



Clare
County Council

Killaloe Bypass, Shannon Bridge Crossing and R494 Improvement

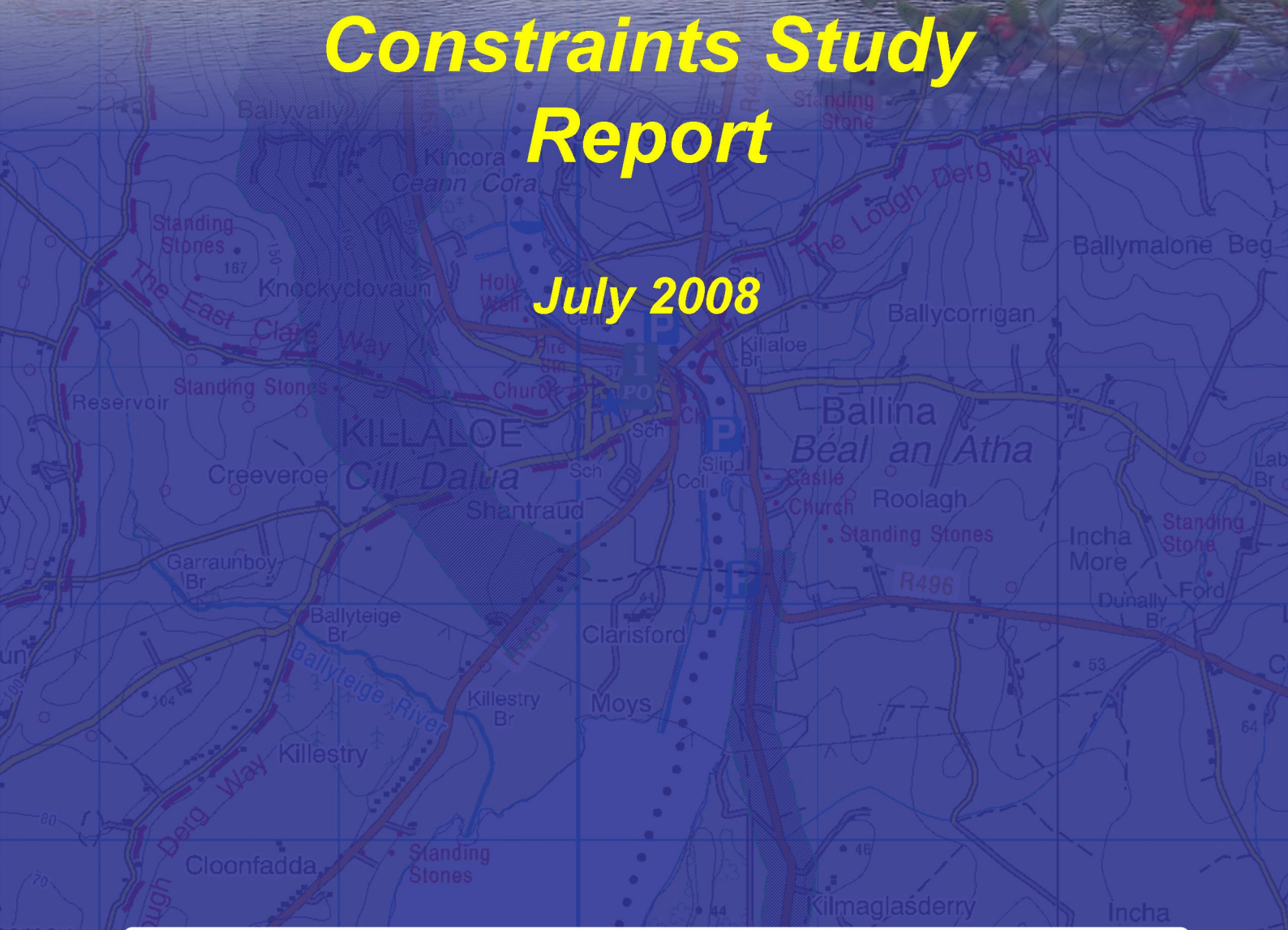


North Tipperary
County Council



Constraints Study Report

July 2008



Department of Transport
An Roinn Iompair



Roughan &
O'Donovan
CONSULTING ENGINEERS

Killaloe Bypass, Shannon Bridge Crossing and R494 Improvement

Constraints Study Report

TABLE OF CONTENTS

1.	Introduction	1
1.1	Need for the Scheme	1
1.2	Scheme Development.....	1
1.3	Objective of the Constraints Study	2
1.4	Format of the Report.....	2
2.	Initial Review of Study Area	3
3.	Public Consultation	4
4.	Engineering and Topography	7
4.1	Topography	7
4.2	Flooding and Drainage.....	7
4.3	Road Network.....	10
4.4	Utility Services	11
5.	Traffic and Road Accidents	13
6.	Geology and Hydrogeology	15
6.1	Introduction and Context.....	15
6.2	Sources of Information.....	15
6.3	Receiving Environment	15
6.4	Assessment and Recommendations.....	19
7.	Socio-Economic Assessment	20
7.1	Introduction and Context.....	20
7.2	Receiving Environment	20
7.3	Possible Effects of the Proposed Development.....	22
8.	Land Use	24
8.1	Housing and Development.....	24
8.2	Commercial/Industrial	24
8.3	Tourism/Amenity	25
8.4	Land Ownership.....	25
9.	Terrestrial Ecology	26
9.1	Methods.....	26
9.2	Designated Sites for Conservation.....	26
9.3	R494 and Killaloe Bypass: Description of the Study Area	28
9.4	Likely Conservation Interests within the Study Area and Potential Constraints ..	29
9.5	Conclusion and Recommendations.....	30

10. Aquatic Ecology	32
10.1 Methodology	32
10.2 Existing Environment	32
10.3 Potential Impacts of the Proposal.....	33
11. Archaeological and Cultural Heritage	36
11.1 Methodology	36
11.2 Archaeological Heritage.....	36
11.3 Architectural Heritage	38
11.4 Cultural Heritage.....	40
11.5 Summary and Conclusion.....	41
12. Landscape and Visual	43
12.1 Landscape Designations.....	43
12.2 Description of the Receiving Environment.....	45
12.3 Visual Impact	47
12.4 Landscape Character.....	48
13. Conclusion	50
Appendix 1 List of consultees	53
Appendix 2 Responses from consultees	55
Appendix 3 Consultation leaflet	56
Appendix 4 NPWS Designated Sites	57
Appendix 5 Correspondence from Clare County Archaeologist	66
Appendix 6 NRA Project Management Guidelines: Phase 2 Questionnaire	68

Table of Figures

Figures are provided the end of each chapter:

Figure 1.1 Site Location

Figure 2.1 Constraints Study Area

Figure 4.1 Flooding and Drainage

Figure 4.2 Existing Utilities (page 1 of 2)

Figure 4.3 Existing Utilities (page 2 of 2)

Figure 6.1 Geology

Figure 7.1 location of Commercial and Business Activities

Figure 8.1 Planning applications (sheet 1 of 2)

Figure 8.2 Planning applications (sheet 2 of 2)

Figure 8.3 East Clare Development Plan 2005-2011

Figure 8.4 Western Area LAP North Tipperary 2006

Figure 9.1 Conservation Designations

Figure 11.1 Archaeology, Architecture and Cultural Heritage (sheet 1 of 2)

Figure 11.2 Archaeology, Architecture and Cultural Heritage (sheet 2 of 2)

Figure 13.1 Combined Constraints (sheet 1 of 2)

Figure 13.2 Combined Constraints (sheet 1 of 2)

1.0 Introduction

1.1 Need for the Scheme

Clare County Council in conjunction with North Tipperary County Council, have commissioned a Constraints Study, Route Selection Study and Preliminary Design for a proposed western bypass of Killaloe in County Clare, together with an improvement of the existing R494 between Birdhill and Ballina in County Tipperary. In addition, an Environmental Impact Statement (EIS) and Compulsory Purchase Order (CPO) will be prepared for the Killaloe Bypass, the proposed Shannon Bridge Crossing scheme and the R494 Improvement.

The Constraints Study, Route Selection Study and Preliminary Design have previously been completed for the Shannon Bridge Crossing scheme.

The proposed scheme consists of three sections as follows:

1. Killaloe Bypass: This part of the Scheme aims to create a western bypass around the town of Killaloe which will connect the R463 to the north of town with the Shannon Bridge Crossing section to the south.
2. Shannon Bridge Crossing: This section of the Scheme has been determined by previous detailed studies and will cross the River Shannon approximately 1km south of the existing Killaloe Bridge.
3. R494 Upgrade: This section will involve widening, regarding and possible local realignment of the R494 from its junction with the R494 to the N7 north of Birdhill.

See **Figure 1.1** for Location of the proposed scheme.

1.2 Scheme Development

Clare County Council in conjunction with North Tipperary County Council have engaged the services of Roughan & O'Donovan to progress the planning, design and environmental assessment of the Scheme. As part of this process the guidelines for national road schemes which are laid out in the National Roads Project Management Guidelines (NRA, 2000), will be followed where appropriate. The following reports will be compiled as part of the planning process:

- Constraints Study Report (Killaloe Bypass and R494)
- Route Selection Report (Killaloe Bypass and R494)
- Environmental Impact Statement (Killaloe Bypass, Shannon Bridge Crossing, R494)
- Preliminary Design Report (Killaloe Bypass, Shannon Bridge Crossing, R494)

As part of previous the previous study carried out for the Shannon Bridge Crossing Scheme; a Constraints Report, Route Selection Report and a Preliminary Design Report have been published.

A Technical Steering Committee has been set up which comprises of technical officers from Clare County Council, North Tipperary County Council and Roughan and O'Donovan Consulting Engineers (ROD).

1.3 Objective of the Constraints Study

The Constraints Study has been carried out with the objective of gathering, for the Killaloe Bypass and R494 upgrade, as much background information, as possible. This data collection is focused on determining the constraints including physical, environmental and engineering constraints which exist and could affect the location, design and progress of these sections of the Scheme. This stage of the process summarises the findings of a consultation exercise with the public to identify constraints and concerns within the community.

This report records the collection of data to the end of May 2008. In particular research on the engineering and environmental constraints have been carried out and recorded. The process allows for a staged approach to data collection. Early work allows for the determination of the planned routes and structures. Further study is to be carried out parallel with Route Corridor Development and in the form of an EIS.

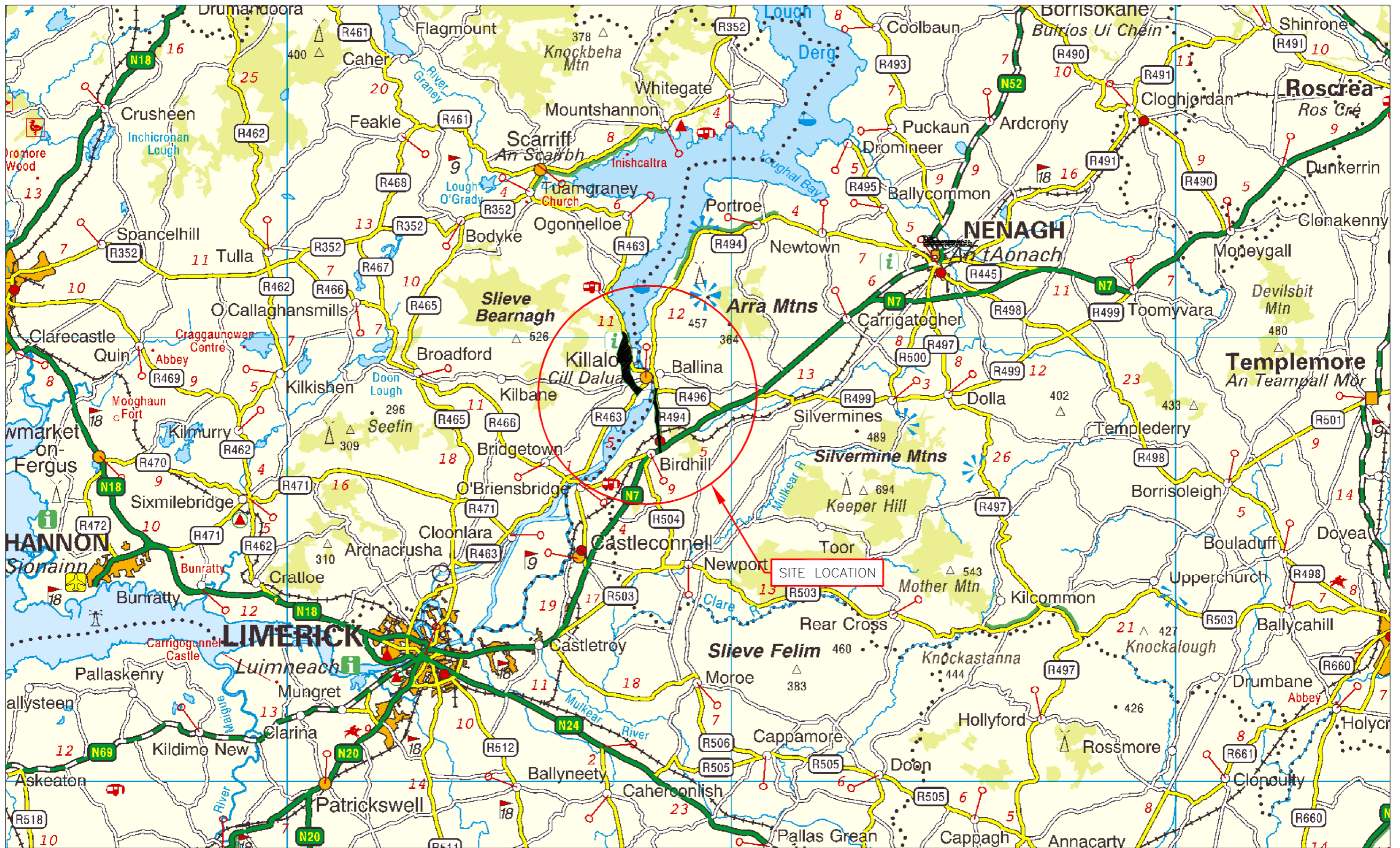
1.4 Format of the Report

The Constraints Study Report consists of an introduction, background to the scheme, and the initial review of the study area and conclusion.

Specialist Chapters of the report are listed below:

Chapter 4	Engineering and Topography
Chapter 5	Traffic and Road Accidents
Chapter 6	Geology and Hydrogeology
Chapter 7	Socio-Economic Impact
Chapter 8	Land Use
Chapter 9	Terrestrial Ecology
Chapter 10	Aquatic Ecology
Chapter 11	Archaeology, Architectural and Cultural Heritage
Chapter 12	Landscape and Visual Aspects

The report concludes with a summary in Chapter 13.



Department of Transport
An Roinn Iompair

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Project Title			
KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title			
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Drawn	OF	Job No.	07-527
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Scale:	(A1)	Date:	MAY 08

2.0 Initial Review of Study Area

A preliminary study was carried out by collecting information on the major constraints within the full extent of the initial study area. The areas in question are indicated as Section 1 and Section 3 of **Figure 2.1**. Information was extracted where relevant from the previous Constraints, Route Selection and Preliminary Design Reports for Shannon Bridge Crossing completed in 2006. This information and the information acquired as part of this study was methodically reviewed in order to assist future determination of the potential routes, resulting in minimal environmental impact. Issues considered as part of the constraints study included:

- Engineering constraints
- Existing infrastructure, land use, topography and physical features
- Planning, development and socio-economic character
- Identification of sites or areas of environmental significance or sensitivity

The above information allows the creation of a study area within which the constraints study is based.

The general principle that was used to define the extents of the study area was that it should be wide enough to include all reasonable route options, but that it should not be excessively wide as to entail collection of a large amount of information that would prove little relevance to the project. This allows for a number of options to be considered in relation to road development and tie-ins.

The study area is limited by the predetermined position of the Shannon Bridge Crossing. The study area encompasses an area bounded by Killaloe and Ballina to the centre. The N7 at Birdhill limits the southern extents of the R494 section of this scheme. The Killaloe Bypass is limited by Knockyclovaun Mountain to the west and the eastern limits of Killaloe Bypass are limited by urban development. To the north of Killaloe the bypass route is to be designed to link with the R463.



SECTION 1
CONSTRAINTS
AREA

SECTION 3
CONSTRAINTS
AREA

ROUTE OF SHANNON
BRIDGE
SECTION 2



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3.0 Public Consultation

As part of this Constraints Study a public consultation was carried out. An information leaflet outlining the scheme to date and the area covered as part of this study with a questionnaire, was made available to the public. The consultation process was advertised in the Clare Champion and Nenagh Guardian on Friday the 14th of March. The Questionnaire was made available at 6 Local Area offices and a scheme map was on display from 14th of March to the 11th of April. The leaflet was also sent out to a number of statutory and non statutory consultees (See **Appendix 1, 2 and 3** for list of consultees, responses and sample questionnaire). Local Area Offices used were as follows:

- Aras an Chontae, Ennis (Roads/Transport Section)
- Scariff Area Council Office
- Killaloe Public Library
- Westbury Office Parteen
- Civil Offices, Nenagh
- Newport Area Council Office

A total of forty-two responses were received from members of the public. The following table summarises responses of the public consultation leaflet outlining issues that were considered most important when selecting a route for the proposed scheme.

Table 3.1 Public Consultation Summary

Importance to Public	Very Important (%)	Important (%)	Least Important (%)
Effect:			
Improvement in Traffic Conditions	50	47	3
Improvement in Road Safety	74	20	6
Impact Upon the Community	76	21	3
Best value for Money	16	28	56
Effect on Business	21	38	41
Effect on Tourism	29	44	26
Conservation of Archaeology	67	27	6
Conservation of Flora and Fauna	73	21	6
Impact on Landscape	77	11	11
Development	21	48	30

In addition to the above table, participants were asked a number of additional questions. The following summarises the general comments made by members of the public involved in the consultation process.

Avoidance of Features

When asked which features should be avoided when selecting the preferred route the following areas were highlighted:

- Private residences
- residential areas at the Shannon River Crossing Section of the Scheme
- Ballyvally area
- Brian Boru's Fort and other archaeological features
- Clarisford Palace
- St Anne's Community College
- Severance of or loss of agricultural farms holdings
- Areas of importance in terms of flora and fauna i.e. south and north of Killaloe town

Advantages and Disadvantages

Public comments outline the following main advantages and disadvantages of the proposed scheme:

Advantages

- Removal of heavy traffic away from town/ reduced congestion
- Safety improvements for current bridge crossing
- Easier access to Killaloe and N7
- Reduced journey times
- Increased safety on wider roads
- Improvements to bridges at Kilmastulla, Kilmaglasderry
- Potential for weight restriction in the town
- Less congestion on bridge and in towns
- Opportunity to improve safety for drivers and pedestrians on R494
- Opportunity to remedy flooding issues on the R494
- Increased opportunity for development at Clarisford due to improved access to lands
- Opportunity to improve attractiveness of Killaloe town to visitors

Disadvantages

- Risk of hazard to pedestrians and local traffic if R463 is connected too close to town
- Loss of private dwelling
- Impact on landscape, Hill of Killaloe, river crossing, visual impact to Clarisford Palace
- Difficulty in access for residents due to increased volume of traffic
- Potential for hazard for cyclists/pedestrians
- Impact on St. Anne's Community College and Clarisford House/Palace
- Bypass and river crossing is too close to the town
- Safety and noise impact of scheme
- Impact on flora and fauna at river crossing
- Security impact
- Impact on agricultural land holding

- Potential impact on archaeology

Additional Comments

A number of additional comments were received as part of the public consultation including:

- Avoid residential communities where possible
- Currently there is flooding at Kilmaglasderry threatening homes, bridge needs upgrading
- Noise, air quality and safety impact should be considered
- Scheme should be in harmony with the surrounding environment
- A proportion of the submissions indicated that they would prefer the river crossing further south
- Give due consideration to land ownership within the area affected
- Create a link/access from new road at R463 at Clarisford/Shandraud allowing for development
- Complete bypass and upgrades before bridge construction
- Provide measures during construction phase for access for people with disabilities at Roolagh Cross
- Noise mitigation is required for residences
- Ensure that waterways remains navigable under new bridge
- Consider architectural merit of new bridge: Landmark bridge
- 5 metre headroom should be available in one of the navigation arches to enable larger power boats and small sailing craft to navigate under the bridge safely
- Post construction as many of the arches as possible should be navigable and the buttress of the bridges designed and orientated in the water at an angle to minimise the upstream and downstream eddies from their footprint on the river bed.
- Sufficient head room (approx 4m) above the water needs to be preserved over the canal navigation so that vessels can continue to use that waterway
- Incorporate safe walking/cycling path along the new roads
- Make provision for users of the East Clare and Lough Derg Way.
- Provision of lighting and footpath to be incorporated into upgrade of R494

Comments received as part of this public consultation will be taken into account during the route selection and the preliminary design phase of the R494 and Killaloe Bypass sections as relevant.

4.0 Engineering and Topography

This chapter outlines the engineering and topographical constraints within the study area.

4.1 Topography

The land to the east of the Study Area from Ballina to Birdhill is flat to gently undulating. Contours are generally between 30mOD and 50mOD.

As the route approaches south of Ballina the topography is relatively flat at approximately 40.00m O.D. The route at Ballina south skirts the banks of the Shannon River. At the proposed crossing there is a gradual fall to the banks of the Shannon to 30.00m where the route crosses the proposed Shannon River crossing.

The constraints study area for the Killaloe section of the scheme proves to be hilly in nature with the fringes of Killaloe town and agricultural lands within the study area to the west on a higher gradient. The hilly topography with steep inclines is evident, extending to heights of 70.00m OD in places. Terrain proves to be especially difficult at the northern section of the constraints study area.

The levels shown on the plans and generally used in this report are to the current OD at Malin Head.



Photo 4.1 Hilly topography of lands to the west of Killaloe

4.2 Flooding and Drainage

A desktop study was carried out in order to determine if flooding is a significant constraint to the proposed works.

The study area is located in the Lower Shannon catchment and contains twelve watercourses (See **Figure 4.1**):

- An unnamed watercourse (stream) adjacent to the intersection of the R494 and N7 which crosses the R494 at Doolly's Bridge
- the Kilmastulla River at Cool Bridge (Coolnadornory);
- An unnamed watercourse at Knockadromin (approximately 300m downstream of Cool Bridge);
- An unnamed watercourse between Knockadromin and Kilmaglasderry (approximately 900m downstream of Cool Bridge);
- An unnamed watercourse at Kilmaglasderry / Fort Henry;
- An unnamed watercourse approximately 150m north of the Fort Henry watercourse
- the River Shannon;
- An unnamed watercourse at Shantraun which crosses the R463 at two locations;
- An unnamed watercourse at Kincora which crosses the R463;
- An unnamed watercourse approximately 200m north of the above watercourse at Kincora;
- An unnamed watercourse to the north of Ballyvally; and
- An unnamed watercourse at Craglea.



Photo 4.2: Unnamed watercourse adjacent to the R494 and N7 intersection (Doolly's Bridge)



Photo 4.3: Unnamed watercourse looking east onto R494 at Kilmaglasderry/Fort Henry

The Kilmastulla River along with the 10 unnamed watercourses are tributaries of the River Shannon. The Kilmastulla River and five watercourses crossing the R494 are located to the east of the River Shannon. The remaining watercourse are located west of the Shannon.

The general area within the constraints study is not known for serious flooding events. The East Clare Development Plan has identified:

“Within East Clare there are relatively few areas identified as serious flood-risk areas.”

Examination of the OPW Flood information website has indicated that major flooding occurred in the Shannon catchment in January 1925, December 1954, Winter 1959/1960, February 1990, Winter 1994/1995 and Winter 1999/2000. The highest recorded flood level within the constraints study area occurred on 01/02/95. The website indicates the existence of a narrow floodplain along the eastern boundary of the River Shannon within the Study Area. It does not appear to impact on the R494.

Public consultation has indicated that flooding occurs at Kilmaglasderry where an unnamed watercourse crosses the R494 via a bridge (Photo 4.3). It is understood (from public constitution) that this flooding is caused due to insufficient capacity of the bridge. Approximately 3 properties have been affected by flooding which has occurred several times over the last 5 years.



Photo 4.4: Unnamed watercourse and culvert approximately 150m north of the watercourse at Kilmaglasderry looking west

Flooding has also been reported at the watercourse (photo 4.4) located 150m north of the Kilmaglasderry/Fort Henry watercourse. These flooding instances occur during intense rainfall events.

The Kilmastulla River floods annually. The OPW website indicates flooding at the intersection of the Kilmastulla River with the N7 (approximately 2Km upstream of the study area). Flooding of the River also occurs at a location where it has been realigned in the past to flow along the eastern bank of the River Shannon. There is a hydrometric station (flow measurement device and or rain gauge) on the Kilmastulla River approximately 500m downstream of where it was diverted from its original discharge point to the Shannon. It is understood that there has been some flooding of the Kilmastulla at Cool Bridge where it crosses the R494.

The Shannon Bridge Crossing Constraints Study has identified that the Parteen Weir is the principal feature affecting flooding and drainage. The report also considered that flooding of lands upstream of the weir and adjacent to the river channel resulting from a rise in the level of the River Shannon would not be expected.

Any bridges or culverts affecting the Shannon River or its tributaries will be subject to approval under Section 50 of the 1945 Arterial Drainage Act. Such approvals are granted by the Office of Public Works.

Stormwater runoff from the proposed road is likely to require treatment as road runoff contains contaminants from various sources. Sustainable Drainage Systems (SuDS) would be used wherever possible to minimise the environmental impact of the road drainage system. SuDS mimic the processes that occur in nature and help both to attenuate stormwater runoff and minimise pollution. The drainage system selected will also need to consider the presence of wells and aquifers.

4.3 Road Network

Killaloe/ Ballina are served by a number of regional roads:

- R463 west of the River Shannon and crossing with the R466 at O'Briensbridge

- R496 east-west direction, joining with the R494
- R494 running north south along the east side of the river Shannon
- The R494 joins the National Route N7 near Birdhill.

A number of local and county roads serve the area as detailed in Figure 2.1

4.4 Utility Services

Enquires were sent to all known service providers, requesting details of both existing and planned installations within or adjacent to the study area. Utilities Services Plans can be seen as **Figures 4.2 and 4.3**, outlining all services found in the region. To date responses have been received from the following bodies:

4.4.1 Electricity

Details of the ESB infrastructure within the Constraints Study are can be seen in **Figure 4.2 and 4.3**. There is one high voltage transmission line (400kV) in proximity to the study area (Dunstown Moneypoint Line). This can be seen outside the Section 1 study area to the south of the town at Creeveroe. Along the R494 the 400kV line crosses north of Killmagladserry and approximately 600m south of the R494 and R496 junction. In addition the Ardna Birdhill line including a 38kV station is present at Birdhill.



Photo 4.5 400kV transmission line crossing the R494 to the rear of the Esso Station

With regard to the Dunstown Moneypoint line the ESB has stated that:

“It is imperative that the ground is not raised under this Line. In addition all building and underground services must maintain a minimum radial clearance of 30m from the line and structures”

4.4.2 Telecommunications

Eircom infrastructure consists of local overhead lines along the existing road network with some underground trunk cables in the urban areas of Killaloe and Ballina. There is also a fibre optic cable commencing in Killaloe, which crosses Killaloe Bridge to Ballina and follows the R494 southwards towards Birdhill.

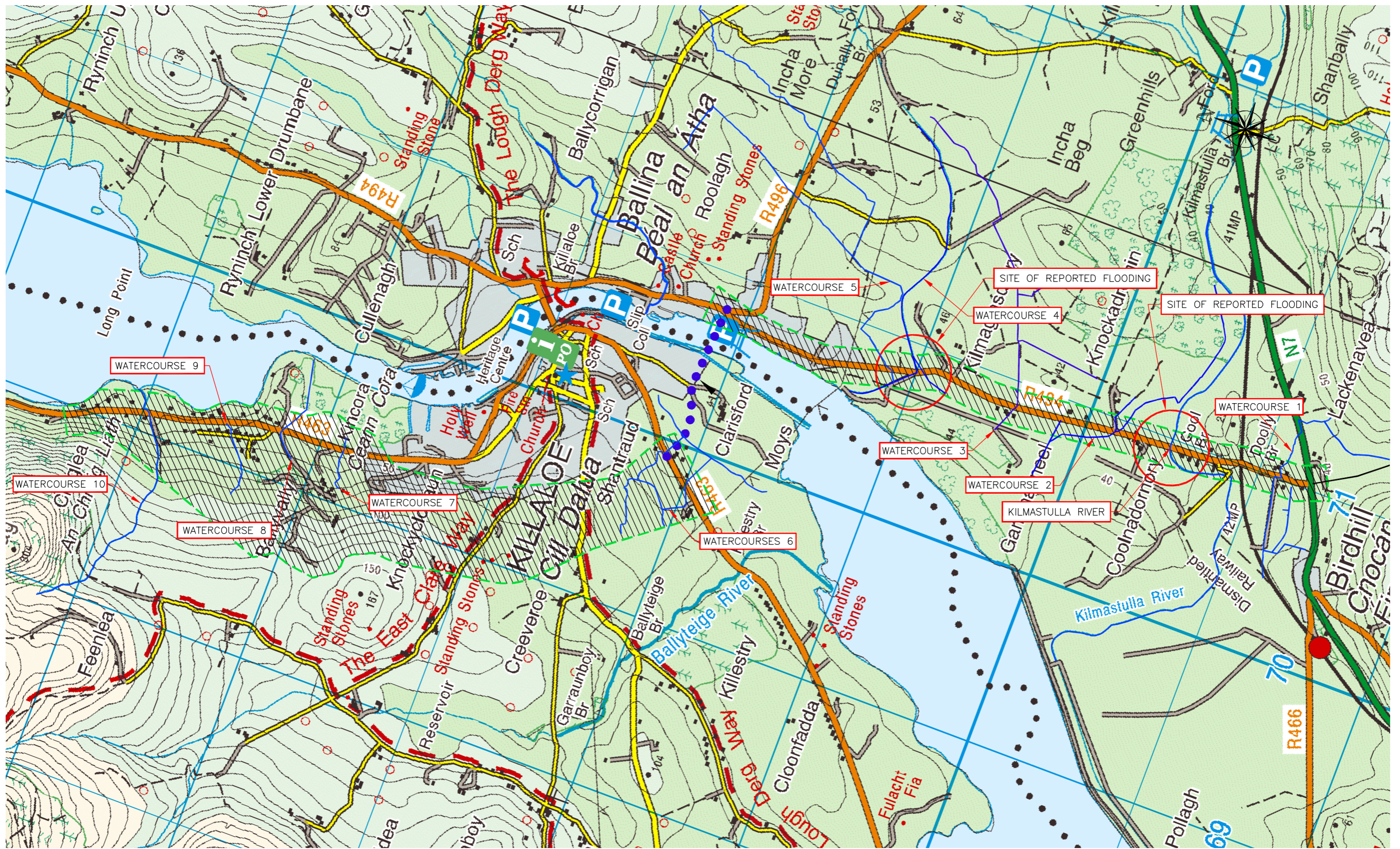
4.4.3 Gas

Bord Gáis have a 250mm diameter distribution main in the R494 carriageway between Ballina and Birdhill. The distribution network crosses under the River Shannon approximately 600m south of the existing Killaloe Bridge. This crossing feeds a 90mm diameter network in Killaloe and a 90mm diameter branch running southbound along the R463.

4.4.4 Water Services

Watermains cross the constraints study area at Shanutraud in Killaloe and follow the R494 in Ballina.

Sewers are evident in the town centres and the Creeveroe Road in Killaloe while they cross under the river north of the proposed Shannon River crossing to the town of Ballina.



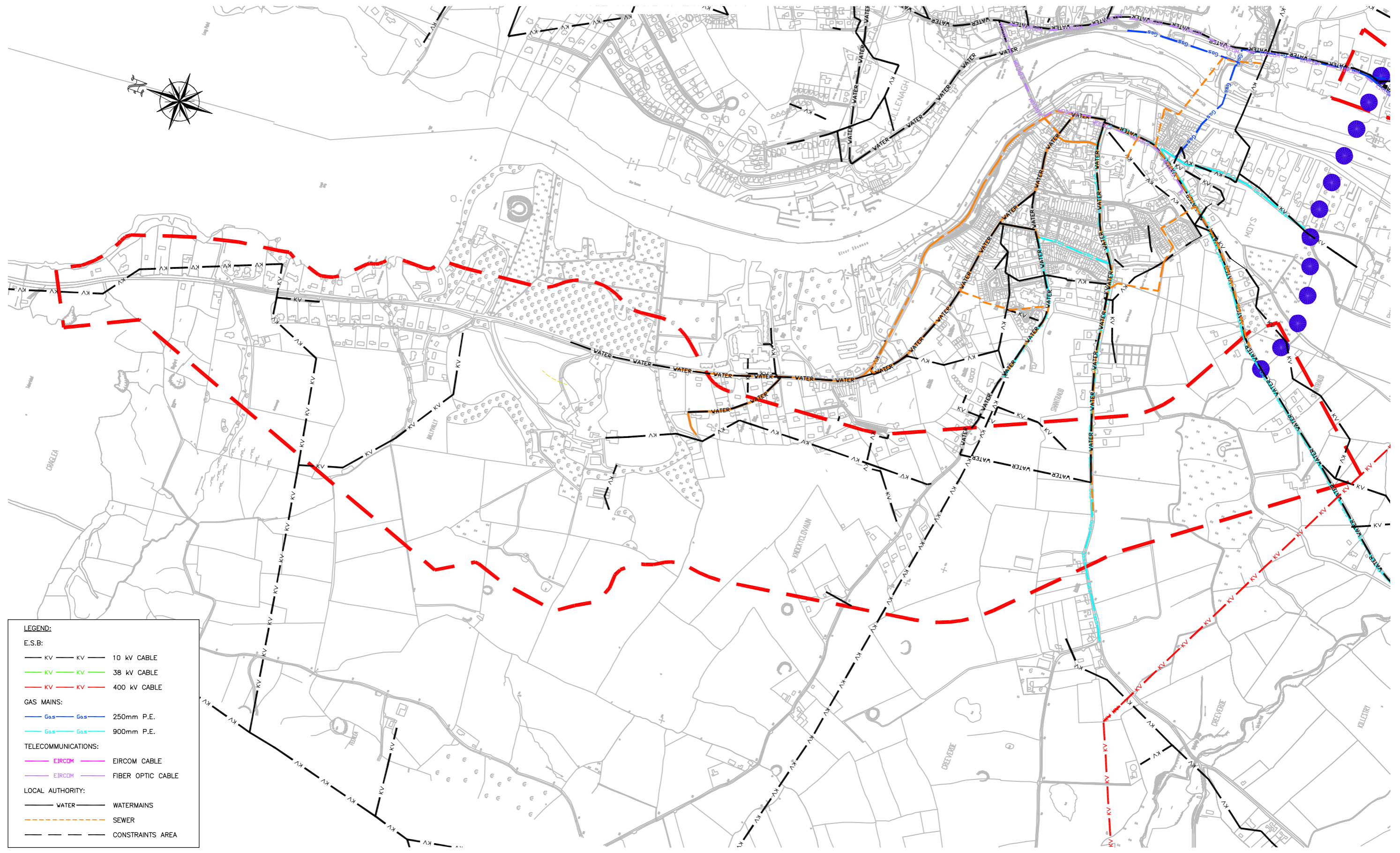
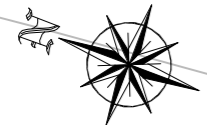
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Project Title				KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT	
Drawing Title				FLOODING & DRAINAGE	
Drawn:	OF	Job No:	07-527	Drawing No:	FIGURE 4.1
Scale:	1:10,000	Date:	JULY 08	Rev:	-



LEGEND:

E.S.B.:

- kv — kv — 10 kv CABLE
- kv — kv — 38 kv CABLE
- kv — kv — 400 kv CABLE

GAS MAINS:

- Gas — Gas — 250mm P.E.
- Gas — Gas — 900mm P.E.

TELECOMMUNICATIONS:

- EIRCOM — EIRCOM CABLE
- EIRCOM — FIBER OPTIC CABLE

LOCAL AUTHORITY:

- WATER — WATERMAINS
- — SEWER
- — CONSTRAINTS AREA

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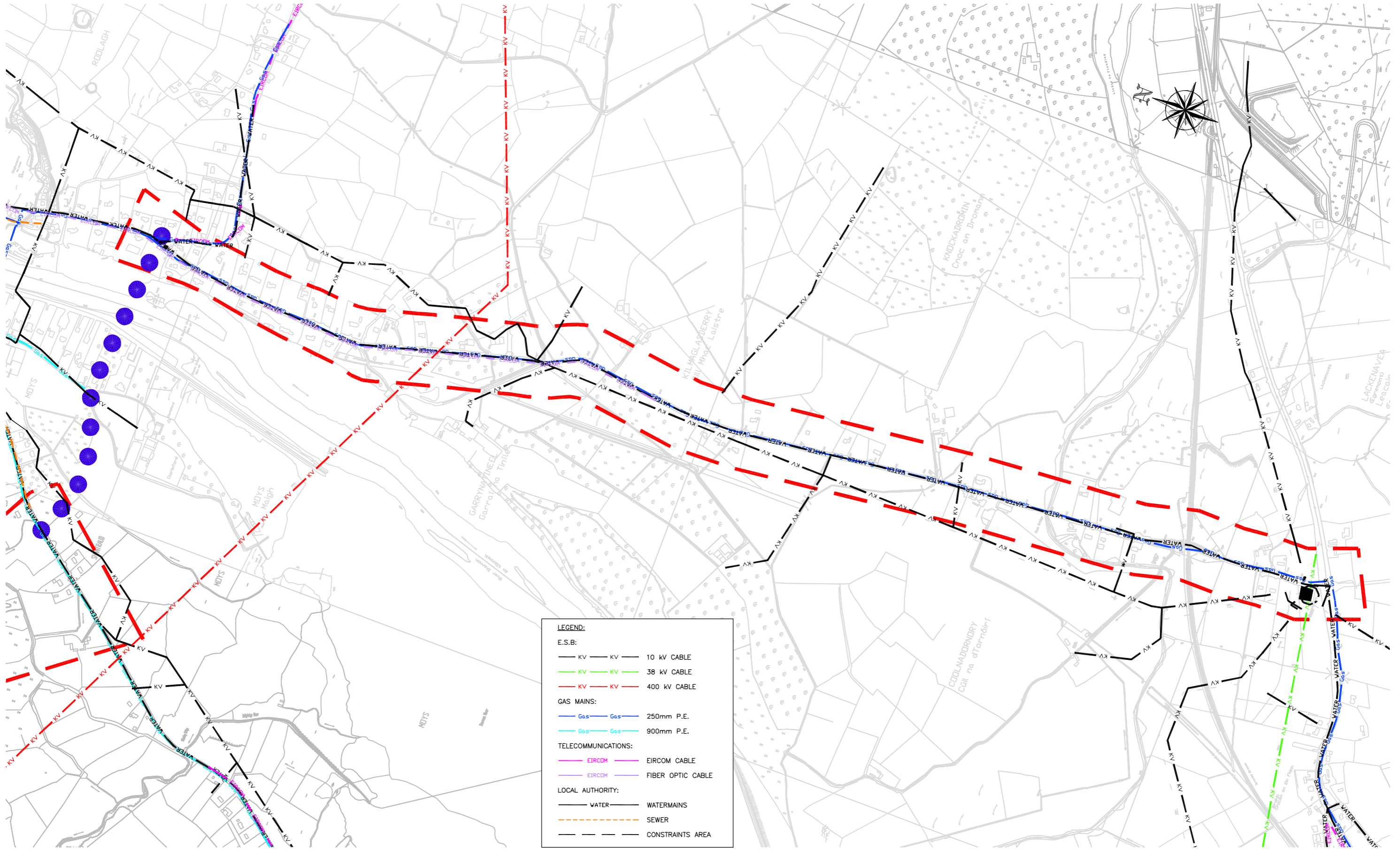
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Project Title				KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title				EXISTING UTILITIES - KILLALOE BYPASS SHEET 1 OF 2			
Drawn:	OF	Job No:	07.527	Drawing No:		Rev:	
Scale:	1:5000 @ A1	Date:	MAY '08	FIGURE 4.2			

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LEGEND:	
E.S.B.:	
	10 kV CABLE
	38 kV CABLE
	400 kV CABLE
GAS MAINS:	
	250mm P.E.
	900mm P.E.
TELECOMMUNICATIONS:	
	EIRCOM CABLE
	FIBER OPTIC CABLE
LOCAL AUTHORITY:	
	WATERMAINS
	SEWER
	CONSTRAINTS AREA

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Project Title	KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT		
Drawing Title	EXISTING UTILITIES - R494 SECTION SHEET 2 OF 2		
Drawn: OF	Job No: 07.527	Drawing No:	Rev:
Scale: (A1) 1:5000 @ A1	Date: MAY '08	FIGURE 4.3	-



5.0 Traffic and Road Accidents

Traffic data collected together with site observations highlights the obvious conflict between the capacity of the existing Killaloe / Ballina Bridge crossing of the Shannon, compared to the traffic demand.



Photo 5.1 Traffic on Ballina side of bridge

To assess the traffic impacts of the proposed Shannon Bridge Crossing a SATURN traffic model was developed by Buchanan Consulting Engineers, as part of the Shannon Bridge Crossing studies including Constraints Study, Route Selection Study (January 2006) and the preparation of the Preliminary Design Report (October 2006). This traffic model was developed following the undertaking of extensive traffic surveys in 2005. This model was developed with the base year of 2005 and traffic forecasts were produced for the year 2022 with and without the proposed bridge link.

Furthermore as part of a sensitivity analysis the model was expanded to consider the impact of a possible western bypass of Killaloe. However this model run was restricted to assessing the through traffic only in relation to the traffic impact on the proposed bridge. In order to fully assess the traffic impacts of the proposed Killaloe Bypass additional traffic surveys and analysis will be required, to take account of the local roads and traffic plus the lands zoned for development.

Additional traffic surveys were commissioned by Roughan & O'Donovan to be carried out by a specialist traffic survey company in March 2008. These traffic surveys were undertaken at the following locations and the results are noted:

- Hill Road, two-way 24-hour traffic volumes of 268 vehicles;
- Shantraud, two-way 24-hour traffic volumes of 1,353 vehicles;
- Abbey Street / Royal Parade junction, peak hour through traffic of 430 vehicles in the AM peak and 570 vehicles in the PM peak.

Based on these additional traffic surveys, taking account of the local traffic and development zoned lands, the traffic model will be updated and refined as part of the future route selection studies.

Accident data was compiled for the study area as part of the Shannon Bridge Crossing Constraints Study Report (May 2005). Table 5.1 below summaries the accident figures for the period 1996 – 2002.

Table 5.1: Accident Figures (1996 – 2002)

	R463	R466	R494	Total
Fatal	2	0	0	2
Serious	3	1	1	5
Minor	17	4	10	31
Total	22	5	11	38
Pedestrian Involvement	4	2	2	8

6.0 Geology and Hydrogeology

6.1 Introduction and Context

This chapter outlines the geological, geotechnical and hydrogeological conditions in the study area. This includes the bedrock and soils types and details of any suspected soft or unstable ground. The data has been collected on the basis of a desk study. No site investigation works have been undertaken to date.

6.2 Sources of Information

The following sources of information were consulted as part of the study:

- Geology of Tipperary. A geological description to accompany the bedrock geology Scale 1:100,000 Map Series Sheet 18'. Geological Survey of Ireland 1996.
- Geological Survey of Ireland, Eastern R B D Subsoils database, 2008.
- Geological Survey of Ireland, Karst Features Database, 2008.
- Geological Survey of Ireland, Draft Vulnerability Maps, 2008.
- Geological Survey of Ireland, Draft Aquifer Maps, 2008.
- Environmental Protection Agency, Local Authority landfill sites in Ireland, 1995 -1997.
- Geological Survey of Ireland, Directory of active quarries, pits and mines in Ireland 2001.

6.3 Receiving Environment

6.3.1 Bedrock

A summary of the geological sequence and main rock types likely to be encountered along the route is shown in Table 6.1. These are based on the available information on the 1:100,000 scale Geological Survey of Ireland map of the area (Sheet 18 Bedrock Geology Map Series for Tipperary (1996)).

The site is shown to be underlain by sandstones, mudstones and limestone of the Carboniferous Age, conglomerates, sandstones, mudstones, grit and claystones of Devonian Age and greywacke of Silurian Age.

The sandstone, limestone, grit and possibly the greywacke rock may be non argillaceous and should meet the NRA specifications for use in road projects. The remaining rock types may be argillaceous and therefore not suitable for reuse below groundwater. This will be further determined following site investigation works.

No significant rock outcrops were identified by the GSI within the study area but there is the possibility of local outcrops.

Table 6.1: Geological formations occurring in the study area

Period	Formation	Rock Types	Excavatability	Dip angle	Map Symbol (where used)
Carboniferous	Lower Limestone Shale	Sandstone, mudstone & thin limestone	Generally Rippable	No Data	LLS
	Ballysteen Formation	Folssiliferous dark grey muddy limestone	Generally Rippable	No Data	BA
Devonian	Old Red Sandstone	Red conglomerate, sandstone, mudstone	Generally Rippable	5° to 20° to the southeast	ORS
	Keeper Hill Formation	Pale and red sandstone, grit & claystone	Generally Rippable	No Data	KH
Silurian	Broadford Formation	Fine to Conglomeratic graded greywacke	Generally Rippable	85° to the northwest	BF

The distribution of various bedrock units along the study area is shown on **Figure 6.1** reproduced from the GSI mapping.

6.3.2 Soils and Subsoil

Information on the subsoil/Quaternary geology of the study area has been obtained from the GSI website.

The following overburden types have been identified by the GSI:

- Made Ground
- Alluvium (undifferentiated).
- Till Derived from Lower Palaeozoic Rocks
- Glacio Fluvial Sands and Gravels

Glacial deposits range from sandy gravelly clay to sands and gravels based on GSI data and information from nearby sites. These deposits do not pose a problem for road construction and for engineering purposes these deposits can be divided into glacial till (fine grained) and glacial till (coarse grained).

Glacial Till (Fine Grained)

Fine grained glacial tills dominate much of the study area.

The depth of the fine grained till occurring within the study area is not known and is likely to vary considerably between 0 and 10m below.

The geotechnical properties of Irish glacial tills are well documented (Hanrahan, 1997). These soils are generally well graded, variable with gravel lenses, with an absence of clay minerals. The clay fraction (rock flour) typically amounts to about 15% and fines fraction (clay and silt) is about 30 to 40%. The glacial tills are generally over-consolidated and therefore possess low compressibility. These soils

are usually firm to stiff, however due to their low plasticity, they are very susceptible to softening and deterioration in wet weather, especially if heavily trafficked. When the clayey tills are kept dry, they present relatively little difficulty to road construction.

Glacial Till (Coarse Grained)

Glacio-fluvial deposits of gravels may be present within the study area.

Gravel materials do not present problems for road construction, provided the road alignment is kept above the water table. Generally, gravels provide good formation for pavement construction and are generally suitable for reuse. Water bearing sand and silt layers, where encountered, can be problematic.

6.3.3 Soft Ground

Alluvium

Alluvial deposits are associated with the River Shannon, its tributaries and streams. These deposits are typically high plasticity silts and clays and may have an amount of organic content. They typically consist of normally or slightly over consolidated silt and clays or fluvial sands and gravels.

Peat deposits

Peat deposits have not been identified in the study area but may be present in small localised areas.

Table 6.2: Typical Soil Properties

Soil Type	Strength	Compressibility	Use as Earthworks
Glacial Till (Coarse Grained)	Good	Low	Good
Glacial Till (Fine Grained)	Variable	Low-medium	Variable
Alluvium	Poor	High	Poor
Peat	Very poor	Very high	Not suitable

6.3.4 Unstable Ground

Karst Solution Features

A search for any Karst features that may be identified within the study area was conducted through The Geological Survey of Ireland Groundwater Department, using their GSI Karst database. The database search was conducted using the online GIS mapping and direct contact with the GSI. The only Karst feature identified near the study area is a "Swallow Hole", located east of Ardnacrusa.

The possibility of undisclosed Karst features along the route cannot be completely discounted but the risk is considered to be relatively low.

Slope Stability

In order to assess the stability of any rock cuttings, it is important to identify the orientation of discontinuities, their condition and also the extent of weathering present, during the site investigation. Steep ground should also be identified. A survey of any previous cases of slope failure in the area of study would prove very useful. Areas of instability may be revealed by examination of local aerial photographs along the proposed route.

The bedrock in the study area may vary in orientation as a result of their sedimentary characteristics and the rock-forming processes. From the available GSI data, the dip

angle of the various rock types varies between 5° to the southeast to 85° to the northwest.

Slopes may be susceptible to cutting instability because of the complex geological structure characterising these rocks (i.e. folds, faults and variable dip). Cutting stability in the rock types described in Table 6.1 would not pose a problem to the road construction provided adequate rock traps were designed and any required rock bolts installed in areas with unfavourable dip orientation.

Mining Areas

The GSI Directory of active quarries, pits and mines in Ireland was consulted for the presence of any such features. The database showed no mining areas within the study area but a metallic mine is located east of the town of Killaloe and a quarry is located east of Birdhill.

6.3.5 Made Ground

Made ground will be present to variable depths in some areas of the project and is usually associated with prior road construction and other developments. The made ground will not be acceptable for road construction as it is typically not an engineered fill but may be suitable for reuse. It is not possible to identify the nature or extent of this made ground prior to field investigation being undertaken.

No pits, quarries or landfill areas are situated in the study area itself.

6.3.6 Groundwater

The Groundwater Map of the GSI was consulted for source protection areas within the study area. None were identified.

6.3.7 Resources

Aquifers

Aquifer Vulnerability data is available from the Groundwater vulnerability maps on the GSI website for the region of the study area. The vulnerability is based on the available depth to bedrock and the type of overburden as shown on Table 6.3.

Table 6.3 Vulnerability Mapping Guidelines.

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	> 3.0m	3.0 - 10.0m	3.0 - 5.0m	> 3.0m	N/A
Moderate (M)	N/A	> 10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	> 10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
 (2) Precise permeability values cannot be given at present.
 (3) Release point of contaminants is assumed to be 1-2 m below ground surface.

The groundwater maps indicate that vulnerability in the general vicinity of the study area to be “High to Moderate” to the west of the River Shannon “High to Low with only an interim study taking place”, in the area to the east of the River Shannon.

Road drainage as well as accidental spillages could potentially have an impact on the quality of the local groundwater. In areas where the road may cross through zones of high aquifer vulnerability, specific design measures for road drainage may be required to prevent surface activity from polluting the underlying groundwater.

6.4 Assessment and Recommendations

Initial evaluation of the site does not indicate any high risk geological or geotechnical constraints in the constraints area investigated.

The proposed development will require to be founded on suitable competent strata and further investigation of the sites is recommended to confirm the ground condition at the exact location of the proposed works. Geophysical survey is also recommended to confirm the ground conditions between boreholes and ensure that the limestone does not have any karstic features and or/high permeability zones.

A monitoring programme for reading of groundwater monitoring installations installed during the initial site investigation is also recommended.

7.0 Socio-Economic Assessment

7.1 Introduction and Context

This chapter outlines the socio-economic profile of the study area. This includes the planning framework and details of the principal centres of population affected by the development. Also included in the study is an overview of present rural and urban areas.

7.2 Receiving Environment

The county of Clare holds a population of 110,950 as documented from Census 2006 resulting in an increase in population of 7.4% from 2002. North Tipperary recorded a population of 66,023 people in Census 2006 an 8.2% increase from 2002.

Approximately 1,035 people live in Killaloe showing a decrease of 11.8% since 2002, while approximately 1,861 people reside in Ballina showing a 57% increase in population for the same time period. Population changes for Killaloe / Ballina should be considered collectively as both towns are interdependent in terms of socio-economic balance.



Photo 7.1 Killaloe Town, viewed the from north east

Linked physically by the Killaloe Bridge across the River Shannon these settlements have a complimentary nature. Killaloe is a small heritage town with appeal for development because of its proximity to Limerick and location on the River Shannon. The town holds historic value as the home of Brian Boru, and has high landscape quality. Situated at the mouth of Lough Derg a number of visitors are attracted to the town.

Ballina is inextricably linked to Killaloe with excellent links to N7 Dublin Road and to Limerick and has undergone significant development in the recent years. Like Killaloe it is rich in heritage and has appeal due to the presence of features such as the River Shannon and Lough Derg.

Given the structure and physical constraints of Killaloe, it is felt that Ballina will absorb much of the development pressure between the towns during the oncoming years.

Community Facilities

Killaloe and Ballina have a number of community services including a police station (Killaloe Police Station), a fire station (in Killaloe), and a number of schools including:

- Killaloe boy's National School
- Killaloe convent of Mercy National School
- Scoil Naisunta, Ballina
- St. Anne's Community College Killaloe.

Churches include St. Flannan's Cathedral and St. Flannan's Church, Killaloe and Church of our Lady and St. Lua in Ballina. There is no hospital situated in Killaloe/Ballina.

Sport, Leisure and Tourist Activities

Playing fields are available at St. Anne's Community College (in close proximity to the proposed River Crossing) with two outdoor multi-purpose courts, a full sized playing pitch and a practice pitch and a running track. GAA Clubs are active in both Ballina (Ballina GAA Club) and Killaloe (Smith O'Brien's). There is an equestrian centre in Ballina and a tennis club in Killaloe.

These clubs and playing fields are an integral part of their respective communities and it is important that any potential interference with these playing fields is kept to a minimum.

Tourism is forefront in the area of Killaloe and Ballina as the area provides a rich and interesting history in an exceptionally beautiful riverside setting with access to Ireland's greatest waterways. It is an important source of revenue in both towns with leisure development in the area largely concentrated on the shores of Lough Derg. Killaloe and Ballina have a complimentary provision of services to meet this demand. Killaloe provides historical and cultural attractions in the historic core and Ballina provides much of the open space, restaurants and car parking on the shores of the lake.

Recreation

Water sports are a popular activity in Killaloe. Boats ranging from rowing boats to Shannon Cabin Cruisers are available for hire; water skiing is also a popular activity. The East Clare Way and the Lough Derg Way both run through the towns and the East Clare Way runs through the constrains study area at the Killaloe Bypass Section of the scheme. Fishing is good along the canal and also boat fishing is popular.



Photo 7.2 Leisure Crafts at Killaloe Canal

Retail, commercial and Industrial Activities

Shannonside Business Park is located on the R494 just outside Birdhill with a number of businesses including Anchor Point Motorhomes, Marine Action boats, National Floor Specialists, The Platinum Touch; a number of units are currently vacant. Fort Henry Business Park and a number of other businesses are also located along this road. A wide range of businesses and commercial activities are located in the towns of Killaloe and Ballina.

Killaloe and Ballina are well served by a range of services and act as the main service provider for the wider area. However, there are limited employment uses and they are increasingly becoming linked satellite towns to Limerick city, resulting in a greater demand for housing in the area.

See **Figure 7.1** for Locations of Community and Business Activities within the study area.

7.3 Possible Effects of the Proposed Development

The proposed development is likely to have a positive effect at a local level. The R494 road improvements will overcome deficiencies along the route. The Shannon River Crossing and Killaloe bypass will improve capacity deficiencies within the towns and reduce journey times for those situated in the affected area. Road infrastructure improvements will contribute to competitiveness and balance of regional development. As previously mentioned access to both community and economic facilities will be improved.

7.3.1 Social Structure

Social Structure is not likely to be strongly impacted by the proposed development.

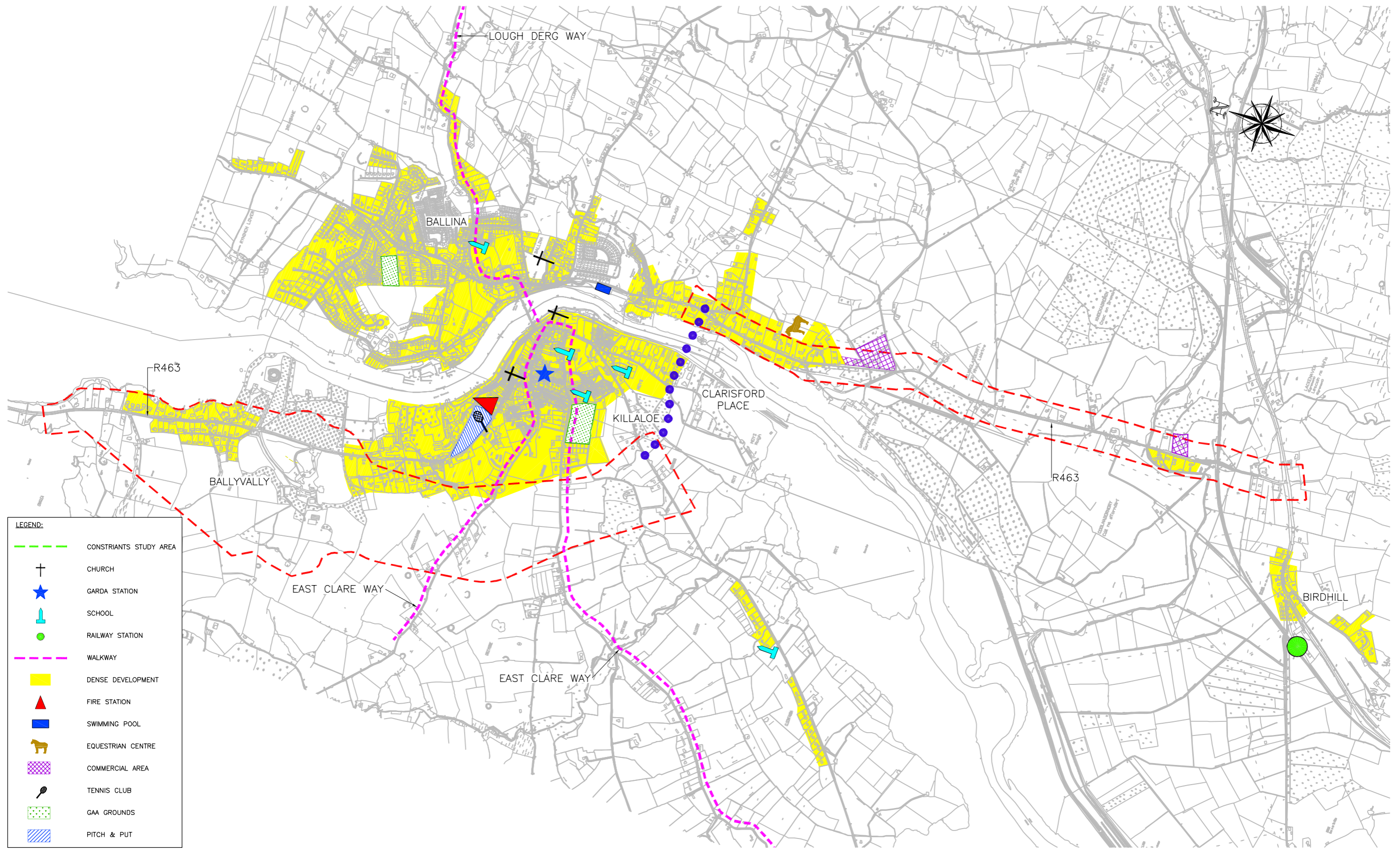
The Ballina Section of the Route is rural in nature for much of its length with one-off housing developments along the route in addition to light industry and business. The Killaloe bypass section is rural in nature and a proposed regional road will provide improved access to this hinterland. The town centres will benefit positively by reduced congestion and ease of movement.

7.3.2 Economic Structure

The economic structure may be affected by land use, business activity and property values. Land prices may also change as a result of improved infrastructure.

7.3.3 Loss of Land

Land take including property is likely to involve the loss of small portions of land used by the community, agricultural land and private land. Impact on residences will be kept to a minimum. In the case of this proposed scheme land take will be by agreement where possible and is not expected to be significant.



LEGEND:

	CONSTRAINTS STUDY AREA
	CHURCH
	GARDA STATION
	SCHOOL
	RAILWAY STATION
	WALKWAY
	DENSE DEVELOPMENT
	FIRE STATION
	SWIMMING POOL
	EQUESTRIAN CENTRE
	COMMERCIAL AREA
	TENNIS CLUB
	GAA GROUNDS
	PITCH & PUT

NOTES:
 (1) EXISTING LEVELS ARE DERIVED FROM OS MAPPING

No.	Revision	Stage	Date	By	Chkd	App'd

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Project Title				KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title				LOCATION OF COMMERCIAL & BUSINESS ACTIVITIES			
Drawn:	OF	Job No:	07-527	Drawing No:		Rev:	
Scale:	1:10,000	Date:	MAY '08	FIGURE 7.1			

8.0 Land Use

The land types included in the constraints study are made up of residential, woodland, wetland, agricultural land, and water bodies.

8.1 Housing and Development

An examination of the records of the Planning Department of Clare County Council and North Tipperary County Council has identified planning granted or applied for within the constraints area. All applied for and granted planning permission applications have been identified in **Figures 8.1 and 8.2**

As part of the East Clare Development Plan 2005 – 2011 future zoning has been identified for Killaloe and can be seen in **Figure 8.3**. The Western Area Local Area Plan for North Tipperary 2006 outlines settlement plans for future zoning for Ballina (**Figure 8.4**) and for Birdhill.

Zoning for Birdhill does not create any constraints for the proposed scheme.

The section of the R494 that is included in the proposed scheme is rural in nature and not included in the zoning for Ballina town. Ribbon development is apparent along the route of the R494 which has inhibited the potential for future cluster development here. Ballina has a potential to develop extensively within the town boundaries. The proposed R494 upgrade does not create constraints to any future cluster development policy that exist in Ballina.

The area identified for the proposed Shannon Crossing is identified in the Local area Plan for Killaloe. This route is surrounded by lands identified as Other Settlement Lands.

Killaloe is listed for controlled settlement growth in the County Settlement Strategy, the town is has limited growth potential due to the need to conserve its historic core and the rise of lands to Sleive Bernagh to the west of the town. The constraints study area for Killaloe Bypass is generally outside of the zoning for Killaloe town (See **Figure 8.3**) with some exceptions. The eastern extent of the study area has been identified as lands zoned residential in R5 and SR1 Strategic Reserve Area. R5 has been identified for residential medium density development of permanent dwellings with a lower density along the western edge to provide a suitable urban edge to the open countryside. SR1 is a strategic reserve of housing land zoned to meet any housing demands during the lifetime of the plan where land already zoned for residential development has been developed or granted planning permission for development and is intended to form the natural progression of development out from the town. There is limited potential for cluster development to the west of the town which can be facilitated by the proposed Killaloe Bypass.

8.2 Commercial/Industrial

Areas of commercial and industrial enterprise are identified in zoning maps for Killaloe and Ballina **Figures 8.3 and 8.4**. All such areas are identified within the town areas and away from the constraints study area. Industrial and commercial lands for Killaloe will be well served by the Killaloe Bypass with link roads to these zones.

8.3 Agricultural

The lands included in the Killaloe constraints study area and lands surrounding the R494 are predominantly agricultural in nature. There will be some severance of lands

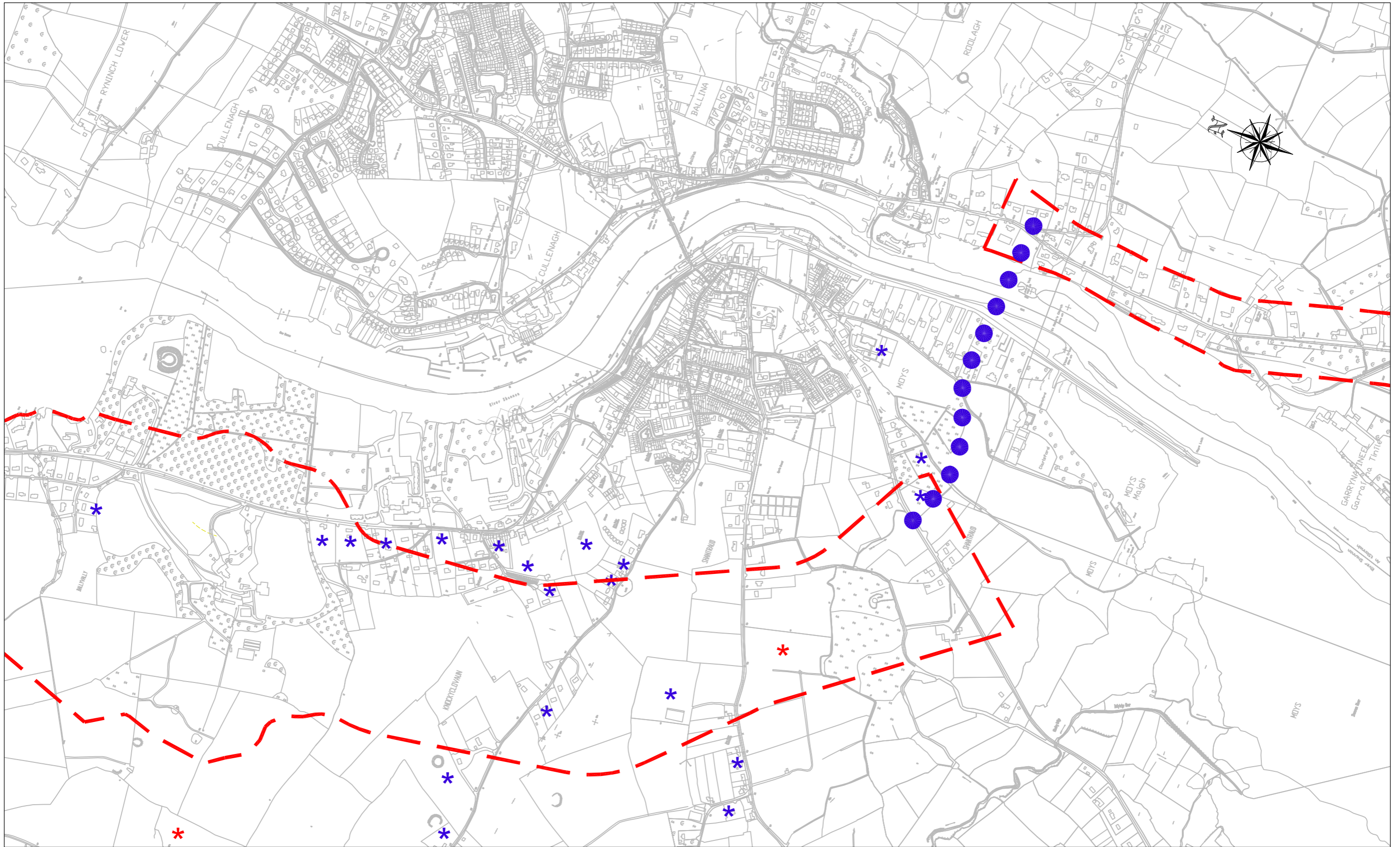
in the Killaloe area and provision will need to be made for access to lands. Cattle are crossed over the R484 to the north of the Kilmastulla River. Provisions for crossings of these cattle will be required as part of the design process.

8.4 Tourism/Amenity

Both towns are well known for their rich association with heritage and culture as well as their strong tourism industry located along the river Shannon. Within the constraints study area a number of protected structures and monuments can be found. In addition the river area is identified as an important boating, cruising and fishing amenity. In Killaloe the study area also includes a number of wooded areas of amenity importance.

8.5 Land Ownership

A land search has been carried out to identify ownership of the land in the vicinity of the potential route. It is inevitable that some private holdings will be impacted by the development, however the scheme will be designed so as to minimise land severance and impact on dwellings.



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NOTES:
(1) EXISTING LEVELS ARE DERIVED FROM OS MAPPING

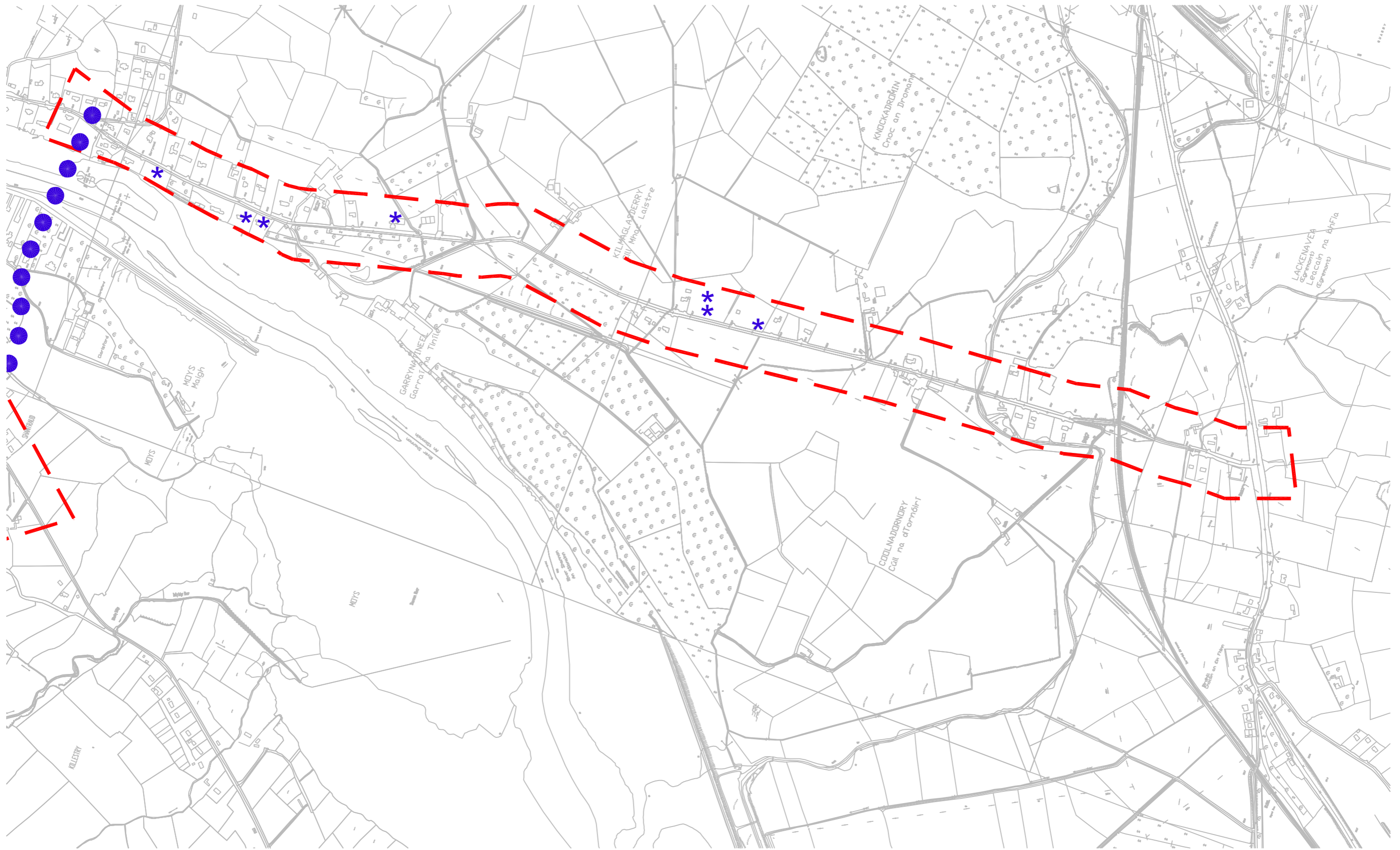
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- * PLANNING PERMISSION GRANTED

No.	Revision	Date	By	Chkd	App'd
	Stage				

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Project Title KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title PLANNING APPLICATION SHEET 1 OF 2			
Drawn: OF	Job No: 07-527	Drawing No: FIGURE 8.1	Rev: -
Scale: 1:5000 (A1)	Date: MAY '08		



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- * PLANNING PERMISSION GRANTED

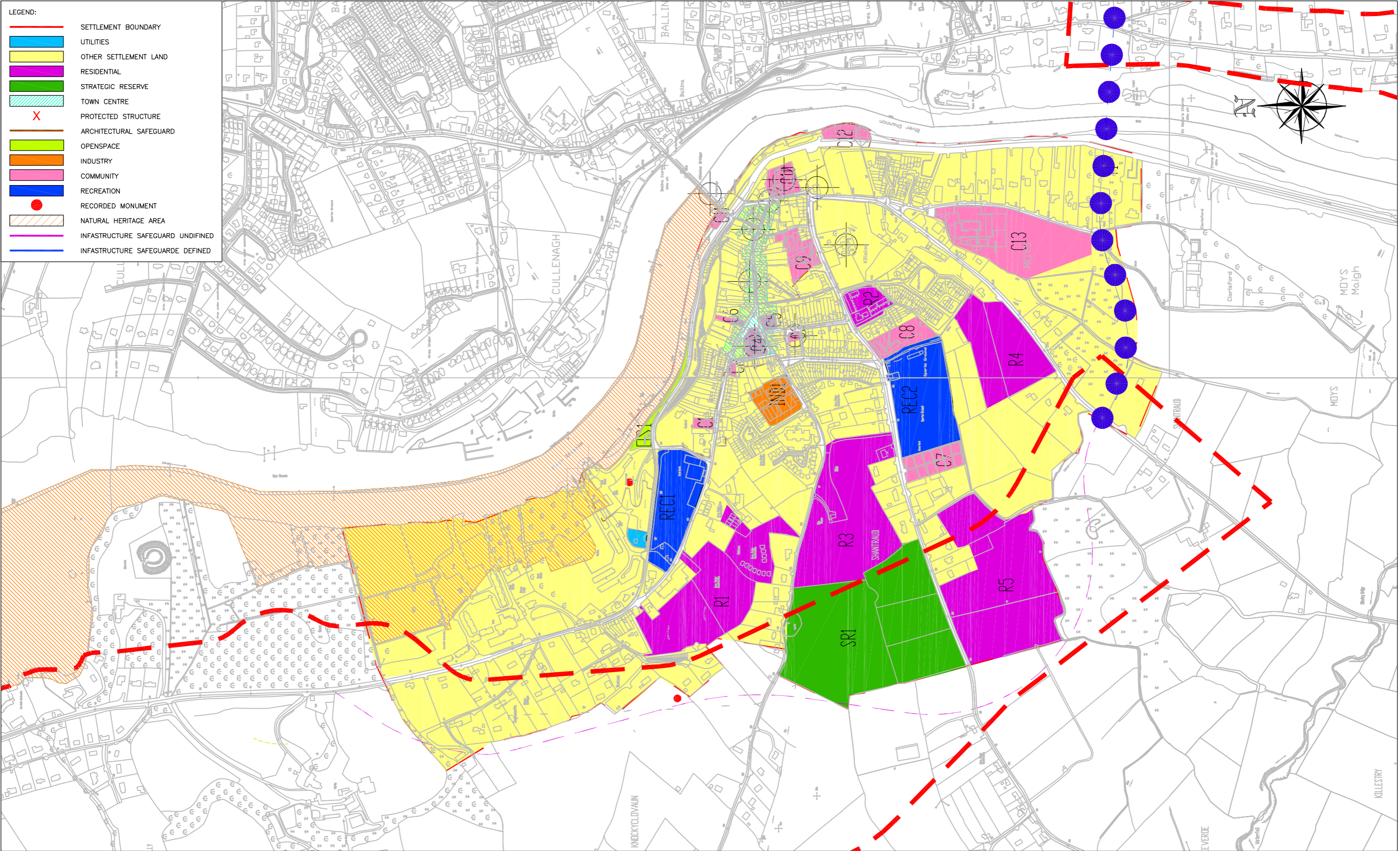
No.	Revision	Date	By	Chkd	App'd
	Stage	Date	Date	Date	Date

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Project Title KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title PLANNING APPLICATION SHEET 2 OF 2			
Drawn: OF	Job No: 07.527	Drawing No: FIGURE 8.2	Rev: -
Scale: 1:5000 @ A1	Date: MAY '08		

- LEGEND:**
-  SETTLEMENT BOUNDARY
 -  UTILITIES
 -  OTHER SETTLEMENT LAND
 -  RESIDENTIAL
 -  STRATEGIC RESERVE
 -  TOWN CENTRE
 -  PROTECTED STRUCTURE
 -  ARCHITECTURAL SAFEGUARD
 -  OPENSOURCE
 -  INDUSTRY
 -  COMMUNITY
 -  RECREATION
 -  RECORDED MONUMENT
 -  NATURAL HERITAGE AREA
 -  INFRASTRUCTURE SAFEGUARDE UNDEFINED
 -  INFRASTRUCTURE SAFEGUARDE DEFINED



NOTES:
(1) EXISTING LEVELS ARE DERIVED FROM OS MAPPING

No.	Revision	Stage	Date	By	Chkd	App'd

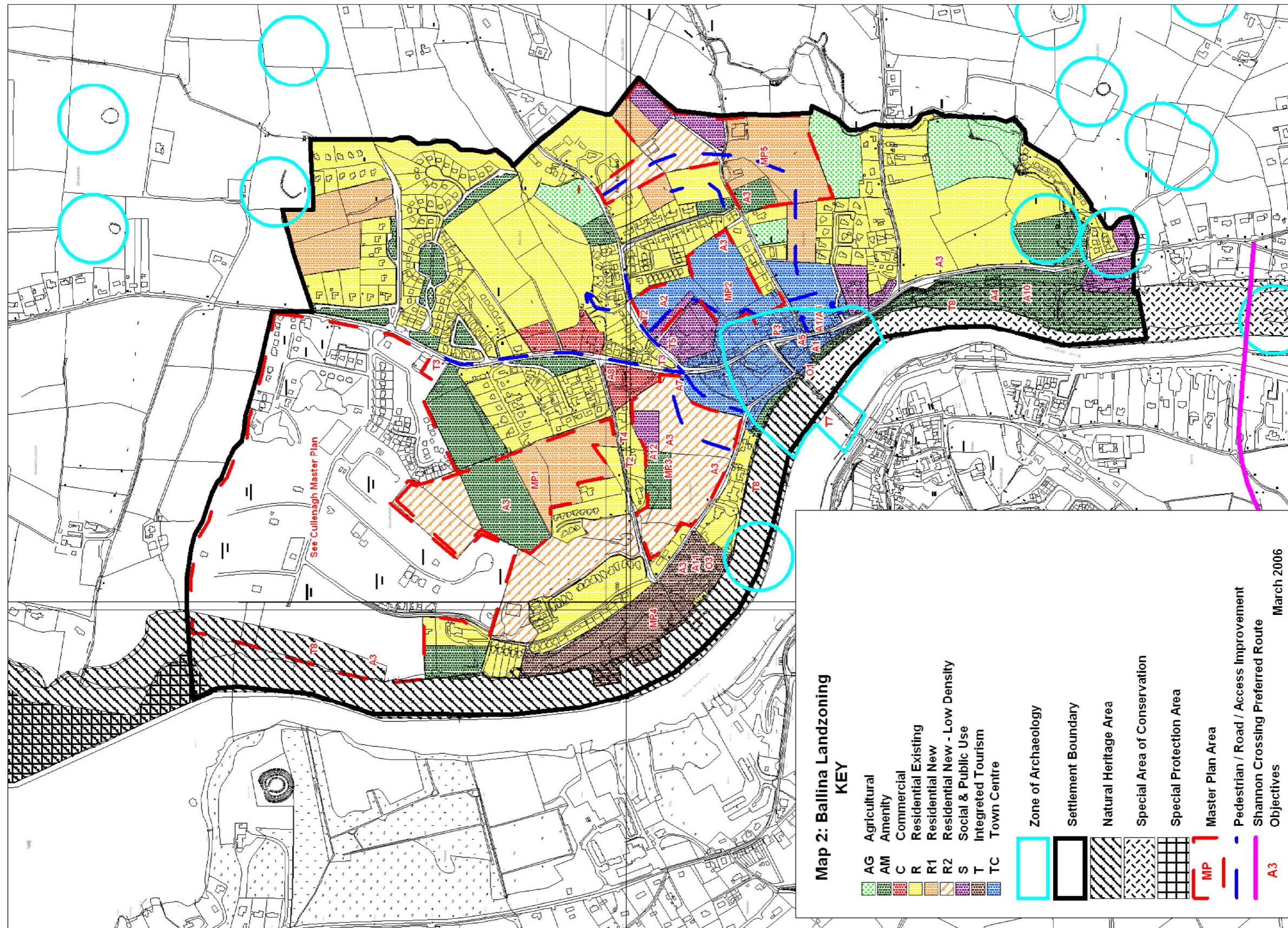
No.	Revision	Stage	Date	By	Chkd	App'd

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Designed: SG Checked: MC Approved: RTP Status: -

Project Title		KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT	
Drawing Title		EAST CLARE DEVELOPMENT PLAN 2005-2011	
Drawn: OF	Job No: 07-527	Drawing No:	Rev:
Scale: (A1) 1:5000	Date: MAY '08	FIGURE 8.3	-



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NOTES:
(1) EXISTING LEVELS ARE DERIVED FROM OS MAPPING

No.	Revision	Stage	Date	By	Chkd	App'd

PRELIMINARY
APPROVAL
TENDER
CONSTRUCTION

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Project Title		KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT	
Drawing Title		WESTERN AREA LAP FOR NORTH TIPP 2006	
Drawn:	OF	Job No:	07-527
Scale:	N.T.S.	Date:	MAY '08
		Drawing No:	FIGURE 8.4
		Rev:	-

9.0 Terrestrial Ecology

9.1 Methods

Information on habitats, flora and fauna were collated following a desk study of the standard ecological literature. Of particular value were the 2005 Constraints Study Report and 2006 Route Selection Report for the Shannon Bridge Crossing Feasibility Study and Preliminary Report. This information is presented again in this report as the area in question will also be affected by the proposed Killaloe Bypass and R494 upgrade sections of the scheme. Information held by National Parks & Wildlife Service of the Department of Environment, Heritage and Local Government was also used. Clare Library and Clare Biodiversity Records Centre were also accessed for information.

A number of statutory bodies were consulted by letter regarding the development and asked to comment on potential constraints within the study area.

9.2 Designated Sites for Conservation

9.2.1 Candidate Special Area of Conservation (cSAC)

The Lower River Shannon (see Figure 9.1)

The Lower River Shannon candidate Special Area of Conservation (code 002165), designated under the EU Habitats Directive includes a large area stretching along the Shannon Valley from Killaloe to Loop Head/ Kerry Head for a distance of 120 km.

The site is selected as a cSAC for Annex I (EU Habitats Directive) habitats of *Molina* meadows on calcareous peat or clayey-silt- laden soils, water courses of plain to montane levels with *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*.

In addition the site is selected for an additional 12 Annex I habitats, however these habitats are associated with saline coastal conditions and are not considered relevant for the purposes of this study.

The site is also designated for a number of Annex II species of the same directive; those occurring in this type of habitat include all three species of Brook Lamprey, River Lamprey and Sea Lamprey, Freshwater Pearl Mussel and Atlantic salmon, Twaite Shad, Pollan and Otter. (See Annex 9.1 for a full description of the Lower River Shannon cSAC).

A number of cSAC sites are also present with 10km of the Study area and are as follows:

Slieve Bernagh Bog (002313)

Situated to the west of Lough Derg and comprising of the Slieve Bernagh mountain range, the site has been selected for blanket bog, wet heath and dry heath, all habitats listed on Annex I of the EU habitats directive. At least two pairs of Hen Harriers occur here and use the cSAC for foraging. This species is listed on Annex I of the EU Birds Directive.

Silvermines Mountains (002258)

Situated north of Keeper Hill, approximately 10km south of Nenagh, this area is selected for Annex I habitats of wet and dry heath and unimproved upland grassland. Up to 11 pairs of Hen Harriers are known to use these uplands.

Glenomra Wood (001013)

This area is a deciduous wood located 10km north of Limerick City and is a good example of deciduous semi-natural woodland (Annex I habitats)

Clare Glen (000930)

On the Limerick -Tipperary border the area consists of mixed broadleaved species of both native and non native species, a number of rare mosses and fungus are also present as is the Killarney fern (Annex II plant species of the EU Habitats Directive).

Keeper Hill (001197)

Keeper Hill is protected due to its presence of intact blanket bog and species rich Nardus grassland both of which are priority habitats under the EU Habitats Directive. Peregrine Falcon (Annex I species) and Red Grouse occur here.

9.2.2 Special Protection Area

Special Protection areas (SPA) are designated for the protection of internationally important populations of birds through the EU Birds Directive of 79/409/EEC.

Lough Derg SPA

Lough Derg SPA is of high ornithological importance as it supports nationally important breeding populations of Common Tern, Cormorant, Great Crested Grebe, Tufted Duck and Black-headed Gull. In winter, it has nationally important populations of Tufted Duck and Goldeneye, as well as a range of other species including Whooper Swan. The site is used on occasions by Greenland White-fronted Goose. The presence of Common Tern, Whooper Swan and Greenland White-fronted Goose is of particular note as these are listed on Annex I of the E.U. Birds Directive.

9.2.3 National Heritage Areas

Lough Derg (pNHA)

This pNHA has six habitats listed on Annex I of the EU Habitats Directive, four of which are priority habitats; in addition the area is important for its breeding and wintering bird populations. Other habitats occurring include semi natural deciduous woodland callow grassland and wooded islands. The site is the only one in the country for Irish Fleabane. Marsh Pea also occurs within the site along with Stoneworth all of which are Red Data Book species. Protected mammals include otter and badgers and aquatic animals include Lamprey, Pollan, trout and Atlantic salmon. White clawed crayfish and Freshwater Pearl mussel are found in many of the rivers to the east of the lake.

A further eight pNHAs are located within 10km of the site

- Gortacullin Bog (24010)
- Bleanbeg bog (2450)
- Knockalisheen Marsh (2001)
- Doon Lough (0337)
- Derrgareen heath (0931)
- Glenomra Wood (1013)
- Clare Glen (0930)
- Keeper Hill (1197)

9.3 R494 and Killaloe Bypass: Description of the Study Area

The R494 section of the study area consists of the existing road way with hedgerows lining much of the road. Ribbon development is evident with a number of residential dwellings located along the road. A number of business can also be seen here namely those located at Shannonside Business Development and Fort Henry Business Development. The hedgerows appear to be in good condition in some areas although poor continuity can be seen as the road progresses towards the town of Ballina and development becomes more frequent. As the route moves eastwards towards the proposed River Shannon crossing, it crosses a small disused plot of agricultural land which has some scrub development. Along the banks of the Shannon River is a good line of Riparian Woodland. Here is an almost continuous strip of Alder and Willow dominated woodlands extending for several kilometres south. This area lies within the Lower River Shannon cSAC.



Photo 9.1 R494 looking northwards

The proposed route then crosses the river Shannon which is designated a candidate Special Area of Conservation. Approaching the banks of the western side of the river the route travels through an area of wetland and scrub land and residential dwelling before joining up with the R463 Small areas of woodland are passed though here which are dominated by semi mature Alder which is of local importance.

The constraints study here widens to encompass a broader area; the land is predominantly made up of agricultural land of small to medium pastoral farming. Some conifer plantations are evident along the southern extents of the constraints study area. As one moves north the lands parcels are poorly divided by hedgerows and stone walls with occasional trees. The hedge systems appear to be of poor connectivity and of little ecological value.

At Ballyvally the mature parklands and hedgerows, together with large stands of trees are of good quality and considered locally important. This section of the study area also provides connectivity to the treelines and sections of mixed woodlands along the shore of the Shannon to the east and west of the R463.



Photo 9.2 River Shannon and its eastern fringes



Photo 9.3 Agricultural lands west of Killaloe

9.4 Likely Conservation Interests within the Study Area and Potential Constraints

9.4.1 Habitats and Flora

The primary areas of ecological interest would be those along the riverbanks of the Shannon and Canals and woodlands present to the north and south of the Killaloe

bypass section of the scheme. Crossing of the Shannon River is also considered an important area in terms of ecological viability as the area is protected and maintains excellent populations of a number of species of flora and fauna.

Much of the greenfield areas consists of agricultural land with stonewalling and poor connectivity, such habitat type are common to Ireland and not considered to be of ecological importance.

Woodlands and wetlands that are within the constraints study area are likely to be of local conservation interest.

Known plants of conservation interest within a 10km grid have been identified and accessed via the NPWS website. The rare and legally protected Opposite Pondweed has previously been identified along Killaloe Canal.

Known habitats along the Shannon River Crossing include Alder Woodland immediately west of Killaloe Canal, the area is considered to be of moderate Value and locally important. Riparian Woodland on the eastern Banks of the River Shannon to the south of Ballina is classified as high value and locally important for its semi natural habitat with high biodiversity.

9.4.2 Fauna

The following mammals are known or are likely to occur within the constraints study area; otter, badger, bat species, pine martin, Irish hare, red squirrel, stoat, pygmy shrew, hedgehog. Full surveys for mammals will be included at later stages of the process in conjunction with the EIS.

Badger tracks have been identified along the Shannon Bridge Crossing section of the study. In addition the habitats of woodlands and wetlands on the east section of the crossing are very suitable to bats, red squirrel and pine martin. Any houses in this area should be surveyed for bats prior to works carried out.

In addition a number of birds have been recorded in a 10km grid including corncrake, lapwing, curlew and barn owl and the cuckoo has been identified within the Clare Biodiversity Records. Previous surveys have also noted the presence of the Kingfisher along the Killaloe Canal. The presence of many birds and the suitability of habitats within the study area for these species can be determined through field survey work and through consultation with Birdwatch Ireland during the Route Selection phase of this scheme.

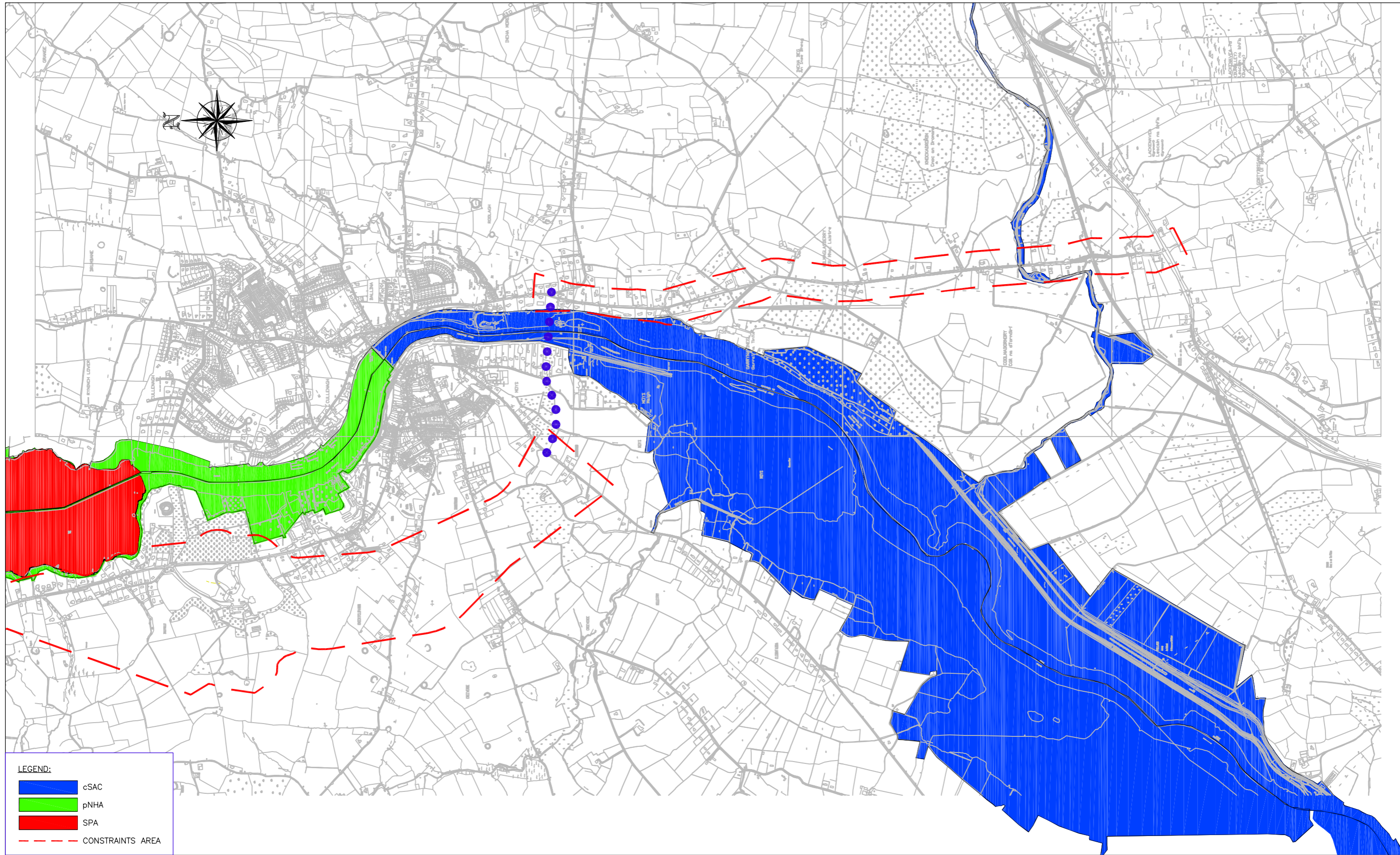
9.5 Conclusion and Recommendations

Primary areas of conservation interest known for the Scheme are located along the proposed Shannon River Crossing where the route crosses over cSAC designated land. With regard to the R494 Section care should be taken in the design of the crossing for the Killmastulla River which also makes up part of the Lower River Shannon cSAC.

For the Killaloe Bypass section, to the north of Killaloe and to the east of the existing R463 lands are either designated as pNHA lands or possess habitats of regional importance. This area should be considered for any tie-in to the northern section of Killaloe

Other areas identified that provide constraints are the woodlands and riparian vegetation along the river and woodlands to the south east and north of Killaloe town.

Providing a sensitive approach is taken with route selection which will minimise fragmentation, impacts to the local ecology can be minimised.



LEGEND:

- cSAC
- pNHA
- SPA
- CONSTRAINTS AREA



NOTES:
 (1) EXISTING LEVELS ARE DERIVED FROM OS MAPPING

No.	Revision	Date	By	Chkd	App'd
	Stage				

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Project Title		KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT	
Drawing Title		CONSERVATION DESIGNATION	
Drawn:	OF	Job No:	07-527
Scale:	1:5000	Date:	MAY '08
		Drawing No:	FIGURE 9.1
		Rev:	-

10.0 Aquatic Ecology

10.1 Methodology

Screening of the Study Area has identified the potential significant impact on the aquatic environment. This chapter highlights the potential constraints relating to the aquatic environment of Killaloe/Ballina.

10.2 Existing Environment

Within the constraints study area the proposed scheme will involve crossing up to 12 watercourses including the Killmastulla and Shannon River. There are 5 other watercourses crossing the R494 with an additional 5 within the Killaloe Constraints study area. The Killmastulla and Shannon River alone are considered to be of fisheries importance

The Killmastulla River rises in the Silvermines mountains and flows into the river Shannon just northwest of Birdhill. It is an important salmonid river and also is known for spawning ground for sea lamprey.

The crossing of the river Shannon is identified as an important constraint and has been previously investigated as part of Constraints and Route Selection studies for the Shannon Bridge Crossing. This work is also referred to in this report as the areas in question will be affected by the R494 and Killaloe Bypass section of the Scheme.



Photo 10.1 River Shannon south of Killaloe/Ballina towns

Lower River Shannon cSAC

The lower river Shannon runs through the constraints study area for the scheme and is a designated candidate Special Area of Conservation (cSAC). In addition the Killmastulla River is an important tributary of the Shannon and is also designated as an cSAC. The lower River Shannon is selected for a number of species listed on Annex II of Council Directive 92/43/EEC

- River Lamprey
- Brook Lamprey
- Sea Lamprey
- Atlantic Salmon

The Lower River Shannon cSAC also holds the Freshwater Pearl Mussel (Annex II of the Habitats Directive); however the Freshwater Pearl Mussel is not known for Lough Derg or the River Shannon, while the Mussel is likely to be found in its tributaries.

The Shannon is identified as an important fishery and the main fish of commercial and amenity value within the Study area are salmon, pike, perch, bream, brown trout, eels and coarse fish hybrids.

Killaloe is one of the busiest fishing and boating centres in the Midwest and is a starting point for the Shannon cruise.

Zebra mussels are known to Lough Derg and the River Shannon. The Zebra Mussel may have been introduced to the lake system as early as 1994. The mussels impact aquatic systems by reducing concentrations of planktonic algae and particulate matter in the water leading to an increase in water transparency. The mussels have an important influence on the concentrations of nutrients which cause eutrophication, on water transparency and on concentrations of chlorophyll.

Studies show that there has been reduction in the level of eutrophication, increased chlorophyll concentrations and reduced water transparency which is possibly linked to the introduction of the mussel.

10.3 Potential Impacts of the Proposal

Operational Impacts

The bridge crossing of the Killmastulla River will have to take into consideration the impacts to salmonids species and lamprey. The construction phase of all water crossings will need to mitigate against pollution events. As a pre-existing bridge is located in this area it is unlikely that risks to the river in terms of any long term operational phase impacts will increase, and this will be ensured in the design of the scheme.



Photo 10.2 Killmastulla River

The River Shannon near Killaloe is physically unsuitable for spawning by salmon trout or lamprey, and some coarse fish spawning may take place. However more suitable areas for this purpose are located in the reservoir and Lough Derg. Some adult and juvenile salmon pass through this area but the area is not used for angling for this species. Pollan has been recorded in small numbers as bycatch in eel nets operated at Killaloe Bridge however it is thought that these fish are washed out of Lough Derg itself, the main habitat for the species. No suitable spawning habitat for this species is thought to occur along the affected stretch of the river or in downstream areas.

During operational phase of the Scheme there is potential for runoff of pollutants from road surfaces. The pollutants of most concern in roadway runoff vary greatly but may include hydrocarbons, sediments, metals and salts and nutrients. Accidental spillages along the road surfaces may occur and can consist of almost any polluting substances with varying impacts.

There is one watercourse at Craglea on the Killaloe side of the Constraints Study Area (**See Figure 4.1**). This is a small river and may hold some riparian habitats of significance. Care should be taken in the design of the river crossing in order to minimise impacts on the system and that of the Lough Derg which the River flows into.

Construction Impacts

The construction phase of the Scheme will have potential impacts on the Lower Shannon cSAC, Killmastulla River and other unnamed rivers. These impacts may include suspended sediment due to runoff of soil from the construction area. It is known from laboratory studies that fish may avoid sediment plumes implying that migration route for fish may be blocked if the concentrations of suspended solids are too high. Suspended sediment due to runoff of soil from construction areas, or due to disturbance of fine sub-surface sediments in the course of instream construction and excavation, can have severe negative impacts on invertebrate and plant life and on

all life stages of fish. Other substances associated with the construction process such as raw or uncured concrete and grout, runoff from exposed aggregate surfaces, cast in place concrete and concrete trucks fuels lubricants and hydraulic fluids used on the construction site can lead to pollution events.

11.0 Archaeological and Cultural Heritage

This report has been compiled by TVAS (Ireland) Ltd. It discusses the archaeological and cultural heritage potential of the lands currently under study for the proposed scheme and identifies the issues this potential presents for the proposed development. Locations of significance can be seen in **Figure 11.1 and 11.2**

11.1 Methodology

Desk-based study of the existing archaeological records and other potentially relevant literary and cartographic sources was undertaken in order to compile this study. The following sources of information were used as part of the study:

- Record of Monuments and Places
- Sites of Monuments Records (SMR)
- Sites listed in the Register of Historic Monuments
- National Monuments (as identified by the National Monuments Services (NMS) of the Department of Environment, Heritage and Local Government (DoEHLG))
- Topographical files of the National Museum of Ireland
- Cartographic sources
- Other documentary Sources
- Record of Protected Structures in County Clare (RPS) and County Tipperary (North Riding)
- National Inventory of Architectural Heritage of County Tipperary and County Clare
- County Clare Development Plan 2005-2011
- County Tipperary (NR) Development Plan 2005-2011

11.2 Archaeological Heritage

Recorded Monuments

Five recorded monuments were identified within the constraints study area. These sites are indicated on the accompanying mapping (**Figure 11.1 and 11.2**)

Table 11.1: Recorded Monuments within the Constraints Study Area

Reference No.	Townland	Monument type	NGR	Information Source
CLO45-027	Knockyclovaun	Enclosure	16880/17318	RMP
CL045-057	Knockyclovaun	Aerial photograph circular enclosure	16928/17311	RMP
CL045-057	Creeveroe	Standing stone	16897/17292	RMP
CL045-029	Creeveroe	Standing stone	16899/17289	RMP
CL045-030	Creeveroe	Standing stone	16906/17311	RMP

None of the above listed monuments have National Monument or Registered Historic Monument Status.

The above enclosure at Knockyclovaun identified is likely to be of prehistoric or early medieval date. Three standing stones identified are most likely to be of prehistoric date and should be considered both individually and as a group with significance within the landscape.

It is prudent to briefly examine monument in the vicinity of the study area in order to form a more complete picture of the archaeological character of the area. Within 500m of the study area a further 32 monuments are listed on the Record of Monuments and Places (see **Figure 11.1 and 11.2**).

The majority of sites listed within 500m of the study area are either enclosures or ringforts and are likely to be of early medieval date, although some could potentially be prehistoric monuments. Of particular note is Bealboru (CL0345-031), a large ringfort on the western bank of Lough Derg that is reputed to have been the stronghold of Brian Boru. This site was excavated in the 1960's and produced a wealth of archaeological material of early medieval and medieval date.

Other monuments in the vicinity are standing stones, a mound, an earth work, holywells, a cross site, a castle, churches and burial grounds, an early historic house and the historic towns of Killaloe and Ballina. The churches include the original location of the monastic site of St. Lua that formerly stood on Friar's Island in the Shannon but was moved to Killaloe town when the island was flooded as part of the development of Ardnacrusha hydroelectric power station in 1929. Together the monuments provide evidence of activity either side of the Shannon dating from the prehistoric through to the modern period.

Stray Finds from the National Museum of Ireland

The topographical files of the National Museum of Ireland indicate the findspots of archaeological artefacts. These are often not very specific locations and commonly simply indicate the townland in which the artefact was found.

A number of polished stone axeheads have been found in Killeestry and Creeveroe. Knockyclovaun has uncovered possible whetstone. Ballyvally has shown a wealth of finds including shoe buckles, sword and crannong blades, spearheads, arrowheads, axeheads and spears.

In Tipperary stone axeheads have been uncovered in Roolagh and Knockadromin.

Previous excavations

The results of archaeological investigations in Ireland are published in summary form in Excavations (Bennett 1987-2004). A search of the database was made for in the townlands within the constraints study area. Other than two sites located outside the constraints study area, the remaining investigations did not produce archaeological material.

The following excavations are relevant for this constraints study:

- Ballyvally, 00E314, 00D020, 00R069: no archaeological significance
- Knockyclovaun 00E0113, *fulacht fiadh* NGR 1700/1729, not excavated
- Creeveroe 02E1594, 02E1759, 03E0485, no archaeological significance
- Shantraud 99E0172 Romanesque cathedral doorway
- Moys/Roolagh 97E0135 no archaeological significance

Areas of Archaeological Potential

The Killaloe- Ballina crossing of the River Shannon has been significant from the prehistoric period onwards. Records of a bridge in this location go back to at least the 11th century.

The name Killaloe derives from the church of Lua or Molua, the saint who gave his name to the diocese, parish and town of this name. The town owes its origin to the sixth century monastic establishment of St. Lua, which first stood on a small island in the Shannon, about 1km downstream from Killaloe bridge and later was moved to more spacious ground on the mainland opposite. Killaloe is associated with Brian Boru who ruled from there as King of Ireland. The town continued to prosper during the medieval and post medieval periods and played an important role in 17th century conflicts.

The historical importance of the area around Killaloe and Ballina should be recognised. There is the potential for unrecorded sub-surface archaeological site relating to prehistoric, early medieval or later occupation, or indeed industrial or military activities nearby, within part of the study area.

Shores of Lough Derg

The western shores of Lough Derg falls within the study area at the northern end of Killaloe bypass and the eastern shore of the River Shannon is similarly included at the northern end of the R494 realignment.

Whilst there are no specific archaeological monuments recorded with either of these zones, rivers and lakes are generally considered to be of high archaeological potential. Intensive activity in this particular area throughout the prehistoric and medieval periods is attested to by the number of artifacts listed in the files of the National Museum of Ireland as having been recovered from this part of the River Shannon and Lough Derg, in addition to the concentration of monuments in the vicinity.

The river and lough shores themselves may be the repositories of artefacts previously deposited in the water, and the fields immediately adjacent have potential to contain subsurface evidence of prehistoric or later settlement or other activity.

The area of shore on the eastern edge of the River Shannon lies immediately opposite the island on which the original monastic settlement of St. Lua and therefore has the potential to contain related medieval features.

The archaeological potential of the river crossing itself has been identified in the previous study for the selection of the crossing point.

11.3 Architectural Heritage

A single protected structure was identified with the constraints study area. Additionally, a neighbouring property, although not protected, was identified as being of architectural merit. The County Clare Architectural Conservation Officer concurs that, in the absence of a National Inventory of Architectural Heritage for County Clare, it would remiss not to include Ballyvally House within the inventory shown in Table 11.2.

There are two unprotected properties in Co. Tipperary that are recorded on the National Inventory of Architectural Heritage as being of architectural merit.

These sites are indicated on the accompanying mapping (**Figure 11.2 and 11.3**) and are also shown below in Table 11.2

Table 11.2 Architectural Heritage Sites within the Constraints Study Area

Ref No.	Townland	Site Type	NGR	Source	Importance / Legal Status
RPS 440	Ballyvally	Gate Lodge	169283/173914	RPS Co. Clare	Regional
-	Ballyvally	House 18 th Century	169100/173920	-	None yet
RPS 441	Moys	House 18 th Century	170181/171905	RPS Co. Clare	Regional
TN-58-R-707715	Garrynatineel	House 18 th Century	170803/171426	NIAH	None
TN-58-R-705711	Garrynatineel	House & Gardens 18 th Century	170617/171143	NIAH	None

RPS 440 Ballyvally House Gate Lodge (RPS 440) (NGR 169283/173914). Detached three-bay single story gate lodge c. 1820 with lancet-arched openings. The structure is at the gateway to Ballyvally House and comprises four stone-cut piers with moulded capping, globe finials and curved walls having square-headed pedestrian gate with keystones.



Photo 11.1 Gate Lodge to Ballyvally House

Ballyvally House (NGR 169100/173920) is at the earliest an 18th century structure and is mentioned in *Houses of Clare* (Weir 1999, 32). The house is described as:

“... a square, double pile, two story, three bay, gable-ended house, facing north, with a central front door. There are tow bay, single storied wings with bowed ends on

either side of the front. Each of the first floor windows just out on either side of the Ionic pillared porch. There are fine coach and utility houses facing the yard, which adjoins the rear of the house. The bowed gateway has niches and the quadruple pillars are surmounted by square banded globes. The driveway curves its way up to the house."

RPS 441 Clarisford Palace (RPS 411) (NGR 170181/171905) is described as a detached five-bay three story over basement Bishop's Palace built 1771-79. The property was sold by the Church of Ireland in 1977. The palace is described by Lewis (1837) as:

"...finely situated in a highly improved demesne, near the only ford across the river into this county from that of Tipperary; the mansion is handsome and of modern appearance and, though small, forms a pleasant residence."

TN-58-R-705711 Fort Henry (NGR 170617/171143). Elements of the core landscape seen on the 1836 -1846 Ordnance Survey map are visible in the aerial photography taken by the National Inventory of Architectural Heritage, but are in a degraded condition. The peripheral landscape of the site shows little similarity with the features seen on the Ordnance Survey maps.

11.4 Cultural Heritage

Townland names

Townland names provide information regarding topography and social activity. These are given below.

- Craglea, *Carraig Liath* 'grey rock'
- Ballyvally *Baile Uí Mhothla* 'homestead of the Mohilly (or Moakley) family'
- Knockyclovaun *Cnoc Uí Chlumháin* 'O'Chlumháin's hill' or possibly 'hill of the buzzard'
- Creeveroe *Craobh Rua* 'Red branch'
- Shantruad *Sean tSráid* 'old street' reputedly the road or street to Brian Boru's palace
- Killestry *Cill Aistire* 'church of the doorkeeper' (porter)
- Roolagh *Rualach* meaning not known
- Garrynatineel *Garraí na Tiníle* 'garden of the lime-kiln'
- Kilmaglasderry *Cill Mhac Laistre* 'church of the son of Laister'
- Knockadromin *Cnoc na Dromainne* 'the hill of the mountain ridge'
- Coolnadornory *Cúil na dTornóirí* 'corner of the woodturners or 'carpenter's corner'
- Gortybrigane *Gort Uí Bhriagáin* 'Brigane's field' or possibly 'field of the standing stone' as *breagan* in some part of the county refers to a standing stone
- Lackenavera (Egremont) *Leacain na bhFia* (Egremont) 'the hillside of the deer' or Flagstone of the Deer

Townland Boundaries

Townlands are an important landscape feature. There, the smallest recorded land divisions, are often of great antiquity and pre date parishes and counties. Townland boundaries commonly utilise natural features such as stream, follow routeways, or are recognisable as substantial field boundaries that are easily distinguishable from the smaller field divisions.

Townland boundaries within the constraints study area in County Clare include

- Craglea/Ballyvally.
- Ballyvally/Knockyclovaun,
- Knockyclovaun/Creeveroe,
- Creeveroe/shantraun
- Creeveroe/Killertry
- Shantraud/Killertry

Townland boundaries within the constraints study area in County Tipperary include:

- Roolagh/Garrynatineel
- Garrynatineel/Kilmasglasderry
- Kilmaglisderry/Knockadronim
- Knockadronim/coolnadorory
- Coolnadorory/Gortybrigane
- Gortybrigane/Lackenavera

11.5 Summary and Conclusion

Five archaeological monuments, five architectural structures and two areas of archaeological potential have been identified within the constraints area. These sites are summarised in Table 3.

Table 11.3 Summary of Archaeological, Architectural and Cultural Heritage within the Constraints Study Area

Legal Status	Townland	Site type	Information Source
Recorded Monument	Knockclovaun	Enclosure CL045-027	RMP
Recorded Monument	Knockclovaun	Aerial photograph circular enclosure CL045 028	RMP
Recorded Monument	Creeveroe	Standing stone CL045-028	RMP
Recorded Monument	Creeveroe	Standing stone CL045-029	RMP
Recorded Monument	Creeveroe	Standing stone CL045-030	RMP
Protected structure	Ballyvally	Gate Lodge RPS 440	RPS Co. Clare
None	Ballyvally	House 18 th century	Cartographic sources, documentary sources
None	Moys	House 18 th century	RPS Co. Clare
None	Garrynatineel	House 18 th century	NIAH
None	Garrynatineel	House & gardens 18 th century	NIAH
None	Craglea / Ballyvally	Area of significant archaeological potential: Shore of Lough Derg	RMP, NMI topographic files, cartographic sources

Table 11.3 Summary of Archaeological, Architectural and Cultural Heritage within the Constraints Study Area contd.

Legal Status	Townland	Site type	Information Source
None	Roolagh / Garrynatineel	Area of significant archaeological potential: Shore of River Shannon	RMP, NMH topographical files, cartographic sources

Archaeological Heritage Constraints

The five previously recorded monuments within the study area comprise three standing stones and two enclosures. These features and additional monument in the vicinity indicate that the area was occupied during the prehistoric period and into early medieval period. Stray finds of artefacts in the area, particularly in and on the edges of the River Shannon and Lough Derg provide further evidence of this activity.

The archaeological monuments have statutory protection under the National Monuments Acts and preservation in situ is the preference of DoEHLG for such monuments.

The proposed road development within the constraints study area has the potential to impact on archaeological deposits with no surface expression. The National Monuments Act provides protection of these potential sites. Archaeological testing may be a requirement of the local authorities and national bodies such as the National Monuments Service of the DoEHLG and the National Museum of Ireland. Two areas of significant archaeological potential have been identified along the banks of Lough Derg and the River Shannon

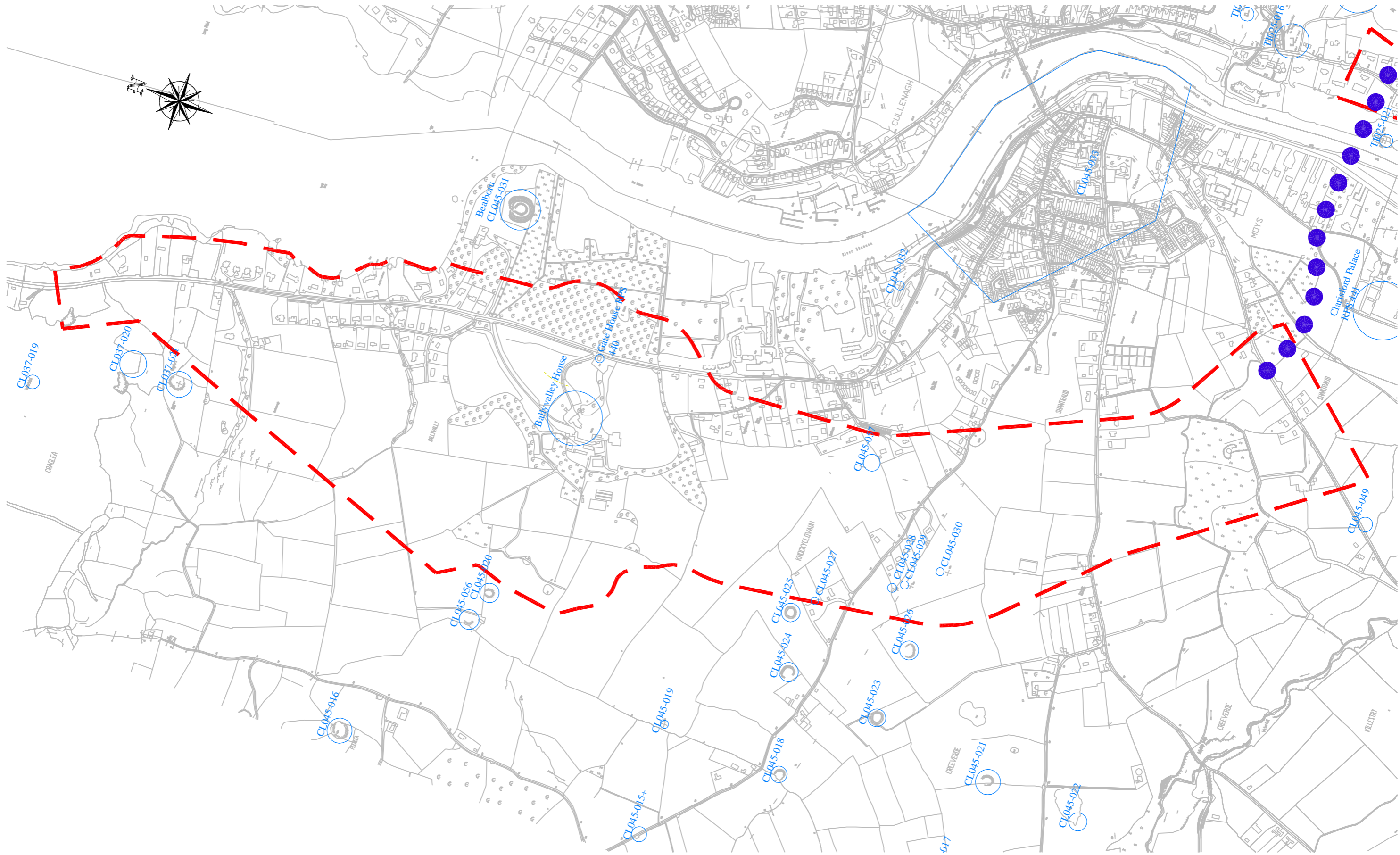
Architectural Heritage Constrains

Ballyvally House Gate Lodge and Clarisford Palace are protected under the County Clare Development Plan 2005-2011 as part of the specification of the Planning and Development Act 2000. Under current legislation, a structure and its curtilage and other structures within the curtilage and their interiors are protected. The extent of that curtilage needs to be determined on a case by case basis as described in Architectural Heritage Protection: Guidelines for Planning Authorities (2004).

It should be also taken into account that Ballyvally House, Gortna House and Fort Henry are important architectural structures and, although not subject to specific protection, should be considered to be of archaeological merit.

Cultural Heritage Constraints

The townland divisions within the study area should be considered to be of potential heritage value. Field inspection of the townland boundaries will identify which if any, are potentially early landscape features.



NOTES:
 (1) EXISTING LEVELS ARE DERIVED FROM OS MAPPING

LEGEND:
 CL045-017 SITE LOCATION & REFERENCE NUMBER

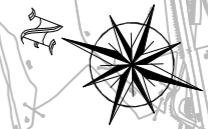
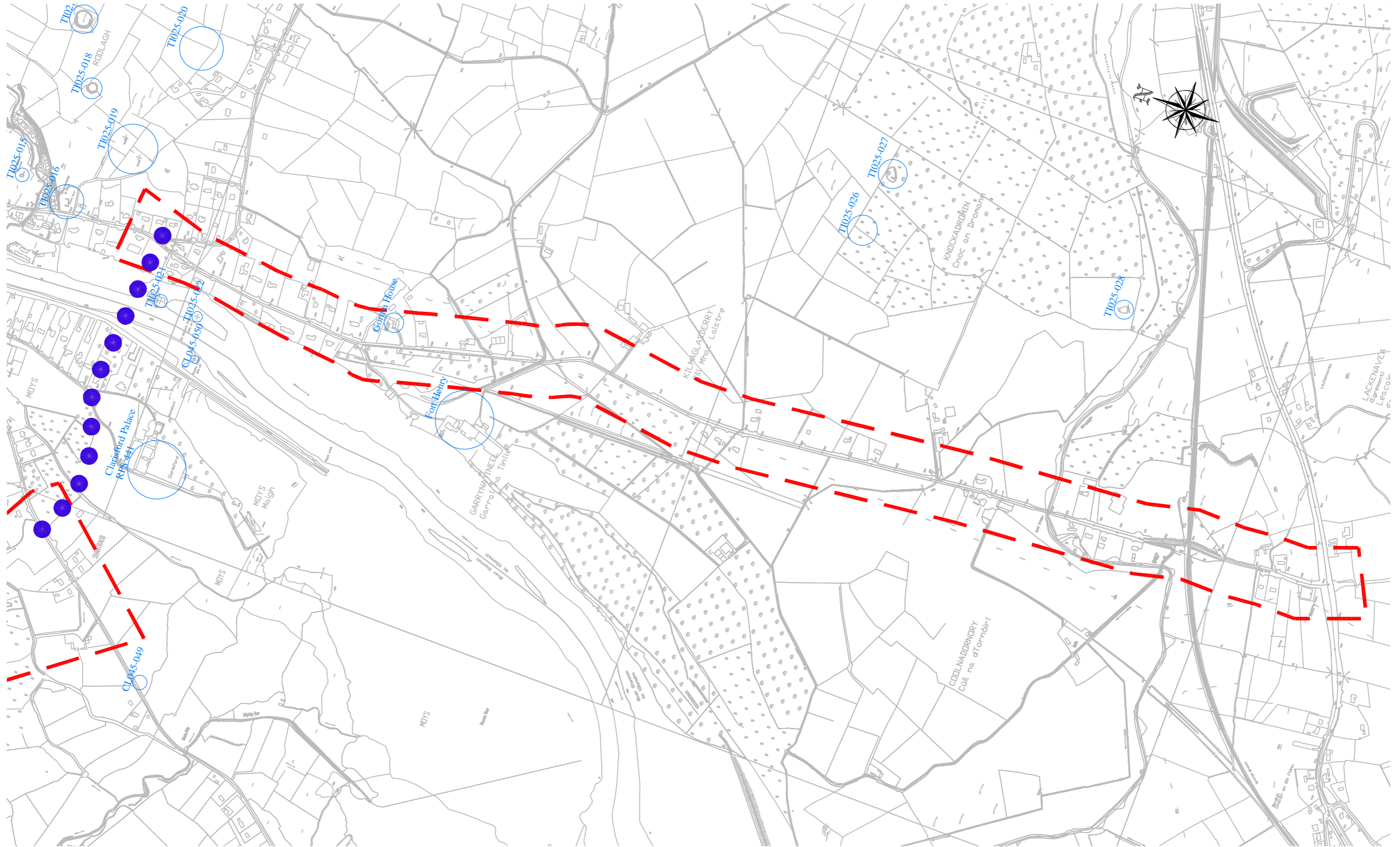
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PRELIMINARY					
APPROVAL					
TENDER					
CONSTRUCTION					

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Designed: SG Checked: MC Approved: RTP Status: -

Project Title KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title ARCHAEOLOGY, ARCHITECTURE & CULTURAL HERITAGE SHEET 1 OF 2			
Drawn: OF	Job No: 07.527	Drawing No: FIGURE 11.1	Rev: -
Scale: (A1) 1:5000 @ A1	Date: MAY '08		



NOTES:
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LEGEND
CL045-017
SITE LOCATION & REFERENCE NUMBER

No.	Revision	Date	By	Chkd	App'd
Stage		Date	Date		
PRELIMINARY					
APPROVAL					
TENDER					
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Project Title	KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT		
Drawing Title	ARCHAEOLOGY, ARCHITECTURE & CULTURAL HERITAGE SHEET 2 OF 2		
Drawn:	OF	Job No:	07.527
Scale:	1:5000 @ A1	Date:	MAY '08
		Drawing No:	FIGURE 11.2
		Rev:	-

12.0 Landscape and Visual

This chapter involves an assessment examining capacity of the receiving environment to visually absorb the proposed development including the improved road development of the R494, and a bypass of the town of Killaloe, into the present landscape and visual fabric.

The purpose of the constraints study is to identify the potential impacts early in the design and options assessment process to facilitate changes to the design to avoid or mitigate potential adverse impacts or incorporate opportunities for beneficial impacts.

12.1 Landscape Designations

The following itemised designations and objectives are considered landscape constraints as they have been identified by the local planning authorities, and will influence the selection of the options for the Killaloe Bypass in particular.

Clare County Development Plan 2005 – 2011

- Designated scenic route R463 from O'Briensbridge through Killaloe to outside of Ogonnelloe
- Objective 9: To conserve, protect and where possible enhance the landscape character of the county as a natural asset in its own right and as a resource for the support and promotion of the sustainable economic growth and quality of life in the County, including those views and prospects and amenities of places and features of natural beauty and interest whose protection does not conflict with development necessary to sustain rural communities.
- Objective 17: To promote and facilitate the growth of the tourism product through the integration of tourist facilities, including sites, attractions and recreational and leisure infrastructure, identification of locations for appropriate development, the conservation of landscape and the conservation of the natural and built environment.
- CDP 40: In areas identified as being vulnerable landscapes the Planning Authority will only normally permit proposal for development of the highest quality in terms of siting and design and where development will not adversely impact upon to a significant extent upon the character, integrity, or uniformity of the landscape.
- CDP 43: The Planning Authority will normally only permit development where it can be clearly demonstrated that the appearance and character of existing local landscape feature area where appropriate retained, protected and enhanced, in particular hedgerow, shelter belts and stone walls.
- CDP 44: The Planning Authority will normally only permit development where trees and groups of trees of high amenity value are retained and where such retention is not possible to require that suitable replanting takes place within or adjacent to the site.
- CDP 45: It will be the policy of the Planning Authority to require that those seeking to carry out development in the environs of a scenic route to demonstrate that there will be no adverse obstruction or degradation of the views towards and from visually vulnerable features, or significant alterations to the appearance or character of these areas.

East Clare Local Area Plan 2005 - 2011

- Policy ENV 1: Landscape Conservation
Proposal for development within the open countryside will normally be permitted only where it can be clearly demonstrated that:
 - (a) There is no adverse effects on the character of the Landscape; and
 - (b) A high standard of site layout, design and building materials in incorporated to conserve and enhance this landscape character
- Policy ENV 2: Protection of vulnerable Landscape
Proposal for development within the areas designated as vulnerable landscapes will normally be permitted only where it can be clearly demonstrated that the development will not impinge in a significant way upon the character, integrity or uniformity of the Landscape
- Policy ENV 4: Retention, protection and enhancement of Landscape Features
Proposal for development will be permitted where it can be clearly demonstrated that they retain, protect and where necessary, enhance the appearance and character of existing local landscape features, in particular hedgerows, shelter belts and stone walls.
- Policy ENV 5: Protection of Trees
Proposals for Development that would result in the loss, destruction or significant damage to any tree or shrub, which makes a recognised contribution to the amenity, character or appearance of the area, will not normally be permitted.

North Tipperary Development Plan 2004 - 2010

- Preserve the Quality of the landscape, open space, architectural and cultural heritage, material asset and natural resources
- Protect the integrity of the built environment from damage caused by insensitive development proposals

Key landscape aims include:

- To sustain conserve and enhance the landscape diversity character and quality of the Country.
- To protect sensitive areas from development that would detract from or be injurious to the amenity of the area
- To provide for development and change that would benefit the rural economy which protecting and enhancing the landscape
- Policy ENV 1: Landscape Protection
It is the policy of the Council in assessing applications for development that would impact on landscape to balance the need to protect landscape character against the requirement for socio economic development in accordance with value assessment and sensitivity as identified in the county Landscape Character Assessment (when completed).
- Policy ENV2: Vulnerable Landscape
It is the policy of the council to resist development that would
 - (a) Interfere with the view of the water/mountains from any point within a visually vulnerable area; or
 - (b) Detract from the view from the lake or lake shore or
 - (c) Break the skyline; or

- (d) Materially impact upon the character integrity or uniformity of a vulnerable landscape or scenic area when viewed from scenic routes and the environs of archaeological or historic sites.
- Policy ENV3 views and prospects
It is the policy of the council to protect views and prospects of special amenity value or special interest, as set out in Appendix 6 of the county Designations map

12.2 Description of the Receiving Environment

Landscape Description

12.2.1 Shannon Crossing

The study area at the Shannon River Crossing comprises of a gently undulating agricultural landscape, dominated by the river with the small towns of Killaloe and Ballina on either side.



Photo 12.1 Views of Killaloe and Ballina from the west

Killaloe town is well known for its status as a heritage town and for having historical character that can be seen in its building and streets of the town centre. Modern development is restricted to the outer fringes of the town, mainly screened from riverside views by established woodland and rising contours of the town.

Ballina has a relatively historical town centre; however more commercial building and new built residential houses are visible within the study area when compared to the town of Killaloe.

The existing bridge over the Shannon River is a local historical icon and very much an important feature in the visual environment of the towns. The bridge has an exposed natural stone finish, an established network of climbing plants and ferns

within the exposed stones and wrought-iron light posts reflecting the character of the historical features of Killaloe.

This natural stone finish of the bridge is repeated within the streetscape of Killaloe, as seen in the buildings adjacent to the riverside car park, the channel wall lining the riverside at the car park, the Derg House cafe and the Killaloe cathedral and the ESB facility south of the bridge on the Killaloe riverbank. Other buildings within the river facing street network of Killaloe are distinctly historical in character as are the narrow winding streets.

Killaloe/Ballina Fringe

The urban fringe of Killaloe/Ballina is divided between many new built residential areas and industrial/commercial areas, along with associated services typical of a town growing in size. Both commercial and residential areas are robust in landscape character that can tolerate further development. Residential developments appear new in character and comprise a mix of dwelling types such as town houses, detached, semi-detached and apartment style accommodation.

Agricultural lands between Ballina and Birdhill and west of Killaloe

This area comprises of the suburban fringe of Ballina extending to the southern extents of the town. The route along the R494 reflects the typical rural landscape of Ireland often scattered frequently with a number of one off houses. Also evident are a number of small businesses such as Shannonside Business Park. There are some varying landscapes reflected along the route with Fort Henry located approximately 1km south of the town. The property still maintains much of the character of old estate lands.

The location of the proposed Killaloe Bypass consists of lands that are generally agricultural in nature divided by hedgerows and stone walls.

This predominantly agricultural landscape becomes hilly in places; views are generally focused towards the town. The area has number of one off houses that are gradually extending eastwards where the topography suits. The hilly topography around Ballyvally is considered to possess a high landscape character value with a cluster of private dwelling in proximity to heritage sites. Ballyvally House and Estate Lands are well maintained, with mature parklands and excellent views of Killaloe, the River and hills to the east.



Photo 12.3 Views of Ballyvally and Knockyclovaun from Ballina Lakeside Hotel

12.3 Visual Impact

The landscape situated at the R494 section of the study area is predominantly linear as it runs parallel to the River Shannon; the views here are limited by the strong network of hedgerows and tree lines and tend to be evident only in snapshot views of the area. Along the Killaloe Bypass section of the study area the lands rise steeply to form the uplands of Slieve Bernagh, views from here across the valley consist of the Arra and Silver Mine Mountains. Such topographical features result in a high degree of visual enclosure from medium range views due to land form intruding. Therefore views to the site are mainly confined to short and long range. However due to the large scale of contours and the vast tracks of land between the study area and the mountain ranges long range views to the sites are high in number yet minimal in clarity.

Visual receptors include the public or community at large, residents, visitors and other groups of viewers affected by a proposed scheme. When evaluating the effects on views and the visual amenity of the identified visual receptors, the magnitude or scale of visual change is described by preference to the distance of the viewpoint from the proposal. Short range views often experience high visual impacts due to a development or structure as the visual receptor is in close proximity to the proposal. Therefore the proposal appears larger in scale or magnitude as opposed to when observed from a long range viewpoint.

Short-range views to the existing bridge and town centre of Killaloe are the most exposed within the study area. The building and structures of the town can be clearly viewed from across the river in Ballina as well as from Lough Derg.

The lands associated with the R463 are susceptible to a high visual impact, as there are panoramic views to these lands from along the scenic route, as well as from lands across the river along the R466 in North Tipperary. Tie in at the R463 will create impact to users of the route and to the local residential community. The Killaloe bypass is situated within an area of lands made up of mainly agricultural

fields, would be highly visible from the expanses of rural land within this section of the Study area. However views from the towns towards Slieve Bernagh are likely to experience a small to moderate impact where the hilly nature of area will easily absorb such a feature.

12.4 Landscape Character

Undulating agricultural landscapes are seen as the dominant landscape type along the R494 study area and parts of the Killaloe Bypass section of the study area. This is characterised by irregular shaped fields with robust often tree-lined hedgerows designating boundaries, in places with stands of trees. Farm buildings, rural residences and country lanes are scattered throughout the countryside. The topography within this landscape character type is gently rolling; often more level around the riverside and is part of a greater plain stretching between the Ballykillea Mountain range to the North West and the Ballina ridgeline to the north east extending south. A small stream and large watercourses cross the plain feeding into the River Shannon.

The landscape is large enough to absorb changes related to the proposed scheme s without destroying the overall character. The changes that occur locally will be mostly constrained by the undulating landscape and potential for landscape mitigation is high given the existing vegetated character.

Mature woodland landscape and woodland fringes are mostly located to the south of Killaloe and Ballina and the north of Killaloe. The uninterrupted tree line of such woodland blocks makes up an integral portion of the skyline, when viewed from the lowlands of the Shannon valley, as well as from the ridgelines paralleling the river to the east and west. Any clearing of woodland done in conjunction with the proposed scheme will potentially result in permanent loss of part of the existing woodland which is an important component of the rural landscape. Likewise most woodland blocks potentially affected are not significant enough scale to visually absorb change, should the proposed scheme adversely impact upon them during construction and operation phases of the proposal. Therefore it can be concluded that the deciduous woodland/fringe landscape character areas within the route corridor are considered in this assessment to be highly sensitive to change.



Photo 12.3 Woodlands to the north of Killaloe to the East of Ballyvally

Fort Henry Demesne falls under this study area to the south of Ballina. The estate and demesnes character an important landscape both historically and visually. The grounds were carefully designed to enhance the natural features of the landscape, for the benefits of the main house. The estate has matured and developed since. Many examples of this type of landscape have been lost in Ireland. The estate lands are not therefore capable of absorbing large scale changes without destroying their existing character.

One conifer plantation is located within the Killaloe Bypass section of the study area. The plantation is of dense farms closely planted. The dense nature and evergreen characteristics will create a lesser impact that that of the mature deciduous woodland however this same dense nature will ensure that any potential cutting though such a plantation will appear as evident fragmentation of a consistent tree line when viewed against the horizon.

The urban fringes of Killaloe and Ballina are built to take advantage of the rural landscape. Consideration is also given to the fact that relief of local traffic congestion in town fringes and urban areas is considered to be a positive impact upon completion of most relief road schemes. Overall, the portion of town fringe landscape within the study area is considered in this assessment to be slightly sensitive. Where individual residences are concerned, the sensitivity of the impact upon individual properties would largely depend on distance between property and the proposed route.

13.0 Conclusion

Considerable information has been collected which will guide the development toward route proposals for the R494 and Killaloe Bypass sections and EIS for the entire Scheme.

The proposed development is intended to create safe and convenient access to and between settlements, employment, services and education while reducing congestion within the town centre and improve access around Ballina and Killaloe.

The study area encompasses an area bounded by Killaloe and Ballina to the centre. The N7 at Birdhill limits the southern extents of the R494 section of this scheme. The Killaloe Bypass section is limited by Knockyclovaun Mountain to the west and the need to tie in with the R463 to the north of Killaloe town.

The land to the east of the Study Area from Ballina to Birdhill is flat to gently undulating.

The constraints study area for the Killaloe section of the scheme proves to be hilly in nature. The terrain proves to be especially difficult at the northern section of the constraints study area due to the steep topography that is evident here.

Flooding does not appear to be a significant factor on the Killaloe Bypass constraints study area. There is some flooding known at an existing culvert at the Kilmaglassderry/Fort Henry area along R494, additional flooding occurs at a culvert on the R494 directly north of this. Some flooding is known to occur at Coole Bridge on the Kilmastulla River.

The geological study has shown that generally, the geology is not a significant constraint to the route of the road.

The combined towns of Killaloe and Ballina support a population of 2,851. Ballina and Killaloe are inextricably linked with settlements that have complimentary natures. The proposed development is likely to have a positive effect at a local level by improving capacity deficiencies within the towns and reducing journey times for those situated in the affected area. Road infrastructure improvements will contribute to competitiveness and balance of regional development.

Primary areas of conservation interest as affected by the Scheme are located where the route crosses over the Lower River Shannon cSAC; additionally Lough Derg SPA and pNHA are in proximity to the proposed development. Other areas identified that provide constraints are the woodlands and riparian vegetation along the river and woodlands to the south east and north of Killaloe town. Providing a sensitive approach is taken, especially care in the route selection process when considering habitat fragmentation of the site, impacts of the development can be reduced.

Five previously recorded monuments are found within the study area and comprise three standing stones and two enclosures. These features and additional monuments in the vicinity indicate that the area was occupied during the prehistoric period and into early medieval period. Stray finds of artefacts in the area, particularly in and on the edges of the River Shannon and Lough Derg provide further evidence of this activity.

Ballyvally Gate Lodge and Clarisford Palace are protected under the County Clare Development Plan 2005-2011. Under current legislation, a structure and its curtilage and other structures within the curtilage and their interiors are protected. The extent of that curtilage needs to be determined on a case by case basis.

It should be also taken into account that Ballyvally House, Gortna House and Fort Henry are important architectural structures and, although not subject to specific protection, should be considered to be of archaeological merit.

The townland divisions within the study area should be considered to be of potential heritage value. Field inspection of the townland boundaries will identify which if any, are potentially early landscape features.

The study area for the scheme comprises of a gently undulating agricultural landscape, dominated by the river with the small towns of Killaloe and Ballina on either side with hilly terrain to the west. Much of the study area is made up of urban fringes of the towns and agricultural lands. Visual receptors are impacted by short range views and will impact mostly residents and users of the study area in proximity.

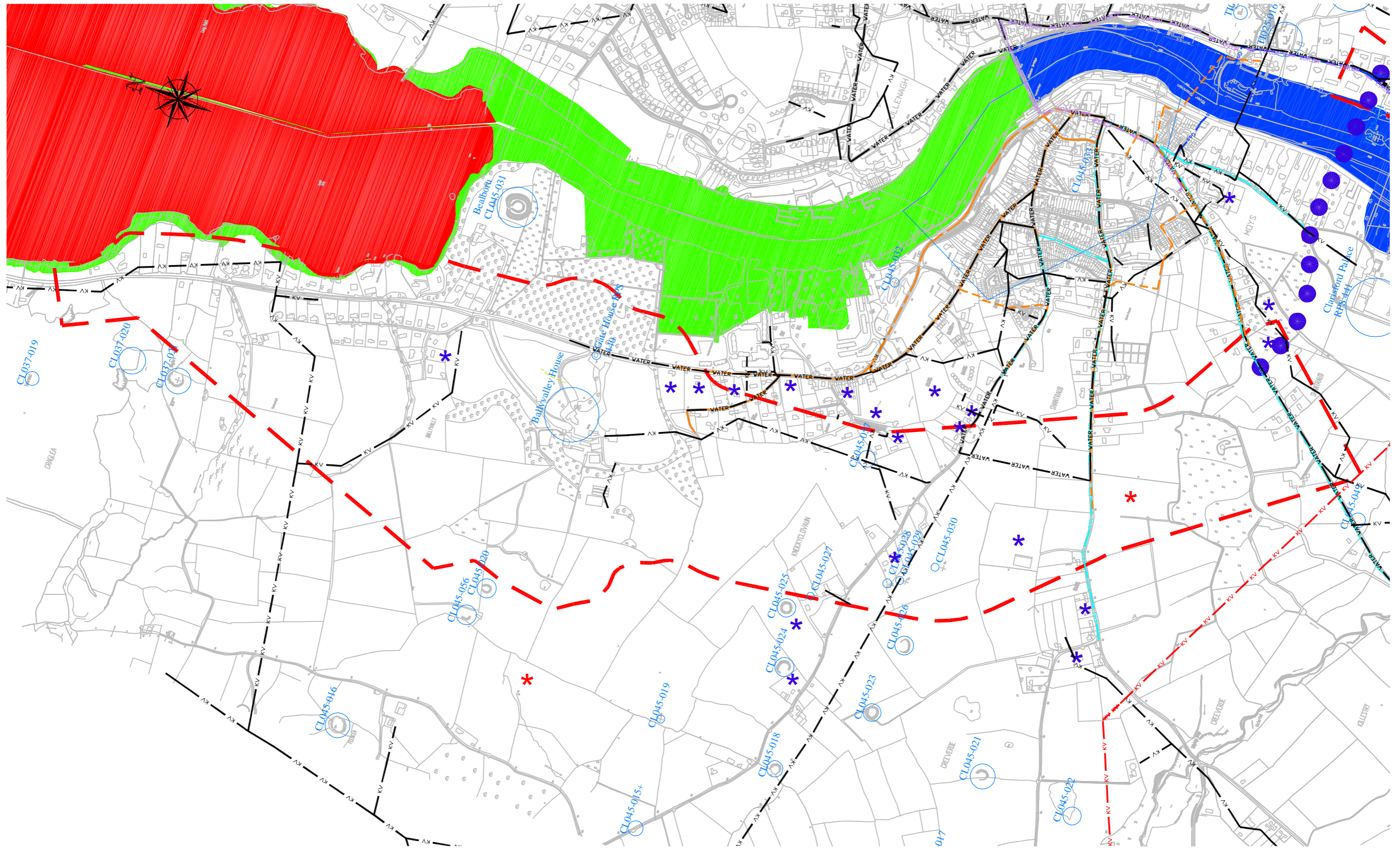
The landscape is generally large enough to absorb changes related to a river crossing and associated roads without destroying the overall character.

The information collected for the R494 road improvements and Killaloe Bypass is both wide ranging and comprehensive and provides a sound basis for the development of route selection. Data collection will continue through the route selection stage and beyond concentrating on the route corridors and on the preferred route corridor when it is identified. Work will cumulate with the completion of a full EIS.

Figures 13.1 and 13.2 provide a detailed map of the constraints identified during this study for the proposed scheme.

Upon approval from the Client, the next phase: Route Selection will commence. The Constraints Study Report has allowed for the determination of and execution of the Route Selection. A Route Selection Study Report is to be compiled using the information collated throughout this study to choose the best possible route options while avoiding the constraints identified to the greatest extent possible and in a balance manner.

A preferred route will emerge from these studies and public consultation will assist in decisions before compilation of the EIS.



Department of Transport
An Roinn Iompair

NOTES:
(1) EXISTING LEVELS ARE DERIVED FROM OS MAPPING

No.	Revision	Date	By	Chkd	App'd
	Stage				

Roughan & O'Donovan
Consulting Engineers
Civil - Structural - Transportation - Environmental

Arena House, Arena Road,
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Tel : +353 1 294 0800
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www.roughanodonovan.com

Project Title KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title COMBINED CONSTRAINTS SHEET 1 OF 2			
Drawn: OF	Job No: 07.527	Drawing No:	Rev:
Scale: (A1) 1:5000 @ A1	Date: MAY '08	FIGURE 13.1	-

APPENDIX 1: List of Consultees

List of Consultees

Name of Consultee
An Taisce - The National Trust
Architectural Heritage Advisory unit
Badgerwatch Ireland
BirdWatch Ireland
Bat Conservation Ireland
Botanical Society of the British Isles
Bord Gáis
Clare County Council
Coillte
Department of Agriculture and food
Department of Community, Rural and Gaeltacht Affairs
Department of EHLG, Development Applications Unit,
Department of the Environment, Heritage and Local Government
National Parks & Wildlife Service
Department of Transport
Dragonfly Ireland
East Clare Heritage
Environmental Protection Agency
Eircom
Electricity Supply Board (ESB)
ESB networks
Failte Ireland / Bord Fáilte – National Tourism Development Agency
Friends of the Earth Ireland
Friends of the Irish Environment
Geological Survey of Ireland
Heritage Council
Irish Wildlife Trust
National Parks & Wildlife Service
Native Woodland Trust
Office of Public Works
Royal Institute of Architects of Ireland
Shannon Development Company
Shannon Regional Fisheries Board
Teagasc - The Irish and Agriculture Food Development Authority
Clare County Council: Richard Cronin Conservation Officer Congella McGuire Heritage Officer, Simon Large Archaeologist W. Walsh Water Services Sean Ward, Environment.
North Tipp County Council Siobhan Geraghty Heritage Officer Jim Maguire Water Services Frank. O' Halloran, Environmental Services Brian Beck Senior Planner

APPENDIX 2: Responses from Consultees



CLARE COUNTY COUNCIL
Comhairle Chontae an Chláir

Sinead Gavin
Roughan & O'Donovan
Consulting Engineers
Arena House
Arena Road
Sandyford
Dublin 18

ROUGHAN & O'DONOVAN	
21 APR 2008	
PROJECT No.	FILE No.
ACTION	
CIRCULATION	

Planning Section
New Road
Ennis
Co. Clare

18th April 2008

Re: Shannon Crossing, Killaloe, Co. Clare.

Roinn Pleanála
Bothar Nua
Inis
Contae an Chláir

Dear Ms Gavin

With reference to your letter of March 20th, my apologies for the delay in responding but I was on leave until April 3rd. I know that Simon Large, County Archaeologist, has responded with regard to the impact on Recorded Monuments but I would like to bring your team's attention to buildings of architectural importance on the proposed route.

T: +353 65 682 1616
F: +353 65 682 8233

The most important structure is likely to be Clarisford Place, c.1770 and its associated structures e.g. gate-lodges, boat house, plantations etc, protected in the Clare County Record as PS No 441. Every effort should be made to reduce the visual impact on the structure, estate walls etc.

E: plannoff@clarecoco.ie
W: <http://clarecoco.clare.ie>


The only other house of importance on the route outlined is Ballyvalley House which dates from the 18th century, is in good condition, inhabited and contains numerous out buildings, gate lodges and an impressive entrance. Care must be taken to avoid visual or material impact on this important house and associated structures.

I would advise that scoping this landscape should include reference to the following documents:

- (a) Clare Grand Jury Map 1787
- (b) 1st O.S. Map 1839-42
- (c) The Houses of Clare – Hugh Weir, Ballinakella Press 1990
- (d) The Record of Monuments and Places
- (e) The Clare Coastal Architecture Survey (Lough Derg)

I trust this information is of some use.

Yours sincerely


Risteard Ua Cróinín MA MIAI MAACO
Conservation Officer

cc: Simon Large, Co Archaeologist
Monica Meehan, SEO, Planning Section



Caring for

Clare's Environment



ROUGHAN & O'DONOVAN

21 APR 2008

PROJECT No.	FILE No.
ACTION	50
CIRCULATION	

April, 2008

Ms Sinead Gavin
Roughan & O'Donovan
Consulting Engineers
Arena House
Arena Road
Sandyford
Dublin 18

Your Ref: 07.527.24

Re: Killaloe Bypass, Shannon River Crossing, R494 Road Improvement

Dear Ms. Gavin,

I refer to your request dated 15th March for observations from this Department on the above. I suggest that your firm should consider the likely impact, if any, of the proposed bypass, bridge crossing and road upgrade on agriculture/agricultural activities in the locality as part of the constraints study and environmental impact assessment. Aspects that should be considered include the following:

- The likely disruption of agricultural activities during the construction phase and when the new routes become operational.
- Access to lands
- Impact on water supplies (quality & quantity), particularly during the construction phase
- Likely noise impacts
- Safety Impacts

Yours sincerely,

Michael MacCarthy
Environment Section

Johnstown Castle Estate,
Co. Wexford, Ireland.

Eastát Chaisleán Bhaile Sheonach,
Chontae Loch Garman, Éire.

Head Office

Transport House, Kildare Street, Dublin 2, Ireland.

Príomh-Oifig

Teach Iompair, Sráid Chill Dara, Baile Átha Cliath 2, Éire.

Tel

+353 1 6707444

Local

1890 443311

Fax

+353 1 6709633

Web

www.transport.ie



Department of Transport
An Roinn Iompair



Ref: 07.527.24

1 April 2008

Ms. Sinead Gavin,
Roughan & O'Donovan,
Consulting Engineers,
Arena House,
Arena Road,
Sandyford,
Dublin 18.

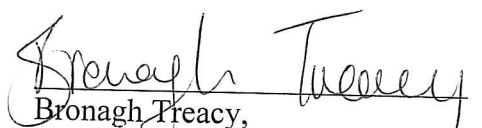
Re: Killaloe Bypass, Shannon River Crossing

Dear Ms. Gavin,

I refer to your letter and enclosures of 15 March 2008 in relation to the above scheme.

This Department has no comments.

Yours sincerely,


Bronagh Treacy,
Regional & Local Roads Division,
Tel: 01 888 2273

ROUGHAN & O'DONOVAN	
03 APR 2008	
DEVELOP. No.	REVISION
ACTION	SG
COORDINATOR	

ESBI Engineering & Facility Management Ltd
Stephen Court, 18/21 St Stephen's Green, Dublin 2, Ireland
Telephone +353-1-703 8000 Fax +353-1-703 7194
www.esbi.ie

Our Ref: PE452-F210-1-6729

03/04/2008

Sinead Gavin,
Roughan & O'Donovan
Arena House,
Arena Road,
Sandyford,
Dublin 16

Re: Killaloe Bypass, Shannon River Crossing, R494 Road Improvement in proximity to Dunstown Moneypoint 400kV Line.

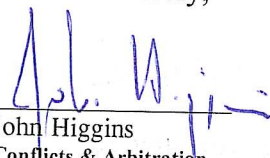
Sinead,

I am in receipt of your map showing the constraints areas for the above.

Please be aware that the areas highlighted come in proximity to Dunstown Moneypoint 400kV Line. This high voltage transmission line is part of the National Grid and is of strategic importance to the country.

1. It is imperative that the ground is not raised under this Line. In addition, all buildings and underground services must maintain a minimum radial clearance of 30m from the line and structures.
2. Building material, soil / spoil and sheds, must not infringe the minimum lateral clearances already specified. **Such material must NOT be stored under the Line.**
3. Low loaders / high loaders / cranes, etc. must maintain the minimum lateral clearance specified or in the case of cranes be outside falling distance plus a safety margin. The use of cranes, low loaders, high loaders, excavators and other construction equipment within the specified minimum lateral clearances are potentially hazardous and their use must be agreed with ESB in advance.

Yours Sincerely,



John Higgins
Conflicts & Arbitration,
Asset Management Services,
ESBI Engineering & Facility Management Ltd.
Tel: +353 (0)1 703 8233
Fax: +353 (0)1 6615359
mailto: john.higgins@esbi.ie
www.esbi.ie

RECEIVED
7 APR 2008
SG

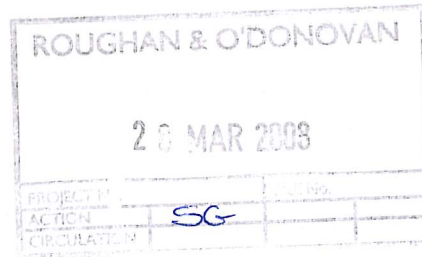


Suirbhéireacht Gheolaíochta Éireann
Tor an Bhacaigh
Bóthar Haddington
Baile Átha Cliath 4



Geological Survey of Ireland
Beggars Bush
Haddington Road
Dublin 4

Sinead Gavin
Roughan & O'Donovan
Arena House
Arena Road
Sandyford
Dublin 18



Irish Geological Heritage Section
Tel: 01-6782741/Fax 01-6782559
Email: sophie.preteseille@gsi.ie
<http://www.gsi.ie>

26th March 2008

Re: Informal EIS Scoping

Subject: Killaloe Bypass, Shannon River Crossing, R494 Road Improvement

Ref: 07.527.24

Dear Ms Gavin,

With reference to your letter of the 15th March 2008, concerning the above scheme, there are no geological heritage sites currently on our database that lie within or near any of the Section 1, 2 and 3.

For your information, the Geological Survey of Ireland (GSI) is in partnership with the National Parks and Wildlife Service (NPWS) of the Department of Environment, Heritage and Local Government to identify and select important geological and geomorphological sites throughout the country for designation as NHAs (Natural Heritage Areas). This is being addressed under 16 different geological themes. For each theme a larger number of sites from which to make the NHA selection are being examined, in order to identify the most significant scientifically. Our criterion of designating the minimum number of sites to exemplify the theme means that many sites of national importance are not selected as the very best examples. However, a second tier of County Geological Sites (CGS) (as per the National Heritage Plan) means that many of these can be included in County Development Plans and receive a measure of recognition and protection through inclusion in the planning system. Please note that we are still in the process of finalizing these proposed sites.

I am sure that you are already aware that the areas covered by Sections 1, 2 and 3 lie very close to several designated conservation sites by the NPWS:

- Lough Derg NHA and SPA
- Lower River Shannon SAC

Should development go ahead (all other factors considered), GSI would much appreciate a copy of reports detailing any site investigations carried out. The data would be added to GSI's national database of site investigation boreholes, implemented to provide a better service to the civil engineering sector.

GSI would also request notification of ground excavations, etc. undertaken that might provide good geological exposures for our examination. This would allow recording, fossil or rock sample collecting and gathering of new data in order to enhance our understanding of the area.

Should any significant bedrock cuttings be created, we would ask that they be designed to remain visible as rock exposure rather than covered with soil and vegetated.

.../...

Please note, that some maps/databases are available on the GSI website: www.gsi.ie , section "Online Mapping" or "Web Mapping", direct link: <http://www.gsi.ie/Mapping.htm> . Data available mainly concern Bedrock, Groundwater, Karst, Geotechnical boreholes, Mineral locations and quarry directory. The Geological Heritage data are in the process of being migrated to this website but won't be available before summer 2008. So for any enquiry regarding geological heritage sites, please contact us directly.

I hope that these comments are of assistance, and if the GSI can be of any further help, please contact me.

Yours sincerely,



Sophie Prétesaille,
Irish Geological Heritage Programme

21 April 2008

Our ref: G2008/246

Your ref: 07.527.24

Ms. Sinead Gavin
Roughan & O'Donovan
Consulting Engineers
Arena House,
Arena Road,
Sandyford,
Dublin 8

ROUGHAN & O'DONOVAN	
23 APR 2008	
PROJECT No.	FILE No.
ACTION	SC
CIRCULATION	

**Re: Killaloe Bypass, Shannon River Crossing, R494 road improvement.
Informal EIS Scoping**

Dear Ms Gavin,

Further to our letter of 16 April 2008 concerning the above, outlined below are the nature conservation recommendations of the Department of the Environment, Heritage and Local Government. These comments relate to both the Clare and Tipperary parts of the project.

Guidance Documents

- At the Constraints Study stage, and at all subsequent stages of project planning and design, the following NRA documents, and any new NRA guidance documents that issue during the life of the project, should be consulted and followed:
 - *Environmental Impact Assessment of National Road Schemes – a Practical Guide;*
 - *Guidelines for Assessment of Ecological Impacts of National Road Schemes;*
 - *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes;*
 - *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes;*
 - *Guidelines for the Treatment of Bats During the Construction of National Road Schemes;*
 - *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes;*
 - *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes;*
 - *A Guide to Landscape Treatments for National Road Schemes in Ireland;*
 - *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes.*
- The EPA's *Guidelines on Information to be Contained in Environmental Impact Statements (2002)* and *Advice Notes on Current Practice (on the preparation of Environmental Impact Statements) (2003)* should be followed when considering the environmental impacts of a new road.
- There should be due regard to all NPWS Circular Letters including, in particular, NPWS Circular Letter 2/07: *Guidance on Compliance with Regulation 23 of the*



Habitats Regulations 1997 – Strict Protection of Certain Species/Derogation Licences.

4. Best practice should be followed with regard to route selection and road design. In this regard, the COST 341 guidelines¹ and Nairn and Fossitt (2004²) are noted and, in particular, “*project planning and design should aim to avoid ecological damage first and foremost, especially for protected or sensitive habitats and/or species, before employing mitigation techniques. Compensatory measures should only be employed as a last resort where avoidance is impractical, and the mitigation measures are considered insufficient*” (Trocmé 2002).

Nature Conservation Issues

5. The proposed project will have direct and indirect impacts on Lower River Shannon cSAC (site code 2165), and may also have indirect impacts on Lough Derg (Shannon) SPA (site code 4058) and Lough Derg pNHA (site code 11). The potential for cumulative impacts is also noted. Details of the most up-to-date boundaries of sites with nature conservation designations are available from www.npws.ie. Site synopses (summary descriptions of the key conservation interests of sites), and lists of ‘qualifying interests’³ for SACs are also available from the website.
6. Information on the ecology of the constraints study area and surrounds is available from existing EISs and other impact assessment reports prepared for large riverside developments in the vicinity of Killaloe. The Clare Biodiversity Records Centre is likely to hold data for this area. These sources of information should be consulted.
7. Based on the limited project information provided to date, the project is likely to have significant effects on at least one Natura 2000 site (SAC or SPA), and its conservation objectives, or the possibility of such effects cannot be excluded with certainty at this stage. Accordingly, an EU Habitats Directive Article 6(3) appropriate assessment will be required as part of, or in parallel with the EIS for the scheme. Guidance from the NRA (in preparation) and the Commission⁴ should be followed in this regard.
8. Lower River Shannon cSAC has been selected for, among other things, the conservation of the following Annex I habitats and Annex II species:
 - *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)
 - *Lampetra fluviatilis* [1099]
 - *Lampetra planeri* [1096]

¹ Trocmé, M. ed. (2002) *COST 341. Habitat Fragmentation Due to Transport Infrastructure: The European Review*. European Commission, Brussels.

² Nairn, R. and Fossitt, J.A. (2004). The ecological impacts of roads, and an approach to their assessment for National Road Schemes. In: Davenport, J. and Davenport, J.L. (eds), *The Effects of Human Transport on Ecosystems: Boats and Planes, Cars and Trains*, 98-114. Royal Irish Academy, Dublin.

³ SACs are selected for the conservation of certain EU Habitats Directive Annex I habitats and/or Annex II species; these are the qualifying interests for the sites, and determine, to a large extent, the conservation objectives for the site

⁴ European Communities. 2000. *Managing Natura 2000 sites: the provisions of Article 6 of the Habitats’ Directive 92/43/EEC*
European Communities. 2002. *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*

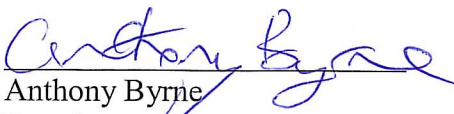
European Communities. 2007. *Guidance document on Article 6(4) of the Habitats Directive’ 92/43/EEC. Clarification of the concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission*

- *Petromyzon marinus* [1095]
- *Salmo salar* [1106]
- *Lutra lutra* [1355]

Surveys of the above habitats and species will be required, as appropriate, to inform the appropriate assessment.

- In addition to impacts on water quality, the road has the potential to have indirect and cumulative impacts on the water supply to sensitive wetland habitats, some of which are spring fed. Of particular concern are areas of EU Habitats Directive Annex I and Annex I priority habitat fringing the lake, north of Killaloe, including ‘*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)’. Some areas of this type of woodland are outside the current pNHA boundary.
- The associated impacts of surplus material disposal (peat, soil and subsoil) should be given due consideration at this early stage. Significant deposits of alluvial or lacustrine material are likely to occur in parts of the study area. It is noted that the European Communities (Environmental Impact Assessment) Regulations, 1989-2001, state that an EIS shall contain: 1) *a description of the physical characteristics of the whole proposed development and the **land-use requirements during the construction and operational phases,** and 2) a description of the likely significant effects ... of the proposed development on the environment resulting from [among other things] ... the existence of the proposed development ... and **the elimination of waste.*** If significant amounts of peat or other unsuitable material require excavation and disposal as part of a road scheme, suitable disposal sites will need to be identified and assessed as part of the EIS so that this activity does not cause negative environmental impacts.
- The road is likely to pass through areas of active or former floodplain associated with the River Shannon. The route options must be considered in terms of their likely impacts on hydrology, including flow conveyance, floodplain storage and flood attenuation.

Mise le meas,


 Anthony Byrne
 Development Applications Unit

APPENDIX 3: Public Consultation Leaflet

APPENDIX 4: NPWS Designated Sites

SITE SYNOPSIS

SITE NAME: LOWER RIVER SHANNON

SITE CODE: 002165

This very large site stretches along the Shannon valley from Killaloe to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus Estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. The Shannon and Fergus flow through Carboniferous limestone as far as Foynes, but west of Foynes *Namurian shales* and flagstones predominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian Rocks and the western stretches through Carboniferous Limestone. The Mulkear flows through Lower Palaeozoic Rocks in the upper reaches before passing through Namurian Rocks, followed by Lower Carboniferous Shales and Carboniferous Limestone. The Mulkear River itself, immediately north of Pallas Green passes through an area of Rhyolites, Tufts and Agglomerates. Rivers within the subcatchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughau, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarraff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, *Molinia* meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, *Salicornia* mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Bottle-nosed Dolphin, Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic Salmon and Otter.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Mague River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River Estuary.

Both the Fergus and inner Shannon estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some Eel-grass beds (*Zostera* spp.) and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community, which has been noted from the inner Shannon and Fergus estuaries, is a *Macoma- Scrobicularia-Nereis* community.

In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate: swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea* agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and Club-rushes (*Scirpus maritimus*, *S. tabernaemontani* and *S. triquetrus*). In addition to the nationally rare Triangular Club-rush (*Scirpus triquetrus*), two scarce species are found in some of these creeks (e.g. Ballinacurra Creek): Lesser Bulrush (*Typha angustifolia*) and Summer Snowflake (*Leucojum aestivum*).

Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus Estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh Grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Seaspurrey (*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus Estuary: a type of robust Saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the compass of Common Saltmarsh-grass (*Puccinellia maritima*) and Hard-grass (*Parapholis strigosa*).

Saltmarsh vegetation also occurs around a number of lagoons within the site. The two which have been surveyed as part of a National Inventory of Lagoons are Shannon Airport Lagoon and Cloonconeen Pool. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland.

Aquatic vegetation in the lagoon includes typical species such as Beaked Tasselweed (*Ruppia maritima*) and green algae (*Cladophora* sp.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (*Hydrobia ventrosa*, *Cerastoderma glaucum*, *Lekanesphaera hookeri*, *Palaemonetes varians*, *Sigara stagnalis* and *Enochrus bicolor*). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of Stonewort (*Chara canescens* and *Chara cf. connivens*).

Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris*), Sea Campion (*Silene maritima*), Thrift and Plantains (*Plantago* spp.). A rare endemic Sea Lavender (*Limonium recurvum subsp. pseudotranswallinum*) occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Bird's-foot Trefoil (*Lotus corniculatus*).

The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top and below this each of the shores has different characteristic species giving a range of different shore types in the pcSAC.

The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps to ridged bedrock with gullies of sand between the ridges to ridged bedrock with boulders or a

mixture of cobbles, gravel and sand. Kelp is very common to about 18m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include the following:

- stony beaches and bedrock shores - these shores support a typical zonation of seaweeds (*Fucus* spp., *Ascophyllum nodosum* and kelps).
- shingle beaches - the more stable areas of shingle support characteristic species such as Sea Beet, Sea Mayweed (*Matricaria maritima*), Sea Campion and Curled Dock (*Rumex crispus*).
- Sandbanks which are slightly covered by sea water at all times – there is a known occurrence of sand/gravel beds in the area from Kerry Head to Beal Head.
- sand dunes - a small area of sand dunes occurs at Beal Point. The dominant species is Marram Grass (*Ammophila arenaria*).

Flowing into the estuaries are a number of tidal rivers. Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon being broad, generally slow-flowing and naturally eutrophic; the Fergus being smaller and alkaline; while the narrow, fast-flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Seminatural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, however, improved grassland is most common. One grassland type of particular conservation significance, *Molinia* meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes and sedges and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (*Carex pallescens*).

Floating river vegetation characterised by species of Water-crowfoot (*Ranunculus* spp.), Pondweeds (*Potamogeton* spp.) and the moss *Fontinalis antipyretica* are present throughout the major river systems within the site. The rivers contain an interesting bryoflora with *Schistidium alpicola* var. *alpicola* recorded from in-stream boulders on the Bilboa, new to county Limerick. Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with sally (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis*.

The herbaceous layer consists of tall perennial herbs. A fringe of Bulrush (*Typha* sp.) occurs on the riverside of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ash-alder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species with occasional Oak (*Quercus robur*), Elm (*Ulmus glabra*, *U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species-rich.

Woodland is infrequent within the site, however Cahiracon Wood contains a strip of old Oak woodland. Sessile Oak (*Quercus petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmateia*) and Pendulous Sedge (*Carex pendula*).

In the low hills to the south of the Slievefelim mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of Birch (*Betula spp.*), Hazel, Oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and Willow (*Salix spp.*). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora feature prominent Greater wood-rush and Bilberry (*Vaccinium myrtillus*) with a typical range of woodland herbs. Where there is more light available, Bracken (*Pteridium aquilinum*) features.

The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, Oak and Birch. There is a good scrub layer with Hawthorn, Willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The hazel is actively coppiced in places.

There is a small area of actively regenerating cut away raised bog at Ballyrorheen. It is situated approx. 5km north west of Cappamore Co. Limerick. The bog contains some wet areas with good moss (*Sphagnum*) cover. Species of particular interest include the Cranberry (*Vaccinium oxycoccos*) and the White Sedge (*Carex curta*) along with two other regionally rare mosses including *S. fimbriatum*. The site is being invaded by Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of rhododendron has greatly reduced the overall value of the site. A number of plant species that are Irish Red Data Book species occur within the site- several are protected under the Flora (Protection) Order, 1999:

- Triangular Club-rush (*Scirpus triquetrus*) - in Ireland this protected species is only found in the Shannon Estuary, where it borders creeks in the inner estuary.
- Opposite-leaved Pondweed (*Groenlandia densa*) - this protected pondweed is found in the Shannon where it passes through Limerick City.
- Meadow Barley (*Hordeum secalinum*) - this protected species is abundant in saltmarshes at Ringmoylan and Mantlehill.
- Hairy Violet (*Viola hirta*) - this protected violet occurs in the Askeaton/Foynesarea.
- Golden Dock (*Rumex maritimus*) - noted as occurring in the River Fergus Estuary.
- Bearded Stonewort (*Chara canescens*) - a brackish water specialist found in Shannon Airport lagoon.
- Convergent Stonewort (*Chara connivens*) - presence in Shannon Airport Lagoon to be confirmed.

Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found but none were seen in 1993/94.

Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96); Teal (2,319; 1995-96); Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719, 1995/96), Black-tailed Godwit (1062; 1995/96), Curlew (1504; 1995/96), Redshank (3228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present,

including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank.

A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregrine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4010 individuals at Loop Head, 1987). There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary consisting of at least 56-68 animals (1996). This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. Otter, a species also listed on Annex II of this directive, is commonly found on the site.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon while the Mulkear catchment excels as a grilse fishery though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of Lamprey.

Two additional fish of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon. Freshwater Pearl-mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River. There is a wide range of landuses within the site. The most common use of the terrestrial parts is grazing by cattle and some areas have been damaged through overgrazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus Estuary). Further, reclamation continues to pose a threat as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale.

In the past, Cord-grass (*Spartina sp.*) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds.

Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory - except in the upper estuary, reflecting the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences by industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats.

Fishing is a main tourist attraction on the Shannon and there are a large number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitat lagoon, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.

17.05.2005

SITE SYNOPSIS

SITE NAME: LOUGH DERG (SHANNON) SPA

SITE CODE: 004058

Lough Derg is the largest of the Shannon Lakes, being some 40 km long. Its maximum breadth across the Scarriff Bay -Youghal Bay transect is 13 km but for most of its length it is less than 5 km wide. The lake is relatively shallow at the northern end being mostly 6 m in depth but in the middle region it has an axial trench and descends to over 25 m in places. The narrow southern end of the lake has the greatest average depth, with a maximum of 34 m. The greater part of the lake lies on Carboniferous limestone but the narrow southern section is underlain by Silurian strata. Most of the lower part of the lake is enclosed by hills on both sides, the Slieve Aughty Mountains to the west and the Arra Mountains to the east. The northern end is bordered by relatively flat, agricultural country. The lake shows the high hardness levels and alkaline pH to be expected from its mainly limestone catchment basin, and it has most recently been classified as a mesotrophic system. The lake has many small islands, especially on its western and northern sides. The shoreline is often fringed with swamp vegetation. Aquatic vegetation includes a range of charophyte species, including the Red Data Book species, *Chara tomentosa*. The shoreline is often fringed by swamp vegetation, comprised of such species as Common Reed (*Phragmites australis*), Great Fen-sedge (*Cladium mariscus*) and Bottle Sedge (*Carex rostrata*).

Lough Derg is of importance for both breeding and wintering birds. The site supports a nationally important breeding colony of Common Tern (55 pairs recorded in 1995). Management of one of the islands used for nesting has increased the area of suitable habitat available and prevented nests being destroyed by fluctuating water levels. Large numbers of Black-headed Gull have traditionally bred on the many islands (2,176 pairs in 1985) but the recent status of this species is not known. A large Cormorant colony occurs in trees on the islands near Portumna - 167 nests were counted in 1995 and 122 in 1999. Lough Derg is also a noted breeding site for Great Crested Grebe (47 pairs in 1995) and Tufted Duck (326 individuals in late May 1995).

In winter, the lake is important for a range of waterfowl species, especially diving ducks, with nationally important populations of Tufted Duck (1,029), Goldeneye (215) and Mute Swan (235) - figures are average peaks for 4 of the 5 seasons 1995/96-1999/00. Other species which occur include Cormorant (120), Whooper Swan (18), Wigeon (272), Teal (342), Mallard (417), Pochard (61), Black-headed Gull (814), Coot (229), Lapwing (1,346) and Little Grebe (14). Lough Derg has traditionally been used by a relatively small flock of Greenland White-fronted Goose based in the Lough Derg-Lough Graney area and possibly further afield. The mean flock size for the 5 winters 1989/90-1993/94 was only 22, but few sightings have been made in recent years, In March 2004, however, c. 20 birds were observed in the Scarriff Bay area indicating that a flock may still be present in the area.

Lough Derg is of conservation interest for its fish and freshwater invertebrates. Lampreys, listed on Annex II of the E.U. Habitats Directive, are known to occur and the lake contains a landlocked population of Sea Lamprey (*Petromyzon marinus*). Brook Lamprey (*Lampetra planeri*) is known to be common in the lower River Shannon catchment where all three Irish Lamprey species breed. The endangered fish species Pollan (*Coregonus autumnalis pollan*) is recorded from Lough Derg, one of only four sites (L. Neagh, L. Erne, L. Ree and L. Derg) in which it occurs. Lough Derg is also a well-known fishing lake with a good Trout (*Salmo trutta*) fishery.

Atlantic Salmon (*Salmo salar*) also use the lake as a spawning ground.

Lough Derg was classified as being strongly eutrophic in the early 1990s. Since 1997, a monitoring programme on the Shannon lakes has shown that the symptoms of eutrophication previously documented (i.e. high chlorophyll level and reduced water visibility)

have been ameliorated significantly. These reductions have coincided with the invasion of the Shannon system by the Zebra Mussel (*Dreissena polymorpha*), a species which feeds on plankton, and also with measures to reduce phosphorus in sewage plants in the catchment. Enrichment of the lake, both by agricultural run-off and sewage, remains a threat and could affect the bird populations, especially the diving duck. Whilst the presence of Zebra Mussel in Lough Derg appears to have improved water quality in the lake, in the long-term this invasive bivalve may threaten the ecology of the lake. Recreational activities presently cause some disturbance to the birds and an increase in such activities would be of concern. Lough Derg SPA is of high ornithological importance as it supports nationally important breeding populations of Common Tern, Cormorant, Great Crested Grebe, and probably Tufted Duck and Black-headed Gull. In winter, it has nationally important populations of Tufted Duck and Goldeneye, as well as a range of other species including Whooper Swan. The site is still used on occasions by Greenland White-fronted Goose. The presence of Common Tern, Whooper Swan and Greenland White-fronted Goose is of particular note as these are listed on Annex I of the E.U. Birds Directive.

18.8.2004

APPENDIX 5: Correspondence from Clare County Archaeologist

From: Simon Large, County Archaeologist

Date: 4th July 2008

I was asked to examine the proposed land take for the relief road route around Killaloe, connecting the proposed new Shannon Bridge crossing.

I have examined the route having superimposed it onto an OS 6-inch Map. This allowed me to relate the land take to existing monuments as recorded on the RMP and sites of archaeological potential. The following is a desktop survey.

Southeast of the southern extent of the land take is an enclosure, CL045-049. The normal zone of archaeological protection applied to an enclosure is 30-meters from the outside of the bank. This enclosure is c.90-meters from any potential development and is not under direct threat.

The Townland of Knockyclovaun contains a number of archaeological features. CL045-028, 029 and 030 are all standing stones (galláns). All three are within the proposed land take. Standing stones are difficult to demark. Simply they require a suitable buffer zone, 30-meters from the stone. However, as in this case, were three standing stones, roughly aligned, which are also in close proximity, c.100 meters. They may need to be treated as inter-related and form part of a larger landscape identity. Excavations of standing stones have indicated their use as burial markers. They have also been identified as boundary markers, while in other cases they form an alignment, as a sighting stone.

I would recommend a site visit to determine the their relationship to the landscape and the best mitigation strategy.

Enclosure CL045-027 is north of the group of standing stones. The proposed western line of the land take passes over this recorded monument; therefore, there is potential for direct impact. The normal zone of archaeological protection applied to an enclosure is 30-meters from the outside of the bank. CL045-025, another enclosure, is northwest of CL045-026. It is 30-meters west of the western boundary of the land take. This is beyond the applied zone of archaeological protection. CL045-057 is described as a potential site. It is within the land take; therefore a site visit is recommended to identify the archaeology and then recommend a suitable buffer zone.

North of Killaloe, adjacent to the western boundary of the land take, there are two more recorded monuments. CL045-020, an enclosure, is c.20-meters west of the western boundary. Ten meters of the buffer zone is within the land take. Therefore, there may be potential for direct impact on known archaeology.

The second feature, enclosure CL037-021 is c.32-meters west of the western boundary of the land take. This is beyond the applied zone of archaeological protection.

The route through Knockyclovaun presents the greatest risks to known archaeology monuments. A field evaluation examining the proposed route in relation to know archaeology would be a preferred option and is recommended.

Simon Large, MA, MIAI
County Archaeologist

APPENDIX 6: NRA Project Management Guidelines: Phase 2 Questionnaire

PHASE 2 CONSTRAINTS STUDY
Questionnaire

Project Route/Name: Killaloe bypass, Shannon River Crossing, R494 Improvements

Project Ref No: 07.527

1. Has the study carried out the following tasks and are they covered in the report:
(if 'No', reasons should be provided on a separate sheet)

	Yes	No
a) Defined the broad study area, including a description of the works in accordance with the agreed brief?	x	
b) Had a First Public Consultation meeting?	x	
c) Carried out a windscreen survey to fill in gaps in maps (houses/roads) etc. ?	x	
d) Carried out a Planning Search?	x	
e) Reviewed Rates Maps for indicative ownerships and extents?		x
f) Carried out a Land Registry Search?	x	
g) Field checked Streams, Rivers, Canals, Bridges/Culverts having regard to:		
- drainage systems?	x	
- Local flooding knowledge?	x	
- Springs/Wells/Water-table/Turloughs?	x	
- OPW/DUCHAS records and requirements regarding streams, river canals, lakes groundwater?	x	
- Fisheries requirements, waterways of fisheries value?	x	
- Groundwater?	x	
- Railways/private crossing?	x	
h) Inquired about Utilities (existing /planned)		
a. Electricity/Telecommunications/Gas/Cable /Water & Sanitary/Private Water Schemes?	x	
b. Were copies of drawings/ plans required?	x	
i) Investigated Archaeology/heritage Service, including designated areas, sites of importance for protected flora and fauna?	x	
j) Have Traffic History/Pedestrian Use/Schools/Ports/Airports been described in the study?	x	
k) Has accident data been included?	x	
l) Is the existing road network condition described (including reviews of the NRA Database and Visual Surveys)?		x

+ [SEE ACCOMPANYING NOTE]

- m) Have the Geology (including the Geological Survey of Ireland records /known quarries/local knowledge/sinkholes been described? **x**
- n) Is the local economy/business/tourism described (and any planned developments)? **x**
- o) Are the aesthetics of the area described? **x**
- p) Are known significant flora/fauna described? **x**
- q) Have the Development Plan/Zoning/Industrial plans been examined for constraints? **x**
- r) Has a review of Irish/EU Legislation/Regulations relating to infrastructure Funding/environment been carried out? (i.e to include issues relating to licensing? Requirements during construction, quarries, tips, mobile phones, etc.)? **x**
- s) Has a table listing sites/features identified been included with an approximate ranking of their importance? **x**

2. If the answer to any of the following questions is 'Yes', please provide additional material, on separate sheets, outlining the action being taken:

- | | Yes | No |
|--|------------|-----------|
| a) Are there any access constraints? | x | |
| b) Are there known areas of special designation within a ten kilometre radius of the study area? | x | |
| c) Are there UCD/Borough Impacts? | | x |
| d) Will section 59 Agreements be necessary? | x | |
| e) Any other constraints of note? | x | |

The completed questionnaire should be submitted to the address below, together with the following;

- Constraints Study Report
- Updated Project Management Report Forms:
 - PM-1- Phase 1 Overall Project Programme Form
 - PM-2 Phase 2 Constraints Study Monitoring Chart
 - PM-3- Phase 3 Route Selection Monitoring Chart

Signed:

_____ Do Project Engineer

Date: _____

**Project Planning & Reporting Manager, National Roads Authority,
St. Martins House, Waterloo Road, Dublin 4**

PHASE 2 CONSTRAINTS STUDY-QUESTIONNAIRE

Killaloe Bypass, Shannon River Crossing, R494 improvements

Note to accompany submission of Questionnaire:

1 e) Review of the Rates Maps was not completed as part of the Constraints Study. This process will be carried out as part of the route selection process.

1 i) N/A for non national road schemes

1 g) Construction requirements will be completed as part of the Environmental Impact Statement.

1 h) Constraints have been summarised in chapter 13 of the Constraints Study Report; ranking of constraints will be carried out as part of the route selection report for each route option.

2 a) Access to lands have been denied on one plot of land, this matter is currently being dealt with.

2 b) Areas of special designations are, shown in chapter 8 of the constraints study report

2 d) A section 85 agreement is required between Clare County Council and North Tipperary County Council, whereby Clare County Council are acting as project managers for the proposed scheme.

2 e) Major Constraints were identified during the Initial Review of the Study Area. See Constraints Study Report for details of all constraints.