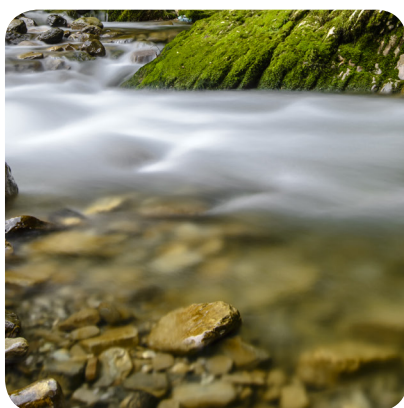
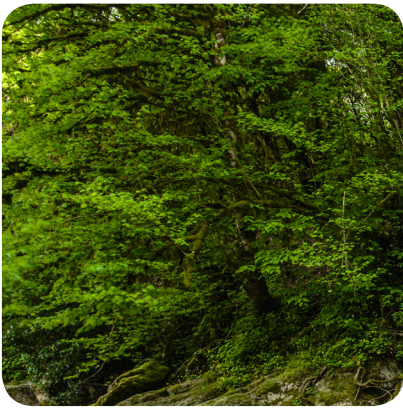




Environmental Impact Assessment Screening Report of Bridge Rehabilitation Works at Beheenagh Bridge, Co. Kerry

November 2016
















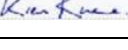


Environmental Impact Assessment Screening Report of Bridge Rehabilitation Works at Beheenagh Bridge, Co. Kerry

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1 INTRODUCTION

This Environmental Impact Assessment Screening Report will assess the proposed works to the Beheenagh Bridge in Co. Kerry (KY-N72-009) (here after referred to as the Bridge) in Co. Kerry and examine any likely impacts which have the potential to occur as a result of the works in the surrounding area.

The Bridge carries the N72 (National Secondary Road) over the River Beheenagh. The Bridge is approximately 1.5 km East of Barraduff. It is a multi-span masonry arch Bridge with 4 spans and overall length of 22m. The maximum span is 5.35m and the minimum span is 3.6m.

1.1 BACKGROUND

The Bridge is a multi-span masonry arch bridge and can be seen in **Figure 1.1**.

An initial inspection of the Bridge was carried out by an RPS engineer on the 24th May 2016 and the following was noted:

- The existing structure is generally in good condition.
- The parapets and spandrels are of mixed masonry style and construction likely due to vehicle impacts and subsequent repair.
- Scour on the piers has been repaired with sandbags and grout.

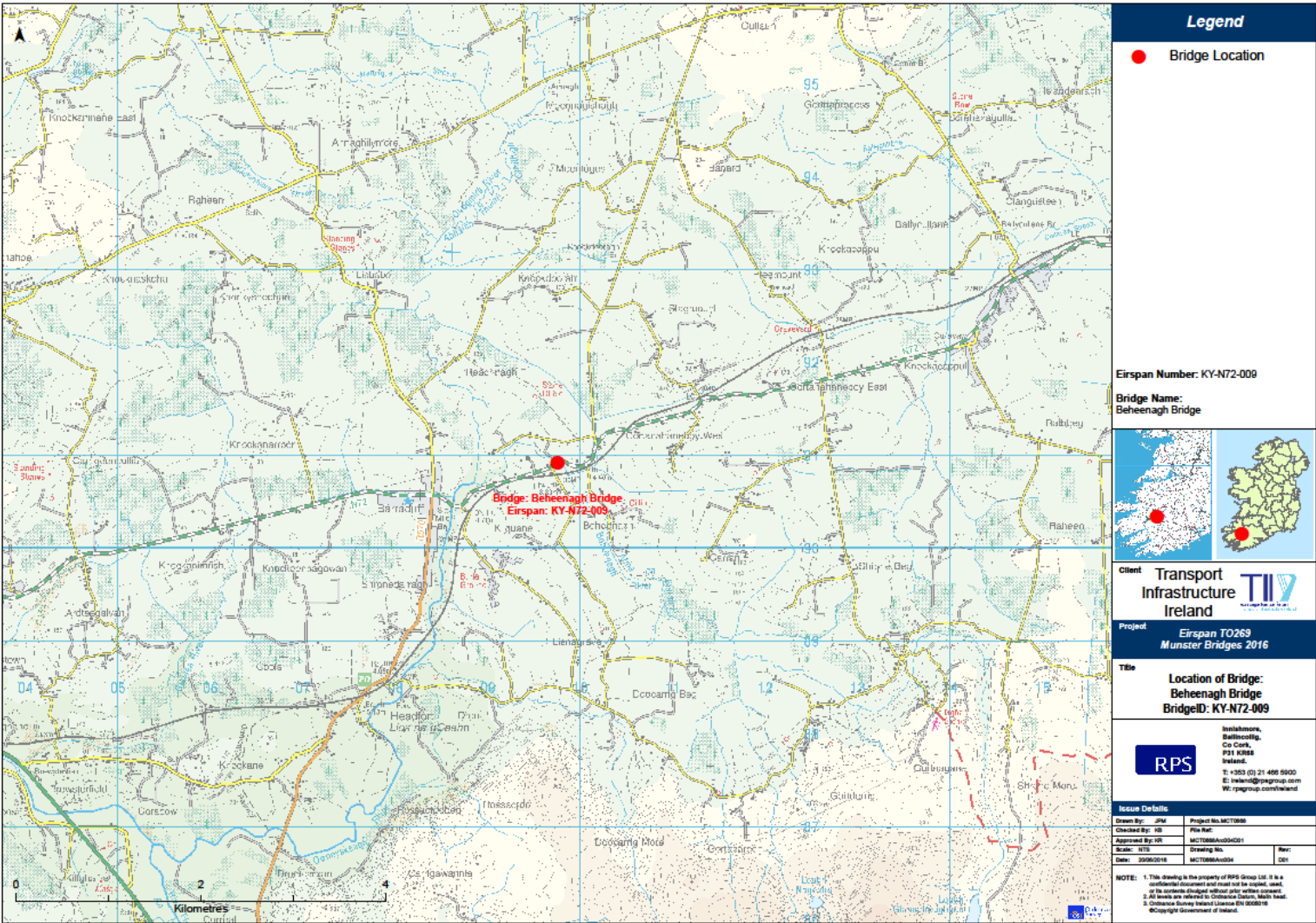
Ecology surveys were undertaken by an RPS ecologist on the 20th June and 26th July 2016, the finds of which have informed this assessment.

Aquatic Surveys were carried out by Aquatic Services Unit (ASU) of University College Cork in July 2016, the finds of which have also informed this assessment.

Figure 1.1: Photograph of Beheenagh Upper Bridge



Figure 1.2: Location of Proposed Works

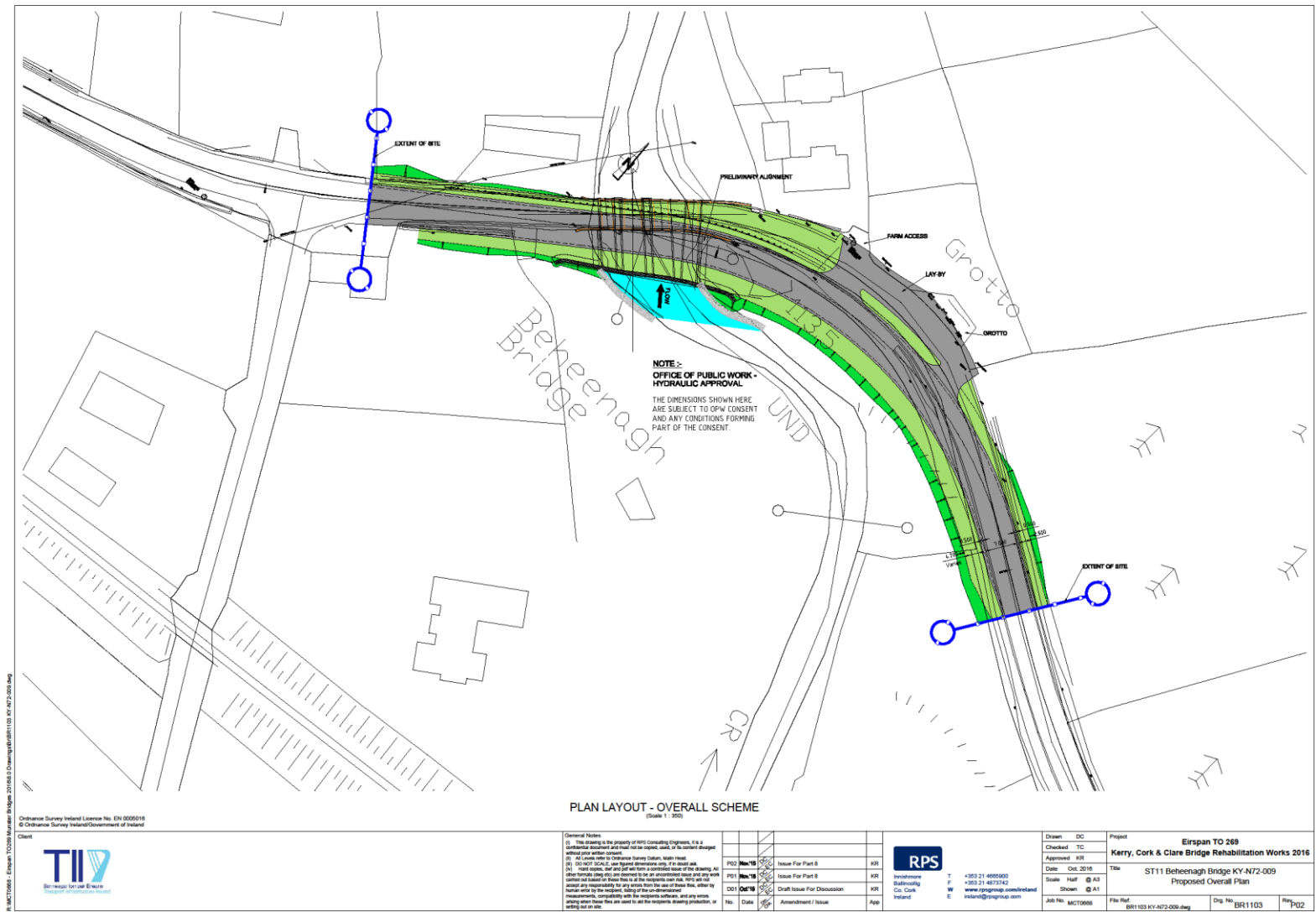


1.2 DESCRIPTION OF PROPOSED WORKS

The proposed works include the online realignment of approximately 220m of the existing N72. The works shall also include the construction of an insitu reinforced concrete bridge widening the existing bridge, the widened bridge shall be (14m long and approximately 16.5m wide). The works shall include, inter alia the following activities:

- Provision of traffic management including a bailey bridge, site clearance and erection of contractor's compound;
- Earthworks (import and export of fill materials) for the construction of the widened road base and embankments;
- Provision of water management: the existing river shall be dammed and flumed to allow the foundations for the bridge extension to be constructed;
- Excavation for the new bridge foundations;
- Construction of new in-situ concrete bridge foundations, abutments and bridge deck;
- Application of bridge deck waterproofing and installation of new bridge parapets and safety barrier;
- Masonry cladding to the widened reinforced concrete section;
- Provision of new road surfacing and lines on the widened road;
- Topsoiling and grass seeding of the widening bridge embankments;
- Demobilisation from site and removal of traffic management; and
- Standard Environmental Protection Measures.

Figure 1.3: Layout of Proposed Works at Beheenagh Bridge



1.3 METHOD STATEMENT

The sequence of work activities shall be dependent on the contractor's proposed construction sequence. The contractor's proposed construction sequence may also require that the works be undertaken on a phased basis.

Bridge footprint design: The widened bridge footprint within the river will be of a similar nature to that already in existence which allows for fish migration through the central arches. Flat concrete bed reinforcement is not acceptable as it may affect the success of lampreys, eels and salmonids in passing the Bridge and therefore is not proposed. The bed design allows for passage of all species and will be reflective of the existing natural river bed.

Refer to **Appendix A** of the **Appropriate Assessment (AA) Screening Report** in **Appendix 1** of this Report for proposed works drawings and Method Statement for the protection of water quality and aquatic species.

Refer to **Appendix 3** of this EIA Screening for the Method Statement for the protection of built heritage.

The proposed works are to be carried out over a period of 16-20 weeks.

1.3.1 Design and Construction Methodology

This Method Statement contained in **Appendix A** of the **AA Screening Report** in **Appendix 1** comprises the Principal Control Measures to safeguard the ecological integrity of the watercourses spanned by the bridge, protection of environment and the avoidance of pollution.

The proposed works will be carried out by a competent contractor experienced in this type of work and who has undertaken this type of work at other bridge locations. This contractor will be suitably appointed through a tendering process and will meet the requirements of the construction measures outlined below, together with the requirements of the Method Statements provided to each contractor at the tendering stage. The works will be undertaken in consultation with IFI and under supervision of IFI or a suitably appointed ecologist.

The following guidelines and documents have informed the Method Statement and should be consulted during the detailed planning of the works phase and further development of the Method Statement:

Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA) in particular;

- IFI (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters*. Inland Fisheries Ireland, Dublin;
- Irish Water (2016). *Information and Guidance Document on Japanese knotweed Asset Strategy and Sustainability*;
- NRA (2008) *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*. National Roads Authority, Dublin;
- NRA (2010) *Guidelines for the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*. National Roads Authority, Dublin;

- NRA (2008) 'Environmental Impact Assessment of National Road Schemes, A Practical Guide' National Roads Authority, Dublin;
- Murphy, D. (2004) Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin;
- DOMNR (1998). Fishery guidelines for Local Authority works. Department of the Marine and Natural Resources, Dublin;
- H. Masters-Williams et al (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532), CIRIA;
- E. Murnane, A. Heap and A. Swain. (2006) Control of water pollution from linear construction projects. Technical guidance (C648), CIRIA; and
- E. Murnane et al., (2006) Control of water pollution from linear construction projects. Site guide (C649), CIRIA.

A Level 3 Building Survey¹ must be undertaken prior to construction works commencing by a suitably qualified archaeologist. Separately, a wade survey at the Bridge is to be completed under licence from the National Monuments Service. This report should be submitted to KCC Conservation Officer on completion of the works.

¹ As per standards set out in Hammond & McMahon (2002) *Recording and Conserving Ireland's Industrial Heritage*. Kilkenny: The Heritage Council

The EIA shall be carried out in accordance with relevant European and Irish legislation.

1.3.2 Mandatory EIA

EU Directive 85/337/EEC (Council Directive of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment) as amended is commonly referred to as the EIA Directive and has been further codified by Directive 2011/92/EU. Directive 2011/92/EU requires a process of assessment of environmental impacts for all projects listed in the Directive which are likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location.

As set out in the Environmental Impact Assessment of National Road Schemes, A Practical Guide (NRA, 2008) insofar as roads are concerned, the EIA Directive is transposed into law in Ireland through the Roads Act, 1993-2015 (No. 14 of 1993). The current requirements for EIA are set out in Part IV of the Roads Act, 1993, and Part V of the Roads Regulations, 1994 (S.I. No. 119 of 1994). In particular, sections 50 and 51 of the Act, as amended deal with EIA.

The overriding consideration in determining whether a road scheme should be subject to EIA is the likelihood of significant environmental effects. In interpreting which projects are likely to have significant environmental effects, the EIA Directive lists those projects for which EIA is mandatory (Annex I) and those projects for which EIA may be required (Annex II). With regard to Annex II projects, Member States can choose to apply thresholds or use case by case examination or a combination of both to assess whether these projects require EIA. For road schemes in Ireland, a combination of both is used.

The proposed project was assessed in terms of the mandatory requirements as set out in the EIA Directive and the Roads Act 1993-2015. The NRA Guidelines set out the relevant threshold for EIA Screening and can be seen in NRA Guidelines in **Table 3-1** of the document entitled 'Summary of the Legislative Requirements for the EIA Screening' and the following text is noteworthy.

- *The construction of a new bridge or tunnel which would be 100 metres or more in length.*
- *The construction of a new road of four or more lanes, or the realignment or widening of an existing road so as to provide four or more lanes, where such new, realigned or widened road would be eight kilometres or more in length in a rural area, or 500 metres or more in length in an urban area.*

This proposal is not one which requires a Mandatory EIA i.e. does not fall in to a category as defined in Annex I or II of the Directive. However it is necessary to assess whether significant effects on the environment are likely as a result of the proposed development and if a sub-threshold EIA may be required.

1.3.3 Sub-Threshold EIA

In addition, provision is made for sub-threshold development where although not meeting or exceeding the thresholds set out in Annex II, a development could still be likely to have significant effects on the environment. The method of assessing those effects for the purposes of deciding

whether or not sub-threshold development does in fact create a significant effect on the environment are set out in Annex III to Directive 2011/92/EU.

Projects which are deemed to be likely to have significant effects on the environment also require EIA as sub-threshold development. The 1997 amending Directive (97/11/EC) introduced guidance for Member States in terms of deciding whether or not a development is likely to have '*significant effects on the environment*'. The guidance is provided by way of criteria set out in Annex III of the consolidated Directive (2011/92/EU). The proposed works consulted with the requirement as laid out in the NRA Guidelines on sub threshold categories as outlined in **Table 1-1** below.

Table 1-1: Summary of Legislative Requirements (Sub-Threshold) for EIA Screening (extract from the NRA Guidelines (2008))

Sub Threshold		Regulatory Reference
(5) Where An Bord Pleanála (ABP) considers that a proposed road development would be likely to have significant effects on the environment it shall direct the road authority to prepare an EIS.		S. 50(1)(b) of the Roads Act
(6) Where a road authority considers that a proposed road development would be likely to have significant effects on the environment it shall inform ABP in writing and where ABP concurs it shall direct the road authority to prepare an EIS.		S. 50(1)(c) of the Roads Act
(7) Where a proposed road development would be located on certain environmental sites ⁴ the road authority shall decide whether the proposed road development would be likely to have significant effects on the environment. "The sites concerned are":	(i) Special Area of Conservation (SAC)	S. 50(1)(d) of the Roads Act, 1993, as inserted by Art. 14(a) of the EIA (Amendment) Regulations, 1999.
	(ii) A site notified in accordance with Regulation 4 of the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997)	
	(iii) Special Protection Area	
	(iv) A site where consultation has been initiated in accordance with Article 5 of Council Directive 92/43/EC of 21 May, 1992, on the conservation of natural habitats and of wild flora and fauna.	
	(v) A Nature Reserve within the meaning of sections 15 or 16 of the Wildlife Act, 1976.	
	(vi) Refuge for Fauna under section 17 of the Wildlife Act, 1976.	
If the road authority considers that significant environmental effects are likely, it shall inform ABP in accordance with section 50(1)(c).		

In considering whether a sub-threshold proposed road development is likely to have significant environmental effects, the road authority and the Board, under section 50 (1) (e) of the Roads Act, must have regard to the criteria set out in article 27 of the European Communities (EIA) Regulations, 1989. This article refers to the criteria for determining whether a development would or would not be likely to have significant effects on the environment set out in Annex III to the EIA Directive, as amended. These criteria are grouped into three categories as set out below:

- (I) Characteristics of the proposed development;

(II) Location of proposed development; and

(III) Characteristics of the potential impacts.

In order to inform the screening evaluation, consideration was given to the potential for impacts on particular aspects of the environment, as set out in **Section 3** of the report. These Environmental Topics are set out in the EIA Directive as follows:-

- (a) Human beings, fauna and flora;
- (b) Soil, water, air, climate and the landscape;
- (c) Material assets and the cultural heritage; and
- (d) The interaction between the factors referred to in points (a), (b) and (c).

2 PLANNING POLICY REVIEW

2.1 JUSTIFICATION FOR THE PROJECT

Kerry County Council, on behalf of Transport Infrastructure Ireland (TII – Formerly the National Roads Authority) has engaged RPS Consulting Engineers Ltd. to undertake various bridge rehabilitation schemes in Kerry, Cork and Clare. Kerry County Council is acting as the lead Local Authority (LA) for procurement and statutory process on behalf of Cork and Clare through a Section 85 Agreement.

The purpose of this scheme is to develop a bridge widening scheme that will that will remove an existing pinch point on the existing N72 Killarney-Rathmore road. The TII (HD15 Collision Data) categorizes Safety Ranking of the N72 in the vicinity of the Bridge as '*twice above expected collision rate*'. The Bridge widening and road alignment/widening either side of the Bridge will improve the road geometry and remove the existing "humpback".

A short section of the N72 from Church View to Barraduff, incorporating the Bridge is listed in the National Secondary Road Needs Study, Network Options Report: South West Region (NRA, 2011) (N72.d.3.T2,) as being in need of improvement and includes for the provision of widening the existing bridge over the River Beheenagh.

The primary legislative drivers for the project are as follows:

- **Water Framework Directive** - The objectives of the Water Framework Directive (WFD) are to protect the current status of all rivers in Ireland and aims to reach good or high status.
- **Safety, Health and Welfare at Work (General Application) Regulations 2007** - Under the Safety, Health and Welfare at Work Act every employer is required to carry out a risk assessment for the workplace which should identify any hazards present in the workplace, assess the risks arising from such hazards and identify the steps to be taken to deal with any risks.

2.2 COUNTY LEVEL - DEVELOPMENT PLAN PROVISIONS

The main provisions of the Kerry County Development Plan (CDP 2015-2021) relevant to this site and surrounding area are as follows:

CDP Objective

Section 7.1 of Chapter 7 Transport & Infrastructure of the Kerry CDP acknowledges that the role of the South West Regional Planning Guidelines (RPGs) in listing key infrastructural projects required for balanced development of the Region and emphasise the link between the provision of infrastructure and land use planning. Building on the RPGs the priority infrastructure requirements for the County over the CDP period 2015-2021 and beyond include the following schemes listed in **Tables 7.1a Priority Roads Infrastructure Projects**. The section of N72 National Secondary Road containing the Bridge does not appear on **Table 7.1a**.

Section 7.2.1.1 notes the importance of Secondary routes within the County.

‘These routes are of vital economic importance, linking the County with other major centres and ports and are important arteries within the County itself.’

Other Objectives as set out in the Kerry CDP in regards to roads include the following:

RD-17: Protect the capacity and safety of the national road and strategically important regional road network in the County and ensure compliance with the Spatial Planning and National Roads Planning Guidelines (January 2012) and the NRA Traffic & Transport Assessment Guidelines (2007).

RD-22: Provide a safe road system throughout the County through Road Safety Schemes encourage the promotion of road safety in the County and review existing speed limits during the lifetime of this Plan in accordance with any National Guidelines or Directives that may issue.

2.3 LOCAL LEVEL – TRALEE/KILLARNEY HUB FUNCTIONAL AREA LOCAL AREA PLAN (LAP), 2013-2019

The settlement of Barraduff sits within the Tralee/Killarney Hub Functional Area Local Area Plan 2013–2019. Under the Barraduff LAP **Section 1.7 Vehicular and Pedestrian Traffic** it is noted that:

‘Barraduff has developed around a crossroads of a regional road (R570) and the Killarney-Rathmore N72 national secondary road. There is therefore, a considerable level of through traffic’.

2.4 USE OF ADJOINING, ABUTTING OR ADJACENT LANDS

On the north verge there is a residential access and boundary fence on approach (approx. 50m upstream of parapet wall) and a residential access on departure (approx. 18m downstream of parapet wall).

On the south verge is a residential access on departure (approx. 36m downstream of parapet wall).

3 LIKELY EFFECTS ON THE ENVIRONMENT FROM THE PROPOSED DEVELOPMENT

3.1 INTRODUCTION

As detailed in **Section 1.4.1** the proposed project has been screened out for Mandatory EIA. Therefore it is considered that in order to inform the EIA screening evaluation, consideration was given to the potential for impacts on particular aspects of the environment, as set out below. As per **Section 2.4.7** of the 'Guidelines on the Information to be Contained in Environmental Impact Statements' (EPA, 2002) where a single or limited number of environmental topics are identified as being potentially adversely affected by the development, those topics are discussed in greater detail.

The Environmental topics as set out in the EIA Directive (2011/92/EU) are as follows:-

- Human beings, fauna and flora;
- Soil, water, air, climate and the landscape;
- Material assets and the cultural heritage; and
- The interaction between the factors referred to in points (a), (b) and (c).

3.2 OVERVIEW

The existing Bridge is located on the N72 (National Secondary Road) and carries the road over the River Beheenagh. The Bridge is approximately 1.5 km East of Barraduff.

3.3 BACKGROUND

The Bridge as seen in **Figure 1.1** is a multi-span masonry arch Bridge with 4 spans and overall length of 22m.

3.4 HUMAN BEINGS AND MATERIAL ASSETS

According to the TII (HD15 Collision Data) the Safety Ranking for the section of the N72 at the Bridge is given a rating of '*twice above expected collision rate*' therefore collision ranking at the structure is high. It is expected that this proposal will have a positive impact on human beings and material assets for the area by providing a safe and secure route to connect with the wider Kerry area.

On the north verge there is a residential access and boundary fence on approach (approx. 50m upstream of the parapet wall) and a utility chamber in line of existing parapet adjacent to the downstream end face, and a residential access on departure (approx. 18m downstream of parapet wall).

On the south verge there is a concrete post and rail fencing running up to the upstream end face of the existing parapet wall and a residential access on departure (approx. 36m downstream of parapet wall).

The construction phase of the project is expected to last approximately 16-20 weeks. Any minor disturbance to residents in the area will be temporary over the period of the construction works and will likely be during normal working hours. One lane of traffic will remain open at all times during the works. Therefore minimal temporary impacts on residential uses are considered likely during the construction period.

Long term impacts will be of a positive nature through the provision of safer and improved access for local community and the wider Kerry area. There will be no permanent loss of agricultural property and disturbance to human beings and material assets will be minimal and temporary during the construction phase only.

3.5 WATER

The Bridge crosses the River Beheenagh. An EPA monitoring station of water quality of the River Maine takes place at the Bridge downstream 2004-2015 data (<http://gis.epa.ie/Envision>) indicates a Q value of 4, 'Good Status' (Refer to **Figure 3.1**). The Water Framework Directive classifies the River Beheenagh upstream of the Bridge as a Waterbody of 'Good' status and downstream of the Bridge as 'High' for the period 2010-2012 (<http://watermaps.wfdireland.ie>). The River Beheenagh flows into the Owneykeagh at Barraduff and then flows in a south westerly direction for 6km to join the River Flesh (also 'Good' Status) and flows in to Lough Leane 11 km to the west. The Lake Water Quality of Lough Leane is considered to be of 'Oligotrophic / Mesotrophic' status according to the EPA (2010-2012) and received a Lake Waterbody WFD Status (2010-2012) of 'Good'. (Refer to **Figure 3.2**).

Under the WFD Register of Protected Areas, the River Beheenagh is designated as a Rivers for Drinking Water and Lough Leane is a designated Nutrient Sensitive Lake. There are no Salmonid rivers in the vicinity of the Bridge as designated under the WFD Register of Protected Areas. The Bridge and its environs are located in the Laune *Margaritifera* sensitive area². This site is known for 'Catchments of other extant populations' of *Margaritifera* (Freshwater Pearl Mussel; FPM), in addition the site is in close proximity to other similar sensitive areas, namely that of the Maine – BrownFlesk, Lee – Sullane and the Roughty.

² <http://www.npws.ie/maps-and-data/habitat-and-species-data>, accessed 01/07/2016

Figure 3.1: EPA Data on Water Courses and Water Quality in the Vicinity of the Proposed Works

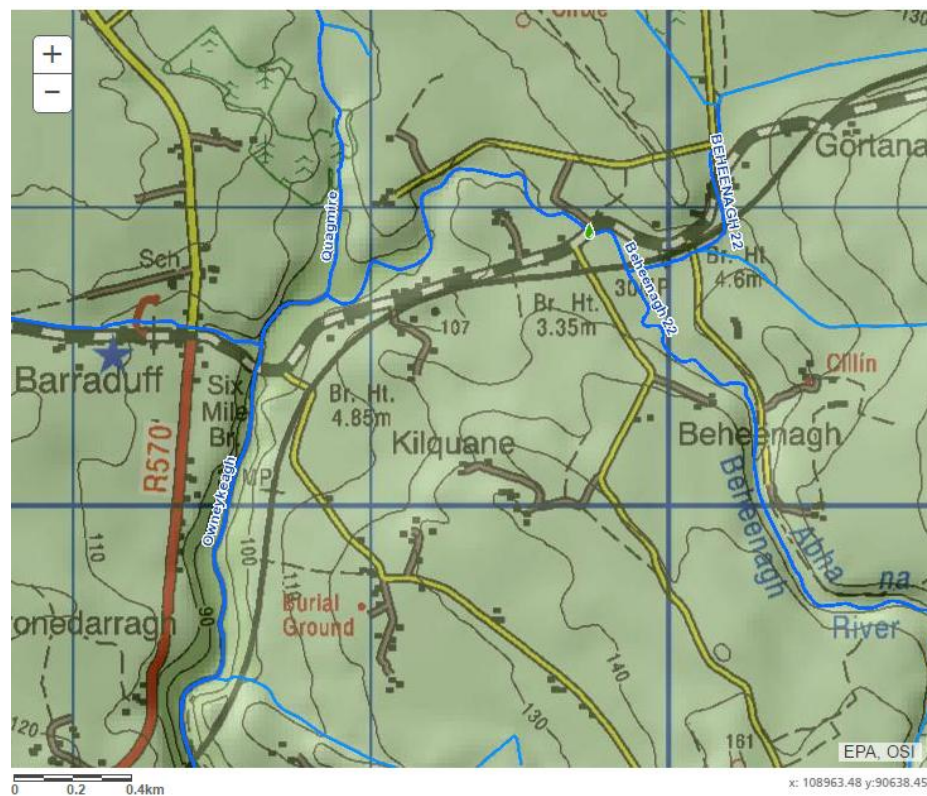
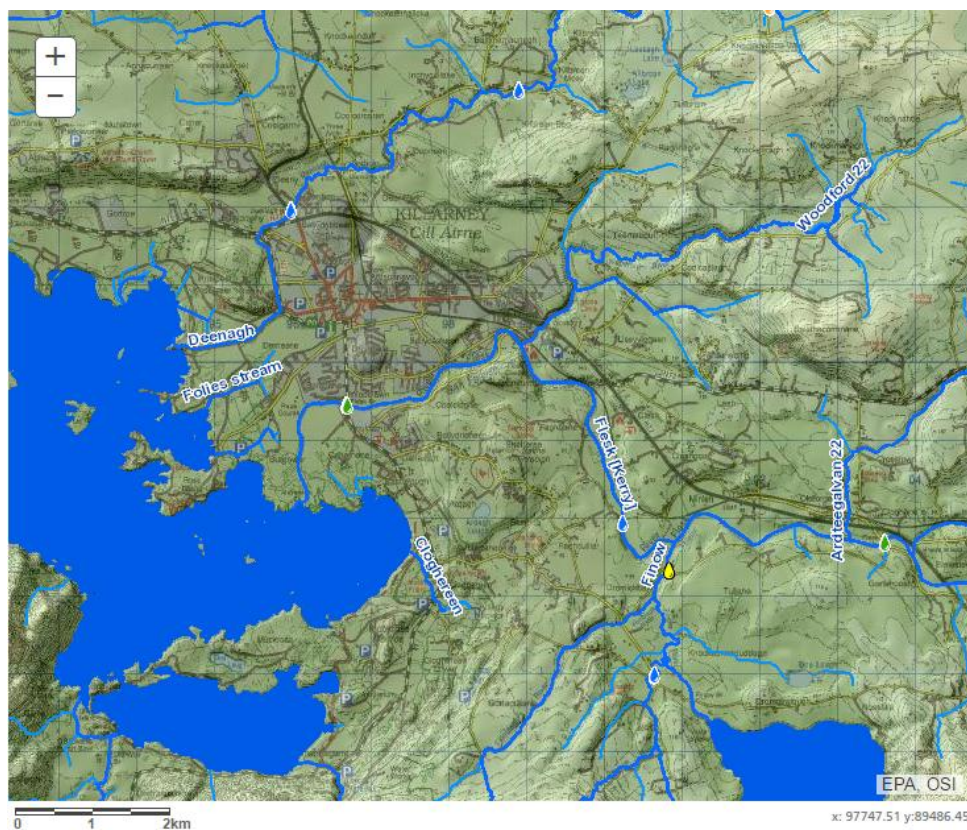


Figure 3.2: EPA data on the Lake Water Quality of Lough Leane



Section 50 Application Report

In accordance with the Arterial Drainage Act, 1945, all works affecting watercourse crossings are subject to approval from the OPW and a Section 50 application must be completed. RPS carried out a Section 50 Application Report (Refer to **Appendix 2**) for the Bridge in November 2016 and concluded that the proposed alterations of the Bridge will not adversely affect flood elevations on the Beheenagh River and the proposed alterations are satisfactory in reference to Section 50 requirements of the Arterial Drainage Act, 1945. The proposed bridge structure will not result in increased flood levels upstream of the existing bridge crossing.

3.6 ECOLOGY

3.6.1 Terrestrial Ecology

Ecology surveys were undertaken by an RPS ecologist on the 20th June and 26th July 2016 and the following section summarises the information gathered during these site visits.

The Bridge is surrounded by wet improved grassland to the north-west and a derelict house and associated garden to the north-east. The area to the south east of the Bridge supports wet, scrubby grassland comprising Bramble (*Rubus fruticosus*), Nettle (*Urtica dioica*), Creeping Thistle (*Cirsium arvense*), Yorkshire Fog (*Holcus lanatus*), Meadow Grass (*Poa* spp), Soft Rush (*Juncus effusus*) and Hemlock Water-dropwort (*Oenanthe crocata*) with a line of mature ivy covered pines set back from the road. These trees have moderate potential as roosting or resting places for bats. An area of Willow scrub is located to the south-west of the Bridge.

Beheenagh River is lined by woodland comprising Willow (*Salix* spp), Alder (*Alnus glutinosa*) and occasional Hawthorn (*Crataegus monogyna*) both upstream and downstream of the Bridge. No evidence of otter activity or otter holts was observed in the vicinity of the Bridge other than a possible old otter spraint. However, otter has been recorded at Sixmilebridge approximately 1.2km west of the Bridge and are likely to forage along the Beheenagh River.

The masonry arch of the Bridge has been treated with shotcrete (sprayed concrete) and does not contain any crevices that are of potential use as roosting or resting places by bats. No evidence of nesting birds or kingfisher was observed in the Bridge or adjacent riverbanks (wagtail was spotted upstream). No invasive non-native species were observed at the Bridge itself; however Cherry Laurel (*Prunus laurocerasus*) and Japanese Knotweed (*Fallopia japonica*) is present in the garden of the derelict house to the north-east of the Bridge.

3.6.2 Aquatic Ecology

The Bridge forms part of the protected species surveys undertaken as part of the Kerry, Cork and Clare Bridge Rehabilitations 2016: Protected Aquatic Species and Habitats Surveys, by Aquatic Services Unit (ASU) of University College Cork, carried out in July 2016. The surveys focused on the following species:

- Freshwater pearl mussel (*Margaritifera margaritifera*);
- Atlantic salmon (*Salmo salar*);

- Lampreys (*Lampetra* spp., *Petromyzon marinus*); and
- European eel (*Anguilla anguilla*).

The following section summarises the information gathered during surveying. The survey conducted in July 2016 by Aquatic Service Unit (UCC) included a Stage 1 Freshwater Pearl Mussel, Fisheries Habitat Assessment and a general habitat description. The Beheenagh River is a moderate sized river (5-6m width and 0.25m depth on average) with a high energy series of rapid/riffles and runs over mainly cobble and small boulder substrates with the bryophyte plant community *Fontanalis squamosa*. There were some interstitial deposits of clean, fine bed material (gravel/coarse sand). The river banks support a natural, woodland riparian tree cover.

No evidence of Freshwater Pearl Mussel (FPM) was observed during the site survey and the habitat provides limited potential for FPM owing to the high energy nature of the river which does not facilitate accumulation of finer bed materials (gravel/coarse sand) suitable for mussels. There were some patches of suitable habitat where fine bed material had deposited at margins and behind larger boulders, but no mussels were observed. There are no existing records of FPM for Beheenagh River, and no records for the downstream Owneyskeagh River.

With regards to other protected species, numerous salmonids were observed in runs. At this location, the Beheenagh River provides ideal salmonid nursery habitat with pockets of spawning habitat potential for salmon, trout and lampreys. Lamprey nursery habitat was lacking owing to the high energy nature of the channel and general absence of accumulated silty sediments in which ammocoetes could burrow. The plant community observed would correlate with Callitricho-Batrachion sub-type CB6a of Annex I Habitat 3260 characteristic of fast flowing, bryophyte dominated, upland rivers (Hatton-Ellis & Grieve, 2003). This habitat is widespread in Ireland.

3.6.3 Brief Description of the European Sites

The potential effects on European Sites as a result of the proposed Bridge works are limited to impacts primarily related to changes in water quality. There are six SACs and three SPAs within 15km of the Bridge. **Table 3.1** lists the SACs and **Table 3.2** lists the SPAs that are within 15km of the project area. **Figure 3.3** shows their locations in relation to the proposed repair works. The proposed Bridge works are situated within the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC.

The integrity of a European Site (referred to in Article 6.3 of the EU Habitats Directive) is determined based on the conservation status of the Qualifying Interests of the SAC or SPA. The Qualifying Interests for each site have been obtained through a review of the Conservation Objectives available from the National Parks and Wildlife Service (NPWS).

Table 3-1: SACs within 15km of the Proposed Works

Site Code	Site Name	Qualifying Habitats	Qualifying Species	Distance From Bridge ³	Connectivity
000365	Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC	<p>Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]</p> <p>Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130]</p> <p>Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]</p> <p>Northern Atlantic wet heaths with Erica tetralix [4010]</p> <p>European dry heaths [4030]</p> <p>Alpine and Boreal heaths [4060]</p> <p>Juniperus communis formations on heaths or calcareous grasslands [5130]</p> <p>Calaminarian grasslands of the Violetalia calaminariae [6130]</p> <p>Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410]</p> <p>Blanket bogs (* if active bog) [7130]</p> <p>Depressions on peat substrates of the Rhynchosporion [7150]</p> <p>Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]</p> <p>Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]</p> <p>Taxus baccata woods of the British Isles [91J0]</p>	<p>Geomalacus maculosus (Kerry Slug) [1024]</p> <p>Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]</p> <p>Euphydrys aurinia (Marsh Fritillary) [1065]</p> <p>Petromyzon marinus (Sea Lamprey) [1095]</p> <p>Lampetra planeri (Brook Lamprey) [1096]</p> <p>Lampetra fluviatilis (River Lamprey) [1099]</p> <p>Salmo salar (Salmon) [1106]</p> <p>Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303]</p> <p>Lutra lutra (Otter) [1355]</p> <p>Trichomanes speciosum (Killarney Fern) [1421]</p> <p>Najas flexilis (Slender Naiad) [1833]</p> <p>Alosa fallax killarnensis (Killarney Shad) [5046]</p>	0km	Direct connectivity Beheenagh River is situated in the Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC

³ Measured in kilometres "as the crow flies"

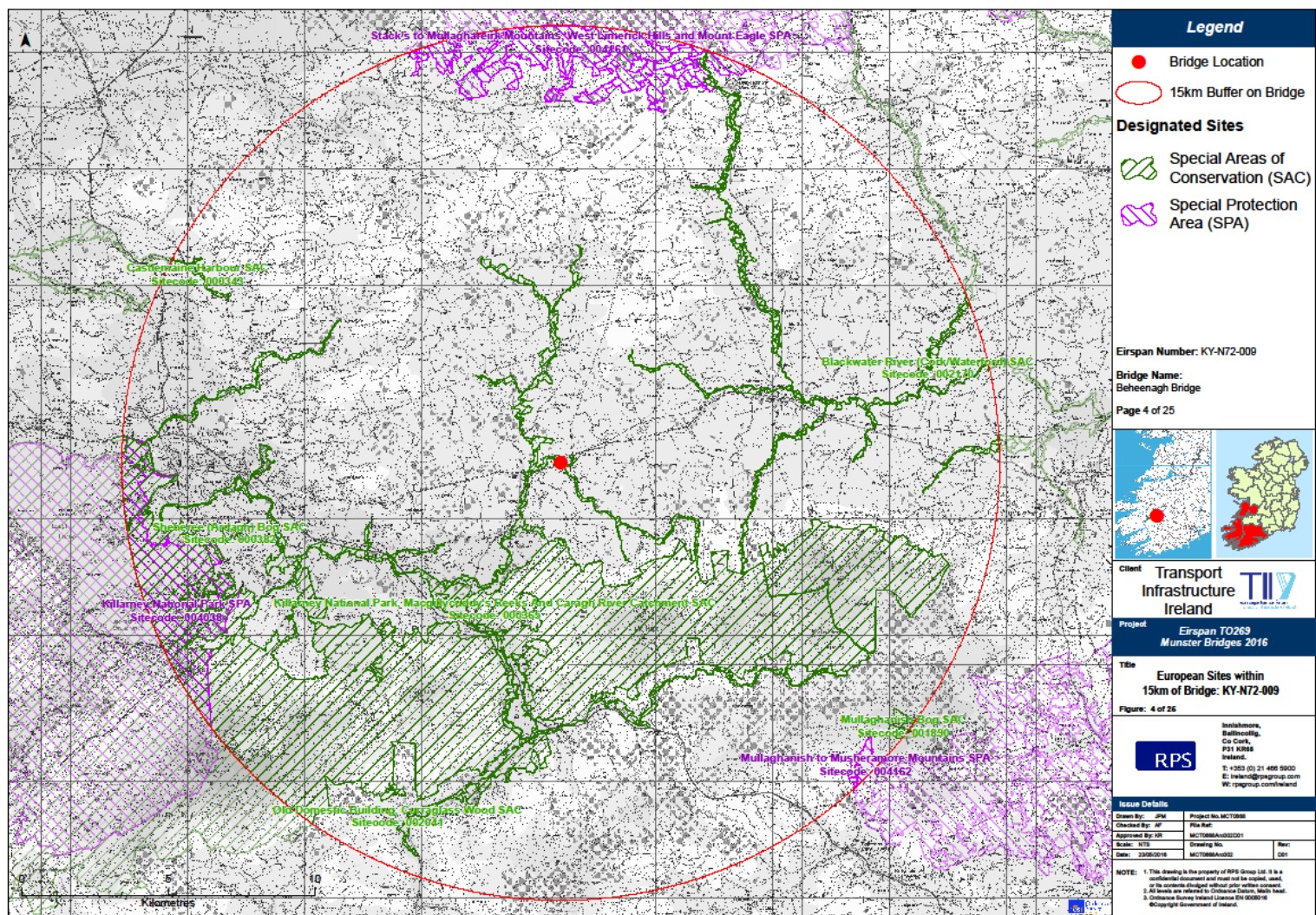
Site Code	Site Name	Qualifying Habitats	Qualifying Species	Distance From Bridge ³	Connectivity
002170	Blackwater River (Cork/Waterford) SAC	<p>Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] *Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] *<i>Taxus baccata</i> woods of the British Isles [91J0] (*Priority Habitat)</p>	<p><i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029] <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092] <i>Petromyzon marinus</i> (Sea Lamprey) [1095] <i>Lampetra planeri</i> (Brook Lamprey) [1096] <i>Lampetra fluviatilis</i> (River Lamprey) [1099] <i>Alosa fallax fallax</i> (Twaite Shad) [1103] <i>Salmo salar</i> (Salmon) [1106] <i>Lutra lutra</i> (Otter) [1355] <i>Trichomanes speciosum</i> (Killarney Fern) [1421]</p>	4.2km – East	No connectivity
000382	Sheheree (Ardagh) Bog SAC	<p>Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120]</p>		11.3km – West	No connectivity
000343	Castlemaine Harbour SAC	<p>Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia</p>	<p><i>Petromyzon marinus</i> (Sea Lamprey) [1095] <i>Lampetra fluviatilis</i> (River Lamprey) [1099] <i>Salmo salar</i> (Salmon) [1106] <i>Lutra lutra</i> (Otter) [1355] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]</p>	12.6km – North West	No connectivity

Site Code	Site Name	Qualifying Habitats	Qualifying Species	Distance From Bridge ³	Connectivity
		maritimi) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with Salix repens ssp. argentea (Salicion arenariae) [2170] Humid dune slacks [2190] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]			
002041	Old Domestic Building, Curraglass Wood SAC		Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303]	13.3km – South	No connectivity
001890	Mullaghanish Bog SAC	Blanket bogs (* if active bog) [7130]		14.1km – South East	No connectivity

Table 3-2: SPAs within 15km of Proposed Works

Site Code	Site Name	Qualifying Annex I species	Feature	Distance From Bridge	Connectivity
004038	Killarney National Park SPA	Merlin (<i>Falco columbarius</i>) [A098] Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]		11.7km – South	Remote indirect connectivity the Beheenagh River merges with the Owneykeagh River, which flows to the River Flesk and Lough Leane which is part of the Killarney National Park SPA [004038]
004161	Stack's Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	Hen Harrier (<i>Circus cyaneus</i>) [A082]		12.3km – North	No connectivity
004162	Mullaghanish Musheramore Mountains SPA	Hen Harrier (<i>Circus cyaneus</i>) [A082]		14.1 – South East	No connectivity

Figure 3.3: Designated Sites within a 15km Buffer of the Bridge



An **AA Screening Report** was prepared for the proposed works which addressed potential for direct and indirect impacts to the designated sites and the following section is summarised from the **AA Screening Report** (Refer to **Appendix 1**).

There is no hydrological connectivity between the proposed works and Blackwater River (Cork/Waterford) SAC, Sheheree (Ardagh) Bog SAC, Castlemaine Harbour SAC, Old Domestic Building, Curraglass Wood SAC and Mullaghanish Bog SAC. Furthermore, these SAC's are situated a significant distance from the proposed works (between 4.2km and 14.1km) and will not be impacted either directly or indirectly. Therefore potential significant effects to these sites are no longer considered as part of this assessment.

Likewise, there is no hydrological connectivity between the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA and Mullaghanish and Musheramore Mountains SPA and the proposed works. These sites are located a significant distance from the proposed works (between 12.3km and 14.1km) and it is extremely unlikely that the qualifying species of these SPAs use the agriculturally improved lands and scrub in the vicinity of the proposed works. It is not anticipated that the proposed works would result in a significant increase in the level of background noise disturbance in the local areas. Any disturbance to bird species within nearby European Sites as a result of the proposed works is considered extremely unlikely. Furthermore, potential disturbances will be temporary and confined to the construction phase of the development only. Therefore, it is not anticipated that the proposed works will have a significant effect on Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA Mullaghanish and Musheramore Mountains SPA with regards to noise disturbance of birds.

The potential significant effects on European sites as a result of the proposed N72 bridge realignment works are primarily limited to those incurred due to a change in water quality in the underlying water course and in turn the Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC, as detailed below.

Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC

This very large site encompasses the mountains, rivers and lakes of the Iveragh Peninsula and the Paps Mountains, which stretch east from Killarney towards Millstreet. Overall, the site is of high ecological value because of the diversity, quality and extensiveness of many of the habitats, and impressive list of rare species of flora and fauna⁴.

The generic conservation objectives for Killarney National Park SAC are provided in the Conservation Objectives document available on the NPWS website, as follows:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000365.pdf.
For this report the version consulted was: Version 5.0, 15/08/2016.

The qualifying habitats and species of Killarney National Park SAC are listed in **Table 3.1**.

The aquatic ecology survey conducted at the Bridge in July 2016 found that numerous salmonids were present in runs in the vicinity of the Bridge. The Beheenagh River provides ideal salmonid nursery habitat at the location of the Bridge, with pockets of spawning habitat potential for salmon, trout and lampreys. Lamprey nursery habitat was lacking owing to the high energy nature of the

⁴ Killarney National Park SAC: Site synopsis, Version date 20.08.2013.

channel and general absence of accumulated silty sediments in which ammocoetes could burrow. The plant community observed in the vicinity of the bridge would correlate with Callitricho-Batrachion sub-type CB6a of Annex I Habitat 3260 characteristic of fast flowing, bryophyte dominated, upland rivers. There is therefore a risk of direct impact on salmonids, lamprey and floating vegetation habitat in proximity to the bridge as a result of construction activities, as detailed in **Table 3.3**.

Table 3-3: Summary of Potential Impacts on Aquatic Species

Proposed Works	Potential Impact
<p><u>Bridge Widening/Replacement</u></p> <ul style="list-style-type: none"> Provision of traffic management including a Bailey bridge, site clearance and erection of contractor's compound; Earthworks (import and export of fill materials) for the construction of the widened road base and embankments; Provision of water management: the existing river shall be dammed and flumed to allow the foundations for the bridge extension to be constructed; Excavation for the new bridge foundations; Construction of new in-situ concrete bridge foundations, abutments and bridge deck; Application of bridge deck waterproofing and installation of new bridge parapets and safety barrier; Masonry cladding to the widened reinforced concrete section Provision of new road surfacing and lines on the widened road; Topsoiling and grass seeding of the widening bridge embankments; Demobilisation from site and removal of traffic management; and Standard Environmental Protection Measures. 	<p>This is a locally high value salmonid river (including for salmon). There is potential for indirect medium term negative impacts downstream of the bridge in association with wet concrete and mortar usage (bridge widening/reinforcing/paved verge construction, repointing), entering the watercourse from the works area. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Species affected in Beheenagh River would be Annex II species, Atlantic salmon, and other salmonids (brown trout) and possibly Annex II species river/brook lampreys.</p> <p>Slight temporary negative impacts could arise locally from sediment washout to the river associated with site clearance for bridge/road widening. The majority of the riverine habitat downstream of the bridge is fast flowing and would not favour silt accumulation and smothering of habitat, but elevated levels of suspended solids (>25mg/l) can stress and abrade gills of salmonid fishes.</p> <p>There could be a direct impact on migration of salmonids (salmon) and lampreys depending on timing of works owing to a high level of engineering activity at the bridge.</p> <p>Bridge widening/replacement will require that the works area be dewatered meaning a temporary loss of habitat for fish beneath the bridge. Although the existing bridge footprint is reinforced masonry/stone blockwork, salmonids may use this area and would certainly be present in the downstream riffle area. When dams are introduced, fish may be trapped within the proposed dry working area and they will die when the channel is dewatered.</p> <p>During the operational phase, there is potential for significant impact at a local scale if the new bridge footprint is not passable by fish. This can occur if bed reinforcement creates an overly shallow, overly wide flow regime, and especially if there is a high downstream apron that can act as an impassable barrier to lampreys and salmon.</p> <p>Direct impact to the plant community Callitricho-Batrachion sub-type CB6a of Annex I Habitat 3260, which is present in the vicinity of the bridge.</p>

(refer to the AA in **Appendix 1**)

A reduction in water quality due to sedimentation, release of suspended solids and pollutants such as concrete and mortar may impair plant growth and impact on salmonid and lamprey spawning habitat. This could have knock-on effects further up the food chain on invertebrates, birds, fish and mammals. A reduction in water quality may also impact on otters within and downstream of the study area. Should large quantities of suspended solids enter waterbodies in the vicinity of the proposed development it could potentially affect the riverine habitat and associated protected species and habitats. An accidental spillage and release of hydrocarbons to sensitive watercourses in the immediate surroundings could have significant adverse impacts on protected species within the Beheenagh River. In addition, the potential spillage and release of hydrocarbons from plant equipment during the construction phase may arise.

The proposed works have been designed with stringent protective measures built into the works methodology (work during periods of low flow, careful handling of fuels and lubricants, appropriate disposal of contaminants etc.) as detailed in **Appendix A of Appendix 1**. These measures have been designed to ensure that the water quality of the underlying watercourse is protected during the proposed works. Such measures to protect waterbodies will ensure that the water quality of the Beheenagh River and the Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC are protected from the works. Likewise, such measures will also ensure that adverse impacts to water dependent species such as salmon and lamprey are avoided.

Should these best practice measures (as outlined in **Appendix A**) be followed during the works, it is not anticipated that the proposed works will result in any potential discharges to the Beheenagh River and in turn, Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC. These protective measures were built into the works design in order to protect the salmonid and lamprey populations as identified in the aquatic survey (see **Appendix B of Appendix 1**) as these are qualifying species of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC which is directly connected with the site. These measures will also in turn protect other species and habitats of concern, such as otter and floating vegetation.

IFI have been consulted in relation to the proposed works and will monitor the works. Electrofishing is required prior to the localised and temporary drying out of the river and a suitably qualified person shall be present during the damming and drying out to rescue and relocate any fish that become stranded by the operation (see **Appendix A**). These measures have been incorporated into the works to ensure the protection of salmonid species and lamprey from direct impact during the construction phase.

As noted in **Section 1.3**, the widened bridge footprint within the river will be of a similar nature to that already in existence, which allows for fish migration through the central arches. The bed design allows for passage of all species and will be reflective of the existing natural river bed. Further, instream works will be undertaken between 1st June and 30th September. Therefore, no impediment to passage for lamprey, salmon or otter is anticipated to arise from the proposed works during the construction or operational phases.

The aquatic plant community present downstream of the bridge (pertaining to Habitat 3260 Type CB6a) is considered by Hatton-Ellis & Grieve⁵ to be less vulnerable to indirect adverse impacts as a result of any sediment loss that may arise during works given the high energy river type in which it

⁵ Hatton-Ellis, T. W. and Grieve, N. (2003). Ecology of Watercourses Characterised by Ranunculion fluitantis and Callitriche-Batrachion Vegetation. Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough.

occurs. There may be a direct, but temporary loss of a very small area of this habitat in the immediate footprint of works, but in general it does not occur in the main footprint of the new bridge upstream of the existing structure. Regrowth of this habitat will occur fairly quickly once works are complete (within 1 or 2 growing seasons); therefore no significant adverse effects to this habitat are anticipated to arise as a result of the proposed works.

The **AA Screening Report** examined the likely changes that will arise from the proposed works to the Bridge which could potentially affect the European Sites as listed in **Table 3.1** and **Table 3.2**. The **AA Screening Report** concludes that the likely impacts that will arise from the proposed works to the Bridge in County Kerry (KY-N72-009) have been examined in the context of a number of factors that could have a significant effect on European Sites. None of the sites within 15km of the works area, or any other European Site, will be adversely affected. A finding of No Significant Effects Matrix has been completed and is presented in Section 4 of this Screening Statement.

On the basis of the findings of this Screening for Appropriate Assessment of European Sites, it is concluded that the proposed realignment works to the Beheenagh Bridge in County Kerry (KY-N72-009), will not have a significant effect on the Natura 2000 network and a Stage 2 Appropriate Assessment is not required.

3.7 SOILS, GEOLOGY AND HYDROGEOLOGY

Information on the soils, geology and hydrogeology of the study area has been obtained from the Geological Survey of Ireland (GSI) Spatial Resources Viewer. The groundwater vulnerability in the immediate vicinity of the Bridge is 'Low'.

The area in the immediate vicinity of the Bridge is classed as being underlain by a Locally Important Aquifer – LI Bedrock which is Moderately Productive only in Local Zones.

The GSI National Generalised Bedrock Geology Map indicates the Bridge site is underlain by Namurian (undifferentiated) - Shale and Sandstone.

The Teagasc Subsoil is A - Alluvium undifferentiated gravelly within the River Beheenagh Valley and the surrounding areas are TDSs - Sandstone till Devonian respectively. The soil is AlluvMIN - Mineral Alluvium within the River Beheenagh Valley and the surrounding areas are AminPD - Surface water Gleys / Ground water Gleys Acidic.

There is no potential for significant impacts in relation to soils, geology or hydrogeology arising from the construction activities associated with the proposed works.

3.8 AIR, CLIMATIC FACTORS, NOISE & VIBRATION

It is considered that air quality in the area is not likely to be significantly impacted upon by way of this proposal. Standard dust control construction measures, including water spraying and sweeping of roads have been incorporated into the construction Method Statement.

The closest human receptor for noise and vibration impacts is a dwelling adjacent to the Bridge to the northwest. Faunal receptors include both mobile species such as salmon and lamprey. Potential

sources of noise and vibration during this project include dump trucks and HGV's which will operate for the construction period of the works.

The scale of the construction will comprise something in the order of 25 truckloads per day at peak times. While the activity will take place over 16-20 weeks the intensity of the activity on any day will typically be limited to a delivery of materials, some vehicle and personnel movement around the site and typical construction activities. The intensity at any instant in time will not be such to cause any significant noise or vibration impact and long periods of the construction will comprise manual labour with minimal noise and vibration impact. Given the rural, sparsely populated nature of the area and to the location of dwellings relative to the proposed works, it is considered that significant impacts on human receptors are not likely to occur in this instance. Adherence to protective measures in the Method Statement will ensure there are no residual impacts on sensitive aquatic species or birds.

3.9 LANDSCAPE, CULTURAL AND BUILT HERITAGE

There are 6 Sites and Monuments Records (SMRs) within 1km of the works according to the Archaeological Survey of Ireland. There are no National Inventory of Architectural Heritage (NIAH) records within 1km of the development.

An archaeological screening was carried out by John Cronin & Associates and notes that the Bridge itself appears on first-edition OS map but it **is not** included on the RPS or NIAH listings. However, the Bridge is included on the Sites and Monuments Record (No. KE068-120) but the Department has indicated that it is not scheduled for inclusion in the next revision of the Record of Monuments and Places (RMP).

The following provides a description of the Bridge as set out in www.archaeology.ie:

A NE-SW humpback road-bridge, of random rubble sandstone, spanning the Beheenagh River. Four semicircular arches with roughly shaped voussoirs, some of which are projecting. The two central arches are the largest (span c. 5m). The SW arch (span 3.5m) is dry. There is a low rounded cutwater with ornamental moulding on the upstream side of the central pier (Wth 1.2m) and a low pointed cutwater on the NE pier. The arches are underpinned with concrete and the parapets have concrete coping. Paving on the river-bed under the arches extends beyond the bridge on the downstream side

The proposed works are to extend out the south western (upstream) side of the Bridge by approximately 9.7m. The existing Bridge will remain intact with exception of the removal of the south parapet wall to approximately 300mm below existing road level, repairs and extension of the north parapet wall (masonry from the south parapet wall shall be utilised to limit the extents of new masonry required) and the relocation of the cutwaters to the new upstream elevation; the parapet walls are much altered and largely-re-built and have been the subject of vehicle impact. Given that the bridge is not a RPS or RMP site, that the value of bridge is considered low to medium and the parapet wall has already been altered from its original status it is considered that the proposed work will potentially result in a slight to moderate effect (based on *Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes* (NRA, undated) and *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS, 2011).

It is concluded that provided a Level 3 Building Survey (including Photographic Record) and a wade survey by a suitably qualified archaeologist under license from the National Monuments Service is undertaken prior to construction works that significant effects are not predicted.

Map 12.1k Amenities/Views and Prospects which accompanies the Kerry CDP (2015-2021) and details Amenities/Views in the vicinity of the Bridge shows that the Bridge is not located within any designated Special Amenity or View and Prospects.

3.10 INTERRELATIONSHIPS OF THE FOREGOING

The greater the number of different aspects of the environment which are likely to be affected and the greater the links between the effects, the more likely significant effects may occur.

Impact inter-relationships/interactions relate to the reactions between impacts within a project and the inter-relationship between impacts identified under one topic with impacts identified under another topic.

The consideration of impact inter-relationships and interactions provides an opportunity to consider the overall impacts of a project which might not be immediately apparent.

The most important interaction in this case is that between ecology and water quality. It is very important that the project is undertaken in such a manner so as to ensure that water quality of the river and downstream is not unduly harmed. It is considered that the proposal as outlined contains such safeguards as integral components of the overall project and therefore avoids the potential for interaction of impacts or associated cumulative impacts. This matter has been addressed within the proposal.

All above receptors contribute to the distinctive character of the area. Cumulative impacts on the suite of these features maybe significant in scale, nature and duration. Cumulative impacts are assessed in **Table 3-5** of this EIA Screening and **Table 3-4** of the **AA Screening Report** in **Appendix 1** and are not considered significant.

3.11 EIA SCREENING

3.11.1 Checklist of Criteria

Section 1.3 of this document outlines that this project is not considered either Annex I or Annex II to Directive 2011/92/EU.

The Checklist of Criteria for Evaluating the Significance of Environmental Effects – as per S5.39 of the ‘Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development’ (DEHLG, 2003) is designed to help competent/consent authorities decide whether EIA is required based on the characteristics of the likely impacts of a project i.e. to decide whether the effects of a project are likely to be significant. The checklist was originally proposed in ‘Guidance on EIA – Screening’ (June, 2001; prepared for the European Commission by ERM (UK)). Consideration has been given to the project under each question to be considered.

Figure 3.4: Questions to be considered in EIA Screening

Question to be Considered	Response
1. Will there be a large change in environmental conditions?	No – the proposed works Method Statement has in built protective measures outlined in Appendix A of Appendix 1: AA Screening Report which ensure no significant environmental effects.
2. Will new features be out-of-scale with the existing environment?	No – given that this is an upgrade/rehabilitation of an existing Bridge it is considered the proposed works will be of a scale which will not have a negative impact on the landscape. Further the Bridge is not located within any designated Special Amenity or View and Prospects.
3. Will the effect be particularly complex?	No - any adverse effects will be minor and temporary and are limited to potential effects on wildlife and humans as a result of noise disturbance. Protective measures built into the works Method Statement have been proposed to minimise the potential for impacts.
4. Will the effect extend over a large area?	No - effects will be limited to the immediate vicinity of the current footprint of the Bridge and resurfacing or the road immediate adjacent to the Bridge. Protective measures built into the works Method Statement will ensure that there are no surface water pollution effects which are transported downstream.
5. Will there be any potential for transfrontier impact?	No. Small local scale improvement works only.
6. Will many people be affected?	Local residents, commuters and tourists and businesses will benefit from this development as a result of having a safer bridge in place. There will be a temporary negative impact as a result of noise and possibly traffic during the construction stage only.
7. Will many receptors of other types (fauna and flora, businesses, facilities) be affected?	Individual species of birds and mammals may be temporarily affected due to noise disturbance from activities associated with the upgrade/rehabilitation. However, due to the short-term temporary nature of the works and the distance to designated sites from the works there will be no significant or long-term effects on these receptors. Businesses and facilities will be temporarily affected by the proposed development during the construction period only. One lane of traffic will however be maintained at all times thus avoiding any potential for significant effects.
8. Will valuable or scarce features or resources be affected?	No – the works are located in an area which is not considered to be of high quality or importance.
9. Is there a risk that environmental standards will be breached?	Instream works as part of the project are limited to water management and protective measures have been built in to the works Method Statement in order to minimise the potential for impacts. Therefore it is considered that environmental standards will not be breached.
10. Is there a risk that protected sites, areas, features will be affected?	An AA Screening has been prepared for the project. The AA Screening concluded that significant effects on European Sites are not considered likely. The Bridge is included on the Sites and Monuments Record

Question to be Considered	Response
	<p>(SMR) (No. KE068-120) but the Department has indicated that it is not scheduled for inclusion in the next revision of the RMP. Provided a Level 3 Building Survey and a wade survey under license from the National Monuments Service no significant effects are likely.</p> <p>Other than the Bridge there are no recorded archaeological features recorded in close proximity to the proposed works therefore no additional impacts to protected archaeological sites are considered likely.</p>
11. Is there a high probability of the effect occurring?	Significant negative impacts on species or habitats as a result of works are unlikely.
12. Will the effect continue for a long time?	<p>The works are expected to last approximately 16-20 weeks. Any minor disturbance to species in the area will be temporary over the period of the construction works.</p> <p>The works include widening of an existing Bridge which is already a permanent feature in the landscape.</p>
13. Will the effect be permanent rather than temporary?	As discussed above the majority of the effects will be temporary however there will be a permanent visual impact of the widened Bridge, as was the case of the existing Bridge. The Bridge is not located within any designated Special Amenity or View and Prospects therefore any impacts are not considered significant.
14. Will the impact be continuous rather than intermittent?	Temporary indirect disturbance impacts on species will be intermittent while construction is ongoing.
15. If it is intermittent will it be frequent rather than rare?	For the period of construction i.e. 16-20 weeks any disturbance impacts will likely be daily during normal working hours.
16. Will the impact be irreversible?	The temporary impacts on species are reversible.
17. Will it be difficult to avoid, or reduce or repair or compensate for the effect?	<p>No – this proposal is not a particularly complex or large proposal. Potential negative effects can be avoided by way of the standard environmental protection measures contained in the overall proposal.</p> <p>The Bridge is included on the Sites and Monuments Record (SMR) (No. KE068-120) but the Department has indicated that it is not scheduled for inclusion in the next revision of the RMP. Provided a Level 3 Building Survey and a wade survey under license from the National Monuments Service no significant effects are likely.</p>

3.11.2 Screening Selection Criteria

Article 4(3) of Directive 97/11/EC requires that Competent Authorities must take into account the selection criteria set out in Annex III of the Directive when making screening decisions on a case-by-case basis and when setting thresholds and criteria for projects requiring EIA. The criteria have been transposed in full into Irish legislation, in the Third Schedule to the European Communities

(Environmental Impact Assessment) (Amendment) Regulations 1999 (S.I. No. 93 of 1999) and in Schedule 7 to the Planning and Development Regulations 2001 (S.I. No. 600 of 2001), as amended.

The criteria, as transposed in Irish legislation, are grouped under three headings viz. (i) Characteristics of Proposed Development, (ii) Location of Proposed Development and (iii) Characteristics of Potential Impacts and are detailed in the Appendix to 'Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development' (Department of the Environment, Heritage and Local Government, 2003).

Competent/consent authorities must have regard to these criteria in forming an opinion as to whether or not a sub-threshold development is likely to have significant effects on the environment. The key issue is 'are the likely effects "significant" in the context of these criteria'. These criteria are listed below and the project is considered under each criterion.

Figure 3.5: Selection Criteria from Annex III of the EIA Directive

1. Characteristics of Development	
Size	This is considered to be a small scale development – comprising widening and road alignment/widening to an existing Bridge.
Cumulative impacts with other developments / projects	There are a number of existing residences within 100m of the Bridge. A search of the Kerry County Council website Planning Inquiry System showed no planning applications of relevance to the proposed works. The works themselves will result in positive impacts for future planning applications/development in the area by providing safer access. (Refer to Table 3-4 in Appendix 1: AA Screening Report for further details).
The nature of any associated demolition works	<p>The following demolition works are proposed: demolition of the existing parapet walls. The southern one is to be removed and the northern one is to be replaced.</p> <p>The potential for significant effects associated with demolition works is not considered significant given the construction methods proposed and the protective measures incorporated into the design and construction methodology.</p>
Use of natural resources	Natural resources such as aggregates (used in concrete), steel, soil and rock will be used in the proposed works as part of the Bridge works.
The production of wastes	No large-scale wastes will be generated.
Pollution and nuisances	This proposal has the potential to generate nuisances associated with noise at the construction stage. However these impacts will be temporary in nature and during the daytime only.
The risk of accidents having regard to substances or technologies used	<p>There is no hazardous activity on site posing a significant risk to a habitat or human environment.</p> <p>There is a slight risk of small scale spillage of pollutants such as concrete and oils / hydrocarbons however protective measures have been proposed to minimise those risks (See Appendix 1 for protective measures included in the Method Statement of the AA Screening Report).</p>
2. Location of Proposed Development	
Existing land use	Local Authority Public Roadway

Previous land use	Local Authority Public Roadway
Relative abundance, quality and regenerative capacity of natural resources in the area	The approximate quantity of material will be as follows: Surfacing 400m ³ , Imported fill 1650m ³ and Concrete 150 m ³ . Excavated material will enable the construction of the proposed works, a portion of this will be retained on site for reuse, with the remainder removed from the site. The material removed will be disposed of in accordance with best practice measures to a licensed tip or recycling facility. There will be road resurfacing. Species in the area might be temporarily disturbed during the construction period but with protective measures it is considered that impacts will not be significant.
<p>The existing environment and absorption capacity of the natural environment, paying particular attention to the following areas:</p> <p>Wetlands</p> <p>Coastal zones</p> <p>Mountain and forest areas</p> <p>Nature reserves and parks</p> <p>European sites</p> <p>Areas in which environmental quality standards laid down by the EU have already been exceeded</p> <p>Densely populated areas</p> <p>Landscape of historical, cultural or archaeological significance</p>	<p>Wetlands: The proposed development will primarily be located within the existing footprint of the Bridge and immediate area. There are no implications for wetland habitats as a result of the proposed development. Coastal Zone: There are no implications for coastal zones as a result of the proposed development.</p> <p>Mountain and forest areas: The proposed development will be located within wet improved agricultural grassland. There are no implications for mountain and forest areas as a result of the proposed works.</p> <p>Nature reserves and parks: The proposed works are not located within or in close proximity to any nature reserve or park.</p> <p>European Sites: No permanent significant effects are predicted (Refer to AA Screening Report in Appendix 1).</p> <p>Areas in which environmental quality standards laid down by the EU have already been exceeded: None</p> <p>Densely populated areas: None</p> <p>Landscape of historical, cultural or archaeological significance: The proposed project is not located within an area designated by Kerry County Council as being of either high value, sensitivity nor importance for landscape.</p> <p>The Bridge is included on the Sites and Monuments Record (SMR) (No. KE068-120) but the Department has indicated that it is not scheduled for inclusion in the next revision of the RMP. Provided a Level 3 Building Survey and a wade survey is undertaken under license from the National Monuments Service no significant effects are likely.</p>
<p align="center">3. Characteristics of Potential Impacts</p> <p align="center">The potential significant effects of the proposed development in relation to the criteria set out in 1 & 2 above and having particular regard to:</p>	
Extent of the Impact (geographical area and size of affected population)	<p>The widened Bridge will be on the footprint of the existing Bridge but will increase the existing width to 16.5m.</p> <p>Any disturbance effects from the construction phase of the project may temporarily affect local individuals of species in the vicinity of the works.</p> <p>An increase in safety of the Bridge and immediate road has positive implications for the people in the area and other users of the public roadway.</p> <p>The extent of impact is generally limited to the development site itself and its immediate vicinity.</p>
Transfrontier nature of the impact	None. No cross border implications.
Magnitude and complexity of the	Main impacts include potential for temporary impacts to wildlife as a

impact	result of noise disturbance. These are not considered to be overly high in magnitude or complex in nature.
Probability of the impact	<p>Best practice during the works phase will mitigate potential negative effects – particularly those related to the construction phase.</p> <p>Detailed design as submitted and incorporated into the proposal reduces the probability of impacts occurring, particularly in relation to ecology.</p> <p>Despite this, some temporary impacts on local wildlife are likely to result from the proposed works.</p> <p>With the proposed protective measures outlined in the AA Screening Report (Appendix 1) no significant impacts to salmon or Freshwater Pearl Mussel are anticipated.</p>
Duration, frequency and reversibility of the Impact	<p>Construction risks (hydrocarbon spillages etc.) and nuisances (noise etc.) are likely to be temporary in nature. Therefore, impacts to wildlife as a result of noise disturbance will be temporary and reversible.</p> <p>Impacts with respect to construction stage noise and air and water quality are temporary in nature, in that they will cease when the works are completed.</p> <p>The temporary impacts of the proposed development are largely theoretically reversible.</p>
4. Recommendation and Conclusion	
<p>Having regard to the above, and in particular to the nature, scale and location of the proposed project, by itself and in combination with other plans and projects, it is considered that this proposal is not likely to have significant effects on the environment and that an EIA is not required in this instance.</p> <p>Implementation of the Method Statement including the protective measures outlined in the AA Screening Report (RPS, 2016) must be undertaken by the contractor and overseen by a Kerry County Council Representative. A Level 3 Building Survey must be undertaken and a Wade Survey under license from the National Monuments Service.</p>	

APPENDIX 1

APPROPRIATE ASSESSMENT SCREENING REPORT

**(Appendix A: Proposed Works Drawings and Method Statement,
Appendix B: Aquatic Ecology Survey Report)**



TII Programme of Bridge Rehabilitation Works, Counties, Cork, Clare and Kerry

Appropriate Assessment Screening - Beheenagh Bridge, Co. Kerry

Document Control Sheet

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1 INTRODUCTION

1.1 BACKGROUND

This report comprises information in support of screening for an Appropriate Assessment in line with the requirements of the Planning and Development Act 2000-2015 and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) for the proposed realignment works to Beheenagh Bridge in Co. Kerry (KY-N72-009), herein after referred to as the Bridge.

1.2 EXISTING SITUATION AND SITE LOCATION

Beheenagh Bridge, as seen in **Figure 1.1**, carries the N72 over the River Beheenagh. It is a multi-span masonry arch bridge with 4 spans and overall length of 22m. The maximum span is 5.35m and the minimum span is 3.6m. The bridge is approximately 1.5 km east of Barraduff.

The location of the bridge is illustrated in **Figure 1.2**.

Figure 1.1: Photograph of Beheenagh Bridge



Realignment and widening works to the bridge is required and is the subject of this Appropriate Assessment Screening (AA).

1.3 LEGISLATIVE CONTEXT

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as “The Habitats Directive”, provides legal protection for habitats and species of European importance. Articles 3 to 9 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. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European Sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):-

Any plan or project not directly connected with or necessary to the management of the [European] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site’s conservation objectives. In 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) states:-

If, in spite of a negative assessment of the implications for the [European] 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 a social or economic nature, Member States 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.

This Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna is transposed into Irish Law through the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) as stated above.

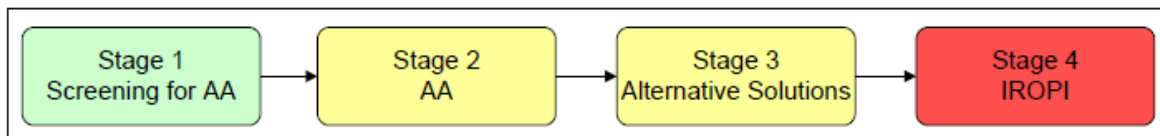
2 METHODOLOGY

2.1 STAGES OF THE APPROPRIATE ASSESSMENT

The Department of the Environment, Heritage and Local Government guidelines (DELHG, 2009, rev. 2010) outlines the European Commission's methodological guidance (EC, 2002) promoting a four-stage process to complete the Appropriate Assessment (AA), and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in **Figure 2.1**. Stages 1-2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

Figure 2.1: Four Stages of Appropriate Assessment



Stages 1 and 2 relate to Regulation 42 of the Birds and Natural Habitats Regulations; and Stage 2 relates to Article 6(3) of the Habitats Directive; and Stages 3 and 4 to Article 6(4) of the Habitats Directive.

Stage 1 - Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):-

- i. Whether a plan or project (in this instance the proposed works) is directly connected to or necessary for the management of the European Sites, and
- ii. Whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on the European Sites in view of their conservation objectives.

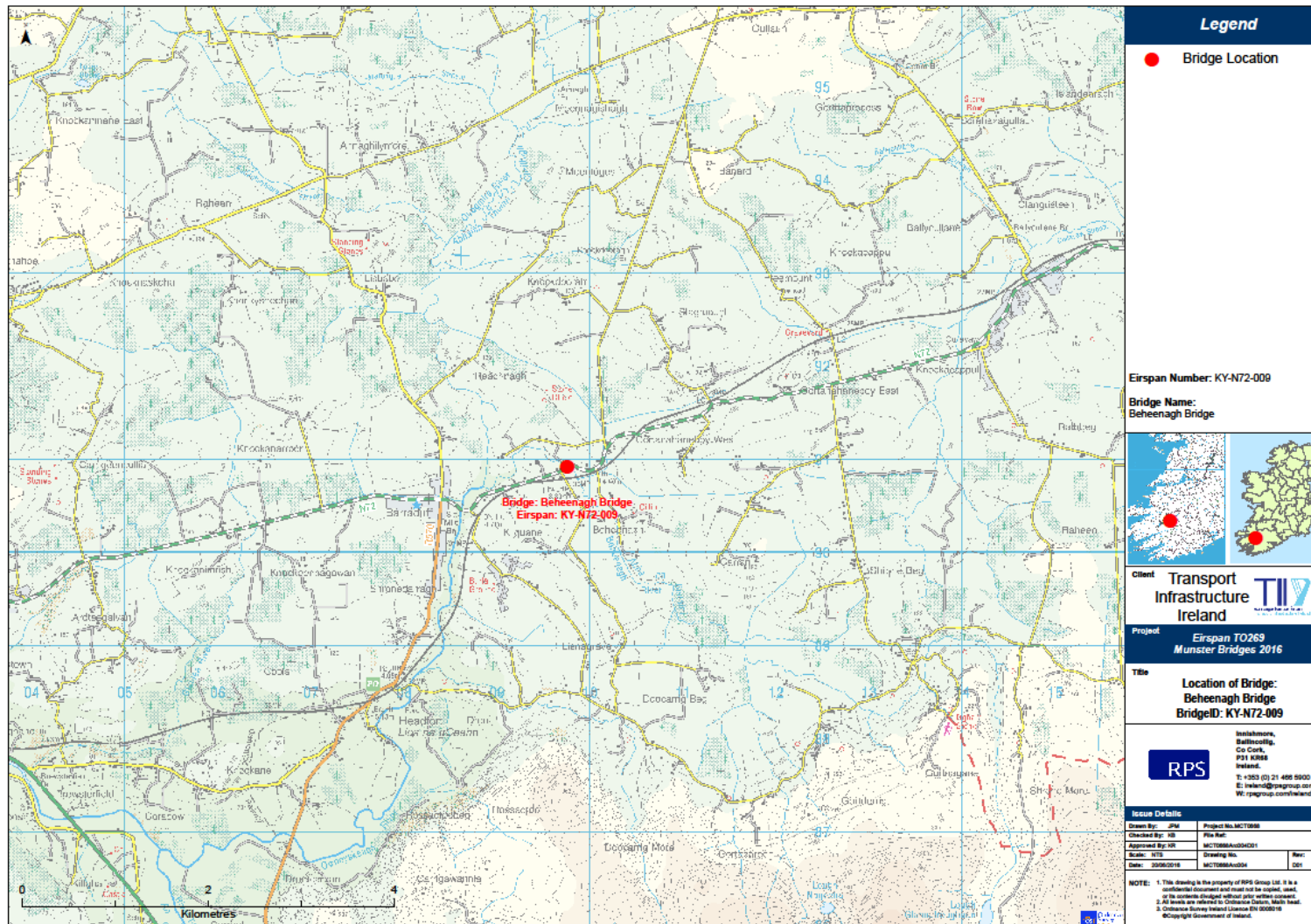
If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). This report fulfils the information necessary to enable the competent authority to screen the proposal for the requirement to prepare an Appropriate Assessment.

This report forms Stage 1 of the AA process and sets out the following information:-

- Description of the proposed bridge works,
- Characteristics of the proximal European Sites, and
- Assessment of Significance of the proposed works on the European Sites in question.

This report has been prepared having regard to the following:-

- Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities (DOEHLG 2009, Rev.v 2010),
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC, 2000),
- 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, Office for Official Publications of the European Communities, Luxembourg (EC, 2002),
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; (EC, 2007),
- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission 2013,
- The European Union (Environmental Impact Assessment and Habitats) Regulations 2011,
- The European Communities (Birds and Natural Habitats) Regulations 2011, and
- The Planning and Development Act 2000-2015.



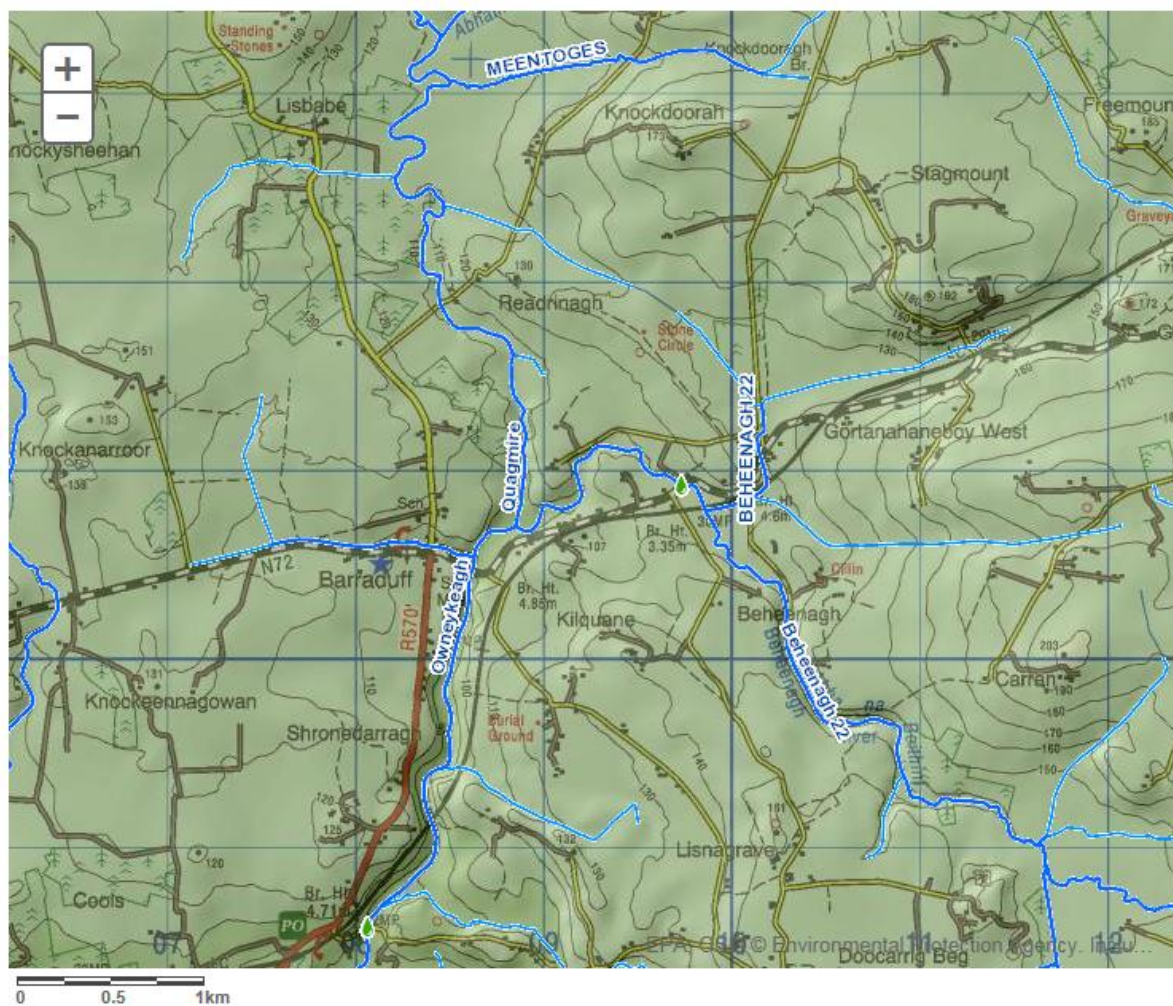
3 SCREENING

3.1 EXISTING ENVIRONMENT

Beheenagh Bridge carries the N72 over the Beheenagh River. It is a multi-span masonry arch bridge with 4 spans and overall length of 22m. The max span is 5.35m and the min span is 3.6m. The Beheenagh River is an upper tributary of the Owneyskeagh which flows into the Flesk. The Flesk flows through Killarney and into Lough Leane. The lake outflow forms the River Laune, travelling 20km north-west to Castlemaine Harbour near Killorglin. The water quality of the River Beheenagh is considered to be of Q4 'Good' status at the EPA monitoring station at the Bridge. The River is indicated in the EPA map illustrated in **Figure 3.1**.

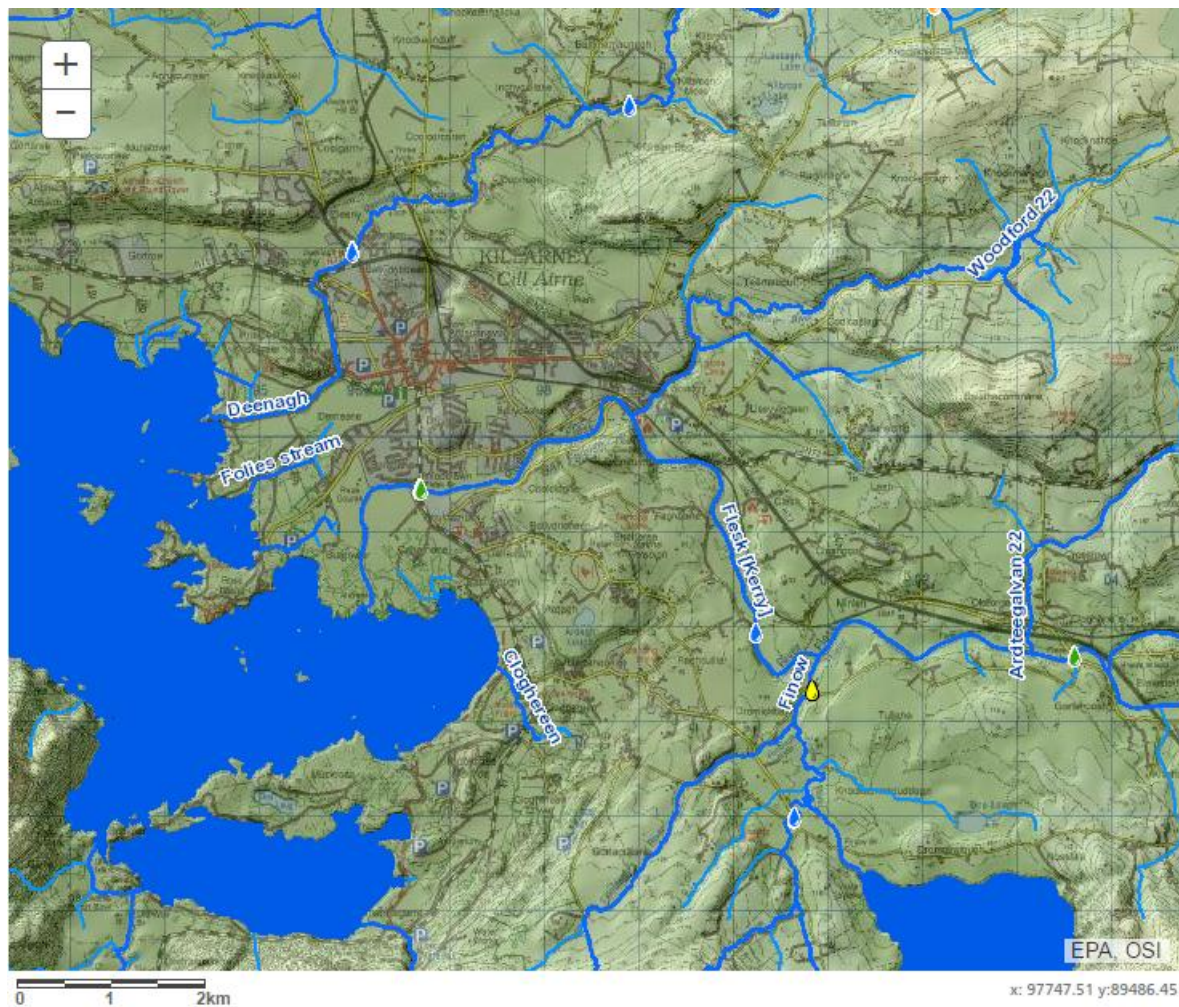
Lough Leane is classified as an oligotrophic/ mesotrophic lake, and is of 'good' status (**Figure 3.2**)¹.

Figure 3.1: EPA Data on Water Courses and Water Quality in the Vicinity of the Proposed Bridge Works



¹ <http://gis.epa.ie/Envision>, accessed 03/10/2016

Figure 3.2: EPA Data on Coastal Water Quality of Lough Leane



The Bridge and its environs are located in the Laune *Margaritifera* sensitive area². This site is known for 'Catchments of other extant populations' of *Margaritifera* (Freshwater Pearl Mussel; FPM), in addition the site is in close proximity to other similar sensitive areas, namely that of the Maine – Brownflesk, Lee – Sullane and the Roughty. The Bridge and its environs are located within Munster Blackwater *Margaritifera* sensitive area. This site is known for 'Catchments of SAC populations listed in S.I. 296 of 2009' of *Margaritifera* (Freshwater Pearl Mussel; FPM). The Bridge realignment works are situated in Laune-Maine-Dingle Catchment which forms HA22 and is not hydrometrically connected to the Blackwater Catchment.

Site visits were conducted by an RPS ecologist on 20th June and 26th July 2016. An Aquatic survey was conducted by the Aquatic Service Unit in July 2016. **Section 3.1.1** and **Section 3.1.2** summarises the information gathered during the respective site visits.

² <http://www.npws.ie/maps-and-data/habitat-and-species-data>, accessed 01/07/2016

3.1.1 Terrestrial Flora and Fauna

Beheenagh Bridge is surrounded by wet improved grassland to the north-west and a derelict house and associated garden to the north-east. The area to the south east of the bridge supports wet, scrubby grassland comprising Bramble (*Rubus fruticosus*), Nettle (*Urtica dioica*), Creeping Thistle (*Cirsium arvense*), Yorkshire Fog (*Holcus lanatus*), Meadow Grass (*Poa* spp), Soft Rush (*Juncus effusus*) and Hemlock Water-dropwort (*Oenanthe crocata*) with a line of mature ivy covered pines set back from the road. These trees have moderate potential as roosting or resting places for bats. An area of Willow scrub is located to the south-west of the bridge.

Beheenagh River is lined by woodland comprising Willow (*Salix* spp), Alder (*Alnus glutinosa*) and occasional Hawthorn (*Crataegus monogyna*) both upstream and downstream of the bridge. No evidence of otter activity or otter holts was observed in the vicinity of the Bridge other than a possible old otter spraint. However, otter has been recorded at Sixmilebridge approximately 1.2km west of Beheenagh Bridge and are likely to forage along the Beheenagh River.

The masonry arch of the bridge has been treated with shotcrete (sprayed concrete) and does not contain any crevices that are of potential use as roosting or resting places by bats. No evidence of nesting birds or kingfisher was observed in the bridge or adjacent riverbanks (wagtail was spotted upstream). No invasive non-native species were observed at the bridge itself; however Cherry Laurel (*Prunus laurocerasus*) and Japanese Knotweed (*Fallopia japonica*) is present in the garden of the derelict house to the north-east of the bridge.

3.1.2 Aquatic Ecology

Survey conducted in July 2016 included a Stage 1 Freshwater Pearl Mussel, Fisheries Habitat Assessment and a general habitat description. The Beheenagh River is a moderate sized river (5-6m width and 0.25m depth on average) with a high energy series of rapid/riffles and runs over mainly cobble and small boulder substrates with the bryophyte plant community *Fontinalis squamosa*. There were some interstitial deposits of clean, fine bed material (gravel/coarse sand). The river banks support a natural, woodland riparian tree cover.

No evidence of Freshwater Pearl Mussel (FPM) was observed during the site survey and the habitat provides limited potential for FPM owing to the high energy nature of river which does not facilitate accumulation of finer bed materials (gravel/coarse sand) suitable for mussels. There were some patches of suitable habitat where fine bed material had deposited at margins and behind larger boulders, but no mussels were observed. There are no existing records of FPM for Beheenagh River, and no records for the downstream Owneyskeagh River.

With regards to other protected species, numerous salmonids were observed in runs. At this location, the Beheenagh River provides ideal salmonid nursery habitat with pockets of spawning habitat potential for salmon, trout and lampreys. Lamprey nursery habitat was lacking owing to the high energy nature of the channel and general absence of accumulated silty sediments in which ammocoetes could burrow.

The floating vegetation community observed during the site survey would correlate with Callitricho-Batrachion sub-type CB6a of Annex I Habitat 3260 characteristic of fast flowing, bryophyte dominated, upland rivers (Hatton-Ellis & Grieve, 2003) which is widespread in Ireland. This vegetation type, mainly represented by bryophytes such as *Fontinalis* spp., occurs in the Beheenagh River beginning just downstream of the bridge and continues downstream over the surveyed reach. It does not occur within the footprint of the proposed bridge extension upstream of the existing structure. This is the typical habitat of this type of high energy, upland river and has a wide distribution within Ireland.

3.1.3 Invasive Species

No records of invasive species are known from the study area. However, Cherry Laurel and Japanese Knotweed were observed in the garden of a derelict house to the north-east of the bridge during the surveys conducted on 20th June and 26th July 2016. The derelict house and gardens do not fall within the development footprint.

3.2 DESCRIPTION OF PROJECT

3.2.1 Proposed Works

The proposed works include the online realignment of approximately 220m of the existing N72. The works shall also include the construction of an insitu reinforced concrete bridge widening the existing bridge, the widened bridge shall be (14m long and approximately 16.5m wide). The works shall include, inter alia the following activities:-

- Provision of traffic management including a bailey bridge, site clearance and erection of contractor's compound;
- Earthworks (import and export of fill materials) for the construction of the widened road base and embankments;
- Provision of water management: the existing river shall be dammed and flumed to allow the foundations for the bridge extension to be constructed;
- Excavation for the new bridge foundations;
- Construction of new in-situ concrete bridge foundations, abutments and bridge deck;
- Application of bridge deck waterproofing and installation of new bridge parapets and safety barrier;
- Masonry cladding to the widened reinforced concrete section
- Provision of new road surfacing and lines on the widened road;
- Topsoiling and grass seeding of the widening bridge embankments;
- Demobilisation from site and removal of traffic management; and
- Standard Environmental Protection Measures.

The sequence of work activities shall be dependent on the contractor's proposed construction sequence. The contractor's proposed construction sequence may also require that the works be undertaken on a phased basis.

Bridge Footprint Design: The widened bridge footprint within the river will be of a similar nature to that already in existence which allows for fish migration through the central arches. Flat concrete bed reinforcement is not acceptable as it may affect the success of lampreys, eels and salmonids in passing the bridge and therefore is not proposed. The bed design allows for passage of all species and will be reflective of the existing natural river bed.

3.2.2 Design and Construction Methodology

A method statement for undertaking the works is provided in **Appendix A**. This Method Statement comprises the Principal Control Measures to safeguard the ecological integrity of the watercourse spanned by the bridge, protection of environment and the avoidance of pollution.

The proposed works will be carried out by a competent contractor experienced in this type of work and who has undertaken this type of work at other bridge locations. This contractor will be suitably appointed through a tendering process and will meet the requirements of the construction measures outlined below, together with the requirements of the method statements provided to each contractor at the tendering stage. The works will be undertaken in consultation with IFI and under supervision of IFI or a suitably appointed ecologist.

The following guidelines and documents have informed the method statement and should be consulted during the detailed planning of the works phase and further development of the method statement:

Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA) in particular:-

- IFI (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters*. Inland Fisheries Ireland, Dublin;
- Irish Water (2016). *Information and Guidance Document on Japanese knotweed Asset Strategy and Sustainability*;
- NRA (2008) *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*. National Roads Authority, Dublin;
- NRA (2010) *Guidelines for the Management of Noxious Weeds and Non- Native Invasive Plant Species on National Roads*. National Roads Authority, Dublin;
- NRA (2008) 'Environmental Impact Assessment of National Road Schemes, A Practical Guide' National Roads Authority, Dublin;
- Murphy, D. (2004) *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites*. Eastern Regional Fisheries Board, Dublin;
- DOMNR (1998). *Fishery guidelines for Local Authority works*. Department of the Marine and Natural Resources, Dublin;
- H. Masters-Williams et al (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors (C532)*, CIRIA;
- E. Murnane, A. Heap and A. Swain. (2006) *Control of water pollution from linear construction projects. Technical guidance (C648)*, CIRIA; and
- E. Murnane et al., (2006) *Control of water pollution from linear construction projects. Site guide (C649)*, CIRIA.

3.3 BRIEF DESCRIPTION OF THE EUROPEAN SITES

Table 3.1 lists the SACs and **Table 3.2** lists the SPAs that are within 15km of the project area, and **Figure 3.1** shows their locations in relation to the proposed realignment works. There are six SACs and three SPAs within 15km of the Bridge.

The integrity of a European Site (referred to in Article 6.3 of the EU Habitats Directive) is determined based on the conservation status of the Qualifying Interests of the SAC or SPA. The Qualifying Interests for each site have been obtained through a review of the Conservation Objectives available from the National Parks and Wildlife Service (NPWS).

Table 3.1: SACs within 15km of the Proposed Bridge Realignment Works

Site Code	Site Name	Qualifying Habitats	Qualifying Species	Distance From Bridge ³	Connectivity
000365	Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC	<p>Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]</p> <p>Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130]</p> <p>Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260]</p> <p>Northern Atlantic wet heaths with Erica tetralix [4010]</p> <p>European dry heaths [4030]</p> <p>Alpine and Boreal heaths [4060]</p> <p>Juniperus communis formations on heaths or calcareous grasslands [5130]</p> <p>Calaminarian grasslands of the Violetalia calaminariae [6130]</p> <p>Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410]</p> <p>Blanket bogs (* if active bog) [7130]</p> <p>Depressions on peat substrates of the Rhynchosporion [7150]</p> <p>Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]</p> <p>Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]</p> <p>Taxus baccata woods of the British Isles [91J0]</p>	<p><i>Geomalacus maculosus</i> (Kerry Slug) [1024]</p> <p><i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029]</p> <p><i>Euphydryas aurinia</i> (Marsh Fritillary) [1065]</p> <p><i>Petromyzon marinus</i> (Sea Lamprey) [1095]</p> <p><i>Lampetra planeri</i> (Brook Lamprey) [1096]</p> <p><i>Lampetra fluviatilis</i> (River Lamprey) [1099]</p> <p><i>Salmo salar</i> (Salmon) [1106]</p> <p><i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]</p> <p><i>Lutra lutra</i> (Otter) [1355]</p> <p><i>Trichomanes speciosum</i> (Killarney Fern) [1421]</p> <p><i>Najas flexilis</i> (Slender Naiad) [1833]</p> <p><i>Alosa fallax killarnensis</i> (Killarney Shad) [5046]</p>	0km	Direct connectivity Beheenagh River is situated in the Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC

³ Measured in kilometres "as the crow flies"

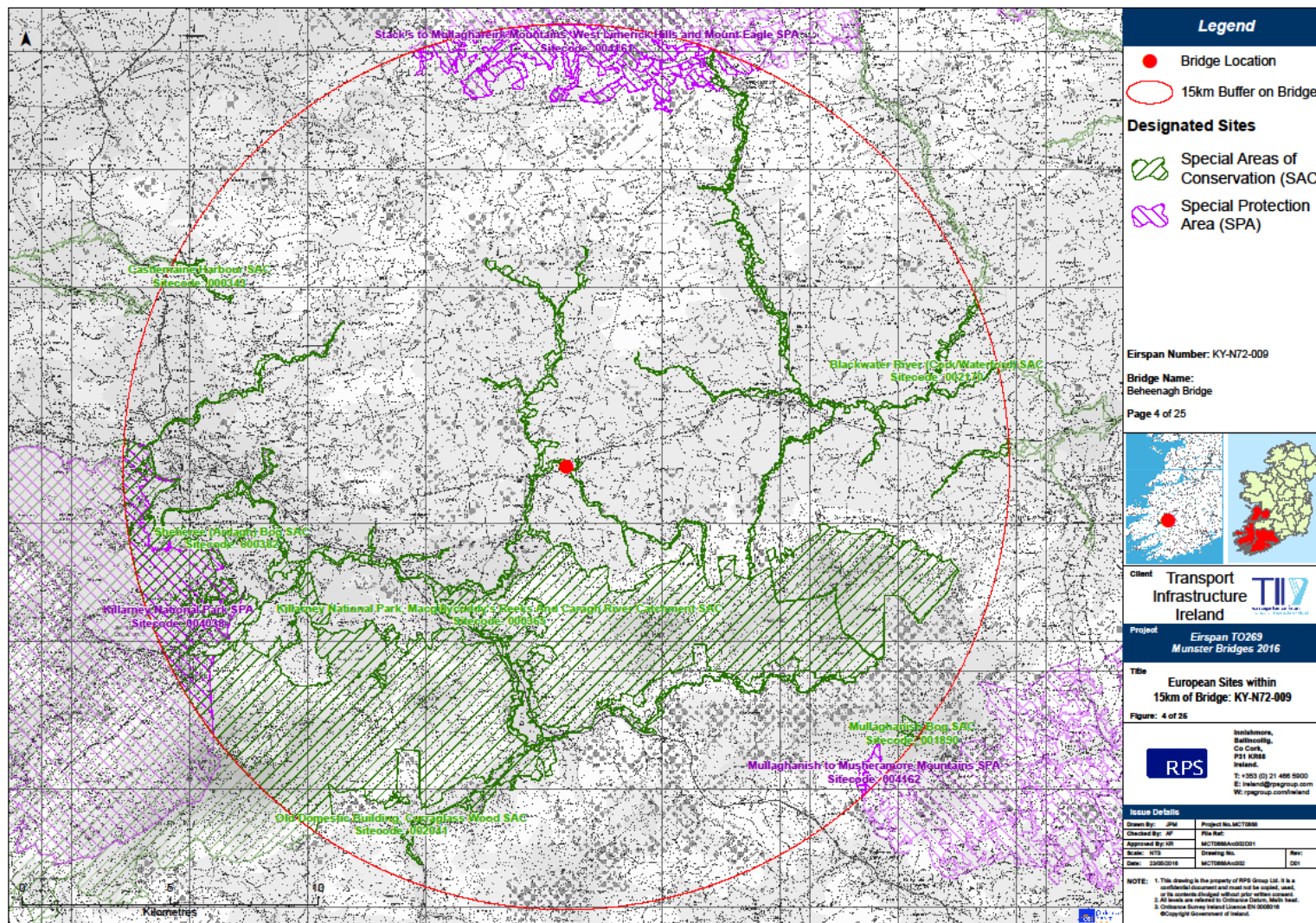
Site Code	Site Name	Qualifying Habitats	Qualifying Species	Distance From Bridge ³	Connectivity
002170	Blackwater River (Cork/Waterford) SAC	<p>Estuaries [1130]</p> <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Perennial vegetation of stony banks [1220]</p> <p>Salicornia and other annuals colonising mud and sand [1310]</p> <p>Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</p> <p>Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]</p> <p>Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</p> <p>*Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p> <p>*<i>Taxus baccat</i> woods of the British Isles [91J0] (*Priority Habitat)</p>	<p><i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029]</p> <p><i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]</p> <p><i>Petromyzon marinus</i> (Sea Lamprey) [1095]</p> <p><i>Lampetra planeri</i> (Brook Lamprey) [1096]</p> <p><i>Lampetra fluviatilis</i> (River Lamprey) [1099]</p> <p><i>Alosa fallax fallax</i> (Twaiite Shad) [1103]</p> <p><i>Salmo salar</i> (Salmon) [1106]</p> <p><i>Lutra lutra</i> (Otter) [1355]</p> <p><i>Trichomanes speciosum</i> (Killarney Fern) [1421]</p>	4.2km – East	No connectivity
000382	Sheheree (Ardagh) Bog SAC	<p>Active raised bogs [7110]</p> <p>Degraded raised bogs still capable of natural regeneration [7120]</p>		11.3km – West	No connectivity
000343	Castlemaine Harbour SAC	<p>Estuaries [1130]</p> <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Annual vegetation of drift lines [1210]</p> <p>Perennial vegetation of stony banks [1220]</p> <p>Salicornia and other annuals colonising mud and sand [1310]</p>	<p><i>Petromyzon marinus</i> (Sea Lamprey) [1095]</p> <p><i>Lampetra fluviatilis</i> (River Lamprey) [1099]</p> <p><i>Salmo salar</i> (Salmon) [1106]</p> <p><i>Lutra lutra</i> (Otter) [1355]</p> <p><i>Petalophyllum ralfsii</i> (Petalwort)</p>	12.6km – North West	No connectivity

Site Code	Site Name	Qualifying Habitats	Qualifying Species	Distance From Bridge ³	Connectivity
		<p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</p> <p>Embryonic shifting dunes [2110]</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]</p> <p>Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]</p> <p>Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>) [2170]</p> <p>Humid dune slacks [2190]</p> <p>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p>	[1395]		
002041	Old Domestic Building, Curraglass Wood SAC		<i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]	13.3km – South	No connectivity
001890	Mullaghanish Bog SAC	Blanket bogs (* if active bog) [7130]		14.1km – South East	No connectivity

Table 3.2: SPAs within 15km of the Proposed Bridge Realignment Works

Site Code	Site Name	Qualifying Feature Annex I species	Distance From Bridge	Connectivity
004038	Killarney National Park SPA	Merlin (<i>Falco columbarius</i>) [A098] Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]	11.7km – South	Remote indirect connectivity the Beheenagh River merges with the Owneykeagh River, which flows to the River Flesk and Lough Leane which is part of the Killarney National Park SPA [004038]
004161	Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	Hen Harrier (<i>Circus cyaneus</i>) [A082]	12.3km – North	No connectivity
004162	Mullaghanish to Musheramore Mountains SPA	Hen Harrier (<i>Circus cyaneus</i>) [A082]	14.1 – South East	No connectivity

Figure 3.3: European Sites within 15km of the Bridge Realignment Works



3.4 ASSESSMENT CRITERIA

3.4.1 Direct, Indirect or Secondary Impacts

Tables 3.1 and 3.2 list the European Sites within 15km of the proposed works. There are nine sites in all, six SACs and three SPAs. The proposed bridge works are situated within the Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment SAC.

There is no hydrological connectivity between the proposed works and Blackwater River (Cork/Waterford) SAC, Sheheree (Ardagh) Bog SAC, Castlemaine Harbour SAC, Old Domestic Building, Curraglass Wood SAC and Mullaghanish Bog SAC. Furthermore, these SAC's are situated a significant distance from the proposed works (between 4.2km and 14.1km) and will not be impacted either directly or indirectly. Therefore potential significant effects to these sites are no longer considered as part of this assessment.

Likewise, there is no hydrological connectivity between the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA and Mullaghanish and Musheramore Mountains SPA and the proposed works. These sites are located a significant distance from the proposed works (between 12.3km and 14.1km) and it is extremely unlikely that the qualifying species of these SPAs use the agriculturally improved lands and scrub in the vicinity of the proposed works. It is not anticipated that the proposed works would result in a significant increase in the level of background noise disturbance in the local areas. Any disturbance to bird species within nearby European Sites as a result of the proposed works is considered extremely unlikely. Furthermore, potential disturbances will be temporary and confined to the construction phase of the development only. Therefore, it is not anticipated that the proposed works will have a significant effect on Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA Mullaghanish and Musheramore Mountains SPA with regards to noise disturbance of birds.

The potential significant effects on European sites as a result of the proposed N72 bridge realignment works are primarily limited to those incurred due to a change in water quality in the underlying water course and in turn the Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC, as detailed below.

Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC

This very large site encompasses the mountains, rivers and lakes of the Iveragh Peninsula and the Paps Mountains, which stretch east from Killarney towards Millstreet. Overall, the site is of high ecological value because of the diversity, quality and extensiveness of many of the habitats, and impressive list of rare species of flora and fauna⁴.

The generic conservation objectives for Killarney National Park SAC are provided in the Conservation Objectives document available on the NPWS website, as follows:

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000365.pdf.

For this report the version consulted was: Version 5.0, 15/08/2016.

⁴ Killarney National Park SAC: Site synopsis, Version date 20.08.2013.

The qualifying habitats and species of Killarney National Park SAC are listed in **Table 3.1**.

The aquatic ecology survey conducted at Beheenagh Bridge in July 2016 found that numerous salmonids were present in runs in the vicinity of the bridge. The Beheenagh River provides ideal salmonid nursery habitat at the location of the bridge, with pockets of spawning habitat potential for salmon, trout and lampreys. Lamprey nursery habitat was lacking owing to the high energy nature of the channel and general absence of accumulated silty sediments in which ammocoetes could burrow. The plant community observed in the vicinity of the bridge would correlate with Callitricho-Batrachion sub-type CB6a of Annex I Habitat 3260 characteristic of fast flowing, bryophyte dominated, upland rivers. There is, therefore, a risk of direct impact on salmonids, lamprey and floating vegetation habitat in proximity to the bridge as a result of construction activities, as detailed in **Table 3.3**.

Table 3.3: Summary of Potential Impacts on Aquatic Species

Proposed Works	Potential Impact
Bridge Widening/Replacement <ul style="list-style-type: none"> Provision of traffic management including a bailey bridge, site clearance and erection of contractor's compound; Earthworks (import and export of fill materials) for the construction of the widened road base and embankments; Provision of water management: the existing river shall be dammed and flumed to allow the foundations for the bridge extension to be constructed; Excavation for the new bridge foundations; Construction of new in-situ concrete bridge foundations, abutments and bridge deck; Application of bridge deck waterproofing and installation of new bridge parapets and safety barrier; Masonry cladding to the widened reinforced concrete section Provision of new road surfacing and lines on the widened road; Topsoiling and grass seeding of the widening bridge embankments; Demobilisation from site and removal of traffic management; and Standard Environmental Protection Measures. 	<p>This is a locally high value salmonid river (including for salmon). There is potential for indirect medium term negative impacts downstream of the bridge in association with wet concrete and mortar usage (bridge widening/reinforcing/ paved verge construction, repointing), entering the watercourse from the works area. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Species affected in Beheenagh River would be Annex II species, Atlantic salmon, and other salmonids (brown trout) and possibly Annex II species river/brook lampreys.</p> <p>Slight temporary negative impacts could arise locally from sediment washout to the river associated with site clearance for bridge/road widening. The majority of the riverine habitat downstream of the bridge is fast flowing and would not favour silt accumulation and smothering of habitat, but elevated levels of suspended solids (>25mg/l) can stress and abrade gills of salmonid fishes.</p> <p>There could be a direct impact on migration of salmonids (salmon) and lampreys depending on timing of works owing to a high level of engineering activity at the bridge.</p> <p>Bridge widening/replacement will require that the works area be dewatered meaning a temporary loss of habitat for fish beneath the bridge. Although the existing bridge footprint is reinforced masonry/stone blockwork, salmonids may use this area and would certainly be present in the downstream riffle area. When dams are introduced, fish may be trapped within the proposed dry working area and they will die when the channel is dewatered.</p> <p>During the operational phase, there is potential for significant impact at a local scale if the new bridge footprint is not passable by fish. This can occur if bed reinforcement creates an overly shallow, overly wide flow regime, and especially if there is a high downstream apron that can act as an impassable barrier to lampreys and salmon.</p> <p>Direct impact to the plant community Callitricho-Batrachion sub-type CB6a of Annex I Habitat 3260, which is present in the vicinity of the bridge.</p>

A reduction in water quality due to sedimentation, release of suspended solids and pollutants such as concrete and mortar may impair plant growth and impact on salmonid and lamprey spawning habitat. This could have knock-on effects further up the food chain on invertebrates, birds, fish and mammals. A reduction in water quality may also impact on otters within and downstream of the study area. Should large quantities of suspended solids enter waterbodies in the vicinity of the proposed development it could potentially affect the riverine habitat and associated protected species and habitats. An accidental spillage and release of hydrocarbons to sensitive watercourses in the immediate surroundings could have significant adverse impacts on protected species within the Beheenagh River. In addition, the potential spillage and release of hydrocarbons from plant equipment during the construction phase may arise.

The proposed realignment works have been designed with stringent protective measures built into the works methodology (work during periods of low flow, careful handling of fuels and lubricants, appropriate disposal of contaminants etc.) as detailed in **Appendix A**. These measures have been designed to ensure that the water quality of the underlying watercourse is protected during the proposed works. Such measures to protect waterbodies will ensure that the water quality of the Beheenagh River and the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC are protected from the works. Likewise, such measures will also ensure that adverse impacts to water dependent species such as salmon and lamprey are avoided.

Should these best practice measures (as outlined in **Appendix A**) be followed during the works, it is not anticipated that the proposed works will result in any potential discharges to the Beheenagh River and in turn, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC. These protective measures were built into the works design in order to protect the salmonid and lamprey populations as identified in the aquatic survey (see **Appendix B**) as these are qualifying species of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC which is directly connected with the site. These measures will also in turn protect other species and habitats of concern, such as otter and floating vegetation.

IFI have been consulted in relation to the proposed works and will monitor the works. Electrofishing is required prior to the localised and temporary drying out of the river and a suitably qualified person shall be present during the damming and drying out to rescue and relocate any fish that become stranded by the operation (see **Appendix A**). These measures have been incorporated into the works to ensure the protection of salmonid species and lamprey from direct impact during the construction phase.

As noted in **Section 3.2.1**, the widened bridge footprint within the river will be of a similar nature to that already in existence, which allows for fish migration through the central arches. The bed design allows for passage of all species and will be reflective of the existing natural river bed. Further, instream works will be undertaken between 1st June and 30th September. Therefore, no impediment to passage for lamprey, salmon or otter is anticipated to arise from the proposed works during the construction or operational phases.

The aquatic plant community present downstream of the bridge (pertaining to Habitat 3260 Type CB6a) is considered by Hatton-Ellis & Grieve⁵ to be less vulnerable to indirect adverse impacts as a result of any sediment loss that may arise during works given the high energy river type in which it occurs. There may be a direct, but temporary loss of a very small area of this habitat in the

⁵ Hatton-Ellis, T. W. and Grieve, N. (2003). Ecology of Watercourses Characterised by Ranunculion fluitantis and Callitricho-Batrachion Vegetation. Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough.

immediate footprint of works, but in general it does not occur in the main footprint of the new bridge upstream of the existing structure. Regrowth of this habitat will occur fairly quickly once works are complete (within 1 or 2 growing seasons); therefore no significant adverse effects to this habitat are anticipated to arise as a result of the proposed works.

Killarney National Park SPA

As noted above, should the best practice measures built into the project design (as outlined in **Appendix A**) be followed during the works, it is not anticipated that the proposed works will result in any potential discharges to Beheenagh River. This in turn will protect the water quality of Killarney National Park SPA, which is approximately 22km downstream of the Bridge. It is extremely unlikely that the qualifying species of this SPA are using the improved grassland and scrub in the vicinity of the proposed works. It is not anticipated that the proposed works would result in a significant increase in the level of background noise disturbance in the local areas. Any disturbance to bird species within nearby European Sites as a result of the proposed works is considered extremely unlikely. Furthermore, potential disturbances will be temporary and confined to the construction phase of the development only. Therefore, it is not anticipated that the proposed works will have a significant effect on Killarney National Park SPA with regards to noise disturbance of birds.

Taking into account the nature of the works, the protective measures incorporated into the project design and potential for impact downstream, it is not anticipated that the proposed realignment works will have a significant effect on any European Site.

3.4.2 Cumulative and in Combination Impacts

It is a requirement of Appropriate Assessment that the cumulative or in-combination effects of the proposed development together with other plans or projects are assessed. Cumulative impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments, or as the combined effect of a set of developments, taken together⁶.

The measures incorporated into the methodology for the proposed bridge realignment works were developed to ensure the protection of all waterbodies. It is not anticipated that the proposed works will result in any impacts on any European Site. **Table 3.4** lists those potential Projects or Plans which may contribute to cumulative or in-combination impacts.

⁶ Scottish Natural Heritage (2012) Guidance: Assessing the cumulative impact of onshore energy developments. SNH.

Table 3.4: List of Potential Plans and Projects which may contribute to Cumulative Impacts

Name of Plan or Project	Key Issues Directly Linked to Relevant European Sites	Potential Cumulative or In-Combination Impacts
Kerry County Development Plan 2014-2020	<p>The core strategy of the plan includes:-</p> <ul style="list-style-type: none"> Set out a vision and blueprint for the future sustainable development of the County Protect and conserve the heritage of the County Protect and support rural areas through careful management of physical and environmental resources Support sustainable agriculture and agricultural related development in County Kerry Support sustainable tourism development in Kerry Promote and support the integration of land use and transport Integrate measures to adapt to and mitigate against climate change in all policies Ensure that future development patterns accord with the sustainable management of water resources. 	Positive Impacts
Tralee/Killarney Hub Functional Area Local Area Plan 2013-2019	<p>Tralee/Killarney is designated under the National Spatial Strategy as a Hub which is described as a focal point for the County's development in a National context and identified to promote balanced regional development.</p> <p>The policies and objectives of the Tralee/Killarney Hub Functional Area Local Area Plan are intended to contribute to the delivery of sustainable development of each settlement within the Plan.</p>	Positive Impacts
South West River Basin Management Plan	The RBMPs aim to protect, improve and manage the water bodies within each river basin sustainably.	Positive Impacts
NPWS Conservation Management Plans	Generic Conservation objectives have been published for the Killarney National Park SAC and SPA.	Positive Impacts
<p>Planning Search – Kerry County Council:</p> <p>http://www.kerrycoco.ie/en/allservices/planning/onlineplanningenquiry</p>	<p>Local planning applications that may have a cumulative or in-combination impact with the proposed emergency works.</p> <p>No planning applications of relevance to the proposed realignment works were found.</p>	None

No other pathways have been identified which could contribute to cumulative or in-combination effects.

Table 3.5 identifies the direct, indirect and secondary impacts of the proposed realignment works at the Bridge on European Sites within a 15km buffer zone of the bridge.

Table 3.5: Potential Significant Effects on European Sites from the Proposed Bridge Realignment Works

Site Name	Direct Impacts	Indirect/ Secondary	Resource Requirements (Drinking Water Abstraction, etc.)	Emissions (Disposal to Land, Water or Air)	Excavation Requirements	Transportation Requirements	Duration of Construction, Operation, Decommissioning
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Blackwater River (Cork/Waterford) SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Sheheree (Ardagh) Bog SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Castlemaine Harbour SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Old Domestic Building, Curraglass Wood SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Mullaghanish Bog SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Killarney National Park SPA	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Mullaghanish to Musheramore Mountains SPA	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest

3.4.3 Likely Changes to the European Site(s)

The likely changes that will arise from the proposed realignment works to Beheenagh Bridge have been examined in the context of a number of factors that could potentially affect European Sites. Overall, it has been found that the implementation of the proposed realignment works to the Bridge near Barraduff, Co. Kerry will not have a significant effect on European Sites (**Table 3.6**):-

Table 3.6: Likely Effect on European Sites

Site Name	Reduction of Habitat Area	Disturbance to Key Species	Habitat or Species Fragmentation	Reduction in Species Density	Changes in Key Indicators of Conservation Value (Water Quality, etc.)	Climate Change
Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC	None	None	None	None	None	None
Blackwater River (Cork/Waterford) SAC	None	None	None	None	None	None
Sheherree (Ardagh) Bog SAC	None	None	None	None	None	None
Castlemaine Harbour SAC	None	None	None	None	None	None
Old Domestic Building, Curraglass Wood SAC	None	None	None	None	None	None
Mullaghanish Bog SAC	None	None	None	None	None	None
Killarney National Park SPA	None	None	None	None	None	None
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	None	None	None	None	None	None
Mullaghanish to Musheramore Mountains SPA	None	None	None	None	None	None

3.4.4 Elements of the Project where the Effects are Likely to be Significant

No elements of the proposed realignment works to the Bridge are likely to cause significant effects on European Sites.

4 SCREENING CONCLUSIONS AND STATEMENT

The likely impacts that will arise from the proposed realignment works to the Beheenagh Bridge in County Kerry (KY-N72-009), have been examined in the context of a number of factors that could have a significant effect on European Sites. None of the sites within 15km of the works area, or any other European Site, will be adversely affected. A finding of No Significant Effects Matrix has been completed and is presented in Section 4 of this Screening Statement.

On the basis of the findings of this Screening for Appropriate Assessment of European Sites, it is concluded that the proposed realignment works to the Beheenagh Bridge in County Kerry (KY-N72-009), will not have a significant effect on the Natura 2000 network and a Stage 2 Appropriate Assessment is not required.

5 FINDING OF NO SIGNIFICANT EFFECTS REPORT MATRIX

Name of Project or Plan	AA Screening of Realignment Works to Beheenagh Bridge, Co. Kerry.
Name and Location of European Site	<ul style="list-style-type: none"> ▪ Killarney National Park, Macgillicuddy's Reeks And Caragh River Catchment SAC ▪ Blackwater River (Cork/Waterford) SAC ▪ Sheheree (Ardagh) Bog SAC ▪ Castlemaine Harbour SAC ▪ Old Domestic Building, Curraglass Wood SAC ▪ Mullaghanish Bog SAC ▪ Killarney National Park SPA ▪ Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA ▪ Mullaghanish to Musheramore Mountains SPA
Description of the Project or Plan	<ul style="list-style-type: none"> ▪ Initial set-up and site clearance (site clearance limited to minor vegetation removal for access). ▪ Set up water management - dam and flume the watercourse through the existing structure. ▪ Re-point the existing masonry arch barrel using NHL mortar applied hand or spray applied (subject to contractor methodology). ▪ Excavate of the new bridge foundations ▪ Construction of new in situ concrete bridge foundations, abutments and bridge deck. ▪ Implementation of standard environmental operating procedures. ▪ Remove water management and demobilise.
Is the project or plan directly connected with or necessary to the management of the site?	No.
Are there other projects or plans that together with the project or plan being assessed could affect the site?	No.
The Assessment of Significance of Effects	
Describe how the project or plan (alone or in combination) is likely to affect the European Site.	The proposed realignment works to the Beheenagh Bridge (KY-N72-009), Co. Kerry are not likely to affect any site that makes up the Natura 2000 network.
Explain why these effects are not considered significant.	<p>The potential significant effects on European sites as a result of the proposed bridge replacement works are primarily limited to those incurred due to a change in water quality in the underlying water course and in turn Killarney National Parks, Macgillicuddy Reeks and Caragh River Catchment SAC.</p> <p>The proposed bridge works have been designed with stringent protective measures built into the works methodology (e.g. careful handling of fuels and lubricants, appropriate disposal of contaminants etc.). In addition, all works will be conducted in consultation with Inland Fisheries Ireland (IFI) and a suitably qualified ecologist will be present during any dewatering of the river. These measures have been designed to ensure that the water quality of the underlying watercourse is protected during the proposed works. Such measures to protect waterbodies will ensure that the water quality of the Beheenagh River and in turn the SAC are protected. Such</p>

Name of Project or Plan	AA Screening of Realignment Works to Beheenagh Bridge, Co. Kerry.
	measures will also ensure that adverse impacts to water dependent species such as Salmon and Lamprey are avoided. Should these best practice measures be followed during the works, it is not anticipated that the proposed works will result in any potential discharges to the Beheenagh River and in turn, the SAC. These protective measures were built into the works design in order to protect the salmonid and Lamprey population as identified in the aquatic survey (see Appendix B) as Salmon and Lamprey are qualifying species of the Killarney National Parks, Macgillycuddy Reeks and Caragh River Catchment SAC. These measures will also protect other species of concern, such as Otter and habitats such as floating vegetation. Further, the use of electrofishing prior to works and the inclusion of an appropriate river bed design will ensure that no significant effects on Salmon and Lamprey will arise as a result of the proposed works. Taking into account the extensive protective measures incorporated into the project design (see Appendix A), it is not anticipated that the proposed realignment works will have a significant effect on any European Site.
List of agencies consulted: provide contact name and telephone or e-mail address.	Inland Fisheries Ireland, Sunnyside House, Macroom, Co. Cork.
Response to consultation.	<p>IFI would prefer if the bridge extension did not interfere instream or to such an extent on the river bed as the footprint of the abutments require. Salmon will have to be removed and transferred to another location in the river prior to any dewatering at the site.</p> <p>The Method Statement should include a section to address fish removal whereby authorised persons are contracted for the purpose of electrofishing /fish transfer. To ensure their availability with the requisite authorisations a competent operator should be sourced at an early date to allow works proceed as and when required.</p> <p>The river bed apron under the existing bridge is an exceptionally good fish habitat which must be maintained and IFI may require that this be replicated upstream under the new extension.</p> <p>The timing for start to completion of instream works on this river is from 1st June- 30th September.</p>
Data Collected to Carry Out the Assessment	
Who carried out the assessment?	RPS
Sources of data	NPWS Database Information from RPS Engineering Department.
Level of assessment completed	Desktop
Where can the full results of the assessment be accessed and viewed?	Kerry County Council
Overall Conclusion	Stage 1 Screening indicates that the proposed realignment works on the Beheenagh Bridge (KY-N72-009), Co.Kerry, will not have a significant negative impact on the Natura 2000 network. Therefore, a Stage 2 'Appropriate Assessment' under Article 6(3) of the Habitats Directive 92/43/EEC is not required.

APPENDIX A

PROPOSED WORKS DRAWINGS



KERRY COUNTY COUNCIL

Kerry, Cork & Clare Bridge Rehabilitation Works 2016 - Part 8 Planning

ST11 Beheenagh Bridge KY-N72-009

DECEMBER 2016

DRAWINGS :-

BR0000c	ST11 Beheenagh Bridge KY-N72-009
BR0007c	ST11 Beheenagh Bridge KY-N72-009
BR1103	ST11 Beheenagh Bridge KY-N72-009
BR1104	ST11 Beheenagh Bridge KY-N72-009
BR1105	ST11 Beheenagh Bridge KY-N72-009

INDEX SHEET
BRIDGE LOCATION
PROPOSED OVERALL LAYOUT
PROPOSED BRIDGE (Sheet 1 of 2)
PROPOSED BRIDGE (Sheet 2 of 2)

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KERRY
COUNTY
COUNCIL

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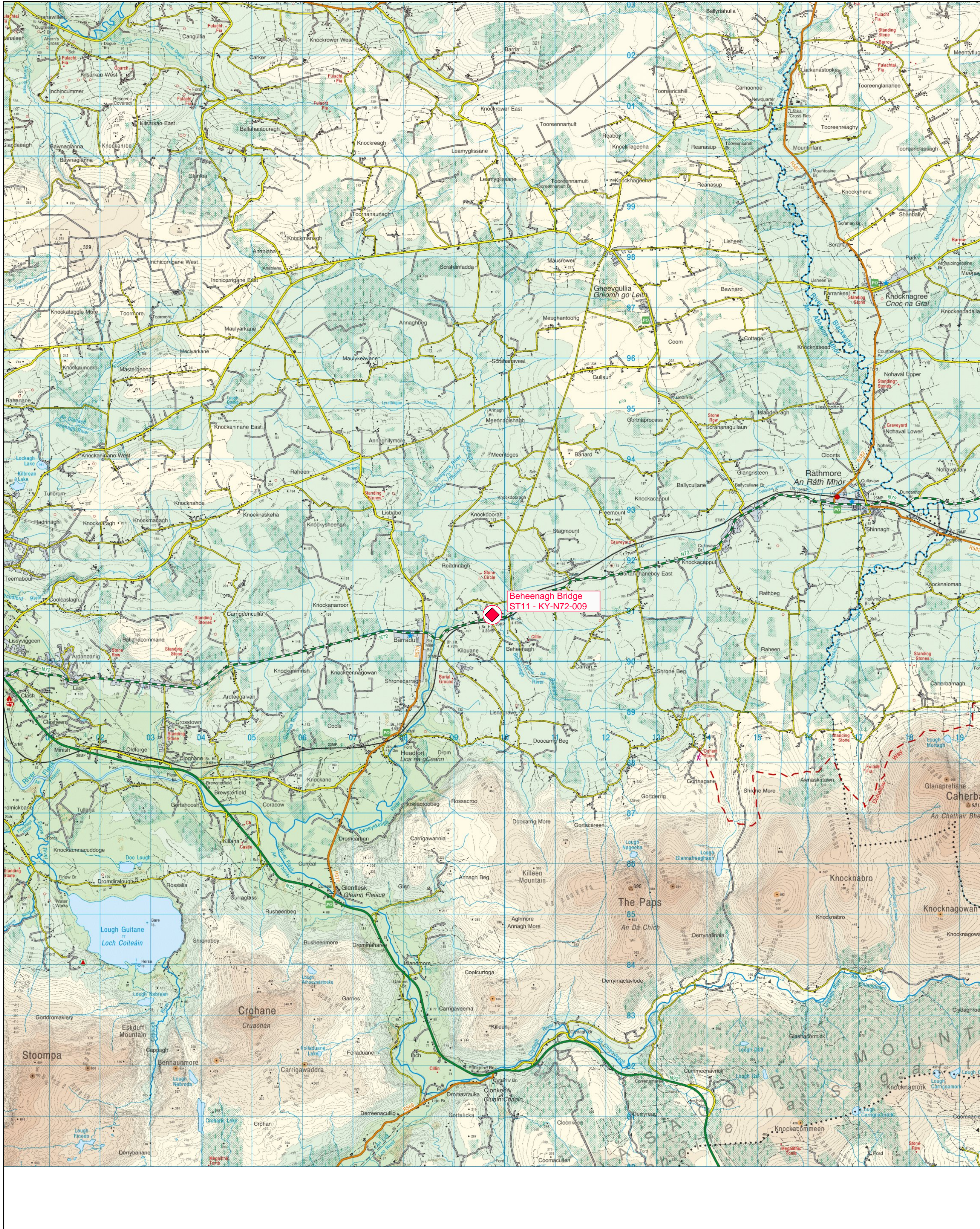
No.	Date	by	App	Amendment / Issue
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P02	Nov.'16	DC/EC		Issue For Part 8
P01	Nov.'16	DC/EC		Issue For Part 8



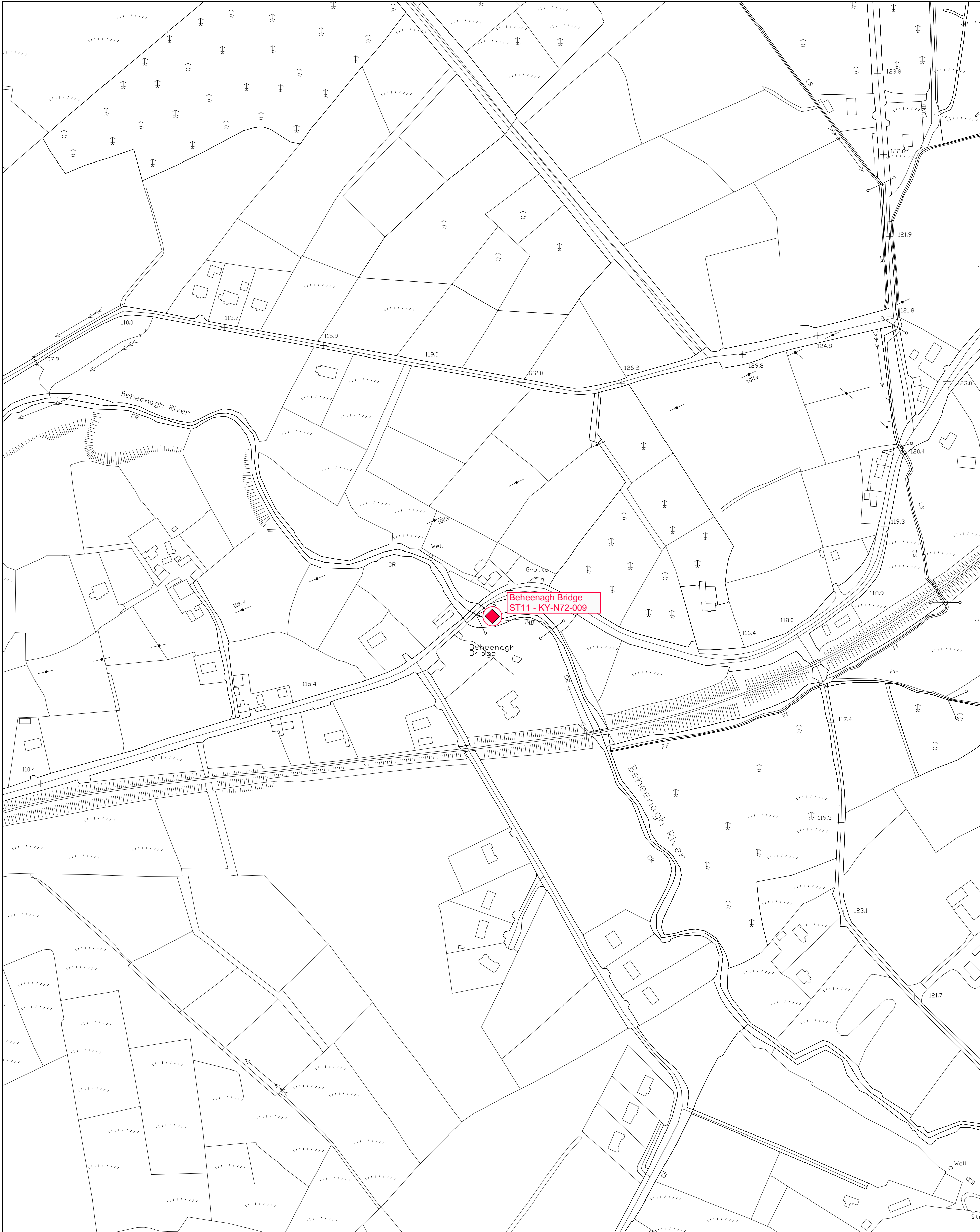
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Drawn DC	Project
Checked TC	Eirspan TO 269
Approved KR	Munster Bridges 2016
Date Nov. 2016	Title
Scale Half @ A3	ST11 Beheenagh Bridge KY-N72-009
Shown @ A1	Bridge Location
Job No. MCT0668	File Ref. MCT0668BR0000.dwg
Drg. No. BR0000c	Rev P03

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LOCATION PLAN
(Scale 1 : 50,000)



LOCATION PLAN
(Scale 1 : 2,500)

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P01	Nov.'16	EC	Issue For Part 8	KR	
No.	Date	DC/EC	Amendment / Issue	App	



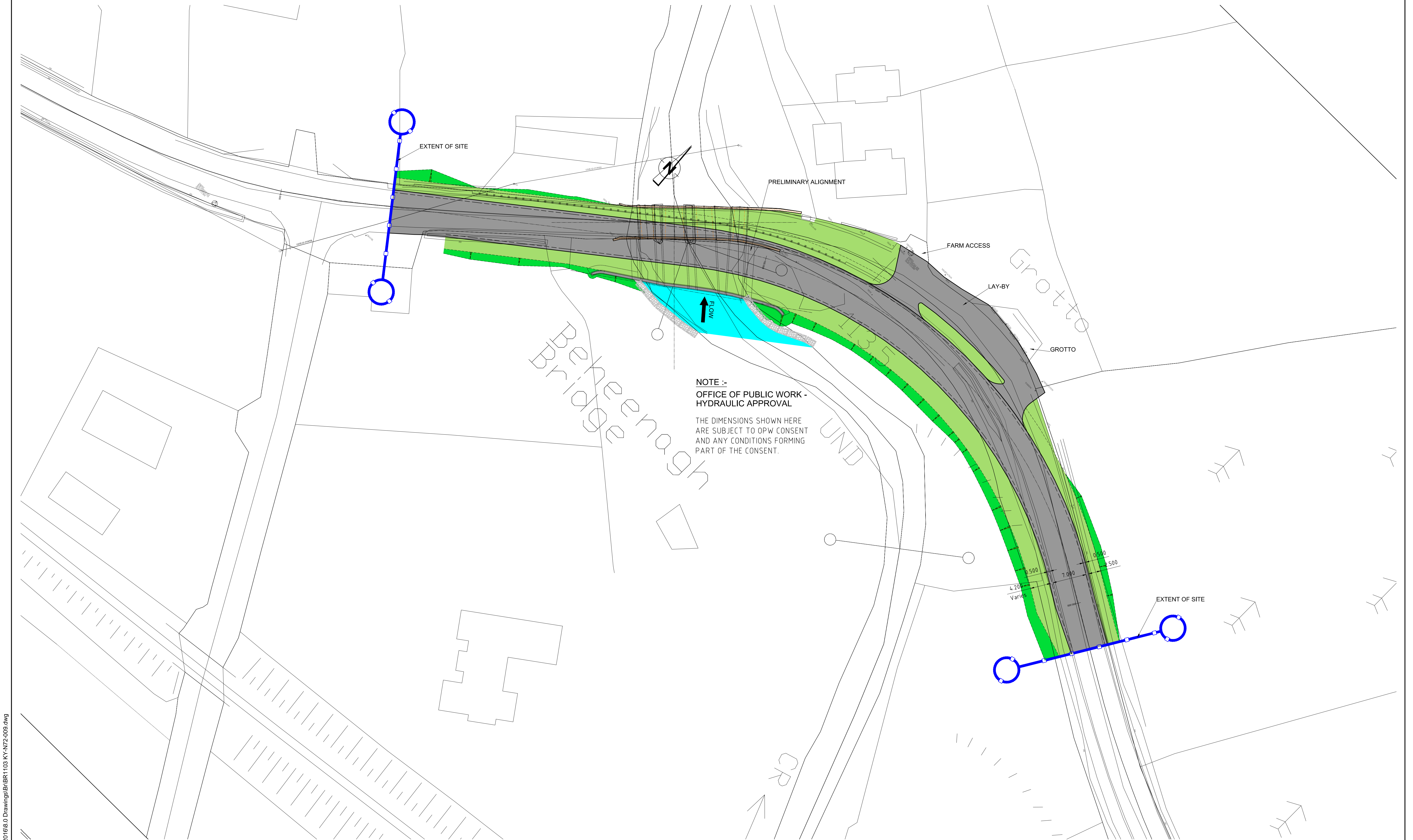
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Checked	KR
Approved	KR
Date	Nov. 2016
Scale	Half @ A3
Shown	@ A1
Job No.	MCT0668

Project	Eirspan TO 269 Kerry, Cork & Clare Bridge Rehabilitation Works 2016
Title	ST11 Beheenagh Bridge KY-N72-009 Bridge Location
File Ref.	MCT0668BR0007.dwg
Drg. No.	BR0007c
Rev	P02

R:\MCT0668 - Eirspan TO269 Munster Bridges 2016\8.0 Drawings\BR1103 KY-N72-009.dwg



PLAN LAYOUT - OVERALL SCHEME
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No.	Date	Dr/Iss	Amendment / Issue	App
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P01	Nov.'16	DC/EC	Issue For Part 8	KR
D01	Oct.'16	DC/EC	Draft Issue For Discussion	KR



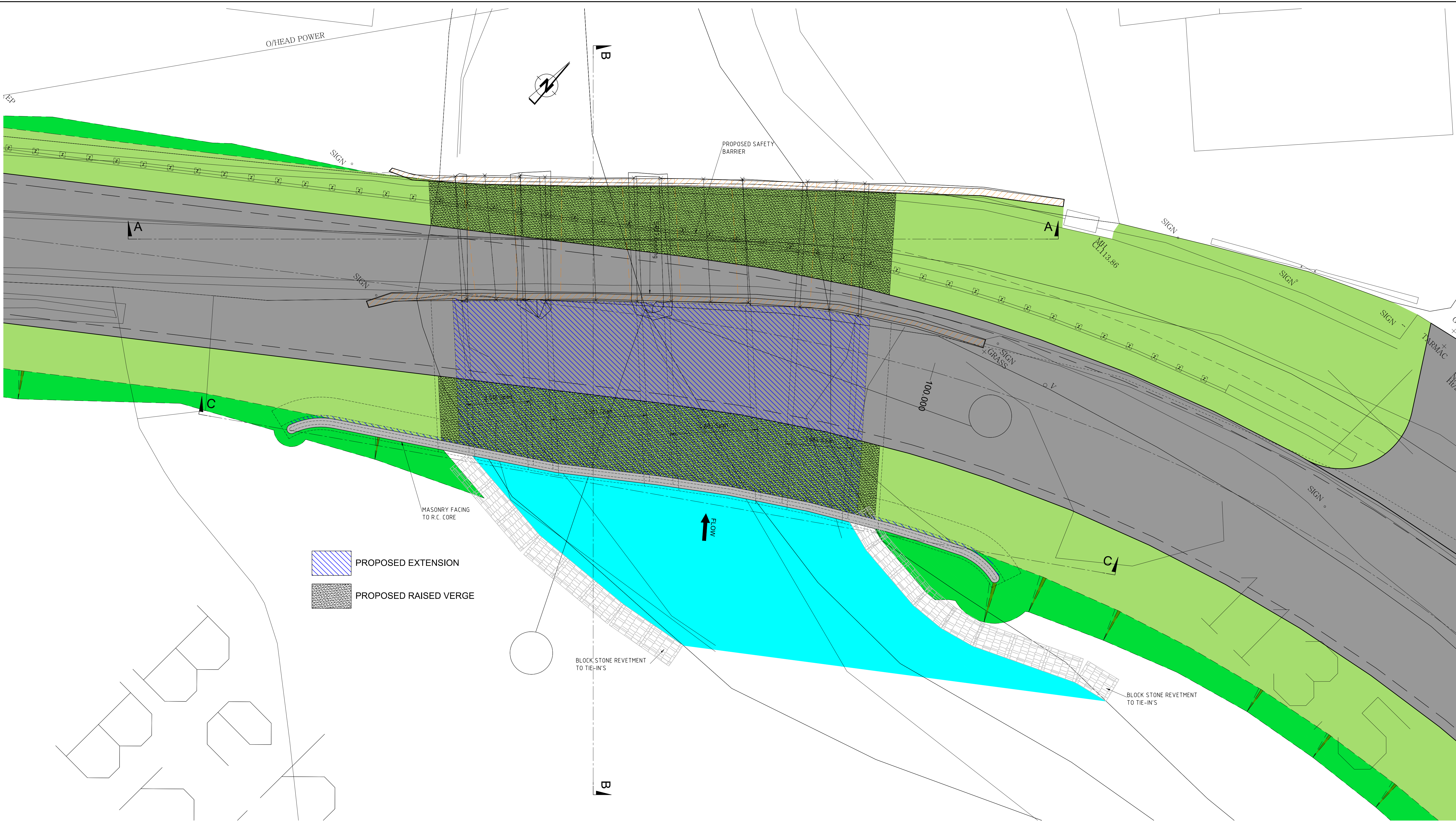
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Approved	KR
Date	Oct. 2016
Scale	Half @ A3
Shown	@ A1
Job No.	MCT0668

Project	Eirspan TO 269 Kerry, Cork & Clare Bridge Rehabilitation Works 2016
Title	ST11 Beheenagh Bridge KY-N72-009 Proposed Overall Plan
File Ref.	BR1103 KY-N72-009.dwg
Drg. No.	BR1103
Rev	P02

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PLAN LAYOUT
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P01	Nov.'16	DC	EC	KR
D01	Oct.'16	DC	EC	KR
No.	Date	by	chk	App



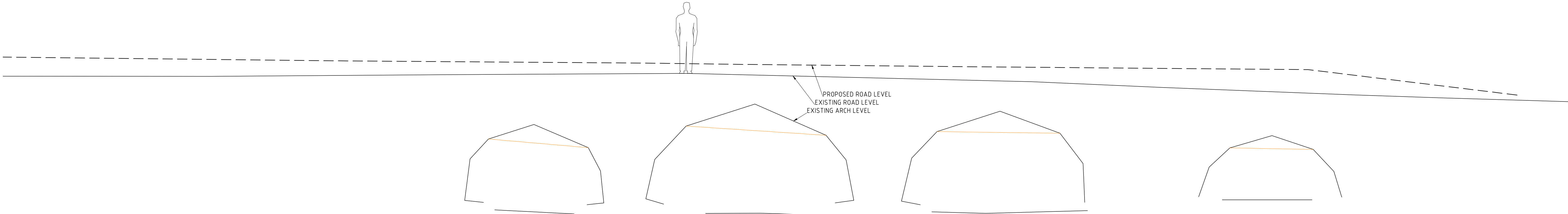
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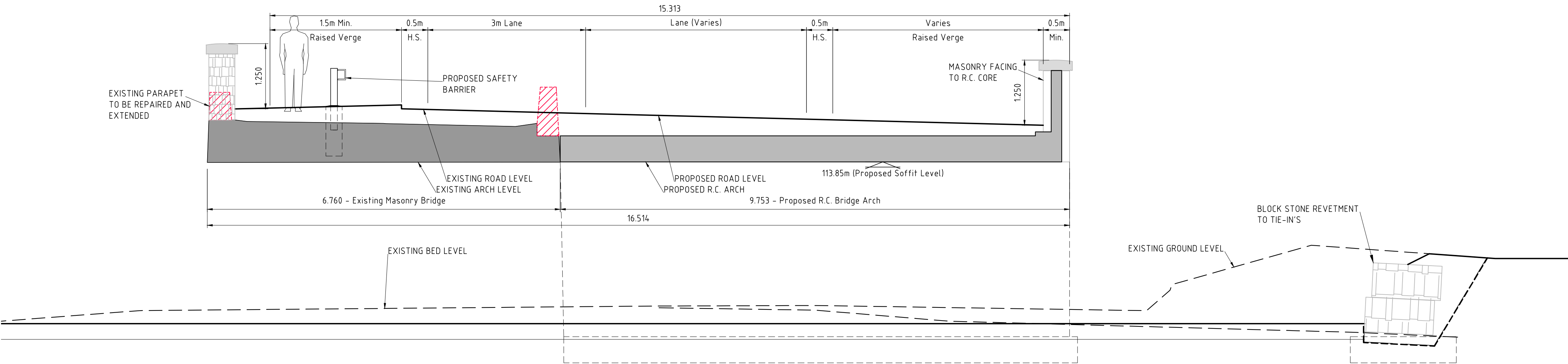
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Approved	KR
Date	Oct. 2016
Scale	Half @ A3
Shown	@ A1
Job No.	MCT0668

Project	Eirspan TO 269 Kerry, Cork & Clare Bridge Rehabilitation Works 2016
Title	ST11 Beheenagh Bridge KY-N72-009 Proposed Bridge (Sheet 1 of 2)
File Ref.	BR1103 KY-N72-009.dwg
Drg. No.	BR1104
Rev	P02

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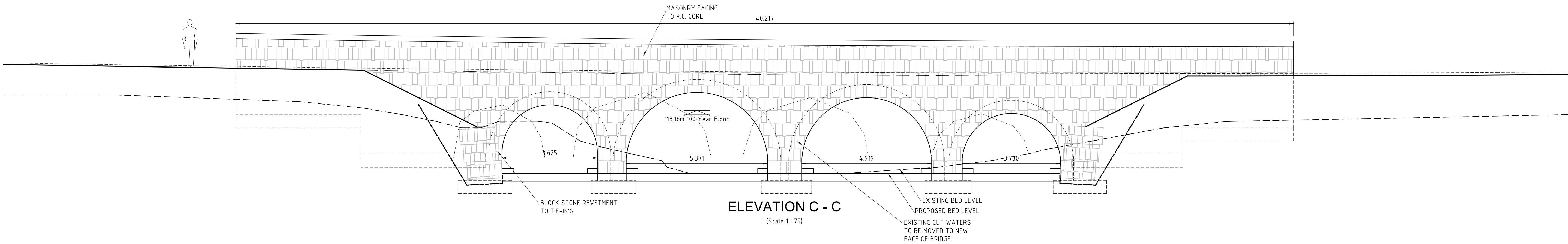


SECTION A - A
(Scale 1: 50)



EXISTING TO BE REMOVED / REPAIRED

SECTION B - B
(Scale 1: 50)



ELEVATION C - C
(Scale 1: 75)

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No.	Date	By	App	Amendment / Issue
P02	Nov.'16	DC	EC	Issue For Part 8
P01	Nov.'16	DC	EC	Issue For Part 8
D01	Ocl.'16	DC	EC	Draft Issue For Discussion
No.	Date	By	App	Amendment / Issue



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Date	Oct. 2016
Scale	Half @ A3
Shown	@ A1
Job No.	MCT0668

Project	Eirspan TO 269 Kerry, Cork & Clare Bridge Rehabilitation Works 2016
Title	ST11 Beheenagh Bridge KY-N72-009 Proposed Bridge (Sheet 2 of 2)
File Ref.	BR1103 KY-N72-009.dwg
Drg. No.	BR1105
Rev	P02

APPENDIX A

METHOD STATEMENT

1.1 SCOPE OF METHOD STATEMENT FOR THE PROTECTION OF AQUATIC ECOLOGY AND FISHERIES

This Generic Method Statement comprises the Principal Control Measures to safeguard the ecological integrity of the watercourses spanned by the bridge, protection of environment and the avoidance of pollution. Health and Safety Requirements are not included in this method statement as discussed below.

The preparation of a site specific Method Statement is subject to detailed design and finalisation by the appointed Contractor(s) and should not be taken as definitive but as a minimum requirement. It is not the purpose of this Generic Method Statement to reproduce or replace arrangements and procedures that shall be produced by a Contractor that shall be appointed to the Construction Stage (as PSCS), and where appropriate this Generic Method Statement shall be considered in that light and shall updated or even replaced by a more detailed and further considered document used by the appointed Contractor to manage safety, health and the environment dependant on the Contractor(s) proposed construction methodology

The proposed works shall be undertaken by a Contractor(s), suitably appointed through a tendering process that has demonstrated their experience in undertaking similar bridge rehabilitation /widening works adjacent to watercourses.

Note: the term Contractor in this Generic Method Statement refers to the appointed Contractor or Contractors and the term Site Representative (SR) is used throughout the Plan to represent the Contractor's person in charge of the project i.e. the Project Manager, Construction Manager, Site Manager, Site Agent or Environmental Officer as appointed by the Contractor.

The safety and health component of the Method Statement is not included here and shall be prepared by the contractor in accordance with the Safety, Health and Welfare at Work (Construction) Regulations.

1.2 GENERAL MEASURES

The following text sets out in summary the general measures that will be incorporated into the Contractor Method Statements and how they will be implemented on site:-

- Except where absolutely necessary, machinery will operate from the bank side and not in-stream;
 - Machinery used will not be refuelled near the river and no fuels, oils etc. will be stored on-site;
 - No hedgerows or trees will be removed between 1st March and 31st August as per the Wildlife Act;
 - Wash-down water from exposed bridge surfaces will be trapped to allow sediment to settle out and reach neutral pH before clarified water is released to the river or drain system or allowed to percolate into the ground;
 - Raw or uncured waste concrete will be disposed of by removal from the site;
 - Fuels, lubricants and hydraulic fluids for equipment used on the site, as well as any solvents, oils, and paints shall be carefully handled to avoid spillage, properly secured against
-

unauthorised access or vandalism, and provided with spill containment according to codes of practice;

- Any spillage of fuels, lubricants or hydraulic oils must be immediately contained and the contaminated soil removed from the site and properly disposed of;
- Waste oils and hydraulic fluids must be collected in leak-proof containers and removed from the site for disposal or re-cycling;
- Mixing of concrete must be carried out away from watercourses;
- Run off from machine service and concrete mixing areas must not enter the watercourse;
- All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) must be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species such as Japanese knotweed, Rhododendron and Himalayan Balsam; and
- Generation of dust will be controlled during the demolition of the bridge structure through use of bowsers/wetting down as appropriate.

1.3 SEQUENCE OF WORKS

The works must be undertaken in consultation with IFI and under supervision of IFI or a suitably appointed ecologist.

1.3.1 Site Preparation

The contractor must:

- Liaise with the Inland Fisheries Ireland (IFI) and National Parks and Wildlife Service (NPWS) before any works commence.
- Mobilise on site and setup traffic management.
- Undertake site clearance in preparation for widened road embankments including removal of existing vegetation under the footprint of the new road embankments and contractors compound.

1.3.2 Water Management

The installation of the water management shall be carefully planned and executed by skilled operatives with experience in the installation of Water Management to avoid any negative impacts on the watercourse arising from the introduction of silt or sediment due to sandbags being damaged while being placed.

- The existing watercourse shall be dammed at a suitable location approximately 5-15m upstream of the new upstream elevation.
 - Damming of the watercourse will be undertaken at a period of low flow.
 - The dam shall be constructed by laying sheets of heavy duty polythene in the river bed on which 1 tonne sandbags shall be placed. The polythene shall then be returned over the sandbags to prevent water ingress between the bags.
-

-
- A large diameter pipe shall be used to flume the water through the existing structure and it shall discharge a suitable distance downstream of the structure, approximately 5-10m downstream.
 - For the duration of the installation of the water management water levels shall be monitored and if required water shall be over pumped from the dam set up area to downstream of the structure to ensure that downstream flows are not stopped or significantly interrupted.
 - Sand-bags will be clean and of good integrity, preferably fully sealed (i.e., composed of high grade polythene, not webbing or hessian) and will be filled with clean, coarse grade sand with no fines.
 - On completion of the fluming arrangement a sump shall be constructed and a pump shall be used to remove any water seepage from river bed area that that has now been bypassed.
 - This water shall be pumped to a suitable location away from the watercourse and shall be allowed to settle in a soakaway.
 - At no time will contaminated water from the working area be pumped directly to the river/stream.

During dewatering, pumps used on-site should have a grill to help prevent fish being sucked into pipes.

1.3.3 Construction Works

- On completion of the water management excavation for the new bridge foundations and retaining walls shall be undertaken.
 - The new foundations and retaining wall footings shall be shuttered, reinforcement placed and concrete poured.
 - Wet concrete and cement/mortar are very alkaline and corrosive and can cause serious pollution to watercourses.
 - Disposal of raw or uncured waste concrete must be controlled to ensure that the watercourse or karst features will not be impacted.
 - Best practice in bulk-liquid concrete management addressing pouring and handling, secure shuttering / form-work, adequate curing times.
 - Wash water from cleaning ready mix concrete lorries and mixers may be contaminated with cement and is therefore highly alkaline. Lorries and mixers and all concrete delivery equipment (wheelbarrows, buckets etc.) must be washed out off site.
 - Cement dust must be controlled as it is alkaline and harmful to the surrounding ecology. Activities which result in the creation of cement dust must be controlled by dampening down areas.
 - The shutter on the foundation and footing shall then be struck and the new pier, abutment and retaining wall stem shall be shuttered reinforcement placed and the concrete poured.
 - The shutter on the pier, abutment and retaining wall stem shall then be struck and the arches, wing walls and spandrel walls shall be shuttered reinforcement placed and the concrete poured. Temporary scaffolding shall be erected as required to facilitate access.
 - The shutter on the arches, wing walls and spandrel walls shall then be struck and the masonry reconstruction shall commence.
-

-
- Where shuttering is used, measures should be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils.
 - Once all concrete works have been completed waterproofing shall be applied to all buried surfaces before backfilling with 6N structural fill.
 - The masonry construction shall be undertaken such that the new elevation matches the original elevation using lime mortar.
 - Block stone revetments shall then be placed adjacent to river bank for the upstream embankments to protect toe of embankment and prevent material entering the watercourse.
 - The new embankments shall be constructed by grading, levelling and compacting fill materials before top soiling and grass seeding.
 - On completion of the embankment works adjacent to the watercourse the water management shall then be removed.
 - Safety fencing, safety barriers and new raised concrete verges shall be completed in conjunction with top soiling and grass seeding of the verges.
 - The road construction shall be completed by grading, levelling and compacting a number of layers of unbound structural fill in the portion of the road to be extended. The road construction shall then be completed by laying a number of layers of bituminous bound layers.
 - The timing of the works must be specified and agreed with the IFI in relation to fish migration and spawning periods.

1.3.4 Hydrocarbons

- There can be no storage of hydrocarbons or any polluting chemicals within 50m of the watercourse or any active/inactive drains connecting to the river. There must be no refuelling of vehicles/equipment within 50m of a river.
- Any diesel or fuel oils stored on site must be banded to 110% of the capacity of the storage tank. Design and installation of fuel tanks must be in accordance with best practice guidelines BPGCS005, oil storage guidelines. Drip trays and spill kits must be kept available on site.
- All stationary plant should be placed on drip trays to prevent leaking oils reaching the river or entering groundwater.
- No washings or waste materials of any kind can be directed into the stream.
- Machinery on site must have pollution control kits on hand in the event of an emergency.

1.3.5 Construction Waste

All construction related waste, e.g., plastics, cable ties, geotextile etc. must be collected and disposed of correctly so that they don't enter river channels.

1.3.6 Concrete

Wet concrete and cement/mortar are very alkaline and corrosive and can cause serious pollution to watercourses.

-
- Disposal of raw or uncured waste concrete must be controlled to ensure that the watercourse will not be impacted.
 - Best practice in bulk-liquid concrete management addressing pouring and handling, secure shuttering / form-work, adequate curing times must be adhered to.
 - Where shuttering is used, measures must be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils.
 - Wash water from cleaning ready mix concrete lorries and mixers may be contaminated with cement and is therefore highly alkaline. Lorries and mixers and all concrete delivery equipment (wheelbarrows, buckets etc.) must be washed out off site.
 - Cement dust must be controlled as it is alkaline and harmful to the surrounding ecology. Activities which result in the creation of cement dust must be controlled by dampening down areas.
 - The timing of the works must be specified and agreed with the IFI in relation to fish migration and spawning periods.

1.3.7 Additional Measures Specifically to Protect Fish Species and Aquatic Species

The following measures are critical for protecting fish and aquatic species:

- Instream works will be undertaken between 1st June- 30th September
 - Works must be undertaken during a period of low flow when there is a low risk of flood events. This makes all activities and mitigations easier to implement and manage and limits the potential for generation of sediment and mobilisation of sediment and pollutants downstream.
 - The placement of sandbags and capacity of the flume must be such that, in the event that a spate occurs, water can be managed so it does not flow into the works area.
 - There will be pumps on hand within the dried out streambed works area to deal with leaks through upstream and downstream dams. Leaked water can be pumped back over to the watercourse so long as it is not contaminated with pollutants/sediment from the works area. Any contaminated water must be disposed of correctly off-site. Any pumps used must have appropriate grill or mesh screens at intake points to avoid intake of fish.
 - Works will be completed with one damming/ draw down to avoid repeated interventions that carry negative impacts on each occasion.
 - Sandbagging must be carefully planned and executed as this carries a risk of negative impacts through generation or introduction of silt and sediment to the river system. Sandbagging is less risky than other methods, but only if bags are clean and of good integrity, preferably fully sealed (i.e., composed of high grade polythene, not webbing or hessian). They should contain very clean, coarse grade sand with no fines at all. They need to be carefully handled and placed so they don't burst and no other additional material (like clay or soil etc.) should be introduced to seal gaps.
 - Arrangement must be made to accommodate IFI staff to be on-site to monitor damming and drying out of the streambed.
 - Electrofishing is required prior to the localised temporary drying out of the river and a suitably qualified person shall be present during the actual damming and drying out to rescue and relocate any fish that become stranded by the operation. This suitably qualified person shall be sourced at an early date to allow works proceed as and when required.
-

-
- The discharge point of the flume must be carefully placed so as to avoid scouring of banks and streambed. A baffle can be used to ensure water velocity at the discharge point is reduced.
 - All new and old concrete debris must be collected and removed regularly during works and correctly disposed of, off-site. No debris shall enter the river.
 - At any stage during works, any splashed, leaked, spilled or excess mortar must be prevented from entering the stream and/or making contact with the dry river bed or any standing water. There must be a spillage response plan in place prior to works commencing.
 - Any concrete shuttering used must be secure and leak-free. Correct concrete curing times must be observed.

1.3.7.1 Special Measures for Invasive Species

The following best practice avoidance measures are derived 'Irish Water Information and Guidance Document on Japanese knotweed' and must be applied as far as practicable:

- Fence off or clearly mark infested area including, where possible, the extent of the rhizome system underground;
 - A dedicated footwear & vehicular wheel wash down facility will be installed into a contained area within the site;
 - Vehicles leaving the site will be inspected for any plant material and washed down into a contained area;
 - Material gathered in dedicated wash down contained areas will need to be appropriately treated along with other contaminated soil on site; and
 - For any material entering the site, the supplier must provide an assurance that it is free of Japanese Knotweed
-

APPENDIX B

AQUATIC ECOLOGY REPORT

Kerry, Cork and Clare Bridge rehabilitations 2016

Protected Aquatic Species and Habitats Surveys



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Document Control Sheet:

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Project Title:	Kerry, Cork and Clare Bridge rehabilitations, 2016
Document Title:	Protected Aquatic Species and Habitats Surveys

Text Pages	55	Appendices	0
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Rev.	Status	Date	Author(s)	Reviewed By	Approved By
1	Draft	04/08/2016	LW	GM	
			<i>LW</i>		
2	Final	26/10/2016	LW		
			<i>LW</i>		

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1 INTRODUCTION

The Aquatic Services Unit (ASU) were commissioned to: (i) carry out protected aquatic species/habitats surveys, (ii) conduct ecological impact assessments, and (iii) make recommendations for mitigation in relation to proposed bridge maintenance works at 17 bridge sites in Counties Kerry (12), Cork (1) and Clare (4). All necessary field studies were conducted during good weather conditions in July 2016.

A number of aquatic species and habitats are protected under the provisions of the Wildlife Acts (1976 and Amendment 2000) and Annex I, II and V of the EU Habitats Directive (1992/43/EEC). In relation to the current studies, these include the following groups:

- Freshwater pearl mussel (*Margaritifera margaritifera*)
- Atlantic salmon (*Salmo salar*)
- Lampreys (*Lampetra* spp., *Petromyzon marinus*)
- European eel (*Anguilla anguilla*)
- Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation.

The Freshwater pearl mussel is an endangered freshwater bivalve listed under Annex II and V of the EU Habitats Directive (92/43/EEC) and protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Berne). The 2007 Habitats Directive Article 17 reports classified the pearl mussel as in unfavourable-bad conservation status in all EU regions (<http://biodiversity.eionet.europa.eu/article17/>). There are two species in Ireland, *Margaritifera margaritifera* and *M. durrovensis*, both of which are critically endangered on the Irish Regional non-marine mollusc red list (Byrne *et al.*, 2009) and at unfavourable-bad status in Ireland (NPWS, 2013). It is legally protected in Ireland under Schedule 1 of the Wildlife Act (1976) (S. I. 112 of 1990); the European Communities (Natural Habitats) Regulations (S. I. 477 of 2011), and the Water Framework Directive through the EC Environmental Objectives (Freshwater Pearl Mussel) Regulations (S.I. 296 of 2009).

Atlantic salmon and lampreys, in freshwater, are Annex II species under the EU Habitats Directive, protected within designated SACs. With reference to the current studies, salmon and all three lamprey species are qualifying interests of Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment SAC (000365) and the Lower River Shannon SAC (002165).

The European eel is IUCN 'Critically endangered' and its conservation is currently of high priority throughout Europe owing to dramatic population declines in recent years. It is 'Critically endangered' according to Ireland's Red List No. 5 (King *et al.*, 2011). Although not statutorily protected, the species is of considerable ecological and conservation importance.

Listed under Annex I of the EU Habitats Directive “Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260]” are characterised by a range of submerged and floating leaved aquatic vegetation. Classification of the annexed habitat covers a range of sub-types reflecting a range of river flow types and geology. Plants associated with Habitat 3260 are: *Ranunculus saniculifolius*, *R. trichophyllus*, *R. fluitans*, *R. peltatus*, *R. penicillatus* ssp. *penicillatus*, *R. penicillatus* spp. *pseudofluitans*, *R. aquatilis*, *Myriophyllum* spp., *Callitriche* spp., *Berula erecta*, *Zannichellia palustris*, *Potamogeton* spp. and *Fontinalis antipyretica*. The annexed habitat covers river types ranging from nutrient poor, fast flowing upland bryophyte rivers to large *Ranunculus fluitans* rivers to eutrophic, lowland *Potamogeton* rivers (Hatton-Ellis & Grieve, 2003).

The current study involved: (i) collation of existing records and information on protected species in the relevant watercourses/catchments; (ii) field studies covering reaches around and downstream of each bridge; (iii) impact assessment and mitigation recommendations in relation to aquatic habitats and species.

2 METHODOLOGY

2.1 Desk study

A thorough search of available databases, reports and journals was conducted to establish existing and records for protected aquatic species at and downstream of each of the seventeen bridges, and within the greater downstream catchment. Data sources included:

- Inland Fisheries Ireland (IFI) Water Framework Directive (WFD) Fish Sampling data;
- Environmental Protection Agency (EPA) river monitoring data - <http://gis.epa.ie/Envision>;
- National Biodiversity Data Centre Maps - <http://maps.biodiversityireland.ie/>;
- National Parks and Wildlife Mapviewer - <http://webgis.npws.ie/npwsviewer/>;
- Peer reviewed scientific literature.

2.2 Survey Locations

Bridge locations and maps were as provided by RPS Group Ltd and listed in Table 1.

Table 1 - Bridge Locations

BridgeID	Bridge Name	Easting ITM	Northing ITM	Catchment
KY-N70-007	Ballynamona Upper Bridge	484806.28	605898.09	Maine
KY-N23-005	Dysert	498584.71	608085.69	Maine
KY-N71-001	McCarthy O'Leary Bridge	496678.58	589550.58	Flesk (Laune)
KY-N72-009	Beheenagh Bridge	509723.76	590971.24	Flesk (Laune)
KY-N72-003	Ballymalis Bridge	484221.34	594497.54	Laune
KY-N72-001	Coolroe South Bridge	483059.6	595521.33	Laune
KY-N69-011.3	Palas Bridge	493826.41	626008.72	Feale
KY-N72-004	Pallis Bridge	488582.37	592699.92	Laune
KY-N86-005	Enrights Bridge	480008.36	611888.44	Tralee Bay
KY-N86-039	Clooncurra Bridge	450198.26	601004.12	Dingle Bay
KY-N86-043	Garfinny Bridge	448081.7	601034.23	Dingle Bay
KY-N86-034	Gort na Gcrann Bridge	456925.4	601480.15	Dingle Bay
CC-N72-033	Downeys Bridge	593324.6	596052.93	Bride (Blackwater)
CL-N67-012	MountRivers Bridge	99112.767	166006.135	Creegh
CL-N67-019	Moy River Bridge	109482.385	185910.823	Moy (Clare)
CL-N68-005	Liscasey Bridge East	121907.124	166584.171	Owenslieve/ Shannon
CL-N85-009	Cullenagh Bridge	115353.274	186806.251	Inagh

2.3 General Habitat Descriptions

General habitat characteristics were recorded including: substrate and flow types, depth and width, shading, surrounding land-use and general morphological character. The latter were assessed, generally based on criteria for river hydromorphology using the principles of the Rapid Hydromorphological Assessment Technique (RHAT) (Anon, 2009).

2.4 Fisheries Habitat Assessment

Pre-existing fisheries information was ascertained through desk studies, mainly based on WFD fish survey data. Field-based fisheries habitat assessments involved bankside walkover and in-channel investigations along the full survey reach visually assessing the principle in-channel and bank-side habitats (e.g., substrates, flow type, width, depth, marginal vegetation etc.), and the suitability of these as spawning, nursery and holding sites for fish, principally those that are relevant to protected aquatic species: salmon, river/brook/sea lamprey and freshwater pearl mussel.

2.5 Stage 1 FPM Survey

Stage 1 FPM surveys were conducted downstream of four bridges: Beheenagh, McCarthy O'Leary (Flesk) and Pallis Bridges in Co. Kerry and Mountrivers Bridge in Co. Clare. Surveys adhered to standard methodology as set out in Anon. (2004), carried out by highly experienced surveyors under NPWS Licence No. C028/2016 (exp. Dec 31st, 2016). The rivers were viewed using bathyscopes (underwater viewers) in wadeable reaches and snorkelling in deeper areas. River levels were low and there had been no recent spates prior to surveying. For each survey, water clarity was excellent and conditions were clear. Photographs and upstream/downstream coordinates for each survey reach were taken.

3 RESULTS

3.1 Desk study

Flesk/Laune Catchment [Beheenagh, McCarthy O'Leary, Pallis, Ballymalis, Coolroe South Bridges]

Five of the bridges occur in the greater River Laune catchment which includes the River Flesk and the Beheenagh River, the latter an upper tributary of the Owneyskeagh which flows into the Flesk. The Flesk flows through Killarney and into Lough Leane. The lake outflow forms the River Laune, travelling 20km north-west to Castlemaine Harbour near Killorglin.

During WFD fish sampling in 2008 (CRFB, 2009) salmon, eel and brown trout were recorded on the Flesk just upstream of McCarthy O'Leary Bridge (Flesk Bridge). As part of the same sampling round, salmon, brown trout, sea trout and eel were recorded on the Gweestin River, a tributary of the Laune which is located 0.75km downstream of Ballymalis Bridge.

In studies by O'Gorman *et al.* (2015) River and Brook lamprey (*Lampetra fluviatilis*; *Lampetra planeri*) occurred on the Beheenagh, Flesk and Laune Rivers, with ammocoetes recorded by in large numbers at certain sites in 2014. *Lampetra* spp. were also present in the Gweestin River. In the same study, Sea lamprey (*Petromyzon marinus*) occurred in small numbers on main channels of Rivers Laune and Flesk.

Freshwater pearl mussels occur in the Laune catchment, and were recorded in small numbers on the River Flesk downstream of McCarthy O'Leary Bridge (Flesk Bridge) during Catchment Flood Risk Management Studies conducted by the Office of Public Works (OPW) (Ecofact, 2012).

Maine Catchment [Dysert Br., Ballynamona Upper Br.]

Two bridges occur on unnamed tributaries of the River Maine: Dysert Bridge Trib. (confluences just west of Castleisland) and Ballynamona Upper Trib. (confluences downstream of Castlemaine). WFD fish sampling in 2008 recorded salmon, lamprey, brown trout, sea trout and eel on the main channel of the River Maine (CRFB 2009). Brook lampreys have been observed spawning in the catchment, while river lampreys are present in the Maine downstream of the N22 Bridge - the bridge bed structure is apparently a barrier to migrating lamprey passage (Ecofact, 2014). Freshwater pearl mussels are present in small numbers in the River Maine around the confluence with the Brown Flesk River, but are considered to perhaps have been washed out from the small population that occurs in the Brown Flesk. A few scattered adults were found downstream of the Brown Flesk confluence during surveys by Ross (2009), but habitat was deemed largely unsuitable owing to high levels of filamentous algae and silt.

Feale Catchment [Palas Br.]

Palas Bridge is located on a headwater tributary of the River Brick which adjoins Lixnaw Canal and flows into the main channel of the River Feale near Ballyduff. Although there are FPM records for the Feale (Ross, 2009), these are well upstream of the River Brick confluence and the species would not be expected to occur in the very lower (tidal) reaches of the Feale. Habitat in the River Brick is highly canalized and also unsuitable.

The main channel of the River Feale is a designated salmonid water listed in the First Schedule of the Quality of Salmonid Waters Regulations. It is reported to be one of the best sea trout and salmon fisheries in Ireland. During WFD fish sampling, six species of fish were recorded on the Feale. Atlantic salmon, sea trout, brown trout, lamprey and eel were recorded (CRFB, 2008). The River Feale has a lower density and more restricted distribution of lampreys compared to other large Irish rivers (O'Connor, 2006) owing to the dominance of high gradient channels and erosive nature of spate flows that characterize the system. Presence of Sea and/or River and Brook Lampreys have been reported for the main channel of the Feale almost as far downstream as the River Brick confluence (O'Connor, 2006).

Creagh River Catchment [Mountrivers Br.]

The Creagh River is known for good stocks of sea trout and small runs of salmon during floods in early summer. It was surveyed in its lower middle reaches (Drumellihy Br.) in 2009 and 2012 by IFI as part of their WFD fish monitoring programme (Kelly *et al.*, 2013a). A good population of brown trout (5 age-classes) and salmon (3 age-classes) were recorded along with sea trout, eel, and flounder, the latter indicative of tidal influence in the lower reaches of the river.

Inagh River Catchment [Cullenagh Br.]

There is a fish pass on the falls at Ennistimon. Salmon, trout and eel are recorded on the Inagh River and the river is part of IFI's eel monitoring programme. The Inagh is currently better known as a coarse fishery (rudd and pike).

Owenslieve River Catchment [Liscasey Br. East]

Discharging directly to the Shannon Estuary, the Owenslieve River has a population of river lamprey occurring up as far as an impassible barrier located 2km upstream of the tidal head (Igoe *et al.*, 2004), which is a few kilometers downstream of the bridge in question.

Bride River Catchment [Downeys Br.]

Downeys Bridge crosses a small headwater tributary of the Bride River, the main channel of which forms part of the Blackwater River (Cork/Waterford) SAC (002170) with freshwater qualifying interests including freshwater pearl mussel, white-clawed crayfish, lampreys and Annex I Habitat 3260. The Bride confluences with the estuarine reaches of the Blackwater main channel, thus being hydrologically downstream of freshwater pearl mussel populations of the SAC. There are no existing records of crayfish in the Bride catchment. Two sites were electric fished on the River Bride as part of 2012 WFD surveillance monitoring. Both sites were upstream of the Downeys Bridge tributary confluence. Salmon (various size-classes), sea trout, brown trout, juvenile lamprey, eel and stone loach were captured and the river merited Good Ecological Status according to fish (Kelly *et al.*, 2013b).

3.2 Field Studies

3.2.1 Beheenagh Bridge [KY-N72-009]

Survey Reach Coordinates	X (ITM)	Y (ITM)
U/S	509698	591012
D/S	509515	591055
Location	Co Kerry. Irish Grid Square: W09. Just east of Barraduff town on N72. Surveyed from 30m u/s to 300m downstream of bridge.	
Surveys Conducted	Stage 1 Freshwater Pearl Mussel, Fisheries Habitat Assessment, General Habitat Description.	
Habitat Description	Moderate sized river (5-6m width and 0.25m depth on average) with high energy series of rapid/riffles and runs over mainly cobble and small boulder substrates with a bryophyte plant community, mainly <i>Fontanalis squamosa</i> . Some interstitial deposits of clean, fine bed material (gravel/coarse sand). Natural, woodland riparian tree cover.	
Evidence of FPM	None.	
Habitat potential for FPM	Limited potential owing to high energy nature of river which does not facilitate accumulation of finer bed materials (gravel/coarse sand) suitable for mussels. There were some patches of suitable habitat where fine bed material had deposited at margins and behind larger boulders, but no mussels were observed.	
Existing FPM records	None for Beheenagh River. No records for the downstream Owneyskeagh River.	
Other protected species/habitats	Numerous salmonids observed in runs. Ideal salmonid nursery habitat with pockets of spawning habitat potential for salmon, trout and lampreys. Lamprey nursery habitat was lacking owing to the high energy nature of the channel and general absence of accumulated silty sediments in which ammocoetes could burrow. The plant community would pertain to Callitricho-Batrachion sub-type CB6a of Annex I Habitat 3260 characteristic of fast flowing, bryophyte dominated, upland rivers (Hatton-Ellis & Grieve, 2003). This vegetation type, mainly represented by bryophytes such as <i>Fontanalis</i> spp., occurs in the Beheenagh River beginning just downstream of the bridge and continues downstream over the surveyed reach. It does not occur within the footprint of the proposed bridge extension upstream of the existing structure. This is the typical habitat of this type of high energy, upland river and has a wide distribution.	





Plate 1: Beheenagh River from d/s of N72 bridge

Plate 2: Beheenagh River - high energy, fast

showing fast flowing rapid/riffle habitat. No mussels. (15/07/2016)	flowing rapid/run habitat with natural riparian cover. (15/07/2016)
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3.2.2 McCarthy O'Leary Bridge [KY-N71-001]

Survey Reach Coordinates	X (ITM)	Y (ITM)
U/S	496720	589430
D/S	96410	89440
Location	Co. Kerry. Irish Grid Square: V98. Flesk Bridge at Woodlawn, 1km south of Killarney town centre. Surveyed from 30m u/s to 300m downstream of bridge.	
Surveys Conducted	Stage 1 Freshwater Pearl Mussel, Fisheries Habitat Assessment, General Habitat Description	
Habitat Description	A broad, wide river (>20m) with limited scour pools (1.5m deep); extended riffle sections downstream of the bridge (0.15m deep) and glides (0.40-0.75m deep). A low, constructed weir is located about 50m downstream of the bridge but this would be passable to most fish species.	
Evidence of FPM	5 large, scattered adults on True Right (TR) side of channel between the bridge and the weir + 2 dead shells in glide d/s of mid-channel islands.	
Habitat potential for FPM	Good habitat potential in pockets where finer bed material had accumulated behind boulders and towards river margins. River margins were depositing with too much fine silt. Macrophyte cover was generally low in more suitable glide habitat, and no excessive amount of filamentous algae was observed.	
Existing FPM records	2 mussels reported in Ecofact (2012) downstream of the bridge in a similar location as the current survey.	
Other Protected Species/ Habitats	An abundance of young salmon were observed during snorkelling surveys, along with eel and trout. Substrates were conducive to and salmonid spawning and would also hold potential for lamprey spawning. There was potential lamprey nursery habitat present, i.e., accumulated sediments near river margins. The plant community had a patchy distribution, with large areas of little or no plant cover. Overall, the community pertained to fragmented Annex I Habitat 3260, dominated by <i>Ranunculus</i> spp., and <i>Fontinalis antipyretica</i> (and other bryophytes) with a little <i>Sparganium emersum</i> and <i>Myriophyllum alterniflorum</i> noted in glide habitat.	

	
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<p>Plate 3: View u/s over glide/riffle habitat in the upper section of the survey reach d/s of bridge. Circle marks location of 5 mussels. (19/07/2016)</p>	<p>Plate 4: Lower end of survey reach comprising a long glide/run over cobble/gravel/boulder substrates. No mussels (19/07/2016)</p>
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3.2.3 Pallis Bridge [KY-N72-004]

Survey Reach Coordinates	X (ITM)	Y (ITM)
U/S	488610	592665
D/S	488346	592556
Location	Co. Kerry. Irish Grid Square: V89, Pallis townland, 7km west of Killarney town centre on N72.	
Surveys Conducted	Stage 1 Freshwater Pearl Mussel, Fisheries Habitat Assessment, General Habitat Description	
Habitat Description	Small, slow flowing riffle/run type stream with substrates of cobble, gravel and coarse sand. Water was turbid (grey-white) at time of surveying, with 100% cover of thick filamentous algal cover (mainly diatom + <i>Vaucheria</i> spp.) (Plate 6), suggesting a pollution point source upstream. The stream was 2-4m wide with shallow riffles & 0.30m pool/glides with a high degree of riparian tree cover. Bridge footprint - solid concrete (Plate 5).	
Evidence of FPM	None	
Habitat potential for FPM	Completely unsuitable - too small with poor water quality.	
Existing FPM records	None	
Other Protected Species/Habitats	<p>Most likely a trout stream, although salmon from the main channel of the Laune may use the lower reaches for nursery habitat (moving in from the Laune). Potential for brook and/or river lamprey spawning and nursery - although limited owing to paucity of fine sediments for ammocoetes.</p> <p>The stream confluent with the Laune c.300m downstream where there is excellent salmon and lamprey habitat and is within the Castlemaine Harbour SAC. Sea and river lampreys, and salmon, are qualifying interests of the SAC.</p>	



Plate 5: Footprint of bridge showing concrete bed reinforcement. No mussels. (19/07/2016)



Plate 6: Excessive filamentous algal growth on all substrates. Completely unsuitable for mussels. Poor quality habitat for salmonids. (19/07/2016)

3.2.4 MountRivers Bridge [CL-N67-012]

Survey Reach Coordinates	X (ITM)	Y (ITM)
U/S	99128	165988
D/S	98963	166249
Location	Co. Clare. Irish Grid Square: Q96. Bridge over Creegh/Skivileen River located c.2km east of Doonbeg village.	
Surveys Conducted	Stage 1 Freshwater Pearl Mussel, Fisheries Habitat Assessment, General Habitat Description.	
Habitat Description	Moderate sized, lowland river (8m) with a combination of shallower riffle/runs (0.15m) and deeper glides (0.03-1.0m). Deeply drained historically and embanked. Slow glide habitat dominated downstream of the bridge. Survey was conducted at low tide, as the river is tidally influenced. Substrates are mainly cobble embedded in heavy clay with occasional deposits of gravel/sand and a lot of fine silt. Water colour was high. Shallow reaches had 100% cover of <i>Ranunculus</i> spp., <i>Potamogeton perfoliatus</i> , <i>Potamogeton crispus</i> , <i>Myriophyllum alterniflorum</i> and <i>Cladophora</i> .	
Evidence of FPM	None	
Habitat potential for FPM	Unsuitable for mussels – silty, sluggish and embedded clay substrates.	
Existing FPM records	None. A previous survey of the Creegh River catchment skipped this reach as habitat was deemed unsuitable.	
Other Protected Species/Habitats	The primary importance of the channel downstream of the bridge is as a migration route for salmon and sea trout. There is some suitable salmonid nursery habitat just downstream of the bridge. The presence of larger resident brown trout in deeper reaches downstream of the bridge cannot be ruled out. Eels were abundant downstream of the bridge.	



Plate 7: View from u/s of MountRivers Bridge showing in channel growth of emergent vegetation. Unsuitable for mussel (22/07/2016)



Plate 8: Highly coloured, sluggish glide over embedded clay/cobble substrates with layer of silt. Unsuitable for mussels (22/07/2016)

3.2.5 Dysert Bridge [KY-N23-005]

Survey Coordinates	Reach	X	Y
U/S		498626	608008
D/S		498574	608179
Location	Co. Kerry. Irish Grid Square: Q90. Unnamed tributary of the River Maine near Ballygree townland, c.2km southwest of Castleisland.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	The stream is highly modified by drainage, especially downstream of the bridge where it is mostly canalised. Upstream and for a short distance downstream of the bridge there were braided gravelly channels. The bridge footprint has a concrete reinforced bed. The stream was generally 3.5m wide and 0.15-0.35m deep with steep clay banks overgrown with bramble and tall herb. In general there was no riparian tree cover. Substrates comprised some cobble and pebble embedded in clay with a layer of loose fine silt. There were patches of cleaner gravels nearer the bridge which would be suitable for salmonid spawning (mainly trout) and nursery and perhaps lamprey spawning. <i>Oenanthe crocata</i> and <i>Ranunculus</i> spp. were present. There was good eel habitat and it is considered a very good trout nursery stream.		
Protected Habitats	Species/	Probably unsuitable for salmon, but they cannot be ruled out from occupying limited, though suitable salmonid nursery habitat just upstream of the bridge. Brook lampreys (<i>Lampetra planeri</i>) are likely to be present, although there was limited availability of sediment deposits in reaches downstream of the bridge as the channel appears scoured back to hard clay as a result of drainage/contained flow. Desk studies suggest that River and Sea Lampreys cannot pass the N22 bridge across the Maine River (>10km downstream), so would not be present.	



Plate 9: View d/s towards Dysert Bridge showing braided gravelly channel suitable as with *Ranunculus* and *Oenanthe crocata*. Suitable salmonid nursery habitat. (15/07/2016)



Plate 10: Turbid, sluggish glide typical d/s of Dysert Bridge. Not suitable spawning or nursery habitat for salmonids and limited suitability for brook lamprey nursery. (15/07/2016)

3.2.6 Ballynamona Upper Bridge [KY-N70-007]

Survey Coordinates	Reach	X	Y
U/S		484823	605869
D/S		484807	605768
Location	Co. Kerry. Irish Grid Square: Q80. Unnamed tributary of the River Maine at Ballynamona Upper townland, 3km NE of Castlemaine.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	From 10m upstream to about 20m downstream, milking cows use the stream bed beneath the bridge to access milking sheds from fields north of the N70. There is manure in the stream and cobbly substrates are disturbed by constant trampling. In its natural state (away from cattle influence), the stream is small (1-1.5m wide, with 0.03m riffles and small pool/runs up to 0.15m) and step-pool-cascade in nature. Substrates were cobble and gravel with a limited bryophyte community and quite dense riparian tree cover for at least the first 150m d/s of the bridge.		
Protected Habitats	Species/	This is at best a small trout stream. It is too small and unstable for salmon and generally lacks silt deposits suitable for lamprey nursery, although brook lamprey (<i>Lampetra planeri</i>) cannot be ruled out. The stream is affected by milking cows accessing regularly so habitat around the bridge itself is not highly suitable, even for trout.	



Plate 11: View u/s towards Ballynamona Upper Bridge showing the route that milking cows take along the streambed and through the bridge (15/07/2016).

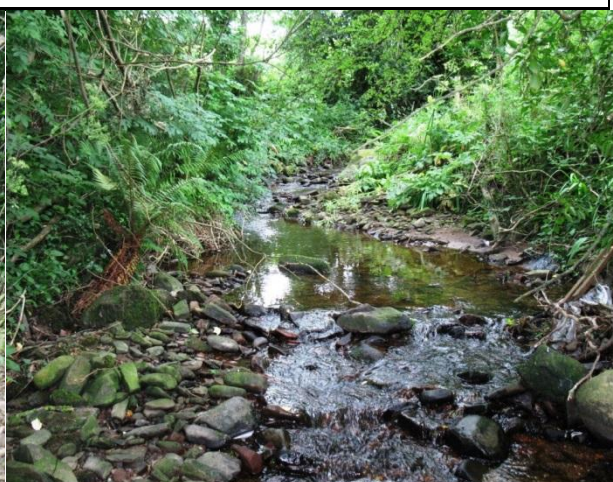




Plate 12: Typical habitat of the stream where a juvenile trout was captured (15/07/2016).

3.2.7 Ballymalis Bridge [KY-N72-003]

Survey Coordinates	Reach	X	Y
U/S		484221	594497
D/S		484129	594494
Location	Co. Kerry. Irish Grid Square: V89. N72 bridge over Dorrnagh Stream in townland of Ballymalis between Killarney and Killorglin.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	The stream is highly modified by drainage, being canalised in nature. Upstream of the bridge there is a stagnant glide, while habitat downstream alternates between sluggish glide and reaches of pebble/gravel riffle. It was 2.5m wide and 0.05m in riffles. There were growths of brown filamentous diatom, and little other instream vegetation. It was challenging to access the stream in downstream reaches from the bridge as it is very overgrown with bramble and is deeply incised into the landscape making access almost impossible. The footprint of the bridge was strewn with large mossy cobbles. The river had a fetid smell and was highly turbid, suggesting a point source of pollution upstream. It was deemed unsafe to investigate this stream too closely owing to the obvious pollution level. Trout, which have lower water quality requirements than salmon are likely to present.		
Protected Habitats	Species/	The site is within the Castlemaine Harbour SAC and is a tributary of the Gweestin River (1km downstream of Ballymalis Bridge) which has a salmon and river/brook lamprey population. The stream in question, however, is likely to be too polluted in reaches downstream of the bridge to sustain salmon, although their presence cannot be ruled out. River/brook lamprey are likely to be present, as are eel.	
			
Plate 13: View d/s from Ballymalis Bridge showing turbid, fetid smelling waters forming a sluggish glide (22/07/2016)		Plate 14: Faster flowing pebble/gravel reaches downstream of the bridge which would be suitable (probably trout) nursery habitat (22/07/2016)	

3.2.8 Coolroe South Bridge [KY-N72-001]

Survey Coordinates	Reach	X	Y
U/S		483090	595478
D/S		482960	595356
Location	Co. Kerry. Irish Grid Square: V89. N72 bridge over Kealbrogheen Stream in townland of Coolroe South between Killarney and Killorglin.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	The stream is highly modified by drainage, having been straightened, embanked and canalised in nature downstream of the bridge. Upstream of the bridge there is a stagnant glide, while habitat downstream alternates between sluggish glide and reaches of pebble/gravel riffle within the previously deepened channel. The stream was generally 2.5m wide and 0.05m deep in riffles. There were growths of brown filamentous diatoms on most substrates, and little other instream vegetation. It was challenging to access the stream in downstream reaches from the bridge as it is very overgrown with bramble and is deeply incised into the landscape making access impossible. The stream was highly turbid and there were loose silty deposits on benthic substrates.		
Protected Habitats	Species/	This stream is a tributary of the Laune (c.0.4km downstream of the bridge) which has a salmon and sea/river/brook lamprey population. The stream in question, however, does not possess very suitable salmon spawning or nursery habitat, although they cannot be ruled out from using some patches of faster flowing water with gravels, >100m downstream of the bridge. Lamprey spawning and nursery also cannot be ruled out, mainly brook lamprey (<i>Lampetra planeri</i>), ammocoetes of which may be present in silty deposits. Water quality is questionable in the stream, which is another factor that may exclude presence of salmon in the surveyed reaches.	



Plate 15: View d/s from Coolroe South Bridge showing general nature of drained stream with steep unstable banks, limited flow and substrate diversity and turbid waters (22/07/2016)



Plate 16: View u/s from the bridge showing turbid, sluggish glide with limited flow diversity and open banks (22/07/2016)

3.2.9 Palas Bridge [KY-N69-011.3]

Survey Coordinates	Reach	X	Y
U/S		493866	625963
D/S		493778	626029
Location	Co. Kerry. Irish Grid Square: Q92. N69 bridge near Pallas townland (northeast of Tralee) over unnamed headwater tributary of River Brick which flows to the Feale.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	Small step/cascade-riffle/run type stream (1.6m wide, 0.05m deep in runs). Substrates of pebble, gravel, small cobble and coarse sand. No instream vegetation, but with good riparian tree cover. Clear water, low volume and trickle flows. Upstream of the bridge, the stream follows bedrock chutes in a V-shaped wooded gully. The footprint of the bridge has a reinforced bed made of stones. The stream was historically drained (deepened) but has recovered within the deepened channel.		
Protected Habitats	Species/	This headwater stream is almost certainly too small and unstable to support salmon. It is likely to be a good trout stream. Brook lamprey cannot be ruled out, although they are unlikely owing to the limited availability of stable silt deposits for nursery habitat. The SAC boundary is c1.2km downstream, but this stream is not considered to be of significant ecological importance with respect to aquatic qualifying interests of the SAC (salmon, lampreys).	

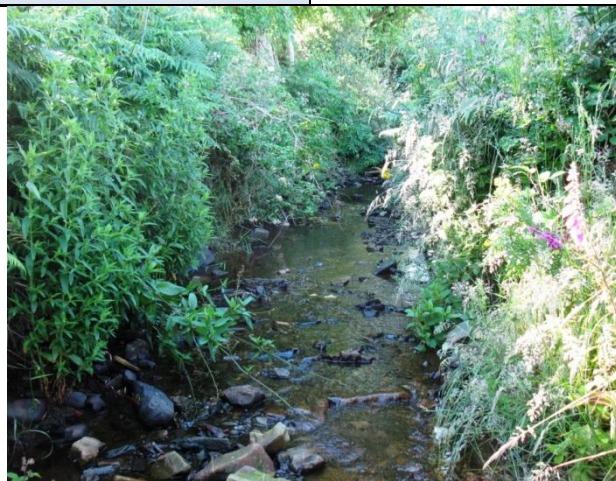


Plate 17: Typical habitat d/s of Pallas Bridge showing pebble/gravel substrates and riffle/run nature which has recovered within the historically drained channel (14/07/2016).



Plate 18: View u/s towards the bridge (14/07/2016).

3.2.10 Enright's Bridge [KY-N86-005]

Survey Coordinates	Reach	X	Y
U/S		480035	611818
D/S		479820	611910
Location	Co. Kerry. Irish Grid Square: Q81. N86 bridge over unnamed stream in townland of Annagh, west of Blennerville, Tralee.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	Small, slow flowing stream (1.8m wide; 0.1m deep). Realigned and deepened downstream of the road bridge. Substrates generally coarse cobble immediately d/s of bridge, but then becoming more evenly graded with pebble and gravels. There was no instream vegetation recorded in the first 100m d/s of the bridge. The stream becomes tidally influenced c.100m d/s of the bridge, with high instream levels of the ephemeral algae, <i>Enteromorpha</i> spp., present. This plant species signifies tidal influence, which is clearly evident further downstream where lower stream reaches were essentially estuarine with anoxic muds. Considered to be good trout and eel habitat.		
Protected Habitats	Species/	The short reach of non-tidally influenced habitat downstream of the bridge is probably unsuitable for protected aquatic species. It is considered a trout stream. Suitable silty deposits for lamprey ammocoetes were lacking.	



Plate 19: Typical habitat d/s of Enright's Bridge showing pebble/gravel substrates and riffle/run nature which has recovered within the historically realigned and deepened channel (14/07/2016)



Plate 20: View downstream from c300m d/s of the bridge showing estuarine nature of the streams tidal head (14/07/2016)

3.2.11 Gort na Gcrann Bridge [KY-N86-034]

Survey Coordinates	Reach	X	Y
U/S		456925	601480
D/S		457050	601152
Location	Co. Kerry. Irish Grid Square: Q81. N86 bridge over unnamed stream in townland of Gort na Chorráin, 2km west of Annascaul.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	Small, low volume, slow flowing stream (1.2m wide; 0.07m deep). Upstream of the road was a steep mossy bedrock cascade. The stream is culverted beneath the road in a large concrete pipe. Downstream of the road the stream formed a series of step/cascade and riffle/run sequences with cobble, pebble and gravel substrates. It was heavily overgrown with Fuschia, gorse and brambles and was largely inaccessible. There was no instream vegetation.		
Protected Habitats	Species/	The stream may have limited value for trout, but is otherwise of low, local ecological value.	




Plate 21: View of Gort na Chorráin stream looking upstream into N86 culvert (13/07/2016)



Plate 22: Nature of substrates downstream of the road (13/07/2016)

3.2.12 Clooncurra Bridge [KY-N86-039]

Survey Coordinates	Reach	X	Y
U/S		450246	600966
D/S		450072	600800
Location	Co. Kerry. Irish Grid Square: Q50. N86 bridge over unnamed tributary of Owenlondrig River in townland of Clooncurra, 1.5km west of Lispole.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	Small, medium volume, moderately-fast flowing stream (1.5m wide; 0.10m deep). Downstream of the road the stream was fairly uniform in nature having been historically deepened and probably straightened. It formed a continuous riffle/run sequence with cobble, pebble and gravel substrates. It was heavily overgrown with (invasive) <i>Montbretia</i> , <i>Fuschia</i> and brambles and was largely inaccessible owing to deepened nature and heavy, impenetrable bank cover. There was no instream vegetation.		
Protected Habitats	Species/	The stream may have value for trout, but is otherwise of low, local ecological value. Eel were present.	








Plate 23: View of Clooncurra Bridge looking u/s showing low clearance (13/07/2016)	Plate 24: Channel d/s of the bridge showing typical riffle/run nature of stream over cobble/pebble/gravel substrates (13/07/2016)
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3.2.13 Garfinny Bridge [KY-N86-09]

Survey Coordinates	Reach	X	Y
U/S		4	6
D/S		4	6
Location	Co. Kerry. Irish Grid Square: Q81. N86 bridge over unnamed stream in townland of Gort na Chorráin, 2km west of Annascaul.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	Small, medium volume, moderately-fast flowing stream (1.5m wide; 0.10m deep). Downstream of the road the stream was fairly uniform in nature having		

		been historically deepened and probably straightened. It formed a continuous riffle/run sequence with cobble, pebble and gravel substrates. Water was very clear and flows were swift. The channel was quite overgrown at banks with (invasive) <i>Montbretia</i> , <i>Fuschia</i> and brambles with Willow common. Instream vegetation was generally limited to the aquatic moss, <i>Fontanalis squamosa</i> .
Protected Habitats	Species/	The stream has potential for salmon to be present owing to presence of clean gravels, although it may be too unstable owing to swift flows caused by channelisation as a result of historical drainage. It would certainly support trout and eel, and possibly lamprey species also, although soft sediments were lacking and therefore not ideal lamprey nursery habitat.
		
Plate 25: View of Garfinny Bridge looking d/s from just above the road (13/07/2016)		Plate 26: Channel d/s of the bridge showing typical riffle/glide nature of stream over cobble/pebble/gravel substrates (13/07/2016)

3.2.14 Liscasey Bridge East [CL-N68-005]

Survey Coordinates	Reach	X	Y
U/S		121914	166615
D/S		121943	166349
Location	Co. Clare. Irish Grid Square: R26. N68 bridge over unnamed tributary stream of Owenslieve River at Lisseycasey village.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	Small, medium volume, slow-moderate flowing stream (1.5m wide; 0.07m deep). The stream was culverted under the road. There have been a numerous hydromorphological alterations to this stream and there is an impassable fish barrier c.100m d/s of the road. In general the first 100m forms a series of cascade-pool-runs over cobble/bedrock substrates. There is a high weir with a pipe inserted @100m, after which the stream has a lower gradient and forms pebble/gravel riffle-runs. In general there is a hedgerow of riparian tree cover, quite dense in the first 50m d/s of the road owing to presence of conifers and cherry laurel. There was no instream vegetation noted other than some liverworts and mosses. Water was clear, but moderately coloured (humic).		
Protected Habitats	Species/	The channel has been realigned and deepened in the past, but instream habitat has recovered somewhat lending itself to being trout nursery habitat. Brook	

lampreys may be present downstream of the weir utilising a few patches of gravel for spawning and fine sediments for nursery.	
	
Plate 27: View of Liscasey Bridge East looking u/s showing cobbly substrates and bank reinforcement (22/07/2016)	Plate 28: Channel d/s of the weir showing typical riffle/run nature of stream over cobble/pebble/gravel substrates (22/07/2016)

3.2.15 Moy River Bridge [CL-N67-019]

Survey Coordinates	Reach	X	Y
U/S		109406	185932
D/S		109406	186055
Location	Co. Clare. Irish Grid Square: R08. N67 bridge over Moy River, just south of Lahinch.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	Medium sized river (2-3m wide; 0.10m riffles; 0.80m pools). Tidally influenced up to about 250m d/s of the bridge. Just downstream of the bridge the channel is more incised and there were deeper, bouldery run-glides. From about 70m d/s of the bridge habitat was pool-riffle-run type up to the point where a tidal influence begins. From there downstream to the sea there is a series of slow flowing glide/pools. In the riverine reach up to the road, substrates were a combination of cobble, gravel and sand with deposits of fine sediment at margins and in pools. Natural woodland riparian vegetation shades the channel, but not excessively. Water was clear and slightly coloured (humic). Filamentous green algae (<i>Cladophora</i> spp.) formed a fine wispy layer on some substrates but there was no other significant instream vegetation apart from some mosses on boulder/ bedrock chutes upstream of the road bridge.		
Protected Habitats	Species/	There were patches of good salmonid spawning and nursery habitat between the bridge and the tidal reaches. While trout would certainly be present, salmon migration may be affected by the nature of the river outflow which was subterranean through the boulder beach where it meets the sea. Lamprey may be present – Brook lamprey more likely, although the river is not ideal for this species owing to the spatey nature which would periodically scour fine sediment away. Eel were captured.	



3.2.16 Cullenagh Bridge [CL-N85-009]

Survey Coordinates	Reach	X	Y
U/S		115352	186843
D/S		115249	186706
Location	Co. Clare. Irish Grid Square: R18. N85 bridge over unnamed tributary stream of the Inagh River in Cullenagh townland, c.3km east of Ennistymon.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	Moderately small stream (2.5m wide; 0.06m riffles). Historically deepened and realigned from the road to the Inagh main channel, meaning that is quite uniform in its cross section and flow type. Instream habitat has recovered somewhat within the drained channel and there was generally a continuous series of quite fast riffle/run reaches over pebble/gravel substrates. There was an abundance of <i>Oenanthe crocata</i> growing instream, which is typical of drained streams that self-narrow over time after drainage. Around the bridge was a stagnant pool/glide with sandy silty deposits. Steep banks were heavily overgrown with grasses, rushes, willow, bramble and tall herb. Water was slightly turbid and slightly coloured (humic). There was a layer of brown filamentous diatom growth over most substrates and a fine layer of deposited silt.		
Protected Habitats	Species/	It cannot be ruled out that salmon may enter from the Inagh main channel to spawn, but it is not considered to be a salmon stream. Brook lamprey may be present, utilising good spawning substrates in parts and patches of silty deposits. Eel are very likely to be present.	





Plate 31: Channel d/s of bridge showing riffle-run over cobble, pebble, gravel substrates (22/07/2016)



Plate 32: Channel further downstream showing deeply drained nature with overgrown banks (22/07/2016)

3.2.17 Downey's Bridge [CC-N72-033]

Survey Coordinates	Reach	X	Y
U/S		593374	595894
D/S		593523	595628
Location	Co. Cork. Irish Grid Square: W99. N72 bridge over unnamed tributary stream of the Collatrim Stream (Trib. of Bride River) in townland of Moydilliga, 2km east of Currabehea village.		
Surveys Conducted	Fisheries Habitat Assessment, General Habitat Description		
Habitat Description	<p>The stream varies from 0.7-1.7m wide over the surveyed length. It is generally shallow with a substrate dominated by small and large cobble, gravel & pebble and coarse sand/fine silty sand. The majority of the habitat is shallow riffle (riffle/run), cascade, shallow run/glide and pool.. The channel is largely plant free due to the nature of the flow and the heavy flow, however, the green alga <i>Vaucheria</i> sp was frequently present just downstream of the bridge, mainly in small amounts but occasionally locally common in slack-flow, unshaded stretches. <i>Apium nodiflorum</i> (fool's watercress) and <i>Rorippa nasturtium-aquaticum</i> agg. (watercress) are present along some margins but never to excess.</p> <p>The initial 110m downstream of the bridge is a moderately sinuous stretch which is well shaded with heavy tree cover along both banks (alder mainly) the next 40m has been straightened with all cover removed from both banks. The substrate in this stretch is ideal for trout spawning. Farther downstream to the end of the survey reach, the stream is again enclosed along both banks by a heavy tree cover, which heavily shades the sinuous channel. There were a few pockets of fine silty substrate which are likely to contain lamprey ammocoetes. Cattle access the stream in three places along the surveyed reach.</p> <p>The stream is overall in a fairly natural condition despite some channel re-alignment and can be considered principally a trout stream and although salmon could occasionally enter it to spawn, it wouldn't be considered a salmon stream. There are suitable fish holding, nursery and spawning conditions for trout. Lamprey, most likely <i>Lampetra planeri</i> (brook lamprey) are also likely to be</p>		

		present, given that there is suitable habitat present.
Protected Habitats	Species/	Lamprey most likely <i>Lampetra planeri</i> (brook lamprey)
		
Plate 33: View u/s to bridge (26/07/2016)		Plate 34: Cleared and straightened stretch (26/07/2016)

4 IMPACT ASSESSMENT

4.1 Potential Impacts and Recommendations

Potential impacts on protected aquatic species associated with engineering works can be either **direct** (physical disturbance or direct mortality) and/or **indirect** (downstream impacts as a result of changes to water flow and/or water quality as a result of works).

In general, indirect negative impacts arise in three ways: (1) sediment release to the watercourse; (2) toxic chemical release (e.g., concrete, hydrocarbons) to the watercourse and in relation to freshwater pearl mussels; (3) negative impacts on salmonid host fish.

4.1.1 Beheenagh Bridge [KY-N72-009]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<u>Bridge Widening/Replacement</u> <ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Site clearance and earthworks for new road embankment. Construction of new or widened reinforced concrete bridge. Provision of road surfacing, paved 	<p>This is a locally high value salmonid river (including for salmon). There is potential for indirect medium term negative impacts downstream of the bridge in association with wet concrete and mortar usage (bridge widening/reinforcing/ paved verge construction, repointing), entering the watercourse from the works area. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Species affected in Beheenagh River would be Annex II species, Atlantic salmon, and other salmonids (brown trout) and possibly Annex II species river/brook lampreys.</p> <p>Slight temporary negative impacts</p>	<p><u>Construction Method Statement:</u> A detailed method statement should be drawn up by the contractor indicating what standard measures will be taken to avoid: (i) sediment or soil loss, and (ii) cement and hydrocarbon release, associated with all aspects of the construction phase. It must include details of the water management strategy including number of pumps required and all other aspects to ensure a dry working environment.</p> <p><u>Water management:</u> An appropriate method must be selected for dewatering of the works area during construction. The river is quite high energy with spate flows and would be subject to flashy floods. Use of a dam and pump over set up is unlikely to be feasible. A bypass channel would be most desirable at this location. The empty flood eye at the eastern side (True Right) of the bridge could be utilised for this. A bypass channel could be excavated from upstream to downstream using dry land beneath this empty flood eye. The bypass channel</p>	<p>The Beheenagh River has high local fisheries importance and further discussion regarding options for water management during construction works is required as well as discussion informing the new bridge design, with particular regards to fish passage issues during operation.</p> <p>Consultation with IFI is essential and agreement on construction methods/materials and bridge design must be sought with them. IFI must be made aware of the existence of this report. A meeting that includes a suitably qualified and experienced ecologist, IFI staff and the (RPS) bridge design team is</p>

<p>verges and safety barriers.</p>	<p>could arise locally from sediment washout to the river associated with site clearance for bridge/road widening. The majority of the riverine habitat downstream of the bridge is fast flowing and would not favour silt accumulation and smothering of habitat, but elevated levels of suspended solids (>25mg/l) can stress and abrade gills of salmonid fishes.</p> <p>There could be a direct impact on migration of salmonids (salmon) and lampreys depending on timing of works owing to a high level of engineering activity at the bridge.</p> <p>Bridge widening/replacement will require that the works area be dewatered meaning a temporary loss of habitat for fish beneath the bridge. Although the existing bridge footprint is reinforced masonry/stone blockwork, salmonids may use this area and would certainly be present in the downstream riffle area. When dams are introduced, fish may be trapped within the proposed dry working area and they will die when the channel is dewatered.</p> <p>The aquatic plant community present downstream of the bridge (pertaining to Habitat 3260 Type CB6a) is considered by Hatton-Ellis & Grieve (2003) to be less vulnerable to indirect adverse impacts as a result of any sediment loss that may arise during</p>	<p>would need to be lined with geotextile (staked down) and coarse locally sourced stone should be placed along the bottom of it to secure it. A dam can then be placed at the upstream side of the bridge to channel flow towards the bypass channel. The entrance to the bypass channel must remain plugged until the channel is fully secured with geotextile/stone. The earthen plug should only be removed once the dam is placed. A dam would be necessary downstream, however, there is a natural fall in the river longitudinal gradient and the bypass channel could discharge downstream of this. Further discussion on the water management regime at this bridge is recommended, and must be agreed with IFI, as the river has high, local fisheries importance. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Bridge footprint design</u>: The widened bridge footprint within the river should be of a similar nature to that already in existence which allows for fish migration through the central arches. Flat concrete bed reinforcement is not acceptable as it may affect the success of lampreys, eels and salmonids in passing the bridge. A bed design must allow for passage of all species and should incorporate protruding rocks to provide refugia in fast flows. Further discussion on the bridge design in terms of long-term fish passage issues is recommended with input from IFI and a suitably qualified freshwater ecologist, as the river has high local fisheries importance.</p> <p><u>Habitat reinstatement</u>: Once the new bridge is in place and instream works completed, all debris/residue from the works must be removed from the river bed. The bed level should be set to a similar level as currently exists with the cobbly riffle section reinstated downstream of the bridge.</p>	<p>recommended before residual impacts can be concluded.</p>
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	<p>works given the high energy river type in which it occurs. There may be a direct, but temporary loss of a very small area of this habitat in the immediate footprint of works, but in general it does not occur in the main footprint of the new bridge upstream of the existing structure. Any temporary loss of this habitat is a minor to negligible impact given that regrowth will occur fairly quickly once works are complete (within 1 or 2 growing seasons).</p> <p>During the operational phase, there is potential for significant impact at a local scale if the new bridge footprint is not passable by fish. This can occur if bed reinforcement creates an overly shallow, overly wide flow regime, and especially if there is a high downstream apron that can act as an impassable barrier to lampreys and salmon.</p>	<p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Fisheries</u> – Inland Fisheries Ireland (Macroom) must be consulted in the design phase with regards to construction methods and materials proposed, and bridge design (especially the with regards to residual bed levels and ensuring fish passage). IFI must be informed of the existence of this report.</p> <p><u>Fish removal/rescue:</u> must be carried out within the dammed section around the bridge prior to dewatering. This will require that IFI or a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel upstream of works.</p> <p><u>Timing of works:</u> significant instream works such as those associated with concrete invert lining and channel dewatering must be agreed with IFI and should observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Use of wet concrete/mortar:</u> See Notes on Best Practise – Cement/Mortar, Section 4.2.2, below. If mortar and concrete are used over water on parapets and wing walls, there must be a plastic or webbing tarpaulin sheet laid on scaffold beneath works to prevent spills and leaks entering the watercourse.</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> See Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p>	
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4.1.2 McCarthy O'Leary Bridge [KY-N71-001]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Removal of the existing road surface and footways. Provision of bridge deck waterproofing and new bridge joints. Reinstatement road surfacing, paved verges and safety barriers. 	<p>There is potential for indirect negative impacts associated with debris (old concrete etc.) and/or toxic substances, such as wet concrete (paved verge construction) and waterproofing materials, entering the watercourse from the works area. Wet concrete, in particular, is highly alkaline and if it enters the watercourse can cause serious fish and invertebrate kills. Old concrete debris can also cause pH changes in watercourses and be toxic to fish and invertebrates. It is considered that the risk of such an impact is low from a well-managed work site.</p> <p>The site is located within the SAC. A small number of Freshwater Pearl Mussel located just downstream of the bridge could be affected. Juvenile salmon in ideal nursery habitat for some distance downstream of the bridge may also be affected. Both groups are qualifying interests of the SAC.</p>	<p>Removal of old concrete and road surfacing debris: All old concrete and road surface debris must be collected and removed regularly during works and correctly disposed of, off-site. No debris shall enter the river. Works should occur during good weather with speedy removal of debris including removal of dust and fines from the road surface. Dust should be damped down if necessary to prevent it mobilising to the water surface below the road bridge.</p> <p>Use of wet concrete: See Notes on Construction Best Practise – Concrete, Section 4.2.2, below.</p> <p>Deck waterproofing substances: must be applied carefully avoiding drips, leaks and spills that could enter the drains or the river directly.</p> <p>Fisheries: This reach of the Flesk comprises high value salmon and lamprey habitat and there are a few pearl mussel present. For this reason, even though there are no instream works proposed, IFI (Macroon) should be furnished with a copy of the Construction Method Statement and be made aware of the existence of this report. In the absence of instream works, there should be no issue with the timing of works in terms of salmonid restricted periods, but the timing should be agreed with IFI.</p>	<p>The key to mitigation is ensuring that no old road or concrete debris dust or sediment; wet concrete or waterproofing substances are allowed to enter the river during the works period.</p> <p>It is feasible that this can be achieved using Construction Best Practise in the area of run off control and careful use of wet concrete around watercourses. IFI must be consulted prior to works proceeding and furnished with a copy of the construction method statement.</p> <p>The risk of negative indirect impact on qualifying interests of the SAC is low using a thoroughly planned construction operation and a well-managed construction site. The impact on aquatic qualifying interests of the SAC (pearl mussel, salmon, lampreys, Annex I Habitat 3260) will be neutral with all recommendations implemented.</p>

4.1.3 Pallis Bridge [KY-N72-004]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Provision of paved verges and safety barriers. Construction of new reinforced concrete parapet walls clad in masonry. Demolition of existing up stream wingwalls and construction of new rc wingwalls. Construction of new concrete lining to the invert of culvert units. 	<p>Potential for indirect negative impacts downstream associated with debris (old concrete etc.) and/or toxic substances, such as wet concrete (paved verge construction) and mortar, entering the watercourse from the works area. Wet concrete and mortar, in particular, are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Old concrete debris can also cause pH changes in watercourses and be toxic to fish and invertebrates.</p> <p>Instream works involving use of wet concrete (invert lining) carry potential for moderate temporary impacts on salmon and lampreys (qualifying interests of the SAC) in a local area downstream of the stream confluence with the River Laune. The site is located c.200m upstream of the SAC. While the stream itself is not considered to be important habitat for qualifying interests of the SAC, the Laune confluence is only 300m downstream and possesses ideal habitat for aquatic protected species (salmon, lamprey). Young salmon may forage in the lower</p>	<p><u>Construction Method Statement:</u> A detailed method statement should be drawn up by the contractor indicating what standard measures will be taken to avoid: (i) sediment or soil loss, and (ii) cement and hydrocarbon release, associated with all aspects of the construction phase. It must include details of the water management strategy including number of pumps required and all other aspects to ensure a dry working environment.</p> <p><u>Removal of old concrete and masonry:</u> All old concrete and masonry debris must be collected and removed regularly during works and correctly disposed of, off-site. No debris shall enter the river.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Water management:</u> Concrete invert lining works must occur in the dry to avoid potential for transport of toxic substances downstream to the SAC. A suitable method of dewatering the channel must be selected. Habitat beneath the bridge is not significant for fisheries or benthos. At low flow, stream volumes could feasibly be dammed upstream and down and flumed or piped through the existing culvert to dewater the works area. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fisheries</u> – Inland Fisheries Ireland should be consulted prior to works commencing with regards to construction methods proposed and with regard to the design of invert lining such that fish passage is maintained or enhanced. IFI shall be informed of the existence of this report.</p>	<p>The primary issue at this site is ensuring that pollutants and sediment are not allowed to enter the stream from the works area to potentially be exported into the River Laune / Castlemaine Harbour SAC a short distance downstream.</p> <p>Fish rescue/removal is not required at this site as there is very little habitat for fish within the existing culvert. The risks are low for downstream fisheries values and freshwater life stages of qualifying interests of the SAC (salmon, sea and river lampreys) if a suitable water management method is selected and operations are well planned and executed. Provided the recommendations are adhered to, and Construction Best Practise implemented, the impact on aquatic protected species of this stream, and the SAC downstream, will be neutral.</p>

	<p>reaches of the stream in question, moving up from the Laune.</p> <p>There is potential for permanent negative impact to the ecology of the stream if the design of new concrete invert lining along the culvert in any way prevents upstream or downstream fish movement.</p>	<p><u>Timing of works:</u> significant instream works such as those associated with concrete invert lining and channel dewatering must be agreed with IFI and should observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Use of wet concrete/mortar:</u> At any stage during works, any splashed, leaked, spilled or excess concrete must be prevented from entering the river or drains and storm water pipes that connect to the river. There must be a feasible spillage response plan in place prior to works commencing. See Notes on Construction Best Practise – Concrete, Section 4.2.2, below.</p>	
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4.1.4 Mountrivers Bridge [CL-N67-012]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<p><u>Bridge Widening/Replacement</u></p> <ul style="list-style-type: none"> ▪ Masonry Repair & Repointing throughout the Bridge including removal of vegetation. ▪ Site clearance and earthworks for new road embankment. ▪ Construction of new or widened reinforced concrete bridge. ▪ Provision of road surfacing, paved verges and safety barriers. 	<p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete (bridge widening/reinforcing/ paved verge construction) and mortar, entering the watercourse from the works area. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Species affected could be salmon (and other salmonids – sea and brown trout), eels and flounder.</p> <p>Slight temporary negative impacts</p>	<p><u>Construction Method Statement:</u> A detailed method statement should be drawn up by the contractor indicating what standard measures will be taken to avoid: (i) sediment or soil loss, and (ii) cement and hydrocarbon release, associated with all aspects of the construction phase. It must include details of the water management strategy including number of pumps required and all other aspects to ensure a dry working environment.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Water management:</u> A suitable method of dewatering the channel must be selected so that works occur in the dry, thus avoiding potential for export of toxic substances and</p>	<p>Providing all recommendations are implemented and methods and materials are agreed with IFI, there will be a low risk of negative impacts downstream of the proposed bridge works. Consultation and agreement with IFI and correct timing of works to comply with salmonid restrictions is essential, as is the selection of a suitable method of maintaining a dry works area during the construction phase. With Construction Best Practise employed as set out, and fish removal / rescue during the</p>

	<p>could arise locally from sediment washout to the river associated with site clearance for bridge/road widening. The majority of the riverine habitat downstream of the bridge is depositing, so siltation is not the major concern, but high levels of suspended solids can stress and abrade gills of salmonid fishes.</p> <p>There could be a direct impact on migration of salmonids (salmon, sea trout) depending on timing of works owing to a high level of engineering activity at the bridge, which is situated at the outlet of the whole Creegh catchment.</p> <p>Bridge widening/replacement will require that the works area be dewatered meaning temporary loss of habitat and migration route for fish beneath the bridge. Habitat beneath the bridge has limited fisheries value per se, but there is suitable salmonid nursery habitat in the 10m reach downstream of the bridge. When dams are introduced, fish may be trapped within the proposed dry working area and they will die when the channel is dewatered.</p>	<p>sediment downstream. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fisheries</u>: Inland Fisheries Ireland (Limerick) should be consulted prior to works commencing to seek agreement on the proposed construction methods. IFI must be informed of the existence of this report.</p> <p><u>Fish removal/rescue</u>: must be carried out within the dammed section around the bridge prior to dewatering. This will require that IFI or a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel upstream of works.</p> <p><u>Timing of works</u>: significant instream works such as those associated with channel dewatering and bridge widening/replacement must be agreed with IFI and must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Use of wet concrete/mortar</u>: See Notes on Construction Best Practise – Concrete, Section 4.2.2, below.</p> <p><u>Avoiding hydrocarbon loss to watercourse</u>: See Notes on Construction Best Practise – Hydrocarbon Loss, Section 4.2.3, below.</p>	<p>dewatering stage, there will be a neutral impact on fisheries values (which includes Annex II species, Atlantic salmon).</p>
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4.1.5 Dysert Bridge [KY-N23-005]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<p><u>Bridge Widening/Replacement</u></p> <ul style="list-style-type: none"> Site clearance and earthworks for new road embankment. Construction of new widened bridge. The existing bridge shall be demolished and a new single span bridge shall be provided, it will be a similar length but double the width. Widening of the road/embankment on both sides of the bridge will be undertaken. A large diameter flume pipe will be set up c.10m upstream, and the river blocked with 1 tonne sandbags, the pipe will stop approximately 10m downstream. Excavation for half of the new bridge foundations will then be undertaken and the new foundations and abutments will be cast insitu. The precast beams will then be 	<p>Old concrete/masonry debris and dust generated as the bridge is removed has the potential to alter stream pH locally and be toxic to fish and invertebrates. This could affect salmonid spawning/nursery near the bridge on the upstream side.</p> <p>Dewatering of the channel to conduct works in the dry presents potential for direct mortality of salmonids, eels and brook lampreys. Fish will die if left stranded within the dammed channel reach as the working area is pumped dry.</p> <p>If machinery and equipment are tracking instream to demolish the bridge, the physical structure and integrity of salmonid habitat (gravels) upstream of the bridge may be disturbed or removed and lead to loss of this moderately important habitat unit within the otherwise largely drained channel.</p> <p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete (bridge widening/reinforcing/ paved verge construction) and mortar, entering the watercourse from the works area. Wet concrete and mortar are</p>	<p><u>Construction Method Statement:</u> A detailed method statement should be drawn up by the contractor indicating what standard measures will be taken to avoid: (i) sediment or soil loss, and (ii) cement and hydrocarbon release, associated with all aspects of the construction phase. The method statement must include details of the water management strategy, including step by step approach, number of pumps required and all other aspects to ensure both a dry working environment and a continuous downstream flow during bridge widening works.</p> <p><u>Water management:</u> Instream works must occur in the dry. Given there is a need for machine tracking instream it is probably advisable that once the streambed is pumped out, that geotextile and hardcore is placed on machine track routes across the river bed. This will limit the generation of sediment laden water that needs to be pumped out. Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fish removal/rescue:</u> must be carried out within the dammed section around the bridge prior to dewatering. This will require that IFI or a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel upstream of works.</p> <p><u>Habitat reinstatement:</u> Once the new bridge is in place and instream works completed, all debris/residue from the works must be removed from the river bed. The bed level should be set to a similar level as currently</p>	<p>The risk of any significant negative impacts at the bridge itself is relatively low because the habitat is not high quality, particularly downstream of the bridge where historical drainage has canalised the stream. A primary issue is the stringent avoidance of export of suspended sediment and pollutants (cement, hydrocarbons) downstream to the River Maine main channel (1.5km d/s) where salmon occur.</p> <p>Providing all recommendations are implemented, especially those concerning timing restrictions in salmonid habitat and consultation with IFI, and with Construction Best Practise applied, there will be a neutral impact on ecological values of the stream, and a neutral impact on freshwater life stages of aquatic qualifying interests (salmon; river and sea lamprey) of the Castlemaine Harbour SAC (c.20km downstream).</p>

<p>landed and the deck will cast in-situ. Once half of the bridge is complete traffic will be diverted on to this allowing the old bridge to be demolished. Demolition will likely be with a rockbreaker on a large excavator.</p> <ul style="list-style-type: none"> Provision of road surfacing, paved verges and safety barriers. 	<p>highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Fish species affected could likely be trout, brook lampreys and eels, although salmon cannot be ruled out upstream of the bridge.</p>	<p>exists with the gravelly riffle section reinstated around the bridge. If geotextile and hardcore is used to secure access along the riverbed, this must all be removed and disposed offsite, with existing river gravels redistributed evenly across the bed prior to channel rewatering.</p> <p><u>Fisheries</u> – Inland Fisheries Ireland (Macroom) should be consulted prior to works commencing to seek agreement on the proposed construction methods. IFI must be informed of the existence of this report.</p> <p><u>Timing of works:</u> significant instream works such as those associated with bridge removal must be agreed with IFI and must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Use of wet concrete:</u> Although the new bridge is single span and precast, any additional wet concrete used during the construction must be cast while the riverbed is dry. See Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> See Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p>	
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4.1.6 Ballynamona Upper Bridge [KY-N70-007]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<p><u>Bridge Widening/Replacement</u></p> <ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including 	<p>This is a small, fairly low volume trout stream. Patchy spawning habitat downstream of the bridge can be negatively affected indirectly if excessive sediment or fines enter</p>	<p><u>Construction Method Statement:</u> A detailed method statement should be drawn up by the contractor indicating what standard measures will be taken to avoid: (i) sediment or soil loss, and (ii) cement and hydrocarbon release, associated with all aspects of the construction</p>	<p>If all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream, and no</p>

<p>removal of vegetation.</p> <ul style="list-style-type: none"> • Site clearance and earthworks for new road embankment. • Construction of new or widened reinforced concrete bridge. • Provision of road surfacing, paved verges and safety barriers. 	<p>the stream during construction. Suspended solids can harm fish gills in small streams such as this, also smothering spawning/nursery habitat and altering invertebrate food supply. There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete (bridge widening/reinforcing/ paved verge construction) and mortar, entering the watercourse from the works area. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Fish species affected would most likely be trout.</p> <p>During the operational phase, there is potential for permanent impact at a local scale if the new bridge footprint is not passable by fish. This can occur if bed reinforcement creates an overly shallow, overly wide flow regime, and especially if there is a high downstream apron that can act as an impassable barrier to trout, lampreys and eels.</p>	<p>phase.</p> <p><u>Water management:</u> An appropriate method of damming and pumping or piping through of the stream must be selected. It is a small stream, meaning sandbags in low flows ought to be sufficient. In addition - apply Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Timing of works:</u> instream works such as those associated with this bridge widening must be agreed with IFI and must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fish removal/rescue:</u> must be carried out within the dammed section around the bridge prior to dewatering. This will require that a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel up- or downstream of works.</p> <p><u>Fisheries:</u> Inland Fisheries Ireland (Macroom) should be consulted at the design stage of the bridge to seek agreement on the proposed construction methods and to ensure that fish passage is maintained through appropriate bridge bed design (level and type). IFI must be informed of the existence of this report.</p> <p><u>Use of wet concrete:</u> See Notes on Construction Best Practise – Cement, Section 4.2.2, below.</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> See Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p>	<p>impact on freshwater life stages of aquatic qualifying interests (salmon; river and sea lamprey) of the Castlemaine Harbour SAC (4.6km downstream).</p>
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4.1.7 Ballymalis Bridge [KY-N72-003]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. 	<p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar (masonry repairs), entering the watercourse as a result of works. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Fish species affected here would most likely be trout and eel, but possibly salmon and lampreys also.</p>	<p><u>Water Management:</u> If masonry repairs are required below the waterline the stream must be dammed and water pumped or piped over the works area. The stream is reasonably small and sandbagging during low flows should be an appropriate option. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works:</u> if instream works are involved (channel dewatering), then the salmonid restricted period must be observed (no instream works between October 1st and May 1st).</p> <p><u>Fish removal/rescue:</u> in the case that instream works are required fish removal must be carried out within the dammed section around the bridge prior to dewatering. This will require that a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel up- or downstream of works.</p> <p><u>Fisheries:</u> IFI should be notified prior to the works and made aware of the existence of this report.</p>	<p>This site is within the Castlemaine Harbour SAC, and although it appeared polluted at the time of surveying, it must be assumed that aquatic qualifying interests of the SAC (salmon; river/sea lampreys) may occur, or at least migrate through the area. Providing all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream and a neutral impact on aquatic qualifying interests of the SAC (including those residing in the Gweestin & Laune Rivers downstream).</p>

4.1.8 Coolroe South Bridge [KY-N72-001]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. 	<p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar (masonry repairs), entering the watercourse as a result of works. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Fish species affected here would most likely be trout, eel and perhaps brook lamprey. With its proximity to the River Laune, it cannot be ruled out that young salmon could forage into the lower reaches of the tributary.</p>	<p><u>Water Management:</u> If masonry repairs are required below the waterline the stream must be dammed and water pumped or piped over the works area. The stream is reasonably small and sandbagging during low flows should be an appropriate option. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fish removal/rescue:</u> must be carried out within the dammed section around the bridge prior to dewatering. This will require that a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel up- or downstream of works.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works:</u> instream works (water management, masonry repairs) must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fisheries:</u> IFI should be notified prior to the works and made aware of the existence of this report. There is no requirement for further IFI consultation for works at this bridge.</p>	<p>Provided all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream, and no impact on the Laune River or the SAC a number of kilometres downstream.</p>

4.1.9 Palas Bridge [KY-N69-011.3]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Reinstatement of the riverbed. Provision of paved verges and safety barriers. 	<p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar (masonry repairs), entering the watercourse as a result of works. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Fish species affected here would most likely be trout and perhaps brook lamprey.</p>	<p><u>Water Management:</u> masonry repairs are required below the waterline within the stream, therefore it must be dammed and water pumped or piped over the works area so that works occur in the dry. The stream is reasonably small and sandbagging during low flows should be an appropriate option. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fish removal/rescue:</u> must be carried out within the dammed section around the bridge prior to dewatering. This will require that a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel up- or downstream of works.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works:</u> instream works must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fisheries:</u> IFI should be notified well prior to the works and</p>	<p>Provided all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream, and a neutral impact on the River Brick and aquatic qualifying interests of the SAC a short distance downstream.</p>

		<p>made aware of the existence of this report.</p> <p><u>Habitat reinstatement:</u> the reinstated riverbed beneath the bridge should be passable by salmonids and brook lampreys. This requires that there is no extended apron with a significant drop to the river downstream of the bridge. The bed reinforcement should ideally not be flat, but slightly V-shaped towards the centre to facilitate low flows with some depth. Small boulders/rock should be set into the reinforced riverbed to create current diversity and refugia for fish movement.</p>	
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4.1.10 Enrights Bridge [KY-N86-005]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Provision of paved verges and safety barriers. Demolition of existing concrete deck extension and construction of new concrete deck. 	<p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar (masonry repairs), entering the watercourse as a result of works. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Fish species affected here would most likely be trout and eel.</p>	<p><u>Water Management:</u> masonry repairs are required below the waterline within the stream, therefore it must be dammed and water pumped or piped over the works area so that works occur in the dry. The stream is reasonably small and sandbagging during low flows should be an appropriate option. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fish removal/rescue:</u> must be carried out within the dammed section around the bridge prior to dewatering. This will require that a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel up- or downstream of works.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best</p>	<p>Overall there is low risk of negative impacts on aquatic species at this site given its proximity to the tidal head and sub-optimal fisheries habitat.</p> <p>Providing all recommendations are implemented and Construction Best Practise is employed, there will be a neutral impact on ecological values of the stream and a low risk of export of pollutants downstream to the SAC.</p>

		<p>Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse: Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</u></p> <p><u>Timing of works:</u> instream works must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fisheries:</u> IFI should be notified well prior to the works and made aware of the existence of this report. There is no requirement for further IFI consultation for works at this bridge so long as timing restrictions are respected.</p> <p><u>Habitat reinstatement:</u> the reinstated riverbed beneath the bridge should be passable by trout and brook lampreys. This requires that there is no extended apron with a significant drop to the river downstream of the bridge. The bed reinforcement should ideally not be flat, but slightly V-shaped towards the centre to facilitate low flows with some depth. Small boulders/rock should be set into the reinforced riverbed to create current diversity and refuge for fish movement.</p>	
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4.1.11 Gort na Gcrann Bridge [KY-N86-034]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Provision of paved verges and safety barriers. 	There is very low risk of impact on aquatic ecological values of this stream owing to the unsuitability of habitat for fish and invertebrates around the bridge. However, if concrete or mortar needs to be used below the waterline then there is a	<p><u>Water Management:</u> if masonry repairs are required below the waterline within the stream, water must be managed so that works occur in the dry. Flows are so low through this culverted bridge that it may be feasible to sandbag within the mouth of the culvert upstream and pipe flows through to obtain dry conditions. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p>	Overall there is low risk of negative impacts on aquatic species at this site because it is a very small stream with low volume where water management should be relatively straightforward. Provided all recommendations are

	<p>risk of short term slight negative impact downstream of the bridge. Wet concrete/mortar (masonry repairs) are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Fish species affected here would most likely be trout.</p>	<p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works:</u> instream works must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fisheries:</u> IFI should be notified prior to the works and made aware of the existence of this report. There is no requirement for further IFI consultation for works at this bridge so long as timing restrictions are respected.</p>	<p>implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream and a low risk of transport of sediment and pollutants further downstream in the catchment.</p>
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4.1.12 Clooncurra Bridge [KY-N86-039]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Provision of paved verges and safety barriers. Infill of scour hole with mass concrete. 	<p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar (masonry repairs, infill of scour hole), entering the watercourse as a result of works. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and</p>	<p><u>Water Management:</u> wet concrete use is required below the waterline within the stream, therefore water must be managed so that works occur in the dry. The low volume of the stream makes it conducive to sandbagging and pump over during low flow (the bridge clearance is very low and may not be possible to pipe/pump through). An appropriate method must be selected to obtain dry conditions for concrete usage. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed</p>	<p>Providing all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream and a low risk of export of pollutants downstream to the SAC.</p>

	<p>invertebrate kills. Fish species affected here would most likely be trout and eel.</p>	<p>vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works:</u> instream works must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fisheries:</u> IFI should be notified well prior to the works and made aware of the existence of this report. There is no requirement for further IFI consultation for works at this bridge so long as timing restrictions are respected.</p>	
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4.1.13 Garfinny Bridge [KY-N86-043]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Provision of paved verges and safety barriers. 	<p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar (masonry repairs & repointing), entering the watercourse as a result of works. Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills. Fish species affected here would most likely be trout, although</p>	<p><u>Water Management:</u> wet concrete use is required below the waterline within the stream, therefore water must be managed so that works occur in the dry. The stream is fairly high energy meaning that sandbagging would need to be well planned and implemented a good few metres upstream of the bridge where flows are slacker. An appropriate method must be selected to obtain dry conditions for masonry repairs below the waterline. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fish removal/rescue:</u> must be carried out within the dammed section around the bridge prior to dewatering. This will require that a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur.</p>	<p>Providing all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream and a low risk of export of pollutants to the SAC downstream.</p>

	salmon cannot be entirely ruled out.	<p>Fish must be removed using depletion electrofishing methods and fish returned to the channel up- or downstream of works.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works:</u> instream works must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fisheries:</u> IFI should be notified well prior to the works and made aware of the existence of this report. There is no requirement for further IFI consultation for works at this bridge so long as timing restrictions are respected.</p>	
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4.1.14 Liscasey Bridge East [CL-N68-005]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Provision of paved verges and safety barriers. Construction of new 	There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar entering the watercourse as a result of works (masonry repairs & repointing; new concrete invert lining). Wet	<u>Water Management:</u> wet concrete use is required below the waterline for concrete invert lining, therefore water must be managed so that works occur in the dry. The stream is low volume and conducive to sandbagging and pipe through/pump over. An appropriate method must be selected to obtain dry working conditions. There is no significant fisheries habitat within the culverted reach, so fish removal/rescue is not necessary at this site. See Notes on	Providing all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream and a low risk of export of pollutants to the Lower Shannon River SAC (c.6.5km) downstream.

concrete lining to the invert of culvert units.	<p>concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills downstream. Fish species affected here would most likely be trout.</p> <p>There is potential for permanent negative impact to the ecology of the stream if the design of new concrete invert lining along the culvert in any way prevents upstream or downstream fish movement.</p>	<p>Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works:</u> instream works must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fisheries:</u> IFI should be notified well prior to the works and made aware of the existence of this report. There is no requirement for further IFI consultation for works at this bridge so long as timing restrictions are respected and the invert lining ensures at least the current level of fish passage.</p>	
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4.1.15 Moy River Bridge [CL-N67-019]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Extensive site clearance to improve sightlines on approach to the structure. 	<p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar entering the watercourse as a result of works (masonry repairs & repointing; new concrete invert lining). Wet</p>	<p><u>Water Management:</u> in the case that wet concrete/mortar use is required below the waterline, water must be managed so that works occur in the dry. The river is fairly high energy upstream of the bridge and an appropriate method must be selected to obtain dry conditions for any repairs below the waterline. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fish removal/rescue:</u> must be carried out within the dammed</p>	<p>Providing all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream.</p>

	<p>concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills downstream. Fish species affected here would most likely be trout.</p>	<p>section around the bridge prior to dewatering. This will require that a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel up- or downstream of works.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works:</u> instream works must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fisheries:</u> IFI should be notified well prior to the works and made aware of the existence of this report. There is no requirement for further IFI consultation for works at this bridge so long as timing restrictions are respected.</p>	
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4.1.16 Cullenagh Bridge [CL-N85-009]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. 	There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar entering the watercourse as a result of works	<u>Water Management:</u> in the case that wet concrete/mortar use is required below the waterline, water must be managed so that works occur in the dry. The river is fairly low energy and low volume up- and downstream of the bridge for a short distance and ought to be conducive to	Providing all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the

	<p>(masonry repairs & repointing). Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills downstream. Fish species affected here would most likely be trout.</p>	<p>damming (sandbagging) and piping through or pumping over. An appropriate method must be selected to obtain dry conditions for any repairs below the waterline. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fish removal/rescue</u>: There is a large area of slack water beneath the bridge that could hold eel and larger trout so fish rescue must be carried out within the dammed section around the bridge prior to dewatering. This will require that a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel up- or downstream of works.</p> <p><u>Removal of vegetation</u>: Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar</u>: Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse</u>: Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works</u>: instream works must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p> <p><u>Fisheries</u>: IFI should be notified well prior to the works and made aware of the existence of this report. There is no requirement for further IFI consultation for works at this bridge so long as timing restrictions are respected.</p>	<p>stream and a low risk of export of pollutants to the Inagh River a short distance downstream.</p>
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4.1.17 Downeys Bridge [CC-N72-033]

Proposed Works	Potential Impact	Recommendations	Residual Impact
<ul style="list-style-type: none"> Masonry Repair & Repointing throughout the Bridge including removal of vegetation. Provision of tie bars. 	<p>There is potential for indirect short term negative impacts downstream of the bridge in association with wet concrete/mortar entering the watercourse as a result of works (masonry repairs & repointing). Wet concrete and mortar are highly alkaline and if they enter the watercourse can cause serious fish and invertebrate kills downstream. Fish species affected here would most likely be trout.</p> <p>Concrete dust generated through horizontal drilling to insert tie bars carries a similar risk to wet concrete usage as it can alter stream pH locally and negatively affect fish and invertebrates.</p>	<p><u>Water Management:</u> in the case that wet concrete/mortar use is required below the waterline, water must be managed so that works occur in the dry. The river is fairly low energy and low volume up- and downstream of the bridge for a short distance and ought to be conducive to damming (sandbagging) and piping through or pumping over. An appropriate method must be selected to obtain dry conditions for any repairs below the waterline. See Notes on Construction Best Practise – Water Management, Section 4.2.1, below.</p> <p><u>Fish removal/rescue:</u> There is an area of slack water beneath the bridge that could hold eel and larger trout so fish rescue must be carried out within the dammed section around the bridge prior to dewatering. This will require that a suitably qualified ecologist with electrofishing experience be on hand on the day that dewatering will occur. Fish must be removed using depletion electrofishing methods and fish returned to the channel up- or downstream of works.</p> <p><u>Removal of vegetation:</u> Ideally vegetation should be removed by hand, not through use of herbicide sprays. All removed vegetation, debris and dirt must be gathered and disposed of offsite.</p> <p><u>Use of concrete/mortar:</u> Notes on Construction Best Practise – Cement, Section 4.2.2, below</p> <p><u>Avoiding hydrocarbon loss to watercourse:</u> Notes on Construction Best Practise – Hydrocarbons, Section 4.2.3, below.</p> <p><u>Timing of works:</u> instream works must observe salmonid restricted periods (no instream works between October 1st and May 1st).</p>	<p>If all recommendations are implemented and Construction Best Practise is applied, there will be a neutral impact on ecological values of the stream and a very low risk of export of pollutants to the River Bride and SAC downstream.</p>

		<u>Fisheries</u> : IFI should be notified well prior to the works and made aware of the existence of this report. There is no requirement for further IFI consultation for works at this bridge so long as timing restrictions are respected.	
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4.2 Construction Best Practise Notes

4.2.1 Water Management

- Damming of a watercourse should occur at low flow.
- It is essential that sufficient pump or flume capacity is on hand before operations commence to ensure that: (a) upstream flows can be adequately transferred, and (b) downstream flows are not stopped or significantly interrupted.
- Sandbagging (damming) must be carefully planned and executed as this carries a risk of negative impacts through generation or introduction of silt and sediment to the river system (if bags burst, for example).
- Sand-bags (small or 1-tonne) must be clean and of good integrity, preferably fully sealed (i.e., composed of high grade polythene, not webbing or hessian).
- Sand-bags must be filled with very clean, coarse grade sand with no fines at all. They need to be carefully handled and placed so they don't burst and no other additional material (like clay or soil etc.) should be introduced to seal gaps.
- Small (1/4 filled) sandbags should be on hand to seal gaps/leaks in dams as they arise – this will discourage the use of clay or soil to seal gaps.
- In large, high energy rivers such as the Beheenagh, the use of cofferdam construction may be necessary to ensure water-tightness around the instream works area. Given the high energy nature of the river and the potential for impacts on salmonid habitats downstream, it is not feasible to seal gaps in 1-tonne sandbag dams with clay or soil. This would introduce high levels of fines to the system and would easily erode under elevated flows.

With any works involving river damming – there is always a need for additional pumping from the works area to retain dry conditions. Complete drying out of instream working areas is a difficult task. Even tiny leaks through dams can lead to pooling of water over time, requiring intermittent or continual pumping out. This water can easily become contaminated with sediment or substances that are harmful to aquatic life (cement, oils etc.).

- At no time should contaminated water from the working area be pumped directly to the river/stream.
- Water contaminated with sediment should be pumped through a series of settlement tanks before it is discharged back to the waterbody.
- Water contaminated with spilled or leaked concrete or even water that leaks and surrounds newly dry concrete can be very alkaline. It must be pumped into barrels and removed off-site to an appropriate disposal facility.

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During dewatering, pumps used on-site should have a grill to help prevent fish being sucked into pipes.

4.2.2 Concrete/Mortar

- Wet concrete and cement/mortar are very alkaline and corrosive and can cause serious pollution to watercourses.
- Disposal of raw or uncured waste concrete must be controlled to ensure that the watercourse or karst features will not be impacted.

- Best practice in bulk-liquid concrete management addressing pouring and handling, secure shuttering / form-work, adequate curing times.
- Where shuttering is used, measures should be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils.
- Wash water from cleaning ready mix concrete lorries and mixers may be contaminated with cement and is therefore highly alkaline. Lorries and mixers and all concrete delivery equipment (wheelbarrows, buckets etc.) must be washed out off site.
- Cement dust must be controlled as it is alkaline and harmful to the surrounding ecology. Activities which result in the creation of cement dust must be controlled by dampening down areas.
- The timing of the works must be specified and agreed with the IFI in relation to fish migration and spawning periods.
-

4.2.3 Hydrocarbons

- There can be no storage of hydrocarbons or any polluting chemicals within 50m of the watercourse or any active/inactive drains connecting to the river. There must be no refuelling of vehicles/equipment within 50m of a river.
- Any diesel or fuel oils stored on site must be bunded to 110% of the capacity of the storage tank. Design and installation of fuel tanks must be in accordance with best practice guidelines BPGCS005, oil storage guidelines. Drip trays and spill kits must be kept available on site.
- All stationary plant should be placed on drip trays to prevent leaking oils reaching the river or entering groundwater.
- No washings or waste materials of any kind can be directed into the stream.
- Machinery on site must have pollution control kits on hand in the event of an emergency.

4.2.4 Construction Waste

All construction related waste, e.g., plastics, cable ties, geotextile etc. must be collected and disposed of correctly so that they don't enter river channels.

4.2.5 Fish Passage

Highlighted above are the bridges where new or widened bridge structures are proposed and fish passage is an important consideration. However, any of the sites where below water line masonry repairs to an existing concrete or stone bed reinforcement set-up are required must take fish passage issues into account.

- Masonry repairs should be in keeping with the existing bed form and should maintain or enhance the potential for upstream/downstream fish movement. Flat masonry bed reinforcement can be fitted with a low flow notch, and/or stones set into the concrete to encourage turbulence and create refugia for fish movement through the structure.
- Flat, overly-wide, uniform concrete bed designs must be avoided as these promote extremely shallow flows and can discourage or prevent fish movement.

- Protruding, high downstream bridge bed aprons or culvert overhangs are unacceptable as these discourage or prevent fish movement.
- IFI should be consulted in any case where significant bed reinforcement works are required.

5 CONCLUSIONS

The above sets out, exhaustively, the issues arising in relation to aquatic ecological values and protected species (where relevant) at seventeen national road bridges where maintenance and repair works are proposed.

At all but one bridge it can be concluded that, providing site specific recommendations are implemented utilising good forward planning (detailed Construction Method Statement) and Construction Best Practise, the impact on local and downstream aquatic ecological values (including instream protected species and habitats and SACs) will be neutral.

In the case of Beheenagh Bridge, Co. Kerry, further discussion is required regarding an appropriate water management strategy and the new (widened) bridge design. It is recommended that the discussions involve Inland Fisheries Ireland. The river has high fisheries value and it is important that the new bed level design, for example, maintains or enhances fish passage for lampreys, salmon and eels beneath the widened bridge. The Beheenagh is the most sensitive of the sites assessed in terms of the quality of the habitat and the scale and magnitude of works proposed.

A key to successful mitigation of potentially negative impacts at all sites, is in the selection and correct implementation of a water management strategy appropriate to each river/stream type such that works can occur in the dry. With regards water management strategy preparation and planning, the Construction Method Statements must detail the approach clearly **and** list all necessary equipment required on-site to ensure, for example: (i) adequate pumping capacity for stream volumes taking into account the potential for unexpected flooding, (ii) effective sediment/pollutant removal from water pumped out from the active works area, (iii) adequate numbers of sand bags of different sizes to ensure gaps can be filled without using clay or soil.

Stage 1 freshwater pearl mussel surveys conducted in the 300m downstream reach at four bridge sites (McCarthy O'Leary Br., Pallis Br., Beheenagh Br. and MountRivers Br.) revealed a handful of scattered adult mussels (5 in total) a short distance downstream of only McCarthy O'Leary Bridge, on the Flesk River. There are no instream works required at this bridge, and the risk of indirect impacts on mussels as a result of the type /scale of works proposed is very low. The remaining three sites investigated were negative for pearl mussel, either largely lacking in suitable habitat (Beheenagh Br.) or completely unsuitable for the species (MountRivers Br., Pallis Br.).

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APPENDIX 2

SECTION 50 APPLICATION REPORT



Beheenagh Bridge, Co. Kerry

Section 50 Application Report

Document Control Sheet

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1 INTRODUCTION

1.1 BACKGROUND

Kerry County Council, on behalf of Transport Infrastructure Ireland (TII – Formerly the National Roads Authority) has engaged RPS Consulting Engineers Ltd. to undertake various bridge rehabilitation schemes in Kerry, Cork and Clare. Kerry County Council has proposed to widen the existing masonry arch bridge on the N72 at Beheenagh (KY-N72-009) in order to improve road safety and provide an improved carriageway cross section. The proposed works will involve widening the existing bridge on both sides of the existing carriageway.

In accordance with the Arterial Drainage Act, 1945, all works affecting watercourse crossings are subject to approval from the OPW and a Section 50 application must be completed.

2 CATCHMENT DETAILS

2.1 LOCATION

The bridge crossing is on the Beheenagh River (as named by the EPA – Maps Web Portal <http://gis.epa.ie/Envision>) on the N72 approximately 7.5 km west of Rathmore, Co. Kerry. The location of the bridge is illustrated in **Figure 2.1** and in **Appendix A**.

Figure 2.1 – Beheenagh Bridge Location



2.2 CATCHMENT DESCRIPTION

The contributing catchment area of the Beheenagh River at the bridge crossing is approximately 25.4 km². The river rises approximately 11 km south east of Beheenagh Bridge (KY-N72-009) in the Paps Mountains and flows in a north westerly direction downstream of the bridge. The watercourse is bounded predominantly by rural lands used for agriculture with mountainous land to the south of the catchment. Figure 2.2 illustrates the extent of the catchment upstream of Beheenagh Bridge. This image is taken from the OPW Flood Studies Update (FSU) Web Portal (<http://opw.hydronet.com/>).

Catchment data available indicates that the stream is quite steep (S_{1085}) and the permeability of the soil is slightly low (BFI_{soil}). These catchment characteristics are likely to increase the rate of flow within the channel in comparison with another catchment.

Beheenagh Bridge (KY-N72-009)

BFI represents the influence of soils and geology on the river flows within FSU. BFI_{soil} ranges from 0 (low permeability) to 1 (high permeability) with the catchment in question having a value of approximately 0.45.

For the purposes of estimating potential flood levels at Beheenagh Bridge, flow rates during extreme events must be estimated. There are no OPW or EPA flow monitoring stations within the catchment of Beheenagh River, therefore the catchment is considered an 'ungauged catchment'. The contributing catchment area is approximately 25.4 km² therefore, to apply a conservative approach, the catchment response to rainfall has been estimated using the following methods:

- ### 2.3.1 Institute of Hydrology Report No. 124 Method

MCT0668RP1003A01

Table 2.1 – Catchment Characteristics for Beheenagh Catchment

Catchment Characteristics	Description	Beheenagh Catchment
AREA	Catchment Area (km ²)	25.10
SAAR	Standard Annual Average Rainfall (mm) From Fig II 3.1(I), Vol. 5 of FSR	1500
SOIL	Index of Rainfall Acceptance Potential From Fig. 1 4.18 (I) Vol.5 of FSR	0.42

The unfactored Mean Annual Flood (MAF) or Q_{bar} is calculated using the following equation:

$$Q_{bar} = 0.00108 (AREA^{0.89} SAAR^{1.17} SOIL^{1.27})$$

Using this methodology Q_{bar} within the Beheenagh catchment was estimated at **16.05 m³/s**. The factorial standard error (68% confidence) associated with this 3-variable equation is 1.65. This factor has been applied to the estimated Q_{bar} to obtain a value of **26.48 m³/s**.

Using this estimated Mean Annual Flood flow, the flow rates for various return periods are calculated using growth curve multipliers recommended in the Flood Studies Report. **Table 2.2** sets out the estimated flows for each return period.

Table 2.2 – Flows calculated for various return periods

Return Period (Years)	Annual Exceedance Probability (AEP)	Estimated Flow (m ³ /s)
10	10%	36.3
20	5%	38.9
50	2%	46.9
100	1%	51.9

2.3.2 OPW Flood Studies Update (FSU) Method

The Flood Studies Update (FSU) web portal facilitates the estimation of flood flows, extreme rainfall depths, and other hydrological variables for river locations in the Republic of Ireland. As the contributing catchment area at Beheenagh Bridge is 25.1 km², this methodology was also used to estimate the extreme flow rates.

2.3.2.1 Subject Site Selection

Within the FSU web portal, node 22_2692_1 was selected as this node is the closed to the upstream boundary of the hydraulic model constructed and is therefore the *subject site*.

2.3.2.2 Pivotal Site Selection

Physical Catchment Descriptors (PCD) are used to describe an aspect of the catchment in a single number. For example, drainage area (AREA) summarises catchment size and standard average annual rainfall (SAAR) summarises the relative wetness within the catchment.

Depending on the Physical Catchment Characteristics of the subject site, the FSU portal selects *Pivotal sites* based on their hydrological similarity in area, permeability, rainfall, urbanisation and slope to the Subject Site. Pivotal sites are used to adjust the initial flow estimates derived from the Physical Catchment Descriptors. Table 2.3 compares the PCDs for the subject site with the potential Pivotal sites selected through the FSU Portal.

Table 2.3 – Pivotal Site Catchment Characteristics

Physical Catchment Descriptor (PCD)	Subject Site 22_2692_1	Pivotal Sites				
		22006	22071	22035	18016	18050
		Flesk	Tomies Pier	Laune Bridge	Duncannon	Duarrigle
		Flesk	Lough Leane	Laune River	Blackwater (Munster)	Blackwater (Munster)
		Kerry	Kerry	Kerry	Cork	Cork
Area (km ²)	25.14	328.8	557.69	559.65	116.7	248.8
BFISOIL	0.4524	0.3884	0.6442	0.6368	0.3505	0.406
SAAR (mm)	1586	1819	2010	2009	1440	1469
FARL	0.984	0.961	0.73	0.731	1	0.999
DRAIN (km/km ²)	1.32	1.265	1.363	1.363	1.027	1.191
S1085 (m/km)	12.954	9.42	7.757	7.579	4.88	3.19
ARTDRAIN2	0	0	0	0	0	0
URBEXT	0	0.0054	0.0097	0.0097	0.0078	0.0036
Hydrological Similarity	-	2.29	3.23	3.21	1.771	1.92

The Hydrological Similarity of the potential Pivotal Site to the Subject site is calculated based on the PCDs presented. Table 2.4 includes recommendations from the FSU regarding ranges of hydrological similarity (D_{ij}):

Table 2.4 – FSU recommendations on Hydrological Similarity

Range	Degree of Similarity
$D_{ij} \leq 1.0$	High Similarity
$1.0 \geq D_{ij} \geq 2.0$	Medium Similarity
$D_{ij} \geq 2.0$	Low Similarity

Three of the potential pivotal sites are located downstream of Beheenagh Bridge but these catchments are greater in area and are significantly influenced by the presence of lakes such as Lough Leane. The catchment area associated with Duarrigle is much larger than that associated with Beheenagh Bridge. Based on the Hydrological Similarity, the Blackwater catchment at Duncannon is found to be quite similar to the subject catchment. This catchment is geographically close and is not influenced by the presence of lakes. This gauge has been used to inform the index flood (Q_{med}) for the design flow.

2.3.2.3 Index Flood Estimation

The index flood is defined as the median annual maximum flow (Q_{med}) and is equivalent to the 50% AEP peak flow. The $Q_{med,rural}$ for the subject site was estimated as 13.59 m³/s using the 7 variable equation. The 7 variable equation is based on Physical Catchment Descriptors for the catchment.

$$Q_{med} = 1.237 \times 10^{-5} \text{Area}^{0.937} \text{BFISOIL}^{-0.922} \text{Saar}^{1.306} \text{Farl}^{2.217} \text{DrainD}^{0.341} (1 + \text{ARTDRAIN2})^{0.408}$$

The $Q_{med,rural}$ estimated using the 7 variable equation is then adjusted by the ratio between the recorded median annual maximum flood ($Q_{med,AMAX}$) and $Q_{med,rural}$ at the selected pivotal site, Duncannon and then adjusted for urbanisation to derive Q_{med} . The following table illustrates the estimated Q_{med} flow following adjustment.

Table 2.5 – Estimated Q_{med}

Station No.	Station Name	Q_{med} (m ³ /s)	Pivotal Adjustment Factor	Q_{med} (m ³ /s)
22_2692_1	Beheenagh Bridge	13.59	1.55	21.07

2.3.3 Flood Frequency Analysis

The FSU methodology was used to derive peak flow rates for fluvial flood events up to the 1 in 1,000 year event (0.1%AEP). Hydrologically similar gauged sites are then selected to form a pooling group based on the Euclidian distance measure (d_{ij}) between catchment characteristics such as Area, SAAR, and BFISOIL. The grouped annual maximum levels (AMAX data) are pooled to create a combined record length. This is generally in accordance with the 5T rule – 5 times the record length of the target design event, i.e. 500 years of pooled data when designing for a 1 in 100 year return event or 1% AEP event. This pooling group was reviewed to ensure similarity with the subject catchment.

2-parameter and 3-parameter statistical distributions including Extreme Value (EV1), Log Normal (LN2 and LN3), Logistic (LO) and Generalised Extreme Value (GEV) distributions are assessed and fitted to the pooled data. The pooled average was compared with the L-moments for all the distributions. The GLO and GEV type distributions were found to best match the pooled average. Table 2.6 presents the estimated flow rates associated with the GLO, LO, GEV and EV1 distributions. The LO distribution provides the most conservative flow estimate for the 1 in 100 year return event while the GLO distribution estimates a higher flow rate for the 1 in 1000 year return event. **Table 2.6** includes flow rates estimated using the GLO, LO, GEV and EV1 distributions. As the required is design standard the 1 in 100 year event, the 1 in 100 year flow rate estimate provided by the LO distribution is considered appropriate.

Table 2.6 – Estimated Peak Flow Rates for various Return Periods

Return Period (Years)	AEP (%)	Estimated Flow Rate (m ³ /s) GLO Distribution	Estimated Flow Rate (m ³ /s) LO Distribution	Estimated Flow Rate (m ³ /s) GEV Distribution	Estimated Flow Rate (m ³ /s) EV1 Distribution
5	20	26.07	27.95	26.59	26.61
20	5	33.15	35.68	33.56	33.8
50	2	38.38	40.38	37.87	38.35
100	1	42.8	43.87	41.04	41.76
1000	0.1	61.28	55.34	51.21	53.04

2.4 DESIGN FLOW

The IH124 and FSU methodologies were used to estimate the flood flow rates associated with a 1 in 100 year event in Beheenagh River. Comparing the estimates in Table 2.2 and Table 2.6, it can be seen that the IH124 estimates are significantly greater. In order to conservatively assess the flood levels associated with a 1 in 100 year event in the Beheenagh River, the estimated provided by the IH 124 methodology was used in the HEC-RAS model. Calculation details are included in **Appendix B**.

2.5 CLIMATE CHANGE

The “OPW Assessment of Potential Future Scenarios, Flood Risk Management Draft Guidance”, 2009 makes recommendations on the expected impacts of climate change. This considers two scenarios Mid Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). Based on these scenarios the allowances described in **Error! Reference source not found.** are recommended for climate change.

Table 2.7 – Recommended allowances for Climate Change (Taken from OPW – Assessment of Potential Future Scenarios for Flood Risk Management)

	MRFS	HEFS
Extreme Rainfall Depths	+20%	+30%
Flood Flows	+20%	+30%
Mean Sea Level Rise	+500mm	+1000mm
Land Movement	-0.5mm/year*	-0.5mm/year*
Urbanisation	No general allowance – Review on case by case basis	No general allowance – Review on case by case basis
Forestation	-1/6Tp**	-1/3Tp** +10%SPR***
Notes: * Applicable to the southern part of the country (Dublin – Galway and south) ** Reduce the time to peak (Tp) by a third *** Add 10% to the standard percentage runoff (SPR) rate		

2.6 SIMULATED FLOW

In accordance with the guidelines, a 100 year flood (1% AEP) is adopted for design and analysis of the proposed structure. The Institute of Hydrology Report No. 124 method of flow estimation is considered the most appropriate. Based on the above recommendations the 1 in 100 year return period flow rate simulated in HEC-RAS is 62.3 m³/s.

3 CROSSING DETAILS

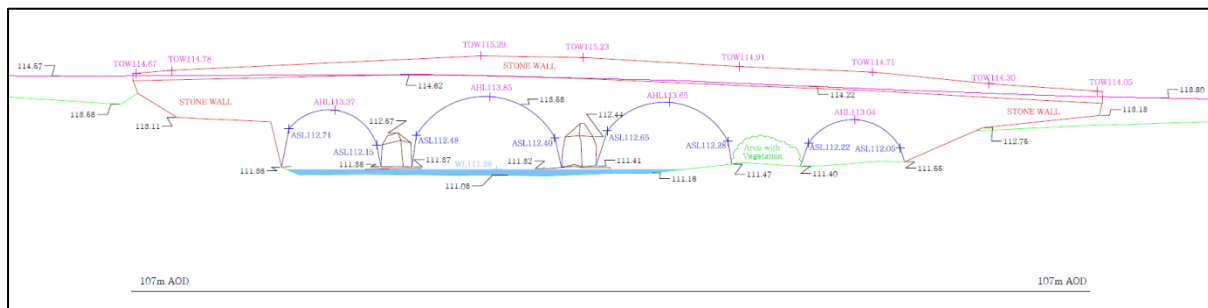
3.1 EXISTING BRIDGE STRUCTURE

Beheenagh Bridge is a 4 span masonry arch with a max span of 5.35 m, an overall length of 22.00 m and an out-to-out width of 6.77 m. The existing soffit level of the bridge varies from 113.04 to 113.85 m OD Malin, approximately 2.77 m above bed level. Photos of the existing structure are included in **Appendix C**. **Figure 3.1** illustrates the existing upstream bridge cross section and the cross sectional flow area under each arch is as follows:

- Left arch: 5.11 m²,
- Left central arch: 11.90 m²,
- Right central arch: 8.34 m²,
- Right arch: 5.65 m².

Note: The bridge is viewed looking downstream.

Figure 3.1 – Cross section of existing bridge looking downstream



3.2 PROPOSED BRIDGE STRUCTURE

The proposed works involve widening the existing bridge on the up and downstream sides of the existing bridge. The existing bridge structure will remain in place. The proposed soffit level is 113.85 m OD, to match the existing structure. **Appendix D** contains plan and cross section drawings of the proposed works at Beheenagh Bridge.

4 HYDRAULIC ANALYSIS AND RESULTS

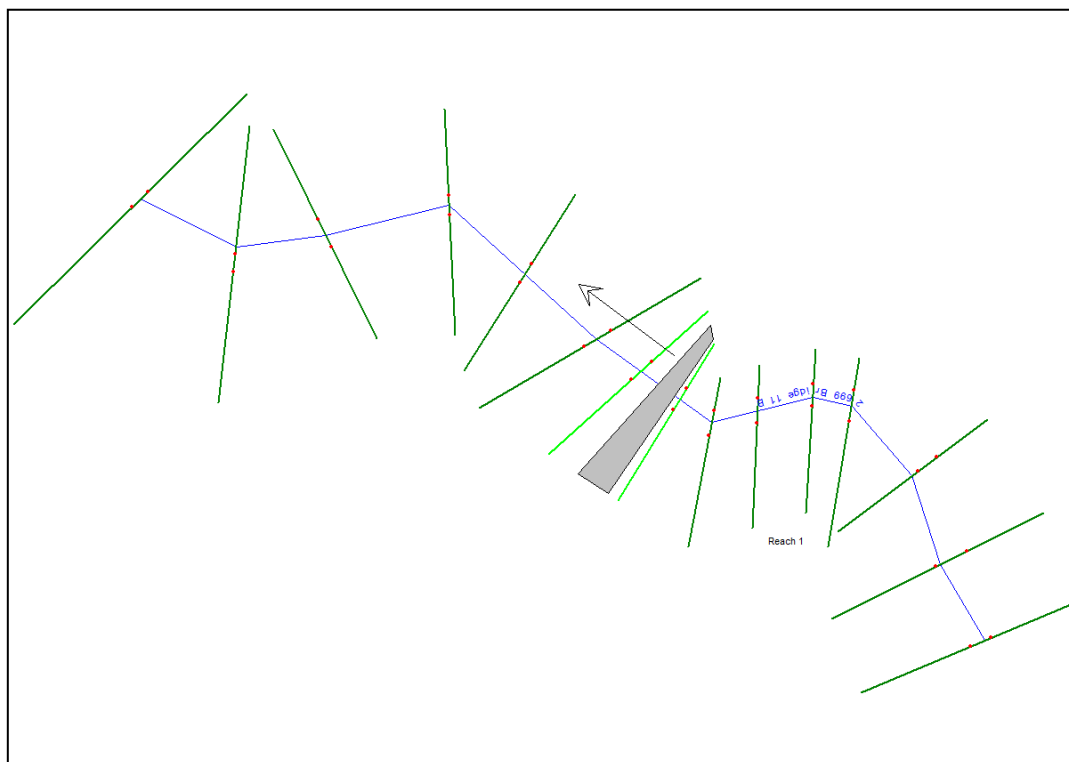
4.1 HEC-RAS MODEL

Hydraulic analysis of the water course was carried out using HEC-RAS (Version 4.1.0) software. This program calculates the water surface profiles for steady state, one dimensional flow in open channels.

The HEC-RAS model was generated using data recorded as part of a topographical survey undertaken by Apex Surveys Ltd. in July 2016. The survey was carried out in order to establish river cross section, flood plain information, stream bed levels, and existing structure details. The hydraulic model was constructed from approximately 157 m upstream to 187 m downstream of the existing bridge. The total length of the channel modelled is 352m.

Figure 4.1 illustrates the layout of the hydraulic model and cross section locations relative to the existing bridge. The model was run in steady state with a mixed flow (sub critical and/or supercritical) regime, using the 100 year return period peak flow estimated.

Figure 4.1 – HEC-RAS Model Layout



4.2 MANNING'S ROUGHNESS COEFFICIENT

HEC-RAS estimates energy losses due to friction using Manning's equation. In order to construct the hydraulic model of the watercourse, the channel bed and banks were reviewed to assign appropriate Manning's 'n' (channel roughness) values.

The Manning’s ‘n’ roughness values were adjusted based on the water levels recorded during the river cross section survey and on the type and density of the vegetation within the cross sections. The ‘n’ values were chosen based on guidance provided in “Open Channel Hydraulics”, (Chow, 1959). Table 4.1 includes the roughness coefficients used for each element of the hydraulic model.

Table 4.1 – Manning’s Roughness Coefficients

Location	Value
Main Channel	0.03 – 0.09
Floodplain, Light Brush	0.035 – 0.05

4.3 SIMULATION RESULTS

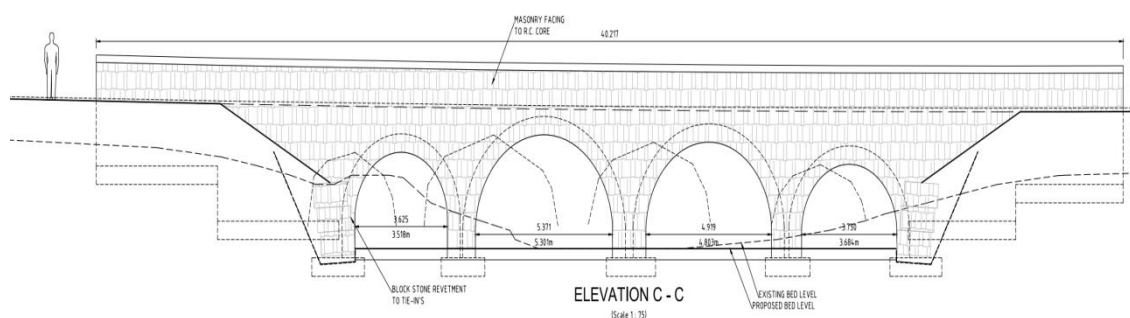
In accordance with the guidelines, a 100 year (1% AEP) flood flow rate has been adopted for design and analysis of the proposed structure. The 1 in 100 year flow rate of $62.3 \text{ m}^3/\text{s}$ was simulated within HEC-RAS to estimate the 1 in 100 year flood level at the existing Dysert Bridge.

A hydraulic model with the proposed structure was prepared to calculate the soffit level required to convey the 1 in 100 year flood event with a freeboard of 300 mm. It was found that the existing soffit level of 113.85 m OD would be sufficient to satisfy these requirements.

4.4 DESIGN DETAILS

The proposed bridge structure is based on the dimensions and gradient of the existing portion of the opening to be retained, estimated peak flows, existing and proposed road geometry, and OPW criteria. The proposed bridge extension is a reinforced concrete extension of the existing masonry arch structure. **Figure 4.2** illustrates the cross section of the proposed bridge. Plan and section details of the proposed bridge are included in **Appendix D**.

Figure 4.2 – Proposed Bridge Cross Section



4.5 MODEL RESULTS

Losses will occur as a result of friction in the channel up and downstream of the proposed structure and within the bridge crossing. The proposed abutments and bridge deck will be of smooth concrete. The existing gravel river bed will remain through the existing and extended bridge. A roughness coefficient of 0.07 for the gravel bed has been adopted for analysis purposes. The HEC-RAS results are included in **Appendix E** for the existing and proposed bridge configurations.

Following assessment of the existing and proposed structures at Beheenagh, it was found that the 1 in 100 year flood level at the bridge crossing is 113.14 m OD. Allowing the recommended freeboard of 300 mm, a soffit level of 113.44 m would be required to convey a 1 in 100 year event while allowing for the required freeboard. The soffit level within the existing central arch is 113.85 m OD, 0.41 m above the minimum level recommended by the OPW. The proposed widened structure will have a soffit level of 113.85 m OD which is considered adequate to convey the 1 in 100 year flood flow while allowing the required freeboard.

5 CONCLUSION

The preceding report and calculations show that the proposed alterations of the Beheenagh Bridge will not adversely affect flood elevations on the Beheenagh River and the proposed alterations are satisfactory in reference to the requirements of Section 50 of the Arterial Drainage Act, 1945.

- The existing structure will remain in place with the proposed widening works on the up and downstream faces of the existing bridge.
- The conveyance area of the existing bridge will not be reduced as a result of the proposed works.
- The soffit level of the proposed widening works will match the existing structure. This is considered sufficient to convey the 1 in 100 year flow rate while maintaining the required freeboard.
- The proposed bridge structure will not result in increased flood levels upstream of the existing bridge crossing.

APPENDIX A
Catchment Map

APPENDIX B

Design Flow Estimation

Design Flows for Beheenagh Bridge using IH 124 Method

Reference: Institute of Hydrology, Report No. 124 (IH 124), Equation 7.1 and Flood Studies Report (FSR)

IH 124 Equation 7.1: $Q_{BAR} = 0.00108 [AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}]$

Q_{BAR} = mean annual flood

Total Catchment Area , **A**

25.40 km²

Proportion of catchment with Class 1 Type Soil **S₁**
From the figures opposite

0.00

Proportion of catchment with Class 2 Type Soil **S₂**
From the figures opposite

0.35

Proportion of catchment with Class 3 Type Soil **S₃**
From the figures opposite

0.00

Proportion of catchment with Class 4 Type Soil **S₄**
From the figures opposite

0.20

Proportion of catchment with Class 5 Type Soil **S₅**
From the figures opposite

0.45

SOIL = $(0.15S_1 + 0.3S_2 + 0.4S_3 + 0.45S_4 + 0.5S_5) / (S_1 + S_2 + S_3 + S_4 + S_5)$

0.42

Annual Average Rainfall, **SAAR**

From FSU (on the annual average rainfall map, goes from 1200 to 1600mm)

1584.18 mm

Mean annual flood to rural conditons (from IH 124 Equation 7.1),

Qbar (rural)

16.22 m3/s

Factorial Standard Error for 3 variable eqn = 1.65 (68% Confidence)

1.65

Mean Annual Flood

Qbar (urban)

26.76

Note: The following growth factors obtained from Table 2.39 Vol.1 of Flood Studies Report

Return Period of 5 years factor by 1.20

Q(5) =

32.11 m3/s

Climate Change Factor = 1.2

Q(5 + CC) =

38.53 m3/s

Return Period of 10 years factor by 1.37

Q(10) =

36.66 m3/s

Climate Change Factor = 1.2

Q(10 + CC) =

43.99 m3/s

Return Period of 20 years factor by 1.47

Q(20) =

39.34 m3/s

Climate Change Factor = 1.2

Q(20 + CC) =

47.20 m3/s

Return Period of 25 years factor by 1.60

Q(25) =

42.81 m3/s

Climate Change Factor = 1.2

Q(25 + CC) =

51.38 m3/s

Return Period of 50 years factor by 1.77

Q(50) =

47.36 m3/s

Climate Change Factor = 1.2

Q(50 + CC) =

56.84 m3/s

Return Period of 100 years factor by 1.96

Q(100) =

52.45 m3/s

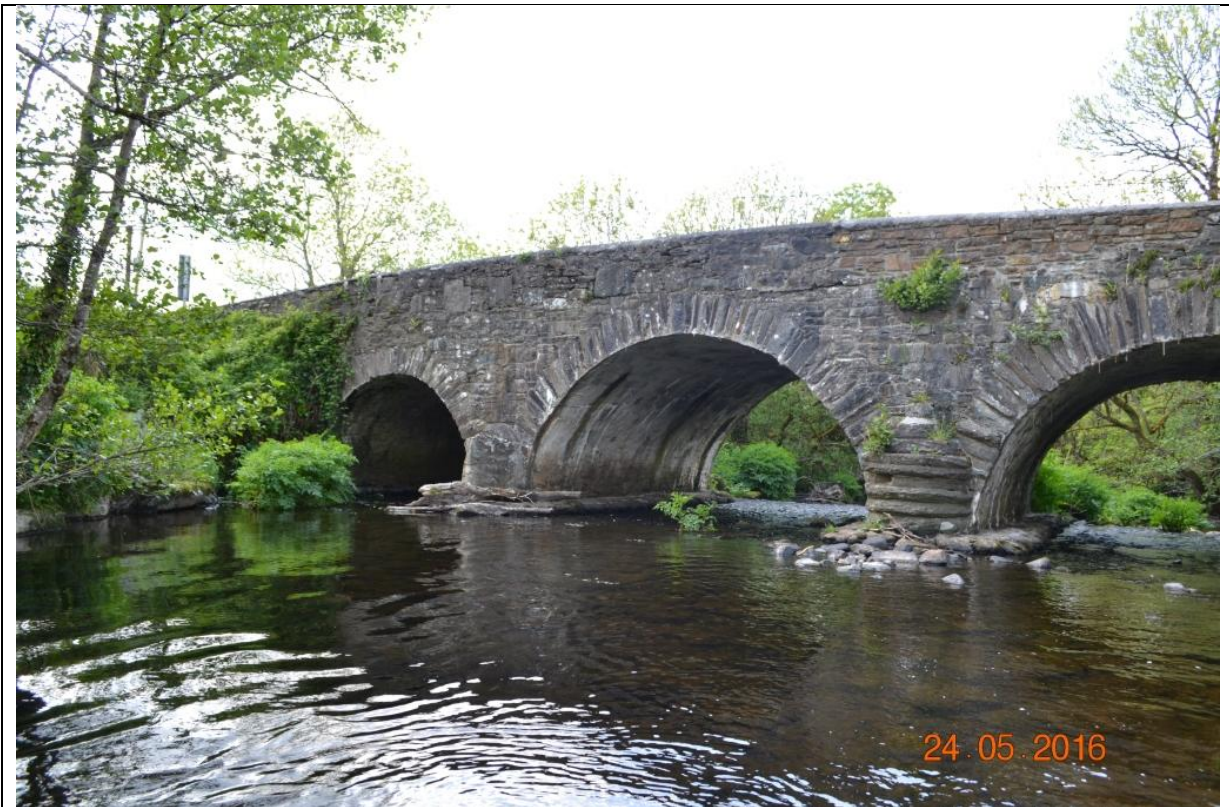
Climate Change Factor = 1.2

Q(100 + CC) =

62.94 m3/s

APPENDIX C

Photographs of Existing Structure



Existing Bridge – Looking downstream (a)



Existing Bridge – Looking downstream (b)



Existing Bridge – Looking upstream (a)



Existing Bridge – Looking upstream (b)



Existing Bridge – Road



Existing Bridge – Road



Existing River Channel – Right central arch, looking downstream



Existing River Channel – Left central arch, looking downstream

APPENDIX D

Proposed Bridge Plan and Section

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PLAN LAYOUT - OVERALL SCHEME
(Scale 1 : 350)

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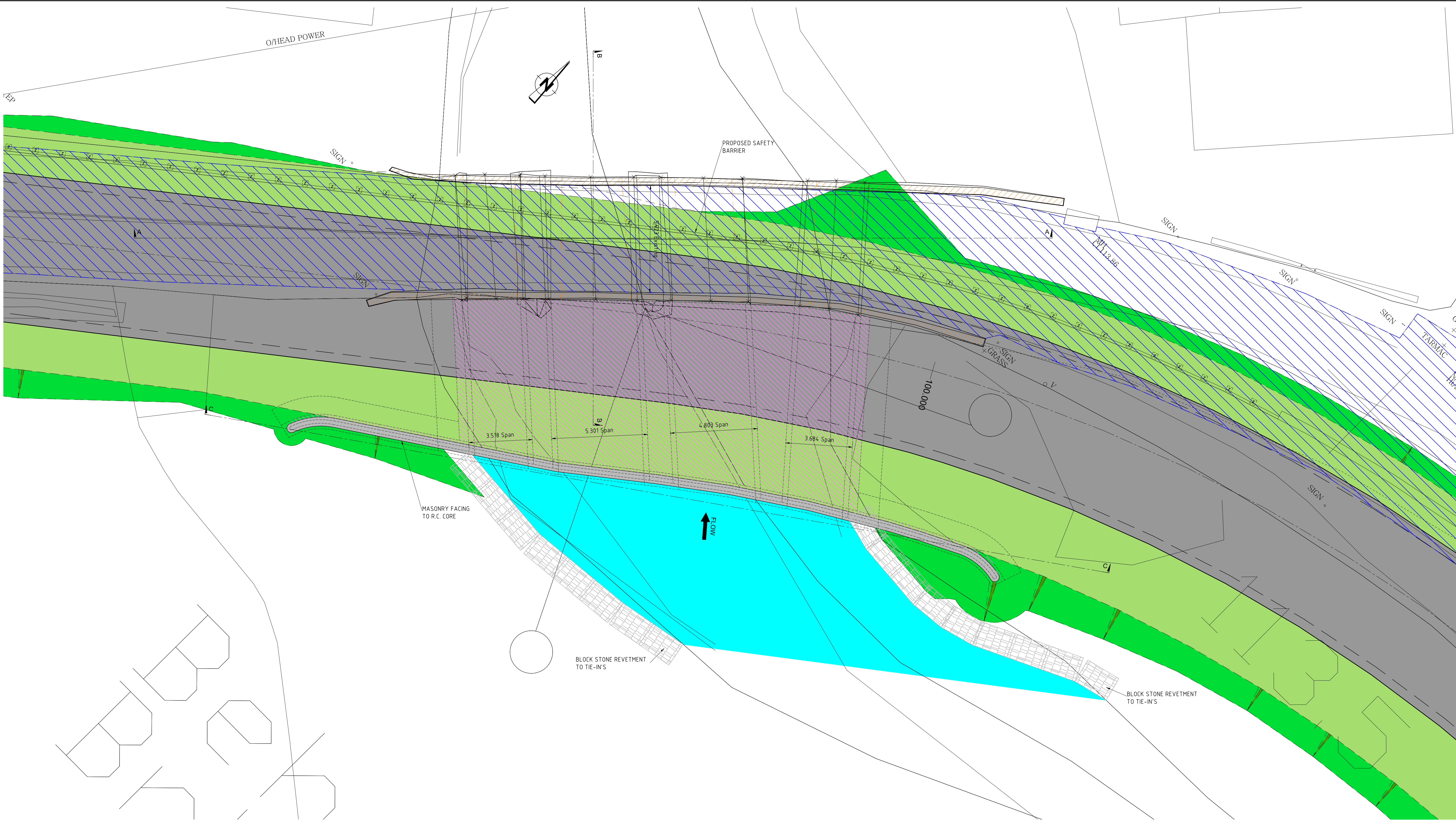


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Project	Eirspan TO 269 Munster Bridges 2016		
Title	ST11 Beheenagh Bridge Bridge KY-N72-009 Proposed Overall Plan		
File Ref.	PL1101 KY-N72-009.dwg	Drg. No.	PL1101
Rev	P01		

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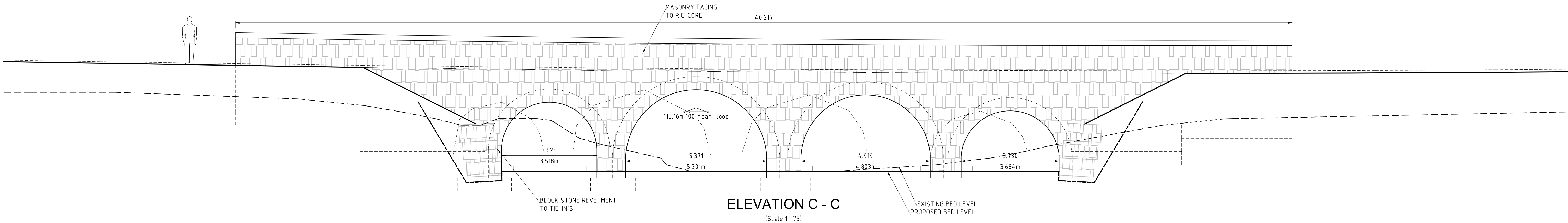
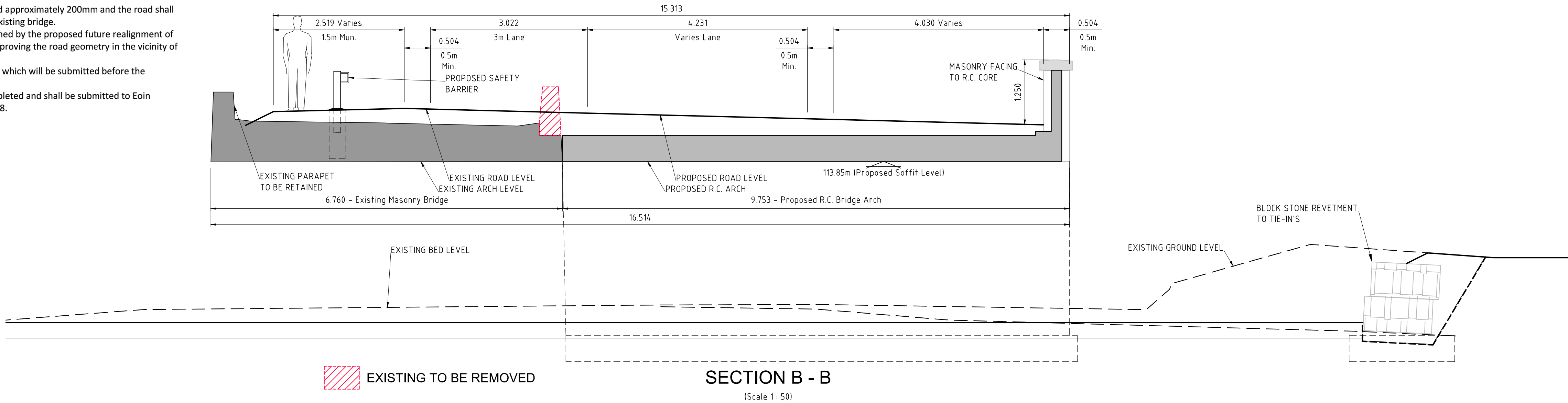
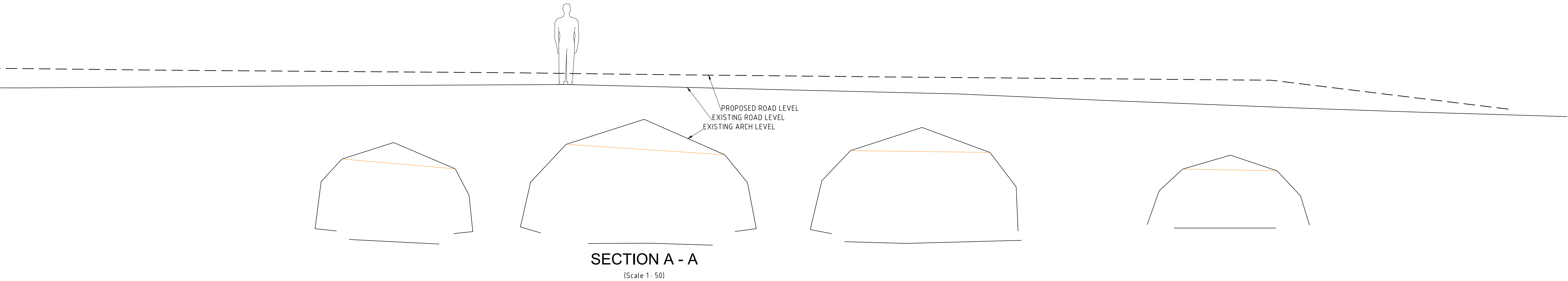
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Rev	P01

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“Pre-submission Consultation for Proposed Part 8 Planning Application for Proposed Works at Beheenagh Bridge KY-N72-009”

The proposed works at Beheenagh Bridge include bridge widening and road realignment/widening over 220m to remove a local pinch-point on the existing N72 Killarney Rathmore Road. The existing masonry arch bridge shall be widened with a reinforced concrete extension clad in masonry stonework, similar to the existing. The existing road level at the structure shall be increased approximately 200mm and the road shall be widened for approximately 100m either side of the existing bridge. The width of the widened bridge has been largely governed by the proposed future realignment of the N70 to the northwest of the existing bridge while improving the road geometry in the vicinity of the structure to remove the existing “humpback”. The works are subject to Section 50 Approval from OPW which will be submitted before the lodgement of the Part 8. The AA Screening and the EIA Screening have been completed and shall be submitted to Eoin Kelleher (KCC) for review prior to lodgement of the Part 8.



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Drg. No.	PL1103
Rev	P01

APPENDIX E

Model Results

River Station	Profile	Return Period Event	Q Total (m ³ /s)	Min Channel EI	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width
10	Existing	100 Year	63.2	110.51	114.25		114.28	0.000288	1.07	88.54	74.82
10	Proposed	100 Year	63.2	110.51	114.13		114.18	0.000373	1.19	79.82	72
9	Existing	100 Year	63.2	111.02	114.25		114.27	0.000145	0.77	113.77	74.33
9	Proposed	100 Year	63.2	111.02	114.14		114.16	0.000184	0.85	105.12	74.17
8	Existing	100 Year	63.2	110.64	114.25		114.27	0.000138	0.79	131.92	75.03
8	Proposed	100 Year	63.2	110.64	114.13		114.15	0.000169	0.85	123.14	75.03
7	Existing	100 Year	63.2	111.05	114.25		114.27	0.000139	0.78	123.83	62.65
7	Proposed	100 Year	63.2	111.05	114.13		114.15	0.000168	0.84	116.48	62.65
6	Existing	100 Year	63.2	110.76	114.24		114.26	0.00015	0.86	115.72	53.78
6	Proposed	100 Year	63.2	110.76	114.13		114.15	0.000178	0.91	109.39	53.78
5.5	Existing	100 Year	63.2	110.74	114.24		114.26	0.000342	0.88	105.6	55.25
5.5	Proposed	100 Year	63.2	110.74	114.12		114.14	0.000416	0.94	98.99	55.25
5	Existing	100 Year	63.2	110.49	114.23		114.25	0.000781	0.69	93.91	56.71
5	Proposed	100 Year	63.2	110.49	114.1		114.13	0.00084	0.9	86.9	56.71
4.5	Existing		Bridge								
4.5	Proposed		Bridge								
4	Existing	100 Year	63.2	110.01	112.53		112.62	0.005907	1.38	50.4	53.67
4	Proposed	100 Year	63.2	110.01	112.53		112.62	0.005907	1.38	50.4	53.67
3	Existing	100 Year	63.2	109.11	111.55	111.48	111.83	0.024746	2.65	28.06	37.28
3	Proposed	100 Year	63.2	109.11	111.55	111.48	111.83	0.024746	2.65	28.06	37.28
2	Existing	100 Year	63.2	109.1	110.69		110.87	0.017429	1.9	34.01	46.89
2	Proposed	100 Year	63.2	109.1	110.69		110.87	0.017429	1.9	34.01	46.89
1	Existing	100 Year	63.2	108.43	110.32		110.48	0.017104	2.13	36.09	58.58
1	Proposed	100 Year	63.2	108.43	110.32		110.48	0.017104	2.13	36.09	58.58
0	Existing	100 Year	63.2	107.63	109.95	109.95	110.22	0.006316	2.77	36.41	57.2
0	Proposed	100 Year	63.2	107.63	109.95	109.95	110.22	0.006316	2.77	36.41	57.2

APPENDIX 3

METHOD STATEMENT FOR THE PROTECTION OF BUILT HERITAGE

1.1 SCOPE OF METHOD STATEMENT FOR THE PROTECTION OF BUILT HERITAGE

This Generic Method Statement comprises the Principal Control Measures to safeguard the built heritage. Health and Safety Requirements are not included in this Method Statement as discussed below.

The preparation of a site specific Method Statement is subject to detailed design and finalisation by the appointed Contractor(s) and should not be taken as definitive but as a minimum requirement. It is not the purpose of this Generic Method Statement to reproduce or replace arrangements and procedures that will be produced by a Contractor that will be appointed to the Construction Stage (as PSCS), and where appropriate this Generic Method Statement will be considered in that light and will be updated or even replaced by a more detailed and further considered document used by the appointed Contractor to manage safety, health and the environment dependant on the Contractor(s) proposed construction methodology.

The proposed works will be undertaken by a Contractor(s), suitably appointed through a tendering process that has demonstrated their experience in undertaking similar bridge rehabilitation /widening works on historic masonry bridges.

Note: the term Contractor in this Generic Method Statement refers to the appointed Contractor or Contractors and the term Site Representative (SR) is used throughout the Plan to represent the Contractor's person in charge of the project i.e. the Project Manager, Construction Manager, Site Manager, Site Agent or Environmental Officer as appointed by the Contractor.

The safety and health component of the Method Statement is not included here and will be prepared by the contractor in accordance with the Safety, Health and Welfare at Work (Construction) Regulations.

1.2 TEMPORARY FIXINGS TO THE EXISTING STRUCTURE FOR CONSTRUCTION PURPOSES

1. In general fixings will be minimised and used only where no alternative method of construction is feasible.
2. If fixings that require anchors are to be used they will not be fixed close to edges of carved decorative features.
3. A strategy for the insertion and removal of fixings and anchors will be developed before commencement of the works. Expanded ferrous anchor sockets will not be left in the structure.

Note:- There are no existing permanent services, ducting or brackets on the existing structure. No new services, ducting or brackets will be fixed to the outside of the structure.

1.3 MASONRY WORKS

1. All masonry works to the existing structure will be undertaken by a skilled stone masons with substantial experience in the repair and restoration of historic masonry structures.
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2. All masonry works will be similar to the existing structure in terms of size, finish, texture, material, joints and bedding.
 3. Exposed faces of new masonry units will be hand dressed to match the original face or tooling.
 4. New stone will not be distressed or toned down to match original.
 5. All mortar used in the repair works will be Natural Hydraulic Lime mortar (NHL). The use of cementitious mortar will not be permitted.

Note: A sample panel of masonry construction will be undertaken independent of the structure in advance of the works in order to verify that the proposed masonry works are comparable to the existing structure.

1.4 RE-POINTING RANDOM RUBBLE MASONRY

1. Where damp conditions have caused moss and algal growth on masonry, the area will be scraped clean with wooden spatulas and cleaned down to remove all organic debris and soil prior to re-pointing.
2. Where mortar joints are loose, friable or open they will be carefully raked out to full depth using tools narrower than the joint to avoid damaging the stone and repointed using NHL mortar. Joints will be finished to match the original finish and where appropriate, the correct number, size, shape, orientation and type of pinning stones to maintain the mortar/stone ratio will be provided.
3. Stones used for pinning repair in rubble masonry will typically have the same colour, surface treatment and edge dressing as the surrounding masonry.

1.5 PRE CONSTRUCTION SURVEY

A Level 3 Building Survey¹ must be undertaken prior to construction works commencing by a suitably qualified archaeologist. Separately, a wade survey at the Bridge is to be completed under licence from the National Monuments Service. This report should be submitted to KCC Conservation Officer on completion of the works.

¹ As per standards set out in Hammond & McMahon (2002) *Recording and Conserving Ireland's Industrial Heritage*. Kilkenny: The Heritage Council
