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Screening for Appropriate Assessment

Remote Water Level Monitoring
in Glenamaddy Turlough,
Co. Galway

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1 Executive Summary

Geological Survey Ireland proposes to establish a remote groundwater flood monitoring network to provide long-term data for groundwater flood risk management. In pursuance of this, Geological Survey Ireland is required to undertake a screening for Appropriate Assessment to examine the likely effects of the proposed works and associated on-going monitoring, either alone or in combination with other projects, on the Natura 2000 network to fulfil the requirements of Article 6(3) of the EU Habitats Directive (92/43/EEC).

Geological Survey Ireland has prepared a screening for Appropriate Assessment in support of the installation of remote water level monitoring at Glenamaddy Turlough, Co. Galway. This report describes the proposed works within the Lough Lurleen Bog/Glenamaddy Turlough Special Area of Conservation (SAC) [Site Code: 000301] and aims to determine whether any possible impacts on this or any other Natura 2000 sites can be characterised as significant. The works consist of the following key elements:

- Installation of housing for water level monitoring equipment in the turlough basin;
- Undergrounding of direct-read cabling from the monitoring point to the telemetry system; and,
- Installation of telemetry system at a roadside location above the maximum likely flood level.

This Appropriate Assessment Screening is considered to incorporate all of the relevant requirements of the European Commission Environment DG guidance document, 'Assessment of plans and projects significantly affecting Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive (92/43/EEC). Through the screening process, it was determined that the proposed work would not significantly impact the hydrology, nutrient status or land management of the site. Therefore, it was objectively concluded that there are not likely to be significant effects on the Glenamaddy Turlough Natura 2000 site as a result of the proposed works.

Furthermore, according to Article 6(3) of the Habitats Directive (HD), any plan or project that may have a significant effect on a Natura 2000 site, and that is not connected with or necessary to the management of the site, should only proceed if it will not have a significant negative impact. In this case, the proposed works will enable the collection of baseline hydrological data in an environment that is primarily ecologically controlled by its flood regime. This type of data collection is implicitly required under the Habitats Directive and as such, it is considered that the proposed monitoring works are screened out of Appropriate Assessment because they are connected to the conservation management of the SAC.

2 Introduction

2.1 Background

Groundwater flooding poses a significant flood hazard to many rural communities in the lowland karst limestone regions of Ireland. The unprecedented flood events of recent years have highlighted the need for a greater understanding of groundwater flooding as a geohazard, and to improve our ability to quantify the location and likelihood of flood occurrence (Naughton et al., 2017). During intense or prolonged rainfall, groundwater flow systems are unable to drain recharge quickly enough and available sub-surface storage rapidly reaches capacity. This excess recharge is then stored as surface flooding within turlough basins, of which there are over 400 recorded examples across the country. Turloughs thus represent the principal form of extensive, recurrent groundwater flooding in Ireland (Mott McDonald, 2010; Naughton et al., 2012).

The winter of 2015/2016 saw unprecedented levels of rainfall across Ireland. Over 600 mm of rainfall fell across the island between December and February, representing 190% of the long-term average and making it the wettest winter on record in a rainfall time series stretching back to 1850 (McCarthy et al., 2016; Noone et al., 2015). This period saw the most extensive groundwater flooding ever recorded. The protracted nature of groundwater flooding, lasting for many months in some cases, caused prolonged hardship to rural communities where they struggled to prevent the inundation of homes and workplaces amid unparalleled disruption to transport networks. Sustained flooding of agricultural land also posed serious welfare risks to livestock and impacted heavily on agriculture.

2.2 GWFlood Project

In response to the serious flooding of winter 2015 specifically related to turloughs, the Programme for a Partnership Government (2016), under the area of Climate Change and Flooding, contains the following objective: *‘Turlough Systems: We will provide resources to the OPW to commission studies into individual problematic (prone to flooding) Turlough systems if requested by a local authority or another relevant State agency’*. Geological Survey Ireland (GSI), a division of the Department of the Environment, Climate and Communications (DECC), were able to deliver on this commitment by developing a new three-year project with funding allocated in Budget 2017.

Through the 2016-2019 groundwater flood project (GWFlood) the Geological Survey Ireland, in collaboration with the University of Dublin Trinity College, worked with local authorities and

government agencies to address the knowledge gap regarding these complex karst systems and provide the necessary information and tools to make scientifically-informed decisions with regards to groundwater flood risk management. A key objective of this project was the establishment of a remote water level monitoring network to provide long-term quantitative groundwater flooding data provide the requisite data to address this knowledge gap by establishing a permanent monitoring network.

Now, through the 2020-2022 the groundwater climate project (GWClimate) Geological Survey Ireland is continuing to expand its monitoring network with a particular focus on groundwater environments that are likely to be impacted by climate change. Glenamaddy Turlough has been identified as one of these locations.

2.3 Conservation Benefits of Monitoring

An additional benefit of a turlough water level monitoring network is that it helps meet the reporting requirements of the EU Habitats Directive (HD). As a Priority Habitat under the HD, appropriate monitoring of turloughs is required to assess conservation status and to inform effective conservation management. Article 17 reporting for habitats requires conservation assessment based on habitat range and area, habitat structure and function and prospects for the habitat through an analysis of recent and current pressures and predicted future threats, and how these pressures and threats will affect trends in range, area, structure and function of the habitat (Evans and Arvela, 2011; Waldren, 2015).

Implicit in this reporting is a requirement for the collection of baseline data with which to compare trends. The main ecological driver that influences the structure and functioning of biological communities in turloughs is the hydrological flooding regime (Waldren, 2015). However, at present, there is no systematic recording of baseline hydrological data for the turlough habitat. The monitoring network proposed here would help to address this deficit.

Due to these conservation benefits, the works can be screened out at the Appropriate Assessment stage as according to Article 6(3) of the Habitats Directive, Appropriate Assessment Screening is required for any plan or project 'which is not directly connected with or necessary to the management of the site as a European Site'. In this case, it is considered that the works are necessary to the conservation management of the site and are thus screened out. Nevertheless, it is important to identify the habitats and species that may be affected by the works, determine whether any significant negative impact might occur and suggest mitigation or avoidance measures. As such, a full screening process has been carried out.

3 Legislative Context for Appropriate Assessment

3.1 General

The first major international agreement on the conservation of wetlands was the Ramsar Convention (1971). This prompted the EU to adopt first the EU Birds Directive (79/409/EEC) in 1979, followed by The EU Habitats Directive (92/43/EEC) in 1992. These Directives provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000.

Special Areas of Conservation (SACs) designated under the Habitats Directive were transcribed into Irish law by the European Communities (Natural Habitats) Regulations (2011) while Special Protection Areas (SPAs) were designated under the Birds Directive. SACs and SPAs are sites that are important at an international level.

Article 6 of the Habitats Directive set out a series of procedural steps to test if a plan or project is likely to affect a Natura 2000 site. Article 6(3) of the Habitats Directive states '*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*'. This assessment process is known as an Appropriate Assessment.

3.2 Appropriate Assessment Process

As described in the European Commission DG Environment guidance document, 'Assessment of plans and projects significantly affecting Natura 2000 sites - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive (92/43/EEC)', the Appropriate Assessment process comprises four sequential stages. The stages are:

Stage 1: Screening for Appropriate Assessment

The process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant given the site's conservation objectives.

Stage 2: Appropriate Assessment

The consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's

structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts.

Stage 3: Assessment of Alternative Solutions

The process which 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 4: Assessment where no alternative solutions exist and where adverse impacts remain

An assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed.

If at any stage in the process it is determined that there will be no significant effect on any Natura 2000 site, the process is effectively completed. Furthermore, plans or projects that are directly connected with or necessary to the nature conservation management of a Natura 2000 site are essentially exempt from further consideration.

4 Appropriate Assessment Screening

This Appropriate Assessment Screening has been carried out in consultation with the National Parks and Wildlife Service (NPWS) and following relevant guidance documents, namely:

- EC (2002) *'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)'*;
- NPWS (2010) Circular Letter NPWS 1/10: *'Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities'*;
- NPWS (2008) Circular Letter SEA 1/08 and NPWS 1/08: *'Appropriate Assessment of Land Use Plans'*.

4.1 Site Description

Glenamaddy Turlough is associated with Lough Lurleen Bog and is one of the largest and most important wetland sites in Ireland and covers an area of 1,161 ha situated northeast of Tuam in north Co. Galway (Figure 1). The Lough Lurleen Bog/Glenamaddy Turlough SAC consists of a large turlough of over 170 ha and an expansive 1,000 ha of western raised bog. The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive:

- [3180] Turloughs*
 - [3270] *Chenopodium rubri* p.p. and *Bidentio* p.p. vegetation
 - [7110] Raised Bog (Active)*
 - [7120] Degraded Raised Bog
 - [7150] *Rhynchosporion* Vegetation
- (* = priority)

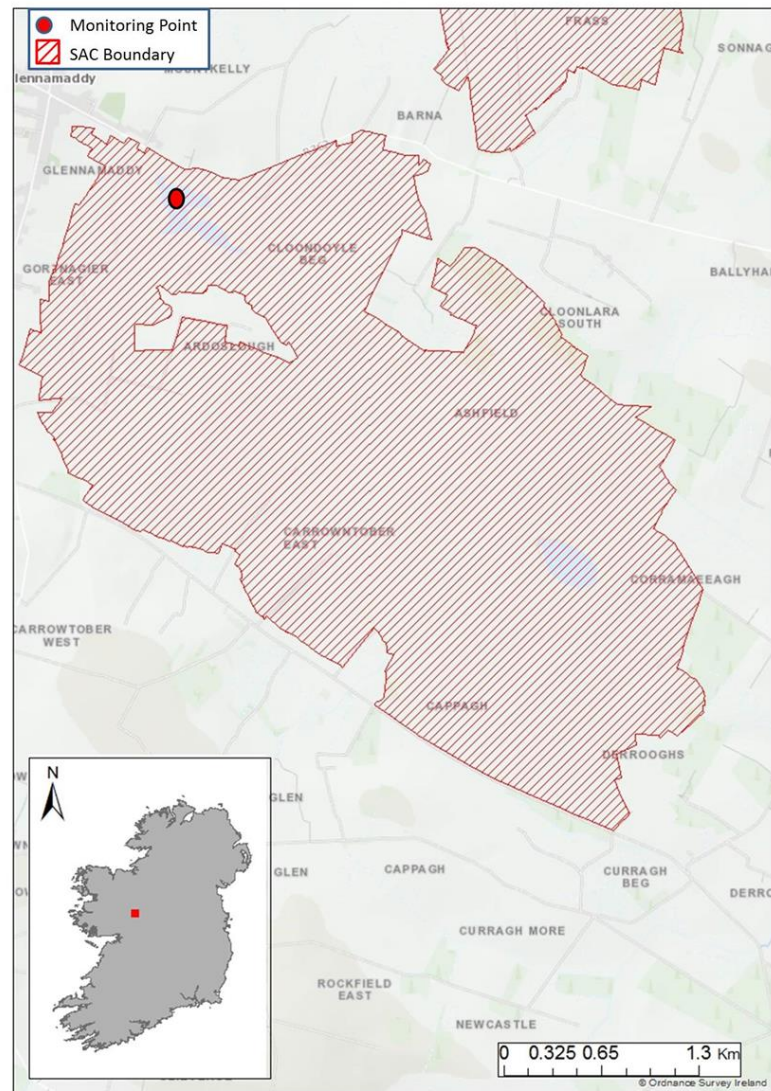


Figure 1: Site location map for Lough Lurgien Bog/Glenamaddy Turlough SAC ([Site Code: 000301])

The NPWS Site Synopsis for Lough Lurgien Bog/Glenamaddy Turlough SAC states the following:

“Glenamaddy Turlough has extensive areas of uniform vegetation, containing large stands of peat grassland, Common Sedge (*Carex nigra*) and Amphibious Bistort (*Polygonum amphibium*). Three rivers flow into the turlough, the largest from Lough Lurgeen bog, and a well-defined swallow hole occurs in the northwestern corner. Vegetation ascribable to the E.U. Habitats Directive Annex I type ‘rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidens* p.p. vegetation’ occurs. The rare Fen Violet (*Viola persicifolia*), a protected plant species, has been recorded from the seasonally inundated turlough bed.

The lake is a traditional goose site and the turlough is used by Greenland Whitefronted Goose (74). Other birds reported for the site during 2 seasons between 1984 and 1987 (three 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.

This is a site of high conservation value due to the presence of a very large turlough in close proximity to an expanse of raised bog. The combination of raised bog, turlough and linking stream is unique in Ireland and is unlikely to occur anywhere else in the world, and the whole system is therefore of high conservation value.”

4.2 Sites outside the Zone of Impact Influence

The Lough Lurgeen Bog/Glenamaddy Turlough SAC lies within a region containing extensive areas of high ecological diversity and conservation value. Table 1 details the sites of ecological importance which lie within a 15 km radius of the SAC boundary.

Table 1: Ecological conservation areas near Lough Lurgeen/Glenamaddy Turlough

Site CODE	Site Name	Designation*
000297	Lough Corrib SAC	SAC
002296	Williamstown Turloughs SAC	SAC
000218	Coolcam Turlough SAC	SAC, pNHA
000255	Croaghill Turlough SAC	SAC, pNHA
002110	Corliskea/Trien/Cloonfellov Bog SAC	SAC, pNHA
000285	Kilsallagh Bog SAC	SAC, pNHA
000296	Lisnageeragh Bog and Ballinastack Turlough SAC	SAC, pNHA

000588	Ballinturly Turlough SAC	SAC, pNHA
000609	Lisduff Turlough SAC	SAC, pNHA
002200	Aughrim (Aghrane) Bog SAC	SAC, NHA
002199	Ballygar (Aghrane) Bog SAC	SAC, NHA
001637	Four Roads Turlough SAC	SAC, pNHA, SPA
002347	Camderry Bog SAC	SAC, pNHA
002350	Curraghleanagh Bog SAC	SAC, pNHA
000326	Shankill West Bog SAC	SAC
002197	Derrinlough (Cloonkeenleananode) Bog SAC	SAC, NHA
000295	Levally Lough SAC	SAC, pNHA
001242	Carrownagappul Bog	SAC, pNHA
001319	Summerville Lough	pNHA
000323	Richmond Esker Nature Reserve	pNHA
001279	Kilkerrin Turlough	pNHA
001282	Kiltullagh Lough	pNHA
000263	Drumbulcaun Bog	pNHA
001237	Boyounagh Turlough	pNHA
000220	Lough Namucka Bog NHA	NHA
000221	Moorfield Bog/Farm Cottage NHA	NHA
000235	Bracklagh Bog NHA	NHA
000281	Keeloges Bog NHA	NHA
000267	Funshin Bog NHA	NHA
000245	Clooncullaun Bog NHA	NHA
000292	Leaha Bog NHA	NHA
000222	Suck River Callows NHA	NHA, SPA
000283	Kilmore Bog NHA	NHA
001244	Castle Ffrench East Bog NHA	NHA
001255	Derrynagran Bog And Esker NHA	NHA

*Designation Acronyms
Heritage Area

NHA: Natural Heritage Area

pNHA: Proposed Natural

Whilst a number of these sites are linked hydrologically to Glenamaddy Turlough (mainly adjacent turloughs), the majority are distant and are not connected. The proposed works, described in Section 4.3 below, are minor and therefore potential impacts to any of the sites above are considered to be very unlikely. These sites have therefore been “screened out” from this assessment.

4.3 Project Description

The proposed installation of a water level monitoring and telemetry consists of the following three main elements:

- a) Installation of housing for water level monitoring equipment in the turlough basin;
- b) Undergrounding of direct-read cabling from the monitoring point to the telemetry system;
- c) Installation of telemetry system at a roadside location above the maximum likely flood level.

A description of the above elements is given below, and their locations are shown in Figure 2 Figure 1.

4.3.1 Monitoring Equipment Housing

Water levels will be monitored using pressure transducer data loggers which will record water level, temperature and conductivity at hourly intervals within the turlough basin. It is proposed to install two loggers at each site, a primary logger connected to the telemetry and a secondary backup in case of failure.

The loggers will be housed within a small precast concrete enclosure (length: 440 mm; width: 590 mm; height: 400 mm) with a plan area of approximately 0.26 m². The enclosure will be installed in the turlough basin. The enclosure is necessary to protect the equipment from livestock and vandalism.

4.3.2 Undergrounding of Direct-Read Cable

For the water level logger to transmit data to the telemetry system, there must be a permanent wired connection between the two units. This “direct-read” cable allows the data to be recovered and transmitted from the logger in real-time, rather than having to wait for the floodwaters to recede in summer and manually recover the data.

The distance between the proposed location in the turlough and the nearest point above the highest recorded flood level is approximately 150 m. This route is located within the boundary of the SAC. It is proposed to bury the cable from the concrete enclosure (monitoring box) up to an access gate by the road.

4.3.3 Telemetry System

The telemetry system sends water level data from the logger to an online portal and will be housed within a weatherproof enclosure above the likely peak flood levels, to ensure the equipment would not be submerged during an extreme flood event. Evidence from the 2015/2016 flood event suggests a maximum flood level of approximately 79.63 m AOD, and so the telemetry housing will be placed a safe distance above this. The location of the telemetry system is outside the SAC boundary and will have no impact on it.



Figure 2: Monitoring equipment site map, Glenamaddy Turlough, Co. Galway

4.4 Potential Impacts

4.4.1 Assessment Criteria

An assessment of potential impacts and likely significant effects was carried out using assessment questions below sourced from the best practice guidance EC (2002) '*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)*'. Each question will be addressed in the context of the three main project elements described in section 4.3, namely:

- a) Installation of the monitoring equipment housing.
- b) Undergrounding of cabling.
- c) Construction of the telemetry system.

Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site:

- a) The plan proposes the installation of a small concrete housing within the Natura 2000 site to hold and protect water level monitoring equipment.
- b) The plan proposes the undergrounding of direct-read cabling running from the monitoring equipment within the turlough up to a nearby road. The cable will be installed within a 2" MDPE pipe for protection against damage and buried to a depth of approximately 0.15 m to 0.3 m.
- c) The plan includes proposals for erecting a pole on the margins of a nearby road outside the SAC boundary and mounting a weather-proof box to house telemetry equipment.

Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site:

- a) Installation of the equipment housing will require the removal of a small amount of soil cover from an area of approx. 0.26 m² within the Turlough Basin, to a depth of 0.2 m to 0.3 m. Excavation will be carried out by hand. Installation is likely to take less than one day.
- b) Undergrounding of the cabling is proposed along a 150 m route within the SAC boundary. Vegetation cover along the trench route will be carefully removed before digging and replaced afterwards. It is proposed to excavate with a small mechanical excavator, and groundworks are expected to take less than one day. Ground

conditions in the turlough during the summer are extremely firm, so it is not envisaged that the passage of the excavator will cause any significant disturbance of the vegetation cover. There are no resource requirements (e.g. water abstraction) or disposal of material required within the site.

- c) The location of the telemetry system is located within the bounds of the SAC on the verge of a local road; however will not have any direct, indirect or secondary impacts on the Natura 2000 site.

Describe any likely significant changes to the site:

- a) The concrete housing within the basin will not cause any significant changes to the site.
- b) The undergrounding of the cabling will not result in a significant change to the habitat area, species composition and species density of the site.
- c) The telemetry system is located outside the site boundary, and neither its construction nor operation will cause significant changes to the site.

Describe any likely impacts on the Natura 2000 site as a whole:

No element of the project is likely to result in interference with the key relationships that define the structure and function of the Lough Lurleen/Glenamaddy Turlough Natura 2000 site, either alone or in combination with any other projects. No element of the proposed project will have to increase the threats to conservation status described in Table 4.1, or negatively impact the site in terms of habitat loss, fragmentation, disruption, disturbance or changes to key hydrological, ecological or hydrochemical characteristics of conservation value. The localised scale of the proposed works means that there will not be a material impact on the structure or function of other Natura 2000 sites within the Glenamaddy area or elsewhere.

Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known:

It can be objectively concluded that there are not likely to be significant effects on the Lough Lurleen/Glenamaddy Turlough Natura 2000 site as a result of the proposed works. No element of the construction or operation phases of the proposed project is likely to result in a significant change to any Annex I habitat, cause a reduction in the area of any listed habitat within any Natura 2000 site or cause any direct or indirect damage to the physical quality of the environment within the site.

4.4.2 Consideration of potential cumulative impacts

As well as singular effects, the potential for in-combination or cumulative effects must be considered. Whilst the proposed works themselves may not cause significant effects when assessed and considered on their own when considered in combination with other plans or projects significant effects to a site may occur.

A cumulative impact arises from incremental changes caused by other plans or projects (completed, in-progress or future plans) together with the proposed works. Having considered that the proposed works alone will not cause likely significant effects, a cumulative assessment must also be carried out.

There are no known plans or projects proposed at, or adjacent to, Glenamaddy Turlough and therefore the cumulative impact assessment outcome is the same as that for the project when assessed alone – no likely significant effects to any site are anticipated.

5 Summary and Conclusions

5.1 Summary

Geological Survey Ireland proposes to establish a remote groundwater flood monitoring network to provide long-term data for groundwater flood risk management. In pursuance of this, Geological Survey Ireland is required to undertake an Appropriate Assessment Screening to examine the likely effects of the proposed monitoring, both alone and in combination with other projects, on the Natura 2000 network to fulfil the requirements of Article 6(3) of the EU Habitats Directive (92/43/EEC).

Geological Survey Ireland has examined the likely impacts to the integrity of the Natura 2000 network that could arise from the proposed installation of remote water level monitoring at the Lough Lurleen/Glenamaddy Turlough SAC [Site Code: 000301], Co. Galway. This report describes the proposed works within the Glenamaddy Turlough and aims to determine whether any possible impacts on this or any other Natura 2000 sites can be characterised as significant. The works consist of the following key elements:

- Installation of housing for water level monitoring equipment in the turlough basin;
- Undergrounding of direct-read cabling from the monitoring point to the telemetry system;

- Installation of telemetry system at a roadside location above the maximum likely flood level.

5.2 Conclusions and Statement

According to Article 6(3) of the Habitats Directive, Appropriate Assessment Screening is required for any plan or project 'which is not directly connected with or necessary to the management of the site as a European Site'. In the case of this project, the proposed works will provide, for the first time, the baseline hydrological data implicitly required under the EU Habitat Directive. As such, the works are necessary to the conservation management of the site and it is thus considered that they can be screened out. Nevertheless, an Appropriate Assessment Screening has been carried out.

This screening report is considered to incorporate all of the relevant requirements of the EC DG Environment guidance document, 'Assessment of plans and projects significantly affecting Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive (92/43/EEC)'. It is considered that the proposed works do not include any element that has the potential to significantly alter the favourable conservation objectives associated with the species and habitats, or, interfere with the key relationships that define the structure or function of any site identified within the 15 km buffer zone.

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