GLENAMADDY WASTE WATER DISCHARGE LICENCE APPLICATION (REG NO. D0379-01)


June 2014
IRISH WATER

GLENAMADDY WASTE WATER DISCHARGE LICENCE APPLICATION
(REG. NO D0379-01)

NATURA IMPACT STATEMENT - STAGE 2 APPROPRIATE ASSESSMENT FOR THE PURPOSES OF THE WASTE WATER DISCHARGE (AUTHORISATION) REGULATIONS, 2007 (S.I. NO 684 OF 2007)

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1. INTRODUCTION

1.1 Background


The Water Services (No.2) Act 2013 provided for the transfer of water services functions from the 34 Local Authorities to Irish Water. It also provided for the transfer of the water services infrastructure assets to Irish Water. With this transfer of assets and functions, Irish Water has now become the licensee for all EPA Waste Water Discharge Licences and Certificate of Authorisation applications.

This Stage 2 Appropriate Assessment, prepared by Nicholas O’Dwyer Ltd. and Ecologist Tony Nagle, on behalf of Irish Water, has been produced to support the Waste Water Discharge Licence application for the Glenamaddy agglomeration (EPA Application Register Numbers D0379—01). In May 2014, Nicholas O’Dwyer Ltd., on behalf of Irish Water prepared a Stage 1 Appropriate Assessment (AA) Screening Report to form a response to the EPA correspondence of 7th March 2014 which requested Irish Water to:

“Undertake a screening for Appropriate Assessment for existing and proposed emissions and state whether the activity, individually or in combination with other plans or projects is likely to have a significant effect on a European Site(s), in view of best scientific knowledge and the conservation objectives of the site(s)”.

The aforementioned AA Screening Report concluded that further assessment was required to assess the scale and magnitude of the groundwater discharge to impact the qualifying habitats and species protected by the Lough Lurgeen Bog/Glenamaddy Turlough SAC and Lough Corrib SAC and that the project must proceed to Stage 2 Appropriate Assessment.

This Stage 2 Appropriate Assessment, Natura Impact Statement, will consider the impact of the existing Glenamaddy WwTP groundwater discharge on the integrity of Lough Lurgeen Bog/Glenamaddy Turlough SAC and Lough Corrib SAC. This will be done alone and in combination with other projects or plans, with respect to the site’s structure and function and their conservation objectives. Any negative impacts on the integrity of these sites will require the implementation of avoidance or mitigation measures to avoid progression to Stages 3 and 4 of the Appropriate Assessment process.
1.2 Appropriate Assessment Legislation

Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora - the "Habitats Directive" - provides legal protection for habitats and species of European importance. The Directive requires the maintenance or restoration of habitats and species of European Community interest, at a favourable conservation status and provides the legislation to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000 sites.

Natura 2000 sites are Special Areas of Conservation (SAC) designated under the Habitats Directive and Special Protection Areas (SPA) designated under the Conservation of Wild Birds Directive (79/409/EEC). Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans or projects affecting Natura 2000 sites.

Article 6(3) establishes the requirement for Appropriate Assessment:

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

Article 6(4) of the Directive deals with alternative solutions, the test of "imperative reasons of overriding public interest" (IROPI) and compensatory measures:

"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".
1.3 Waste Water Discharge (Authorisation) Regulations, 2007

The Wastewater licensing and certification process gives effect to a number of EU Directives by the imposition of restrictions or prohibitions on the discharge of dangerous substances and thus preventing or reducing the pollution of waters by waste water discharges.

All discharges to the aquatic environment from sewerage systems owned, managed and operated by water service authorities (now Irish Water) require Waste Water Discharge Licences or Certificate of Authorisations from the EPA.

The authorisation process provides for the EPA to place stringent conditions on the operation of discharges from WwTPs to ensure that potential effects on the receiving water bodies are strictly limited and controlled. In overall terms the aim is to achieve good surface water and ground water status in addition to complying with standards and objectives established for associated protected areas, including Natura 2000 sites.

1.4 Methodology

An Appropriate Assessment is an assessment of the potential adverse or negative impacts of a plan or project, in combination with other plans or projects, on a European site. An Appropriate Assessment must be carried out before any decision is made to allow the plan or project to proceed. The obligation to undertake Appropriate Assessment derives from both Article 6(3) and 6(4) of the Habitats Directive.

The European Commission (2002) has provided guidance on addressing the provisions of Article 6(3) and 6(4) of the Habitats Directive and identifies four main stages in the process as follows:

Stage One: Screening for Appropriate Assessment

The process identifies the likely significant effects upon a Natura 2000 site of a project or plan, whether alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant. A Stage 1 Assessment was completed by Nicholas O’Dwyer Ltd. on behalf of Irish Water in May 2014. This Assessment determined that a Stage 2 NIS would need to be completed for the current discharge as it could not be excluded, on the basis of objective scientific information following screening, that the discharge, individually or in combination with other plans or projects, would have a significant effect on the Lough Lurgeen Bog/Glenamaddy Turlough SAC and Lough Corrib SAC. The Stage 1 AA Screening Report should be read in conjunction with this Stage 2 NIS.
**Stage Two: Appropriate Assessment**

This stage considers whether the project or plan, alone or in combination with other projects or plans, will have adverse effects on the integrity of a Natura 2000 site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects.

**Stage Three: Assessment of Alternative Solutions**

This process examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site.

**Stage Four: Assessment where no Alternative Solutions Exist and where Adverse Impacts Remain.**

This Stage is an assessment of compensatory measures, where in the light of an assessment of imperative reasons of over-riding public interest, it is deemed that the project or plan should proceed.

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First, the project should aim to avoid any negative impacts on European sites by identifying possible impacts early in the planning stage and designing the project in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the AA process to the point where no adverse impacts on the site(s) remain. If the project is still likely to result in adverse effects, and no further practicable mitigation is possible, then it is rejected. If no alternative solutions are identified and the project is required for imperative reasons of overriding public interest (IROPI test) under Article 6(4) of the Habitats Directive, then compensation measures are required for any remaining adverse effects.

This document brings together all of the information necessary to determine if the current discharge from the Glenamaddy WwTP to the onsite Swallow Hole is adversely affecting the integrity of the **Lough Lurgeen Bog/Glenamaddy Turlough SAC (Site Code: 000301)** and the **Lough Corrib SPA (Site Code: 000297)**.

This Stage 2 Appropriate Assessment has been prepared in accordance with the following guidelines:

• Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (EC, 2002)
• Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (DoEHLG, 2009)
• Department of the Environment Heritage and Local Government Ireland (DOEHLG) Circular L8/08 (September 2008).

The structure of this NIS broadly follows the methodology as recommended in the EPA guidance note: *Waste Water Discharge Licensing – Appropriate Assessment, Version 2.2 2012*.

1.5 **Key Sources of Information**

The data used in this assessment has been drawn broadly from the following sources:

• Glenamaddy WWDLA Application and Further Information Request (Reg. No. D0379-01)
• Stage 1 AA Screening Report (May 2014)
• Galway County Development Plan
• EPA Monitoring Data
• NPWS Data
• Western River Basin District Management Plan and Associated Reports
2. **STAGE 2 APPROPRIATE ASSESSMENT**

2.1 **Introduction**

In Stage 2 of the Appropriate Assessment process the impact of the project or plan (i.e. in this case the groundwater discharge from the Glenamaddy WwTP to Pollanadeirce Swallow Hole, within the Lough Lurgeen Bog/Glenamaddy Turlough SAC) on the integrity of a European Site(s) (i.e. the Lough Lurgeen Bog/Glenamaddy Turlough SAC and Lough Corrib SAC) is considered with respect to the conservation objectives of the sites.

This involves acquiring adequate information on the project, predicting the likely effects (direct, indirect, short- and long-term, isolated, interactive and cumulative) and their impacts on the conservation objectives and status of the European Sites. Finally, mitigation measures need to be identified and assessed against the adverse effects the project is likely to cause.

2.2 **Project & Site Information**

2.2.1 **Site Location**

Glenamaddy is a small town in County Galway, Ireland, to the North East of Tuam at the intersection of the regional roads, R362 and R364. Lough Lurgeen/Glenamaddy Turlough lies to the east of the town. The WwTP site is situated approximately 200 m from the edge of Lough Lurgeen/Glenamaddy Turlough, within the Lough Lurgeen Bog/Glenamaddy Turlough SAC.

2.2.2 **Existing Glenamaddy Sewerage Scheme**

A full description of the existing Glenamaddy Sewerage Scheme is provided in the 2009 WWDL application (No. D0379-01). Provided below is a brief overview of the Scheme and existing groundwater discharge.

The Glenamaddy Sewerage Scheme serves an existing population equivalent of approximately 680 p.e. (Source: Reply to Queries Raised by the EPA under Regulation 18 (3) (b) 15/10/2012) and consists of a network of foul sewers and combined sewers which discharge into the Pollanadeirce Swallow Hole via the existing Glenamaddy Wastewater Treatment Plant (see Fig. 2.1).

The Wastewater Treatment Plant (WwTP) was constructed in the 1950s and consists of primary treatment only, where the raw sewage is screened and undergoes primary settlement in humus tanks (Imhoff Tank) before being discharged into the Pollanadeirce Swallow Hole which forms part of the Glenamaddy Turlough and the Lough Lurgeen Bog/ Glenamaddy Turlough (see Fig. 2.2).
The Waste Water Treatment Plant consists of the following process elements (see Fig. 2.3):

- An inlet chamber consisting of 2 No. channels each containing a coarse bar screen for removal of gross solids and floating debris. The screens are manually raked as required to ensure no build-up of sewage occurs within the sewer network. The screenings are removed off site by a local refuse collector.
- A flow meter has recently being installed downstream of the screening chamber. This flow meter is installed on a temporary basis and can be removed for cleaning when required.
- Whilst the depth of the humus tank (Imhoff Tank) is unknown at present the approximate plan area is 12m² and assuming the depth is in the range of 3 to 5m the estimated design capacity of the tank would be of the order of 360 to 600p.e. However, the tank would not have been designed to meet the requirements of the current Urban Wastewater Treatment Regulations as it was designed and built in the 1950s.
- An automatic grab sampler has recently been installed downstream of the humus tank (Imhoff Tank). This sampler is installed on a temporary basis to monitor the performance of the wastewater treatment works.

The existing wastewater treatment plant is unmanned for a significant portion of the working week. Maintenance is only carried out to remove blockages on the coarse screens or other pipework if required and this maintenance time amounts to approximately 4 hours per week.

Given the basic existing infrastructure at the site, the existing WwTP would not be considered to be effective at treating the sewage generated within the Glenamaddy agglomeration. When compared with the requirements of the Urban Wastewater Treatment Directive, it can be seen that the existing Wastewater Treatment Plant is undersized.
Figure 2.1: Site Location of Glenamaddy WwTP (Source: NPWS Mapping)

Figure 2.2: Existing WwTP Primary Discharge (Source: NPWS Mapping)
2.2.3 Effluent Discharge

The performance of the plant has been monitored for a number of years and the results gathered during the period 2012 to 2014 are displayed on Table 2.1. This monitoring data shows that the average BOD concentrations ranged from 157.67mg/l to 231.75 mg/l and the average Suspended Solids concentration of the final effluent ranged from 111.25mg/l to 130.667mg/l. To date in 2014, all effluent monitoring results are breaching the required standards.

Based on the monitoring data below (Table 2.1), it is acknowledged that the Plant is not operating in compliance with regulatory and legislative standards (e.g. Urban Waste Water Treatment Regulations, Urban Wastewater Treatment Directive).
Table 2.1: Effluent Monitoring for 2012 to 2014

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<th>Year</th>
<th>Parameter (mg/l)</th>
<th>MAC</th>
<th>Samples Taken</th>
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<tr>
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<td>183</td>
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2.3 Walkover Survey

A site visit and walkover survey was conducted on the 16th June 2014. Ecologist Tony Nagle visited Glenamaddy Wastewater Treatment Plant and immediate surrounds (Plate 2.1) and the Sinking River at Lettera Mill (Plate 2.2) to determine the potential for impacts on any protected flora or fauna.

Plate 2.1: View of Glenamaddy WwTP from Glenamaddy Turlough, depicting the surrounding environment
Water levels were quite high at Glenamaddy Lough due to flooding and the high rainfall over the winter months. Bird numbers were low due to the time of year but the following species were noted:

- Mute Swan (3)
- Mallard (5)
- Great Crested Grebe (1)
- Heron (1)
- Black-headed Gull (2)
- Common Gull (3)

Notes were also taken of flora during the site visit and no unusual species were noted. The vegetation was typical of the upper level of turlough basins and included:

- Creeping Bent
- Common Sedge
- Silverweed
- Meadowsweet
- Creeping Buttercup
- Pondweed

Plate 2.2: The Sinking River at Lettera Mill (point at which the effluent returns to surface water)
During the site visit it was noted that the current outfall at Glenamaddy WwTP is only partially submerged as seen in Plate 2.3.

Plate 2.3: Glenamaddy WwTP Outfall to Glenamaddy Turlough

2.4 Natura 2000 Sites
The Appropriate Assessment Stage 1 Screening Report identified two Natura 2000 sites which could be impacted by the Glenamaddy WwTP discharge; Lough Lurgeen Bog/Glenamaddy Turlough SAC (Site Code: 000301) and Lough Corrib SPA (Site Code: 000297) (Fig 2.4). It was deemed necessary that further assessment be carried out on these sites to determine the potential for the Glenamaddy groundwater discharge to impact the site’s qualifying interests/features.
2.4.1 Description of Natura 2000 Sites

**Lough Lurgeen Bog/ Glenamaddy Turlough SAC (Site Code: 000301)**

The Lough Lurgeen Bog/Glenamaddy Turlough SAC covers almost 1,200 ha and is situated east of the town of Glenamaddy. It consists of a very large turlough, over 170 ha in area, and a vast expanse of over 1,000 ha of typical intact western raised bog. A small lake occurs on top of the bog.

The Lake, Bog and Turlough are in close association. Water from the bog feeds the lake which in turn is linked to the turlough. This leads to quite a unique ecosystem which is of high conservation value. On the bog, there are a number of interesting features, pool-hummock systems, a lake, a large fen and a number of flushes, dominated by Purple Moor-grass (*Molinia caerulea*). The lake is a traditional goose site and the turlough is now used by Greenland White-fronted Goose (74). Other birds reported for the site during 2 seasons between 1984 and 1987 (3 counts were made) are Bewick Swan 14, Whooper Swan 8, Wigeon 472, Teal 73, Mallard 229, Shoveler 15, Pochard 20, Golden Plover 23, Lapwing 62, Snipe 20, Curlew 39 and Redshank 15. A very large Turlough of high conservation value in such close proximity to a vast expanse of raised bog is quite unique. The whole ecosystem is therefore of high conservation value.

A site synopsis for this site is appended to **Appendix I**.
Lough Corrib SAC (Site Code: 000297)

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

The Sinking and Grange rivers are closest in proximity to Glenamaddy WwTP and they are both down-gradient from the site.

The Lough Corrib SAC is of major conservation importance and includes 14 habitats listed on Annex I of the E.U. Habitats Directive. Six of these are priority habitats - petrifying springs, Cladium fen, active raised bog, limestone pavement, bog woodland and orchid-rich calcareous grassland. The other annexed habitats present include hard water lakes, lowland oligotrophic lakes, floating river vegetation, alkaline fens, degraded raised bogs, Rhynchosporion vegetation, Molinia meadows and old Oak woodlands. Species present on the site that are listed on Annex II of this directive are Sea Lamprey, Brook Lamprey, Atlantic Salmon, White-clawed Crayfish, Freshwater Pearl Mussel, Otter, Lesser Horseshoe Bat, Slender Naiad and the moss Drepanocladus vernicosus. The shallow, lime-rich waters of the southern basin of the lake support one of the most extensive beds of Stoneworts (Charophytes) in Ireland, with species such as Chara aspera, C. hispida, C. delicatula, C. contraria and C. desmacantha mixed with submerged Pondweeds (Potamogeton perfoliatus, P. gramineus and P. lucens), Shoreweed (Littorella uniflora) and Water Lobelia (Lobelia dortmanna). These Chara beds are an important source of food for waterfowl. In contrast, the northern basin contains more oligotrophic and acidic waters, without Chara species, but with Shoreweed, Water Lobelia, Pipewort (Eriocaulon septangulare), Quillwort (Isoetes lacustris), Alternate Water-milfoil (Myriophyllum alternifolium) and Slender Naiad (Najas flexilis). The last-named is listed under the Flora (Protection) Order, 1999 and is an Annex II species under the EU Habitats Directive.

A site synopsis for this site can be seen in Appendix I.
2.4.2 Qualifying Interests

The qualifying interests of the Lough Lurgeen Bog/Glenamaddy Turlough SAC and the Lough Corrib SAC are discussed below with reference to the DoAHG Document ‘The Status of EU Protected Habitats and Species in Ireland’ Habitat Assessment Vol. 2 and Species Assessment Vol. 3.

Further details on the qualifying interests and the characteristics of the sites in general are included in the AA Stage 1 Screening Report prepared in May 2014.

### Lough Lurgeen Bog/Glenamaddy Turlough SAC Qualifying Interests

The qualifying interests of the Lough Lurgeen Bog/ Glenamaddy Turlough SAC are outlined below:

- [3180] *Turloughs (SW & GW)*
- [7110] *Active raised bogs (SW & GW)*
- [7120] Degraded raised bogs still capable of natural regeneration (SW & GW)
- [7150] Depressions on peat substrates of the Rhynchosporion (SW & GW)

(* = Priority Habitat Type; **SW** – Surface Water Dependent; **GW** – Groundwater Dependent)

#### Turloughs [3180]

A Turlough is a depression in karst limestone that temporarily and/or seasonally floods from groundwater. As per the Natura 2000 standard Data form for this Site, this habitat type covers 16% of the SAC and has a conservation status of A, i.e. excellent conservation status.

There is no evidence of any significant change to the range or area of turlough habitat. The ecological structure and function is considered to be “unfavourable – inadequate”. The future prospects are considered to be “slightly unfavourable”, with numerous low or medium impact threats which would add to current pressures, but would likely not be of sufficient impact to make future prospects “unfavourable – bad”. Therefore, the overall assessment is “Unfavourable inadequate”.

One of the main threats to this habitat type is diffuse pollution; therefore, potential for adverse impacts upon this water dependent habitat from the effluent discharge from the Glenamaddy WwTP is predicted.
**Active raised bogs [7110]**

Raised bogs are accumulations of deep acid peat (3-12m) that originated in shallow lake basins or topographic depressions. They have a typical elevated surface or dome, which develops as raised bogs grow upwards from the surface. The bog dome is primarily rainwater fed (ombrotrophic mire) and isolated from the local groundwater table. This gives rise to acidic conditions deficient in plant nutrients and in turn supports a distinctive suite of vegetation types, which although low in overall diversity, support specialised plant assemblages dominated by a range of mosses of the genus *Sphagnum*. Intact raised bogs are characterised by the presence of ericoid and Cyperaceae species and an abundance of *Sphagnum* species. However, although Degraded Raised Bog may contain a similar species selection to Active Raised Bog, the relative abundance of individual species is different, with a lower cover of *Sphagnum* spp.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 2% of the SAC and has a conservation status of A, *i.e.* excellent conservation status.

The main threats to this habitat are water abstractions and peat extractions. Hence, no adverse impacts are anticipated from the Glenamaddy discharge.

**Degraded raised bogs still capable of natural regeneration [7120]**

Degraded bogs are accumulations of deep acid peat (3-12m) that originated in shallow lake basins or topographic depressions. They have a typical elevated surface or dome, which develops as raised bogs grow upwards from the surface. The bog dome is primarily rainwater fed (ombrotrophic mire) and isolated from the local groundwater table. This gives rise to acidic conditions deficient in plant nutrients and in turn supports a distinctive suite of vegetation types, which although low in overall diversity, support specialised plant assemblages dominated by a range of mosses of the genus *Sphagnum*. Degraded Raised Bog is characterised by the complete absence of (or a patchy thin cover) of an acrotelm layer, which is defined as the living, actively growing upper layer of a raised bog. The presence of the acrotelm is vital to a raised bog as this is the peat forming layer and water storing layer of the bog.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 49% of the SAC and has a conservation status of C, *i.e.* average or reduced conservation status.

The main threats to this habitat are water abstraction and peat extraction. Hence, no adverse impacts are anticipated from the Glenamaddy discharge.
Depressions on peat substrates of the Rhynchosporion [7150]
This habitat consists of open vegetation on peat which is characterised by the abundance of *Rhynchospora alba* or *Rhynchospora fusca*. It can occur in both active and degraded blanket bogs and raised bogs on wet peat substrates on the margins of pools and hollows and also as a pioneer community in areas of disturbed peat such as peat-cuttings.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, *i.e.* good conservation status.

The main threats to this habitat are peat removal, water abstraction, artificial planting on open ground and burning. Hence, no adverse impacts are anticipated from the Glenamaddy discharge.

### Lough Corrib SAC Qualifying Interests
The qualifying interest/features of the Lough Corrib SAC are outlined below:

- [1029] *Margaritifera margaritifera* (SW)
- [1092] *Austropotamobius pallipes* (SW & GW)
- [1095] *Petromyzon marinus* (SW)
- [1096] *Lampetra planeri* (SW)
- [1106] *Salmo salar* (only in fresh water) (SW)
- [1303] *Rhinolophus hipposideros*
- [1355] *Lutra lutra* (SW)
- [1393] *Drepanoclados (Hamatocaulis) vernicosus* (GW)
- [1833] *Najas flexilis* (SW)
- [3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) (SW & GW)
- [3140] Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. (SW & GW)
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (SW)
- [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(* important orchid sites) (SW & GW)
- [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (GW)
- [7110] * Active raised bogs (SW & GW)
- [7120] Degraded raised bogs still capable of natural regeneration (SW & GW)
- [7150] Depressions on peat substrates of the *Rhynchosporion* (SW & GW)
- [7210] * Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (GW)
- [7220] * Petrifying springs with tufa formation (Cratoneurion) (GW)
- [7230] Alkaline fens (GW)
- [8240] Limestone pavements
- [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- [91D0] * Bog woodland (GW)

(* = Priority Habitat Type; SW – Surface Water Dependent; GW – Groundwater Dependent)

**[1029] Margaritifera margaritifera**

The distribution of freshwater pearl mussel *Margaritifera margaritifera* is well known and mapped in Ireland. There have been no documented population extinctions since before the 1970s, therefore the species’ range is stable. The population has been in decline for a very long time, and was likely initiated by early drainage schemes in Ireland (NPWS, 2013b). Pearl mussels have a complicated life cycle, involving native salmon or trout. The key cause of decline in pearl mussel populations in Ireland is unsuitable habitat for juvenile mussels after they fall off the gills of host salmonids (Moorkens, 1999). This stage requires the safety of remaining within the river bed gravels, before growing to a size that allows the emergence of the filtering siphons into the open water body. While the juvenile mussels remain within the river bed gravels, they filter the interstitial water within the gravels. Where the gaps between the gravel and stones gets clogged with fine silt, either physical (from suspended solids entering the river) or organic (from algal growth and decay prompted by nutrients in the water), the flow of water in the interstices becomes very restricted. Without adequate water movement and replacement, oxygen levels are exhausted and young mussels die.

Nutrient enrichment from sewerage effluent in general poses a serious threat to Freshwater Pearl Mussel populations although no pathway between Glenamaddy WwTP and mussel populations within Lough Corrib SAC are likely to exist as the main population of the SAC is found in the Owenriff River which flows in to the Lough. Therefore, no impacts are predicted on the Freshwater Pearl Mussel species from the Glenamaddy WwTP discharge.

**[1092] Austropotamobius pallipes**

The White-clawed Crayfish, *Austropotamobius pallipes*, is the largest non-marine invertebrate found in Ireland. Adults can grow to approximately 11cm in length. It is also relatively long-lived with a maximum life of 10 years. The species is highly vulnerable to
fungal disease carried by several American species of crayfish. The Irish population has considerable conservation significance as the island is uniquely free of both the disease and the non-native Crayfish species. In most of its range White-clawed Crayfish is found most commonly in first-order streams, but in Ireland it has a much wider habitat range occurring in small and medium-sized lakes.

Any nutrient enrichment from the Glenamaddy WwTP groundwater discharge to Lough Corrib poses a serious threat to White-clawed Crayfish populations. Therefore, potential for impacts from the Glenamaddy discharge are possible.

**[1095] Petromyzon marinus**

Sea lamprey (*Petromyzon marinus*) contains both a marine phase and a freshwater phase. Adult sea lamprey range from circa 60 to 100 cm in length and live at sea as external parasites on host fish (Kelly and King 2001). Adult fish migrate in spring into freshwater and ascend rivers.

Nutrient enrichment is not considered to be a serious threat to Sea Lamprey populations. Therefore, no impacts are predicted on the Sea Lamprey species of the Lough Corrib SAC from the Glenamaddy WwTP groundwater discharge.

**[1096] Lampetra planeri**

Brook lamprey (*Lampetra planeri*) is the smallest of the three lamprey taxonomic entities recorded in Ireland. The species is non-parasitic and non-migratory as an adult, living its entire life in freshwater.

Nutrient enrichment is not considered to be a serious threat to Brook Lamprey populations. Therefore, no impacts are predicted on the Brook Lamprey species of the Lough Corrib SAC from the Glenamaddy WwTP groundwater discharge.

**[1106] Salmo salar**

Atlantic salmon is an anadromous species indigenous to the North Atlantic. Salmon use rivers to reproduce and as nursery areas during their juvenile phase. Adults spend one to three years at sea where growth rates are much greater. Eggs are deposited during the winter in a depression, called a redd, excavated in river gravels. The eggs are then covered over with gravel. The eggs develop protected within the substrate and during spring hatch into alevins, at this stage the juvenile fish feed exclusively from their yolk sac, when this is depleted they begin to feed and become known as fry, the fry feed for the summer then over the autumn and gradually develop characteristic vertical bars and become parr. Fry and parr feed primarily upon invertebrates. The Irish population
generally comprises fish that spend two winters (small numbers spend one or three winters) in freshwater before going to sea, in spring, as smolts.

Nutrient enrichment from the Glenamaddy WwTP has the potential to pose a serious threat to Salmon populations of Lough Corrib. Therefore, potential for impacts from the Glenamaddy discharge are possible.

**[1303] Rhinolophus hipposideros**
The lesser horseshoe bat is the only member of the *Rhinolophidae* occurring in Ireland. Summer roosting sites are often in the attics of old or derelict buildings. The bats are faithful to a roost site and will return to the same site each year. Hibernation sites are typically caves, souterrains, cellars and icehouses. Lesser horseshoes rely on linear landscape features (e.g. treelines, stonewalls and hedgerows) to navigate and commute from roosts to feeding sites and are reluctant to fly out in the open. The bats forage on flying insects predominantly in deciduous woodland and riparian vegetation normally within a few km of their roosts.

No impacts are predicted on the lesser horseshoe bat from the Glenamaddy WwTP groundwater discharge.

**[1355] Lutra lutra**
Otters have two basic requirements: aquatic prey and safe refuges where they can rest. In Ireland, otter populations are found along clean rivers and lakes, where fish and other prey are abundant, and where the adjacent habitat offers plenty of cover.

Nutrient enrichment from Glenamaddy WwTP has the potential to pose a serious threat to Otter habitat. Therefore, potential for impacts from the Glenamaddy discharge are possible.

**[1393] Drepanocladus (Hamatocaulis) vernicosus**
*Hamatocaulis vernicosus* is a medium-sized perennial pleurocarpous moss with pinnately branched stems with branches held circa 90° to the stem. It forms green to yellowish green patches. It has distinctive hooked shoot tips and the etymology of the genus name reflects this, as hamatus means 'hook-like' and caulis means 'stem'.

This moss is associated with wetland habitats and tolerant to periodic flooding, however prolonged inundation with silt and nutrients may impact this habitat. Nutrient enrichment from Glenamaddy WwTP has therefore the potential to pose a threat to this habitat.
[1833] Najas flexilis
Najas flexilis is a small annual that grows permanently submerged in the lower euphotic depths of clear-water lowland lakes of the north-west and Kerry.

Nutrient enrichment from sewerage effluent poses a serious threat to this species and it is considered that the Glenamaddy WWTP has the potential to be contributing to unfavourable conditions for this species.

[3110] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) occur in soft water, nutrient poor lakes frequently associated with acid bedrock (notably granite and old red sandstone) overlain by peatland.

As per the Natura 2000 standard data form, this habitat type covers 3% of the SAC and has conservation status A, excellent conservation status.

The main threats to this habitat are diffuse pollution (including household sewage and wastewaters), water abstraction and peat removal; therefore, potential for impacts from the Glenamaddy discharge are possible.

This habitat type is strongly associated with lowland lakes over limestone bedrock, particularly Dinantian pure bedded limestone. The habitat is also found on calcareous sand at the landward side of machair plains, along the north-western coast. This habitat is dominated by algae, particularly Chara species, but is also of international conservation importance for its krustenstein, a cyanobacterial crust that is found on bedrock, stones and cobbles in shallow waters to 2 m depth.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 85% of the SAC and has a conservation status of A, excellent conservation status.

The main threat to this habitat is diffuse pollution to surface and groundwater; therefore, potential for impacts from the Glenamaddy groundwater discharge are possible.

[3260] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
This is a broad habitat type, which covers rivers from upland bryophyte and macroalgal dominated stretches, to lowland depositing rivers with pondweeds and starworts.
As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, good conservation status.

The threats to this habitat are diffuse pollution and modification of hydrographic function; therefore, potential for impacts from the Glenamaddy discharge are possible.

**[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*) (important orchid sites)**

This habitat comprises species-rich plant communities found on shallow, well-drained calcareous substrates. It is considered a priority habitat only if it is an important orchid site.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, good conservation status.

The main threats to this habitat are species composition change and problematic native species. Hence, no adverse impacts are anticipated from the Glenamaddy discharge.

**[6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)**

This habitat is represented in Ireland by both fen and grassland communities on nutrient poor soils. The habitat is either managed as traditional hay meadows (cut only once a year in late summer or autumn with the hay crop removed) or more usually by extensive pasture.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, good conservation status.

The main threats to this habitat are abandonment/lack of mowing, abandonment of pastoral systems, water abstraction, species composition change and forest planting on open ground. No adverse impacts are anticipated from the Glenamaddy discharge.

**Active raised bogs [7110]**

Raised bogs are accumulations of deep acid peat (3-12m) that originated in shallow lake basins or topographic depressions. They have a typical elevated surface or dome, which develops as raised bogs grow upwards from the surface. The bog dome is primarily rainwater fed (ombrotrophic mire) and isolated from the local groundwater table. This gives rise to acidic conditions deficient in plant nutrients and in turn supports a distinctive suite of vegetation types, which although low in overall diversity, support specialised plant assemblages dominated by a range of mosses of the genus Sphagnum.
Intact raised bogs are characterised by the presence of ericoid and Cyperaceae species and an abundance of Sphagnum species. However, although Degraded Raised Bog may contain a similar species selection to Active Raised Bog, the relative abundance of individual species is different, with a lower cover of Sphagnum spp.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 2% of the SAC and has a conservation status of A, excellent conservation status.

The main threats to this habitat are water abstraction and peat extraction. Hence, no adverse impacts are anticipated from the Glenamaddy discharge.

**Degraded raised bogs still capable of natural regeneration [7120]**

Raised bogs are accumulations of deep acid peat (3-12m) that originated in shallow lake basins or topographic depressions. They have a typical elevated surface or dome, which develops as raised bogs grow upwards from the surface. The bog dome is primarily rainwater fed (ombrotrophic mire) and isolated from the local groundwater table. This gives rise to acidic conditions deficient in plant nutrients and in turn supports a distinctive suite of vegetation types, which although low in overall diversity, support specialised plant assemblages dominated by a range of mosses of the genus Sphagnum. Degraded Raised Bog is characterised by the complete absence of (or a patchy thin cover) of an acrotelm layer, which is defined as the living, actively growing upper layer of a raised bog. The presence of the acrotelm is vital to a raised bog as this is the peat forming layer and water storing layer of the bog.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 49% of the SAC and has a conservation status of C, average or reduces conservation status. The main threats to this habitat are water abstraction and peat extraction. Hence, no adverse impacts are anticipated from the Glenamaddy discharge.

**Depressions on peat substrates of the Rhynchosporion [7150]**

This habitat consists of open vegetation on peat which is characterised by the abundance of Rhynchospora alba or Rhynchospora fusca. It can occur in both active and degraded blanket bogs and raised bogs on wet peat substrates on the margins of pools and hollows and also as a pioneer community in areas of disturbed peat such as peat-cuttings.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, good conservation status.
The main threats to this habitat are peat removal, water abstraction, artificial planting on open ground and burning down. Hence, no adverse impacts are anticipated from the Glenamaddy discharge.

[7210] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*

This priority habitat type typically occurs where *C. mariscus* stands are in contact with *Caricion davallianae* or other *Phragmition* species.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, good conservation status.

The main threats to this habitat are water abstraction, land reclamation, groundwater diffuse pollution and abandonment of pastoral systems. Nutrient enrichment from sewage effluent has the potential to pose a serious threat to this habitat.

[7220] Petrifying springs with tufa formation (*Cratoneurion*)

Petrifying Springs with Tufa Formation (*Cratoneurion*) have been defined as springs and seepages where tufa is actively deposited and where characteristic species of bryophytes are dominant or abundant.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, good conservation status.

The main threats to this habitat are landfill and land reclamation. However, Nutrient enrichment from the Glenamaddy WwTP has the potential to pose a serious threat to this habitat. This habitat is considered highly sensitive to nutrient enrichment N and P of groundwater (diffuse and point-source nutrient pollution).

[7230] Alkaline fens

Alkaline fens are typically base-rich basin or flush fen systems with extensive areas of species-rich small sedge communities of the alliance *Caricion davallianae*. These fen systems are often a complex mosaic of habitats, with tall sedge beds, reedbeds, wet grasslands, springs and open-water often co-occurring at a given fen site.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, good conservation status.
The main threats to this habitat are water abstraction, land reclamation, diffuse groundwater pollution and abandonment of pastoral systems. Potential for adverse impacts upon this habitat from the Glenamaddy WwTP effluent discharge are possible.

**[8240] Limestone pavements**

Limestone pavements are both geologically and biologically important resources. The structure of limestone pavement consists typically of blocks of rock, known as clints, separated by fissures, or grikes.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, good conservation status.

The main threats to this habitat are mining, landfill, land reclamation and drying out. No adverse impacts are anticipated from the Glenamaddy discharge.

**[91A0] Old sessile oak woods with Ilex and Blechnum in the British Isles**

Old sessile oak woods habitat is defined in the interpretation manual of EU habitats as "acidophilous Quercus petraea woods, with low, low-branched, trees, with many ferns, mosses, lichens and evergreen bushes." Just 3 indicative species are listed: *Quercus petraea*, *Ilex aquifolium* and *Blechnum* ssp. (sic).

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of B, good conservation status.

The main threats to this habitat are invasive non-native species and grazing. No adverse impacts are anticipated from the Glenamaddy discharge.

**[91D0] Bog woodland**

Bog woodland is a widespread but localised habitat type in Ireland. It occurs in 3 distinct habitats. 1) On raised bogs, where it is associated with weakly flushed sites on the high bog. 2) On cutaway bog, where it occurs in association with weak ground-water influence. 3) Within sessile oak woodlands in association with nutrient-poor flushes. Bog woodlands are dominated by birch (*Betula pubescens*) with small amounts of willow (mostly *Salix aurita* or *S. atrocinerea*). Generally, the field layer is poorly developed but the dwarf shrub layer may be well developed, especially on raised bogs, and the moss layer is well developed, often luxuriant and dominated by *Sphagnum* species.

As per the Natura 2000 standard Data form for this Site, this habitat type covers 1% of the SAC and has a conservation status of A, excellent conservation status.
The main threats to this habitat are peat extraction, anthropogenic hydraulic condition changes. However, it is considered where there is direct GW contribution, nutrient enrichment N of groundwater (diffuse and point-source nutrient pollution) the sensitivity of this habitat to the above is considered “medium” (Western RBD / ESBI / Eleanor Mayes, 2008). Hence, using the precautionary principle, there is the potential for adverse impacts upon this habitat from the Glenamaddy WwTP effluent discharge.

**Summary**

A large portion of the Qualifying Interests of the Lough Lurgeen Bog/ Glenamaddy Turlough SAC and Lough Corrib SAC are groundwater and/or surface water dependent.

The key potential threat and impact from the existing Glenamaddy discharge to the two sites is therefore:

- Pollution and water quality impacts on the water dependent species and habitats of these sites.

The NPWS have confirmed that the existing effluent discharge from Glenamaddy WwTP is having an ecological impact on the downstream receptors; thereby most likely contributing in some form to the overall declining trend in the conservation status of these qualifying interests on a national level (see **Section 2.5** for the conservation status of each habitat and species).

### 2.5 Conservation Objectives

A site's conservation objectives are a statement of the overall nature conservation requirements for a site, expressed in terms of the favourable condition required for the qualifying features.

According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when:

- Its natural range and area it covers within that range, is stable or increasing
- the ecological factors that 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

The favourable conservation status of a species is achieved when:

- Population data on the species concerned indicate that it is maintaining itself
• The natural range of the species is neither being reduced or 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 conservation objectives for the two Natura 2000 sites are set out below.

2.5.1 Lough Lurgeen Bog/Glenamaddy Turlough SAC
Objective: 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:

• [3180] Turloughs
• [7110] Active raised bogs
• [7120] Degraded raised bogs still capable of natural regeneration
• [7150] Depressions on peat substrates of the Rhynchosporion

2.5.2 Lough Corrib SAC
Objective: 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:

• [1029] Margaritifera margaritifera
• [1092] Austropotamobius pallipes
• [1095] Petromyzon marinus
• [1096] Lampetra planeri
• [1106] Salmo salar (only in fresh water)
• [1303] Rhinolophus hipposideros
• [1355] Lutra lutra
• [1393] Drepanocladus (Hamatocalis) vernicosus
• [1833] Najas flexilis
• [3110] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
• [3140] Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
• [3260] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
• [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) (important orchid sites)
• [6410] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
• [7110] Active raised bogs
• [7120] Degraded raised bogs still capable of natural regeneration
• [7150] Depressions on peat substrates of the Rhynchosporion
• [7210] Calcareous fens with Cladium mariscus and species of the Caricion davallianae
• [7220] Petrifying springs with tufa formation (Cratoneurion)
• [7230] Alkaline fens
• [8240] Limestone pavements
• [91A0] Old sessile oak woods with Ilex and Blechnum in the British Isles
• [91D0] Bog woodland

The Conservation Status of Qualifying Interests of each of the qualifying interests of the SACs are listed in Table 2.2.

Table 2.2: Conservation Status of Qualifying Interests: Habitat & Species

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Conservation Status Nationally</th>
<th>Overall Trend in Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lough Lurgen Bog/ Glenamaddy Turlough SAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[3180] *Turloughs</td>
<td>Inadequate</td>
<td>Declining</td>
</tr>
<tr>
<td>[7110] *Active raised bogs</td>
<td>Bad</td>
<td>Declining</td>
</tr>
<tr>
<td>[7120] Degraded raised bogs still capable of natural regeneration</td>
<td>Bad</td>
<td>Declining</td>
</tr>
<tr>
<td>[7150] Depressions on peat substrates of the Rhynchosporion</td>
<td>Inadequate</td>
<td>No Evidence of an Actual Decline</td>
</tr>
<tr>
<td>Lough Corrib SAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[1029] Margaritifera margaritifera</td>
<td>Unfavourable</td>
<td>Bad</td>
</tr>
<tr>
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<td>Inadequate</td>
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<tr>
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<td>Favourable</td>
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<td>[3110] Oligotrophic waters containing very few minerals of sandy plains (<em>Littorelletalia uniflorae</em>)</td>
<td>Bad</td>
<td>Declining</td>
</tr>
<tr>
<td>[3140] Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.</td>
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</tr>
<tr>
<td>[3260] Water courses of plain to montane levels with the <em>Ranunculion fluitantis</em> and <em>Callitricho-Batrachion</em> vegetation</td>
<td>Inadequate</td>
<td>Declining</td>
</tr>
<tr>
<td>[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<em>Festuco Brometalia</em>) (<em>important orchid sites</em>)</td>
<td>Bad</td>
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</tr>
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</tr>
<tr>
<td>[7110] <em>Active raised bogs</em></td>
<td>Bad</td>
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<td>[7210] <em>Calcareous fens with Cladium mariscus and species of the Caricion davallianae</em></td>
<td>Bad</td>
<td>Unknown</td>
</tr>
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<td>Habitat</td>
<td>Conservation Status Nationally</td>
<td>Overall Trend in Conservation Status</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>[7220] * Petrifying springs with tufa formation (<em>Cratoneurion</em>)</td>
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</tr>
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<td>[7230] Alkaline fens</td>
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<td>Unknown</td>
</tr>
<tr>
<td>[8240] * Limestone pavements</td>
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<td>Stable</td>
</tr>
<tr>
<td>[91A0] Old sessile oak woods with <em>Ilex</em> and <em>Blechnum</em> in the British Isles</td>
<td>Bad</td>
<td>Improving</td>
</tr>
<tr>
<td>[91D0] * Bog woodland</td>
<td>Favourable</td>
<td>N/A</td>
</tr>
</tbody>
</table>

It is clear from the above table that a large number of the Qualifying Interests of the Lough Lurgeen Bog/Glenamaddy Turlough and Lough Corrib SACs have a bad or inadequate conservation status nationally with an overall declining trend in their conservation status.
2.6 Baseline Environment
This section of the NIS gives a brief outline of the general baseline of the aquatic environment.

2.6.1 Groundwater Environment

The receiving ground waterbody is the Glenamaddy water body (WFD Code: IE_WE_G_0094). The environment is karstic in form with groundwater flow dominantly through discrete conduits. The bedrock is Burren Limestone, a clean bedded limestone. Groundwater tracing (Drew, D.P and Daly, D., 1993) has identified a direct connection from the Turlough through to the Lettra Mill Spring ~3.5km to the west and this is presented in Figure 2.4 below. Groundwater flow is broadly into the Lough Corrib basin to the south-west (Clare-Corrib groundwater body; WFD Code: IE_WE_G_0020). Groundwater vulnerability to contamination ranges from High to Extreme between Glenamaddy and the Lettra Mill spring. The catchment boundary for the Gortgarrow Source Protection area is ~500m south of the effluent discharge.

Figure 2.4: Karst Features and Tracer Results (GSI Groundwater Mapping http://spatial.dcenr.gov.ie/GeologicalSurvey/Groundwater/index.html)
2.6.2 Water Framework Directive Assessment

The Water Framework Directive was adopted by the EU in order to halt and reverse the decline in water quality. The Directive sets very strict deadlines for meeting water quality objectives, especially in protected areas. The WFD’s objectives can be best summarised as: maintaining "high status" of waters where it exists, preventing any deterioration in the existing status of waters and achieving at least "good status" in all waters by 2015.

Glenamaddy Turlough/Lough Lurgeen Bog is located in the Western River Basin District (WRBD). The WRBD Plan sets out how it is aimed to achieve the objectives of the WFD Directive in this district.

The WRBD Plan establishes four core environmental objectives to be achieved generally by 2015 (or timeframe set by derogation):

- Prevent deterioration
- Restore good status
- Reduce chemical pollution
- Achieve water related protected areas objectives

The Water Framework Directive (WFD) 2000/60/EC establishes the legal framework for the protection, improvement and sustainable management of inland waters, transitional waters, coastal waters and ground waters. The discharge from the Glenamaddy WwTP is directly to Glenamaddy groundwater body. As mentioned above the groundwater flow is broadly into the Lough Corrib basin to the south-west i.e. into the Clare-Corrib Groundwater body.

The overall status of both groundwater bodies is “Poor” and the overall objective is to “Restore” both groundwater bodies by 2021.

2.6.3 Habitat and Species Surrounding Discharge Point

The habitat at the point of discharge is lowland wet grassland with partially flooded rushy fields containing swallow holes that drain the Turlough.

The NPWS have noted that this discharge is enriching the flood area of the Turlough and that this enrichment is affecting the composition and distribution of sensitive plant communities in the area.

They also note that the Glenamaddy Turlough is an important wintering site for Greenland White-fronted Geese and Whooper Swans (Annex I species) and that Golden
Plover and Bewick Swans (also Annex I species) have also been recorded on the area. The Turlough is also an important wintering site for several duck species and lapwing. Any inputs that affects the water quality of the Turlough will have follow on effects on these bird species (Source: Galway Co. Co. Planning Ref 00/5945 and NPWS).

Refer to Section 2.3 for details of the site walkover survey conducted on 16th June 2014.

2.7 Assessment of Potential Impacts

2.7.1 Glenamaddy WwTP Discharge

This stage of the Appropriate Assessment assesses the impact of the effluent discharge on the conservation objectives of the Lough Lurgen Bog/Glenamaddy Turlough SAC and the Lough Corrib SAC qualifying interests as detailed in Sections 2.4 above.

As mentioned previously, groundwater tracing has identified a direct connection from the Glenamaddy Turlough through to the Lettra Mill Spring approximately 3.5km to the west of the Turlough. Groundwater vulnerability to contamination ranges from High to Extreme between Glenamaddy and the Lettra Mill spring. Groundwater flow is broadly into the Lough Corrib basin to the south-west of the Turlough.

The quality of the existing discharge from the WwTP directly to the Glenamaddy Turlough is one of the contributors leading to the overall “Poor” status of this water body. Should this discharge continue, a significant risk will prevail in terms of this waterbody being restored to “Good” status by 2021.

Any deterioration in groundwater quality is likely to be significantly impacting upon the water dependent qualifying interests of the Lough Lurgen Bog/ Glenamaddy Turlough SAC and downstream the Lough Corrib SAC. Any impacts on the groundwater or surface water dependent qualifying features of these sites is conflicting with the conversation objectives of both SAC sites, in terms of the discharge and its likely contribution to the decline in the conversation status of the Natura 2000 sites.

The NPWS have noted that this Glenamaddy discharge is enriching the flood area of the Glenamaddy Turlough and that this enrichment is affecting the composition and distribution of sensitive plant communities in the area.

It is also noted that the Turlough is an important wintering site for Greenland White-fronted Geese and Whooper Swans (Annex I species) and that Golden Plover and Bewick Swans (also Annex I species) have also been recorded on the area. The Turlough is also
an important wintering site for several duck species and lapwing. Any inputs that affects the water quality of the Turlough will have a follow on effects on these bird species.

It is acknowledged that the WwTP is not operating in compliance with regulatory and legislative standards. The continued discharge of this effluent will lead to a continued impact on the quality of the designated sites and will deter the designated sites restoring or maintaining “Favourable Conservation Status” of its species and habitats as required under the Habitats Directive and will impede the receiving groundwater body and associated surface waters achieving “Good Water Status” as required under the Water Framework Directive.

Table 2.3 and Table 2.4 below details the Qualifying Interests for the Lough Lurgeen Bog/Glenamaddy Turlough SAC and Lough Corrib SAC and identifies the potential impacts from the Glenamaddy WwTP groundwater discharge.

Table 2.3 Lough Lurgeen Bog/Glenamaddy Turlough SAC - Qualifying Habitats & Species Potentially Impacted by WwTP Discharge

<table>
<thead>
<tr>
<th>Qualifying Habitats/Species</th>
<th>Potential Impacts</th>
<th>Brief Explanation</th>
<th>Mitigation required</th>
</tr>
</thead>
<tbody>
<tr>
<td>[3180] Turloughs</td>
<td>Yes</td>
<td>Nutrient enrichment from the Glenamaddy WwTP has the potential to pose a serious threat to this habitat. The sensitivity of this habitat to Nutrient enrichment N and particularly P (both dissolved and particulate) of groundwater (diffuse and point-source nutrient pollution) is considered medium to high.</td>
<td>Yes</td>
</tr>
<tr>
<td>[7110] Active raised bogs</td>
<td>No</td>
<td>The main threats to this habitat are water abstractions and peat extractions. Hence, no adverse impacts are anticipated from the Glenamaddy discharge.</td>
<td>No</td>
</tr>
<tr>
<td>[7120] Degraded raised bogs still capable of natural regeneration</td>
<td>No</td>
<td>The main threats to this habitat are water abstractions and peat extractions. Hence, no adverse impacts are anticipated from the Glenamaddy discharge.</td>
<td>No</td>
</tr>
<tr>
<td>[7150] Depressions on peat substrates of the Rhynchosporion</td>
<td>No</td>
<td>Nutrient enrichment from Glenamaddy WwTP does not pose a threat to this habitat as no pollution pathway exists. This habitat is sensitive to changes in groundwater levels (abstractions) and is not considered sensitive to nutrient pollution.</td>
<td>No</td>
</tr>
</tbody>
</table>
### Table 2.4: Lough Corrib SAC - Qualifying Habitats & Species Potentially Impacted by WwTP Discharge

<table>
<thead>
<tr>
<th>Qualifying Species</th>
<th>Potential Impact</th>
<th>Brief Explanation</th>
<th>Mitigation Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1029] <em>Margaritifera margaritifera</em> (Freshwater Pearl Mussel)</td>
<td>No</td>
<td>Nutrient enrichment from sewerage effluent poses a serious threat to Freshwater Pearl Mussel populations although no pathway between Glenamaddy WwTP and mussel populations within Lough Corrib SAC are likely to exist as the main population of the SAC is found in the Owenriff River which flows in to the Lough.</td>
<td>No</td>
</tr>
<tr>
<td>[1092] <em>Austropotamobius pallipes</em> (White-clawed Crayfish)</td>
<td>Yes</td>
<td>Nutrient enrichment from Glenamaddy WwTP poses a serious threat to White-clawed Crayfish populations.</td>
<td>Yes</td>
</tr>
<tr>
<td>[1095] <em>Petromyzon marinus</em> (Sea Lamprey)</td>
<td>No</td>
<td>Nutrient enrichment is not considered to be a serious threat to Sea Lamprey populations.</td>
<td>No</td>
</tr>
<tr>
<td>[1096] <em>Lampetra planeri</em> (Brook Lamprey)</td>
<td>No</td>
<td>Nutrient enrichment is not considered to be a serious threat to Brook Lamprey populations.</td>
<td>No</td>
</tr>
<tr>
<td>[1106] <em>Salmo salar</em> (Salmon)</td>
<td>Yes</td>
<td>Nutrient enrichment from Glenamaddy WwTP poses a serious threat to Salmon populations.</td>
<td>Yes</td>
</tr>
<tr>
<td>[1303] <em>Rhinolophus hipposideros</em> (Lesser Horseshoe Bat)</td>
<td>No</td>
<td>Nutrient enrichment/pollution from sewerage effluent is not likely to be a threat to the Lesser Horseshoe Bat, a terrestrial based flying mammal.</td>
<td>No</td>
</tr>
<tr>
<td>[1355] <em>Lutra lutra</em> (Otter)</td>
<td>Yes</td>
<td>Nutrient enrichment from Glenamaddy WwTP poses a serious threat to Otter habitat.</td>
<td>Yes</td>
</tr>
<tr>
<td>[1393] <em>Drepanocladus (Hamatocaulis) vernicosus</em> (Shining sickle moss)</td>
<td>Yes</td>
<td>This habitat is associated with wetland habitat, tolerant to periodic flooding, however prolonged inundation with silt and nutrients may impact.</td>
<td>Yes</td>
</tr>
<tr>
<td>[1833] <em>Najas flexilis</em> (Slender Naiad)</td>
<td>Yes</td>
<td>Nutrient enrichment from sewerage effluent poses a serious threat to this species and Glenamaddy WwTP is contributing to unfavourable conditions for this species.</td>
<td>Yes</td>
</tr>
<tr>
<td>Qualifying Species</td>
<td>Potential Impact</td>
<td>Brief Explanation</td>
<td>Mitigation Required</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------</td>
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<td>---------------------</td>
</tr>
<tr>
<td>[3110] Oligotrophic waters containing very few minerals of sandy plains (<em>Littorelletalia uniflorae</em>)</td>
<td>Yes</td>
<td>Nutrient enrichment from sewerage effluent poses a serious threat to this habitat and Glenamaddy WwTP is contributing to unfavourable conditions for this habitat.</td>
<td>Yes</td>
</tr>
<tr>
<td>[3140] Hard oligo-mesotrophic waters with benthic vegetation of <em>Chara</em> spp.</td>
<td>Yes</td>
<td>Nutrient enrichment from sewerage effluent/pollution poses a serious threat to this habitat and Glenamaddy WwTP is contributing to unfavourable conditions for this habitat.</td>
<td>Yes</td>
</tr>
<tr>
<td>[3260] Water courses of plain to montane levels with the <em>Ranunculion fluitantis</em> and <em>Callitriccho-Batrachion</em> vegetation</td>
<td>Yes</td>
<td>Nutrient enrichment from sewerage effluent poses a serious threat to this habitat and Glenamaddy WwTP is contributing to unfavourable conditions for this habitat.</td>
<td>Yes</td>
</tr>
<tr>
<td>[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<em>Festuco Brometalia</em>) (important orchid sites)</td>
<td>No</td>
<td>Nutrient enrichment from Glenamaddy WwTP does not pose a threat to this habitat as no pollution pathway exists.</td>
<td>No</td>
</tr>
<tr>
<td>[6410] <em>Molinia</em> meadows on calcareous, peaty or clayey-silt-laden soils (<em>Molinion caeruleae</em>)</td>
<td>No</td>
<td>Nutrient enrichment from Glenamaddy WwTP does not pose a threat to this habitat as no pollution pathway exists.</td>
<td>No</td>
</tr>
<tr>
<td>[7110] Active raised bogs</td>
<td>Yes</td>
<td>Nutrient enrichment from the Glenamaddy WwTP has the potential to pose a serious threat to this habitat. This habitat is considered highly sensitive to nutrient enrichment N and P of groundwater (diffuse and point-source nutrient pollution).</td>
<td>Yes</td>
</tr>
<tr>
<td>Qualifying Species</td>
<td>Potential Impact</td>
<td>Brief Explanation</td>
<td>Mitigation Required</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>[7120] Degraded raised bogs still capable of natural regeneration</td>
<td>Yes</td>
<td>Nutrient enrichment from the Glenamaddy WwTP has the potential to pose a serious threat to this habitat. This habitat is considered highly sensitive to nutrient enrichment N and P of groundwater (diffuse and point-source nutrient pollution).</td>
<td>Yes</td>
</tr>
<tr>
<td>[7150] Depressions on peat substrates of the Rhynchosporion</td>
<td>No</td>
<td>Nutrient enrichment from Glenamaddy WwTP does not pose a threat to this habitat as no pollution pathway exists. This habitat is sensitive to changes in groundwater levels (abstractions) and is not considered sensitive to nutrient pollution.</td>
<td>No</td>
</tr>
<tr>
<td>[7210] Calcareous fens with Cladium mariscus and species of the Caricion davallianae</td>
<td>Yes</td>
<td>Nutrient enrichment from sewerage effluent has the potential to pose a serious threat to this habitat.</td>
<td>Yes</td>
</tr>
<tr>
<td>[7220] Petrifying springs with tufa formation (Cratoneurion)</td>
<td>Yes</td>
<td>Nutrient enrichment from the Glenamaddy WwTP has the potential to pose a serious threat to this habitat. This habitat is considered highly sensitive to nutrient enrichment N and P of groundwater (diffuse and point-source nutrient pollution).</td>
<td>Yes</td>
</tr>
<tr>
<td>[7230] Alkaline fens</td>
<td>Yes</td>
<td>Nutrient enrichment from sewerage effluent has the potential pose a serious threat to this habitat.</td>
<td>Yes</td>
</tr>
<tr>
<td>[8240] Limestone pavements</td>
<td>No</td>
<td>Sewerage effluent does not pose a serious threat to this habitat.</td>
<td>No</td>
</tr>
<tr>
<td>[91D0] Bog woodland</td>
<td>Yes</td>
<td>Nutrient enrichment from sewerage effluent has the potential pose a serious threat to this habitat. Where there is direct GW contribution: Nutrient enrichment N of groundwater (diffuse and point-source nutrient pollution) it is considered that the sensitivity of this habitat to the above is medium. It must be noted however that the key pressure on this habitats is changes in groundwater level (abstractions and arterial drainage).</td>
<td>Yes</td>
</tr>
<tr>
<td>[91A0] Old sessile oak woods with Ilex</td>
<td>No</td>
<td>Sewerage effluent does not pose a serious threat to this habitat.</td>
<td>No</td>
</tr>
</tbody>
</table>
2.8 In Combination Effects with Other Plans and Projects

Cumulative impacts are incremental changes in the environment that result from numerous manmade small-scale alterations. In-combination impacts can result from individually minor but collectively significant changes taking place over a period of time. The consequence of these changes are defined as in-combination effects.

A single plan or project may not in itself have a significant effect on a Natura 2000 site, however, in combination with other plans or projects (existing and planned) it may result in a significant effect on a Natura 2000 Site. As this Screening only relates to a waste water discharge which will only have an impact on the aquatic environment it can be inferred that the ‘in combination’ effect need only apply to other plans and projects that have an impact on the aquatic environment.

Cumulative impacts resulting from WwTP discharges relate primarily to the potential for impacts to key qualifying interests/features of a site and the degradation of water quality, both of which have the potential to alter the integrity (structure and function) of any Natura 2000 site.

**Western River Basin Management Plan**

The Western River Basin Management Plan establishes four core environmental objectives to be achieved for surface, groundwater, coastal and transitional water, generally by 2015:

- prevent deterioration;
- restore good status;
- reduce chemical pollution;
- achieve water related protected areas objectives

The objective for surface waters is to improve waters where necessary with the aim of achieving at least good ecological status and the objective for groundwaters is to restore good status, reversing significant and sustained declining quality trends.

The primary discharge from the Glenamaddy WwTP is considered a key pressure in terms of achieving the above objectives and ultimately achieving/restoring good status...
of all waterbodies by 2015 (for the Glenamaddy and Clare-Corrib groundwater bodies by 2021).

Galway County Development Plan 2009-2015

The Galway County Development Plan 2009-2015 contains environmental policies and objectives to protect Natura 2000 sites and the aquatic environment in County Galway.

A sample of the key policies and objectives are listed below:

Policy HL49: Galway County Council shall protect wetlands, and associated surface and groundwater systems within the Plan area.

Policy HL70: Implement water protection measures to prevent any deterioration of 'good status' waters, and to restore substandard waters to 'good status'.

Policy HL74: Ensure that substandard public wastewater treatment plans are upgraded. In the interim prevent an increase in the nutrient load discharged from these plants and the urgent provision of modern sewerage treatment systems in those towns and villages that have insufficient capacity to meet current demands, do not meet modern standards or currently represent a pollution risk to local water courses.

Policy HL71: Adopt and implement the provisions of the Western River Basin Management Plan and Shannon International River Basin Management Plan. Have regard to recommendations that may result from the applicable River Basin Management Plan.


Objective HL24: It is an objective to provide protection to all natural heritage sites designated or proposed for designation in accordance with National and European legislation. This includes Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas, Statutory Nature Reserves and Ramsar sites.

Policy HL84: Have regard to the programme of measures set out in the Western River Basin Management Plan and Shannon International River Basin Management Plan to bring water up to a good standard, as defined in the EU Water Framework Directive, by 2015.

Policy HL85: Ensure that the ongoing development of Towns and their Environments are undertaken in such a way so as not to compromise the quality of surface water (and
associated habitats and species) and groundwater within the zone of influence of the Development Plan or Local Area Plan area.

**Policy HL90**: Landuses shall not give rise to the pollution of ground or surface waters during the construction or operation of developments. This shall be achieved through the adherence to best practice in the design, installation and management of systems for the interception, collection and appropriate disposal or treatment of all surface waters and effluents.

**Policy IS5**: Ensure that the provision of water and sewerage facilities is undertaken in accordance with EU policies and directives and national legislation.

**Policy IS13**: To promote an ecosystem approach to water and wastewater management through the integrated management of land, water and living resources, a water safety plan approach for the protection of drinking water supplies in County Galway and consideration for hydrological and natural processes, where appropriate.

The quality of discharge from the existing Glenamaddy WwTP, and its potential impacts on the receiving groundwater body and downstream groundwater and surface water bodies and their associated Natura 2000 sites and their water dependent qualifying interests, is clearly leading to a contravention of the above policies and objectives of the County Development Plan.

**Western RBD Groundwater Action Plan 2009**

The 2009 Western RBD Groundwater Action Plan identifies the following groundwater bodies (GWBs) as at risk from land based point source pressures:

**Landfills:**
- 4 GWB at risk due to Landfills, Old Dump Site or Illegal Landfill Site identified
- None at Poor Status

**Mines:**
- 1 GWB at risk due to Old or Closed Mine Sites (Abbeytown)
- None at Poor Status

**Quarries:**
- 2 GWBs at Risk due to Quarrying activities
- None Poor Status
Urban Wastewater Treatment Discharges to Groundwater

- 1 At Risk (Glenamaddy)
- None at Poor Status

Contaminated Land

- 2 At Risk
- None in Poor Status

The above shows that within the Western River Basin District, the Glenamaddy WwTP is seen as a major point source risk in terms of urban waste water treatment discharges to groundwater and is the major source in terms of the “at risk” status of this groundwater body.

Licenced Facility

As part of this Screening Exercise a review of the EPA ENVision was carried out in terms of identifying licenced facilities in the vicinity of the Glenamaddy discharge. The only facility with the potential for in combination impacts with the current Glenamaddy discharge is the Corrib Eggs facility at Lettera, Glenamaddy, Co. Galway (IPC No. P0964-01).

Planning permission (Planning File Reference No. 12/806) was obtained in 2012 for upgrade to the above facility in 2012. An Environmental Impact Statement (EIS) was prepared in support of the planning application and was submitted to the EPA with the IPPC licence application. Uncontaminated storm water emissions from roofs and paved areas discharge to ground via soak pits at this facility. Conditions set in the IPC licence will ensure that manure generated on site shall be stored in a manner which does not pollute ground or surface waters and that there will be no unauthorised discharge of polluting matter to water. A screening for Appropriate Assessment was undertaken to assess, in view of best scientific knowledge if the facilities activities, individually or in combination with other plans or projects is likely to have a significant effect on any European Sites. The Lough Corrib SAC is the site most relevant to the AA screening because it is located approximately 1.1 km downstream of the poultry farm. Surface water emanating from this installation will eventually make its way into the Corrib system, however all potential point sources of pollution from the installation have been carefully controlled and any contaminated surface water arising will be diverted to washwater tanks. The Lough Lurgeen Boq/Glenamaddy Turlough SAC is upstream of the installation and it was concluded that this SAC will not be impacted by the activity of the Corribs Egg facility.
Based on the above, there is likely to be no in-combination impacts on the Lough Lurgeen Bog/Glenamaddy Turlough SAC from the functioning of the Corrib Eggs facility and the Glenamaddy Discharge.

Once the above facility is functioning in compliance with the conditions of their IPC licence it is not deemed that there will be in combination impacts with the Glenamaddy discharge in terms of impacts on the Clare-Corrib Groundwater body and associated Lough Corrib SAC.

2.8.1 Construction of new Glenamaddy WwTP

There are future plans associated with the Glenamaddy Sewerage Scheme to construct a new wastewater treatment plant to replace the existing primary settlement (Imhoff) tanks. A number of receiving waters are being considered as part of this Scheme:

- Glenamaddy Turlough
- Sinking River
- Shiven River
- Springfield River
- Discharge to groundwater

The new wastewater treatment plant facility will be located outside of the Lough Lurgeen Bog/Glenamaddy Turlough SAC. This new WwTP plant will treat effluent to a high standard (in compliance with regulations) resulting in an overall positive effect on water quality in the area. However, until the detailed design is known, significant impacts on the Lough Lurgeen Bog/Glenamaddy Turlough SAC, Lough Corrib SAC or any other Natura 2000 remains uncertain.

As part of this NIS we consider the potential for general impacts associated with the construction of a new WwTP. High level general mitigation measures are detailed in Section 2.9.1 of this report. The recommended mitigation measures are not exclusive and will need to be reviewed and expanded upon in light of the final WwTP design.

Lough Lurgeen Bog/Glenamaddy Turlough SAC and Lough Corrib SAC have a number of groundwater and surface water dependant habitats and species which could be at risk during the construction stage of the new Glenamaddy WwTP. The main threats are as follows:

- Accidental contamination of groundwater or surface waters, by leakage or spillage from machinery and associated equipment
• The removal and disturbance of soil in the locality during construction could cause a potential risk to groundwater as the protective soil layer is removed and the vulnerability of the groundwater to surface contaminants is increased. This would provide direct pathways for contaminants or surface runoff to enter the underlying aquifer.
• Runoff to surface waters.
• Vibration is an additional risk factor for Pearl Mussel, a qualifying feature of the Lough Corrib SAC. This is dependent upon where the WwTP will be sited.
• Anthropogenic disturbance affecting species (specifically otter and bats)
• Accidental spread of invasive species (Japanese Knotweed, the high impact invasive species, has been noted within the Glenamaddy Environ [National Biodiversity Centre Database]

2.9 Mitigation Measures
The current wastewater treatment regime at Glenamaddy WwTP is clearly inadequate and is in breach of the Water Framework Directive and Galway County Development Plan 2009-2015, and needs to be replaced with a modern system that meets the objectives of the Water Framework Directive:

• Prevent deterioration
• Restore good status
• Reduce chemical pollution
• Achieve water related protected areas objectives

The treatment plant currently fails to meet the minimum regulatory and legislative standards as set by the Urban Waste Water Treatment Regulations and the Urban Wastewater Treatment Directive.

2.9.1 Glenamaddy WwTP Discharge Mitigation
It is clear that the existing wastewater treatment in Glenamaddy is insufficient and inadequately treated effluent from the plant is undoubtedly contributing to unsatisfactory water quality in Glenamaddy Turlough and is also potentially affecting water quality in the Clare/Corrib system and Lough Corrib SAC. A new WwTP will remove one of the biggest point sources of pollution to this system and should enable Glenamaddy Lough to achieve “good” status in the short to medium term. Such improvements will also serve to protect the Lough Corrib SAC by enhancing water quality entering the downstream Sinking River and Lough Corrib.
The final treated effluent from the new WwTP will be subject to strict quality standards that reflect the legislative status of the discharge and these standards will also be environmentally cognisant of the specific requirements of the receiving water body and the associated designated Natura 2000 sites.

The new plant will be designed to operate in compliance with existing legislative and regulatory standards. This will improve water quality and help to protect the two Natura 2000 sites.

With regard to the cumulative impacts of the Glenamaddy discharge, the waste water effluent standards will be in line with the Urban Waste Water Treatment Regulations, 2001 and the functioning of the WwTP must be in compliance with any future EPA Waste Water Discharge Licence conditions to ensure the desired environmental quality standards for the receiving waters are met. In terms of additional discharges from other municipal sources into the receiving waterbody, it is imperative that EPA licence conditions relating to discharges from other municipal sources to the aquatic environment are stringently met.

A number of mitigation measures will be put in place further to the issuing of the Wastewater Discharge Licence Application from the EPA for the existing Glenamaddy WwTP). The key mitigation measure will be the treatment of sewage effluent to acceptable standards. This will ensure maximum water quality output to the receiving water bodies and minimise adverse effects on Lough Lurgeen Bog/Glenamaddy Turlough SAC and Lough Corrib SAC.

2.9.2 WwTP Construction Mitigation

There is potential for the construction stage of the new Glenamaddy WwTP to impact on the Natura 2000 sites within the zone of impact. As detailed above the exact location of the new WwTP, the receiving water body and the level of treatment are yet to be determined. We therefore recommend a number of general mitigation measures which should be adhered to during the construction of the WwTP within the Glenamaddy environs.

It is imperative to note that this is not an exhaustive list and these mitigation measures will need to be amended once a detailed design becomes available. The following are a list of general mitigation measures for the Glenamaddy Sewerage Scheme WwTP Construction Stage:
• Aqueous discharge to surface/ground waters will not be allowed, except with consent from the EPA and will adhere to the standards set for suspended solids and volumes.
• Accidental spillages will be prevented by storing all chemicals on site, including fuel oils and lubricants.
• Emergency procedures will be in place should an accidental spillage occur (e.g. spill kits)
• All chemicals will be stored in bunded containers
• A pearl mussel survey (desktop/field survey, as appropriate) will be conducted by a suitably qualified Ecologist to determine the presence of pearl mussel within the receiving waterbody and vicinity of the proposed works. If present, vibration mitigation measures will be required. In addition to the mitigation measures recommended by the Ecologist, all construction activities will be undertaken in accordance with good practice as described by British Standard 5228:1997 Noise and Vibration Control on Construction and Open sites.
• No construction machinery will enter any Natura 2000 site.
• Any trees to be removed, as part of the Glenamaddy Sewerage Scheme will be checked for the presence of bats, specifically the Lesser Horseshoe bat for which the Lough Corrib SAC has been selected. A bat specialist will examine the trees prior to felling to establish whether or not bats are present.
• An otter survey will be undertaken by a suitably qualified Ecologist pre-construction to determine the presence of otter within the area. If present a number of mitigation measures may be necessary, as determined by the Ecologist. These may include the following:
  - Any lighting installed within the construction site should be directed away from the river using appropriate baffles if necessary to avoid light disturbance
  - Works to be undertaken during typical daylight working hours only, avoiding key times of Otter activity (dawn and dusk)
  - Open pits or trenches created during the construction phase of works will be securely covered, or alternatively have a means of egress for any trapped animals at the end of each working day
• Prior to any excavation works the site will be checked for the presence of Japanese Knotweed. If present this invasive species will be removed by a suitably qualified specialist. Removal/eradication measures will be site specific but can include excavation down to 5 meters and the arisings disposed of by incineration.
• A Stage 1 Appropriate Assessment Screening will be prepared for the final design of the proposed WwTP and a Stage 2 NIS prepared, if the requirement for this is determined at the end of Stage 1.

2.10 Concluding Statement

This Appropriate Assessment has been prepared following the EPA (2009) ‘Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007)’. The Department of the Environment, Heritage and Local Government guidance ‘Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities’ (DoEHLG, 2009a) has also been taken into account.

The current assessment for the Waste Water Discharge Licence Application investigates the potential adverse effects on the aquatic qualifying interests of the Natura 2000 network arising from the current WwTP discharge, in combination with other plans / projects affecting the aquatic environment. The assessment considers whether the discharge, alone or in combination with other projects or plans, will have adverse effects on the integrity of a Natura 2000 site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects.

After completing this Natura Impact Statement and the Stage 2 Appropriate Assessment process, it can be concluded that, subject to the implementation of the mitigation measures of Section 2.9 in full, no significant adverse effects on the conservation objectives and qualifying interests/features of Lough Lurgeen Bog/Glenamaddy Turlough SAC and Lough Corrib SAC are likely from the discharge effluent emanating from Glenamaddy WwTP either directly, indirectly or cumulatively.

Regarding the construction of the new Glenamaddy WwTP, when a site location and associated plant design details have been finalised, an Appropriate Assessment Screening will be carried out to ensure that the proposed plant and associated discharge will not impact upon the integrity of the conservation objectives of any Natura 2000 site.

This Stage 2 Natura Impact Statement concludes the Appropriate Assessment process of the Glenamaddy Waste Water Discharge Licence Application.
3. REFERENCES


European Commission: 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 Commissions Managing Natura 2000 Sites. The provisions of Article 6, of the ‘Habitats’ Directive 92/43/EEC.


Key Online Sources

EPA Online Mapping ENVision

NPWS Data and Mapping

Water Matters Mapping and Reports
APPENDIX I: SITES SYNOPSES
SITE SYNOPSIS

SITE NAME : LOUGH LURGEEN BOG/GLENAMADDY TURLOUGH

SITE CODE : 000301

Lough Lurgeen Bog/Glenamaddy Turlough covers almost 1,200 ha and is situated east of the town of Glenamaddy. It consists of a very large turlough, over 170 ha in area, and a vast expanse of over 1,000 ha of typical intact western raised bog. A small lake occurs on top of the bog.

The Lake, Bog and Turlough are in close association. Water from the bog feeds the lake which in turn is linked to the turlough. This leads to quite a unique ecosystem which is of high conservation value.

On the bog, there are a number of interesting features, pool-hummock systems, a lake, a large fen and a number of flushes, dominated by Purple Moor-grass (*Molinia caerulea*). The lake is a traditional goose site and the turlough is now used by Greenland White-fronted Goose (74). Other birds reported for the site during 2 seasons between 1984 and 1987 (3 counts were made) are Bewick's Swan 14, Whooper Swan 8, Wigeon 472, Teal 73, Mallard 229, Shoveler 15, Pochard 20, Golden Plover 23, Lapwing 62, Snipe 20, Curlew 39, Redshank 15.

A very large turlough of high conservation value in such close proximity to a vast expanse of raised bog is quite unique. The whole ecosystem is therefore of high conservation value.

24.5.2005
SITE SYNOPSIS

SITE NAME: LOUGHCORRIB

SITE CODE: 000297

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

This site is of major conservation importance and includes 14 habitats listed on Annex I of the E.U. Habitats Directive. Six of these are priority habitats - petrifying springs, Cladium fen, active raised bog, limestone pavement, bog woodland and orchid-rich calcareous grassland. The other annexed habitats present include hard water lakes, lowland oligotrophic lakes, floating river vegetation, alkaline fens, degraded raised bogs, Rhynchosporion vegetation, Molinia meadows and old Oak woodlands. Species present on the site that are listed on Annex II of this directive are Sea Lamprey, Brook Lamprey, Atlantic Salmon, White-clawed Crayfish, Freshwater Pearl Mussel, Otter, Lesser Horseshoe Bat, Slender Naiad and the moss Drepanoclados vernicosus.

The shallow, lime-rich waters of the southern basin of the lake support one of the most extensive beds of Stoneworts (Charophytes) in Ireland, with species such as Chara aspera, C. hispida, C. delicatula, C. contraria and C. desmacantha mixed with submerged Pondweeds (Potamogeton perfoliatus, P. gramineus and P. lucens), Shoreweed (Littorella uniflora) and Water Lobelia (Lobelia dortmanna). These Chara beds are an important source of food for waterfowl. In contrast, the northern basin contains more oligotrophic and acidic waters, without Chara species, but with Shoreweed, Water Lobelia, Pipewort (Eriocaulon septangulare), Quillwort (Isoetes lacustris), Alternate Water-milfoil (Myriophyllum alternifolium) and Slender Naiad (Najas flexilis). The last-named is listed under the Flora (Protection) Order, 1999 and is an Annex II species under the EU Habitats Directive.

Large areas of reedswamp vegetation, dominated by varying mixtures of Common Reed (Phragmites australis) and Common Club-rush (Scirpus lacustris), occur around the margins of the lake. Reedswamp usually grades into species-rich marsh vegetation.
characterised by Slender Sedge (Carex lasiocarpa), Water Mint (Mentha aquatica), Water Horsetail (Equisetum fluviatile) and Bog Bean (Menyanthes trifoliata). Of particular note are the extensive beds of Great Fen-sedge (Cladium mariscus) that have developed over the marly peat deposits in sheltered bays, particularly in the south-east corner of the lake. Alkaline fen vegetation is more widespread around the lake margins and includes, amongst the typically diverse range of plants, the Slender Cottongrass (Eriophorum gracile), a species protected under the Flora (Protection) Order, 1999. Wet meadows dominated by Purple Moor-grass (Molinia caerulea) occur in seasonally flooded areas close to the lake shore. These support species such as Sharp-flowered Rush (Juncus acutiflorus), Jointed Rush (J. articulatus), Carnation Sedge (Carex panicea), Devil’s-bit Scabious (Succisa pratensis), Creeping Bent (Agrostis stolonifera) and Tormentil (Potentilla erecta), amongst others.

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

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

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

Limestone pavement occurs along much of the shoreline in the lower Corrib basin and supports a rich and diverse flora, including Herb-robert (*Geranium robertianum*), Bloody Crane’s-bill (*G. sanguineum*), Carlene Thistle (*Carlina vulgaris*), Spring Gentian (*Gentiana verna*), Wild Thyme (*Thymus praecox*), Rustyback (*Ceterach officinarum*), Wood Sage (*Teucrium scorodonia*), Slender St. John’s-wort (*Hypericum pulchrum*), Quaking-grass (*Briza media*) and Blue Moor-grass (*Sesleria albicans*). Areas of Hazel (*Corylus avellana*) scrub occur in association with exposed limestone pavement and these include species such as Hawthorn (*Crataegus monogyna*), Buckthorn (*Rhamnus catharticus*), Spindle (*Euonymus europaeus*) with occasional Juniper (*Juniperus communis*). Three Red Data Book species are also found in association with limestone scrub - Alder Buckthorn (*Frangula alnus*), Shrubby Cinquefoil (*Potentilla fruticosa*) and Wood Bitter-vetch (*Vicia orobus*), the latter is also protected under the Flora (Protection) Order, 1999.

Open areas of orchid-rich calcareous grassland are also found in association with the limestone exposures. These can support a typically rich vegetation, including many orchids such as Pyramidal Orchid (*Anacamptis pyramidalis*), Common Spotted-orchid (*Dactylorhiza fuchsii*), Early-purple Orchid (*Orchis mascula*), Frog Orchid (*Coeloglossum viride*), Fragrant Orchid (*Gymnadenia conopsea*), Marsh Helleborine (*Epipactis palustris*), Greater Butterfly-orchid (*Platanthera chlorantha*) and Irish Lady’s-tresses (*Spiranthes romanzoffiana*). The latter is protected under the Flora (Protection) Order, 1999.

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

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

Otter and Irish Hare have been recorded regularly within this site. Both of these species are listed in the Red Data Book and are legally protected by the Wildlife Act 1976. Otter is also listed on Annex II of the E.U. Habitats Directive. Lough Corrib is considered one of the best sites in the country for otter, due to the sheer size of the lake and associated rivers and streams and also the generally high quality of the habitats. Atlantic Salmon (Salmo salar) use the lake and rivers as spawning grounds. Although this species is still fished commercially in Ireland, it is considered to be endangered or locally threatened elsewhere in Europe and is listed on Annex II of the E.U. Habitats Directive. Lough Corrib is also a well known fishing lake with a very good Trout (Salmo trutta) fishery. The lake has a population of Sea Lamprey (Petromyzon marinus), a scarce, though probably under-recorded species listed on Annex II of the E.U. Habitats Directive.

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

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

Despite this ongoing interference however, Lough Corrib is one the best examples of a large lacustrine catchment system in Ireland, with a range of habitats and species still well represented. The lake itself is internationally important for birds and is designated as a Special Protection Area.

6.10.2006