APPROPRIATE ASSESSMENT SCREENING OF PROPOSED REHABILITATION OF DUNANCORY BRIDGE, VIRGINIA, CO. CAVAN

Appropriate Assessment Screening

In accordance with the requirements of Article 6 (3) of the Habitats Directive (Council Directive 92/43/EEC)

Dunancory Bridge

PREPARED FOR

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1. INTRODUCTION

This Appropriate Assessment Screening report has been prepared in compliance with Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DoEHLG 2009, February 2010) and the European Communities (Birds and Natural Habitats) Regulations 2011 (DoEHLG) in order to assess the potential impact of the proposed rehabilitation and widening works to Dunancory Bridge, Virginia, Co. Cavan on the Natura 2000 network.

The closest protected Natura site to Dunancory Bridges is River Boyne and River Blackwater SPA (Site code. 004232) and River Boyne and River Blackwater SAC (Site code 002299) the boundary of which lies approximately 6.25km to the south east of the bridge, where the River Blackwater flows out of the southern shore of Lough Ramor.

This report provides the information required in order to establish whether or not the proposed work is likely to have a potential impact on this protected site in relation to its conservation objectives or specifically on the habitats and species for which this site has been designated.

1.1 Appropriate Assessment

The relevant guidance documents for Appropriate Assessment set out a staged process for carrying out Appropriate Assessment, the first of which is referred to as screening.

Stage 1 - The screening stage identifies the likely impacts on Natura 2000 sites, if any, which would arise from a proposed plan or project, either alone, or in combination with other plans and projects, and further considers whether these impacts are likely to be significant.

If it can be concluded during the screening exercise that there is no likelihood of significant impacts occurring on any Natura 2000 sites, as a result of the proposed development either alone or in combination with other plans and projects, then there is no requirement to proceed to subsequent stages of Appropriate Assessment.

If it is not possible to conclusively rule out significant impacts on Natura 2000 sites, the assessment should proceed to Stage 2: Appropriate Assessment for which a Natura Impact Statement (NIS) must be prepared.

Stage 3 of the process is Assessment of Alternative Solutions which examines alternative ways of achieving the objectives of the plan or project that avoid adverse impacts on the integrity of the Natura 2000 site.

Stage 4 Assessment where Adverse Impacts Remain is 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.

This report is comprised of the ecological impact assessment and testing required under the provisions of Article 6(3) by means of the first stage of Appropriate Assessment – **Stage 1 - the screening process**.

EU Guidance states:

"*This stage examines the likely effects of a project or plan, either alone or in combination with other projects or plans, upon a Natura 2000 site and considers whether it can be objectively concluded that these effects will not be significant*".

This report also provides the information required for the Competent Authority to complete the Appropriate Assessment (Stage 2) should this be necessary in the opinion of the Competent Authority. Screening has been undertaken in accordance with the European Commission's Guidance on Appropriate Assessment (European Commission, 2001) which comprises the following:

1. Description of the Plan
2. Identification of Natura 2000 Sites potentially affected by the Plan
3. Identification and Description of Individual and Cumulative impacts likely to result from the Plan
4. Assessment of the Significance of the impacts identified on the Conservation Objectives of the site(s)
5. Exclusion of sites where it can be objectively concluded that there will be no significant impacts on conservation objectives

2. SCREENING

Following the guidelines set out by NPWS (2009), Appropriate Assessment Screening (Phase 1 - Appropriate Assessment) is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the EU Habitats Directive –

(1) Is the plan or project directly connected to or necessary for the management of the site?
(2) Is the plan or project, alone or in combination with other such plans or projects likely to have significant negative effects on a Natura 2000 site(s) in view of the conservation objectives of that site(s)?

The proposed maintenance/widening works on Dunancory Bridge does not comply with the first screening test as the proposed development is not directly connected to, or necessary for the management of any Natura 2000 site. This screening exercise will therefore inform the Appropriate Assessment process in determining whether the proposed development, alone or in combination with other plans or projects, is likely to have significant effects on the Natura 2000 sites within the study area.
If effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overtly complicated, then the Appropriate Assessment process must proceed to Stage 2 Appropriate Assessment and the preparation of a Natura Impact Statement (NIS).

2.1 Description of Project

This screening report examines whether the proposed widening and maintenance works on Dunancory Bridge will have a significant impact on River Boyne and River Blackwater SPA (Site Code 004232) or on River Boyne and River Blackwater SAC (Site Code 002299).
Dunancory Bridge spans a river which feeds into Lough Ramor approximately 1km downstream and south of the bridge.

The River Blackwater flows out of the southern end of Lough Ramor. The site boundary of River Boyne and River Blackwater SPA and SAC lies at the point where the River Blackwater leaves Lough Ramor.

3. SITE VISIT

Dunancory Bridge was surveyed on 8th February 2020. A range of photographs were taken to include upstream and downstream elevations and views under the arches.
The bridge was surveyed for roosting bats and/or evidence of bat usage using a high-powered torch (Led Lenser Rechargeable System) and an endoscope to examine deep crevices. February is generally too early in the year to record bats roosting in bridges. However, evidence of their presence in a bridge tends to remain in the roost crevice (droppings and staining from urine/bats' fur). The bridge was also surveyed for birds' nests remaining in the bridge from last nesting season.
Otters were surveyed by searching for otter spraints deposited in prominent places on rocks/ledges, otter tracks in mud or trails/slides adjacent to the site. Consultation with NBDC maps prior to survey revealed that there are records of otter on the shore of Lough Ramor – 1km downstream of the bridge.
Consultation with NBDC maps prior to survey revealed that there are records of Freshwater Crayfish *Austropotomobius pallipies* from the river at Dunancory Bridge. There are no records of Freshwater Pearl Mussel *Margaritifera margaritifera* from the river.

Bridge Name: Dunancory Bridge

Bridge ID: CN - 194 -
Grid Reference: N590 881 (Eastern arch) N589 881 (Western arch)
Watercourse: Dunancory River
Species recorded: Evidence of bats, Otter, Dipper's nest

Photo 1 – aerial photo showing the location of Dunancory Bridge. The locations of the two arches are indicated

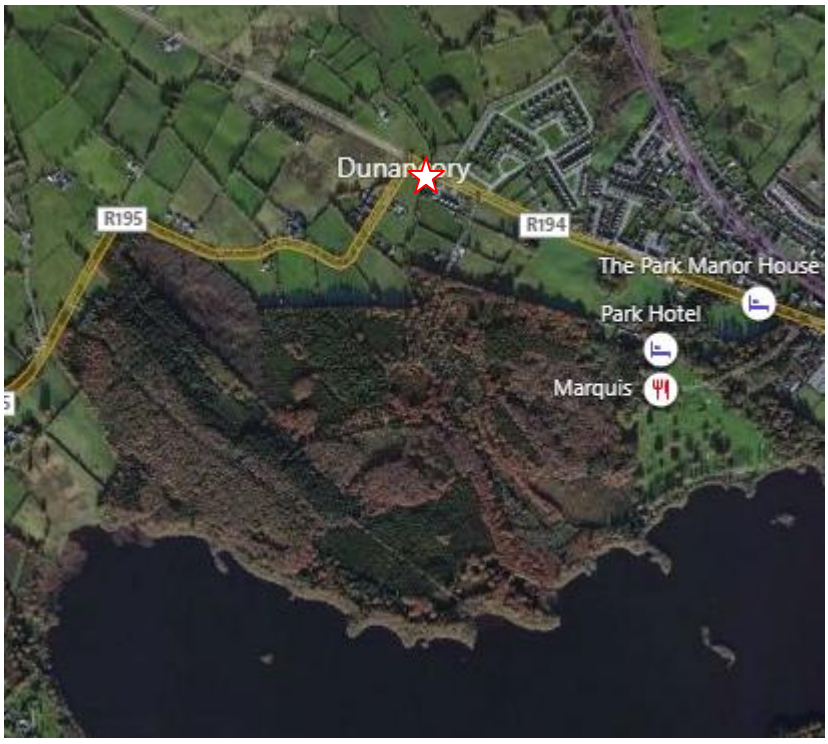

Photo 2 – aerial photo showing proximity of Dunancory Bridge to Lough Ramor. The lake lies approximately 1km downstream from bridge.

Dunancory Bridge is located on the regional road (R194) between Virginia and Ballyjamesduff. The bridge is situated approximately 1km north-west of Virginia town centre on the outskirts of the town.
Dunancory Bridge consists of two arches separated by a grassy island. The river divides in two just upstream of the bridge. The western stream is currently blocked with vegetation so that there is little water flow under the western arch. The eastern stream is larger and flows under the eastern arch in a southerly direction towards Lough Ramor. The bridge stands in an area of improved grassland upstream of the bridge and improved grassland leading into native woodland downstream of the bridge.

The parapet walls have been replaced with metal railings on both sides. The western arch is in poor condition. There is a large crack running around the arch barrel c.0.5 -1m in from the southern face (Photo 5). There is also a crack towards the centre of the arch. A section of stonework has collapsed from the undersurface of the arch close to the northern face. The remains of a dipper's nest were recorded wedged in this void (Photo 6). There is considerable mortar loss from between the stones under the arch. Evidence of usage by bats was recorded in a section of the crack midway under the arch. Staining and a few bat droppings were seen in this crevice, indicating that it had been used as a roosting site by bats last season (Photo 7). It may not be possible to retain this crevice due to its structural nature. Three crevices were marked with red paint for retention for bats close to the downstream face of this western arch (Photos 8 & 9).
The river is choked with vegetation and a build-up of silt immediately upstream of this arch (Photo 11). This build-up should be cleared to allow river to flow freely under this arch.
The eastern arch is in good condition. The stonework under the arch is comprised of regular cut stone and very little loss of mortar (Photo 13). There were two crevices under this arch which were considered to be suitable for bats. One crevice behind the upstream facing stones contained a few bat droppings, indicating that it has been used by bats in the past. This crevice was clearly marked with red paint for retention for bats (Photo 15). A second crevice approximately 2m in from the upstream face was also marked for retention for bats (Photo 15). There were no suitable crevices in the bridge walls.

Ecology
There is considerable mortar loss between the stones under the western arch which has allowed bats to roost in the crevices formed as a result. There is evidence that a small colony of bats (most likely Daubenton's bats) roosted in a section of the crack midway under the arch during the last season.
The remains of a dipper's nest were recorded in a void under this arch. It will not be possible to retain this void. Therefore, an alternative nest site must be provided to allow dippers to continue to nest at this site. A dipper box should be attached to the undersurface of the western arch.
There was also evidence of bats roosting in the crevice behind the upstream facing stones of the eastern arch.
An otter trail was recorded on the grassy island between the two arches (Photo 19).
No freshwater crayfish were recorded in the vicinity of the bridge, even though they have been recorded previously from this site.

No invasive plant species were recorded in the vicinity of the bridge.

Recommendations

- A bat detector survey should be conducted in May 2020 to establish the species and number of bats using the bridge
- All marked crevices must be retained for bats
- Provide nesting box for dippers under western arch towards upstream face
- Ensure that there is no light spillage from the new streetlights onto the water surface

PHOTOGRAPHS

Photo 3 – southern face of western arch. A large oak tree stands just downstream of the bridge. Some boughs have broken and have fallen into the river causing a blockage.

Photo 4 – view under western arch. There is a narrow plinth of stone running along the base of the western abutment.

Photo 5 – deep fissure running around arch barrel 0.5 – 1m in from southern face of western arch

Photo 6 – void in stonework close to northern face of western arch with remains of dipper's nest

Photo 7 – crack midway under western arch with evidence of bat usage in the form of staining

Photo 8 – Two crevices marked for retention for bats under western arch

Photo 9 – Crevice marked for retention for bats towards southern face of western arch

Photo 10 – northern face of western arch. Crevices in the stonework of the upstream wall are too shallow for bats.

Photo 11 – northern face of western arch. The channel upstream of this arch is blocked with vegetation which should be removed.

Photo 12 – northern (upstream) face of eastern arch

Photo 13 – view of stonework under eastern arch which has been well-grouted in the past

Photo 14 – upstream wall of eastern arch. Crevices too shallow for roosting bats

Photo 15 – Crevice marked for retention for bats behind upstream facing stones of eastern arch

Photo 16 – Crevice marked for retention for bats in stonework at apex of eastern arch

Photo 17 – looking downstream towards Lough Ramor – ideal conditions for Daubenton's bats

Photo 18 – looking upstream – again, ideal foraging conditions for Daubenton's bats

Photo 19 – otter tracks in grass between the two arches of Dunancory Bridge

4. SCOPE OF THE WORKS

Proposed Maintenance Works

- Repair and repoint masonry of bridge arches using lime mortar
- Construct a 2000mm wide pedestrian walkway onto both upstream and downstream sides of bridge
- Construct a wing wall embankment at the upstream side of both arches
- Provide street lighting to illuminate the carriageway

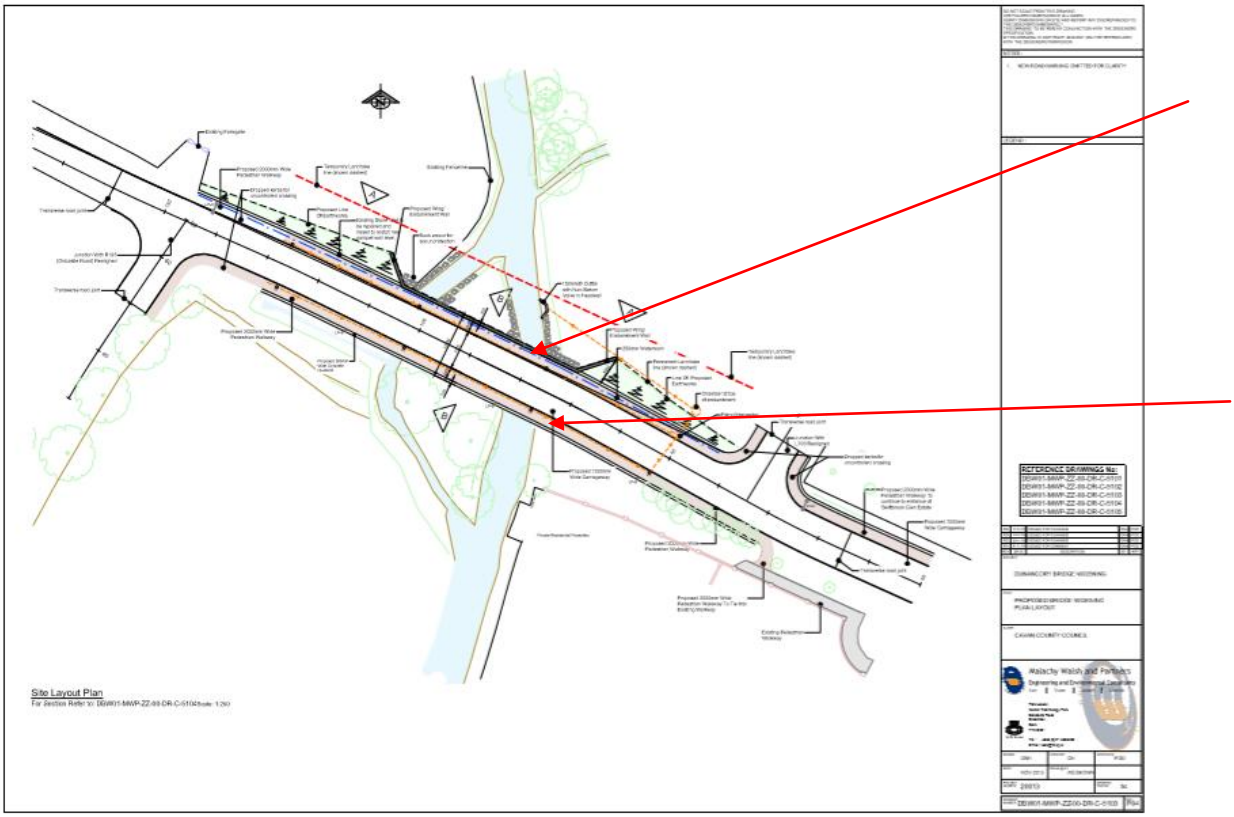

Figure 1 – showing position of proposed walkways at both upstream and downstream faces of the bridge

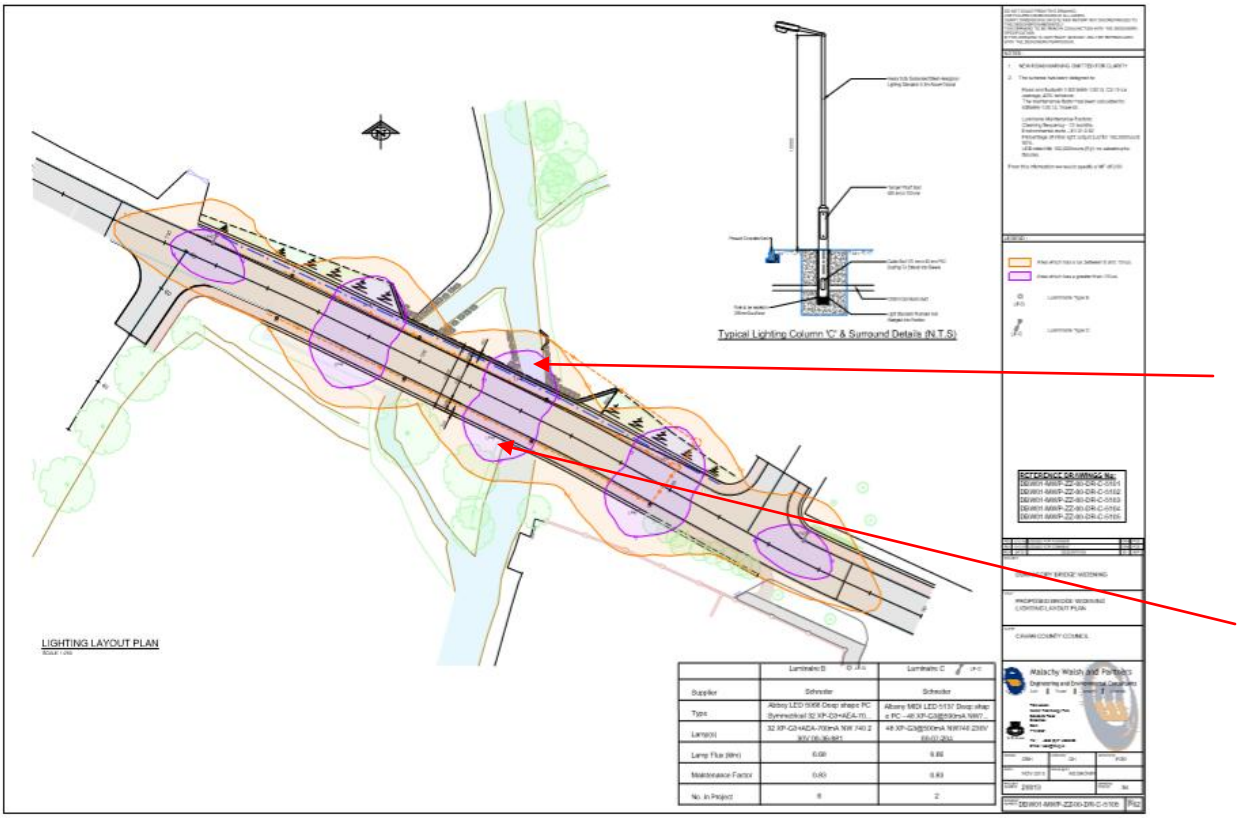

Figure 2 – Showing proposed lighting of carriageway over Dunancory Bridge. The light spillage onto the river must be reduced as it will deter bats from commuting/foraging

Environmental Risks and Control Procedures

An Environmental Method Statement will be prepared by Malachy Walsh and Partners. A signed copy of the Environmental Method Statement will be submitted to the District Conservation Officer of the NPWS. Advance notice of all works and associated Method Statements to be provided to NPWS.

The Method Statement must include details of methodology employed to prevent silt entering the stream by use of silt traps immediately downstream of bridge.

Work platforms erected at the structure to be lined with tarpaulins to catch any falling debris/mortar. Tarpaulins to be carefully removed once pointing is completed.

5. RECEIVING ENVIRONMENT

Identification of Natura 2000 sites potentially impacted by the proposed works

The Habitats Directive protects important habitats and species within Special Areas of Conservation (SACs). It lists certain habitats (Annex I) and species (Annex II) for special protection. A second European Directive – the Birds Directive – seeks to protect birds of conservation importance by the designation of Special Protection Areas (SPA's). Special Areas of Conservation and Special Protection Areas form a pan-European network of protected sites known as Natura 2000 sites.

European and national legislation places an obligation on Ireland to maintain at favourable conservation status sites designated as Special Areas of Conservation and Special Protection Areas.
Favourable conservation status of a habitat is achieved when:

- Its natural range, and the area it covers within that range, is stable of increasing, and
- 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.

The favourable conservation status of a species is achieved when:

- Population data on the species concerned indicate that it is maintaining itself, and
- The natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and
- There is, and probably will continue to be a sufficiently large habitat to maintain its populations on a long-term basis.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition.

5.1 Description of the Receiving Environment

Appropriate Assessment screening is required by National Parks and Wildlife Service (NPWS) to determine the potential for significant effects on any Natura 2000 site (SAC or SPA) or its conservation objectives as a result of this bridge repair project.
The closest Natura 2000 site is River Boyne and River Blackwater SPA (Site code 004232) and River Boyne and River Blackwater SAC (Site code 002299). The boundary of River Boyne and River Blackwater SPA/SAC lies approximately 6.25km from Dunancory Bridge.

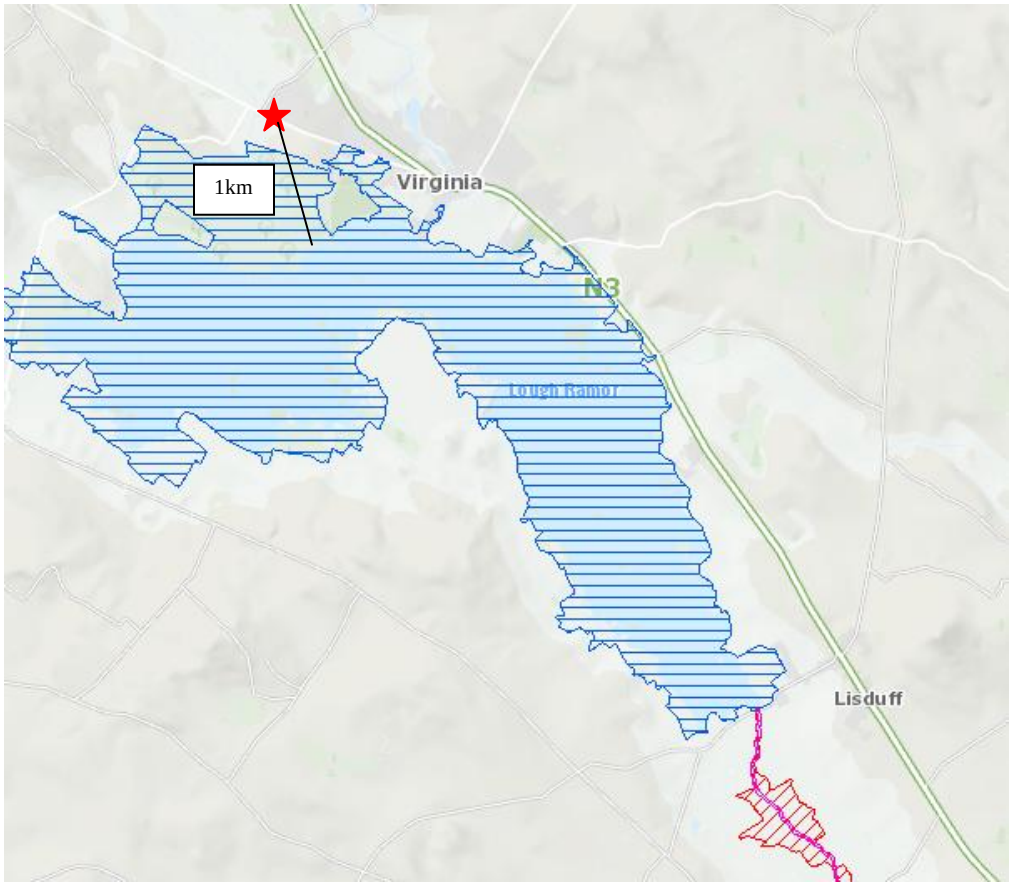

Figure 3 – showing the proximity of Dunancory Bridge to Lough Ramor (c.1km). Lough Ramor is designated as a Natural Heritage area (blue). River Boyne and River Blackwater SPA (pink) commences at the point where the River Blackwater leaves Lough Ramor on its southern shore. River Boyne and River Blackwater SAC (red) also commences at this point

6. DESCRIPTION OF POTENTIAL IMPACTS

6.1 Potential Habitats Affected

Sediment Control:

The rehabilitation of Dunancory Bridge could result in debris, mortar and sediment being washed downstream along the watercourse. Malachy Walsh and Partners have prepared an Environmental Method Statement which outlines measures such as the placement of silt traps downstream of the bridge to catch any suspended sediment.

Tarpaulins lining scaffold and work platforms under the arch will catch any loose mortar inadvertently falling from the bridge structure

Invasive species

All machinery, vehicles and equipment brought on site are to be treated for potential contamination with biohazards such as invasive species.

Pollutants

A spill kit should be available on site.

6.2 Potential Species affected

No bats were found roosting in Dunancory Bridge on the date of the survey but there was evidence of bats roosting in crevices under both arches. These bats are most likely Daubenton's bats because there are ideal foraging conditions for this species both upstream and downstream of the bridge.

An otter trail was recorded in the grass between the two bridge arches upstream of the bridge. Otters will not be adversely affected by the works.

The proposed works will have no significant impact on any of the birds listed within River Boyne and River Blackwater SPA - Kingfisher.

A dipper's nest box should be provided at under the western arch of Dunancory Bridge to allow dippers to continue to nest in this location.

Consultation with National Biodiversity Data Centre maps confirms that there are previous records of Freshwater crayfish *Austromotabobius pallipies* from this site, although none were recorded in the present survey.

There are no records of Freshwater Pearl Mussel *Margaritifera margaritifera* from this watercourse.

Following the implementation of best practice management any risks associated with the works should be reduced to negligible levels. Although there will be some temporary disturbance associated with the proposed works, this disturbance should not cause any significant impacts.

6.3 Cumulative Effects

Article 6(3) of the Habitat's Directive requires an assessment of a plan/project to consider other plans/projects that might, in combination with the proposed plan/project, have the potential to adversely impact upon Natura 2000 sites.

There is no significant potential for cumulative impacts associated with the proposed bridge maintenance works.

6.4 Gauging the impacts on Natura 2000 sites - Integrity of site check list

The potential impacts of the proposed works on Natura 2000 sites are gauged using a checklist, which aids in determining whether the development has the potential to have a significant negative impact on any Natura 2000 site. The checklist contains a number of pertinent questions as set out below

Does the Plan have the potential to:	YES/NO
Cause delays in progress towards achieving the conservation objectives of the Natura 2000 site?	NO
Interrupt progress toward achieving the conservation objectives of the Natura 2000 site?	NO
Disrupt those factors helping to maintain the favourable conditions at the Natura 2000 site?	NO
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the Natura 2000 site?	NO
Cause changes to the vital defining aspects (e.g. nutrient balance) that	NO

determine how the Natura 2000 site functions as a habitat or ecosystem?	
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the Natura 2000 site?	NO
Interfere with predicted or expected natural changes to the Natura 2000 site (such as water dynamics or chemical composition)?	NO
Reduce the area of key habitats within the Natura 2000 site?	NO
Reduce the population of key species of the Natura 2000 site?	NO
Alter the balance between key species of the Natura 2000 site?	NO
Reduce the biodiversity of the Natura 2000 site?	NO
Result in disturbance that could affect population size or density or the balance between key species within the Natura 2000 site?	NO
Result in fragmentation?	NO
Result in the loss or reduction of key features of Natura 2000 sites?	NO

7. CONCLUSIONS OF SCREENING

According to the guidance published by the NPWS (DoEHLG, 2009), Screening for Appropriate Assessment can either identify that a Natura Impact Statement (NIS) is not required where:
(1) A project/proposal is directly related to the management of the site.
(2) There is no potential for significant effects affecting the Natura 2000 network

Where the screening process identifies that significant effects are certain, likely or uncertain the project must either proceed to Stage 2 Appropriate Assessment or be rejected. The likely impacts that will arise from the proposed works have been examined in the context of a number of factors that could potentially impact upon the integrity of the Natura 2000 network. On the basis of the findings of this Screening for Appropriate Assessment, it is concluded that the development:
(1) Is not directly connected with or necessary to the management of a Natura 2000 site and
(2) Will not have significant impacts on the Natura 2000 network.

Therefore, it is concluded that no Natura 2000 site will be adversely affected by the bridge repair works to Dunancory Bridge,

Screening having identified that, assuming all codes of best practice and management are complied with, there is no potential for significant effects affecting the Natura 2000 network, Stage II Appropriate Assessment and the preparation of a Natura Impact Statement is not required in this case

8. REFERENCES

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NPWS (2018) Conservation objectives for River Boyne and River Blackwater SAC [002299]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.

Whilde, A. 1993. *Threatened mammals, birds, amphibians and fish in Ireland. Irish Red Data Book 2: Vertebrates*. Belfast: HMSO.

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Wildlife Amendment Act 2000. Dublin: Government Publications.

Websites

www.npws.ie – website of the national Parks and Wildlife Service

www.nbdc.ie – website of the National Biodiversity Data Centre

www.epa.ie – website of the Environmental Protection Agency

9. APPENDIX

SITE SYNOPSIS
SITE NAME: RIVER BOYNE AND RIVER BLACKWATER SPA
SITE CODE: 004232

The River Boyne and River Blackwater SPA is a long, linear site that comprises stretches of the River Boyne and several of its tributaries; most of the site is in Co. Meath, but it extends also into Cos Cavan, Louth and Westmeath. It includes the following river sections: the River Boyne from the M1 motorway bridge, west of Drogheda, to the junction with the Royal Canal, west of Longwood, Co Meath; the River Blackwater from its junction with the River Boyne in Navan to the junction with Lough Ramor in Co. Cavan; the Tremblestown River/Athboy River from the junction with the River Boyne at Kilnagross Bridge west of Trim to the bridge in Athboy, Co. Meath; the Stoneyford River from its junction with the River Boyne to Stonestown Bridge in Co. Westmeath; the River Deel from its junction with the River Boyne to Cummer Bridge, Co. Westmeath. The site includes the river channel and marginal vegetation. Most of the site is underlain by Carboniferous limestone but Silurian quartzite also occurs in the vicinity of Kells and Carboniferous shales and sandstones close to Trim.
The site is a Special Protection Area (SPA) under the E.U. Birds Directive of special conservation interest for the following species: Kingfisher. A survey in 2010 recorded 19 pairs of Kingfisher (based on 15 probable and 4 possible territories) in the River Boyne and River Blackwater SPA. A survey conducted in 2008 recorded 20-22 Kingfisher territories within the SPA.
Other species which occur within the site include Mute Swan (90), Teal (166), Mallard (219), Cormorant (36), Grey Heron (44), Moorhen (84), Snipe (32) and Sand Martin (553) – all figures are peak counts recorded during the 2010 survey.
The River Boyne and River Blackwater Special Protection Area is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive.
25.11.2010

SITE NAME: RIVER BOYNE AND RIVER BLACKWATER SAC

Conservation objectives for River Boyne and River Blackwater SAC [002299]
The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites. The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:
• its natural range, and area it covers within that range, are stable or increasing, and
• the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
• the conservation status of its typical species is favourable. The favourable conservation status of a species is achieved when:
• population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
• the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

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:
Code Description
7230 Alkaline fens
91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*
* denotes a priority habitat

Code	Common Name	Scientific Name
1099	River Lamprey	Lampetra fluviatilis
1106	Salmon	Salmo salar
1355	Otter	Lutra lutra

21/02/2018

SITE SYNOPSIS
SITE NAME: RIVER BOYNE AND RIVER BLACKWATER SAC
SITE CODE: 002299

This site comprises the freshwater element of the River Boyne as far as the Boyne Aqueduct, the Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Tremblestown Rivers. These riverine stretches drain a considerable area of Meath and Westmeath, and smaller areas of Cavan and Louth. The underlying geology is Carboniferous Limestone for the most part, with areas of Upper, Lower and Middle well represented. In the vicinity of Kells Silurian Quartzite is present while close to Trim are Carboniferous Shales and Sandstones. There are many large towns adjacent to but not within the site, including Slane, Navan, Kells, Trim, Athboy and Ballivor. The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):
[7230] Alkaline Fens
[91E0] Alluvial Forests*
[1099] River Lamprey (Lampetra fluviatilis)
[1106] Atlantic Salmon (Salmo salar)
[1355] Otter (Lutra lutra)

The main areas of alkaline fen in this site are concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. The hummocky nature of the local terrain produces frequent springs and seepages which are rich in lime. A series of base-rich marshes have developed in the poorly-drained hollows, generally linked with these three lakes. Open water is usually fringed by Bulrush (Typha latifolia), Common Club-rush (Scirpus lacustris) or Common Reed (Phragmites australis), and this last species also extends shorewards where a dense stand of Great Fen-sedge (Cladium mariscus) frequently occurs. This in turn grades into a sedge and grass community (Carex spp. and Purple Moor-grass, Molinia caerulea), or one dominated by Black Bog-rush (Schoenus nigricans). An alternative aquatic/terrestrial transition is a floating layer of vegetation. This is normally based on Bogbean (Menyanthes trifoliata) and Marsh Cinquefoil (Potentilla palustris). Other species gradually become established on this cover, especially plants tolerant of low nutrient status e.g. bog mosses (Sphagnum spp.). Diversity of plant and animal life is high in the fen and the flora includes many rarities. Plants of interest include Narrow-leaved Marsh-orchid (Dactylorhiza traunsteineri), Fen Bedstraw (Galium uliginosum), Cowbane (Cicuta virosa), Frogbit (Hydrocharis morsus-ranae) and Least Bur-reed (Sparganium minimum). These species tend to be restricted in their distribution in Ireland. Also notable is the abundance of aquatic stoneworts (Chara spp.) which are characteristic of calcareous wetlands. The rare plant Round-leaved Wintergreen (Pyrola rotundifolia) occurs around Newtown Lough. This species is listed in the Red Data Book and this site represents its only occurrence in Co. Meath. Wet woodland fringes many stretches of the Boyne.
The Boyne River Islands are a small chain of three islands situated 2.5 km west of Drogheda. The islands were formed by the build-up of alluvial sediment in this part of the river where water movement is sluggish. All of the islands are covered by dense thickets

of wet, willow (Salix spp.) woodland, with the following species occurring: Osier (S. viminalis), Crack Willow (S. fragilis), White Willow (S. alba), Purple Willow (Salix purpurea) and Rusty Willow (S. cinerea subsp. oleifolia). A small area of Alder (Alnus glutinosa) woodland is found on soft ground at the edge of the canal in the north-western section of the islands.

Along other stretches of the rivers of the site Rusty Willow scrub and pockets of wet woodland dominated by Alder have become established, particularly at the river edge of mature deciduous woodland. Ash (Fraxinus excelsior) and Downy Birch (Betula pubescens) are common in the latter, and the ground flora is typical of wet woodland with Meadowsweet (Filipendula ulmaria), Wild Angelica (Angelica sylvestris), Yellow Iris (Iris pseudacorus), horsetails (Equisetum spp.) and occasional tussocks of Greater Tussock-sedge (Carex paniculata). The dominant habitat along the edges of the river is freshwater marsh, and the following plant species occur commonly in these areas: Yellow Iris, Creeping Bent (Agrostis stolonifera), Canary Reed-grass (Phalaris arundinacea), Marsh Bedstraw (Galium palustre), Water Mint (Mentha aquatica) and Water Forget-me-not (Myosotis scorpioides). In the wetter areas Common Meadow-rue (Thalictrum flavum) is found. In the vicinity of Dowth, Fen Bedstraw (Galium uliginosum), a scarce species mainly confined to marshy areas in the midlands, is common in this vegetation. Swamp Meadow-grass (Poa palustris) is an introduced plant which has spread into the wild (naturalised) along the Boyne approximately 5 km south-west of Slane. It is a rare species which is listed in the Red Data Book and has been recorded among freshwater marsh vegetation on the banks of the Boyne in this site. The only other record for this species in the Republic of Ireland is from a site in Co. Monaghan. The secondary habitat associated with the marsh is wet grassland and species such as Tall Fescue (Festuca arundinacea), Silverweed (Potentilla anserina), Creeping Buttercup (Ranunculus repens), Meadowsweet and Meadow Vetchling (Lathyrus pratensis) are well represented. Strawberry Clover (Trifolium fragiferum), a plant generally restricted to coastal locations in Ireland, has been recorded from wet grassland vegetation at Trim. At Rossnaree river bank on the River Boyne, Round-Fruited Rush (Juncus compressus) is found in alluvial pasture, which is generally periodically flooded during the winter months. This rare plant is only found in three counties in Ireland.

Along much of the Boyne and along tributary stretches are found areas of mature deciduous woodland on the steeper slopes above the floodplain marsh or wet woodland vegetation. Many of these are planted in origin. However the steeper areas of King Williams Glen and Townley Hall wood have been left unmanaged and now have a more natural character. East of Curley Hole the woodland has a natural appearance with few conifers. Broadleaved species include oaks (Quercus spp.), Ash, willows, Hazel (Corylus avellana), Sycamore (Acer pseudoplatanus), Holly (Ilex aquifolium), Horse-chestnut (Aesculus hipposcastanum) and the shrubs Hawthorn (Crataegus monogyna), Blackthorn (Prunus spinosa) and Elder (Sambucus nigra). Southwest of Slane and in Dowth, some more exotic tree species such as Beech (Fagus sylvatica), and occasionally Lime (Tilia cordata), are seen. The coniferous trees Larch (Larix sp.) and Scots Pine (Pinus sylvestris) also occur. The woodland ground flora includes Barren Strawberry (Potentilla sterilis), Enchanter's-nightshade (Circaea lutetiana) and Ground-ivy (Glechoma hederacea), along with a range of ferns. Variation occurs in the composition of the canopy - for example, in wet patches alongside the river, White Willow and Alder form

the canopy. Other habitats present along the Boyne and Blackwater include lowland dry grassland, improved grassland, reedswamp, weedy waste ground, scrub, hedge, drainage ditch and canal. In the vicinity of Lough Shesk, the dry slopes of the morainic hummocks support grassland vegetation which, in some places, is partially colonised by Gorse (Ulex europaeus) scrub. Those grasslands which remain unimproved for pasture are species-rich, with Common Knapweed (Centaurea nigra), Creeping Thistle (Cirsium arvense) and Ribwort Plantain (Plantago lanceolata) commonly present. Fringing the canal alongside the Boyne south-west of Slane are areas with Reed Sweet-grass (Glyceria maxima), Great Willowherb (Epilobium hirsutum) and Meadowsweet.

The Boyne and its tributaries form one of Ireland's premier game fisheries and the area offers a wide range of angling, from fishing for spring salmon and grilse to seatrout fishing and extensive brown trout fishing. Atlantic Salmon (Salmo salar) use the tributaries and headwaters 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 Habitats Directive. Atlantic Salmon run the Boyne almost every month of the year. The Boyne is most important as it represents an eastern river which holds large three-sea-winter fish from 20-30 lb. These fish generally arrive in February, with smaller spring fish (10 lb) arriving in April/May. The grilse come in July, water permitting. The river gets a further run of fish in late August and this run would appear to last well after the fishing season. The salmon fishing season lasts from 1st March to 30th September.

The Blackwater is a medium sized limestone river which is still recovering from the effects of the arterial drainage scheme of the 1970s. Salmon stocks have not recovered to the numbers that existed pre-drainage. The Deel, Riverstown, Stoneyford and Tremblestown Rivers are all spring-fed, with a continuous high volume of water. They are difficult to fish because some areas are overgrown, while others have been affected by drainage with resultant high banks. This site is also important for the populations of two other species listed on Annex II of the E.U. Habitats Directive which it supports, namely River Lamprey (Lampetra fluviatilis), which is present in the lower reaches of the Boyne River, and Otter (Lutra lutra), which can be found throughout the site.

In addition, the site also supports many more of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger and Irish Hare. Common Frog, another Red Data Book species, also occurs within the site. All of these animals, with the addition of the Stoat and Red Squirrel, which also occur within the site, are protected under the Wildlife Act, 1976.

Whooper Swans winter regularly at several locations along the Boyne and Blackwater Rivers. Known sites are at Newgrange (approx. 20 in recent winters), near Slane (20+ in recent winters), Wilkinstown (several records of 100+) and River Blackwater from Kells to Navan (104 at Kells in winter 1996/97, 182 at Headfort in winter 1997/98, 200-300 in winter 1999/00). The available information indicates that there is a regular wintering population of Whooper Swans based along the Boyne and Blackwater River valleys. The birds use a range of feeding sites but roosting sites are not well known. The population is substantial, certainly of national, and at times international, importance. Numbers are probably in the low hundreds.

Intensive agriculture is the main land use along the site. Much of the grassland is in very large fields and is improved. Silage harvesting is carried out. The spreading of slurry and

fertiliser poses a threat to the water quality of this salmonid river and to the lakes. In the more extensive agricultural areas sheep grazing is carried out. Fishing is a main tourist attraction on the Boyne and Blackwater and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The Eastern Regional Fishery Board have erected fencing along selected stretches of the river as part of their salmonid enhancement programme.

Parts of the river system have been arterially dredged. In 1969 an arterial dredging scheme commenced and disrupted angling for 18 years. The dredging altered the character of the river completely and resulted in many areas in very high banks. The main channel from Drogheda upstream to Navan was left untouched, as were a few stretches on the Blackwater. Ongoing maintenance dredging is carried out along stretches of the river system where the gradient is low. This is extremely destructive to salmonid habitat in the area. Drainage of the adjacent river systems also impacts on the many small wetland areas throughout the site.

The River Boyne is a designated Salmonid Water under the E.U. Freshwater Fish Directive. The site supports populations of several species listed on Annex II of the E.U. Habitats Directive, and habitats listed on Annex I of this Directive, as well as examples of other important habitat types. Although the wet woodland areas appear small there are few similar examples of this type of alluvial wet woodland remaining in the country, particularly in the north-east. The semi-natural habitats, particularly the strips of woodland which extend along the river banks, and the marsh and wet grasslands, increase the overall habitat diversity and add to the ecological value of the site, as does the presence of a range of Red Data Book plant and animal species and the presence of nationally rare plant species.