solely for turlough habitat. Turloughs can be negatively affected by changes in hydrological regimes and water quality. Remediation works will restrict the free production and movement of leachate into groundwater, limiting any continued and future contribution of leachate to Cong-Robe ground waterbody (leachate generation at the historic landfill site does not pose a risk to the groundwater quality as historic landfill site only occupies 0.001% of the groundwater body area). Also, remediation works will consist of the reprofiling of existing capping (and placement of topsoil and subsoil), drainage and landfill gas infrastructure with limited excavation with works occurring above inferred waste only; contamination of groundwater will not occur. Due there being no direct hydrological link, distance (11.6km) and considering that works will be localised and relatively small in scale and prevent leachate from freely entering groundwater, there will be no significant effects either direct or indirect on Kilglassan/Cahervoostia Turlough Complex SAC (000504).

Towerhill House SAC (002179) does feed into Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051) but it does not receive waters from them (they are fed by the River Robe).

## Finding of No Significant Effects Report

This SAC is solely designated for Lesser Horseshoe Bat. Due to the lack of a direct hydrological link and distance (13.8km) no significant effects either direct or indirect will occur on Towerhill House SAC (002179).

Lough Carra/Mask Complex cSAC, Lough Carra SPA (004051), Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) are all have an indirect remote hydrological link to the historic landfill site. Lough Carra is designated as Lough Carra/Mask Complex cSAC (001774) and Lough Carra SPA (004051) and are fed by the Robe River, whilst Lough Corrib is designated as Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) and receives waters from Lough Carra via a linking stream (Cong (Canal)).

Lough Carra/Mask Complex cSAC is designated for 12 qualifying interests (QI). Three of the QIs are terrestrial habitats and are not considered as only aquatic/alluvial/groundwater dependent habitats have the potential to be impacted via hydrological links. There are six aquatic/alluvial habitats/groundwater habitats and one moss species (found in fens and flushes) which could be effected by changes to hydrological regimes/changes in water quality (from silt) as well as Japanese Knotweed<sup>34</sup> spreading to the SAC. There are also two mammals (Otter and Lesser Horseshoe bats) which could be indirectly impacted by changes to hydrological regimes, water quality and the spread of Japanese Knotweed as this could result in less prey availability. However, there is a direct distance of 14.8km and an instream distance of 44km from the point that any potential discharge would leave the historic site (via a tributary of the Robe River) and the point at which the Robe River enters the SAC. Due to the lack of a direct hydrological link, remote distance, no significant effects either direct or indirect will occur on Lough Carra/Mask Complex cSAC.

Lough Carra SPA (004051) is designated solely for Common Gull. This species could be negatively affected if there was a change in water quality or by the introduction of Japanese Knotweed to the SPA as this may affect prey availability. However, there is a direct distance of 14.9km and an instream distance of 45km from the point that any potential discharge would leave the historic site (via a tributary of the Robe River) and the point at which the Robe River enters the SPA. Due to the lack of a direct hydrological link, remote distance, no significant effects either direct or indirect will occur on Lough Carra SPA (004051).

Lough Corrib cSAC (000297) and Lough Corrib SPA (004042) are located another 11km (direct distance) from where the Robe enters Lough Carrow and there is an instream distance of 44km between the historic landfill and Lough Carrow. Lough Carrow and Lough Corrib are connected via a linking stream (Cong (Canal)); which is 4.8km (direct distance) in length and contains weirs which are likely to limit the upward migration of fish.

<sup>34</sup> Please note that the purpose of proposed remediation works are to manage and control leachate and landfill gas at the historic landfill site. An invasive species management plan will be required to assist in the remediation of the historic landfill as the presence of Japanese Knotweed would be detrimental to the functioning of proposed remediation. However, assessment of the potential effects of the invasive species on European sites is based on a worst-case scenario and a management plan/treatment/removal/ of the plant has not been taken into account.



## Finding of No Significant Effects Report

	<p>Lough Corrib cSAC (000297) is designated for 24 QIs; three groundwater dependent habitats, four aquatic habitats, three species of salmonids, as well as freshwater pearl mussel and white clawed crayfish (neither are located within the Lough Corrib area of the SAC), Otter and Lesser Horseshoe bat. The SPA is designated for 14 wetland special conservation interest. From the point that the stream within the historic landfill leaves the site to the point where the Cong (Canal) enters Lough Corrib(links Lough Carrow to the SAC/SPA), there is a direct distance of 28.8km. Due to the lack of a direct hydrological link and the vast distance, no significant effects either direct or indirect will occur on Lough Corrib cSAC (000297) and Lough Corrib SPA (004042).</p> <p>No other individual elements of the project, either alone or in combination with other plans or projects are likely to give rise to significant effects on the European sites identified above.</p>
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<p><i>Explain why these effects are not considered significant</i></p>	<p>There are no direct hydrological links between the site the closest European site is located 6.8km away (direct distance). The closest site with an indirect remote hydrological link is located 44km (instream distance) from the historic landfill site.</p> <p>Seven European sites share the same ground waterbody as the historic landfill and of those European sites four are designated for turlough habitat. The closest European site designated for turlough is located 6.8km away from the European site. There will not be no contamination or additional production of leachate during remediation works.</p> <p>No significant impact will occur to any European site from proposed remediation works either by themselves or in combination with any other projects or plans.</p>
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Name of Agency or Body Consulted	Summary of Response
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-	Consultation was not undertaken due to the positive nature of the works (in terms of leachate) and the lack of potential significant effects.
---	---

### Data Collected to Carry out the Assessment

<i>Who carried out the assessment</i>	<i>Sources of Data</i>	<i>Level of assessment completed</i>	<i>Where can the full results of the assessment be accessed and viewed</i>
This evaluation was completed by Fehily Timoney and Company	<ul style="list-style-type: none"> <li>Information on the designated nature conservation sites within 15km and whist hydrological link outside the 15km of the study area was obtained from the NPWS website and metadata available online from the NPWS mapping system (<a href="http://webgis.npws.ie/npwsviewer/">http://webgis.npws.ie/npwsviewer/</a>).</li> <li>Information on the waterbody catchments in the development area was obtained from the Water</li> </ul>	Appropriate Assessment Screening (Stage One)	Environmental Protection Agency

## Finding of No Significant Effects Report

	<p>Framework Directive Water Mapping Information System <a href="http://gis.epa.ie/Envision">http://gis.epa.ie/Envision</a></p> <ul style="list-style-type: none"><li>• OSI Aerial photography and 1:50000 mapping.</li><li>• Information on the historic landfill site was obtained from the Tier 3 Risk Assessment report located in Appendix 2.</li><li>• Information on the proposed solar farm obtained from the Stage 1 Appropriate Assessment Screening Report located in Appendix 4.</li></ul>		
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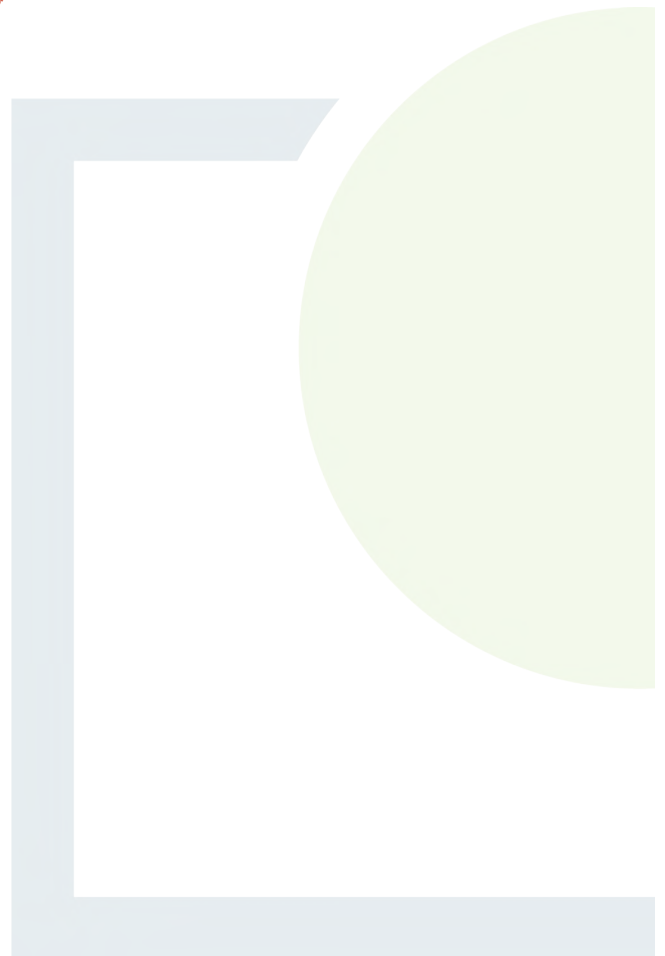


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# APPENDIX 2

## Tier 3 Risk Assessment Report

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**Tier 3 Risk Assessment  
Historic Landfill at Claremorris, Co. Mayo**

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Prepared for: **Mayo County Council**



**Date:** February 2020

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## Tier 3 Risk Assessment

### Historic Landfill at Claremorris, Co. Mayo

User is responsible for Checking the Revision Status of This Document

Rev. No.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
0	Issue for Client Comment	BF/EOC/CF	OM	CJC	10.03.2020

**Client:** Mayo County Council

**Keywords:** Site Investigation, environmental risk assessment, waste, leachate, soil sampling, groundwater sampling.

**Abstract:** This report represents the findings of a Tier 3 risk assessment carried out at Claremorris Historic Landfill, Co. Mayo, conducted in accordance with the EPA Code of Practice for unregulated landfill sites.

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## EXECUTIVE SUMMARY

Fehily Timoney and Company (FT) was appointed by Mayo County Council (MCC) to complete a Tier 3 environmental risk assessment (ERA) of Claremorris Historic Landfill in accordance with the Environmental Protection Agency (EPA) Code of Practice (CoP) (2007): Environmental Risk Assessment for Unregulated Waste Disposal Sites.

The historic landfill occupies approximately 3.2 ha of a wider 9 ha site of open land located to the east of the Claremorris town centre. The site is currently vacant albeit with evidence of rough grazing by horses. Neighbouring adjacent land uses include grassland and, residential land located approximately 280 m west of the site. An electric substation is located approximately 150 m north of the site. The site is bounded by a railway to the North and by the Knock-Claremorris Bypass (N17) to the West, the other sides are bounded by agricultural land (boggy ground). There are no dwellings located within or immediately adjacent the site boundary, however a housing estate (approximately 280 m west) and Claremorris town centre (approximately 80m north-west) are located in the surroundings.

It is proposed that the site be developed to form part of a larger solar farm which incorporates both the field underlain by the historical landfill and an adjacent privately-owned field.

An initial risk assessment of the site was completed by MCC in 2010 which determined that the site had a moderate risk (Class B) to the environment, with the highest score assigned being 61% to leachate migration to the groundwater body via groundwater pathways.

A site investigation (S.I.) program was completed in 2011. The findings of the site investigation work suggest the waste material is deposited in a single infill area over an estimated plan area of 26,000 m<sup>2</sup>.

MCC initially estimated that approximately 168,000 tonnes were deposited at the site. A review of S.I. data suggests that this quantity may be approximately 191,100 tonnes.

Analysis of waste samples from the trial pits excavated, when assessed against the inert waste acceptance criteria, indicated that much of the waste material within the site is typically inert. The waste classification is considered to reflect the level of degradation over time since landfilling ceased. Trial pits confirmed the waste material is near the surface with a minimal topsoil and clay cover present across the site.

Landfill gas monitoring from perimeter well BH02 at the site indicates gas concentrations detected are below threshold levels set by the EPA CoP. However, gas concentrations measured in 2010 at BH01 located within the waste body yielded a methane concentration of 78%. Groundwater monitoring was conducted on BH01 and BH02. Surface water sampling was also undertaken.

Based on the results of this updated assessment, the site is still classified as a **Moderate Risk Classification (Class B)**. The principal risk identified on the site is the risk posed to the aquifer from migration of leachate from the waste material encountered at the site through groundwater.

The purpose of this Tier 3 assessment was to further examine and quantify those risks/impacts through generation of computer models allowing a prediction of both the current and future impacts on:

- Groundwater quality, and
- the current and future extent landfill gas being generated by the waste present on site.



This information was used to inform appropriate remedial and mitigation measures to be implemented on site to either eliminate or reduce these risks.

Estimation of leachate generation at the site indicates that the site may contribute a very small amount of groundwater recharge volume to the wider Clare/Corrib groundwater body, therefore it is not likely to have an impact regionally.

LandGEM was utilised to estimate the quantity of landfill gas produced by the waste underlying the site. The model suggests that the site is continuing to produce landfill gas and methane in moderate quantities, thereby requiring remedial actions to be implemented.

The Tier 3 assessment concluded an engineered landfill cap layer will be required across the site to mitigate the impacts of leachate generated on site on the underlying aquifer and receptors downgradient. The proposed landfill cap will be constructed in accordance with the EPA recommendations/requirements for landfill site design. An engineered cap will have a barrier layer which will isolate rainfall inputs and so reduce future leachate generation. This cap should also be designed to take into consideration the proposed future use of the site as a solar farm and will be required to support any proposed on-site solar farm infrastructure.

To monitor the efficacy of the proposed remediation measures, additional groundwater monitoring locations are proposed downstream of the site. Additional surface water monitoring locations are also proposed upstream and downstream of the waste body.

The landfill capping shall also include active or passive landfill gas controls. A final decision on landfill gas control measures will be made upon completion of a landfill gas pumping trial. The pumping trial shall be used to determine the quantity and quality of landfill gas actively produced at the site. The most appropriate landfill gas control measures should be determined with reference to EPA Guidance: Management of Low Levels of Landfill Gas and EPA Landfill Manuals, Landfill Site Design.



## 1. INTRODUCTION

### 1.1 Background

The Claremorris waste footprint (3.2 ha.) is located within a larger body of open land (approximately 9 ha.) located approximately 1 km south-east from the centre of Claremorris town. Claremorris is approximately 24 km south-east of Castlebar. The landfill site is located in the townland of Clare and situated in agricultural land. The site is, bounded by a railway to the north and by the Knock-Claremorris Bypass (N17) to the West. The south and east boundaries comprise (boggy) agricultural lands. Access to the site was difficult due to overgrown brambles, gorse, trees and alien species.

The exact waste footprint area was unconfirmed. The site operated as a regional landfill accepting municipal waste from 1982 to March 1996. The site is currently under private ownership. The site was capped with boulder clay, but no remediation works have been completed. It has been reported that on occasion fires broke out on the site.

MCC is required to complete a tiered risk assessment of unregulated waste disposal sites in accordance with the Environmental Protection Agency (EPA) code of practice for unregulated waste disposal sites.

A Tier 2 Environmental Risk Assessment was conducted in 2010 and the report can be found in Appendix 1. A site investigation was carried out and the report containing the findings can be found in Appendix 2. MCC's 2010 assessment determined that the site had a moderate risk to the environment, which the highest normalised score assigned being 61.25%.

### 1.2 Scope of Works

FT's scope of work was to undertake a Tier 3 risk assessment of the site in accordance with the EPA Code of Practice (CoP) 2007: *Environmental Risk Assessment for Unregulated Waste Disposal Sites*. FT undertook the following:

- Desk study.
- Site walkover.
- Environmental risk assessment (ERA).
- Development of a conceptual site model (CSM).

The Tier 3 risk assessment was undertaken in tandem with a proposed Part 8 planning application to develop the site and surrounding area into a solar farm. The proposed application accelerated the need to regularise the site by MCC.

As part of the initial desk study, a review of available information including the previous site investigation and assessment was undertaken. This was followed-up with a site walkover by FT personnel. The desk study and site walkover were used to provide an updated view of the condition of the site and as a preliminary step in determining appropriate remediation measures.

The site walkover checklist, accompanying photo log and site walkover notes are included in Appendix 3 to this report.



The information gathered from the desk study and previous intrusive site investigation were used to inform the development of the conceptual site model (CSM) and the Environmental Risk Assessment (ERA). This report presents the findings of the assessment.

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## 2. DESK STUDY

### 2.1 Introduction

The desk study included the review of the following literature sources and websites:

- Geological Survey of Ireland, Groundwater Web Mapping: [www.gsi.ie](http://www.gsi.ie).
- Environmental Protection Agency Maps: <http://gis.epa.ie/Envision>.
- National Parks and Wildlife Service Map Viewer: [www.npws.ie](http://www.npws.ie).
- DoHPLG/EPA/Local Authority maps: [www.catchments.ie](http://www.catchments.ie).
- Mayo County Council Site Plans and Drawings.
- BS 5930: 1999, Code of Practice for Site Investigations.
- BS 10175: 2000, Investigation of Potentially Contaminated Sites – Code of Practice.
- EPA's Historic Mine Sites - Inventory and Risk Classification (2009).
- EPA - Assessing and Developing Natural Background Levels for Chemical Parameters in Irish Groundwater (2017).

A desktop review of available documentation for the site was conducted followed by a site walkover on 16<sup>th</sup> January 2020.

### 2.2 Desk Study

This section of the report presents the findings of the desk study.

#### 2.2.1 Site Description and On-Site Conditions

The Historic landfill is approximately 3.2 ha in size, of open land located to the east of Claremorris town and centre. The site is currently vacant with evidence of rough grazing by horses. Neighbouring land uses include grassland and a housing estate (c. 280 m west). An electric substation is located c. 150m north of the site. The site is bounded by a railway to the North and by the Knock-Claremorris Bypass (N17) to the West, the other sides are bounded by (boggy) agricultural land. There are no dwellings located within or immediately adjacent the site boundary. Claremorris city centre (c. 800m north-west) is located in the surroundings.

The Corine 2018 land use classification for the site is mostly inland wetlands (peat bogs).

The location of the site is shown in Figure 2-1.



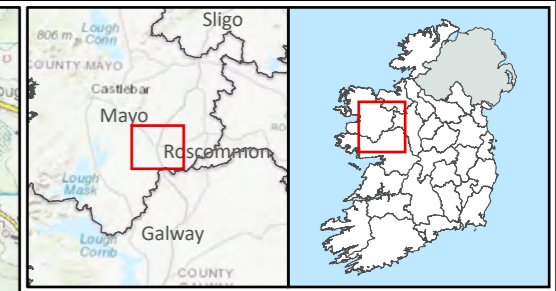
### 2.2.2 Previous Studies

A Tier 2 Environmental Risk Assessment was conducted in 2010 and can be found in Appendix 1. A site investigation was carried out and the report containing the findings is found in Appendix 2.

The Tier 2 assessment comprised the following:

- Desk study.
- Development of a conceptual site model (CSM).
- Site investigation works.
- Sample collection.
- Identification of contaminant sources, pathways of contaminant migration and potential receptors which may be vulnerable if exposed to those contaminants; i.e. the identification of Source- Pathway-Receptor (SPR) linkages.
- The prioritisation of sites and SPR linkages based on their perceived risk.

Based on the available information, the Tier 2 Assessment determined that the overall risk score for Claremorris Landfill was 61.25%, resulting in a risk classification of **Moderate (Class B)**.



Site Boundary

<b>TITLE:</b>	
Site Location	
<b>PROJECT:</b>	
Claremorris Tier 3 and Remediation Plan	
<b>FIGURE NO:</b>	
2.1	
<b>CLIENT:</b>	
Mayo County Council	
<b>SCALE:</b>	<b>REVISION:</b>
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### 2.2.3 Topography

The surrounding site is relatively flat. The waste deposition area is raised with respect to the surrounding topography. The site is readily accessed via an artificial steep incline/embankment from N17 road to the west of the site. The site generally falls from south to north towards the railway and west to east towards the bogland and stream.

Regionally, Claremorris town is located within an extensive flat area along the south-east of County Mayo, with land slightly sloping upwards to the north-east of the town.

### 2.2.4 Geology

#### *Drift/Quaternary Geology*

The quaternary Map provided by GSI Online identifies most quaternary sediments at the site as 'Cut over raised peat' and a north-west portion as 'Gravels derived from Limestones'; 'Till derived from limestones' is found in the surroundings. Quaternary sediments are shown in Figure 2-2.

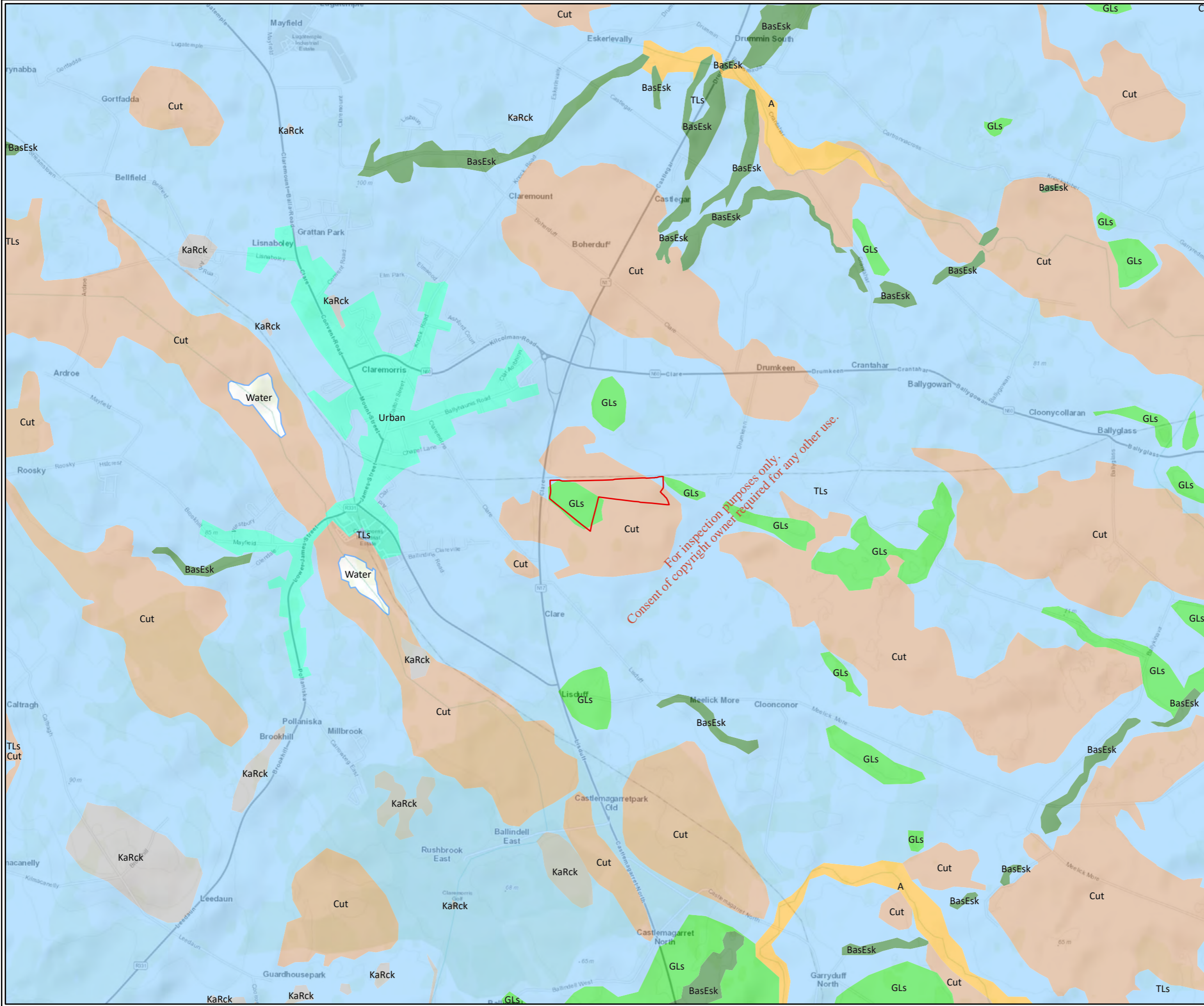
During the installation of boreholes during the site investigation, the presence of natural-black brown peat till is described in the driller's logs to depths of approximately 5.90 m and 4.0 m BGL at boreholes BH01 and BH02, respectively (See Appendix 2).

#### *Solid or Bedrock Geology*

The GSI online 1:100,000 scale bedrock geology map shows the bedrock beneath to be found on a single formation. The entirety of the site and surrounding area are underlain by the Ballymore Limestone Formation (CDBLYM) which is generally made up of dark fine-grained limestone and shale. No areas of bedrock outcrop are shown within or in the immediate vicinity of the site.

The bedrock geology is presented in Figure 2-3.

No bedrock encountered during the installation of boreholes BH01 and BH02, as referenced in the JS Drilling borehole logs (Appendix 2).

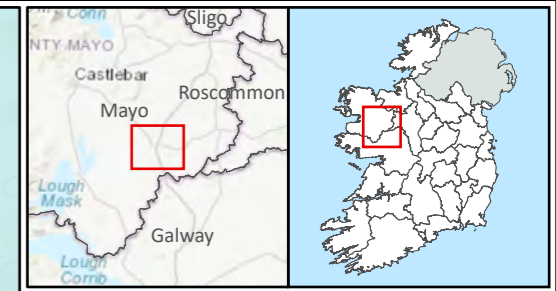
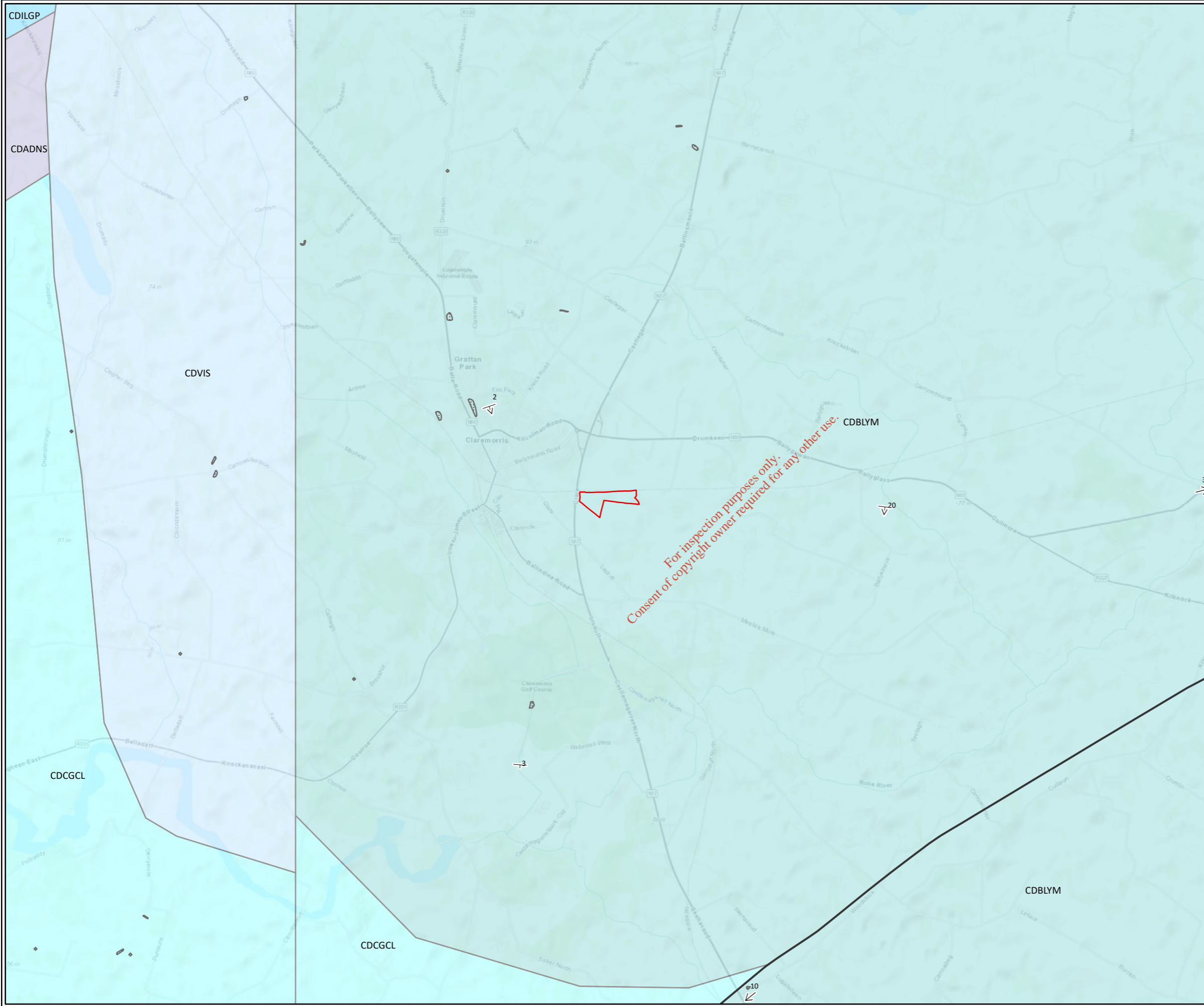


- Site Boundary
- Quaternary Sediments**
- A, Alluvium
- BasEsk, Eskers comprised of gravels of basic reaction
- Cut, Cut over raised peat
- GLs, Gravels derived from Limestones
- KaRck, Karstedt bedrock outcrop or subcrop
- TLS, Till derived from limestones
- Urban
- Water

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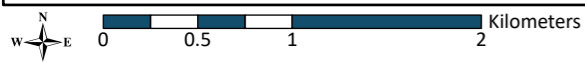
<b>TITLE:</b>	Quaternary Geology	
<b>PROJECT:</b>	Claremorris Tier 3 and Remediation Plan	
<b>FIGURE NO.:</b>	2.2	
<b>CLIENT:</b>	Mayo County Council	
<b>SCALE:</b>	1:20,000	<b>REVISION:</b> 0
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- Site Boundary
- Dip of bedding or main folia on, old GSI data
- Strike and dip of bedding, right way up
- Strike and dip of bedding, way up unknown
- Fault
- Bedrock Outcrop
- Bedrock Geology**
- Ardnasillagh Formation
- Ballymore Limestone Formation
- Cong Canal Formation
- Illaunagappul Formation
- Visean Limestones (undifferentiated)

<b>TITLE:</b>	Bedrock Geology	
<b>PROJECT:</b>	Claremorris Tier 3 and Remediation Plan	
<b>FIGURE NO:</b>	2.3	
<b>CLIENT:</b>	Mayo County Council	
<b>SCALE:</b>	1:40,000	<b>REVISION:</b> 0
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## 2.2.5 Hydrogeology

An examination of the national bedrock aquifer map on the GSI online mapping classifies the underlying bedrock aquifer as 'Regionally Important Aquifer - Karstified (conduit)'. The bedrock aquifer mapping is presented in Figure 2-4.

GSI mapping indicates the presence of karst aquifer located within the site.

Historical mapping for the area shows few springs in the surrounding area. There are several standalone dwellings and clusters of residential units in relative proximity to the site and wider environment where unregistered private wells may be present.

Table 2-1 presents the details of the GSI registered boreholes and springs within 1km of the site. It is noted that all wells listed below have location accuracies of 1 – 2km and may be located outside of the 1km radius.

**Table 2-1: Borehole and Spring Descriptions near the Project Site**

BH/Spring	Yield class	Yield (m <sup>3</sup> /day)	Use	Depth (m)	Depth to Rock confidence (m)	Distance from site (km)	Date
1127SEW004	-	-	Group Scheme	-	-	0.53	1899

The GSI mapping showing approximately locations of known wells and springs is included in Figure 2-5.

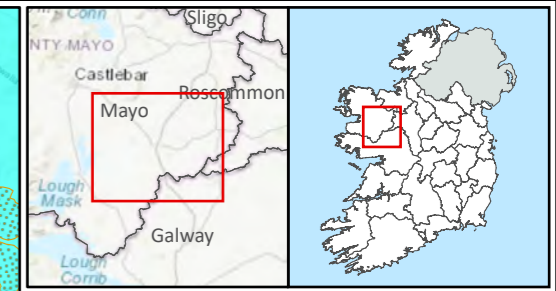
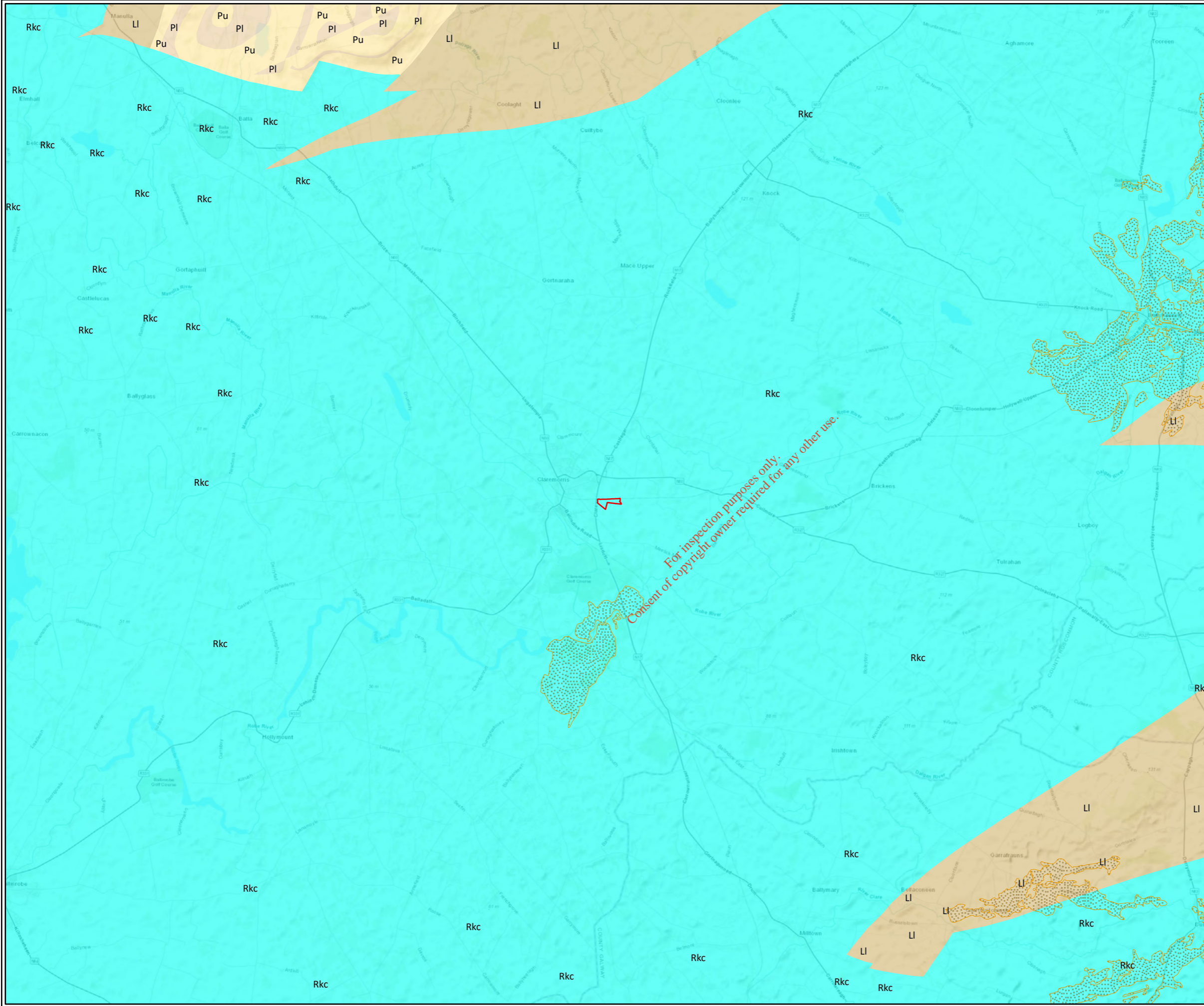
There are no Groundwater Drinking Water Protection Areas within the site boundaries according to GSI. The closest, Loughanemon Barnacarroll GWS, is located approximately 3.2km North from the site. Approximately 4.7 km from the site, also North, Kilcolman Facefield GWS is located. Irishtown GWS can be found c. 5.8km South-East.

The GSI shows that the groundwater body (GWB) underlying the site is the Cong-Robe GWB and it is a Karstic aquifer. The most recent (2013-2018) Water Framework Directive quality status for the GWB is 'Good'. The WFD risk to groundwater quality was most recently classified as 'Review'.

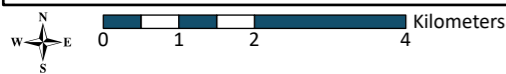
The closest groundwater dependant ecosystem in the area, according to Catchments Maps, is the Clare-Corrib Groundwater in SAC Habitats (Code: IE\_WE\_G\_0020), located c.4.9km South-East of the site at its closest point.

The GSI mapping shows three different groundwater recharge area rates for the site, the primary two areas are:

- Low: A pre-cap recharge rate of 33mm/yr for the site was calculated applying a recharge co-efficient of 4.0% to an effective rainfall rate of 832 mm/yr. GSI define the hydrogeological setting as Basin Peat. Found in most of the site.*
- High: A pre-cap recharge rate of 707mm/yr for the site was calculated applying a recharge co-efficient of 85.0% to an effective rainfall rate of 832 mm/yr. GSI define the hydrogeological setting as High Permeable Subsoil, Sand and Gravels overlain by Well-drained Soil. Found in the North-West portion of the site.*

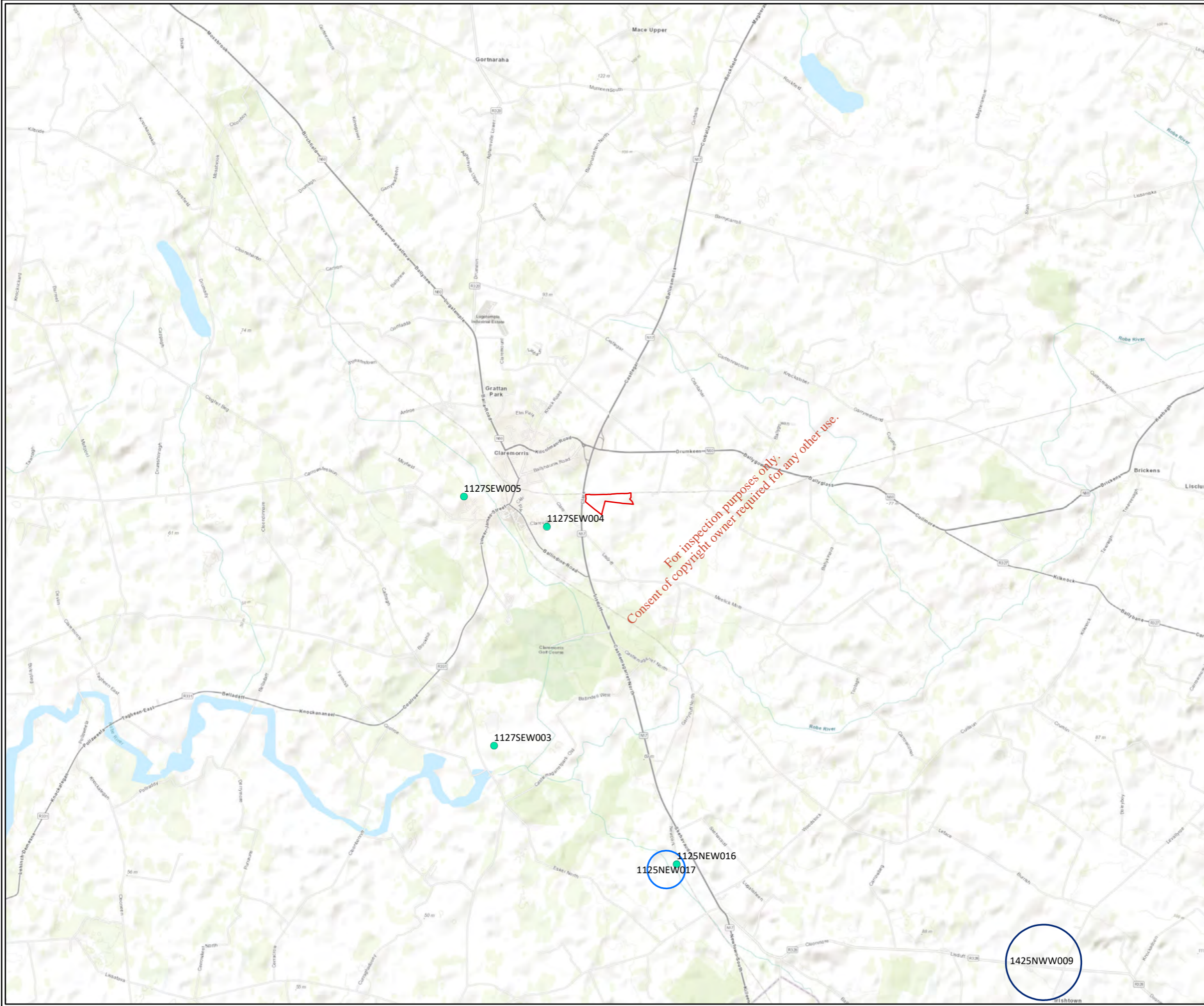


- Site Boundary
- Sand and Gravel Aquifers**
- Locally important gravel aquifer
- Bedrock Aquifers**
- LI: Locally Important Aquifer - Bedrock Mod Produc ve Locally
- PI: Poor Aquifer Bedrock Generally Unproduc ve Except Locally
- Pu: Poor Aquifer Bedrock Generally Unproduc ve
- Rkc: Regionally Important Aquifer - Karsted (conduit)

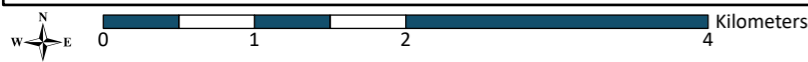


<b>TITLE:</b>	Aquifer Classification	
<b>PROJECT:</b>	Claremorris Tier 3 and Remediation Plan	
<b>FIGURE NO:</b>	2.4	
<b>CLIENT:</b>	Mayo County Council	
<b>SCALE:</b>	1:100,000	<b>REVISION:</b> 0
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- Site Boundary
- Wells and Springs (10-50m Accuracy)
- Wells and Springs (200-500m Accuracy)
- Wells and Springs (500m-1km Accuracy)



<b>TITLE:</b>	
Wells and Springs	
<b>PROJECT:</b>	
Claremorris Tier 3 and Remediation Plan	
<b>FIGURE NO:</b> 2.5	
<b>CLIENT:</b> Mayo County Council	
<b>SCALE:</b> 1:50,000	<b>REVISION:</b> 0
<b>DATE:</b> 13/01/2020	<b>PAGE SIZE:</b> A3
<span style="font-weight: bold; font-size: 1.2em; vertical-align: middle;">FEHILY TIMONEY</span> <span style="font-size: 0.8em; vertical-align: middle; margin-left: 10px;">Cork   Dublin   Carlow www.fehilytimoney.ie</span>	



### 2.2.6 Groundwater Vulnerability

Groundwater vulnerability, as defined by the GSI, is the term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities.

The factors used in assessing groundwater vulnerability include subsoil type and thickness and recharge type as indicated in Table 2-2. The GSI procedure whereby groundwater protection is assessed is outlined in the EPA-GSI publication Groundwater Protection Schemes (DELG/EPA/GSI, 1999).

The GSI Online mapping data set identifies the vulnerability of groundwater to contamination is classified as H (High) to the Western portion of the site, M (Moderate) in the most North-East portion and in the centre portion it is classified as L (Low) Vulnerability. The Groundwater Vulnerability mapping is presented in Figure 2-6.

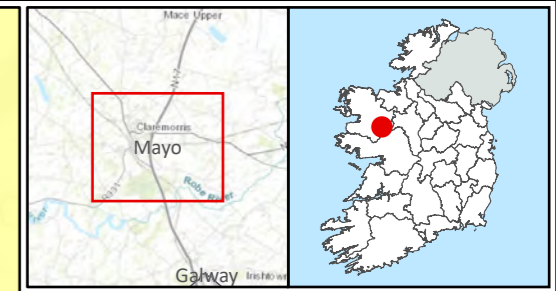
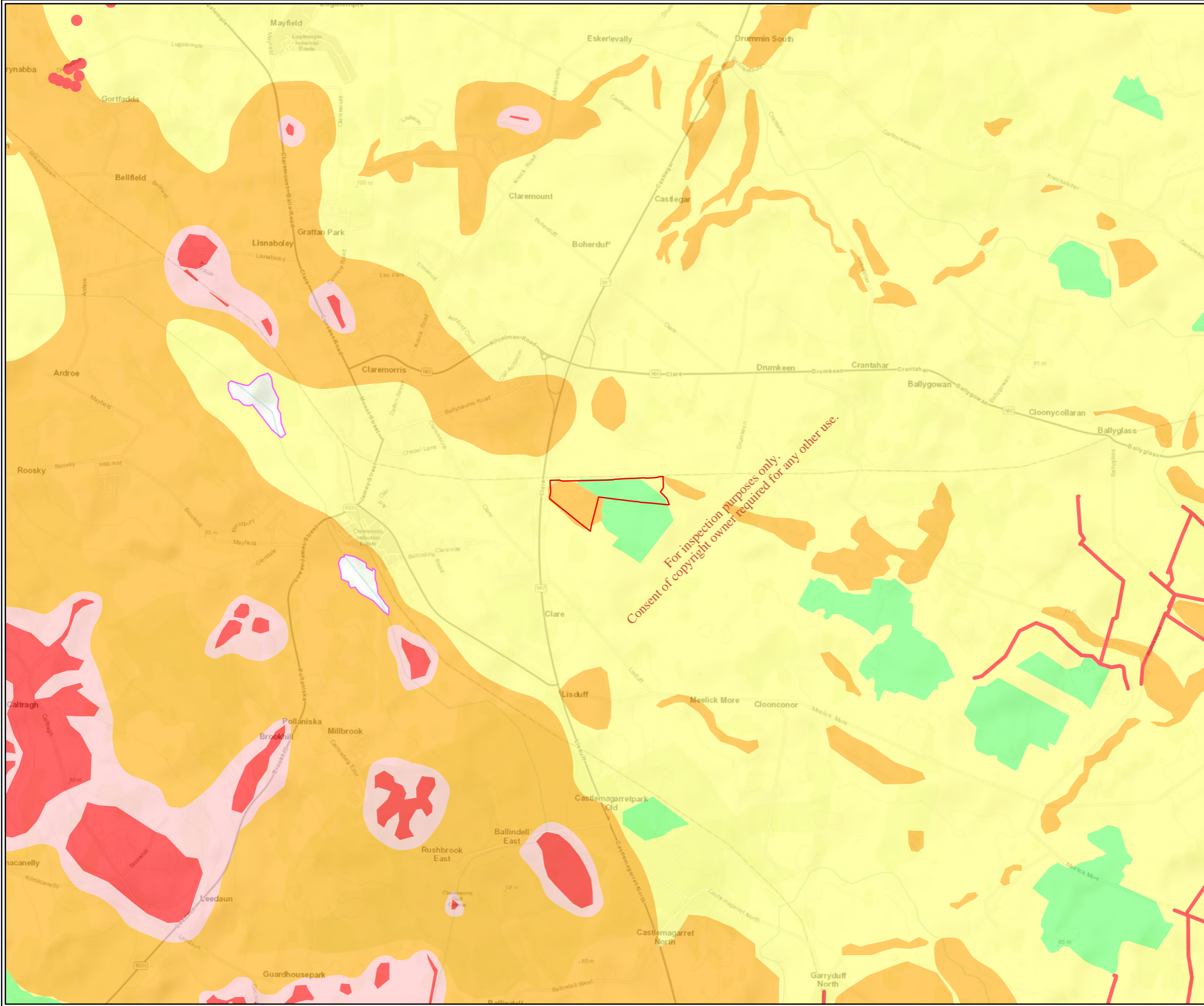
**Table 2-2: GSI Guidelines – Aquifer Vulnerability Mapping**

Vulnerability Rating	Hydrogeological Conditions		
	<i>Subsoil Permeability (Type) and Thickness</i>		
	High Permeability (Shallow Bedrock)	Moderate Permeability (e.g. Sandy soil)	Low Permeability (e.g. Clayey subsoil, clay, peat)
Extreme (E)	0 - 3.0 m	0 - 3.0 m	0 - 3.0 m
High (H)	>3.0 m	3.0 -10.0 m	3.0 - 5.0 m
Moderate (M)	N/A	>10.0 m	5.0 - 10.0 m
Low (L)	N/A	N/A	>10 m

Notes:

N/A = Not Applicable

Precise permeability values cannot be given at present



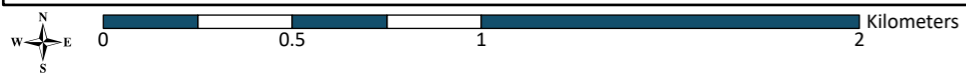
**Site Boundary**

**Groundwater Vulnerability**

- E - Extreme
- H - High
- M - Moderate
- L - Low
- Water
- X - Rock Near Surface or Karst

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<b>TITLE:</b>	Groundwater Vulnerability	
<b>PROJECT:</b>	Claremorris Tier 3 and Remediation Plan	
<b>FIGURE NO:</b>	2.6	
<b>CLIENT:</b>	Mayo County Council	
<b>SCALE:</b>	1:20,000	<b>REVISION:</b> 0
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### 2.2.7 Hydrology

According to catchment maps, the site is located within the Corrib catchment (Hydrometric Area 30), at Sub catchment Robe\_SC\_010 (Code: 30\_9) and Robe\_020 Sub-basin. The nearest surface water feature to the site is the Robe\_020 (also known as Kilbeg-Malone) river (Status: Good) which crosses the site to the North-East corner and flows in a south-westerly direction eventually meeting the Robe\_030 river (Status: Moderate) c. 3.6km downstream of the site.

The Robe\_030 river flows in a south-westerly direction eventually meeting the Robe\_060 river (Status: Good). Robe\_060 discharges to Cong Canal\_010 (Status: Good), which flows to three different lakes and to Corrib\_010 River (Status: Unassigned). Corrib\_010 River discharges to Corrib Estuary (Status: Good) and, lastly, to Inner Galway Bay North (Status: Good) in the South, c. 52km from the site.

### 2.2.8 Ecology

The site is not within or directly adjacent to any Natural Heritage Area (NHA), proposed NHA (pNHA), Special Area of Conservation (SAC) or Special Protection Area (SPA). The nearest protected site is the Carrowkeel Turlough SAC and pNHA (Site Code: 000475) and it is located c.6.8km south-west of the site at its closest point.

There does not appear to be any direct pathway or linkage between the site and this protected area.

There is a Special Area of Conservation, River Moy SAC (Site Code: 002298), located 7.57km north at its closest point from the site.

Another protected site in relative proximity to the site is Lough Corrib SAC (Site Code: 000297), located around c.9.6km on the south-east of the site.

There are no other protected sites in the vicinity of the site or any sites that could be considered at risk.

The ecology protected areas mapping is presented in Figure 2-7.

### 2.2.9 Site History

The earliest historical map available on the OSI website dates from 1837-1842 and 1888-1913. The OSI identifies the land within the site boundary was historically used for agricultural purposes (rough pastures).

The OSI Historical Mapping is presented in Figure 2-8.

Historical aerial imagery from 1995 show evidence of filling activity. The next imagery available in 2000 indicates the activity has ceased.

### 2.2.10 Existing Geological History

The GSI holds no records of areas of Geological Heritage within the site boundary.

The nearest recorded of geological heritage held by the GSI is approximately 12.3km north-east of the site boundary at Knock-Ballyhaunis area.



Knock-Ballyhaunis area is described as a “*Field of megalineations, largest in Ireland, largest individual lineations in Ireland. Many megalineations in till, interspersed with crag-and-tail features.*” and the geological feature of note is “*Mega-Flutings*”.

Another Geological Heritage is Garranlahan Esker, located 18.0km East from the site. Garranlahan Esker is described as “*a long, beaded, often high, sinuous esker ridge system*” and the geological feature of note is “*long, wide tunnel-deposited esker*”.

The geological heritage mapping is presented in Figure 2-9.

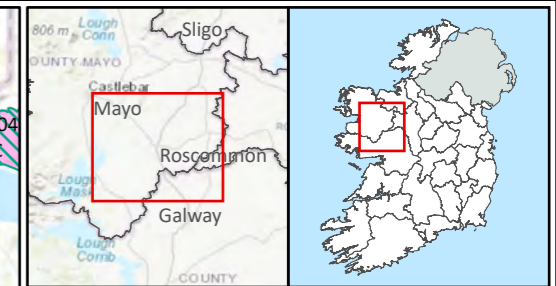
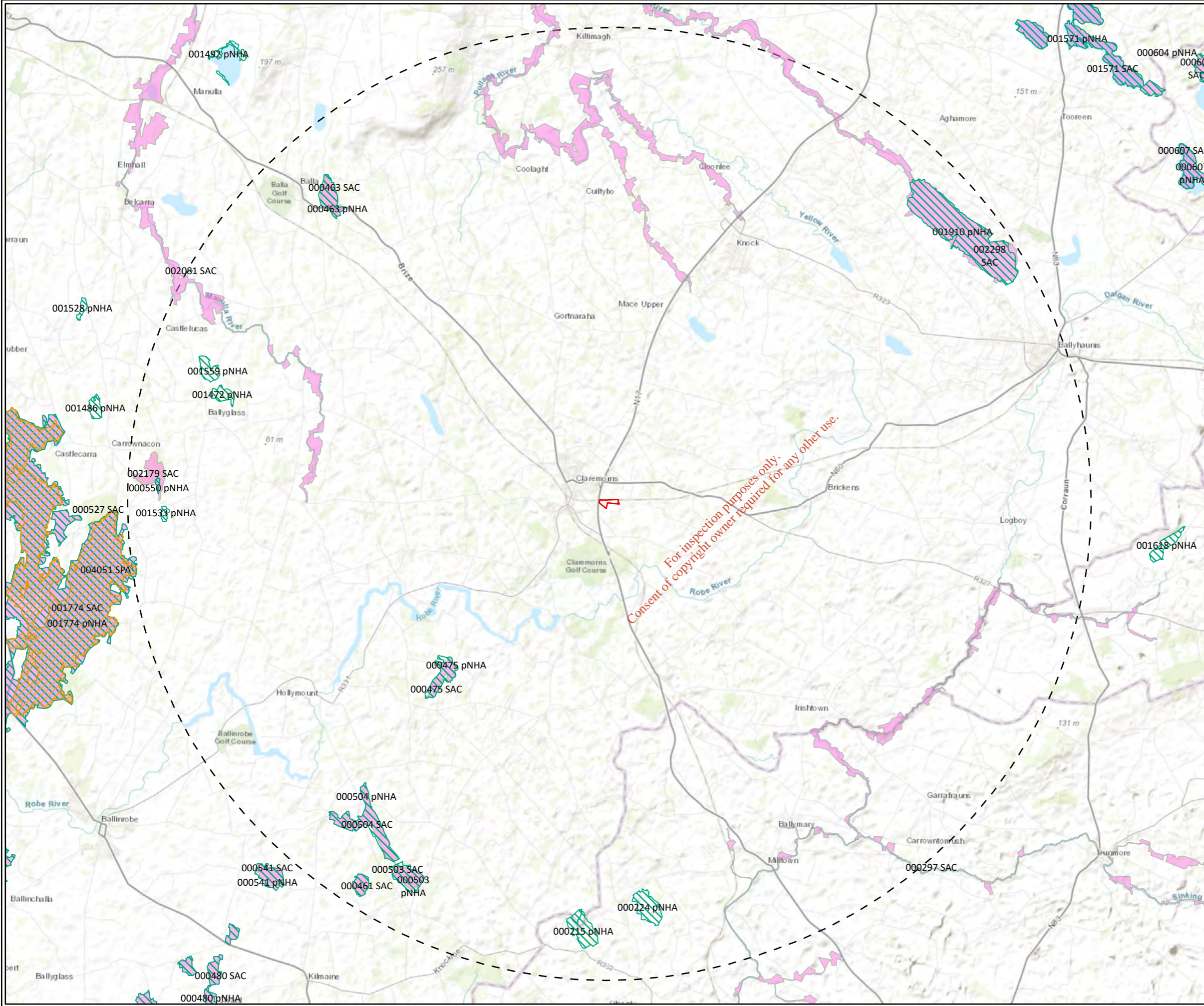
#### 2.2.11 Existing Geotechnical Stability

The GSI landslides database indicates that there are no recorded geo-hazards within the site boundary.

The closest one is located 17km to the north-west of the site, at Bohola, in the village of Carranteaun below Kiltimagh Mountain in December 2001.

#### 2.2.12 Archaeological Heritage

There are six National Monuments to the North, West and East of the site boundaries, between c.0.3km and c.0.9km. They belong to Clare and Kilbeg-Malone Townlands. The Archaeological Survey of Ireland (ASI) is in the process of providing information on monuments, and these records have not been uploaded.

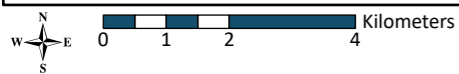


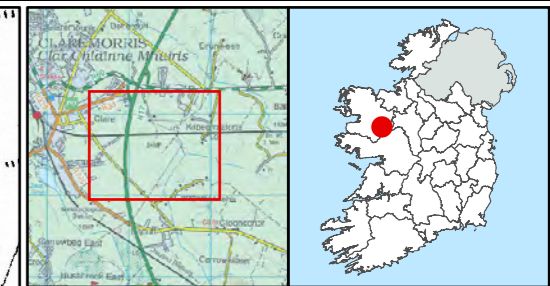
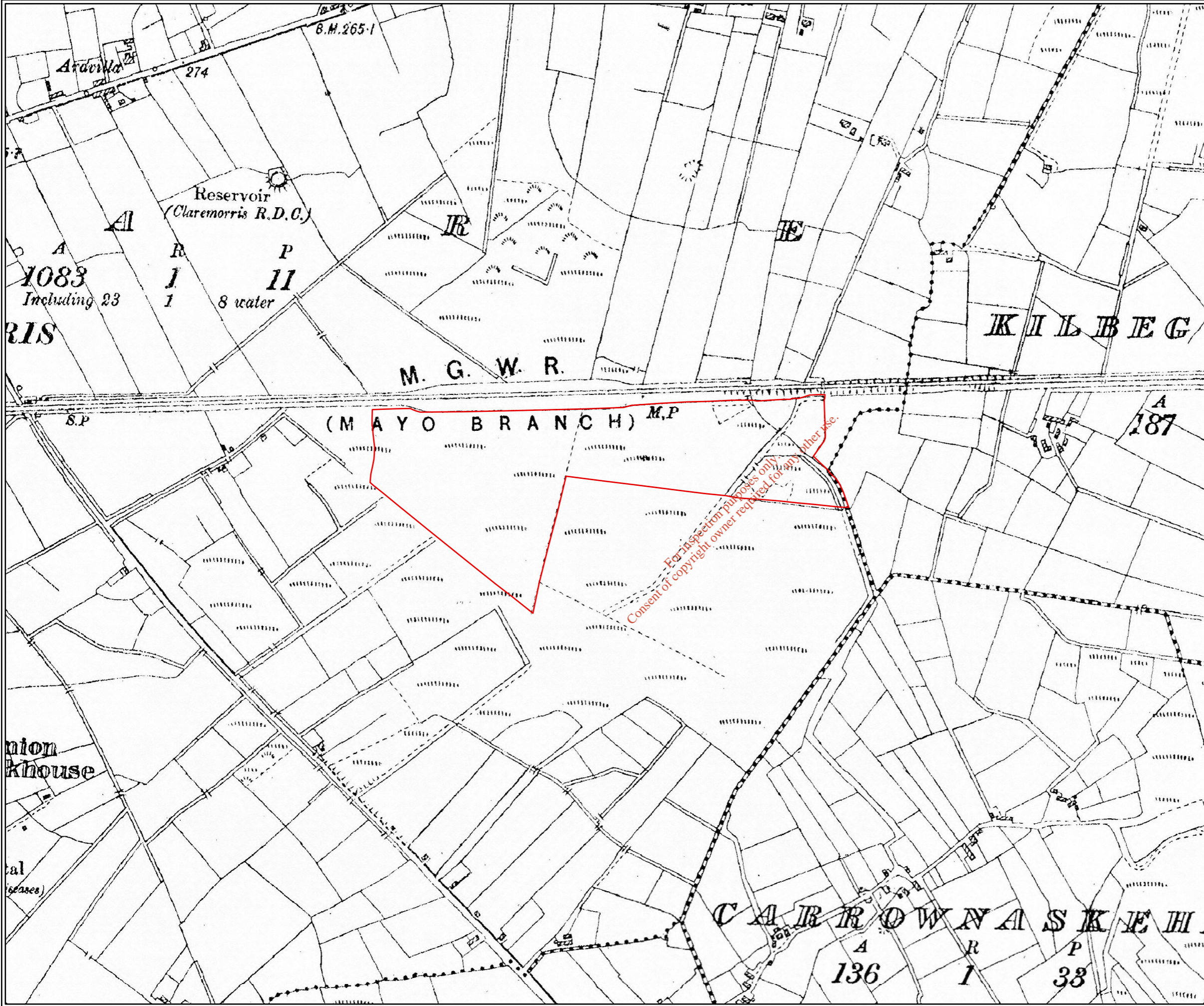
- Site Boundary
- 15km Buffer of Site Boundary
- Proposed Natural Heritage Area (pNHA)      Nearest site: 6.8km
- Special Area of Conservation (SAC)      Nearest site: 6.8km
- Special Protection Area (SPA)      Nearest site: 14.9km

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<b>TITLE:</b> Ecologically Protected Sites	
<b>PROJECT:</b> Claremorris Tier 3 and Remediation Plan	
<b>FIGURE NO:</b> 2.7	
<b>CLIENT:</b> Mayo County Council	
<b>SCALE:</b> 1:120,000	<b>REVISION:</b> 0
<b>DATE:</b> 13/01/2020	<b>PAGE SIZE:</b> A3

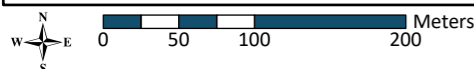
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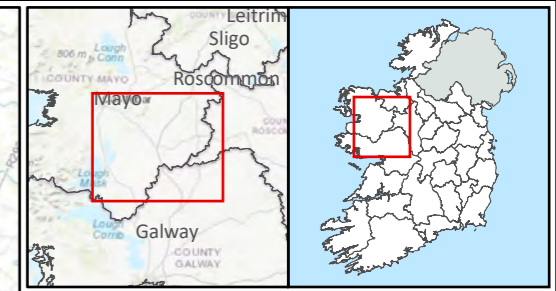
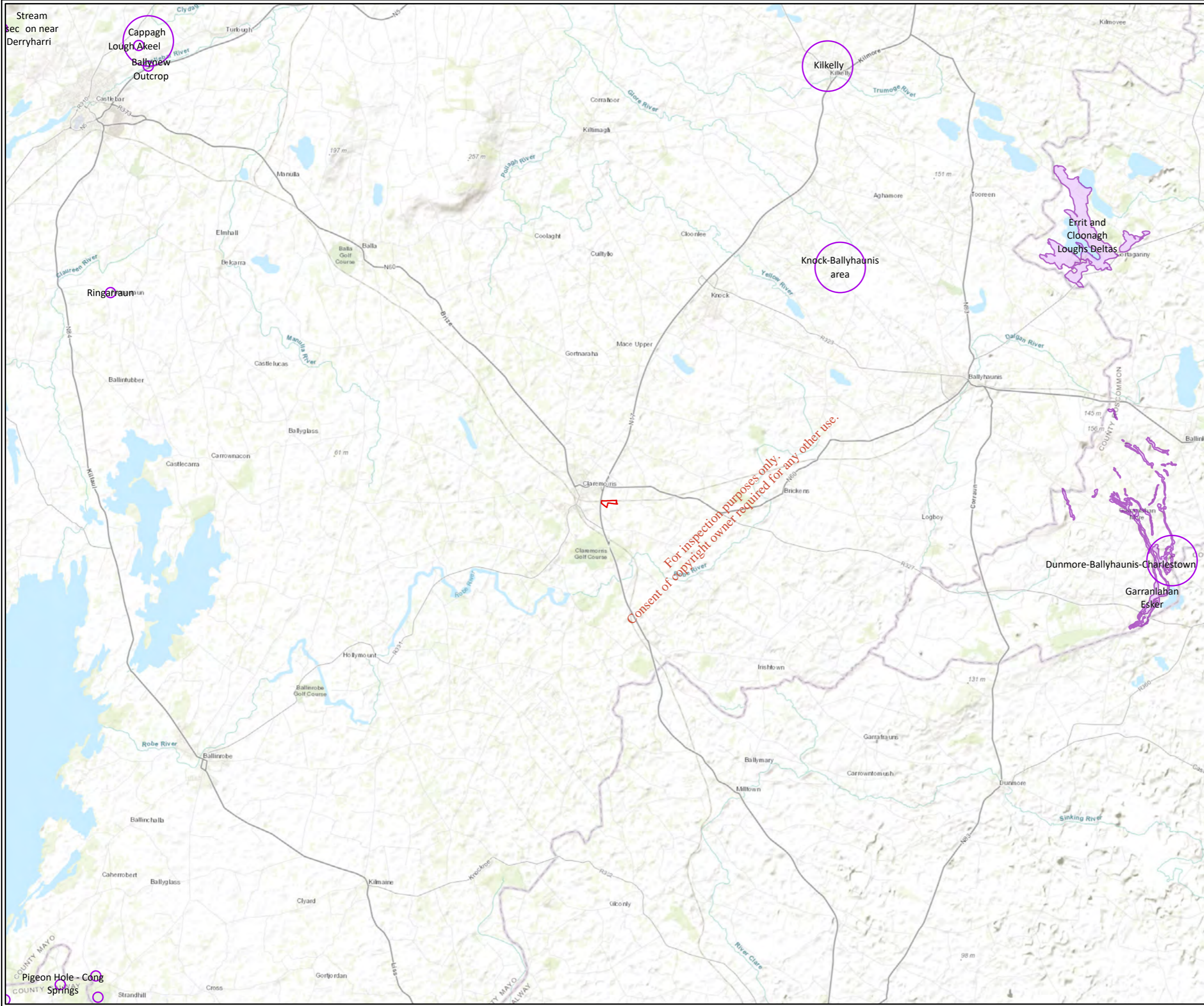




Site Boundary

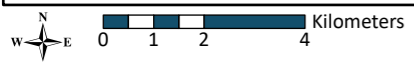
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PROJECT:		Claremorris Tier 3 and Remediation Plan	
FIGURE NO:		2.8	
CLIENT:		Mayo County Council	
SCALE:	1:5,000	REVISION:	0
DATE:	13/01/2020	PAGE SIZE:	A3





- Site Boundary
- Geological Heritage Sites (Audited Boundaries)
- Geological Heritage Sites (Unaudited Boundaries)

<b>TITLE:</b> Geological Heritage	
<b>PROJECT:</b> Claremorris Tier 3 and Remediation Plan	
<b>FIGURE NO.:</b> 2.9	
<b>CLIENT:</b> Mayo County Council	
<b>SCALE:</b> 1:150,000	<b>REVISION:</b> 0
<b>DATE:</b> 13/01/2020	<b>PAGE SIZE:</b> A3





### 2.3 Previous Site Investigation - N17

FT reviewed the GSI Online borehole Mapping and Site investigation reporting log as part of this desk study. FT reviewed a relevant Site Investigations report which was prepared by IGCL Ltd for the N17 road works.

The IGCL report is included in Appendix 4 to this report.

The review highlighted two boreholes located close to the site for the then proposed (now existing) railway overbridge. The boreholes are referred to as 1250R and 1250L indicating their chainage location. The approximate location of these boreholes according the GSI is shown in Figure 2-10 below.



Figure 2-10: GSI Geotechnical Boreholes (Blue Triangle)

A descriptive extract from the report regarding the boreholes is quoted below:

*(b) Chainage 1250 - Bridge over Railway*

*Two holes were bored at this location. In borehole 1250R, 1.00 metres of filling overlies a 2.00 metres peat stratum. Coarse compact gravel was noted from 3.00 to 3.80 metres with Limestone rock found at 3.80 metres.*



*In Borehole 1250L, fill and peat again occurred to a depth of 1.40 metre, overlying a firm stiff gravelly clay. Gravel was noted from 2.70 to 3.70 metres with refusal (probably rock) at 3.70 metres.*

*Diamond drilling methods were used to recover NQ (50mm) core at both locations. At 1250R good quality core was recovered from 3.70 metres below ground level to 7.00 metres, while at Borehole 1250L solid rock core was recovered from 4.90 to 6.70 metres. Some weathered rock was noted in Borehole 12501. above the solid horizon.*

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## 3. TIER 2 SITE INVESTIGATION

### 3.1 Previous Site Investigation Works

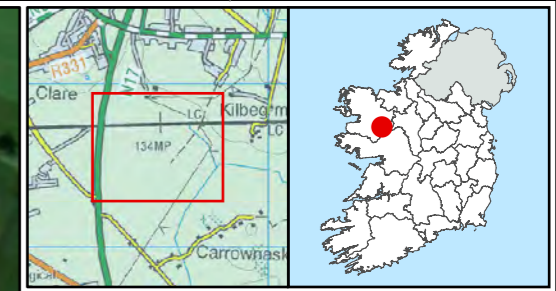
A site investigation on the site was carried out by JS Drilling on behalf of MCC in 2010 and 2011. The full report is presented in Appendix 2.

The scope of site investigation works at the time included:

- Drilling of 2 No. boreholes.
- Excavation of 7 No. trial pits to the full depth of the waste body where possible.
- *In-situ* monitoring of landfill gas.
- Collection of soil/waste samples during drilling/trial pitting.
- Conversion of the 2 No. boreholes to groundwater/leachate monitoring wells.
- Collection of groundwater/leachate from each of the monitoring wells.

The locations of the intrusive works are presented in Figure 3-1.

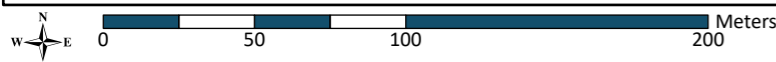




- Site Boundary
- BH
- ST
- TP

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<b>TITLE:</b>	
Site Inves ga on Loca on Plan	
<b>PROJECT:</b>	
Claremorris Tier 3 and Remedia on Plan	
<b>FIGURE NO:</b>	3.1
<b>CLIENT:</b>	Mayo County Council
<b>SCALE:</b> 1:2,500	<b>REVISION:</b> 0
<b>DATE:</b> 15/01/2020	<b>PAGE SIZE:</b> A3





### 3.1.1 Trial Pits

A JS Drilling Engineering Geologist supervised the advancement of 7 No. trial pits, shown in Figure 3-1 on the 25<sup>th</sup> November 2010.

Seven trial pits (TP01–TP07) were excavated using a tracked excavator fitted with a 1m wide and 3m length bucket, to a maximum depth of 6.50m below existing ground level (BGL). The profiles identified during trial pitting provided a picture of the underlying geology of the site and a general profile of the buried waste.

A summary of the ground conditions is presented in Table 3-1 below with photographs and exploratory hole logs provided in the JS Drilling site investigation report, Appendix 2.

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**Table 3-1: Summary of Ground Conditions**

Trial Pit ID	Depth of cover material (m BGL)	Depth to base of made ground/waste (m BGL)	Profile Description
TP01	0.0 - 0.40 (Made Ground) 0.40 – 6.40 (Made Ground)	6.40 (base of excavation)	Soft black-brown PEAT with some plastic and waste content.  Waste moderately well-rotted, mainly domestic with some C&D (concrete insulation). Strong pungent odour.
TP02	0.0 - 0.40 (Made Ground) 0.40 – 6.50 (Made Ground)	6.50 (base of excavation)	Soft black-brown peat FILL with some plastic and waste content.  Waste moderately well-rotted, mainly domestic with some C&D (concrete insulation). Strong pungent odour.
TP03	0.0 – 0.70 (Made Ground) 0.70 – 6.20 (Made Ground)  6.20 – 6.40 (Peat)	6.40 (base of excavation – base of waste body)	Soft black-brown peat FILL with some plastic and waste content.  Waste moderately well-rotted, mainly domestic plastic bags of waste. Strong pungent odour.  Natural soft-firm dry PEAT.
TP04	0.0 - 0.50 (Made Ground) 0.50 – 5.50 (Made Ground)	5.50 (base of excavation - terminated due to ground conditions)	Soft black-brown peat FILL with some roots and vegetation in top 0.20m.  Wet waste poorly well-rotted, mainly domestic plastic bags of waste. Strong pungent odour.
TP05	0.0 - 0.30 (Made Ground) 0.30 – 0.90 (Made Ground) 0.90 – 4.0 (Made Ground)  4.0 – 4.50 (Peat)	4.50 (base of excavation – base of waste body)	Soft black-brown peat FILL with some roots and vegetation in top 0.20m.  Brown black peat FILL with plastic and waste mixed in.  Waste moderately well-rotted, mainly domestic plastic bags of waste. Strong pungent odour.  Natural dark brown-black PEAT.
TP06	0.0 - 0.40 (Made Ground) 0.40 – 0.70 (Made Ground)	6.50 (base of excavation)	Soft black-brown peat FILL.  Brown black peat FILL with plastic and waste mixed in.



Trial Pit ID	Depth of cover material (m BGL)	Depth to base of made ground/waste (m BGL)	Profile Description
	0.70 – 6.50 (Made Ground)		Waste moderately well-rotted, mainly domestic plastic bags of waste and paper dated 1994. Strong pungent-sweet odour.
TP07	0.0 - 0.30 (Made Ground) 0.30 – 5.40 (Made Ground) 5.40 – 5.50 (Peat)	5.50 (base of excavation – base of waste body)	Soft black-brown peat FILL. Waste moderately well-rotted, mainly domestic plastic bags of waste. Strong pungent-sweet odour. Natural black brown PEAT.

Made ground comprising waste was encountered in all 7 No. trial pits (TP01-TP07). No bedrock was encountered.

Waste material was encountered between 0.0m – 6.50m in all trial pits from TP01 to TP07. No groundwater was encountered. Leachate found in all 7 No. trial pits from 3.70m to 6.0m BGL.

Natural ground comprising of Peat was confirmed in 3 No. trial pits (TP03, TP05 and TP07).

### 3.1.2 Waste Sampling

A total of 6 No. samples of the made ground / waste at the site was collected from trial pits TP01-TP06.

All samples were submitted for Waste Acceptance Criteria (WAC) testing to Severn Trent Laboratories Ltd., a UKAS/MCERTS approved laboratory. Samples were collected from site under Chain of Custody procedures.

The results are provided in Appendix 1 of the JS Drilling Report, Appendix 2 of this report.

The results are discussed in Section 4.1.

### 3.1.3 Slit Trenches

The lateral extent of the waste body was determined by 7 No. slit trenches (ST01-ST07) excavated along the edge of the landfill, as shown in Figure 3-1. Slit trench logs are included in Appendix 2 of JS Drilling report, (see Appendix 2 of this report) the findings are summarised on Table 3-2 below.