NATURA IMPACT STATEMENT

PROVISION OF INFORMATION FOR AN APPROPRIATE ASSESSMENT OF THE PROPOSED N69 LISTOWEL BYPASS, CO. KERRY

Prepared for Jacobs

Rev.	Status	Author	Reviewed By	Approved By	Issue Date
R0A	Final	AS/CC	CC/AC	AC	**27/04/2017**

Scott Cawley, College House, 71-73 Rock Road, Blackrock, Co. Dublin, A96 X6V2, Ireland

Tel+353(1)676-9815 Fax +353(1) 676-9816

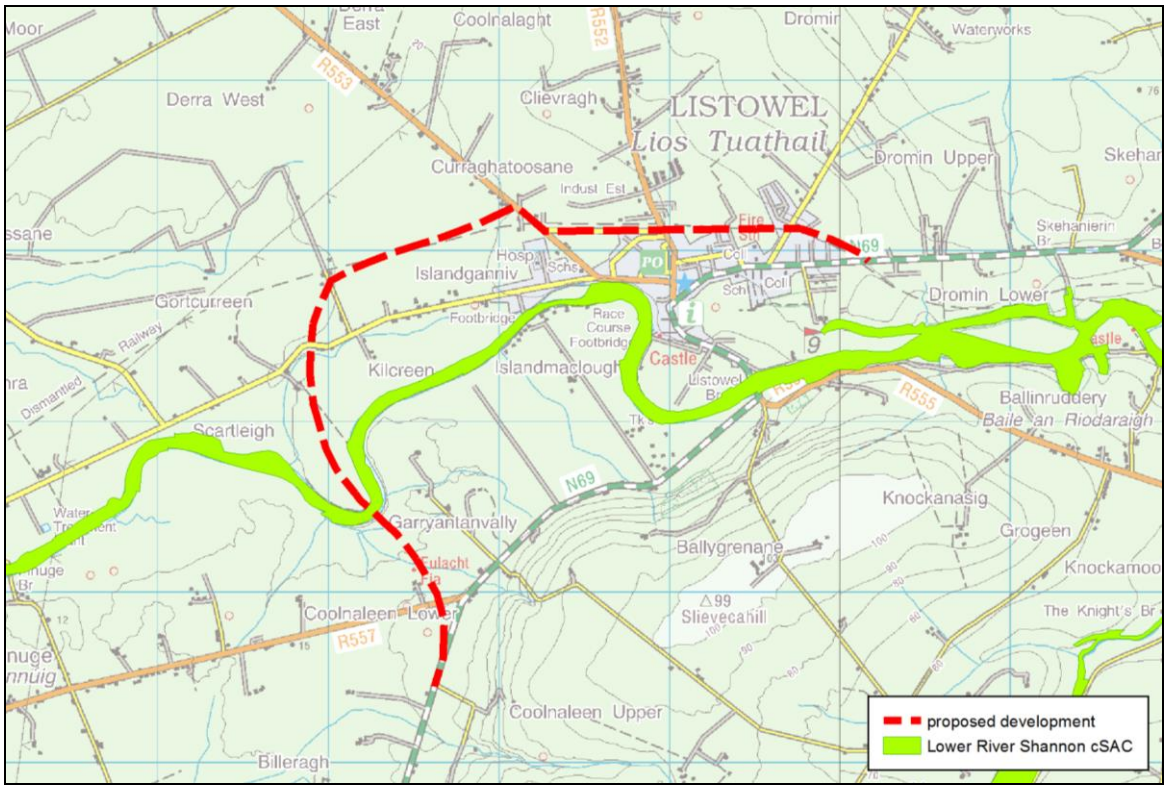
TABLE OF CONTENTS

LIST OF FIGURES

1 Introduction

This report, which contains information required for the competent authority (in this instance An Bord Pleanála) to undertake an Appropriate Assessment (AA), has been prepared by Scott Cawley Ltd. for Jacobs Engineering Ireland Ltd. ('Jacobs') on behalf of their client, Kerry National Road Design Office (NRDO). It provides information on, and assesses the potential for, the proposed N69 Listowel Bypass (the proposed development, see Figure 1) to have significant impacts on Natura 2000 sites (hereafter referred to as European sites)[1] and furthermore assesses whether the proposed development would impact on the integrity of any European site.

Figure 1: Location of the N69 Listowel Bypass (the proposed development)



It is necessary that the decision to permit the proposed development has regard to Article 6 of the *Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora* (as amended) (hereafter referred to as the Habitats Directive). This is transposed in Ireland primarily by *S.I. No. 477 of 2011, European Communities (Birds and Natural Habitats) Regulations 2011* (hereafter referred to as the Birds and Habitats Regulations) and by the *Planning and Development (Amendment) Act 2010,* as amended (hereafter referred to as the Planning Acts).

The information in this report forms part of, and should be read in conjunction with, the documentation being submitted to the competent authority in connection with the proposed road development, in particular the EIS which this report forms a part of.

[1] Natura 2000 sites are defined under the Habitats Directive (Article 3) as a European ecological network of special areas of conservation composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats. In Ireland these sites are designated as *European sites* - defined under the Planning Acts and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs)

2 Methodology

2.1 Guidance and Approach

This report has been prepared with regard to the following guidance documents where relevant:

- *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities.* (Department of Environment, Heritage and Local Government, 2010 revision);
- *Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities.* Circular NPW 1/10 & PSSP 2/10;
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (European Commission Environment Directorate-General, 2001); hereafter referred to as the EC Article 6 Guidance Document. The guidance within this document provides a non-mandatory methodology for carrying out assessments required under Article 6(3) and (4) of the Habitats Directive;
- *Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (European Commission, 2000 and updated draft April 2015).*
- *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 European Commission (European Commission, January 2007);
- *Communication from the Commission on the precautionary principle.* European Commission (2000).

Guidance which has been followed in determining magnitude and significance of impacts as well as in proposing mitigation measures, in relation to European sites, include:

- *Guidelines for Ecological Impact Assessment in the UK and Ireland (2nd Edn)* (Chartered Institute of Ecology and Environmental Assessment, 2016);
- *Guidelines on the Information to be contained in Environmental Impact Statements* (Environmental Protection Agency, 2002 and Revised Draft 2015a)
- *Advice Notes for Preparing Environmental Impact Statements* (Environmental Protection Agency, 2003 and Revised Draft 2015b)
- *Environmental Guidelines Series for Planning and Construction of National Roads* (National Roads Authority, 2005-2009); and
- *Environmental Impact Assessment of National Road Schemes – A Practical Guide* (National Road Authority, 2008a);

2.2 Desktop Study

The sources of desktop data relied upon are listed below:

- Online data available on European sites as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie;
- Information on water quality in the area available from www.epa.ie, and from the applicant's design team;
- Information on the Shannon International River Basin District from www.wfdireland.ie;
- Ordnance Survey of Ireland mapping and aerial photography available from www.osi.ie;
- Aerial photography available online at Google Maps <http://maps.google.com/> and Bing Maps <http://www.bing.com/maps/>;
- Information in the Route Corridor Selection (Kerry County Council, 2012);
- Liaising with Jacobs on the environmental assessments for the proposed development; and

- Information on the status of EU protected habitats in Ireland (National Parks & Wildlife Service, 2013a and 2013b).

The hydrogeological baseline assessment considered the following sources of information:

- Ordnance Survey of Ireland;
- N69 Listowel Bypass Constraints Report (Kerry County Council, August 2007);
- Online maps and data of the Geological Survey of Ireland (GSI) (consulted March-April 2014);
- Ground investigation data produced by Causeway Geotech Ltd. (April 2014);
- Land owner consultation on Private Water Supply followed by site surveys and sampling (2013); and
- *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (National Road Authority, 2009).

The information on ground and groundwater conditions for the proposed development was based on the findings of the ground investigation data produced by Causeway Geotech Ltd. (April 2014). This ground investigation comprised of:

- Thirteen percussion boreholes;
- Two percussion boreholes with rotary core follow on;
- Two rotary open hole boreholes (BH105AD and BH107AD);
- A standpipe installation in each borehole; and
- Forty-one trial pits.

Key cumulative impact assessment sources in relevant documents:

- Ireland's National Biodiversity Plan, 2011 – 2016 (Department of Arts, Heritage and the Gaeltacht, 2011);
- Kerry County Development Plan 2015 – 2021 (Kerry County Council, 2015);
- Listowel Town Development Plan, 2009 – 2015 (Listowel Town Council, 2009);
- Listowel/Ballybunion Functional Areas Local Area Plan 2013-2019 (Kerry County Council, 2013);
- Heritage and Biodiversity Plan, 2008 – 2012 (Kerry County Council, 2008b); and
- Biodiversity Actions 2008-2012 (Kerry County Council, 2008a).

2.3 Site Surveys

Habitats

Flora and habitats were surveyed over four visits: the first between the 3rd and 5th April 2013; the second over the 17th and 18th July 2013; the third on the 26th June 2014, and the fourth between 31st August and 2nd September 2016[2]. The habitats were surveyed using the methodology outlined in the guidance document *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al.*, 2011). All habitat types were identified and classified using the *Guide to Habitats in Ireland* (Fossitt, 2000). Guidance on European Annex I habitat classification was sought from the *Interpretation Manual of EU Habitats* (European Commission, 2013) and the most recent national interpretations of EU Habitats Directive Annex I Habitats, where available. Within each habitat dominant and abundant plant species, indicator species and/or species of conservation interest were recorded. More detailed botanical surveys were undertaken in July 2013 and June 2014 of habitats that were considered to be of a higher ecological value; including the lands within the boundary of the Lower River Shannon SAC at the proposed crossing point of the River Feale.

[2] Surveys between 3rd August and 2nd September 2016 involved ground truthing and updating of surveys undertaken in 2013 and 2014.

Plant nomenclature followed that of the *Checklist of the Flora of Britain & Ireland* (Botanical Society of Britain & Ireland, 2007 and updates), and bryophyte nomenclature follows the *Checklist of British and Irish Bryophytes* (British Bryological Society, 2009).

Otter

A corridor of approximately 500m was initially surveyed for otter *Lutra lutra* activity as part of the multi-disciplinary walkover survey between the 3rd and 5th April 2013. The status and activity of any otter holts was recorded along with any evidence of activity, including paths, tracks, feeding signs, sprainting sites or couches (otter resting places).

Additional survey work was then undertaken for otter activity and their breeding and resting places, having regard to the survey methodology set out in the Design Manual for Roads and Bridges (*HA 81/99 - Nature Conservation Advice in Relation to Otters,* Highways Agency, 2001). A further survey for otter was undertaken on the 11th June 2013 covering a distance of 600m either side of the proposed crossing point of the River Feale. In October 2013, January 2014 and April 2014, further otter surveys were undertaken on all watercourses crossed by the proposed development. These surveys covered a distance of c.2km upstream and downstream of proposed crossing points (where access allowed) in conjunction with spot checks of main bridge sites within a 5km radius for signs of otter presence/activity. Ground truthing and updating of these survey results were undertaken in August and September 2016.

Freshwater pearl mussel

A stage 1 (presence/absence) survey for the freshwater pearl mussel *Margaritifera margaritifera* was carried out by Evelyn Moorkens & Associates from 10th to 12th June 2013 (full report in Appendix 6.2 of the EIS). The survey of the River Feale was carried out by three surveyors; two of whom were in the water at all times, with the other acting as 'bank manager'. The surveyors wore wetsuits to enable snorkelling as well as the standard survey technique using glass bottomed viewing buckets (bathyscopes). The River Feale within the entire footprint of the potential impact zone of the proposed works was surveyed, and for survey purposes, was sub-divided into eight survey sections (see Figure 2).

Brief assessments were also made in the main River Feale channel at Finuge Bridge, downstream of the proposed crossing point, and in Listowel, upstream of the proposed crossing point. Five associated watercourses along the proposed route were surveyed upstream and downstream of proposed crossing points (this was carried out by one surveyor on foot as the watercourses were found to be very narrow and shallow). The survey extent and locations are shown in the *Freshwater Pearl Mussel Survey Report* in Appendix 6.2 of the EIS.

Wintering birds

Following consultation with BirdWatch Ireland, the Irish Whooper Swan Study Group and the NPWS, it was confirmed that an internationally important population of wintering Whooper swans is resident in the locality.

As a result, monthly whooper swan *Cygnus cygnus* surveys were carried out over the periods October 2013 to March 2014 and November 2016 to April 2017. During each survey visit over the winters of 2013/14 and 2016/17, the following sites were visited to record and count any whooper swans present: the known principal feeding site at Ballyouneen (c.6 km west of the proposed development); another known feeding sub-site at Finuge (Galvin's Farm, c.275 m west of the proposed River Feale crossing point); and all suitable agricultural fields within 400 m of the off-line section of the proposed development see Figures 6.13-6.18. Additional sites were also counted as information on the species distribution developed over the surveys, including: Lixnaw Canal, Ballynagare Bridge, Ardcullen Marshes, and Cloneen Causeway. Records were also made of any other wintering bird species present within 400 m of the off-line section of the proposed development.

Fish species

The River Feale is considered to be a nationally important river system for Atlantic salmon *Salmo salar* and brown trout *Salmo trutta*.

Previous studies undertaken in relation to the proposed development noted the presence of holding pools for Atlantic salmon in the vicinity of the proposed crossing point of the River Feale, and spawning and nursery areas were present throughout the lower River Feale in the locality (Mott MacDonald, 2009; Ryan Hanley, 2012). The

Ballygrenane Stream, Garryantanvally Stream, and the Mill Stream Lower (see Figures 7.1-7.6: Surface Water Features) were all noted as having low/moderate potential for juvenile salmonids and lamprey species with none of these species recorded at the proposed crossing points (Ryan Hanley Consulting Engineers, 2012).

Brook lamprey *Lampetra planeri,* river lamprey *L. fluviatilis*, and sea lamprey *Petromyzon marinus* are known from the River Feale with juvenile lamprey previously recorded at sampling stations at the Listowel Racecourse footbridge and upstream of the weir at Scartleigh (O'Connor, 2006). The larvae (or ammocoetes) of these species burrow into fine silts in areas of slack flow along the river bank; a habitat that is not present at the proposed crossing point.

2.4 Consultation

In addition to written correspondence, meetings were held with the NPWS's Divisional Ecologist on 2nd May 2013 and 24th October 2016, as well as an informal site meeting with the local NPWS conservation ranger on 11th June 2013 regarding the scope of the ecological field survey work, existing records of rare and protected species and the likely significant impacts of the proposed development . A data request was submitted to the NPWS on the 10th September 2013 requesting any records of protected species or habitats, and any habitat mapping/surveys undertaken in the vicinity of the proposed crossing point of the Lower River Shannon cSAC.

BirdWatch Ireland were consulted regarding known records for barn owl and other raptor species in the locality on the 19th March 2013 and the 17th October 2013; and in relation to whooper swan *Cygnus cygnus* and other wintering bird records (Olivia Crowe, 11th June 2013 and 26th April 2017). The Irish Whooper Swan Study Group was also consulted in relation to whooper swan records in the locality. Additional consultation was also undertaken with the NPWS on the 9th October 2013 in relation to hen harrier nesting sites within 10km of the proposed development.

The Senior Fisheries Environment Officer with Inland Fisheries Ireland (IFI) was consulted on the 10th September 2013 regarding the fisheries value of the watercourses crossed; and in relation to bridge and culvert design on the 23rd August 2013.

A summary of the consultation responses received is provided in Appendix 6.1 of the EIS.

3 Screening

3.1 Background

The previously referenced guidance documents set out a staged process for carrying out Appropriate Assessment, the first stage of which is referred to as screening. This stage identifies whether any significant impacts on European sites might arise as a result of a proposed development either alone or in combination with other plans and projects.

If the conclusions at the end of the screening exercise are that significant impacts on any European sites, as a result of the proposed development, either alone or in combination with other plans and projects, are likely, uncertain or unknown, then there is a requirement to proceed to subsequent stages of Appropriate Assessment. The findings of the AA must be clearly documented in order to provide transparency of decision-making, and to ensure the application of the 'precautionary principle'[3]. If however the conclusions at the end of the screening exercise are that significant impacts on any European sites, as a result of the proposed development, either alone or in combination with other plans and projects, can be ruled out, the need for Appropriate Assessment does not arise.

[3] One of the primary foundations of the precautionary principle, and globally accepted definitions, results from the work of the Rio Declaration. Principle #15 declaration notes:

"In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

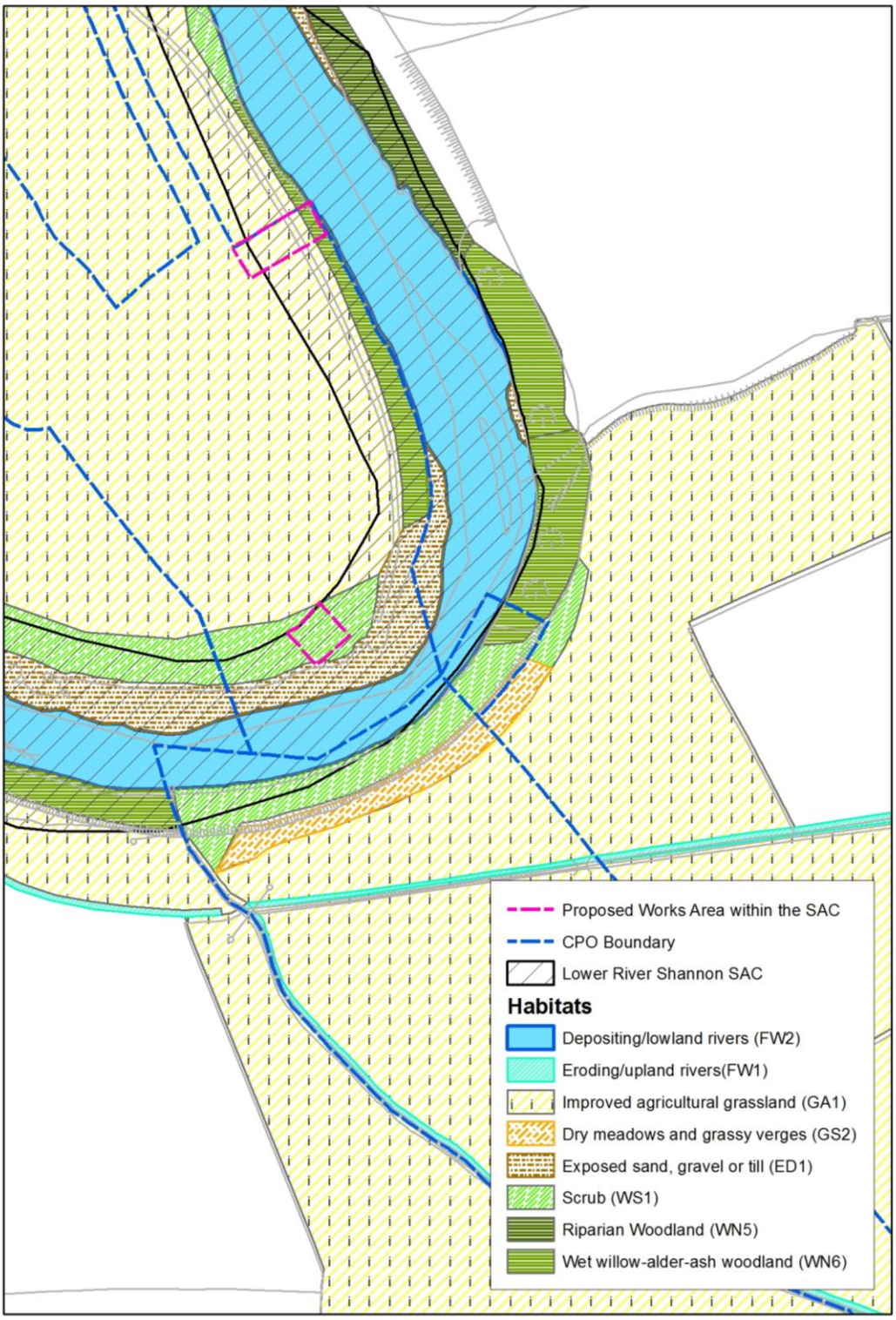
3.2 Overview of the Study Area and Receiving Environment

3.2.1 Site Description and Features of the Surrounding Environment

Habitats

The proposed crossing point of the Lower River Shannon cSAC consists of the following habitat types: mosaic of Exposed Sand, Gravel or Till/Reed and Large Sedge Swamps (ED1/FS1), Depositing/Lowland Rivers (FW2), Improved Agricultural Grassland (GA1), Scrub (WS1) and Wet Willow-Alder-Ash woodland (WN6) – see Figure 2: Habitat map of the proposed crossing point of the Lower River Shannon cSAC.

Figure 2: Habitat map of the proposed crossing point of the Lower River Shannon cSAC (River Feale)



Depositing/Lowland Rivers (FW2) - River Feale

The proposed crossing point of the River Feale is located approximately 3.8km downstream of Listowel Bridge. It is evident that this part of the river has been modified in the past with embankments along either side of the channel. Some rock armouring has been installed along the southern bank to prevent erosion. Similarly, for a stretch of approximately 360m along the northern bank a short distance upstream of the proposed crossing point, concrete reinforcement forms part of the riverbank. This appears to be a stabilisation/protection measure to minimise erosion of the riverbank.

The crossing point is at a shallow pool on a bend in the river. The width of the river at the time of the survey was approximately 20m. The flow regime in the river in the vicinity was a combination of pool, riffle and glide over a largely cobble based substrate.

At the proposed crossing point the southern bank of the river consists of a high, vertical bank (c.4/5m above the water level) of unconsolidated gravel and cobbles (see Plate 1 below). At the top of the bank is an area of dense bramble scrub with narrow bands of Alder *Alnus glutinosa* woodland to the west and east (described in more detail under the WN6 woodland classification below). At the proposed crossing point the northern bank of the river consists of an area of reed swamp on alluvial cobbles and gravels grading to an area of dense gorse scrub on the embankment separating the river channel from the agricultural field beyond. The habitats present on both banks are described in more detail under the relevant habitat classification categories in this section. Instream aquatic plant species were generally quite limited in extent and included Canadian pondweed *Elodea canadensis*, water-starwort spp. *Callitriche* spp. and *Fontinalis* spp.

Some water-crowfoot occurs to the east of the proposed crossing point (*c.*70 m upstream), the principal species of which is *Ranunculus penicillatus* var. *penicillatus*. This area of habitat (given that this species is characteristic) may correspond with the Annex I habitat type "water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation" [3260]. The European Commission definition of this habitat is broad (European Commission, 2013), and despite work undertaken by Kelleher (2011), there is no agreed definition of this habitat and its sub-types in Ireland (NPWS, 2013a). Based on the *Lower River Shannon SAC Conservation Objectives Supporting Document- Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation* (National Parks and Wildlife Service, 2012), this qualifying interest habitat within the Lower River Shannon cSAC includes three high conservation element sub-types to which the area of water crowfoot east of the bridge crossing does not correspond. This habitat therefore, irrespective of its classification, does not form part of the qualifying interest for the Lower River Shannon cSAC.

Exposed Sand, Gravel or Till/Reed and Large Sedge Swamps (ED1/FS1)

This habitat mosaic was present at the proposed crossing point of the River Feale. Along the southern bank there was a cliff face of unconsolidated alluvial deposits (coarse sands, gravels and cobble). This material was largely unvegetated save for sparse cover of reed canary-grass *Phalaris arundinacea*, creeping bent *Agrostis stolonifera* and occasional willow saplings along the waterside boulders (*e.g. Salix fragilis, S. cinerea*).

Plate 1: South bank of River Feale at the proposed crossing point

Along the northern bank of the River Feale, exposed gravels and cobbles are present in a transitional zone between the river and the more established scrub cover higher up the river bank (Plate 2). There is abundant growth of reed canary-grass within this band, of varying densities.

Plate 2: North bank of River Feale at the proposed crossing point

Where habitat conditions support emergent vegetation, the river is fringed by species in addition to reed canary-grass such as purple-loosestrife *Lythrum salicaria*, common nettle *Urtica dioica*, water forget-me-not *Myosotis scorpioides*, docks (*Rumex crispus, R. conglomeratus*), meadowsweet *Filipendula ulmaria*, great willowherb *Epilobium hirsutum*, hogweed *Heracleum sphondylium*, hemlock water-dropwort *Oenanthe crocata*, bittersweet *Solanum dulcamara*, water mint *Mentha aquatica*, branched bur-reed *Sparganium erectum*, wavy bitter-cress *Cardamine flexuosa*, fool's-water-cress *Apium nodiflorum*, water-cress *Rorippa nasturtium-aquaticum*, marsh

valerian *Valeriana dioica*, water horsetail *Equisetum fluviatile* and very occasionally common spike-rush *Eleocharis palustris*.

On the exposed cobbles, species such as procumbent pearlwort *Sagina procumbens*, clovers *Trifolium* spp., redshank *Persicaria maculosa* and water-pepper *Persicaria hydropiper* occur.

Other species present include willows *Salix* spp., colt's-foot *Tussilago farfara*, dandelion *Taraxacum* spp., daisy *Bellis perennis*, creeping buttercup *Ranunculus repens*, red clover *Trifolium pratense*, common nettle, and yarrow *Achillea millefolium*, with willow scrub, becoming more frequent on the upper shores of exposed alluvial material.

The invasive alien plant species Indian balsam (also known as Himalayan balsam) *Impatiens glandulifera* and Japanese knotweed *Fallopia japonica* are also present along the river bank at the proposed crossing point as well as both up and downstream.

Improved Agricultural Grassland (GA1)

A large proportion of the lands crossed by the proposed development corresponded to this habitat type. The majority of fields are subject to intensive grazing and/or regular cutting for silage, with others having been re-sown with agricultural grasses following a change in use from arable crops. Species composition is typically poor with grass species present including: rye-grasses *Lolium* spp., cock's-foot, Yorkshire fog *Holcus lanatus*, creeping bent, crested dog's-tail *Cynosurus cristatus*, meadow foxtail *Alopecurus pratensis* and meadow-grasses *Poa* spp. Herb species are generally limited to species such as creeping buttercup, meadow buttercup *Ranunculus acris*, ribwort plantain *Plantago lanceolata*, dandelion, white clover *Trifolium repens*, daisy, common mouse-ear *Cerastium fontanum*, docks *Rumex* spp. and thistles *Cirsium* spp. Some improved agricultural fields between the River Feale and the R557 and between the Forge Road and the R553 have abundant rush cover in places; soft-rush and jointed rush *Juncus articulatus*. These fields are included within the GA1 classification where rushes do not dominate the vegetation. Wetter patches (with some wet grassland characteristics) are present in the improved agricultural fields south of the River Feale. For example, some patches of yellow iris *Iris pseudacorus* are present in small isolated wet areas in some fields.

Dry Meadows and Grassy Verges (GS2)

The embankment at the southern crossing point of the River Feale is dominated by red fescue but is being overgrown by bramble scrub encroaching from the adjacent scrub habitat along the top of the river bank.

Plate 3: Southern bank – view from agricultural fields looking north

Riparian Woodland (WN5)

This woodland type occurs primarily in mosaic with Scrub WS1 habitat on the northern bank of the River Feale a short distance downstream of the proposed crossing point, on the lower portions of the slope transitioning to reed swamp and exposed cobble mosaic (Exposed Sand, Gravel or Till/Reed and Large Sedge Swamps ED1/FS1). The tree species present are willows (*Salix cinerea*, *S. fragilis* and occasional *Salix alba*) with ground flora supporting reed canary-grass, meadowsweet, rough meadow-grass, remote sedge *Carex remota* and opposite-leaved golden-saxifrage *Chrysosplenium oppositifolium*.

Another area of this habitat occurs on the southern bank of the River Feale a short distance upstream of the crossing point and is similar in nature except that it additionally contains occasional ash (Plate 3).

Detailed botanic surveys of these areas of woodland were undertaken on 26th June 2014. Neither of these areas correspond to the Annex I habitat "Alluvial forests with and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)" [*91E0]. A vegetation assessment undertaken, based on Perrin *et al*. (2008), indicated that although both areas of woodland support the three positive indicator tree species (ash, alder and grey willow), both areas failed all other criteria for meeting the Annex I habitat type *91E0; *i.e.* an absence of enough of the other positive indicator non-tree species, not meeting various criteria for habitat structure, inadequate representation of tree ages and size classes and presence of the negative indicator species sycamore *Acer pseudoplatanus.*

Plate 3: Woodland habitats upstream of the proposed crossing point of the River Feale (view looking south - proposed crossing point is around the bend in the river channel in the distance).

Wet Willow-Alder-Ash Woodland (WN6)

Along the banks of the River Feale on both the southern and northern banks there are a number of thin linear strips of alder dominated woodland. These wooded areas do not directly correspond to Wet Willow-Alder-Ash Woodland (WN6) as described by Fossitt but this is the closest habitat match in that classification system. The habitat most closely corresponds to the *Alnus glutinosa – Filipendula ulmaria* group (3b *Alnus glutinosa – Rubus fruticosus*) vegetation type as per Perrin *et. al.*, 2008. This habitat does not correspond to the Annex I habitat *Alluvial forests with *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

Detailed botanic surveys of these areas of woodland were undertaken on 26th June 2014. None of these areas corresponded to the Annex I habitat "alluvial forests with *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)" [*91E0]. A vegetation community assessment based on Perrin *et al*. (2008) indicated that although these areas of woodland support the three positive indicator tree species (ash, alder and grey willow), these woodland areas failed all other criteria for meeting the Annex I habitat type *91E0; *i.e*. an absence of the other positive

indicator non-tree species, not meeting various criteria for habitat structure, inadequate representation of tree ages and size classes and presence of the negative indicator species sycamore *Acer pseudoplatanus*.

The tree species present primarily include alder with occasional ash *Fraxinus excelsior*, willows (*Salix cinerea*, *S. fragilis* and occasional *Salix alba*) and sycamore *Acer pseudoplatanus*. The understory was represented by hawthorn and elder *Sambucus nigra* and the field layer was dominated by bramble *Rubus fruticosus* agg.

In drier stands the ground flora supports primrose *Primula vulgaris*, enchanter's-nightshade *Circaea lutetiana*, common Ivy *Hedera helix*, bramble, ramsons *Allium ursinum*, male-fern *Dryopteris filix-mas*, hogweed, lesser celandine *Ranunculus ficaria*, bluebells *Hyacinthoides non-scripta (L.)*, wood avens *Geum urbanum*, broad-leaved dock, wood anemone *Anemone nemorosa*, great woodrush *Luzula sylvatica*, alexanders *Smyrnium olusatrum*, red campion *Silene dioica*, common nettle, cleavers *Galium aparine*, hedge woundwort *Stachys sylvatica*, creeping buttercup, bittersweet and ground ivy *Glechoma hederacea*.

In more damp areas, the ground flora supports meadowsweet, rough meadow-grass *Poa trivialis*, remote sedge *Carex remota*, opposite-leaved golden-saxifrage *Chrysosplenium oppositifolium* and hemlock water-dropwort.

Scrub (WS1)

At the proposed crossing point of the River Feale there are substantial areas of scrub on both banks. Dense bramble cover is present along the embankment at the top of the southern river bank; there is complete cover on the north facing side with patches of bramble cover on the south facing side (and some gorse at the western end). An extensive area of gorse scrub is present along the northern riverbank at the proposed crossing point.

Species

Freshwater pearl mussel

There were no records, and no evidence from the survey, for this species downstream of the proposed development. There is very little suitable habitat upstream and downstream of the River Feale crossing point and the habitat in the smaller tributary streams is unsuitable.

Otter

Evidence of otter activity was recorded frequently along the banks of the River Feale and also on the Mill Stream Lower (as shown on Figures 6.6-6.12: Mammal Survey Results). No evidence of otter was recorded along any of the other watercourses crossed by the proposed development.

Three potential otter holts and an otter couch site were recorded within the area surveyed. Two of these sites are located more than 1.3km from the proposed development and will not be affected in any way as they are outside of the zone of influence (150m in relation to active natal holt sites according to National Roads Authority,2006, and Highways Agency, 2001). The remaining potential holt is located along the boundary of the proposed development at Garryantanvally. Although this burrow along the stream bank displayed the characteristics of an otter holt, no evidence of any otter activity was recorded in its vicinity throughout the survey period (in 2013, 2014 and 2016). It is included in the assessment, as it is deemed prudent to have it mapped and rechecked pre-construction to confirm that it is not in use by otter at that time.

Spot checks for evidence of otter activity were also undertaken at major bridge sites within a 5km radius of the proposed development: Drommurrin Bridge, Inch Bridge, Shrone Bridge, Finuge Bridge, Listowel Racecourse (Greenville Road), Listowel Racecourse (Listowel Town Centre), Listowel Bridge, The Knight's Bridge, and Kennelly's Bridge. All, aside from the Listowel Racecourse (Greenville Road) bridge site, had evidence of otter activity on one or more visits. For more details see Figures 6.6-6.12: Mammal Survey Results.

Invasive Plant Species

There are four invasive, non-native plant species listed in the Third Schedule of the *European Communities (Birds and Natural Habitats) Regulations, 2011* present within, or in close proximity to, the proposed development: Japanese knotweed *Fallopia japonica*, Indian balsam *Impatiens glandiflora*, Spanish bluebell & hybrids *Hyacinthoides hispanica* and *H. x massartiana* and three-cornered garlic *Allium triquetrum*. The locations of these invasive species are shown on Figures 6.1-6.5: Invasive Species Results.

Wintering Birds

Surveys to determine the usage of the fields within the zone of influence of the proposed development by whooper swans were carried out over two seasons: 2013-2014 and 2016-2017. The 2013-2014 season commenced in early November 2013 and finished in late March 2014, while surveys for the 2016-2017 season commenced in late November 2016 and ended in early April 2017. Both survey seasons encompassed six survey visits.

In both seasons, there were large flocks of whooper swans (maximum counts of 72 to 549 birds, with a mean of 226) feeding on improved agricultural fields at Ballyouneen (c. 6km west of the proposed River Feale crossing point). Whooper swans also fed on grassland in Finuge, c. 320m west of the River Feale crossing point, albeit in smaller numbers (counts ranging between 0 and 249, with a mean of 63). At Finuge, the date with the highest count of whooper swans corresponded to flooding of other favoured sites in the locality. Whooper swans were observed feeding at five other locations over the two survey seasons, although none of these locations were occupied by the species with the same regularity as Ballyouneen and Finuge. The lowest count of birds was recorded in early April 2014, which might be attributed to the migration of the species to its summering grounds in Iceland.

In addition to the feeding activity observed across the survey sites, whooper swans were observed night roosting within the River Feale, c. 320m west of the proposed development. The number of birds roosting here varied between seven and 59 birds.

With regards to other wetland bird species, a flock of c. 60 golden plover *Pluvialis apricaria* were recorded roosting in the agricultural field immediately to the north of the proposed crossing point of the River Feale in April 2013. A flock of c.170 golden plover were observed in December 2013 in the same area; occasionally settling in the same field between disturbance events. Flocks of up to 72 golden plover were observed overflying the Finuge whooper swan site on the 28th March 2014. In the 2016/17 survey season, 46 golden plover were recorded feeding at Finuge on 24th November 2016.

Snipe *Gallinago gallinago* were flushed from areas of rushy or rank grassland along the off-line section of the proposed development at Islandganniv, Garryantanvally and Coolnaleen Lower during the site surveys in April 2013, October 2013, December 2013, January 2014, February 2014, December 2016 and February 2017.

Flocks of mallard *Anas platyrhynchos* (up to 9 individuals) and teal *Anas crecca* (up to 26 individuals) were recorded along the River Feale in the vicinity of the proposed crossing point during the winter survey periods.

Black-headed gulls *Larus ridibundus* (in flocks of up to 50 birds) were routinely seen in many of the improved agricultural fields next to the River Feale over the course of the surveys; from Finuge Bridge to Listowel Racecourse, including the large field immediately north of the proposed crossing point.

Low numbers (*i.e.* 1-5) of oystercatcher *Haematopus ostralegus*, redshank *Tringa tetanus*, and greenshank *Tringa nebularia* were observed flying over the Finuge site in the 2016/17 survey season.

Pink-footed geese *Anser brachyrhynchus* (five individuals) and one barnacle goose *Branta leucopsis* overflew the Finuge site on the 17th February 2014, entering and leaving the area from the direction of the Cashen Estuary. Eleven greylag geese *Anser anser* were grazing in fields alongside whooper swans on 8th December 2016.

The Finuge whooper swan feeding area and the fields where snipe were recorded, are shown on Figures 6.13-6.18: Bird Survey Results.

Breeding Birds

The results of the breeding bird surveys are shown on Figures 6.13-6.18: Bird Survey Results and the full species list is included in Appendix 6.3 of the EIS.

Fish Species

The River Feale is considered to be a nationally important river system for Atlantic salmon and brown trout. Water quality in the River Feale is classified by the EPA as being of good status (Q4) *c.*1.7km upstream of the proposed crossing point (sampling station at Listowel Racecourse footbridge) and is classified as being of moderate status (Q3-4) at Scartleigh Weir, *c.*1.3km downstream of the proposed crossing point.

Previous studies undertaken in relation to the proposed development noted the presence of holding pools for Atlantic salmon in the vicinity of the proposed crossing point, and spawning and nursery areas were present throughout the lower River Feale in the locality (Mott MacDonald, 2009 and Ryan Hanley, 2012).

All three species of lamprey are known from the River Feale with juvenile lamprey previously recorded at sampling stations at the Listowel Racecourse footbridge and upstream of the weir at Scartleigh (O'Connor, 2006). The larvae (or ammocoetes) of these species burrow into fine silts in areas of slack flow along the river bank; a habitat that is not present at the proposed crossing point.

Baseline Water Quality monitoring results

Baseline water quality monitoring was undertaken in March and June 2013 at various locations along the River Feale and surrounding watercourses see Figures 7.1-7.6: Surface Water Features, in line with the NRA *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Scheme* (NRA, 2009) (see Appendix 6). Where available, these results are compared to the standards in the *European Communities Environmental Objective (Surface Water) Regulations, S.I. 272 of 2009.* Physico-chemical analysis results for the water samples show few exceedances of the guideline limits and there is no indication of pollution within the watercourses. Suspended solids results are were all under the 25 mg/l guideline value for salmonid waters.

3.2.2 Description of the Proposed Development

The proposed development is a combination of new road construction and upgrades to existing roads. It includes new road construction through greenfield lands around the west of the town and the upgrade of the existing John B. Keane Road along the northern fringe of the town as well as side road realignments, junction upgrades and the provision of new pedestrian and cycle infrastructure. The proposed development comprises approximately 7 km of construction between the existing N69 at Billeragh, south of Listowel Town and the existing N69 in Ballygowloge (refer to Figure 1.1 for the proposed development terminus locations). It consists of approximately 3.8 km of new greenfield road construction, 1.2 km upgrade/realignment of existing road, and 2 km of upgrade to the John B. Keane Road and provision of new shared cycle and pedestrian facilities.

The proposed development commences on the existing N69 in the townland of Billeragh approximately 0.7 km south of its junction with the R557 to Finuge and continues along the N69 for a distance of approximately 0.25 km. It then leaves the existing road alignment and proceeds north as greenfield construction through the townland of Coolnaleen and Garryantanvally, intersecting the R557 to Finuge at a new roundabout, then continuing north. It crosses two streams, the Ballygrenane Stream and the Garryantanvally Stream, before crossing the River Feale by means of a river bridge. Continuing northwards, it crosses the Mill Stream Lower and then intersects Local Road, known locally as Greenville Road, at a new roundabout. The mainline then turns northeast, intersecting Local Road L10112, known locally as Forge Road. Access to the northern section of the L10112 will be provided by means of a 'T' junction onto the proposed development, while the section of the L10112 to the south of the proposed development will become a cul-de-sac, accessed via the Greenville Road. The proposed development continues northeast, and turns east following the line of the disused railway for approximately 0.6 km before turning northeast to avoid an existing cluster of dwellings.

The proposed development then intersects the R553 to Ballybunnion at a new roundabout. The John B. Keane Road will be re-designated as N69 National Secondary Road. The John B. Keane Road is currently designated as N69 from the junction with the R552 Ballylongford Road. The existing junction with the R552 Ballylongford Road is a small urban roundabout. As part of the proposed development, this will be upgraded to include traffic signals, in place of the existing roundabout, incorporating pedestrian crossing facilities. The entire length of the John B. Keane Road will be upgraded to include a new shared pedestrian and cyclist facility on its northern side which will generally be constructed within the existing road boundary to minimise adverse impact.

Description of the River Feale Crossing

The proposed River Feale Bridge spans the river and is located within the townland of Garryantanvally. The structure crosses perpendicular to the river and is a two span arrangement with an intermediate support located within the Lower River Shannon SAC, but outside of the high water channel. The south abutment is set-back, with the intermediate pier set-back from the northern edge of the high water channel. The pier set-back allows for a

natural bank path to be maintained for future access for maintenance and fishing and includes an allowance for the curvature of the river. The northern back span has been sized to minimise the overall length of the structure while preventing uplift at the abutment bearings. The length of the main span is approximately 69 m with a back span of 45 m.

Drainage and Attenuation

There are a number of different types of drainage system which were adopted for the carriageway drainage system:

- Sealed Drainage: This drainage system collects, conveys and discharges carriageway runoff via sealed (impervious) conduits. An example of this type of drainage system is the kerb and gully drain. Typically, this type of drainage system is used where footways are provided or on high embankments (> 6 metres).
- Grassed Surface Water Channels: Grassed Surface Water Channels are a development of swales for use as road edge channels. The function of the channel is to collect and convey rainwater runoff from the road surface. At suitable points along the channel, water is discharged into a separate carrier pipe or carrier drain. Where Grassed Surface Water Channels are used a Fin Drain will be provided to ensure any percolation through the channel is intercepted before reaching the unbound pavement layers.
- Over the Edge Drainage (Open Channels): These drains are used to drain over the edge carriageway runoff on smaller embankments (<6 metres high) and to act as interceptor drains for water from adjoining properties at the top of cut slopes and at the toe of embankments. They are generally trapezoidal in shape, 1 metre wide at the base with 1:1 side slopes. They can be unlined or concrete lined, depending on ground conditions.

It is proposed, as part of the drainage design for the proposed development, to construct retention ponds (also known as attenuation ponds) which will reduce the likelihood of flooding in the catchment.

Pollution Control measures from the proposed development are designed in accordance with HD 33/06, HA 103/06, HA 216/06 of the DMRB.

The proposed road drainage system will primarily incorporate grassed surface water channels, kerb and gully, over the edge drainage, sealed pipes, carrier drains, interceptor ditches, culverts, attenuation areas and pollution control as required in accordance with the above design standards.

Pollution control will be achieved during the conveyance of the road runoff to the attenuation features, including a forebay and wetlands at each outfall location, and both grassed surface water channels within the intermediate verges and the over-the-edge drainage to grassed swales/carrier drains where the drainage is allowed filter through the vegetation.

3.2.3 Other development nearby which could lead to cumulative impacts upon local ecology

The River Feale in the vicinity of Listowel is classified as being "at risk of not achieving good status" under the Water Framework Directive Risk Scores (Environmental Protection Agency, 2017). In the absence of the proposed development, potential impacts to water quality, along with any flood relief measures or similar works that may affect the hydrological or flood regime of the River Feale and its tributaries into the future, have the potential to result in negative impacts to the aquatic environment and associated habitats. These include existing IPC licenced discharges, discharges from Listowel Waste Water Treatment Plant (which according to *the Listowel Waste Water Treatment Plant Annual Environmental Report 2012* is operating within capacity, is compliant with the Environmental Limit Values set in the wastewater discharge licence and the discharge does not have an observable negative impact on either water quality or on Water Framework Directive status) and existing storm water overflows from the waste water network which discharge to the River Feale. If the proposed development were to affect the existing hydrological regime or affect existing water quality within the River Feale system there would be the potential for significant adverse "in-combination" effects to result.

The *Shannon River Basin Management Plan 2009-2015* lists the following pressures on water quality within the district, many of which could have *potential* "in-combination" effects with other proposed plans and projects: diffuse pollution risks, such as nutrient enrichment, from agriculture, forestry, peatland and urban land uses; wastewater and industrial discharges; wastewater from unsewered properties; landfills, quarries, mines and

contaminated lands; physical modifications and damage; water abstractions; aquaculture; invasive species; leisure activities; and dangerous substances. A road development has the potential to affect water quality in receiving watercourses at some geographic level and therefore act "in-combination" with some of the pressures listed above.

The key objectives of *Ireland's National Biodiversity Plan 2011 – 2016* are: to mainstream biodiversity in the decision making process across all sectors; to substantially strengthen the knowledge base for conservation, management and sustainable use of biodiversity; to increase awareness and appreciation of biodiversity and ecosystems services; to conserve and restore biodiversity and ecosystem services in the wider countryside and the marine environment; to expand and improve on the management of protected areas and legally protected species; and, to substantially strengthen the effectiveness of international governance for biodiversity and ecosystem services. No risk of significant adverse "in-combination" effects with the proposed development were identified at the strategic level from this plan.

Similarly, Kerry County Council's *Biodiversity Actions 2008-2012* plan and its *Heritage and Biodiversity Plan 2008 – 2012* pose no risk of significant adverse "in-combination" effects with the proposed development as they seek to enhance and protect the county's biodiversity resource.

There is potential for "in-combination" effects of projects undertaken within the scope of the *Kerry County Development Plan 2015 – 2021*, the *Listowel Town Development Plan 2009 – 2015*, and the *Listowel/Ballybunion Functional Areas Local Area Plan 2013-2019*. All of these plans have objectives to protect biodiversity, to comply with the requirements of the EU Habitats Directive, and not to permit development likely to have a significant adverse effect on the integrity of European sites. The Natura Impact Report (NIR) for the *Kerry County Development Plan 2015 – 2021* concluded that "*the Kerry County Development Plan is not likely to have significant effects on a Natura 2000 site, either by itself or in combination with other plans or projects and that adverse impacts on the integrity of Natura 2000 sites are not likely to occur".* The Findings of No Significant Effects (FONSE) report prepared for the *Listowel/Ballybunion Functional Areas Local Area Plan 2013-2019* concluded that the "*Listowel/Ballybunion Functional Areas Local Area Plan (FALAP) (2013-2019) and the related 10th variation to the Kerry County Development Plan 2009-2015, would not have significant effects on Natura 2000 sites. It is therefore considered that an appropriate assessment is not required*". Therefore, no significant adverse "in-combination" effects are predicted to result from these plans in combination with the proposed development.

A planning application was submitted to Kerry County Council to construct a 10 turbine wind farm in the townlands of Lissahane/Ballyhorgan, *c*.2.8km south-west of the proposed development. Planning permission was refused by Kerry County Council in October of 2014 but permission was granted on appeal to An Bórd Pleanála in July 2016. As this area is hydrologically connected to the Lower River Shannon cSAC by way of the existing field drainage network, there is the potential for pollution events during construction to effect water quality in the River Feale. During operation, the most significant of the likely effects are impacts to bird species. An NIS was submitted with the planning application for the proposed wind farm development (McCarthy, Keville, O'Sullivan Ltd., 2014) which concluded that "*no significant or indeterminate impacts are likely as a result of the proposed project on the conservation objectives or overall integrity of any Natura 2000 site in the vicinity of the site of the proposed development*". Given that the proposed development alone was not predicted to result in any significant effects to qualifying interest bird species of the nearby SPAs, the proposed N69 Listowel Bypass will not have any in-combination effects with the proposed wind farm development.

The vast majority of other planning applications in the area relate to housing extensions/renovations or farm improvements (*e.g*. new sheds, roofing, livestock storage units and slurry tanks). The only likely significant effects that would arise in-combination with such developments is a reduction in water quality in receiving watercourses (*e.g*. the River Feale) that could result from septic tanks and/or contaminated run-off from agriculture (*e.g.* accidental discharge of slurry from farm yards).

3.2.4 Designated sites within 15km of the proposed development

Designated sites within 15km of the proposed development are shown in Figure 3 European sites within potential zone of influence of the Proposed Development. Two cSACs and three SPAs are located within this 15km zone; outside of which, there are no other European sites within the zone of influence of the proposed development. Table 1 below outlines the qualifying interests for each European site and identifies whether there are any

potential source-pathway-receptor links via which adverse effects to the sites' qualifying interests and conservation objectives could potentially occur. This was vital to identify any potential adverse effects from the proposed development on the qualifying interests of these European sites, or cumulatively with other developments, that may result.

European sites are considered relevant where a source-pathway-receptor link exists between the proposed development and the European Sites. In order for an impact to occur there must be a risk enabled by having a 'source' (*e.g*. waste water discharge), a 'receptor' (*e.g.* a SAC or other ecologically sensitive feature), and a pathway between the source and the receptor (*i.e.* a watercourse or drainage system which connects the proposed development site to the SAC). The risk of the impact does not automatically mean it will occur, or that it will be significant. However, identification of the risk does mean that there is a possibility of ecological or environmental damage occurring, with the level and significance of the impact depending upon the nature and exposure to the risk and the characteristics of the receptor.

Where a source-pathway-receptor link is identified between the proposed development and a European Site which has the potential to result in adverse effects to the sites' qualifying interests and conservation objectives, each of the qualifying interests are assessed in Table 2 to identify which species or habitats are at risk.

Figure 3: European sites within the potential zone of influence of the proposed development

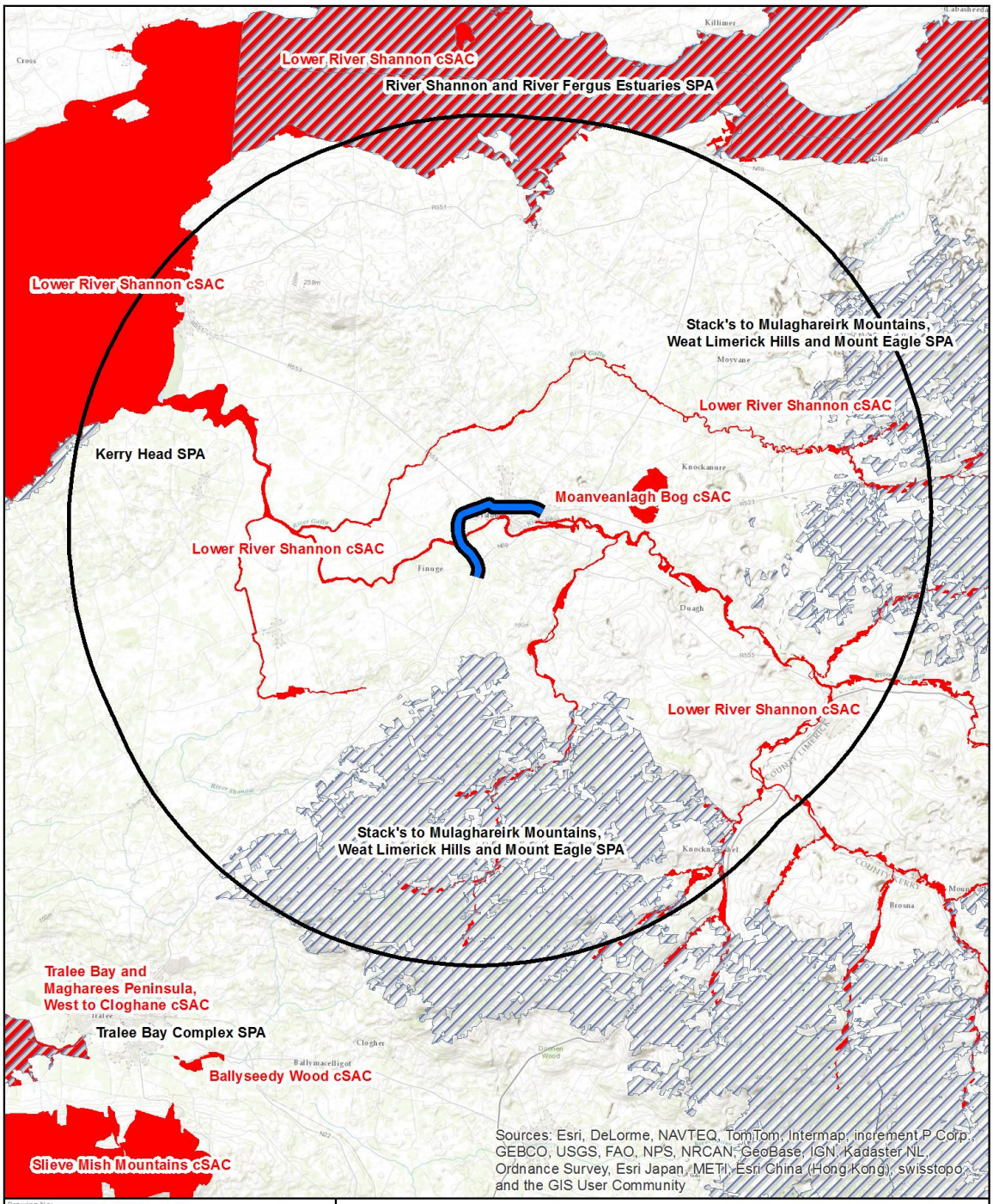


Table 1 Identification of European sites and their Relevance to the Proposed Development (European sites are considered relevant where a receptor -pathway-source link[4] exists between the proposed development and the European Site.			
Site Name & Code	**Distance from Development** (approximate)	**Qualifying Interests (QIs) / Special Conservation Interests (SCIs)** (*Priority Annex I Habitats)	**Do any potential receptor-pathway-source links exist between the proposed development and the European site?**
candidate Special Areas of Conservation (cSACs)			
Lower River Shannon cSAC [002165]	The proposed development crosses the cSAC	▪ Freshwater pearl mussel *Margaritifera margaritifera* [1029] ▪ Sea lamprey *Petromyzon marinus* [1095] ▪ Brook lamprey *Lampetra planeri* [1096] ▪ River lamprey *Lampetra fluviatilis* [1099] ▪ Atlantic salmon *Salmo salar* [1106] ▪ Sandbanks which are slightly covered by sea water all the time [1110] ▪ Estuaries [1130] ▪ Mudflats and sandflats not covered by seawater at low tide [1140] ▪ *Coastal lagoons [1150] ▪ Large shallow inlets and bays [1160] ▪ Reefs [1170] ▪ Perennial vegetation of stony banks [1220] ▪ Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] ▪ *Salicornia* and other annuals colonizing mud and sand [1310] ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] ▪ Bottle-nosed dolphin *Tursiops truncatus* [1349] ▪ Otter *Lutra lutra* [1355]	Yes, as the proposed development crosses the Lower River Shannon cSAC via a proposed new bridge over the River Feale, and drainage outfalls from the proposed road development will discharge to the cSAC. The following are the potential impact sources that have been identified: *Habitat Loss* The construction of the proposed new River Feale Bridge will result in the loss of habitat from within the boundary of the cSAC; none of which is Annex I or Qualifying Interest habitat. *Habitat Degradation* Invasive plant species (*e.g.* Japanese knotweed *Fallopia japonica* and Indian balsam *Impatiens glandulifera*) are present at the crossing point of the River Feale and at locations along some of its tributaries, which are also proposed to be crossed. Construction works in these areas will disturb soils contaminated by these invasive plant species. Therefore, there is a risk that contaminated soils and plant material would be washed downstream to the lower reaches of the River Feale and Cashen Estuary, spreading invasive plant species to uninfested areas within the cSAC, with the potential to result in indirect impacts on downatream Annex I habitat types present. A reduction in air quality could also lead to habitat degradation within the cSAC, influencing plant growth rates and species composition, diversity, and abundance.

[4] In ecological and environmental impact assessment, for an impact to occur there must be a risk enabled by having a 'source' (e.g. construction works at a proposed development site), a 'receptor' (e.g. a SAC or other ecologically sensitive feature), and a pathway between the source and the receptor (i.e. a watercourse which connects the proposed development site to the SAC). The risk of the impact does not automatically mean it will occur, or that it will be significant. However, identification of the risk does mean that there is a possibility of ecological or environmental damage occurring, with the level and significance of the impact depending upon the nature and exposure to the risk and the characteristics of the receptor.

Table 1 Identification of European sites and their Relevance to the Proposed Development (European sites are considered relevant where a receptor -pathway-source link[4] exists between the proposed development and the European Site.			
Site Name & Code	**Distance from Development** (approximate)	**Qualifying Interests (QIs) / Special Conservation Interests (SCIs)** (*Priority Annex I Habitats)	**Do any potential receptor-pathway-source links exist between the proposed development and the European site?**
		▪ Mediterranean salt meadows (*Juncetalia maritimi*) [1410] ▪ Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] ▪ *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] ▪ *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0] Source: NPWS (2012) Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	*Disturbance during Construction* Although there will be no instream works, and therefore no direct disturbance, construction works in the vicinity of the River Feale have the potential to result in indirect disturbance (and associated displacement effects) to aquatic species in the river. *Reduction in Water Quality* As all drainage outfalls from the proposed development will ultimately discharge to the River Feale, or to other surface water features connected to the River Feale/River Cashen system, the construction and operation of the proposed development has the potential to adversely affect water quality in the cSAC and result in associated indirect effects on aquatic qualifying interest Annex I habitats and Annex II species. *Barrier Effect* The proposed clear span bridge design will ensure that that neither the construction nor operation of the proposed development will result in any barrier effect to aquatic species along the River Feale corridor. *Effects on the existing hydrological regime and floodplain connectivity along the River Feale* The clear span bridge design proposed will maintain the existing channel profile and substrate, and the existing flow regime of the river. Hydraulic modelling has been carried out to understand the impact of the road crossing on the flow of the watercourse in normal and flood flow. To consider this the 50% and 1% plus climate change annual exceedance, probability flows were run through the hydraulic model. In both scenarios there is no predicted headloss at the proposed bridge therefore the structure is not providing a restriction to in channel flow. However in the 1% plus climate change event, where the road crosses the floodplain, restriction to flow across the floodplain flow was

Table 1 Identification of European sites and their Relevance to the Proposed Development

(European sites are considered relevant where a receptor -pathway-source link[4] exists between the proposed development and the European Site.

Site Name & Code	Distance from Development (approximate)	Qualifying Interests (QIs) / Special Conservation Interests (SCIs) (*Priority Annex I Habitats)	Do any potential receptor-pathway-source links exist between the proposed development and the European site?
			predicted by the hydraulic modelling (see Figure C2-3 in Appendix 8.2 of the EIS the Flood Risk Assessment - post proposed development with mitigation measures flood risk during 1% AEP plus climate change). This would result in increased retention of water on the floodplain for a period after a 1% plus climate change flood event. Given that the hydraulic modelling did not predict any restriction to in channel flow, and that any such flooding events are likely to be rare (1%) and temporary in nature, none of the aquatic qualifying interest species will be adversely affected. Similarly no significant effects are likely with respect to the estuarine or coastal habitats downstream. Any areas of the Annex I priority habitat Alluvial forests [*91E0] are also unlikely to be significantly affected as this habitat type requires periodic flooding (see Table 4). Nevertheless, effects to the functioning of a floodplain need to be minimised both quantitatively and with respect to the extent of any predicted effects and mitigation measures have been proposed (see Section 5.1.4).
Moanveanlagh Bog SAC [002351]	3.2km east	▪ Active raised bogs [7110] ▪ Degraded raised bogs still capable of natural regeneration [7120] ▪ Depressions on peat substrates of the *Rhynchosporion* [7150] Source: NPWS (2015) Conservation objectives for Moanveanlagh Bog SAC [002351]. Version 1.0. Department of Arts, Heritage & the Gaeltacht.	No, due to the distance of the SAC from the proposed development and the absence of any pathway by which the hydrology of the bog could be affected.
Special Protection Areas (SPAs)			
River Shannon and River Fergus Estuaries SPA [004077]	10.7km north	▪ Cormorant *Phalacrocorax carbo* [A017] ▪ Whooper Swan *Cygnus cygnus* [A038] ▪ Light-bellied Brent Goose *Branta bernicla hrota* [A046]	No. The proposed development will not result in any significant direct or indirect impacts to the SPA. The proposed development sits within the River Feale catchment, a catchment which does not drain directly to this European site. In

Table 1 Identification of European sites and their Relevance to the Proposed Development (European sites are considered relevant where a receptor -pathway-source link[4] exists between the proposed development and the European Site.			
Site Name & Code	**Distance from Development** (approximate)	**Qualifying Interests (QIs) / Special Conservation Interests (SCIs)** (*Priority Annex I Habitats)	**Do any potential receptor-pathway-source links exist between the proposed development and the European site?**
		▪ Shelduck *Tadorna tadorna* [A048] ▪ Wigeon *Anas penelope* [A050] ▪ Teal *Anas crecca* [A052] ▪ Pintail *Anas acuta* [A054] ▪ Shoveler *Anas clypeata* [A056] ▪ Scaup *Aythya marila* [A062] ▪ Ringed Plover *Charadrius hiaticula* [A137] ▪ Golden Plover *Pluvialis apricaria* [A140] ▪ Grey Plover *Pluvialis squatarola* [A141] ▪ Lapwing *Vanellus vanellus* [A142] ▪ Knot *Calidris canutus* [A143] ▪ Dunlin *Calidris alpina* [A149] ▪ Black-tailed Godwit *Limosa limosa* [A156] ▪ Bar-tailed Godwit *Limosa lapponica* [A157] ▪ Curlew *Numenius* arquata [A160] ▪ Redshank *Tringa totanus* [A162] ▪ Greenshank *Tringa nebularia* [A164] ▪ Black-headed Gull *Chroicocephalus ridibundus* [A179] ▪ Wetlands [A999]	theory it could be argued that there is an indirect linkage from the proposed development site to this European site, via drainage through the River Feale catchment to the mouth of the Shannon Estuary which itself is connected back to this European site via tidal movements. However in reality this pathway via freshwater and marine water bodies is so long (approximately 29 km), circuitous and indirect that even if any potential impacts would have travelled this pathway, they would have been fully dissipated and assimilated by the capacity of the wider marine environment so as not to be felt within this SPA. This 29km indirect pathway will not pose a risk of spread of invasive species arising from construction works to the SPA. This is based both on the length and circuitous nature of the pathway as well as the fact that at least *c*. 15km of the final stages of this pathway is via brackish and marine water bodies in which the relevant invasive species (primarily Japanese knotweed and Indian balsalm) would not survive the saline conditions. Due to the approximate 10.7km overland distance from the proposed development site to this SPA, there is no potential for any other impact pathways (*e.g.* due to noise or other airborne impacts). Of the bird species recorded during the course of the ecology surveys undertaken in the preparation of the NIS (Appendix 6.3 of the EIS and Figures 6.13-6.18: Bird Survey Results), only the following species listed as qualifying interests of the SPA were present within the zone of influence of the proposed development: golden plover, whooper swan,

Table 1 Identification of European sites and their Relevance to the Proposed Development (European sites are considered relevant where a receptor -pathway-source link[4] exists between the proposed development and the European Site.			
Site Name & Code	**Distance from Development** (approximate)	**Qualifying Interests (QIs) / Special Conservation Interests (SCIs)** (*Priority Annex I Habitats)	**Do any potential receptor-pathway-source links exist between the proposed development and the European site?**
		Source: NPWS (2012) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	teal, black-headed gull, and cormorant. However, those birds recorded in Listowel are most likely from Cashen Estuary flocks[5] given the relatively close proximity of the estuary to Listowel and the River Cashen/River Feale corridor that connects the estuary with the proposed development site. Even if the SCI bird species recorded were to be from the River Fergus/Shannon Estuaries, displacement of the species would not result in a significant population level impact. This is because there are large areas of suitable foraging habitat of similar quality within the locality which have the capacity to absorb any displaced birds, and as the closest foraging site for whooper swans (Finuge) regularly sustains a relatively small proportion of the Cashen Estuary flock. Therefore, the proposed development will not result in any adverse effects on the River Shannon and River Fergus Estuaries SPA's SCI bird species.

[5] In the case of whooper swan, the birds recorded in the Listowel area were considered as being from the Cashen Estuary flock based on observations during the field surveys and consultation with the Irish Whooper Swan Study Group.

Table 1 Identification of European sites and their Relevance to the Proposed Development (European sites are considered relevant where a receptor -pathway-source link[4] exists between the proposed development and the European Site.			
Site Name & Code	**Distance from Development** (approximate)	**Qualifying Interests (QIs) / Special Conservation Interests (SCIs)** (*Priority Annex I Habitats)	**Do any potential receptor-pathway-source links exist between the proposed development and the European site?**
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]	3km south	▪ Hen Harrier *Circus cyaneus* [A082] Source: NPWS (2016) Conservation objectives for Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]. Generic Version 5.0. Department of Arts, Heritage & the Gaeltacht	No. This European site is not directly impacted. The SPA is located approximately 3km from the proposed development. Hen harrier may therefore range within the Listowel area, as male birds can feed as far as 10km from the nest site and the species is known to range widely during the winter (Hardy *et al.*, 2009). However, given the distance from the known nest sites (there are no known nests within 6km) and the low probability of the species to forage within the zone of influence of any construction disturbance due to the low suitability of the habitats impacted, habitat loss and general construction disturbance associated with the proposed development will not result in any significant effects on this species. Given the distance of the proposed development from the known hen harrier nest sites (there are no known nest sites within 6km), and the low susceptibility of the species to impacts from road traffic, the operation of the proposed development will not result in any significant effects on this species.

Table 1 Identification of European sites and their Relevance to the Proposed Development (European sites are considered relevant where a receptor -pathway-source link[4] exists between the proposed development and the European Site.			
Site Name & Code	**Distance from Development** (approximate)	**Qualifying Interests (QIs) / Special Conservation Interests (SCIs)** (*Priority Annex I Habitats)	**Do any potential receptor-pathway-source links exist between the proposed development and the European site?**
Kerry Head SPA [004189]	14.2km west	▪ Fulmar *Fulmarus glacialis* [A009] ▪ Chough *Pyrrhocorax pyrrhocorax* [A346] Source: NPWS (2016) Conservation objectives for Kerry Head SPA [004189]. Generic Version 5.0. Department of Arts, Heritage & the Gaeltacht.	No. Fulmar is a species which breeds along the Irish coast and winters at sea or at coastal sites. As such, this species will not be affected in any way given the distance separating the proposed development from the SPA and its coastline. Similarly, Chough are also a coastal bird with 95% of breeding sites recorded on islands or within 1km of the coastline (Gray *et al.*, 2003). As such, this species will not be affected in any way given the distance separating the proposed development from the SPA and its coastline. Therefore, the proposed development will not result in any significant effects on the SCI bird species.

Identification of European sites and their Relevance to the Proposed Development Conclusion

Of the five European sites located within the potential zone of influence of the proposed development, only the Lower River Shannon SAC has a source-receptor-pathway link with the proposed development and as such significant effects on this site cannot be ruled out in the absence of mitigation. The proposed development has the potential to affect the Lower River Shannon SAC as a result of: habitat loss at the site of the proposed new bridge over the River Feale; habitat degradation from the spread of invasive plant species, and a reduction in air quality; a reduction in water quality during construction and operation; and, effects on the existing hydrological regime and floodplain connectivity along the River Feale. These potential impacts are further assessed in Table 2 below.

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
Atlantic salmon *Salmo salar* [1106] Sea lamprey *Petromyzon marinus* [1095] Brook lamprey *Lampetra planeri* [1096] River lamprey *Lampetra fluviatilis* [1099]	Atlantic salmon and lamprey species are considered together as the potential for the proposed development to affect these species relates to the same factors: habitat loss, habitat degradation, the risk of a reduction in water quality and the risk of a barrier effect associated with the installation of bridges and other structures on watercourses. The potential for the proposed development to affect the existing hydrological regime and floodplain connectivity has been ruled out (see Table 1). *Habitat loss/habitat degradation* The use of a clear span bridge design over the River Feale, with no construction works within the river channel (during normal flow conditions), avoids any loss of river substrate habitat that would affect these aquatic species. The removal of bankside vegetation at this location will also not result in any direct significant effects on Atlantic salmon or lamprey species. This vegetation is all above the normal water channel level and does not provide shelter or refuge opportunities for these species. Therefore its removal will not affect the ability for these species to continue to use the river habitat. Habitat degradation in relation to these aquatic species is only possible as a result of significant/prolonged pollution and/or siltation events during construction if this were to occur. The risk of pollution events occurring during construction is discussed in more detail below under *Reduction in Water Quality.* Although not within the Lower River Shannon cSAC boundary, habitat loss associated with the installation of structures on the tributary streams (the Ballygrenane Stream, Garryantanvally Stream, and the Mill Stream Lower) is considered here also, as there is the potential for negative effects to occur to cSAC populations if they use these channels. However, in this case the Ballygrenane Stream, Garryantanvally Stream, and the Mill Stream Lower were all noted as low/moderate potential for juvenile salmonids and lamprey species with none of these species recorded at the proposed crossing points (Ryan Hanley Consulting Engineers, 2012). Therefore, works for the installation of structures on these watercourses are not predicted to result in any significant effect to Atlantic salmon or lamprey populations in the Lower River Shannon cSAC. *Disturbance to fish species during construction* Any disturbance due to increased human presence, and noise and vibration associated with the construction works (including the installation of the temporary piles required to construct the bridge abutments in isolation from the river) is not predicted to result in any significant disturbance to aquatic species principally due to the absence of any in-stream works on the River Feale but also in consideration of the temporary nature of any vibration associated with the pile driving, and the short-term nature of general construction works (which will be of a limited duration each day *i.e*. confined to normal working hours). *Reduction in Water Quality* During construction, contaminated surface water runoff and/or an accidental spillage or pollution event affecting any surface water feature has the potential to have significant negative impacts on water quality and may consequently impact on fish species present downstream; significant reductions in water quality can cause stress or mortality in adult and juvenile fish. The effects of frequent and/or prolonged siltation or pollution events in a river system have the potential to be extensive and far-reaching and can have significant impacts *e.g.* prolonged siltation events can damage spawning habitat present downstream by clogging up the interstitial spaces in gravel beds.

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
	In the unlikely instance that a pollution event of such a magnitude occurred during construction, given that the proposed development is within the lower reaches of the catchment this therefore would not have far-reaching effects within the River Feale system. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts during construction, and mitigation measures are proposed to minimise the risk of the proposed development having any perceptible effect on water quality. There will be six new outfall points to surface water features from the road drainage network during operation. During routine operation pollutants (for example oils and hydrocarbons from fuel combustion and salts or herbicides from road maintenance) will be deposited on the road surfaces. The implications for water quality relate to the potential for these pollutants to be transported in surface run-off and enter the water environment via the road drainage system. The impact will depend on the volume and type of traffic using the road, the provision of pollution control measures, and the sensitivity of the receiving watercourse. A Highways Agency Water Risk Assessment Tool (HAWRAT) assessment has been undertaken to assess the carriageway runoff from the proposed development on the receiving watercourses. Full details of this assessment are presented in Chapter 8 and Appendix 8.3 of the EIS but the key relevant findings are presented here. The toxicity thresholds which are used by the tool, have been designed to prevent adverse ecological effects in receiving waters. Equally, in artificial and heavily modified water bodies, the thresholds have been designed to prevent adverse effects on ecological potential. The thresholds are consistent with the requirements of the Water Framework Directive. During the operation of the development, surface water runoff will be passed through a three stage train system of petrol/oil interceptor, attenuation pond, and constructed wetland prior to discharge (as described in Section 3.2.2). The design of the treatment system has taken account of the size of the catchment drained, and the types of contaminants (grit, heavy metals, and hydrocarbons). The results of the HAWRAT assessment show the % removal of pollutants required to achieve required water quality objectives and whether the proposed drainage designs achieve these removals. In each case it can be seen that the proposed drainage designs are adequate and that no additional measures are required. The HAWRAT results indicate that impacts to water quality in all receiving watercourses as a result of the operational phase would be considered to be either imperceptible, or neutral to negligible, due to the pollutant removal ability of the proposed drainage system. The outputs (annual average concentrations for soluble pollutants, dissolved copper and dissolved zinc) were also compared against the Environmental Quality Standards (EQS) in the *European Communities Environmental Objective (Surface Water) Regulations 2009* and in all cases levels are significantly below the annual average (AA-EQS). Based on the HAWRAT assessment, and given the drainage design proposed (a three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, as described in Section 3.2.2) the operating water quality of the drainage outfalls will not have any perceptible impact on water quality in the receiving watercourses. Extreme flood events may temporarily affect the functioning of the attenuation and wetland elements of the treatment chain, but the petrol interceptor would continue to function as designed. However, given the increased dilution factor and flow rates associated with such events the predicted impact on water quality is predicted to be imperceptible. A risk of hydrocarbon and other dangerous substance contamination exists as a result of accidental spillage by vehicles using the proposed development during the operational phase of the proposed development. The Highways Agency (HA) considers that in "c*ircumstances where an outfall discharges within close proximity to (i.e. within 1 km) a protected area for conservation, or could affect important drinking water supplies or other important abstractions, a higher standard of protection will be required such that the risk of a serious pollution incident has an annual probability of less than 0.5%.".* As is demonstrated in Chapter 8 of the EIS (Section 8.2.7 (b) ii) and Appendix 8.4 of the EIS, the probability of accidental spillage occurring has been calculated as being less

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
	than 0.5% in all cases. Therefore, the likelihood of a serous pollution incident is so low that it is not deemed necessary in accordance with the Highways Agency's guidance to further reduce the risk of a serious pollution incident through other measures. Given that all surface water run-off from the proposed development will be captured by the three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, in the extremely unlikely event of an accidental spillage any hydrocarbons or other potential pollutants would pass through this system offering some level of protection to the receiving watercourses. Given the extremely low likelihood and level of protection available through the design of the drainage system significant effects are not predicted. *Barrier Effect* The use of a clear span bridge design over the River Feale avoids the potential for the proposed development to result in any barrier effect to fish passage. It was noted during the field surveys that existing flood prevention measures on the tributaries crossed by the proposed development (Ballygrenane Stream, Garryantanvally Stream, and the Mill Stream Lower) are likely to result in a degree of barrier effect on these watercourses due to the presence of flap valves and, in the case of the Ballygrenane and Garryantanvally Streams, an outfall pipe which is elevated from the River Feale. Given the design of the structures proposed for the Ballygrenane Stream, Garryantanvally Stream, and the Mill Stream Lower (Figure 5: Culvert Typical Arrangement) the proposed development will not pose a risk of any significant effects on these species as a result of barrier effects in the supporting tributary network.
Freshwater pearl mussel *Margaritifera margaritifera* [1029]	The freshwater pearl mussel conservation objectives for the Lower River Shannon cSAC relate specifically to the Cloon River population in County Clare and given the absence of any hydrological connection between the proposed development and this river catchment, there is no potential for the proposed development to result in any direct effects on this population. Although there are no freshwater pearl mussel populations present within the zone of influence of the proposed development (at, or downstream of, the proposed River Feale Bridge or the proposed drainage outfalls), there are records of populations in the catchment, 23km upstream of Listowel (Ross, 2009). The freshwater pearl mussel will not be affected in any way by habitat loss or habitat degradation. There is however, a potential pathway by which the proposed development could have indirect impacts on this species within the River Feale catchment by virtue of the fact that the larval stage of the species' life-cycle relies upon salmonid fish as a host species; any potential effects on salmonid fish species could therefore also potentially affect freshwater pearl mussel recruitment in the catchment. The potential for the proposed development to result in any significant effects on salmonid fish species has already been discussed above in relation to Atlantic salmon.

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
Sandbanks which are slightly covered by sea water all the time [1110]	This habitat type is present in the Shannon Estuary between Ballybunion, Loop Head and Carrigaholt (National Parks & Wildlife Service, 2012a, map 3); separated from the proposed development by *c.*18.5km of river channel and a *c.*4km marine open water buffer. Given the scale of the proposed development and its distance from the location of this habitat type within the cSAC, and the assimilative capacity of the River Feale in its lower reaches and the Shannon Estuary itself, it is not predicted that a pollution event would occur during construction, or operation, of a magnitude or duration that would result in any perceptible change in water quality in the Shannon Estuary. Therefore, the proposed development does not pose a risk of any significant effects on this Annex I habitat within the Lower River Shannon cSAC.
*Coastal lagoons [1150]	The Annex I habitat **Coastal lagoons* is limited to four sites within the Shannon Estuary (National Parks & Wildlife Service, 2012); the closest of which is Cloonconeen Pool, *c.*11.5km from the Cashen Estuary. Given the substantial distance of river channel and open marine water that separates the proposed development site from the locations of this habitat type within the SAC the proposed development does not pose a risk of any significant effects on this Annex I habitat within the Lower River Shannon cSAC.
Large shallow inlets and bays [1160]	This habitat type is associated with the Shannon Estuary *c.*18.5km downstream of the proposed development (National Parks & Wildlife Service, 2012a, map 7). Given the scale of the proposed development and its distance from the location of this habitat type within the SAC, and the assimilative capacity of the River Feale in its lower reaches and the Shannon Estuary itself, it is not predicted that a pollution event would occur during construction, or operation, of a magnitude or duration that would result in any perceptible change in water quality in the Shannon Estuary. Therefore, the proposed development does not pose a risk of any significant effects on this Annex I habitat within the Lower River Shannon cSAC.
Reefs [1170]	This habitat type is associated with the Shannon Estuary *c.*18.5km downstream of the proposed development (National Parks & Wildlife Service, 2012a, map 8). Given the scale of the proposed development and its distance from the location of this habitat type within the cSAC, and the assimilative capacity of the River Feale in its lower reaches and the Shannon Estuary themselves, it is not predicted that a pollution event would occur during construction, or operation, of a magnitude or duration that would result in any perceptible change in water quality in the Shannon Estuary. Therefore, the proposed development does not pose a risk of any significant effects on this Annex I habitat within the Lower River Shannon cSAC.
Perennial vegetation of stony banks [1220]	The nearest location of this habitat type to the proposed development is along the Shannon Estuary coastline at Ballybunion (National Parks & Wildlife Service, 2012a, map 10); *c.*18.5km downstream of the proposed development and north along the coastline. Given that this is a terrestrial habitat type with no surface water pathway by which the proposed development could impact on it, the proposed development does not pose a risk of any significant effects on this Annex I habitat within the Lower River Shannon cSAC.

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	The nearest locations of this habitat type to the proposed development are along the Shannon Estuary coastline south of the Cashen Estuary and north of Ballybunion (National Parks & Wildlife Service, 2012a, map 11); *c.*18.5km downstream of the proposed development, and north and south along the coastline. Given that this is a terrestrial habitat type with no surface water pathway by which the proposed development could impact on it, the proposed development does not pose a risk of any significant effects on of this Annex I habitat within the Lower River Shannon cSAC.
Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] *Salicornia* and other annuals colonizing mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	The extent of the Cashen River Estuary is mapped from the coastline south of Ballybunion to the Finuge Bridge, *c.*2.5km downstream of the proposed development (National Parks & Wildlife Service, 2012a, map 3). As estuaries are ecological units encompassing the aquatic and coastal habitat types associated with the zone of tidal influence in the lower reaches of a river system, those Annex I coastal habitats either known or likely to occur within the Cashen River Estuary are discussed here also (National Parks & Wildlife Service, 2012a, map 12). In relation to the proposed development, the estuarine system and habitats are only likely to be affected either by a reduction in water quality or through the introduction of invasive plant species. *Potential for a Significant Reduction in Water Quality During Construction* During construction, contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently an impact on the estuarine habitats present downstream. The effects of frequent and/or a prolonged pollution events in an estuarine system can have the potential to be extensive and far-reaching and can have potentially significant long-term effects. In the unlikely instance that a pollution event of such a magnitude would occur during construction, given that the proposed development is within the lower reaches of the catchment this therefore would not have far-reaching effects within the River Feale system. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts during construction and mitigation measures are proposed to minimise the risk of the proposed development having any perceptible effect on water quality. *Potential for a Significant Reduction in Water Quality During Operation* There will be six new outfall points to surface water features from the road drainage network during operation. As described in detail above for salmon and lamprey, the HAWRAT assessment indicates that impacts to water quality in all receiving watercourses as a result of the operational phase would be considered to be either imperceptible, or neutral to negligible, due to the pollutant removal ability of the proposed drainage system. The outputs (annual average concentrations for soluble pollutants, dissolved copper and dissolved zinc) were also compared against the Environmental Quality Standards (EQS) in the *European Communities Environmental Objective (Surface Water) Regulations 2009* and in all cases levels are significantly below the annual average (AA-EQS). Based on the HAWRAT assessment and given the drainage design proposed (a three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, as described in Section 3.2.2) the operating water quality of the drainage outfalls will not have any perceptible impact on water quality in the receiving watercourses. Extreme flood events may temporarily affect the functioning of the attenuation and wetland elements of the

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
	treatment chain, but the petrol interceptor would continue to function as designed. However, given the increased dilution factor and flow rates associated with such events the predicted impact on water quality will likely be imperceptible. A risk of hydrocarbon and other dangerous substance contamination exists as a result of accidental spillage by vehicles using the proposed development during the operational phase of the proposed development. The Highways Agency (HA) considers that in "c*ircumstances where an outfall discharges within close proximity to (i.e. within 1 km) a protected area for conservation, or could affect important drinking water supplies or other important abstractions, a higher standard of protection will be required such that the risk of a serious pollution incident has an annual probability of less than 0.5%.".* As is demonstrated in Chapter 8 of the EIS (Section 8.2.7 (b) ii) and Appendix 8.4 of the EIS, the probability of accidental spillage occurring has been calculated as being less than 0.5% in all cases. Therefore, the likelihood of a serous pollution incident is so low that it is not deemed necessary in accordance with the Highways Agency's guidance to further reduce the risk of a serious pollution incident through additional measures. Given that all surface water run-off from the proposed development will be captured by the three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, in the extremely unlikely event of an accidental spillage any hydrocarbons or other potential pollutants would pass through this system offering some level of protection to the receiving watercourses. Given the extremely low likelihood and level of protection available through the design of the drainage system significant effects are not predicted. *Potential for Introducing/Spreading Invasive Plant Species* Invasive plant species are present at the crossing point of the River Feale and along some of its tributaries. Construction works in these areas will disturb soils contaminated by these plant species. Therefore, there is a risk that contaminated soils or plant material will be washed downstream to the lower reaches of the River Feale and Cashen Estuary and result in indirect impacts on the habitats there. The impact of spreading these species within the cSAC could potentially be long-term, and significant at a local level. Given the abundance of invasive plant species cover in the vicinity of the proposed development, there is a high probability that these species will recolonize the vegetated areas within the CPO fence line post-construction (particularly Japanese knotweed along the River Feale corridor and along the disused rail line embankments). As such, there is a risk that routine maintenance works may inadvertently spread contaminated vegetation cuttings to the estuary via the River Feale or other surface water features crossed by the proposed development.
Bottle-nosed dolphin *Tursiops truncatus* [1349]	The Bottle-nosed dolphin is associated with the Shannon Estuary *c*.18.5km downstream of the proposed development (National Parks & Wildlife Service, 2012a, map 16). Given the scale of the proposed development and its distance from the Shannon Estuary, and the assimilative capacity of the River Feale in its lower reaches and the Shannon and Cashen Estuaries themselves, it is not predicted that a pollution event would occur during construction, or operation, of a magnitude or duration that would result in any perceptible change in water quality in the Shannon Estuary. Therefore, the proposed development does not pose a risk of any significant effects on this Annex II species within the Lower River Shannon cSAC.
Otter *Lutra lutra* [1355]	The results of the otter survey show that the species is present throughout the study area, regularly using the River Feale corridor in the vicinity of the proposed New River Feale Bridge (see Figures 6.6 - 6.12: Mammal Survey Results). Although not within the Lower River Shannon cSAC boundary, impacts associated with tributary streams (the Ballygrenane Stream, Garryantanvally Stream, and the Mill Stream Lower) are considered here also, as

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
	it is likely that the otters using these streams are part of the cSAC population. *Disturbance to breeding or resting places during construction* There are no confirmed and active otter breeding or resting places directly impacted by the proposed development. There is one potential otter holt along the proposed development boundary at Coolnaleen Lower/Garryantanvally (H4). Although this burrow along the stream bank displays the characteristics of an otter holt, no evidence of any otter activity has been recorded in its vicinity throughout the survey periods. Given the distance that the active holt and couch sites are from the proposed development site, and the absence of any other confirmed breeding or resting places within the zone of influence of the proposed development (150m based on current guidance - National Roads Authority 2008, NIEA 2011 and Highways Agency 2001), it is not predicted that construction works in the vicinity of these features will result in any disturbance to otter breeding or resting places. *Disturbance to Otter during construction* Any disturbance due to increased human presence, and noise and vibration associated with the construction works (including the installation of the temporary piles required to construct the bridge abutments in isolation from the river) is not predicted to result in any significant disturbance to otter using the watercourses crossed by the proposed development as; the species is generally nocturnal in habit and therefore, will not be affected by works during normal daylight working hours; and, otter are known to tolerate human disturbance under certain circumstances (Bailey & Rochford 2006, The Environment Agency 2010, Irish Wildlife Trust 2012, and also as evidenced by the presence of otter signs along the River Feale in Listowel Town) and the species would be expected to habituate to the presence of construction activities. *Habitat loss/severance during construction* As there were no active and/or confirmed holts or couch sites within the footprint of the proposed development there will be no decline in the number of available holt or couch sites within the cSAC. The use of a clear span bridge design over the River Feale will ensure that the proposed development will not result in any reduction in the extent of freshwater (river) habitat for otter within the cSAC. The construction of the proposed New River Feale Bridge will result in the loss of c.477m^2 of bankside vegetation within the cSAC boundary at two locations; on the north bank of the river at the proposed crossing point (c.409m^2 of scrub), and at the outfall for proposed Pond A3 (c.68m^2 of woodland). In the context of river systems, the *Threat Response Plan - Otter Lutra lutra 2009-2011* document (Department of the Environment, Heritage and the Gaeltacht, 2011) defines otter habitat as a 10m zone of riparian habitat along the river banks. On the south bank the riparian zone consists of a *c.*5m high cliff face of unconsolidated alluvial material topped with a bramble scrub covered earth bank. Given that otter activity was restricted to the boulders lining the base of the cliff in this area, the absence of any existing substantial vegetation cover in this zone, and the clear span bridge design proposed, the vegetation loss in this area is not predicted to result in any significant decline in the extent of the available terrestrial habitat; as evidenced by the continued use by otter of areas under bridge structures in the surrounding area. On the north bank of the river at the proposed crossing point the riparian zone consists of a band of exposed gravels, cobbles, and reed canary grass

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
	with a band of more established scrub cover higher up the river bank. Given the clear span bridge design proposed, the vegetation loss in this area is not predicted to result in any significant decline in the extent of the available terrestrial habitat; as evidenced by the continued use by otter of areas under bridge structures in the surrounding area. At the outfall for proposed Pond A3 the riparian zone consists of a narrow band of woodland. Given the modified nature of the river bank immediately to the north of this location (concrete bank reinforcement works have been carried out in the past) which is still used by otter based on the evidence of the field surveys, the removal of the vegetation required to install the outfall and associated headwall is not predicted to result in any significant decline in the extent of the available terrestrial habitat for the species. As a result of the construction works, it is probable that the physical disturbance to the existing landscape in constructing the watercourse crossings will result in some initial severance along watercourses used by otter. However otter would be expected to habituate to the modified landscape quite quickly and therefore, habitat severance during construction will be temporary and is not predicted to result in any significant effects to the local otter population. *Reduction in Water Quality* During construction, contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently an impact on otter; either directly or indirectly (*e.g*. a reduction in water quality can cause stress or mortality in adult and juvenile fish, a key prey species of otter). The effects of frequent and/or prolonged pollution events in a river system have the potential to be extensive and far-reaching and can have potentially significant long-term effects. In the unlikely instance that a pollution event of such a magnitude would occur during construction, given that the proposed development is within the lower reaches of the catchment, this therefore would not have far-reaching effects within the River Feale system. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts and detailed mitigation measures are proposed to further minimise the risk of the proposed development having any perceptible effect on water quality during construction. There will be six new outfall points to surface water features from the road drainage network during operation. As described in detail above for salmon and lamprey, the HAWRAT assessment indicates that impacts to water quality in all receiving watercourses as a result of the operational phase would be considered to be either imperceptible, or neutral to negligible, due to the pollutant removal ability of the proposed drainage system. The outputs (annual average concentrations for soluble pollutants, dissolved copper and dissolved zinc) were also compared against the Environmental Quality Standards (EQS) in the *European Communities Environmental Objective (Surface Water) Regulations 2009* and in all cases levels are significantly below the Annual Average AA-EQS. Based on the HAWRAT assessment and given the drainage design proposed (a three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, as described in Section 3.2.2) the operating water quality of the drainage outfalls will not have any perceptible impact on water quality in the receiving watercourses. Extreme flood events may temporarily affect the functioning of the attenuation and wetland elements of the treatment chain, but the petrol interceptor would continue to function as designed. However, given the increased dilution factor and flow rates associated with such events the predicted impact on water quality will likely be imperceptible.

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
	A risk of hydrocarbon and other dangerous substance contamination exists as a result of accidental spillage by vehicles using the proposed development during the operational phase of the proposed development. The Highways Agency (HA) considers that in "*circumstances where an outfall discharges within close proximity to (i.e. within 1 km) a protected area for conservation, or could affect important drinking water supplies or other important abstractions, a higher standard of protection will be required such that the risk of a serious pollution incident has an annual probability of less than 0.5%.".* As is demonstrated in Chapter 8 of the EIS (Section 8.2.7 (b) ii) and Appendix 8.4 of the EIS, the probability of accidental spillage occurring has been calculated as being less than 0.5% in all cases. Therefore, the likelihood of a serous pollution incident is so low that it is not deemed necessary in accordance with the Highways Agency's guidance to further reduce the risk of a serious pollution incident through additional measures. Given that all surface water run-off from the proposed development will be captured by the three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, in the extremely unlikely event of an accidental spillage any hydrocarbons or other potential pollutants would pass through this system offering some level of protection to the receiving watercourses. Given the extremely low likelihood and level of protection available through the design of the drainage system significant effects are not predicted. *Habitat severance/barrier effect during operation* The clear span bridge design over the River Feale will ensure that there is no physical severance along this river corridor during operation. However, the installation of the structures on minor tributaries of the River Feale has the potential to result in a permanent barrier impact to otter using these watercourses (which given the relatively small catchments of these tributary streams, are likely to be used by the cSAC otter population); particularly during periods of high water levels when passage through drainage pipes and structures is more difficult for aquatic species. *Road Traffic Collisions* The introduction of new bridges and structures along watercourses crossed by the proposed development will increase the risk of road traffic collisions with otter. *Light Spill* Nocturnal mammals, such as the otter, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich & Longcore, 2005). Lighting is not proposed, including specifically for any of the watercourse crossings along the proposed development, and none of the potential holt locations will be affected by increased background light levels. The lighting design for the proposed development does however, include for lighting to extend for 60m from each junction. The Mill Stream Lower is the only watercourse which is used by otter that falls within the zone of influence of this lighting. As the lighting proposed will be confined to lighting the road surface and not the watercourse beneath it is not predicted that it would result in any displacement effect in relation to otter movement along that watercourse.
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	Some water-crowfoot occurs to the east of the proposed crossing point (*c.*70 m upstream), the principal species of which is *Ranunculus penicillatus* var. *penicillatus*. This area of habitat (given that this species is characteristic) may correspond with the Annex I habitat type "water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation" [3260]. The European Commission definition of this habitat is broad (European Commission, 2013), and despite work undertaken by Kelleher (2011), there is no agreed definition of this habitat and its sub-types in Ireland (NPWS, 2013a). Based on the *Lower River Shannon SAC Conservation Objectives Supporting Document- Watercourses of plain to montane*

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
	levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (National Parks and Wildlife Service, 2012), this qualifying interest habitat within the Lower River Shannon cSAC includes three high conservation element sub-types to which the area of water crowfoot east of the bridge crossing does not correspond. This habitat therefore, irrespective of its classification, does not form part of the qualifying interest for the Lower River Shannon cSAC. In any case, the habitat is located upstream of the proposed New River Feale Bridge location and consequently will not be directly impacted. However, the outfall from the constructed wetland located on the north side of the River Feale discharges to the river *c.*130m upstream of the aquatic vegetation and there is therefore a risk of indirect impacts from a reduction in water quality as a result of construction works. In the unlikely instance that a pollution event would occur of a magnitude that would have any perceptible effect on instream aquatic vegetation, given that the proposed development is within the lower reaches of the catchment, this therefore would not have far-reaching effects within the River Feale system. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts and detailed mitigation measures are proposed to further minimise the risk of the proposed development having any perceptible effect on water quality during construction. There will be a new outfall point from the road drainage network during operation to the River Feale upstream of this area of habitat near the proposed River Feale crossing point. As described in detail above for Salmon and lamprey, the HAWRAT assessment indicates that impacts to water quality in all the receiving River Feale as a result of the operational phase is be considered to be imperceptible, due to the pollutant removal ability of the proposed drainage system. The outputs (annual average concentrations for soluble pollutants, dissolved copper and dissolved zinc) were also compared against the Environmental Quality Standards (EQS) in the *European Communities Environmental Objective (Surface Water) Regulations 2009* and in all cases levels are significantly below the annual average (AA-EQS). Based on the HAWRAT assessment and given the drainage design proposed (a three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, as described in Section 3.2.2) the operating water quality of the drainage outfall will not have any perceptible impact on water quality in the River Feale. Extreme flood events may temporarily affect the functioning of the attenuation and wetland elements of the treatment chain, but the petrol interceptor would continue to function as designed. However, given the increased dilution factor and flow rates associated with such events the predicted impact on water quality will likely be imperceptible. A risk of hydrocarbon and other dangerous substance contamination exists as a result of accidental spillage by vehicles using the proposed development during the operational phase of the proposed development. The Highways Agency (HA) considers that in "*circumstances where an outfall discharges within close proximity to (i.e. within 1 km) a protected area for conservation, or could affect important drinking water supplies or other important abstractions, a higher standard of protection will be required such that the risk of a serious pollution incident has an annual probability of less than 0.5%.".* As is demonstrated in Chapter 8 of the EIS (Section 8.2.7 (b) ii) and Appendix 8.4 of the EIS, the probability of accidental spillage occurring has been calculated as being less than 0.5% in all cases. Therefore, the likelihood of a serous pollution incident is so low that it is not deemed necessary in accordance with the Highways Agency's guidance to further reduce the risk of a serious pollution incident through additional measures. Given that all surface water run-off from the proposed development will be captured by the three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, in the extremely unlikely event of an accidental spillage any hydrocarbons or other potential pollutants would pass through this system offering some level of protection to the receiving watercourses. Given the extremely low likelihood and

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
	level of protection available through the design of the drainage system significant effects are not predicted.
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]	The Annex I habitat *Molinia meadows on calcareous, peaty or clayey-silt-laden soils* (*Molinion caeruleae*) is not present within, or near, the boundary of the proposed development and is not known from the downstream section of the cSAC (National Parks & Wildlife Service, 2012a). As such, this habitat type will not be impacted in any way by the proposed development.
*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	None of the habitats within the zone of influence of the proposed development corresponds with the Annex I habitat type Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*). The only area of this habitat type shown in the conservation objectives document (National Parks & Wildlife Service, 2012a,map 14) is near Toornafulla; more than 25km upstream of the proposed development. However, there may be as yet unknown areas of this habitat type at a distance downstream of the proposed development; and if present could be at risk of indirect impacts from a reduction in water quality as a result of construction works or the spread of invasive plant species. *Reduction in Water Quality* In the unlikely instance that a pollution event would occur of a magnitude that would have any perceptible effect on riparian woodland habitats, given that the proposed development is within the lower reaches of the catchment, this therefore would not have far-reaching effects within the River Feale system. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts and detailed mitigation measures are proposed to further minimise the risk of the proposed development having any perceptible effect on water quality during construction. There will be six new outfall points to surface water features from the road drainage network during operation. As described in detail above for Salmon and lamprey, the HAWRAT assessment indicates that impacts to water quality in all receiving watercourses as a result of the operational phase would be considered to be either imperceptible, or neutral to negligible, due to the pollutant removal ability of the proposed drainage system. The outputs (annual average concentrations for soluble pollutants, dissolved copper and dissolved zinc) were also compared against the Environmental Quality Standards (EQS) in the *European Communities Environmental Objective (Surface Water) Regulations 2009* and in all cases levels are significantly below the annual average (AA-EQS). Based on the HAWRAT assessment and given the drainage design proposed (a three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, as described in Section 3.2.2) the operating water quality of the drainage outfalls will not have any perceptible impact on water quality in the receiving watercourses. Extreme flood events may temporarily affect the functioning of the attenuation and wetland elements of the treatment chain, but the petrol interceptor would continue to function as designed. However, given the increased dilution factor and flow rates associated with such events the predicted impact on water quality will likely be imperceptible. A risk of hydrocarbon and other dangerous substance contamination exists as a result of accidental spillage by vehicles using the proposed development during the operational phase of the proposed development. The Highways Agency (HA) considers that in "*circumstances where an outfall discharges within close proximity to (i.e. within 1 km) a protected area for conservation, or could affect important drinking water supplies or other important abstractions, a higher standard of protection will be required such that the risk of a serious pollution incident has an annual*

Table 2 Detailed Screening Assessment in relation to the qualifying interests of the Lower River Shannon SAC [002165]	
Qualifying Interests (*Priority Annex I Habitats for Conservation)	**Are any of the identified receptor-pathway-source links between the proposed development and the Natura 2000 site likely to have a significant effect on one or more of the qualifying interest habitats or species?**
	probability of less than 0.5%.". As is demonstrated in Chapter 8 of the EIS (Section 8.2.7 (b) ii) and Appendix 8.4 of the EIS, the probability of accidental spillage occurring has been calculated as being less than 0.5% in all cases. Therefore, the likelihood of a serous pollution incident is so low that it is not deemed necessary in accordance with the Highways Agency's guidance to further reduce the risk of a serious pollution incident through additional measures. Given that all surface water run-off from the proposed development will be captured by the three stage system of petrol/oil interceptor, attenuation pond and constructed wetland, in the extremely unlikely event of an accidental spillage any hydrocarbons or other potential pollutants would pass through this system offering some level of protection to the receiving watercourses. Given the extremely low likelihood and level of protection available through the design of the drainage system significant effects are not predicted. *Potential for Introducing/Spreading Invasive Plant Species* Invasive plant species are present at the crossing point of the River Feale and along some of its tributaries. Construction works in these areas will disturb soils contaminated by these plant species. Therefore, there is a risk that contaminated soils or plant material will be washed downstream to the lower reaches of the River Feale and Cashen Estuary and result in indirect impacts on the habitats there. The impact of spreading these species within the cSAC could potentially be long-term, and significant at a local level. Given the abundance of invasive plant species cover in the vicinity of the proposed development, there is a high probability that these species will recolonize the vegetated areas within the CPO fence line post-construction (particularly Japanese knotweed along the River Feale corridor and along the disused rail line embankments). As such, there is a risk that routine maintenance works may inadvertently spread contaminated vegetation cuttings to the estuary via the River Feale or other surface water features crossed by the proposed development.

4 Conclusions of Information for Appropriate Assessment Screening Process

Following an examination, analysis and evaluation of the relevant information, including in particular the nature of the proposed development and its potential relationship with European sites, as well as considering other plans and projects, it is possible to rule out significant impacts on all European sites except for the Lower River Shannon cSAC. For all other European sites there is no likelihood of any significant impacts arising.

In the case of the Lower River Shannon cSAC for which the possibility of significant impacts could not be ruled out, the only potentially significant risks (in the absence of mitigation) were identified as arising from:

- A reduction in water quality in receiving watercourses during construction which has the potential to result in significant adverse effects on Qualifying Interest aquatic habitats and species either directly, or indirectly as a result of habitat degradation.
- The potential for invasive plant species to spread to the habitats downstream during construction and operation.
- The installation of structures on minor tributaries of the River Feale which has the potential to result in permanent barrier impacts to otters using these watercourses.
- The introduction of a new road into a rural landscape, and the associated bridges and structures along watercourses crossed by the proposed development, which will increase the risk of road traffic collisions with otter.

5 Stage Two: Provision of information for an Appropriate Assessment

Within this stage of the assessment, the potential impact of the proposed development on the integrity of the Lower River Shannon cSAC is examined with respect to the site's conservation objectives and to their general structure and function.

This report also sets out the specific mitigation measures that will be in place to ensure that any potential effects of the proposed development on the site's conservation objectives will not result in any adverse effect on the integrity of this European site.

5.1 Lower River Shannon cSAC

5.1.1 Conservation objectives

- The conservation objectives for the Lower River Shannon cSAC are set out in a site specific conservation objectives document (National Parks & Wildlife Service, 2012a) and these objectives, as they relate to qualifying interests that have been assessed as being at risk of significant adverse effects from elements of the proposed development, are summarised in Table 4, Section 5.1.6.

5.1.2 Condition of site and management

The NPWS reports on the status of EU protected habitats and species in Ireland (NPWS, 20013a and 2013b) note that the conservation status of qualifying Annex I habitats within the cSAC are generally in the unfavourable-inadequate category (see Table 3 overleaf). As all the QI habitats and species at risk from the proposed development are aquatic (or strongly associated with the aquatic environment as in the case of otter) or estuarine, the primary pressures and threats are related to water quality, habitat degradation, barriers to species movement and the spread of invasive plant species.

The known threats for the Lower River Shannon cSAC (as noted in the Natura 2000 Standard Data Form) that are related to the potential risks associated with the proposed development are water pollution, derived from both domestic/industrial and agricultural sources and the spread of invasive plant species (although the Natura 2000 Standard Data Form relates this solely to the spread of *Spartina*).

5.1.3 Qualifying Interest potentially exposed to risk

The cSAC was designated for a range of habitats and species, not all of which occur within the zone of influence of any potential effects from the proposed development, and not all of which would be vulnerable to those effects. Table 3 below lists only those qualifying interests of the Lower River Shannon cSAC which fall within the zone of influence of the proposed scheme and are deemed to be potentially at risk from elements of the proposed development.

Table 3 Qualifying interests of the Lower River Shannon SAC which are potentially at risk from elements of the proposed development

Qualifying Interests and current conservation status[6] (*Priority Annex I Habitats for Conservation)	**Potential impact source (note that all other possible impact sources have been ruled out as demonstrated in Table 2)**
Atlantic salmon Salmo salar [1106] Sea lamprey Petromyzon marinus [1095] Brook lamprey Lampetra planeri [1096] River lamprey Lampetra fluviatilis [1099]	A reduction in water quality in receiving watercourses during construction has the potential to result in significant effects on aquatic species directly, or indirectly as a result of habitat degradation.
Freshwater pearl mussel *Margaritifera margaritifera* [1029]	A reduction in water quality in receiving watercourses during construction has the potential to result in significant indirect effects on the freshwater pearl mussel in the River Feale catchment as its host fish species may be affected. (Note that there are no freshwater pearl mussel populations present within the zone of influence of the proposed development and that the freshwater pearl mussel conservation objectives for the Lower River Shannon SAC relate specifically to the Cloon River population in County Clare to which there is no direct hydrological connection from the proposed development. The only potential risk to the species is by virtue of the fact that the larval stage of the mussel's life-cycle relies upon salmonid fish as a host species; any potential adverse effects on salmonid fish species could therefore potentially affect freshwater pearl mussel recruitment in wider the catchment.)
Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] *Salicornia* and other annuals colonizing mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	A reduction in water quality in receiving watercourses during has the potential to result in significant effects on estuarine habitats. There is the potential for invasive plant species to spread to the estuarine habitats downstream during construction and operation which has the potential to result in significant effects on these estuarine habitats.
Otter *Lutra lutra* [1355]	A reduction in water quality in receiving watercourses during construction has the potential to result in significant effects on aquatic species directly, or indirectly as a result of a reduction in prey (fish species). The installation of the structures on minor tributaries of the River Feale has the potential to result in a permanent barrier impact to otter using these watercourses. The introduction of a new road into a rural landscape, and the associated bridges and structures along watercourses crossed by the proposed development, will increase the risk of road traffic collisions with otter.
Water courses of plain to montane levels with the *Ranunculion fluitantis* and	A reduction in water quality in receiving watercourses during construction has the potential to result in significant effects on aquatic habitats.

[6] Conservation status sourced from *The Status of EU Protected Habitats and Species in Ireland: Habitat Assessments, Volume 2* (NPWS, 2013a) and *The Status of EU Protected Habitats and Species in Ireland: Species Assessments, Volume 3* (NPWS, 2013b).
Favourable , Unfavourable-inadequate , Unfavourable , Unknown

Table 3 Qualifying interests of the Lower River Shannon SAC which are potentially at risk from elements of the proposed development	
Qualifying Interests and current conservation status[6] (*Priority Annex I Habitats for Conservation)	**Potential impact source (note that all other possible impact sources have been ruled out as demonstrated in Table 2)**
Callitricho-Batrachion vegetation [3260] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	There is the potential for invasive plant species to spread to riparian woodland habitats downstream during construction and operation which has the potential to result in significant effects on these aquatic habitats.

The construction of the proposed River Feale Bridge will result in the loss of 765m^2 of habitat within the cSAC boundary which is made up of 409m^2 of scrub (north bank), 68m^2 of non-Annex I woodland (which will be lost in association with the installation of the outfall to the River Feale from the attenuation pond on the north bank), and 288m^2 of improved agricultural grassland – see Figure 2. None of the habitats directly impacted by the proposed development within the boundary of the cSAC correspond with any of the Annex I habitats for which the Lower River Shannon cSAC is designated; specifically *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*). The loss of the areas of habitat within the boundary of the cSAC does not represent an adverse effect on the integrity of the Lower River Shannon cSAC in consideration of the site's conservation objectives and qualifying interests (refer to Table 5 for detailed examination of these).

Emissions from car exhausts, and the deposition of particulate matter (PM) and heavy metals (HM) produced by engine, brake and tyre wear, can contribute to increased deposition of pollutants such as oxides of nitrogen (NO_x), particulate matter (PM) and heavy metals (HM) in the vicinity of the road carriageway. This can affect the ecosystems and vegetation present, influencing plant growth rates and species composition, diversity, and abundance.

In terms of NO_x, by 2032 it is predicted that at a distance of 10m from the road the proposed development will lead to an increase on NO_x concentration levels of at most 6.8µg/m^3, to a total concentration of 14.4 µg/m^3, which is still well below the limit value of 30 µg/m^3 for the protection of vegetation (National Roads Authority, 2011). Similarly the dry deposition rate predicted for the year 2032 at 10m from the road is predicted to be 0.35KG(N)/ha/yr, which is well below the critical load of 5 KG(N)/ha/yr defined for all habitat types in *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes* (National Roads Authority, 2011). These values drop off rapidly at increased distance from the road (Table 4).

Table 4	Air Quality Assessment of Ecosystems - proposed N69 Listowel Bypass. Assessment of Impact Along Transect from Proposed Road Through the Lower River Shannon cSAC at Islandganniv South[7]							
Distance To Road (m)	**NO_x Conc. ($\mu g/m^3$) - 2017**			**NO_x Conc. ($\mu g/m^3$) - 2032**			**NO_2 Dry Deposition Rate Impact (KG(N)/ha/yr)**	
	Do Minimum	Do Something	Impact	Do Minimum	Do Something	Impact	2017	2032
10	12.8	17.49	4.7	7.6	14.4	6.8	0.25	0.35
20	12.8	16.35	3.6	7.6	12.7	5.1	0.19	0.27
30	12.8	15.53	2.7	7.6	11.5	3.9	0.15	0.21
40	12.8	14.92	2.1	7.6	10.7	3.1	0.12	0.16
50	12.8	14.47	1.7	7.6	10.0	2.4	0.09	0.13
60	12.8	14.11	1.3	7.6	9.5	1.9	0.07	0.10
70	12.8	13.84	1.0	7.6	9.1	1.5	0.06	0.08
80	12.8	13.61	0.8	7.6	8.8	1.2	0.04	0.06
90	12.8	13.44	0.6	7.6	8.5	0.9	0.04	0.05
100	12.8	13.30	0.5	7.6	8.3	0.7	0.03	0.04
110	12.8	13.19	0.4	7.6	8.2	0.6	0.02	0.03
120	12.8	13.10	0.3	7.6	8.0	0.4	0.02	0.02
130	12.8	13.04	0.2	7.6	7.9	0.3	0.01	0.02
140	12.8	12.99	0.2	7.6	7.9	0.3	0.01	0.01
150	12.8	12.96	0.2	7.6	7.8	0.2	0.01	0.01
160	12.8	12.95	0.1	7.6	7.8	0.2	0.01	0.01
170	12.8	12.94	0.1	7.6	7.8	0.2	0.01	0.01
180	12.8	12.92	0.1	7.6	7.8	0.2	0.01	0.01
190	12.8	12.89	0.1	7.6	7.7	0.1	0.01	0.01
200	12.8	12.9	0.1	7.6	7.7	0.1	0.00	0.01
Standards	30 $\mu g/m^3$	30 $\mu g/m^3$	-	30 $\mu g/m^3$	30 $\mu g/m^3$	-	5 – 10 (KG(N)/ha/yr)	

In terms of PM and HM, the predicted concentrations will be below the ambient air quality standards. There is likely to be some increases in soil concentrations of elements of PM and HM within the immediate vicinity of the road side that will result in some localised effects to vegetation. However, it is not predicted to result in any significant changes to species composition or diversity or to adversely effect on the integrity of the Lower River Shannon cSAC in consideration of the site's conservation objectives and qualifying interests, given the absence of any qualifying interest habitats in the immediate vicinity of the proposed development.

Dust emissions during construction are not predicted to result in any long-lasting permanent significant effects to any habitat types present within the Lower River Shannon cSAC.

5.1.4 Mitigation Measures to Ensure No Significant Effects on the Integrity of the Lower River Shannon cSAC

Measures to Minimise Habitat Loss within the cSAC

The minimum working area on the ground necessary to facilitate the construction of the intermediate pier of the proposed New River Feale Bridge, and proposed Outfall A3, will be used (2284m^2 – see Figure 2: Habitat map of the proposed crossing point of the Lower River Shannon cSAC and Figure 8: River Feale Temporary Works). This area will be clearly delineated and fenced off at the outset of works and maintained for the duration of the construction programme. No other on the ground works within the cSAC boundary will be undertaken outside of this zone.

Mitigation Measures to Reduce the Potential for Impacts to Water Quality in Receiving Watercourses

[7] Table 8.15 of the N69 Listowel Bypass Air Quality and Climate Chapter

Prior to commencement of construction, the contractor will implement the following measures through a detailed Erosion and Sediment Control Plan (dESCP) that forms part of the Environmental Operating Plan (EOP). These measures are based on the following best practice guidelines to ensure that water bodies are adequately protected during construction work:

- Construction Industry Research and Information Association CIRIA C648: Control of water pollution from linear construction projects: Technical guidance (Murnane *et al.* 2006a);
- CIRIA C649: Control of water pollution from linear construction projects: Site guide (Murnane *et al*. 2006b);
- DMRB HD33/06: Surface and sub-surface drainage systems for highways. Design Manual for Roads and Bridges. Volume 4:2, (The Highways Agency, 2006);
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (National Roads Authority, 2005);
- Maintenance and Protection of the Inland Fisheries Resource during Road Construction and Improvement Works - Requirements of the Southern Regional Fisheries Board (Southern Regional Fisheries Board, 2007).

The construction contractor will implement the following mitigation measures, via the CMS, for control of sediment/silt:

- A temporary impervious barrier will be installed to ensure that all works associated with the bridge pier construction at the River Feale are protected against the 1:100 year return period flood event to ensure that there is no hydraulic connectivity between the temporary works and the River Feale during construction (see Figure 8: River Feale Temporary Works);
- Suite of measures to prevent the release of sediment over baseline conditions to the River Feale (or its tributaries) during the construction work. These measures will include but not be limited to silt fences, silt curtains, settlement lagoons, filter materials, and stockpile seeding;
- Suite of measures to minimise the release of sediment from the newly excavated attenuation and constructed wetland areas to the River Feale (or its tributaries). These measures will include but not be limited to silt fences, silt curtains, settlement lagoons, filter materials, and stockpile seeding;
- Suite of measures to minimise the displacement and subsequent erosion and release of soft sediment during bridge and structure installation works, including dewatering of excavations. These measures will include but not be limited to silt fences, silt curtains, settlement lagoons, filter materials, and stockpile seeding;
- Suite of measures to appropriately handle, store and re-use where feasible material removed from the bank of the River Feale in such a way that silt escape to watercourses is avoided or reduced to the minimum practicable;
- Provision of exclusion zones and barriers (sediment fences) between earthworks, stockpiles and temporary surfaces and watercourses to prevent sediment washing into watercourses, or into drainage features that are connected to watercourses;
- Temporary construction of surface drainage and sediment control measures will be in place before earthworks commence;
- Pouring of cement based materials for the works will be carried out in the dry and allowed to cure for 48 hours before re-flooding. Pumped concrete will be monitored to ensure no accidental discharges to watercourses, or to drainage features that are connected to watercourses. Mixer washings and excess concrete will not be discharged to any surface water or drainage features;
- No storage of hydrocarbons or any polluting chemicals will occur within 50m of a watercourse. Fuel storage tanks will be bunded to a capacity at least 110% of the volume of the storage tank. Re-fuelling of plant will not occur within 50 m of any watercourse and only in bunded refuelling areas;

- Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures;
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt);
- Response measures for potential pollution incidents;
- Methods to stabilise watercourse banks that have been cleared of vegetation;
- Maintenance of machinery to be used in-stream;
- Removal and replacement of stream bed material in diverted watercourses;

Monitoring During Construction to Reduce the Potential for Impacts to Water Quality in Receiving Watercourses

A monitoring programme will be required at the pre-construction and construction stage.

Pre-construction water quality monitoring will be undertaken once a week for a 6 month period, prior to the commencement of the construction works. Samples will be taken for total suspended solids (TSS), turbidity, pH, temperature, dissolved oxygen (DO) and hydrocarbons up and downstream of the proposed crossing points (River Feale, WF0, WF1, WF4 and WF5) to confirm the baseline water quality conditions prior to the construction. For turbidity, pH, DO and temperature samples will be taken *in situ*. Samples for suspended soilds and hydrocarbons will be sent to an accredited laboratory for analysis.

Weekly during construction the contractor will monitor the levels of TSS, turbidity, pH, temperature, DO and hydrocarbons at locations to be agreed with Kerry County Council upstream and downstream once a week for the duration of the following works:

- Site clearance works, earthworks movements and stockpiling;
- Excavations including those associated with the provision of drainage works;
- Construction of the River Feale Bridge; and
- Construction works within and adjacent to watercourses including provision of culverts and watercourse realignments.

The construction monitoring results will be compared with those results established in pre-construction monitoring. In the event of an elevation above pre-construction levels an investigation will be undertaken by the contractor and remediation measure will be put in place.

In addition, real-time telemetric monitoring will be used by the contractor to measure turbidity upstream and downstream of the River Feale Bridge. The turbidity level recorded downstream shall not exceed the upstream level by 10%. In the event of an exceedance, an investigation will be carried out to determine the cause and contact will be made with the Kerry Water Services and the Irish Water Environment Division immediately. These results will be compared by the contractor to the weekly turbidity results and reported to KCC.

In addition, daily visual inspections of the surface drainage and sediment control measures and the watercourses will be undertaken by the contractor and these inspections shall be recorded and reported to the EAO. Indicators that water pollution may have occurred include the following:

- Change in water colour;
- Change in water transparency;
- Increases in the level of silt in the water;
- Oily sheen to water surface;
- Floating detritus; or
- Scums and foams.

In the event that such indicators are observed in the River Feale and if the EAO directs works will cease, sampling will be immediately undertaken as described for the weekly monitoring and an investigation of the potential cause will be undertaken by the contractor.

Where the works are identified as the source of the exceedance the following will apply:

- Contact will be made with the Kerry Water Services and/ or Irish Water, the NPWS and IFI.
- Works capable of generating sediment into the watercourses shall be stopped immediately.
- The contractor will be required to take immediate action to implement measures to ensure that such discharges do not re-occur.

The above monitoring will alert the Contractor to any detrimental effects that particular construction activities may be having on water quality so that appropriate remedial action can be taken as quickly as possible; and allow the contractor to demonstrate the success of the mitigation measures employed in maintaining any sediment release within the trigger values established. Further requirements in relation to monitoring are outlined in the pESCP contained in Appendix 8.5 of the EIS.

Mitigation Measures to Control and Prevent the Spread of Invasive Plant Species

The mitigation strategy in relation to invasive plant species is based on the *Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads* (National Roads Authority, 2010) with the objectives of permanently removing all invasive plant species from the working area and preventing the spread of any established populations present within the boundary of the proposed development.

An Outline Invasive Species Management Plan has been prepared (refer to Appendix 6.8 of the EIS) and will be implemented sufficiently far in advance of the proposed construction works commencing so as to allow time to adequately control all invasive species populations within the zone of influence of the proposed development, having regard to the specific timing/seasonal constraints that apply in relation to each individual species. The Outline Invasive Species Management Plans will be revised and finalised by the appointed contractor once precise methods of control identified in the Outline Invasive Species Management Plan are determined. The final Invasive Species Management Plan will assist the construction contractor in implementing the specific mitigation measures required in relation to individual invasive plant species.

As species may spread, or their distribution change, between the habitat surveys carried out for this NIS and the commencement of construction works, the implementation of the final Invasive Species Management Plan will include a pre-construction re-survey within the CPO boundary. In accordance with the NRA guidance (NRA, 2010) this survey will include accurate 1:5,000 scale mapping for the precise location of invasive species. The pre-construction surveys will be undertaken by suitable experts with competence in identifying the species concerned.

Measures to Protect Otter

Otters use many of the watercourses crossed by the road development. To avoid otter road casualties, otter passage facilities (raised ledges within structures or separate dry 600mm pipes) will be provided at watercourses used by otter. Underpasses will be constructed in accordance with the Wildlife Fencing Design Guide (CIRIA No. 646). The locations where otter passage facilities will be provided are shown on the ecology mitigation measures drawings (Figures 6.19-6.23: Ecology Mitigation Measures).

Otter-resistant fencing will be required to guide otters to the underpasses and will be installed in accordance with the specification outlined in the NRA guidance (National Roads Authority, 2008) and at the request of the NPWS will include the 45-degree overhang specified by the UK Highways Agency, (2001).

In accordance with the recommendations described in the *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes* (National Roads Authority, 2008), quarterly monitoring of the effectiveness of the mitigation measures will be undertaken in the first year after the completion of construction works.

Mitigation Measures to Minimise the Effects of Flow Restriction across the Floodplain during Extreme Flood Events (1% plus climate change)

Flood relief culverts have been included in the road embankments leading up to the proposed River Feale Bridge to minimise the obstruction to floodplain flow and water levels in localised areas (Figures 4.1-4.5: Overall Scheme Plan).

5.1.5 In-combination effects of the Proposed Development with other Potential Sources.

The potential impact sources which pose a risk to the qualifying interests of the Lower River Shannon cSAC have been identified, as follows (see also Table 3): a reduction in water quality in receiving watercourses during construction; the potential for invasive plant species to spread to the estuarine habitats downstream during construction and operation; installation of the structures on tributaries of the River Feale has the potential to result in a permanent barrier impact to otter using these watercourses; increased risk of road traffic collisions with Otter.

Given the mitigation measures detailed in Section 5.1.4 of this report, it is unlikely that any of the identified potential impact sources would result in any adverse effects on the integrity of the Lower River Shannon cSAC and therefore, it is not predicted to result in any significant "in-combination" effects with any other plans or projects.

5.1.6 Potential risk to Conservation Objectives resulting from the Proposed Development

Tables 2 and 3 set out the potential risks to the qualifying interests of the Lower River Shannon cSAC and identify those qualifying interests likely to be at risk; Section 5.1.4 of this report then sets out the mitigation measures that will be implemented to ensure that the proposed development will not result in any significant effects on those qualifying interests. Table 5 below, presents the assessment of whether, with the mitigation measures proposed, the proposed development would affect the specific conservation attributes and targets set out for each of the qualifying interests deemed to be potentially at risk from the proposed development.

Table 5 Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development

1029 Freshwater pearl mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of freshwater pearl mussel in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:

* *note that this conservation objective applies to the Freshwater pearl mussel population in the Cloon River, Co. Clare only*

Attribute	Measure	Target	Is the proposed development likely to affect the conservation target?
Distribution	Kilometres	Maintain at 7km.	No, as these targets relate specifically to a catchment that is hydrologically isolated from the proposed development. Even if these targets were to be attributed to the River Feale catchment, there are no populations within the direct zone of influence of the proposed development that could be affected. Since there are not likely to be any significant effects on water quality or host fish species there is no risk to any populations upstream in the catchment and there are no predicted impacts on these targets.
Population size	Number of adult mussels	Restore to 10,000 adult mussels	
Population structure: recruitment	Percentage per size class	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	
Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	
Habitat extent	Kilometres	Restore suitable habitat in more than 3.3km (see map 15) and any additional stretches necessary for salmonid spawning	
Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality - macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93	
Substratum quality: filamentous algae	Percentage	Restore substratum quality - filamentous algae: absent	

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
(macroalgae), macrophytes (rooted higher plants)		or trace (<5%); macrophytes: absent or trace (<5%)	
Substratum quality: sediment	Occurrence	Restore substratum quality - stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	
Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regimes	
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	
1095 Sea lamprey Petromyzon marinus			
To restore the favourable conservation condition of sea lamprey in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Since the proposed development will not result in any barrier effect on watercourses, there is no predicted impact on this target.
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Since the proposed development will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target
Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m²	Since the proposed development will not impact on any such habitat within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Since the proposed development will not impact on the river substrate within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream	More than 50% of sample sites positive	Since the proposed development will not impact on any such habitat within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
	of spawning areas		
1096 Brook lamprey *Lampetra planeri*			
To restore the favourable conservation condition of brook lamprey in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Distribution	% of river accessible	Access to all water courses down to first order streams	Since the proposed development will not result in any barrier effect on watercourses, there is no predicted impact on this target.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Since the proposed development will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Since the proposed development will not impact on any such habitat within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Since the proposed development will not impact on the river substrate within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Since the proposed development will not impact on any such habitat within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
1096 River lamprey *Lampetra fluviatilis*			
To restore the favourable conservation condition of river lamprey in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Distribution	% of river accessible	Access to all watercourses down to first order streams	Since the proposed development will not result in any barrier effect on watercourses, there is no predicted impact on this target.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Since the proposed development will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Since the proposed development will not impact on any such habitat within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Extent and	m² and	No decline in extent and distribution	Since the proposed development will not impact

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
distribution of spawning habitat	occurrence	of spawning beds	on the river substrate within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Since the proposed development will not impact on any such habitat within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
1106 Atlantic salmon *Salmo salar* (only in fresh water)			
To restore the favourable conservation condition of salmon in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Since the proposed development will not result in any barrier effect on watercourses, there is no predicted impact on this target.
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	Since the proposed development will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Since the proposed development will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Out - migrating smolt abundance	Number	No significant decline	Since the proposed development will not result in any barrier effect on watercourses and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Since the proposed development will not impact on any such habitat within the cSAC and will not significantly affect water quality or result in any aquatic habitat degradation, there is no predicted impact on this target.
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Since the proposed development will not significantly affect water quality in receiving watercourses, there is no predicted impact on this target.
1130 Estuaries			
To restore the favourable conservation condition of estuaries in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
			plant species, there is no predicted impact on this target.
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Estuarine subtidal muddy sand to mixed sediment with gammarids community complex; Subtidal sand to mixed sediment with *Nucula nucleus* community complex; Subtidal sand to mixed sediment with *Nephtys spp*. community complex; Fucoid - dominated intertidal reef community complex; Faunal turf - dominated subtidal reef community; and Anemone - dominated subtidal reef community.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
1140 Mudflats and sandflats not covered by seawater at low tide			
To restore the favourable conservation condition of mudflats and sandflats not covered by seawater at low tide in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates spp*. community; and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
1310 *Salicornia* and other annuals colonizing mud and sand			
To restore the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Habitat area	Habitat area	Area stable or increasing, subject to natural processes, including erosion and succession.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Since the proposed development will not have any influence on the hydrological regime of the estuary, there is no predicted impact on this target.
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Since the proposed development will not have any influence on the hydrological regime of the estuary, there is no predicted impact on this target.
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Since the proposed development will not have any influence on the hydrological regime of the estuary, there is no predicted impact on this target.
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation composition: typical species and sub - communities	Percentage cover	Maintain the presence of species - poor communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation structure: negative indicator species - Spartina anglica	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Since the proposed development will not result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)			
To restore the favourable conservation condition of Atlantic salt meadows (*Glauco - Puccinellietalia maritimae*) in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target,
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Physical structure:	Presence/	Maintain natural circulation of	Since the proposed development will not have

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
sediment supply	absence of physical barriers	sediments and organic matter, without any physical obstructions	any influence on the hydrological regime of the estuary, there is no predicted impact on this target.
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Since the proposed development will not have any influence on the hydrological regime of the estuary, there is no predicted impact on this target.
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Since the proposed development will not have any influence on the hydrological regime of the estuary, there is no predicted impact on this target.
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of the saltmarsh area vegetated	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation composition: typical species and sub - communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub - communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation structure: negative indicator species - Spartina anglica	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Since the proposed development will not result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
1410 Mediterranean salt meadows (*Juncetalia maritimi*)			
To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Habitat area	Hectares	Area increasing, subject to natural processes, including erosion and succession.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Physical structure: sediment supply	Presence/ absence of	Maintain natural circulation of sediments and organic matter,	Since the proposed development will not have any influence on the hydrological regime of the

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
	physical barriers	without any physical obstructions	estuary, there is no predicted impact on this target.
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Since the proposed development will not have any influence on the hydrological regime of the estuary, there is no predicted impact on this target.
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Since the proposed development will not have any influence on the hydrological regime of the estuary, there is no predicted impact on this target.
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation composition: typical species	Percentage cover	Maintain range of sub‐communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	Since the proposed development will not significantly affect water quality or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation structure: negative indicator species ‐ Spartina anglica	Hectares	No significant expansion of common cordgrass (Spartina anglica), with an annual spread of less than 1%	Since the proposed development will not result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
1355 Otter *Lutra lutra*			
To restore the favourable conservation condition of Otter *Lutra lutra* in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Distribution	Percentage positive survey sites	No significant decline	Since the proposed development will not result in any significant habitat loss, disturbance, displacement, barrier effects or mortalities (*i.e.* provision of otter passage facilities at watercourses used by otter and otte-resistant fencing), there is no predicted impact on this target.
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along river banks/ around ponds	Since the proposed development will not result in any significant loss, or degradation, of any terrestrial otter habitat within the cSAC, there is no predicted impact on this target.
Extent of marine	Hectares	No significant decline. Area	Since the proposed development will not result

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
habitat		mapped and calculated as 4,461.6ha	in the loss of any marine habitat within the cSAC, there is no predicted impact on this target.
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 500.1km	Since the proposed development will not result in any loss, or degradation, of any freshwater river habitat within the cSAC, there is no predicted impact on this target.
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 125.6ha	Since the proposed development will not result in the loss of any lake/lagoon habitat within the cSAC, there is no predicted impact on this target.
Couching sites and holts	Number	No significant decline	Since the proposed development will not result in the loss of any confirmed holt/couch sites, there is no predicted impact on this target.
Fish biomass available	Kilograms	No significant decline	Since the proposed development will not result in any significant impacts to fish species, there is no predicted impact on this target.
Barriers to connectivity	Number	No significant increase.	Since the proposed development will not result in any barrier effect on watercourses (*i.e.* provision of otter passage facilities at watercourses used by otter), there is no predicted impact on this target.
3260 Water courses of plain to montane levels with the Ranunculion fluitantis and *Callitricho - Batrachion* vegetation			
To restore the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and *Callitricho - Batrachion* vegetation in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Is the proposed development likely to affect the conservation target?**
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	Since the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any aquatic habitat degradation, there is no predicted impact on this target.
Habitat distribution	Occurrence	No decline, subject to natural processes	Since the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any aquatic habitat degradation, there is no predicted impact on this target.
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	Since the proposed development will not have any significant influence on the hydrological regime of the River Feale, there is no predicted impact on this target.
Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	Since the proposed development will not have any significant influence on the hydrological regime of the River Feale, there is no predicted impact on this target.
Hydrological regime: freshwater seepages	Metres per second	Maintain appropriate freshwater seepage regimes	Since the proposed development will not have any significant influence on the hydrological regime of the River Feale, there is no predicted impact on this target.
Substratum composition: particle size range	Millimetres	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub - type (frequently	Since the proposed development will not have any significant influence on the hydrological regime of the River Feale, or result in any aquatic habitat degradation, there is no predicted

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
		sands, gravels and cobbles)	impact on this target.
Water quality: nutrients	Milligrams per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	Since the proposed development will not significantly affect water quality in receiving watercourses, result in any aquatic habitat degradation, there is no predicted impact on this target.
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub‐type should be present and in good condition	Since the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any aquatic habitat degradation, there is no predicted impact on this target.
Floodplain connectivity	Area	The area of active floodplain at and upstream of the habitat should be maintained	Since the proposed development will not significantly affect the functioning of the floodplain, reduce the area of active floodplain at or upstream of the habitat, and flood relief culverts are proposed to minimise the effect of the 1% plus climate change flood event, there is no predicted impact on this target.
Riparian habitat	Area	The area of riparian woodland at and upstream of the bryophyte‐rich sub‐type should be maintained	Since there will be no riparian woodland removed from the vicinity of this habitat type upstream of the proposed development, there is no predicted impact on this target.
91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)			
To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)in the Lower River Shannon cSAC, which is defined by the following list of attributes and targets:			
Attribute	**Measure**	**Target**	**Notes**
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least c.8.5ha for sites surveyed. See map 14	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 14	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; sub canopy layer with semi‐mature trees and	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
		shrubs; and well - developed herb layer	habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age - classes occur in adequate proportions to ensure survival of woodland canopy	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Since the proposed development will not have any significant influence on the hydrological regime of the River Feale, there is no predicted impact on this target.
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Woodland structure: veteran trees	Number per hectare	No decline	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.

Table 5	Site specific conservation objectives of the Qualifying Interests of the Lower River Shannon cSAC which are potentially at risk from elements of the proposed development		
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix spp.*) and, locally, oak (*Quercus robur*) and ash (*Fraxinus excelsior*)	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non‐native invasive species, absent or under control	Since there are no records of this habitat type within the zone of influence of the proposed development and the proposed development will not significantly affect water quality, the existing hydrological regime, or result in any habitat degradation from the spread of invasive plant species, there is no predicted impact on this target.

6 Conclusions of Information Provided for the Appropriate Assessment Process

In order to align with case law clarifying the application of the Habitats Directive and Part XAB of the Planning and Development Act 2000, an AA undertaken by the competent authority should include an examination, analysis, evaluation, findings, conclusions and a final determination. Information to enable the competent authority to perform its statutory function in this regard is presented within this report.

Following an examination, analysis and evaluation of the relevant information including, in particular, the nature of the proposed development and the potential relationship between the proposed development and relevant European sites and, applying the precautionary principle, it is the professional opinion of the authors of this report that there will be no adverse impact on the integrity of any European sites.

In the case of the only relevant European Site, the Lower River Shannon cSAC, the potentially significant impacts (in the absence of mitigation) arise from water quality, the spread of invasive plant species, installation of watercourse structures and the risk of road traffic collisions with wildlife. This report has identified the potential effects these elements could have on the qualifying interests of the Lower River Shannon cSAC and their conservation objectives, in the absence of mitigation. However, with the full implementation of the mitigation measures outlined in Section 5.1.4 of this report, these risks will be avoided or reduced such that there will be no significant affects on habitats or species that are listed as qualifying interests, nor the attainment of their specific conservation objectives, either alone or in-combination with other plans or projects.

Accordingly, in the professional opinion of the authors of this report, whilst it has been acknowledged that there is the potential in the absence of mitigation for the proposed development to have significant direct or indirect impacts on the Lower River Shannon cSAC, with the implementation of the detailed mitigation measures identified in this report, the integrity of this European site will not be adversely affected.

7 References

Bailey, M. and Rochford J. (2006) *Otter Survey of Ireland 2004/2005*. *Irish Wildlife Manuals, No. 23*. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Botanical Society of Britain & Ireland (2007) *Checklist of the British and Irish Flora*. Botanical Society of Britain and Ireland.

British Bryological Society (2009) *Checklist of British and Irish Bryophytes 2009*. British Bryological Society.

Council of the European Communities (1992) *Council Directive of 21 May 1992 on The Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC).* O. J. L 206/35, 22 July 1992.

Department of Arts, Heritage and the Gaeltacht (2011) *Actions for Biodiversity 2011-2016. Ireland's National Biodiversity Plan.*

Department of the Environment, Heritage and Local Government (2010) *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities* (Department of Environment, Heritage and Local Government, Rev Feb 2010).

Department of the Environment, Heritage and the Gaeltacht (2011) *Threat Response Plan Otter Lutra lutra 2009-2011.*

Environmental Protection Agency (2002 and updated Draft 2015) *Guidelines on the information to be contained in Environmental Impact Statement. Wexford:* Environmental Protection Agency.

Environmental Protection Agency (2003 and updated Draft 2015) *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements).*

Environmental Protection Agency (2014) Environmental Protection Agency online databases on water quality. Available online at <http://gis.epa.ie/Envision/>

European Commission (2000a) *Communication from the Commission on the precautionary principle.*

European Commission (2000b and updated Draft April 2015) *Managing Natura 2000 sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC* (EC Environment Directorate-General, 2000); hereinafter referred to as "MN2000".

European Commission (2001) *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (European Commission Environment Directorate-General).

European Commission (2007) *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.*

European Commission (2013) *Interpretation Manual of European Union Habitats.*

Fossitt, J.A (2000) *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny, Ireland.

Government of Ireland (2010) *Planning and Development (Amendment) Act 2010*. The Stationary Office, Dublin.

Government of Ireland (2011) *European Communities (Birds and Habitats) Regulations, 2011*. The Stationary Office, Dublin.

Gray, N., Thomas, G., Trewby, M. & Newton, S. (2003) *The status and distribution of Choughs Pyrrhocorax pyrrhocorax in the Republic of Ireland 2002/03. Irish Birds 7: 147-156.* BirdWatch Ireland.

Hardy, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2009) *Raptors, A Field Guide for Surveys and Monitoring*. The Stationary Office, Edinburgh, U.K.

Highways Agency (2001) *Design Manual for Roads and Bridges: Volume 10: Environmental Design and Management. Section 4: Nature Conservation: Part 2, HA 81/99; Nature Conservation Advice in Relation to Otters.* The Highways Agency.

Highways Agency (2006) *DMRB HD33/06: Surface and sub-surface drainage systems for highways. Design Manual for Roads and Bridges. Volume 4:2.* The Highways Agency.

Chartered Institute of Ecology and Environmental Management (2006). *Guidelines for Ecological Impact Assessment in the UK and Ireland.*

Irish Wildlife Trust (2012) *Cork City Urban Otter Survey 2011-2012.* Irish Wildlife Trust.

Kelleher, C. (2011) *Floating river vegetation (EU Habitat code 3260) – a review of the habitat description and its distribution in Ireland.* Unpublished report for National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Kerry County Council (2008a) *Biodiversity Actions 2008-2012.*

Kerry County Council (2008b) *Heritage & Biodiversity Plan, 2008-2013.*

Kerry County Council (2013) *Listowel/Ballybunion Functional Areas Local Area Plan 2013-2019.*

Kerry County Council (2014) *Kerry County Development Plan. 2015 – 2021.*

Kerry County Council Water Services Department (2012) *Listowel Waste Water Treatment Plant Annual Environmental Report 2012.*

Listowel Town Council (2009) *Listowel Town Development Plan, 2009 – 2015.*

McCarthy, Keville, O'Sullivan Ltd. (2014) *Ballyhorgan Wind Farm EIS*. Stacks Mountain Wind Farm Ltd.

Mott MacDonald (2009) *N69 Listowel Bypass Road Improvement Scheme KY-06-290, Phase 2 Route Selection Stage, Aquatic Ecology & Fisheries Environmental Report*. Unpublished report prepared for Kerry County Council and Kerry National Roads Design Office.

Murnane, E., Heap, A. & Swain, A. (2006a) CIRIA C648: *Control of water pollution from linear construction projects: Technical Guidance*. CIRIA, Classic House, 174–180 Old Street, London EC1V 9BP, U.K.

Murnane, E., Heap, A. & Swain, A. (2006b) CIRIA C649: *Control of water pollution from linear construction projects: Site guide*. CIRIA, Classic House, 174–180 Old Street, London EC1V 9BP, U.K.

National Parks & Wildlife Service (2010). Circular NPW 1/10 & PSSP 2/10 *Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities.* Department of Environment, Heritage and Local Government.

NPWS (2012a) *Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012b) *Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012c). *Conservation Objectives supporting document – Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrrcahion vegetation: Lower River Shannon SAC 002165*. Version 1 June 2012. Unpublished report. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NPWS (2013a) *The Status of EU Protected Habitats and Species in Ireland.* Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NPWS (2013b) *The Status of EU Protected Habitats and Species in Ireland.* Species Assessments Volume 3, Version 1.0. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NPWS (2015a) *Conservation objectives for Kerry Head SPA [004189]. Generic Version 4.0*. Department of Arts, Heritage & the Gaeltacht.

NPWS (2015b) *Conservation objectives for Moanveanlagh Bog SAC [002351]. Generic Version 4.0*. Department of Arts, Heritage & the Gaeltacht.

NPWS (2015c) *Conservation objectives for Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]. Generic Version 4.0*. Department of Arts, Heritage & the Gaeltacht.

National Roads Authority (2005-2011). *Environmental Construction Guidelines Series*, available online at http://www.nra.ie/Publications/Environment/#d.en.3463

NIEA (2011) *Otters & Development*. Northern Ireland Development Agency.

O' Connor, W. (2006) *A Baseline Survey of Juvenile Lamprey Populations in the River Feale Catchment. Irish Wildlife Manuals No. 22.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) *National Survey of Native Woodlands 2003-2008*. Report prepared for the National Parks & Wildlife Service.

Rich, C. & Longcore, T. (eds.) (2005) *Ecological Consequences of Artificial Night Lighting.* Island Press.

Ryan Hanley Consulting Engineers (2012) *Proposed N69 Listowel Bypass. River Habitat Survey*. Unpublished report prepared for Kerry County Council.

Smith, G.F., O'Donoghue, P., O'Hora, K. & Delaney, E. (2011) *Best Practice Guidance for Habitat Survey and mapping*. The Heritage Council, Kilkenny, Ireland.

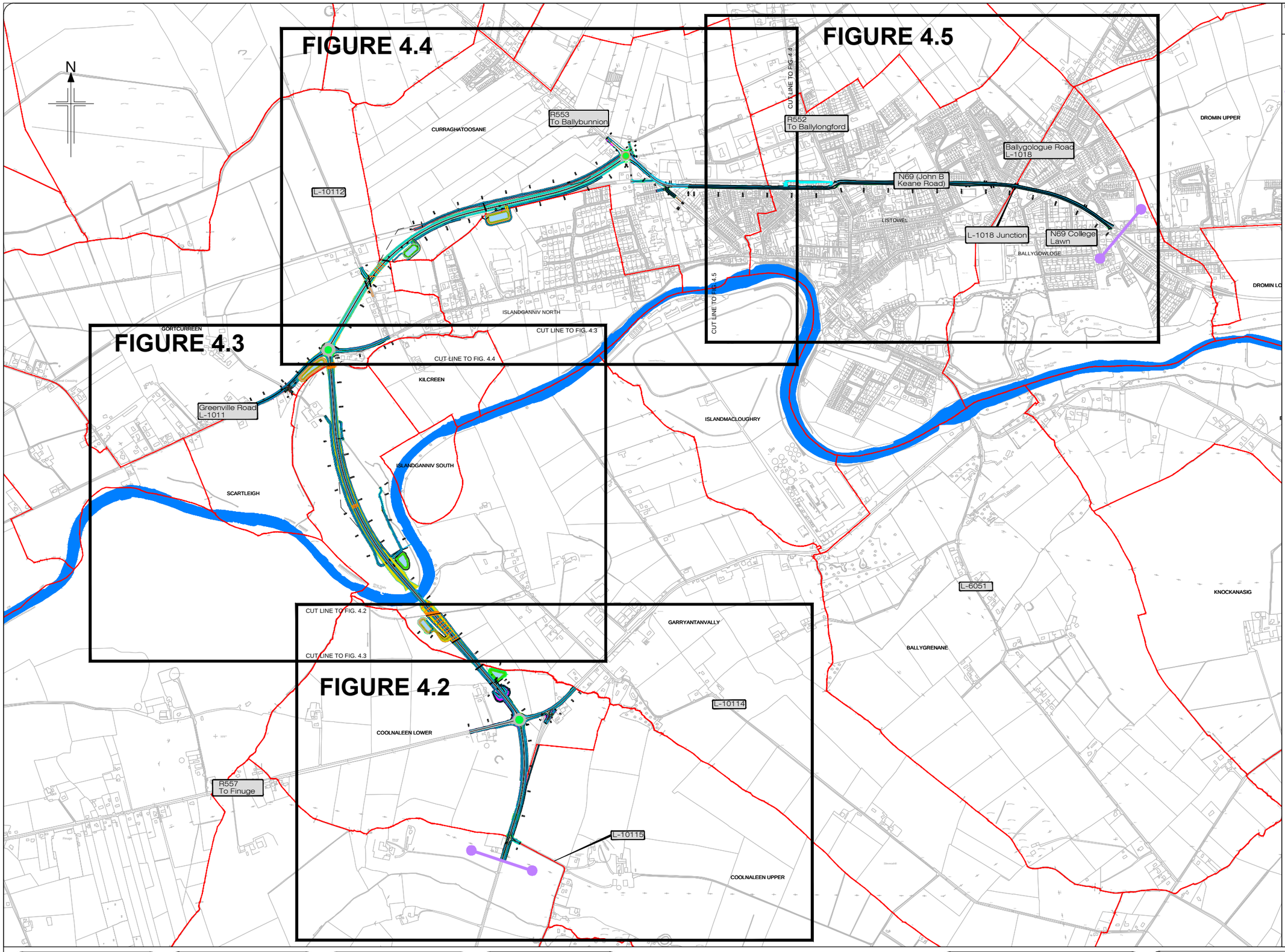
Southern Regional Fisheries Board (2007) *Maintenance and Protection of the Inland Fisheries Resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board.*

The Environment Agency (2010) *Fifth Otter Survey of England 2009-2012. Full Technical Report*. The Environment Agency, U.K.

Water Matters (2009) *Shannon River Basin Management Plan (2009-2015).*

Figures

Figures 4.1 - 4.5: Overall Scheme Plan



Drawing Number

32105301/NIS/Figure 4.1

Legend:

- Scheme Terminus Locations
- ST01 — Structure Reference Number
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Townland Boundary

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

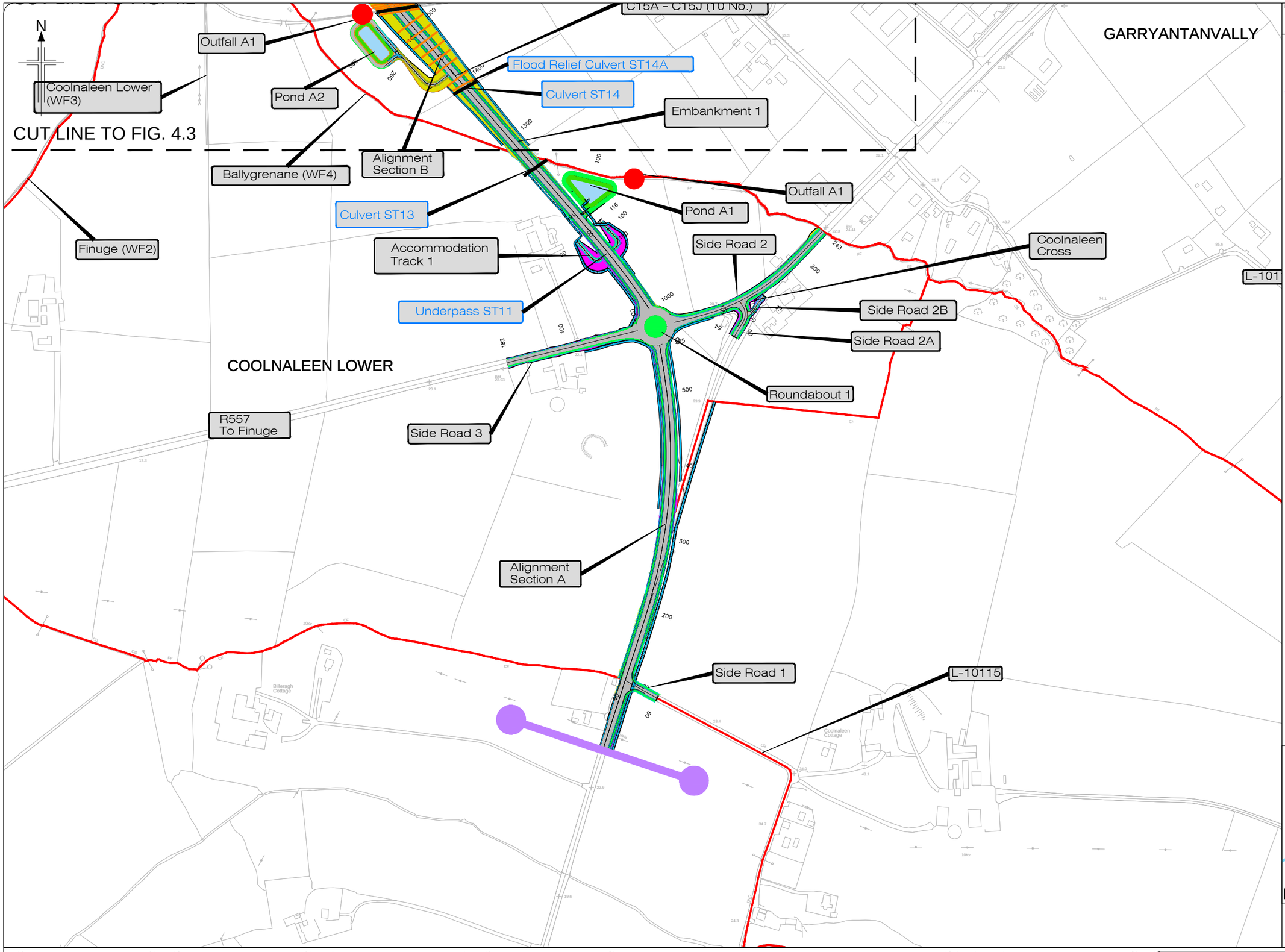
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Nautura Impact Statement
Title:	Overall Scheme Plan - Sheet 1 of 5
Designed: JTM	File Name:
Drawn: MW	Original scales: 1:7,500 @ A1 1:15,000 @ A3
Checked: AM	Date: JUNE 2014
Drawing No.	32105301/NIS/Fig 4.1

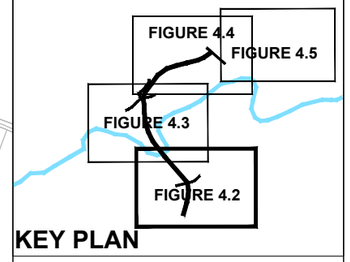


Drawing Number

32105301/NIS/Figure 4.2

Legend:

- Scheme Terminus Locations
- ST01 Structure Reference Number
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Townland Boundary



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Nautura Impact Statement
Title:	Overall Scheme Plan - Sheet 2 of 5
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: JUNE 2014
	Drawing No. 32105301/NIS/Fig 4.2

N

CUT LINE TO FIG. 4.4

Pond A4
Side Road 4
Side Road 5C
Side Road 5A
Side Road 5
Flood Relief Culverts ST27A - ST27F (6N0.)
KILCREEN
Outfall A4
Embankment 2
Greenville Road L-1011
Side Road 5B
Underpass ST24
Accommodation Track 3
Accommodation Track 2
Alignment Section B
Flood Relief Culverts C21, C21A & C21B
ISLANDGANNIV SOUTH
River Feale
SCARTLEIGH
Mill Stream Lower (WF1)
Accommodation Track 2 Continued
Islandganniv North (WF6)
Pond A3
OPW Flap Valve Ref. No. SL 88
OPW Flap Valve Ref. No. SL 86
Outfall A3
Garryantanvally (WF5)
Underpass ST18
New River Feale Bridge ST17
Culvert ST15
OPW Flap Valve Ref. No. SL 89
Flood Relief Culverts ST15A, ST15B & ST15C
CUT LINE TO FIG. 4.2
Flood Relief Culverts C15A - C15J (10 No.)
Outfall A1
Flood Relief Culvert ST14A
Coolnaleen Lower (WF3)
Pond A2
Culvert ST14
Embankment 1
CUT LINE TO FIG. 4.3

Drawing Number
32105301/NIS/Figure 4.3

Legend:

- Scheme Terminus Locations
- ST01 Structure Reference Number
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Townland Boundary

FIGURE 4.4
FIGURE 4.5
FIGURE 4.3
FIGURE 4.2

KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Nautura Impact Statement
Title:	Overall Scheme Plan - Sheet 3 of 5
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: JUNE 2014
Drawing No.	32105301/NIS/Fig 4.3

Drawing Number

32105301/NIS/Figure 4.4

Legend:

- Scheme Terminus Locations
- ST01 — Structure Reference Number
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Townland Boundary

CURRAGHATOOSANE

ISLANDGANNIV NORTH

Existing Culverts

R553 To Ballybunnion

Existing Culvert

Side Road 8

Side Road 8A

Side Road 7

Alignment Section D

Culvert ST39

Culvert C41

Alignment Section C

Roundabout 3

Side Road 9 Junction

Sive Walk Access Track

Embankment 3

Access Track 1

L-10112

Side Road 9A

Old Railway

Pond A5

Side Road 9

Old Railway

Pond A6

L1050 To Ballybunnion

Forge Road

Outfall A6

Existing Culvert

Flood Relief Culverts C33D - C33I (6No.)

Mill Stream Upper (WF0) OPW Ref No. C1/25

Outfall A5

Side Road 6

Culvert C34

Culvert C33A

Culvert C33B

Alignment Section C

Culvert C33C

Forge Road

L-1401

ST27

Roundabout 2

Markey's Bridge

Side Road 4

CUT LINE TO FIG. 4.3

CUT LINE TO FIG. 4.4

CUT LINE TO FIG. 4.5

FIGURE 4.4

FIGURE 4.5

FIGURE 4.3

FIGURE 4.2

KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations-Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Nautura Impact Statement
Title:	Overall Scheme Plan - Sheet 4 of 5
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: JUNE 2014
	Drawing No. 32105301/NIS/Fig 4.4

Drawing Number

32105301/NIS/Figure 4.5

Legend:

- Scheme Terminus Locations
- ST01 — Structure Reference Number
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Townland Boundary

CUT LINE TO FIG. 4.4

R552 To Ballylongford

Industrial Estate

Ballygologue Road L-1018

N69 (John B Keane Road)

LISTOWEL

R552 Junction (Existing)

L-1018 Junction

N69 College Lawn

N69 (Existing)

BALLYGOWLOGE

Roundabout 4 (Existing)

Dromin Upper (WF9)

Town Park

Golf Course

FIGURE 4.4

FIGURE 4.5

FIGURE 4.3

FIGURE 4.2

KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

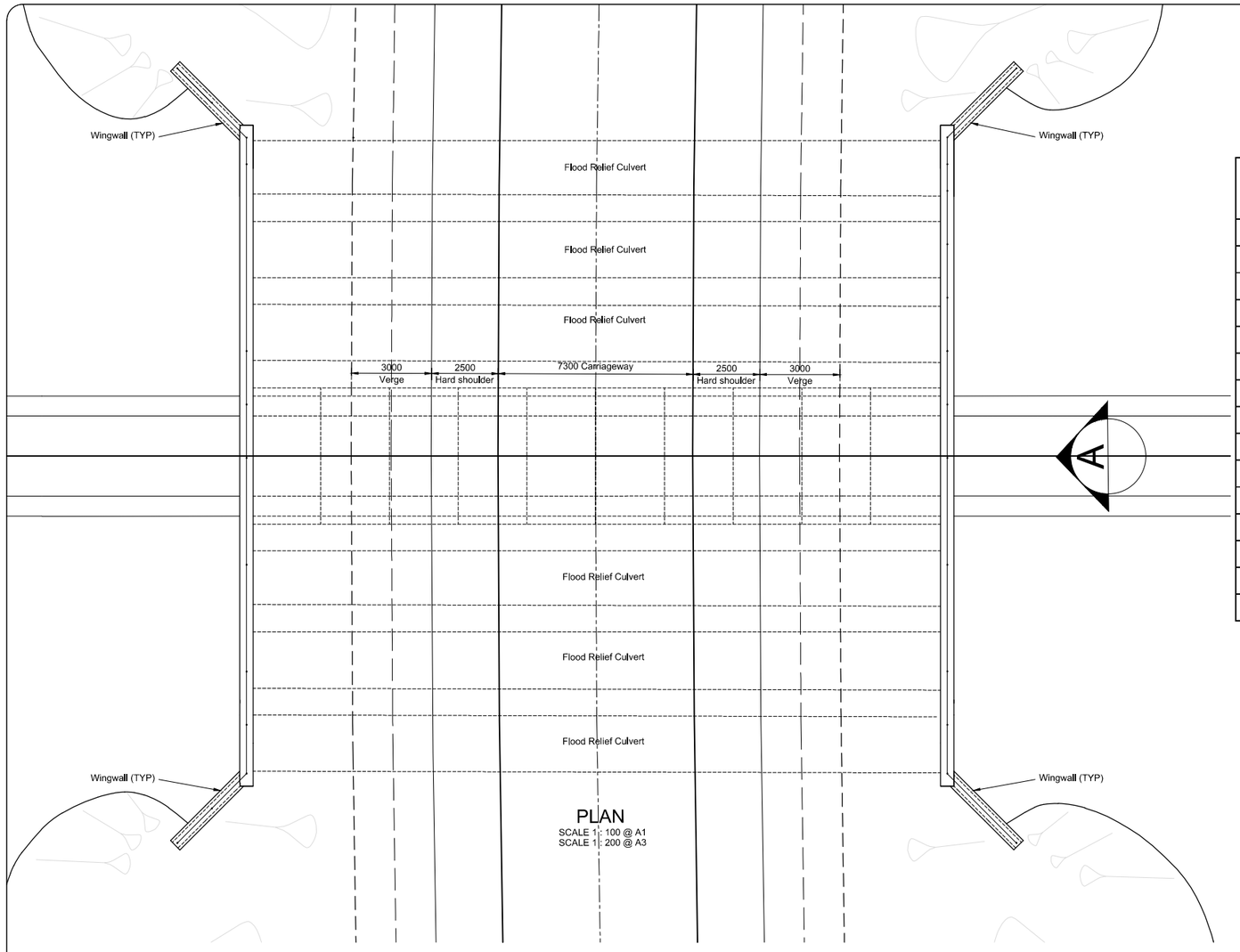
Kerry County Council
Kerry National Roads Design Office
The Inland Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Nautura Impact Statement
Title:	Overall Scheme Plan - Sheet 5 of 5
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: JUNE 2014
Drawing No.	32105301/NIS/Fig 4.5

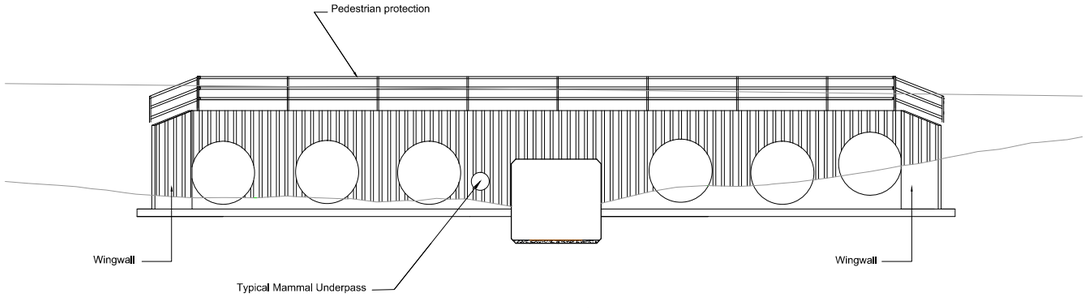
Figure 5: Culvert Typical Design



PLAN

SCALE 1 : 100 @ A1
SCALE 1 : 200 @ A3

Crossing	Structure Number	Approximate Mainline Chainage (m)	Dimensions (m)
Ballygrenane Stream	ST13	1,270	2.1Ø Pipe
Stream	ST14	1,390	2.1Ø Pipe
Flood Relief	ST14A	1,395	2.1Ø Pipe
Stream	ST15	1,525	2.1Ø Pipe
Flood Relief	ST15A	1,530	2.1Ø Pipe
Flood Relief	ST15B	1,535	2.1Ø Pipe
Flood Relief	ST15C	1,540	2.1Ø Pipe
Flood Relief	ST27A	2,660	2.1Ø Pipe
Flood Relief	ST27B	2,663	2.1Ø Pipe
Flood Relief	ST27C	2,668	2.1Ø Pipe
Mill Stream Lower	ST27	2,670	3.0 x 2.8 Box
Flood Relief	ST27D	2,672	2.1Ø Pipe
Flood Relief	ST27E	2,677	2.1Ø Pipe
Flood Relief	ST27F	2,680	2.1Ø Pipe
Mill Stream Upper	ST39	3,880	2.1 x 2.3 Box



ELEVATION A

SCALE 1 : 100 @ A1
SCALE 1 : 200 @ A3

Drawing Number

32105301/NIS/Figure 5

Notes:

1. All dimensions are in millimetres unless noted otherwise.
2. All levels and chainage in metres. All levels refer to Malin Head Datum.

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry

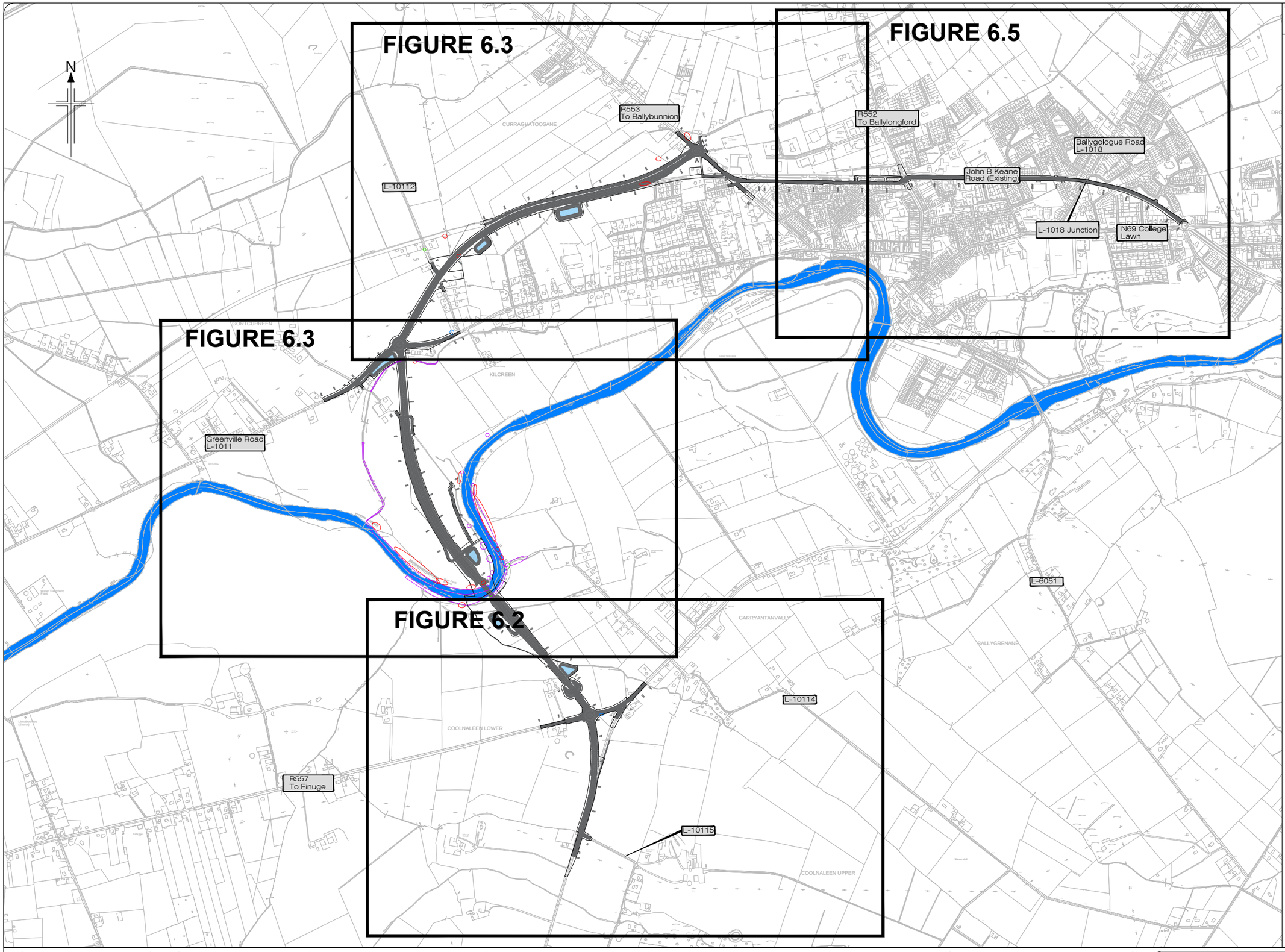
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Culvert Typical Arrangement
Designed: JTM	File Name:
Drawn: MW	Original scales: As shown @ A1
Checked: GMH	Date: August 2014
	Drawing No. 32105301/NIS/Fig 5

Figures 6.1 - 6.5: Invasive Species Results



Drawing Number

32105301/NIS/Figure 6.1

Legend:

- Proposed Development
- Japanese knotweed *Fallopia japonica*
- Spanish bluebell *Hyacinthoides hispanica*
- Three-cornered garlic *Allium triquetrum*
- Himalayan balsam *Impatiens glandiflora*
- Draft CPO

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations-Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Nature Impact Statement
Title:	Invasive Species - Sheet 1 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:7,500 @ A1 1:15,000 @ A3
Checked: AM	Date: April 2017
	Drawing No. 32105301/NIS/Fig 6.1

CUT LINE TO FIG. 6.3

GARRYANTANVALLY

COOLNALEEN LOWER

L-10114

L-10115

Billeragh Cottage

Coolnaleen Cottage

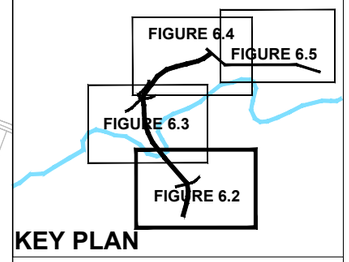
N

Drawing Number

32105301/NIS/Figure 6.2

Legend:

- Proposed Development
- Japanese knotweed *Fallopia japonica*
- Spanish bluebell *Hyacinthoides hispanica*
- Three-cornered garlic *Allium triquetrum*
- Himalayan balsam *Impatiens glandiflora*
- Draft CPO



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council

Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry

Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS

Merrion House
Merrion Road
Dublin 4

Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Invasive Species - Sheet 2 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.2

CUT LINE TO FIG. 6.4

N

Greenville Road
L-1011

KILCREEN

SCARTLEIGH

ISLANDGANNIV SOUTH

River Feale
An tSéil

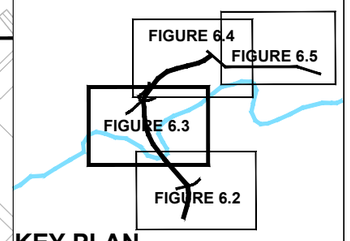
CUT LINE TO FIG. 6.2

CUT LINE TO FIG. 6.3

Drawing Number
32105301/NIS/Figure 6.3

Legend:

- Proposed Development
- Japanese knotweed *Fallopia japonica*
- Spanish bluebell *Hyacinthoides hispanica*
- Three-cornered garlic *Allium triquetrum*
- Himalayan balsam *Impatiens glandiflora*
- Draft CPO



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Invasive Species - Sheet 3 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
	Drawing No. 32105301/NIS/Fig 6.3

Drawing Number

32105301/NIS/Figure 6.4

Legend:

- Proposed Development
- Japanese knotweed *Fallopia japonica*
- Spanish bluebell *Hyacinthoides hispanica*
- Three-cornered garlic *Allium triquetrum*
- Himalayan balsam *Impatiens glandiflora*
- Draft CPO

CURRAGHATOOSANE

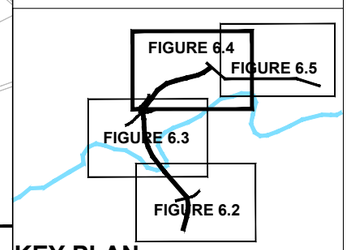
R553
To Ballybunnion

L-10112

CUT LINE TO FIG. 6.3

CUT LINE TO FIG. 6.4

CUT LINE TO FIG. 6.5



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Invasive Species - Sheet 4 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
	Drawing No. 32105301/NIS/Fig 6.4

CUT LINE TO FIG. 6.4

R552
To Ballylongford

Industrial Estate

N69 (John B Keane Road)

Ballygologue Road L-1018

L-1018 Junction

N69 College Lawn

Town Park

Golf Course

Drawing Number

32105301/NIS/Figure 6.5

Legend:

- Proposed Development
- Japanese knotweed *Fallopia japonica*
- Spanish bluebell *Hyacinthoides hispanica*
- Three-cornered garlic *Allium triquetrum*
- Himalayan balsam *Impatiens glandiflora*
- Draft CPO

FIGURE 6.4
FIGURE 6.5
FIGURE 6.3
FIGURE 6.2

KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

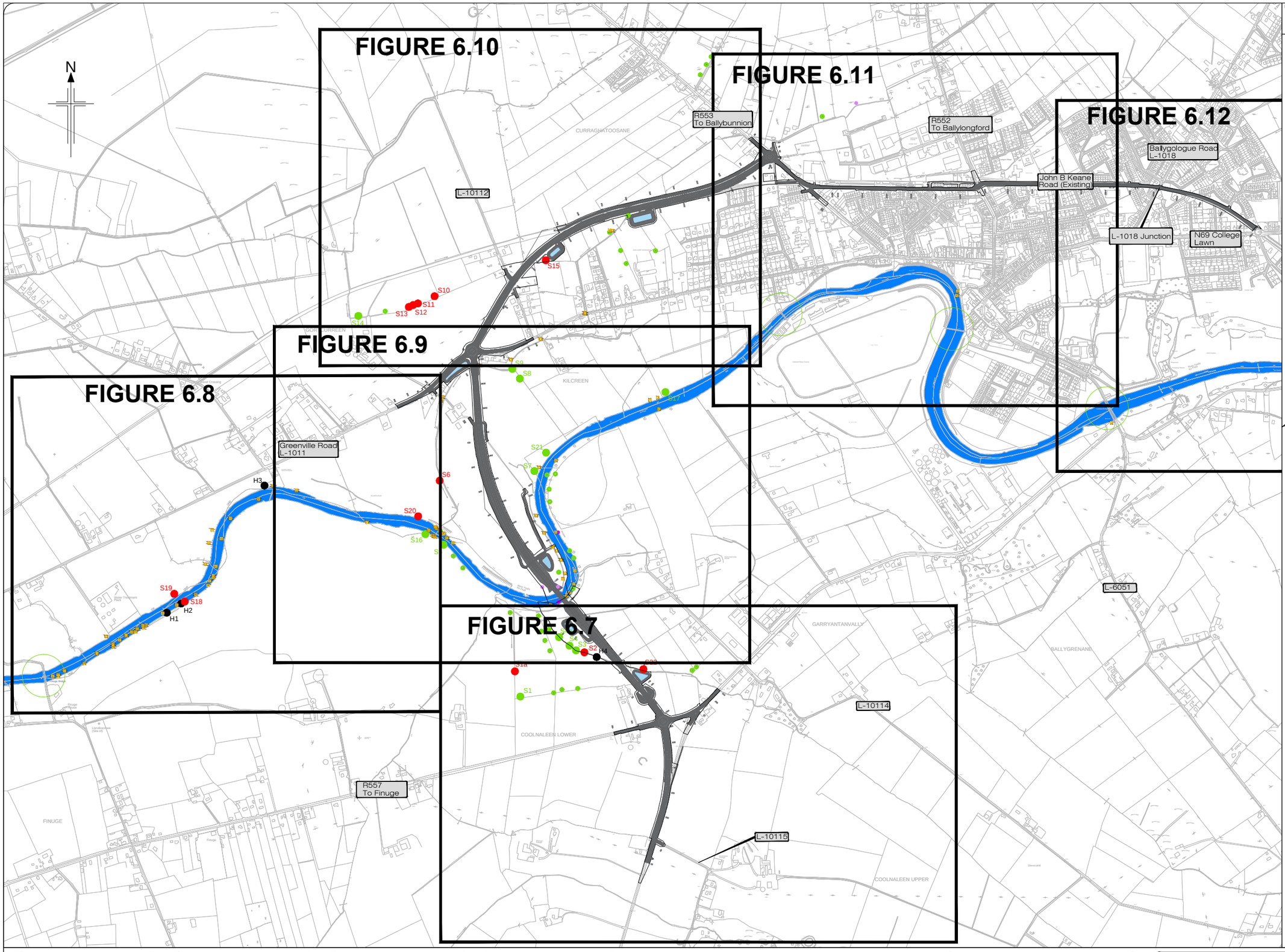
Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Invasive Species - Sheet 5 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.5

Figures 6.6 - 6.12: Mammal Survey Results



Drawing Number

32105301/NIS/Figure 6.6

Legend:

- Proposed Development
- Otter holt
- Otter signs
- Badger sett - Active
- Badger sett - Inactive
- Badger signs
- Hare
- Mink signs
- Additional bridge sites surveyed for Otter
- CPO

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

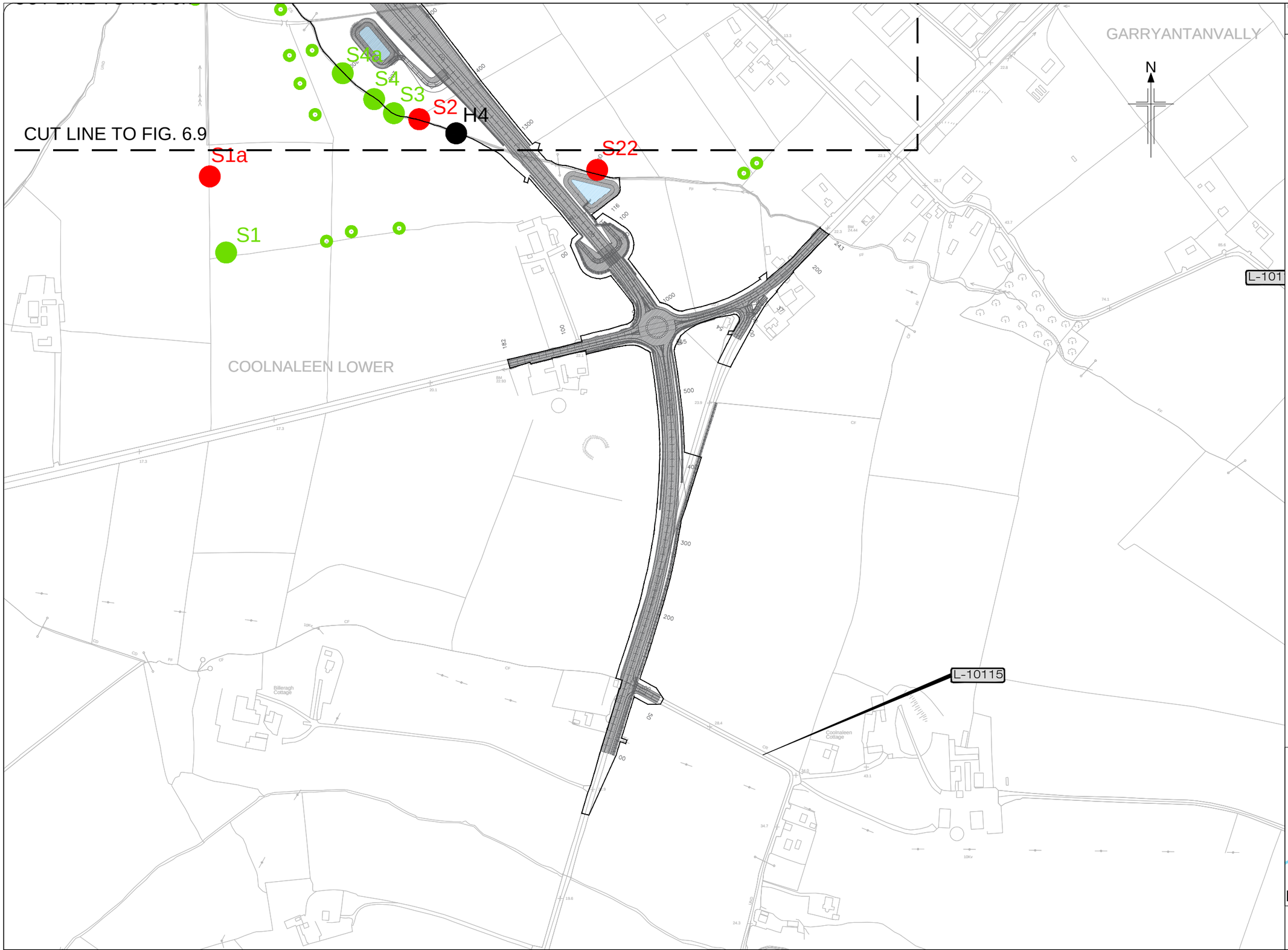
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations-Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Mammal Survey - Sheet 1 of 7
Designed: AS	File Name:
Drawn: MW	Original scales: 1:7,500 @ A1 1:15,000 @ A3
Checked: AM	Date: April 2017
	Drawing No. 32105301/NIS/Fig 6.6

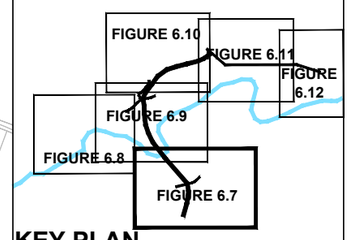


Drawing Number

32105301/NIS/Figure 6.7

Legend:

- Proposed Development
- Otter holt
- Otter signs
- Badger sett - Active
- Badger sett - Inactive
- Badger signs
- Hare
- Mink signs
- Additional bridge sites surveyed for Otter
- CPO



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Mammal Survey - Sheet 2 of 7
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
	Drawing No. 32105301/NIS/Fig 6.7

Drawing Number

32105301/NIS/Figure 6.8

Greenville Road
L-1011

CUT LINE TO FIG. 6.8

CUT LINE TO FIG. 6.9

H3
S20
S16
S5
S19
S18
H2
H1

Water Treatment Plant

Finuge Bridge

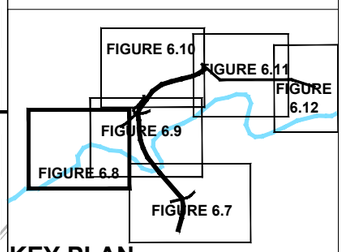
Finuge House

Finuge Burial Ground

SCARTLEIGH

Legend:

- Proposed Development
- Otter holt
- Otter signs
- Badger sett - Active
- Badger sett - Inactive
- Badger signs
- Hare
- Mink signs
- Additional bridge sites surveyed for Otter
- Additional bridge sites surveyed for Otter
- CPO



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

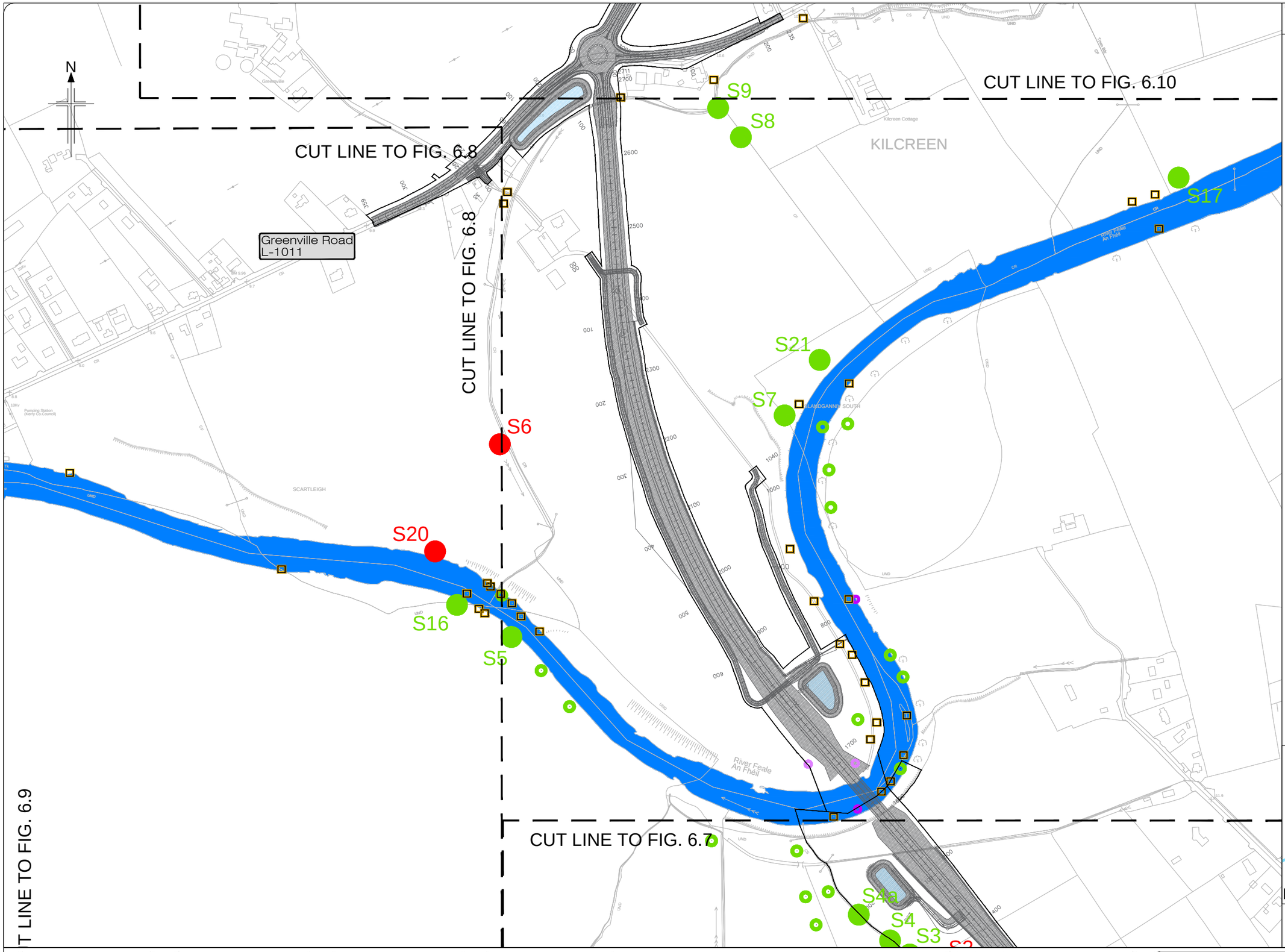
Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

Kerry NRDO

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Mammal Survey - Sheet 3 of 7
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.8

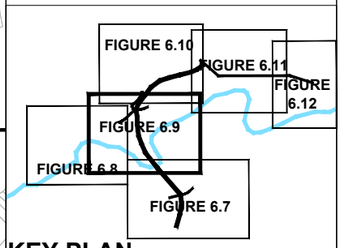


Drawing Number

32105301/NIS/Figure 6.9

Legend:

- Proposed Development
- Otter holt
- Otter signs
- Badger sett - Active
- Badger sett - Inactive
- Badger signs
- Hare
- Mink signs
- Additional bridge sites surveyed for Otter
- CPO



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

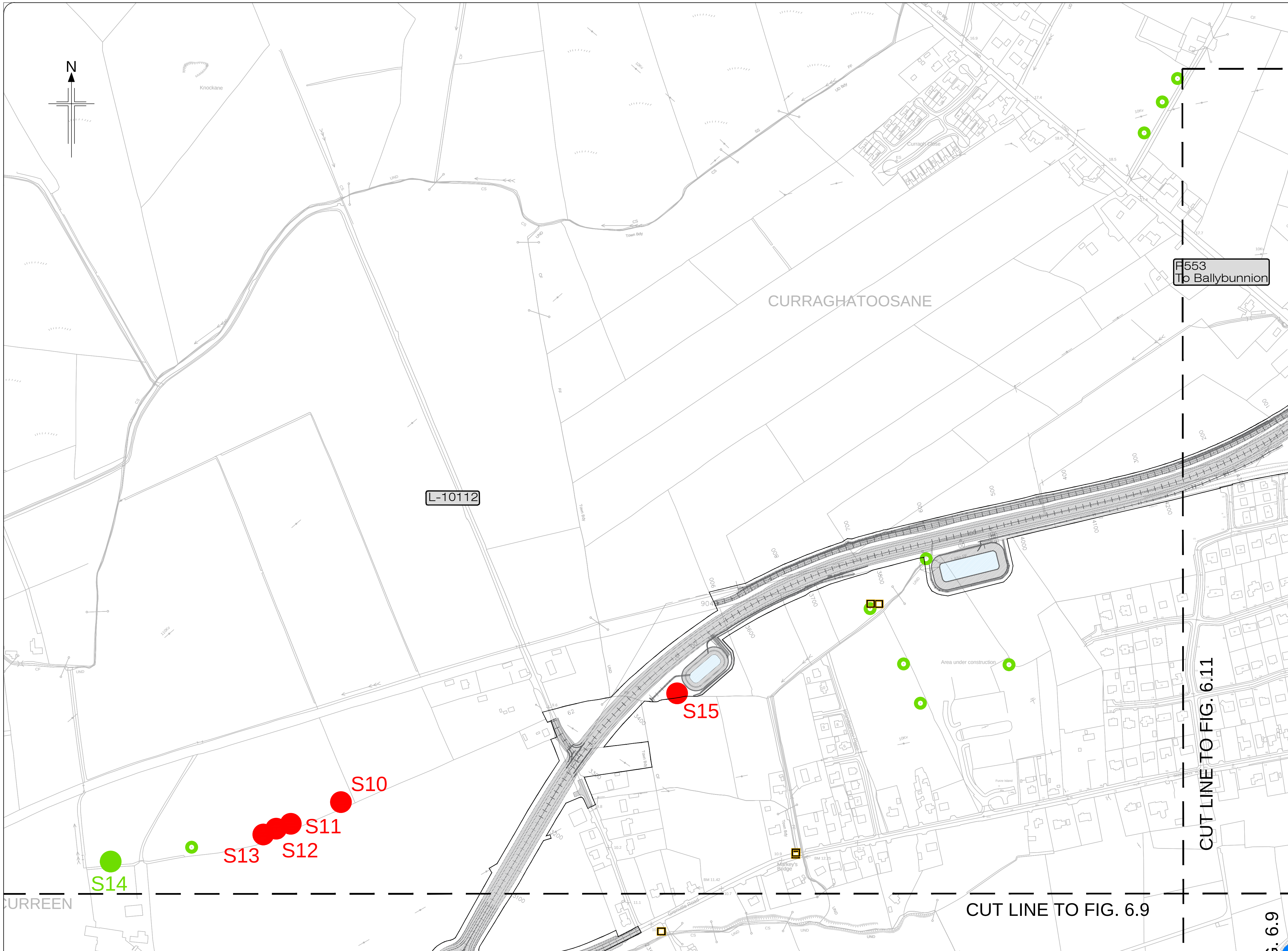
JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natural Impact Statement
Title:	Mammal Survey - Sheet 4 of 7
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.9

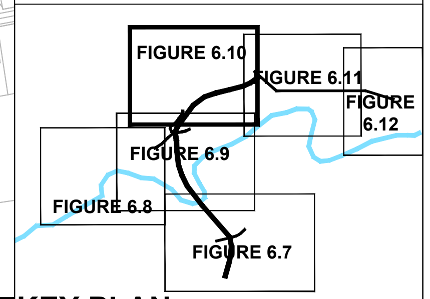
Drawing Number

32105301/NIS/Figure 6.10



Legend:

- Proposed Development
- Otter holt
- Otter signs
- Badger sett - Active
- Badger sett - Inactive
- Badger signs
- Hare
- Mink signs
- Additional bridge sites surveyed for Otter
- CPO



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

TII
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry

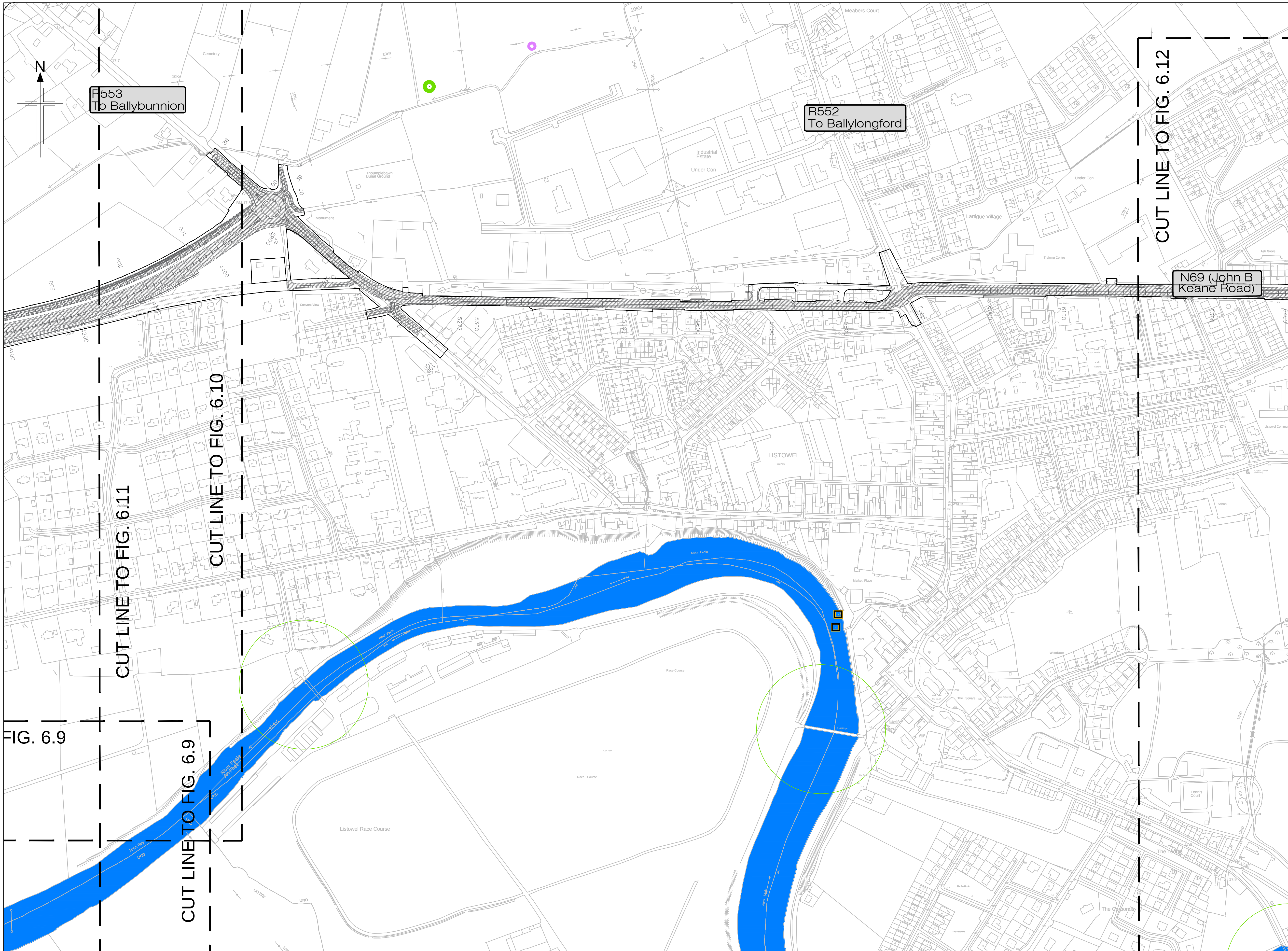
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

Kerry NRDO
National Road Design Office

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS		
Component:	Natura Impact Statement		
Title:	Mammal Survey - Sheet 5 of 7		
Designed: AS	File Name:		Drawing No.
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3		32105301/NIS/Fig 6.10
Checked: AM	Date: April 2017		



All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

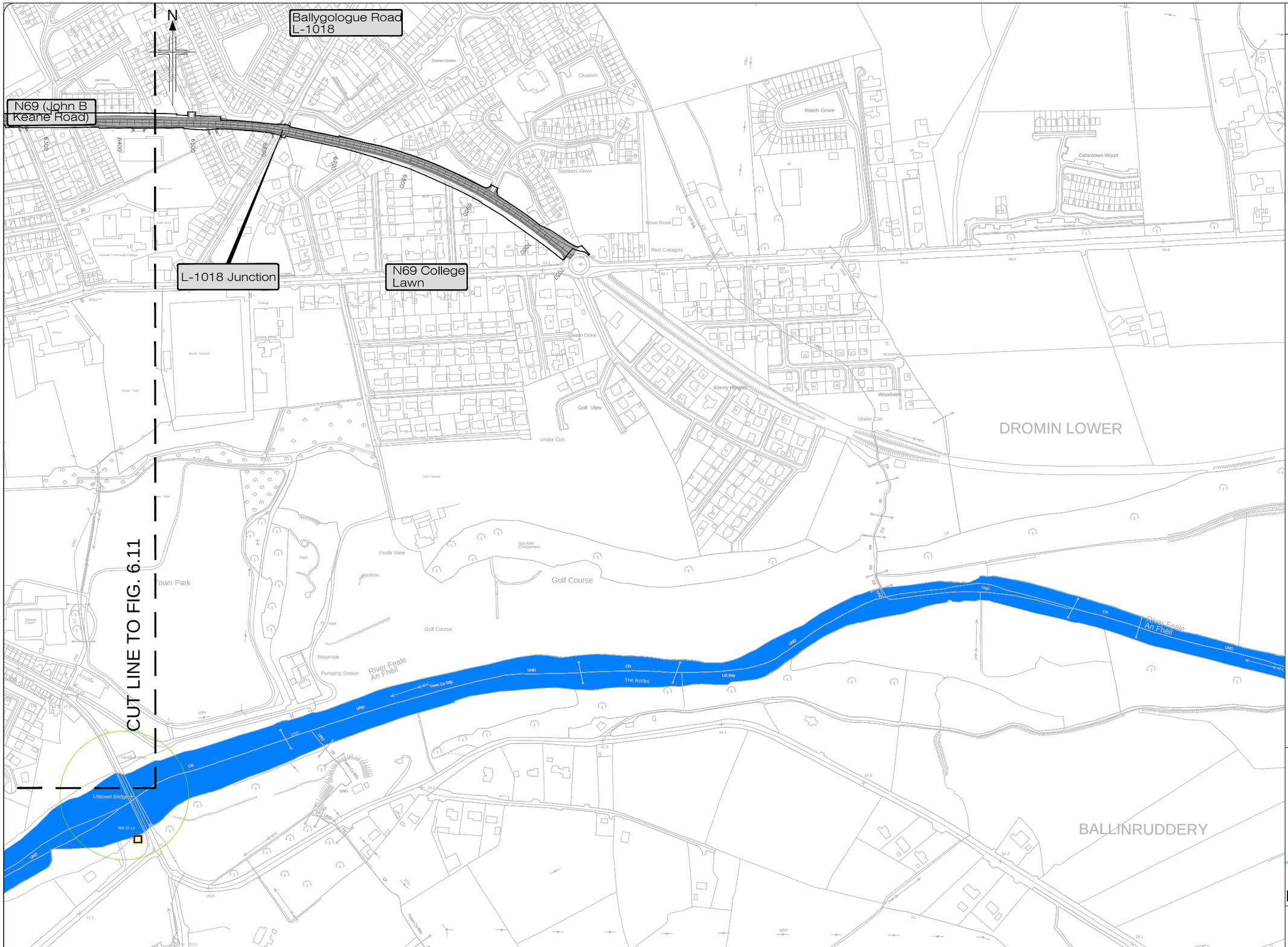
TII
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Mammal Survey - Sheet 6 of 7
Designed:	AS
Drawn:	MW
Checked:	AM
Original scales:	1:2,500 @ A1 1:5,000 @ A3
Date:	April 2017
Drawing No.	32105301/NIS/Fig 6.11

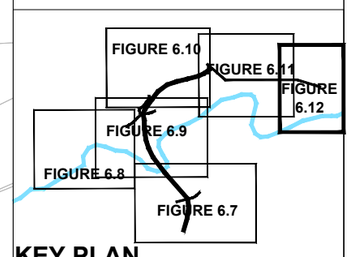


Drawing Number

32105301/NIS/Figure 6.12

Legend:

- Proposed Development
- Otter holt
- Otter signs
- Badger sett - Active
- Badger sett - Inactive
- Badger signs
- Hare
- Mink signs
- Additional bridge sites surveyed for Otter
- CPO



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Mammal Survey - Sheet 7 of 7
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.12

Figures 6.13 - 6.18: Bird Survey Results

Drawing Number

32105301/IS/Figure 6.13

FIGURE 6.17

FIGURE 6.18

FIGURE 6.16

FIGURE 6.15

FIGURE 6.14

N

R553
To Ballybunnion

R552
To Ballylongford

L-10112

N69 (John B Keane Road)

Ballygologue Road
L-1018

L-1018 Junction

N69 College Lawn

Greenville Road
L-1011

See Insert A Below Right For Additional Whooper Swan Feeding Areas

L-6051

L-10114

L-10115

R557
To Finuge

KILCREEN

GARRYANTANVALLY

BALLYGRENANE

COOLNALEEN

COOLNALEEN UPPER

Approximately 6km

Insert A

Legend:

- Proposed Development
- Whooper swan feeding area
- Fields where Snipe were recorded - winter 2013/14
- Breeding bird territories (BoCCI Red and Amber listed)
- Non-breeding raptors (foraging)
- Sandmartin Nest
- Whooper Swan Roost
- Sand Marting Nesting Habitat

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

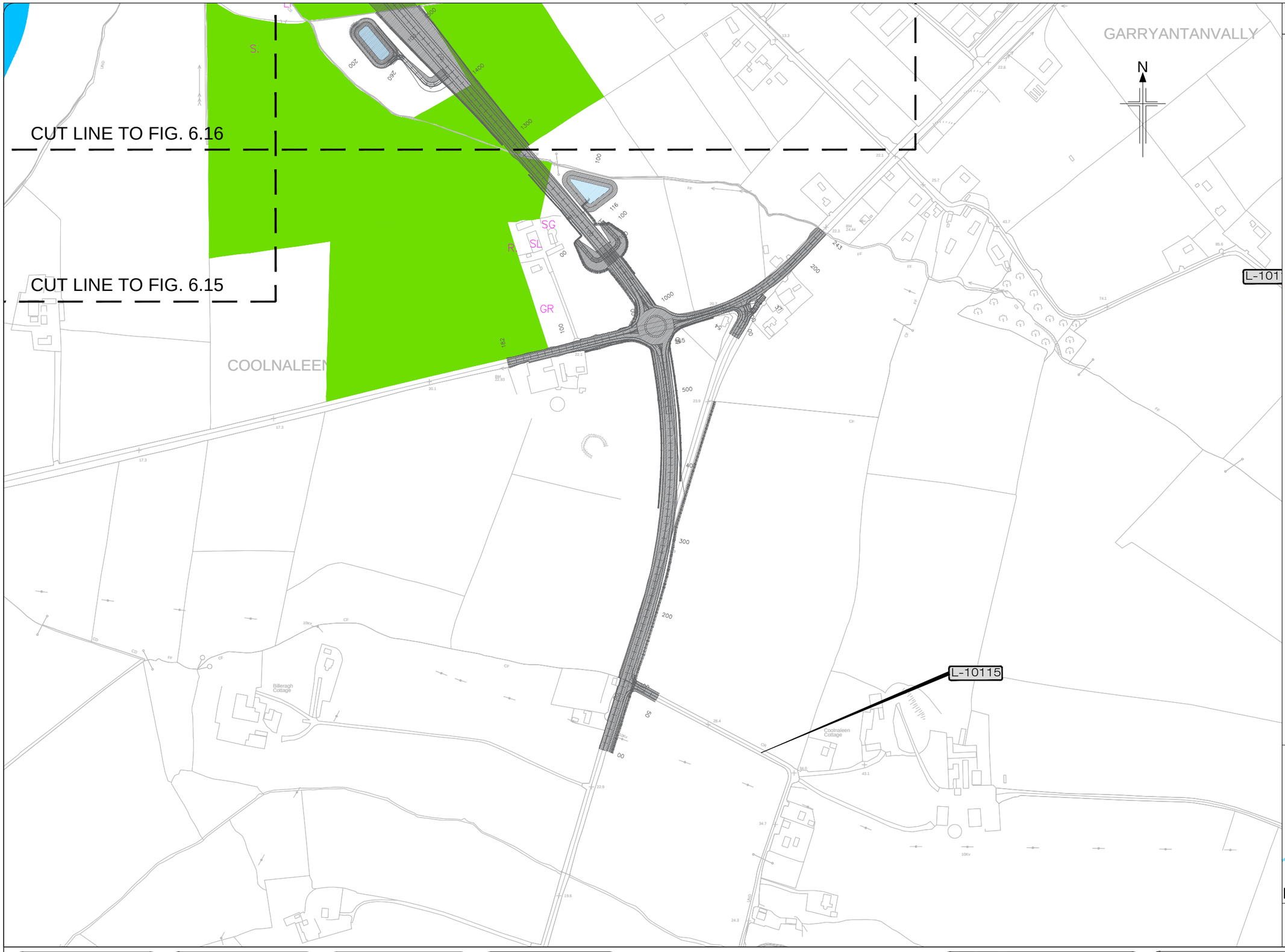
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Birds - Sheet 1 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:7,500 @ A1 1:15,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.13

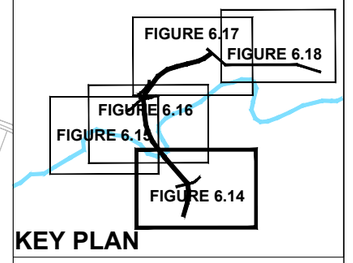


Drawing Number

32105301/NIS/Figure 6.14

Legend:

- Proposed Development
- Whooper swan feeding area
- Fields where Snipe were recorded - winter 2013/14
- Breeding bird territories (BoCCI Red and Amber listed)
- Non-breeding raptors (foraging)
- Sandmartin Nest
- Whooper Swan Roost
- Sand Marting Nesting Habitat



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Birds - Sheet 2 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.14

Drawing Number

32105301/NIS/Figure 6.15

Legend:

- Proposed Development
- Whooper swan feeding area
- Fields where Snipe were recorded - winter 2013/14
- Breeding bird territories (BoCCI Red and Amber listed)
- Non-breeding raptors (foraging)
- Sandmartin Nest
- Whooper Swan Roost
- Sand Marting Nesting Habitat

CUT LINE TO FIG. 6.15

CUT LINE TO FIG. 6.16

Greenville Road L-1011

River Feale An Fhéil

SCARTLEIGH

Level Crossing

Pumping Station (Kerry Co.Council)

Finuge Burial Ground

FIGURE 6.17
FIGURE 6.18
FIGURE 6.16
FIGURE 6.15
FIGURE 6.14

KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Birds - Sheet 3 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.15

CUT LINE TO FIG. 6.17

CUT LINE TO FIG. 6.15

CUT LINE TO FIG. 6.16

N

Greenville Road
L-1011

KILCREEN

ISLANDGANNIV SOUTH

SCARTLEIGH

River Feale
An Fhéil

Garryantanvally House

Kilcreen Cottage

Drawing Number
32105301/NIS/Figure 6.16

Legend:

- Proposed Development
- Whooper swan feeding area
- Fields where Snipe were recorded - winter 2013/14
- Breeding bird territories (BoCCI Red and Amber listed)
- Non-breeding raptors (foraging)
- Sandmartin Nest
- Whooper Swan Roost
- Sand Marting Nesting Habitat

KEY PLAN

FIGURE 6.17
FIGURE 6.18
FIGURE 6.16
FIGURE 6.15
FIGURE 6.14

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

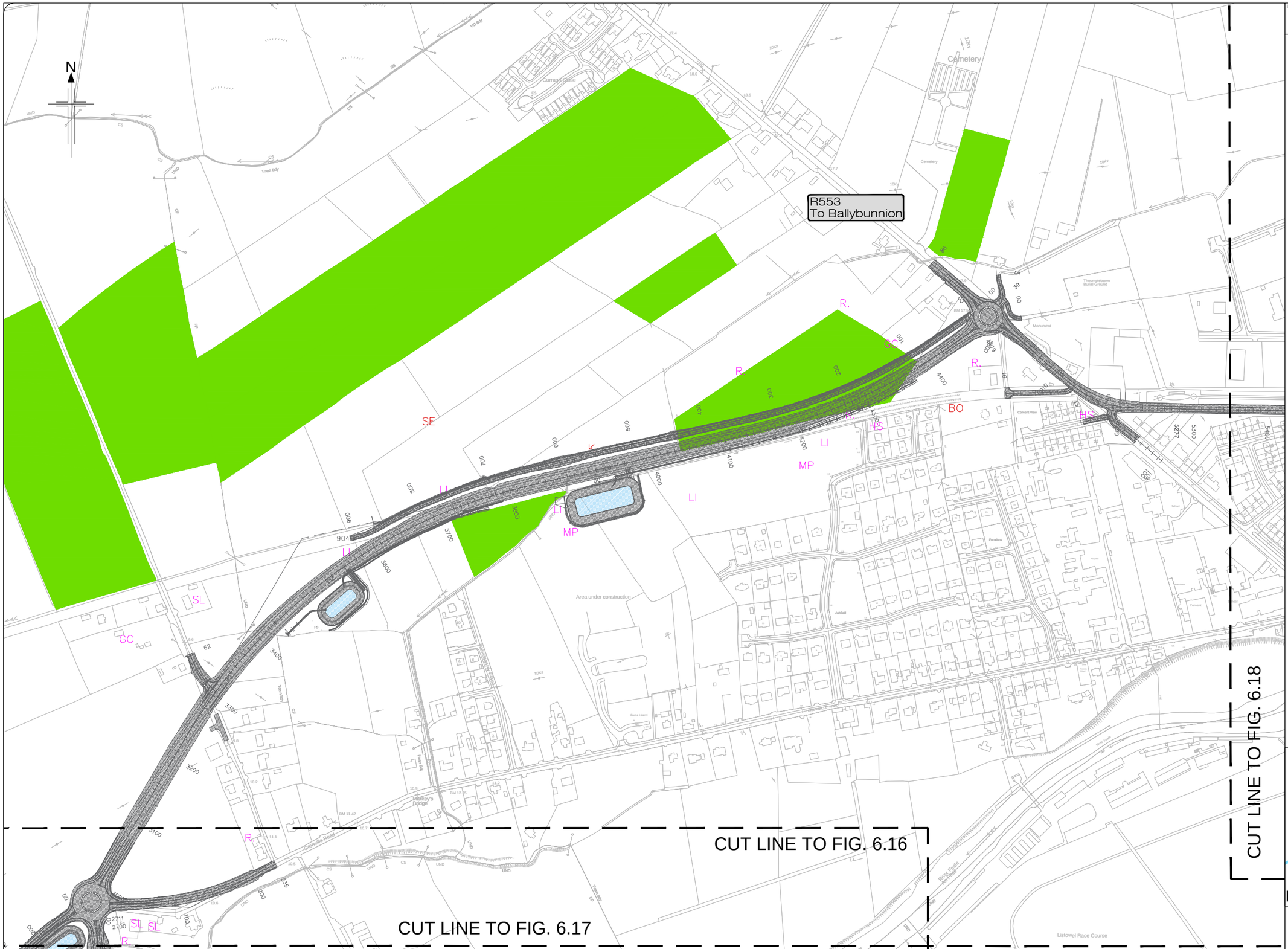
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	May 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Birds - Sheet 4 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.16



An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

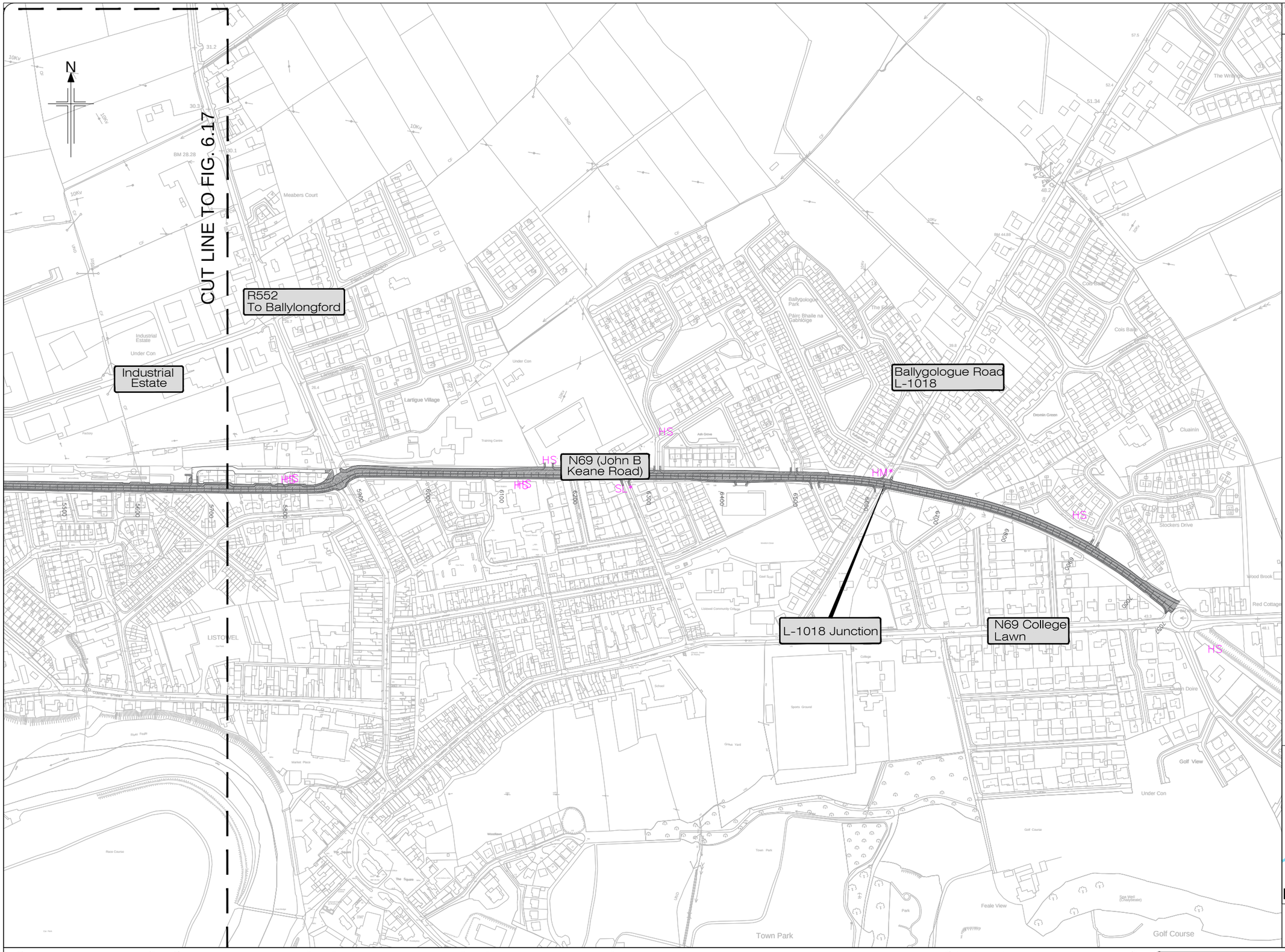
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Birds - Sheet 5 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
	Drawing No. 32105301/NIS/Fig 6.17

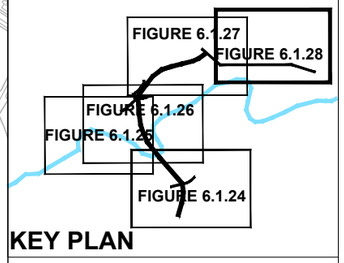


Drawing Number

32105301/NIS/Figure 6.18

Legend:

- Proposed Development
- Whooper swan feeding area
- Fields where Snipe were recorded - winter 2013/14
- Xx Breeding bird territories (BoCCI Red and Amber listed)
- Xx Non-breeding raptors (foraging)
- Sandmartin Nest
- Whooper Swan Roost
- Sand Marting Nesting Habitat



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

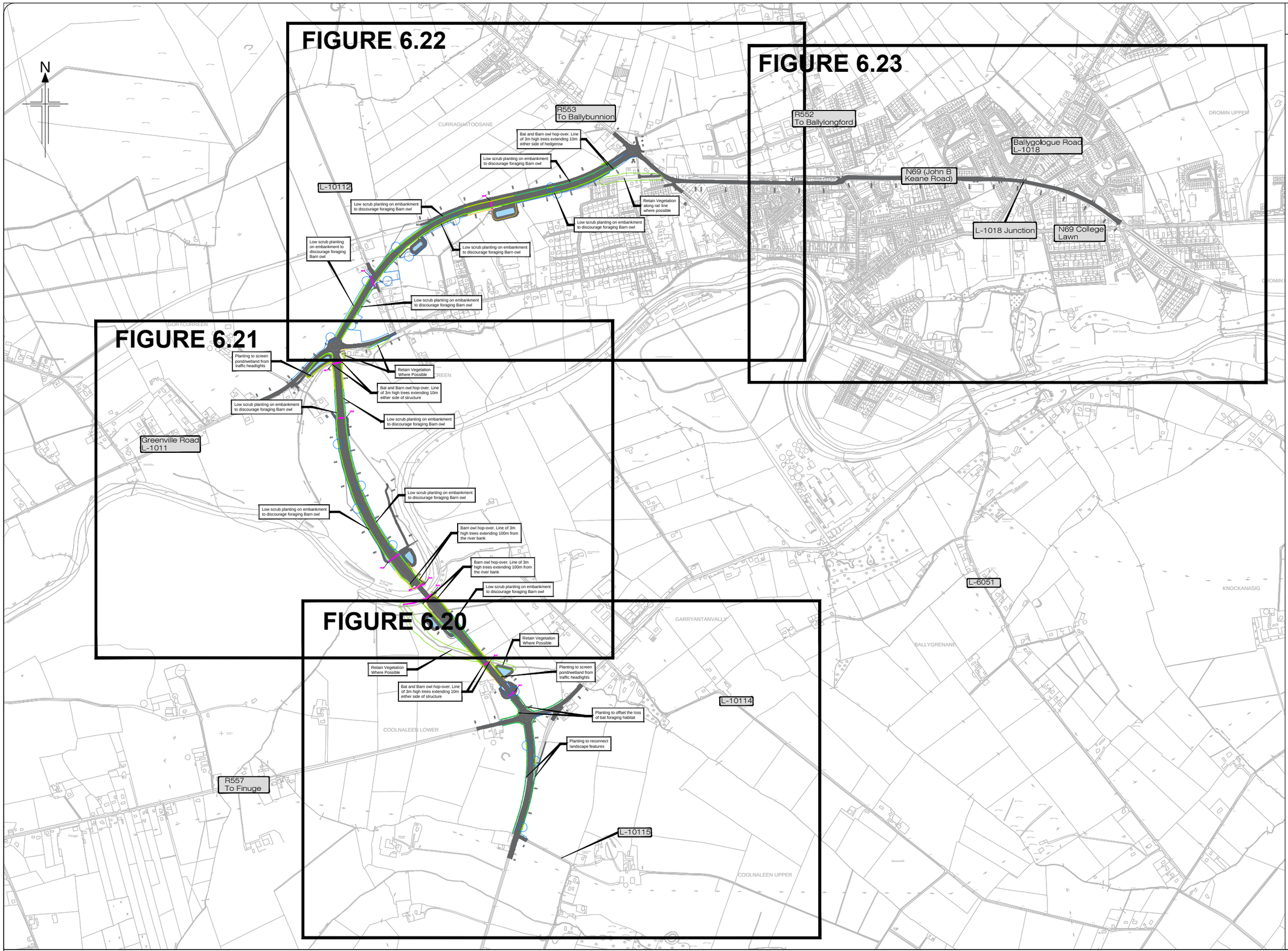
Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Birds - Sheet 6 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.18

Figures 6.19 - 6.23: Ecology Mitigation



Drawing Number

32105301/NIS/Figure 6.19

Legend:

- Proposed Development
- Mammal underpass
- Badger fencing
- Otter fencing
- Planting - see notes for description
- Vegetation to be retained

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Ecology Mitigation - Sheet 1 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:7,500 @ A1 1:15,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.19

Drawing Number

32105301/NIS/Figure 6.20

Legend:

- Proposed Development
- Mammal underpass
- Badger fencing
- Otter fencing
- Planting - see notes for description
- Vegetation to be retained

CUT LINE TO FIG. 6.21

Retain Vegetation Where Possible

Retain Vegetation Where Possible

Bat and Barn owl hop-over. Line of 3m high trees extending 10m either side of structure

Planting to screen pond/wetland from traffic headlights

Planting to offset the loss of bat foraging habitat

Planting to reconnect landscape features

MU1

MU2

L-101

L-10115

COOLNALEEN LOWER

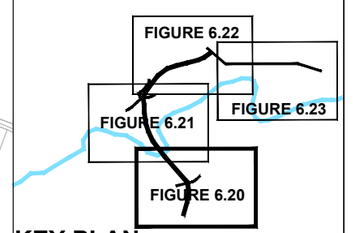
GARRYANTANVALLY

Billeragh Cottage

Coolnaleen Cottage

N

KEY PLAN



All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry

Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Ecology Mitigation- Sheet 2 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
	Drawing No. 32105301/NIS/Fig 6.20

CUT LINE TO FIG. 6.22

Planting to screen pond/wetland from traffic headlights

Retain Vegetation Where Possible

Bat and Barn owl hop-over. Line of 3m high trees extending 10m either side of structure

Low scrub planting on embankment to discourage foraging Barn owl

Low scrub planting on embankment to discourage foraging Barn owl

Greenville Road L-1011

Low scrub planting on embankment to discourage foraging Barn owl

Low scrub planting on embankment to discourage foraging Barn owl

Barn owl hop-over. Line of 3m high trees extending 100m from the river bank

Barn owl hop-over. Line of 3m high trees extending 100m from the river bank

Low scrub planting on embankment to discourage foraging Barn owl

Retain Vegetation Where Possible

CUT LINE TO FIG. 6.20

CUT LINE TO FIG. 6.21

MU2 MU3 MU4 MU5 MU6 MU7

River Feale An Fhéil

SCARTLEIGH

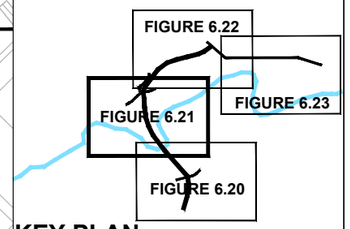
ISLANDOGANNIV SOUTH

Garryantanvally House

Drawing Number
32105301/NIS/Figure 6.21

Legend:

- Proposed Development
- Mammal underpass
- Badger fencing
- Otter fencing
- Planting - see notes for description
- Vegetation to be retained



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Ecology Mitigation - Sheet 3 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
	Drawing No. 32105301/NIS/Fig 6.21

Drawing Number

32105301/NIS/Figure 6.22

Legend:

- Proposed Development
- Mammal underpass
- Badger fencing
- Otter fencing
- Planting - see notes for description
- Vegetation to be retained

R553
To Ballybunnion

CURRAGHATOOSANE

Bat and Barn owl hop-over. Line of 3m high trees extending 10m either side of hedgerow

Low scrub planting on embankment to discourage foraging Barn owl

Low scrub planting on embankment to discourage foraging Barn owl

Retain Vegetation along rail line where possible

Low scrub planting on embankment to discourage foraging Barn owl

Low scrub planting on embankment to discourage foraging Barn owl

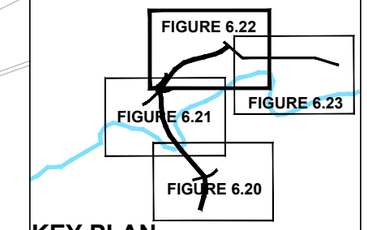
Low scrub planting on embankment to discourage foraging Barn owl

Low scrub planting on embankment to discourage foraging Barn owl

CUT LINE TO FIG. 6.21

CUT LINE TO FIG. 6.22

KEY PLAN



All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Ecology Mitigation - Sheet 4 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
	Drawing No. 32105301/NIS/Fig 6.22

Drawing Number

32105301/NIS/Figure 6.23

Legend:

- Proposed Development
- Mammal underpass
- Badger fencing
- Otter fencing
- Planting - see notes for description
- Vegetation to be retained

CUT LINE TO FIG. 6.23

CUT LINE TO FIG. 6.22

R552
To Ballylongford

Industrial Estate

N69 (John B Keane Road)

Ballygologue Road L-1018

L-1018 Junction

N69 College Lawn

Town Park

Golf Course

River Feale An Fhéil

FIGURE 6.22

FIGURE 6.21

FIGURE 6.23

FIGURE 6.20

KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

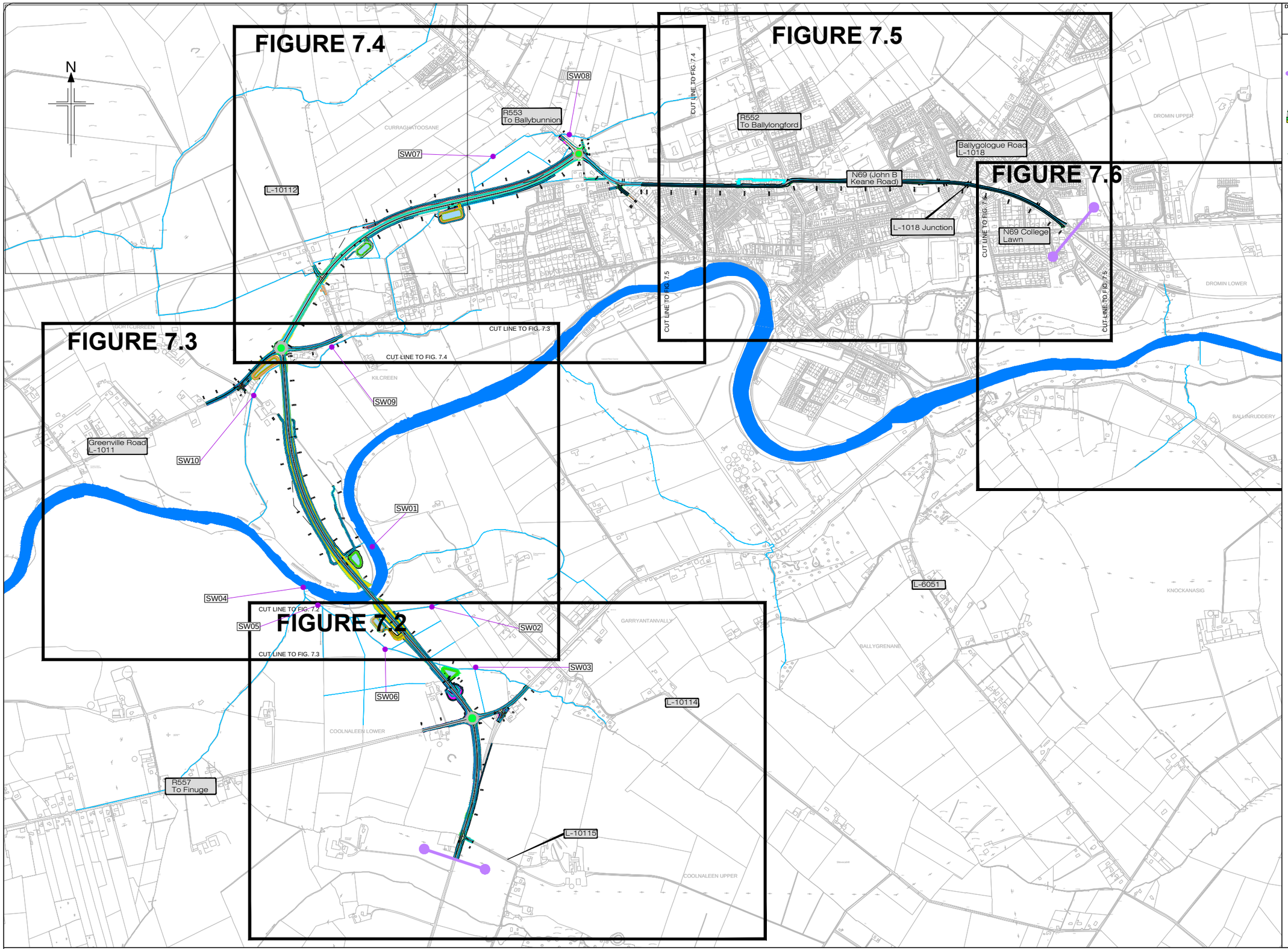
Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Ecology Mitigation - Sheet 5 of 5
Designed: AS	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: April 2017
Drawing No.	32105301/NIS/Fig 6.23

Figures 7.1 - 7.6: Surface Water Features



Drawing Number

32105301/NIS/Figure 7.1

Legend:

- Scheme Terminus Locations
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Sampling Locations SW01
- Water Features (WF1)

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

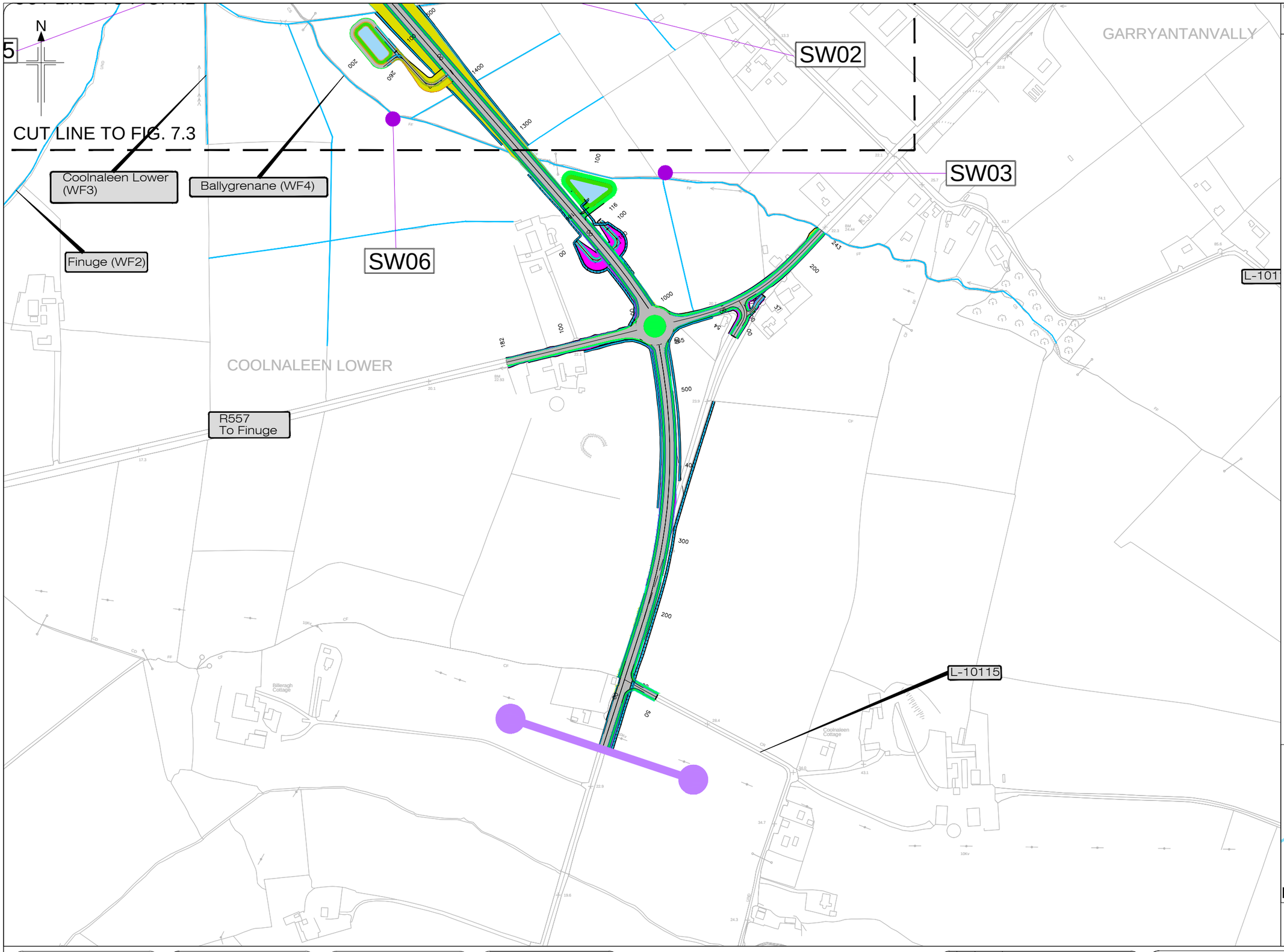
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Surface Water Features - Sheet 1 of 6
Designed: JTM	File Name:
Drawn: MW	Original scales: 1:7,500 @ A1 1:15,000 @ A3
Checked: AM	Date: JUNE 2014
	Drawing No. 32105301/NIS/Fig 7.1

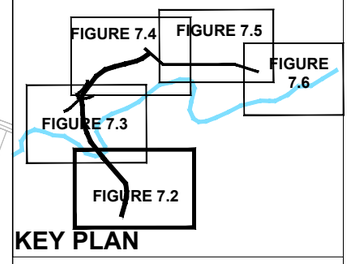


Drawing Number

32105301/NIS/Figure 7.2

Legend:

- Scheme Terminus Locations
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Sampling Locations SW01
- Water Features (WF1)



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

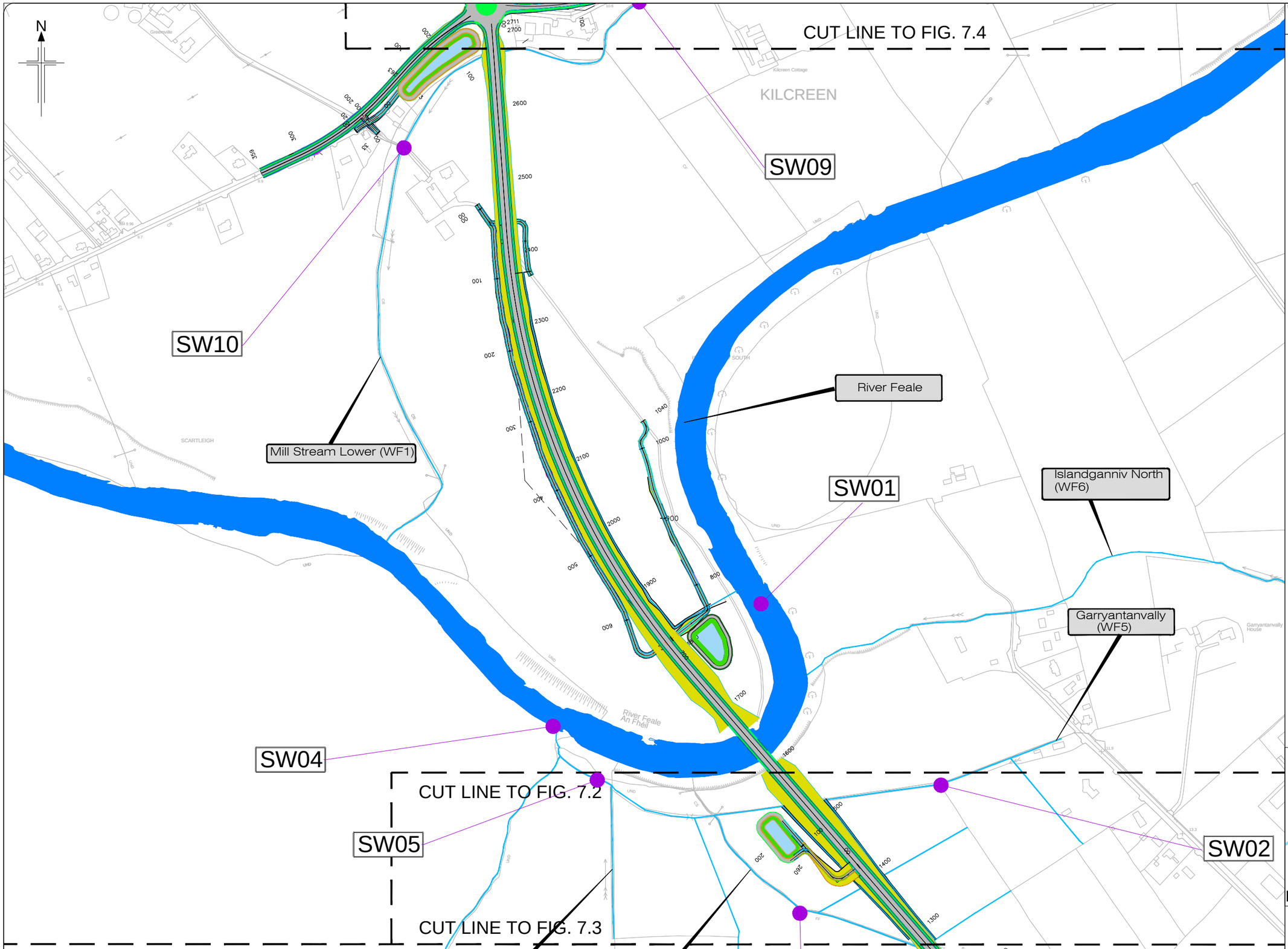
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Surface Water Features - Sheet 2 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: JUNE 2014
Drawing No.	32105301/NIS/Fig 7.2

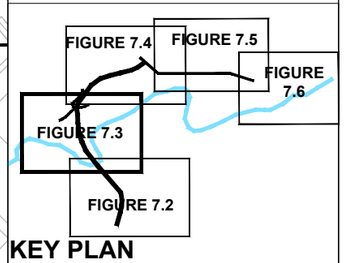


Drawing Number

32105301/NIS/Figure 7.3

Legend:

- Scheme Terminus Locations
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Sampling Locations SW01
- Water Features (WF1)



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations-Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Surface Water Features - Sheet 3 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: JUNE 2014
	Drawing No. 32105301/NIS/Fig 7.3

Drawing Number

32105301/NIS/Figure 7.4

Legend:

- Scheme Terminus Locations
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Sampling Locations SW01
- Water Features (WF1)

Galey River (WF10)

CURRAGHATOOSANE

SW07

SW08

Mill Stream Upper (WF0)

Drainage Ditch to Receive Outfall

Forge Road

L-1401

CUT LINE TO FIG. 7.3

CUT LINE TO FIG. 7.4

CUT LINE TO FIG. 7.5

KEY PLAN

FIGURE 7.4 FIGURE 7.5 FIGURE 7.6 FIGURE 7.3 FIGURE 7.2

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

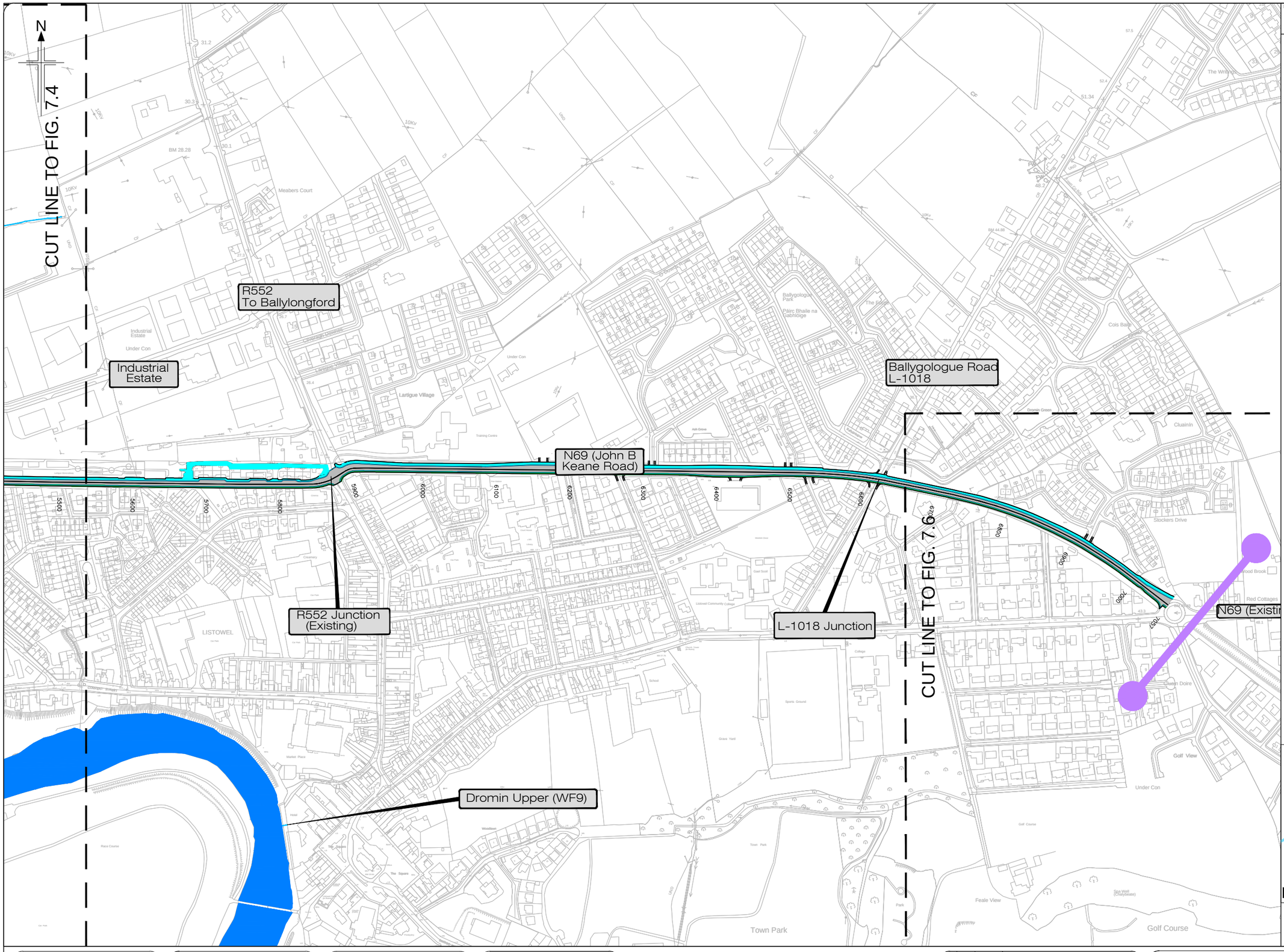
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Surface Water Features - Sheet 4 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: JUNE 2014
	Drawing No. 32105301/NIS/Fig 7.4

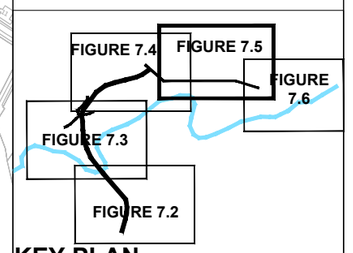


Drawing Number

32105301/NIS/Figure 7.5

Legend:

- Scheme Terminus Locations
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Sampling Locations SW01
- Water Features (WF1)



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

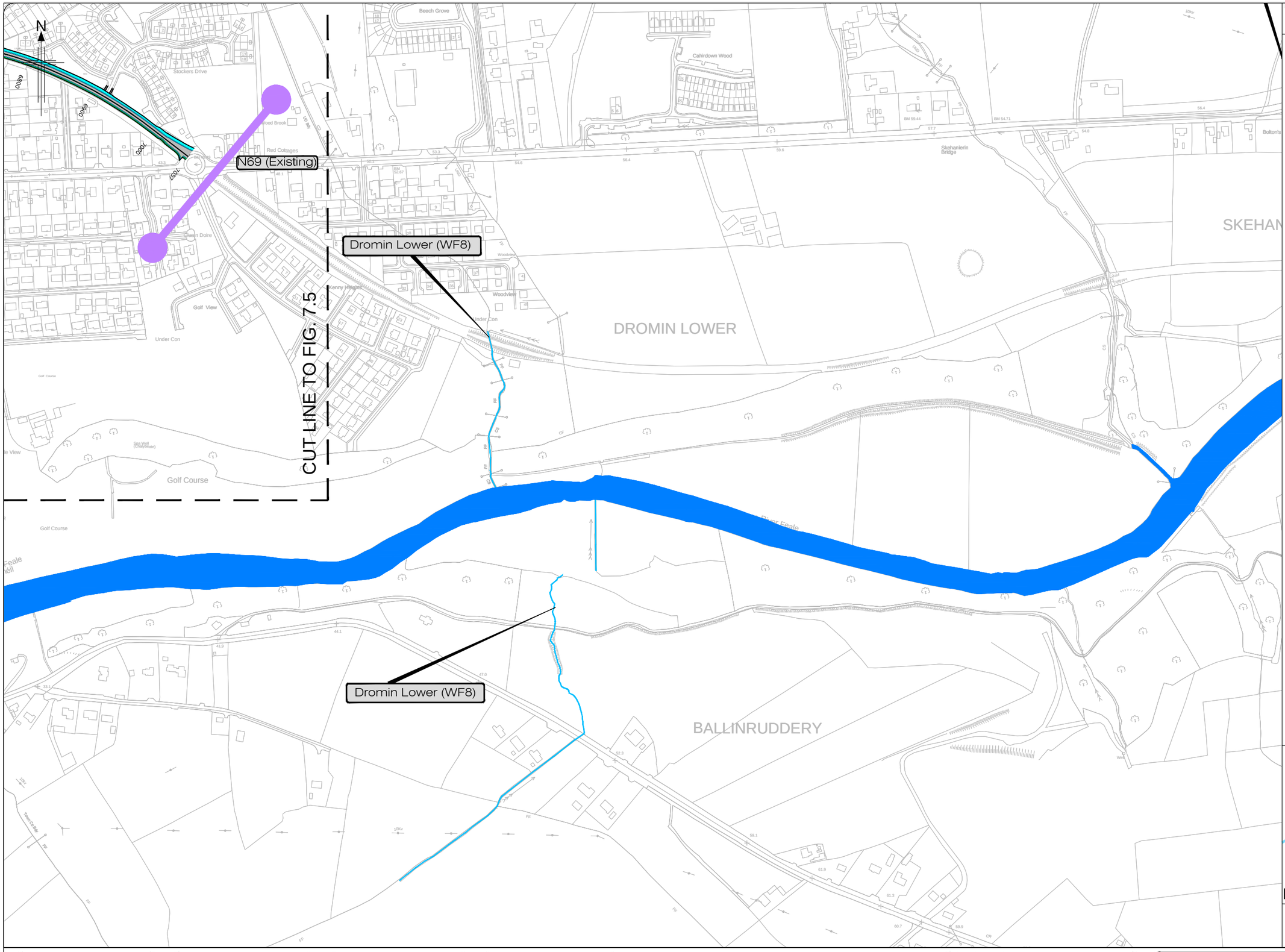
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations: Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS		
Component:	Natura Impact Statement		
Title:	Surface Water Features - Sheet 5 of 6		
Designed: OD	File Name:	Drawing No.	32105301/NIS/Fig 7.5
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3		
Checked: AM	Date: JUNE 2014		

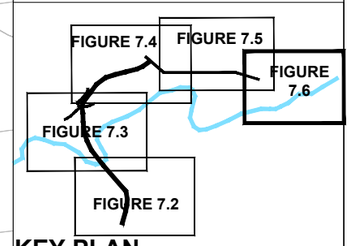


Drawing Number

32105301/NIS/Figure 7.6

Legend:

- Scheme Terminus Locations
- New Road Element on Embankment
- New Road Element in Cutting
- Attenuation Pond/Wetland
- Sampling Locations SW01
- Water Features (WF1)



KEY PLAN

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

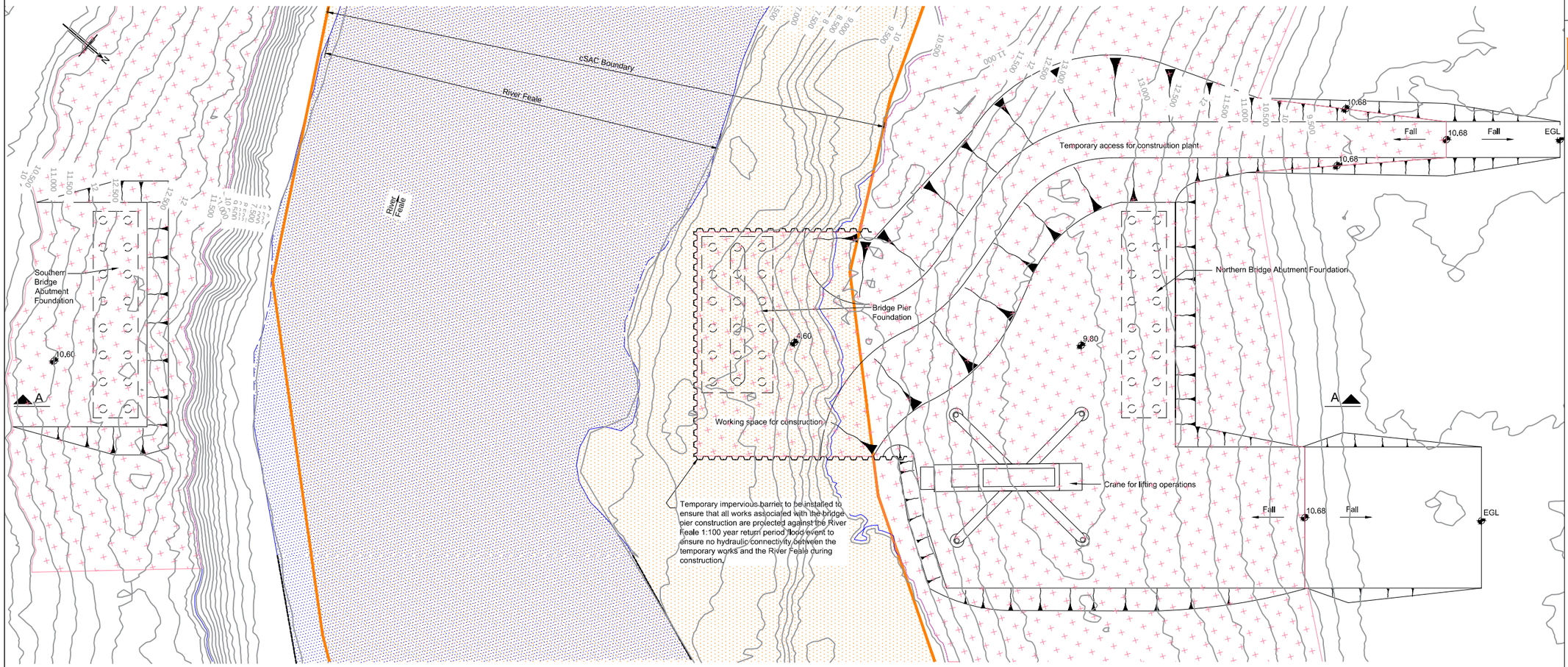
Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations-Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

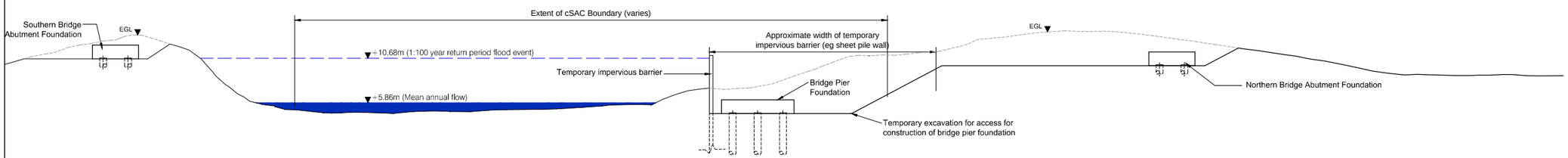
Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	Surface Water Features - Sheet 6 of 6
Designed: OD	File Name:
Drawn: MW	Original scales: 1:2,500 @ A1 1:5,000 @ A3
Checked: AM	Date: JUNE 2014
Drawing No.	32105301/NIS/Fig 7.6

Figure 8 & 9: River Feale Bridge Temporary Works & General Arrangement



Plan
NTS



SECTION A
NTS

Drawing Number

32105301/NIS/Figure 8

NOTES:

cSAC Boundary

Temporaray Works Zone for River Feale Bridge construction above or protected from River Feale 1:100 year return period flood event.

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

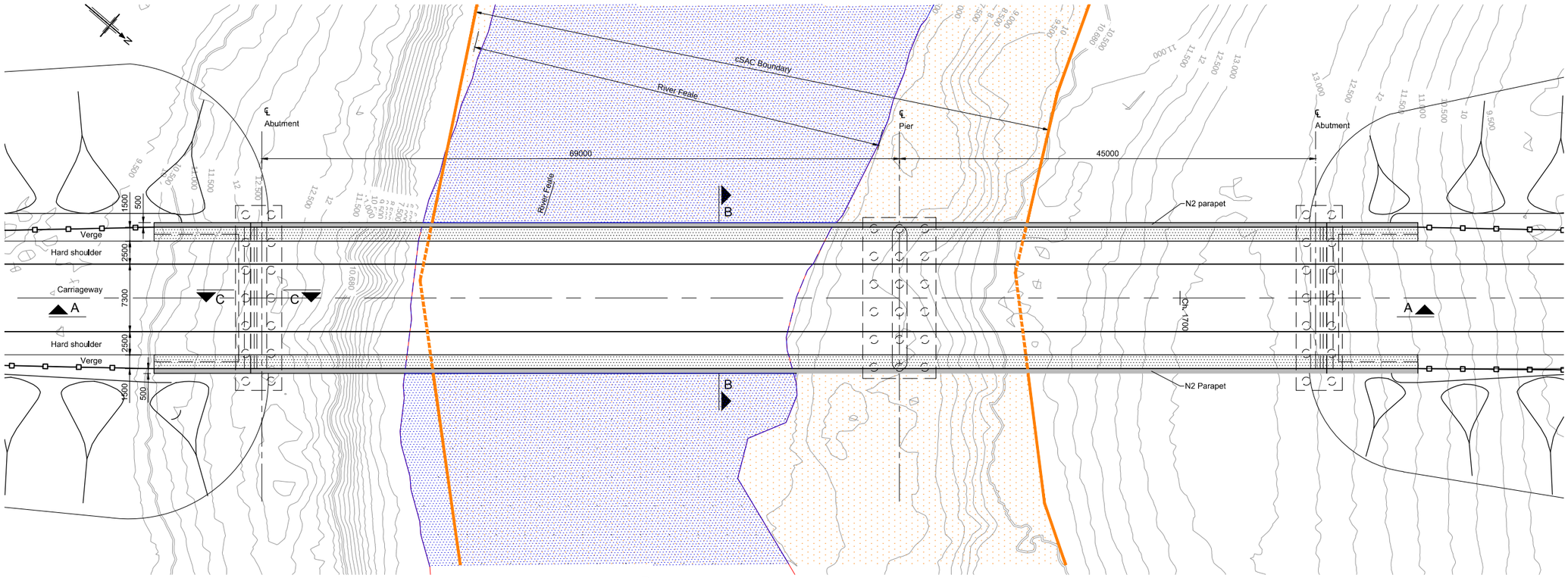
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations-Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

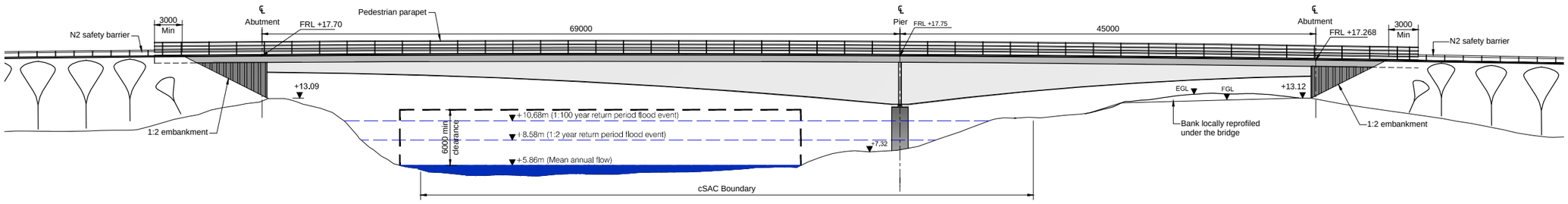
Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Natura Impact Statement
Title:	River Feale Temporary Works
Designed: JTM	File Name: -
Drawn: MW	Original scales: NTS
Checked: GMH	Date: August 2014
	Drawing No. 32105301/NIS/Fig 8



Plan

Scale 1:250 @ A1
1:500 @ A3



East Elevation

SCALE 1 : 250 @ A1
SCALE 1 : 500 @ A3

Drawing Number

32105301/NIS/Figure 9

Notes:

1. All dimensions are in millimetres unless noted otherwise.
2. All levels and chainage in metres. All levels refer to Malin Head Datum.

All details shown on this drawing are indicitative only and are subject to development at detailed design stage.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
Co. Kerry
Mr. C. O'Sullivan, B.E., M.Eng., C.Eng., Eur.Ing., MIEI
Director of Services
Operations Capital Infrastructure & Safety

JACOBS
Merrion House
Merrion Road
Dublin 4
Tel: +353 1 2695666
Fax: +353 1 2695706
www.jacobs.com

Rev	By	Date	Description
0	JTM	April 2017	For Publication

Project:	N69 LISTOWEL BYPASS
Component:	Environmental Impact Statement
Title:	River Feale Bridge General Arrangement
Designed: JTM	File Name:
Drawn: JTM	Original scales: As shown @ A1
Checked: GMH	Date: April 2017
	Drawing No. 32105301/NIS/Fig 9