



Clare
County Council

Killaloe Bypass, Shannon Bridge Crossing and R494 Improvement

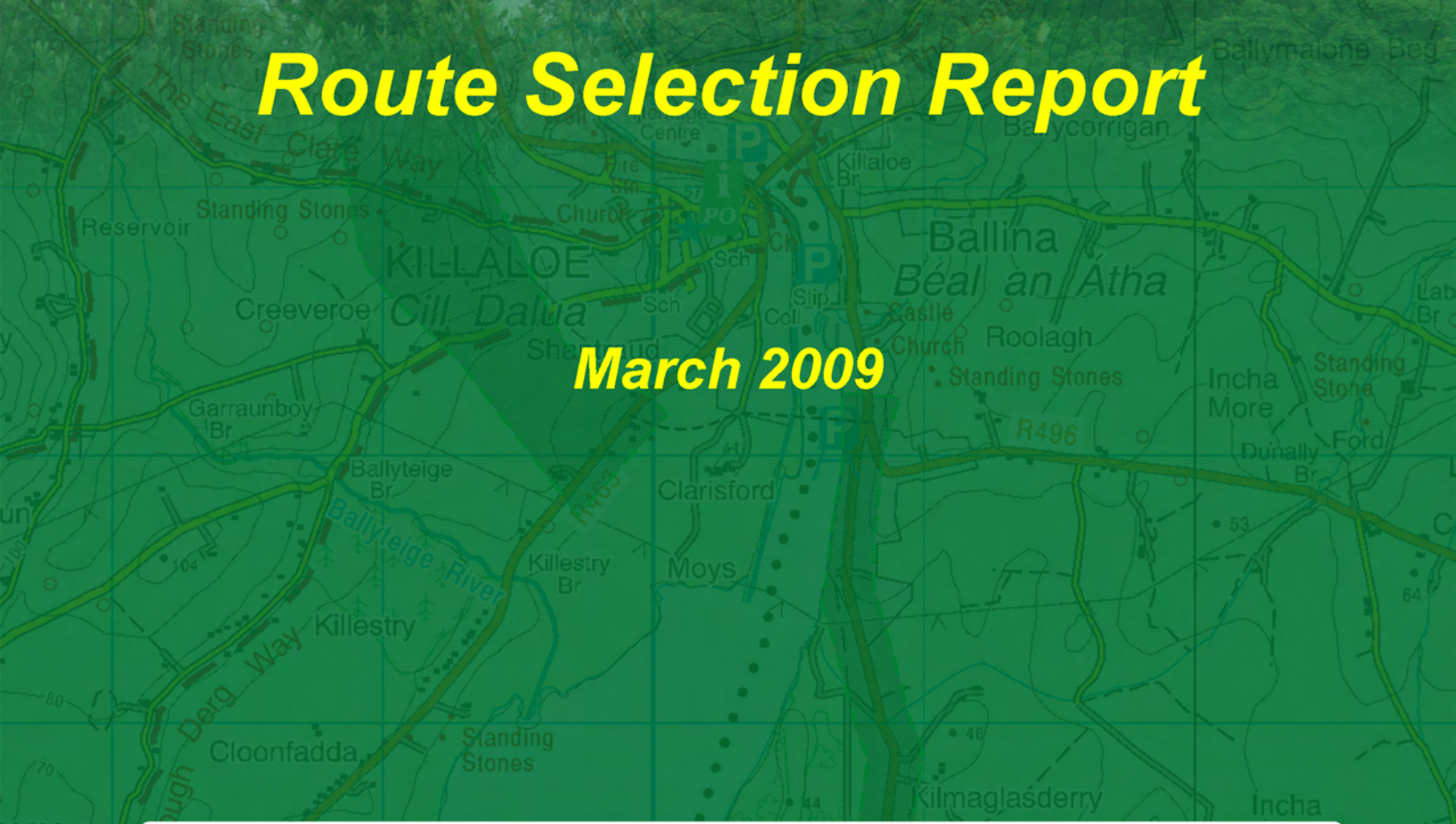


North Tipperary
County Council



Route Selection Report

March 2009



Department of Transport
An Roinn Iompair



Roughan &
O'Donovan
CONSULTING ENGINEERS

Killaloe Bypass, Shannon Bridge Crossing and R494 Improvement

Route Selection Report

TABLE OF CONTENTS

1.	INTRODUCTION	1
1.1	<i>Objective of the Scheme.....</i>	1
1.2	<i>Purpose of this Report</i>	1
1.3	<i>Structure of this Report.....</i>	1
2.	THE NEED FOR THE SCHEME	3
3.	CONSTRAINTS	4
3.1	<i>Constraints Review.....</i>	4
3.2	<i>Collection of Data</i>	4
3.3	<i>Public Consultation No. 1.....</i>	4
4.	DESIGN CONSIDERATIONS	6
4.1	<i>Introduction.....</i>	6
4.2	<i>Proposed Road Cross Sections</i>	6
5.	ROUTE OPTIONS.....	8
5.1	<i>Introduction.....</i>	8
5.2	<i>Initial Route Options.....</i>	8
5.3	<i>Evaluation of the Initial Route Options</i>	9
5.4	<i>Route Options to Bring Forward for Further Evaluation.....</i>	10
5.5	<i>Public Consultation No 2.....</i>	12
6.	TRAFFIC CONDITIONS.....	15
6.1	<i>Introduction.....</i>	15
6.2	<i>Base Model Data</i>	15
6.3	<i>Future Traffic Forecasts.....</i>	16
6.4	<i>Accident Analysis.....</i>	19
7.	ENVIRONMENTAL IMPACTS	20
7.1	<i>Planning and Socio-Economic Impacts.....</i>	20
7.2	<i>Noise and Air Impacts.....</i>	22
7.3	<i>Aquatic Ecology.....</i>	23
7.4	<i>Terrestrial Ecology.....</i>	24
7.5	<i>Landscape and Visual.....</i>	26
7.6	<i>Geology and Hydrogeology.....</i>	27
7.7	<i>Drainage.....</i>	33
7.8	<i>Utility Services</i>	34
7.9	<i>Archaeology and Architectural Heritage.....</i>	36
8.	SELECTION OF PREFERRED ROUTE.....	43
8.1	<i>Costs</i>	43
8.2	<i>Comparison Matrix.....</i>	43
8.3	<i>Identification of Emerging Preferred Route</i>	44

8.4	<i>Public Consultation No. 3</i>	44
8.5	<i>Recommendation of Preferred Route</i>	46
9.	R494 UPGRADE	48
9.1	<i>Introduction</i>	48
9.2	<i>Design Development</i>	48

APPENDIX A FIGURES

Figure 3.1	Constraints Study Area
Figure 5.1A	Killaloe Bypass – Initial Route Options to Establish the Constraints Study Area
Figure 5.1B	Killaloe Bypass – Route Options for Further Evaluation
Figure 5.2	Killaloe Bypass Route Options – Aerial Photography
Figure 5.3	Killaloe Bypass Route Options
Figure 7.1.1	East Clare Development Plan 2005-2011- Zoning
Figure 7.1.2	Killaloe Bypass - Planning Applications
Figure 7.3.1	Conservation Designations
Figure 7.3.2	Watercourses – Killaloe Bypass Section
Figure 7.5	Landscape Type
Figure 7.6.1	Geology
Figure 7.6.2	Ground Investigation - Exploratory Hole Layout Plan
Figure 7.8	Killaloe Bypass – Utility Services Plan
Figure 7.9	Archaeology, Architecture & Cultural Heritage
Figure 8.1	Killaloe Bypass – Route Options and Emerging Preferred Route
Figure 8.2	Killaloe Bypass – Preferred Route

APPENDIX B QUESTIONNAIRE

Phase 3 Route Selection Questionnaire

1. INTRODUCTION

1.1 Objective of 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 as part of the commission for the Killaloe Bypass, the proposed Shannon Bridge Crossing scheme and the R494 Improvement.

The proposed scheme consists of three sections as follows:

- (i) 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 the town with the Shannon Bridge Crossing section to the south;
- (ii) 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. The Constraints Study, Route Selection Study and Preliminary Design have previously been completed for the Shannon Bridge Crossing scheme in 2004;
- (iii) R494 Upgrade: This section will involve widening, regrading and possible local realignment of the R494 from its junction with the R496 to the N7 north of Birdhill.

1.2 Purpose of this Report

The purpose of this report is to describe the Route Selection Phase of the study on the Killaloe Bypass in particular and to recommend a preferred route for the Killaloe Bypass in sufficient detail in particular to fix the optimum location of the route.

The route selection study on the Killaloe Bypass consists of an assessment of the various options on engineering, environmental and economic grounds and demonstrates that complete and thorough investigation and analysis of the most feasible route corridor options have taken place. When the outcome of the route selection process is approved by the local authority, the Preliminary Design phase of the preferred route will follow.

As regards the R494 Upgrade section, as this is largely a road improvement generally along the existing roadway, the route selection process is not relevant. However, the report outlines the development of the proposed alignment and gives background reasoning for the developing alignment.

1.3 Structure of this Report

Roughan & O'Donovan Consulting Engineers carried out the Route Selection Study under the guidance of Clare County Council and North Tipperary County Council, with support from various relevant specialist sub-consultants.

This report considers the following issues that influence the selection of the most appropriate scheme proposal in relation to the Killaloe Bypass:

- Traffic;
- Engineering Alignment and Topography;
- Planning and Socio-Economic Impacts;

- Noise and Air Impacts;
- Aquatic Ecology;
- Terrestrial Ecology;
- Landscape and Visual;
- Geology and Hydrogeology;
- Archaeology and Architectural Heritage.

In relation to the R494 upgrade, the reasoning behind the evolving design is outlined in Chapter 9.

2. THE NEED FOR THE SCHEME

Clare County Council and North Tipperary County Council have identified the need for the provision of a western bypass of Killaloe, a second Shannon River Crossing and the upgrade of the R494 as far as the N7 Nenagh-Limerick Road. The proposed scheme is intended to achieve the following objectives:

- (a) To provide a second river crossing between the towns of Killaloe and Ballina and to reduce congestion and delays on the existing Killaloe bridge;
- (b) To improve traffic circulation around Killaloe and thereby to reduce traffic congestion in the town centre;
- (c) To upgrade the R494 to allow for better use by pedestrians and cyclists, and to improve safety aspects of the road.

The Clare County Development Plan has recognised the need for an efficient road network being essential to the economic development of the County. The Planning Authority seeks to provide a safe and convenient road network for pedestrian, cyclists, public transport, private and commercial vehicles and other road users.

The County Development Plan recognises the importance of the following:

- To protect the road system in a manner which will contribute to the development of the local and national economies;
- To ensure the safety of road users on the public roads;
- To protect the investment of public resources in the provision, improvement and maintenance of the public road system.

The Shannon Crossing at Killaloe has been identified as a key network element necessary to achieve the objectives of the Plan.

The East Clare Local Area Plan recognises that the existing road network is deficient in the provision of crossing points over the River Shannon.

Killaloe and Ballina are linked by a long narrow bridge over the River Shannon. There is no separation between pedestrians and vehicles which results in considerable traffic congestion. It is particularly difficult for large vehicles as they are unable to pass other vehicles and experience difficulty negotiating the turn sharply at the Killaloe end. Regular damage occurs at this point to the parapets. The bridge is a protected structure and cannot be widened or improved to accommodate present traffic requirements. It is an objective of the County Council, and as is set out in the East Clare Local Area Plan, to safeguard the route of a new river crossing in the vicinity of Killaloe.

“Objective T1; Route of the new bridge crossing

The Council will reserve a route corridor as identified on the settlement map, to provide for a future bridge crossing of the Shannon in order to alleviate traffic congestion of the old bridge. Proposals for development that will prevent the development of the bridge and associated roads will not be permitted”

The need for the scheme, including the proposed R494 Improvement, is also recognised in the Western Area Plan published by North Tipperary Country Council.

3. CONSTRAINTS

A Constraints Study was carried out at an early stage of the project planning with the objective of gathering as much background information as possible relating to an agreed study area. In the case of the Killaloe Bypass section, the extent of the study area was agreed at the outset of the commission based on a range of viable route options which had been identified. The methodology for this is described in more detail in Chapter 5 of this report. In the case of the R494 Improvement, a constraints area of width 200m, centred on the centreline of the existing R494 road, was proposed and agreed at the outset.

Data collection was focused on determining the constraints including physical, environmental and engineering constraints, which exist and could affect the location, design and progress of the scheme.

A Constraints Study Report was published in July 2008 which recorded the collection of data to the end of June 2008. Engineering and environmental constraints were also researched and recorded.

3.1 Constraints Review

The Constraints study was carried out by collecting information on major constraints within the full extent of the initial study area; refer to **Figure 3.1 Constraints Study Area**. The information was methodically reviewed and feasible route options were identified.

Issues considered included:

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

3.2 Collection of Data

Specialist sub-consultants were appointed to work alongside the engineering team. Considerable data collection was carried out and is recorded in the individual chapters and figures of the Constraints Report. The data included information on:

- Engineering and topography including major utilities;
- Traffic;
- Geology and Hydrogeology;
- Socio-Economic data;
- Land Use;
- Terrestrial and Aquatic Ecology;
- Archaeology and Cultural Heritage;
- Landscape and Visual.

Full details can be found in the Constraints Study Report.

3.3 Public Consultation No. 1

Public Consultation No. 1 was undertaken between 14th March 2008 and 11th April 2008. The consultation involved the provision of an information leaflet outlining the

scope of the proposal and the area covered as part of this study together with a questionnaire. The consultation process was advertised in the Clare Champion and Nenagh Guardian and a Brochure/Questionnaire was made available at six Local Area Offices during the consultation process. The results of the consultation are recorded in the Constraints Study Report.

4. DESIGN CONSIDERATIONS

4.1 Introduction

This Chapter records proposals made and subsequently agreed for road cross-sections and design speeds for the Killaloe Bypass, Shannon Bridge Crossing and R494 Improvement. All elements of the design carried out to date for the scheme have been carried out in accordance with the NRA Design Manual for Roads and Bridges (DMRB).

4.2 Proposed Road Cross Sections

4.2.1 Section 1: - Killaloe Bypass

Agreed Design Speed: 70 kph

Agreed Road Cross Section:

Traffic Lanes	2 x 3.0m	6.0m
Cycle Lane*	2 x 1.2m	2.4m
Footpath	1 x 2.0m (east side)	2.0m
Grass Verge	1 x 1.0m (east side)	1.0m
Grass Verge	1 x 3.0m (west side)	<u>3.0m</u>
TOTAL		<u>14.4m</u>

(* Cycle Lane will be at road level)

Note: The above design speed and cross section are consistent with the assumptions stated in the document "Shannon Bridge Crossing – Preliminary Design Report" (Rev F01, dated Oct '06).

4.2.2 Section 2: - Shannon Bridge Crossing (as per previous work carried out)

(a) Approaches to Bridge

Agreed Design Speed: 70 kph

Agreed Road Cross Section:

Traffic Lanes	2 x 3.0m	6.0m
Cycle Lane*	2 x 1.2m	2.4m
Footpath	2 x 2.0m	4.0m
Grass Verge	2 x 1.0m	<u>2.0m</u>
TOTAL		<u>14.4m</u>

(* Cycle Lane will be at road level)

(b) Bridge Section

Agreed Design Speed: 70 kph

Agreed Road Cross Section:

Traffic Lanes	2 x 3.0m	6.0m
Cycle Lane*	2 x 1.2m	2.4m
Footpath	2 x 2.0m	4.0m
Parapet Upstands	2 x 0.5m	<u>1.0m</u>
TOTAL		<u>13.4m</u>

(* Cycle Lane will be at road level)

4.2.3 Section 3: - R494 Improvement

(a) Section with 50 kph Speed Limit (i.e. within about 500m of R494/R496 junction)

Agreed Design Speed: 60 kph

Agreed Road Cross Section:

Traffic Lanes	2 x 3.0m	6.0m
Cycle Lane*	2 x 1.2m	2.4m
Footpath	2 x 2.0m	4.0m
Grass Verge	2 x 1.0m	<u>2.0m</u>
TOTAL		<u>14.4m</u>

(* Cycle Lane will be at road level)

(b) Section with 85 kph Design Speed (remote form R494/R496 junction)

Agreed Design Speed: 85kph

Agreed Road Cross Section:

Traffic Lanes	2 x 3.5m	7.0m
Hard Strips	2 x 0.5m	1.0m
Grass Verge	2 x 2.5m	<u>5.0m</u>
TOTAL		<u>13.0 m</u>

The cross section proposed at this section is that of a Reduced Single Carriageway within TD 27 of the DMRB.

4.2.4 Junctions

The junction strategy for the scheme will be informed by the traffic modelling as reported in Chapter 6.

5. ROUTE OPTIONS

5.1 Introduction

This Section provides an outline evaluation of the initial route options considered in order to establish the Constraint Study Area for the Killaloe Bypass element of the scheme, as referred to in Chapter 3 above. Following completion of the evaluation a determination was made as to which of these options were not viable and which route option proposals should be brought forward into the Route Selection Stage for the Killaloe Bypass element of the Scheme.

5.2 Initial Route Options

5.2.1 Thirteen initial route options (K-1 to K-13) which were considered are shown in **Figure 5.1A**. The start chainages for all routes are to the north of the town with a tie-in with the R463 North (Scariff Road). Each route option lies to the west of the town and terminates with a tie-in with the R463 South either at the tie-in of the Shannon Bridge Crossing or at a tie-in south of the Shannon Bridge Crossing tie-in.

5.2.2 The two main constraints in the selection of the initial route options were:

- i) The residential properties within the area of interest;
- ii) The steep ground to the west of the town which is most pronounced at the northern end of the town.

Other significant constraints include Ballyvally House and grounds to the north of the town, archaeological features and the need to tie-in the bypass with the local road network reasonably close to the town itself.

5.2.3 The various initial route options were developed using the OS mapping available together with the ground level contours contained within the same OS mapping. The alignments were developed using the geometric requirements contained within TD9 of NRA DMRB for design speeds of 70kph. However, at the northern end of the scheme, a maximum vertical gradient of 8% was used which is a Departure from the 6% maximum gradient quoted in Chapter 4 of TD 9.

The following table lists the broad effects of each route under three headings:

- Depth of deepest cutting;
- Number of directly affected houses;
- Length of bypass road.

Reference Number of Initial Route Option	Depth of Deepest Cutting (m)	Number of Directly Effected Houses (No)	Length of Bypass Road (km)	Other Remarks
K-1	22.0	4	1.84	Route is tight to town. The houses affected are to the northside of the town.
K-2	30.0	1	1.98	Route is in the middle of the constraints corridor.
K-3	53.0	0	2.40	Route is the most westerly route and has severe impact on the Ballyvally Gate Lodge.
K-4	22.0	2	1.96	Houses affected are Newtown House and the Ballyvally Gate Lodge.
K-5	14.0	4	1.90	Route is closer to town at the north end and further from town at south end.
K-6	22.0	3	1.91	Route affects two houses plus the Ballyvally Gate Lodge.
K-7	45.0	1	2.24	Route affects the Ballyvally Gate Lodge.
K-8	4.0	5	2.04	Route affects 5 houses including the Ballyvally Gate Lodge.
K-9	8.0	1	2.00	Starts in the wet wooded area east of the gate lodge.
K-10	4.0	0	2.20	While Route K-10 is shown not directly affecting any house, it has significant impacts on 6 houses including the gate lodge which will be cut off from the main house.
K-11	13.0	4	1.92	Route K-11 ends at the R463 South some 250m west of the Shannon Bridge Crossing tie-in with the R463 South. Route K-11 can tie in with most other routes at the northern end.
K-12	16.0	0	2.67	Route K-12 passes to the west of Ballyvally House and ties in with the R463 North, 250m north of the gate lodge.
K-13	4.0	0	3.60	Route K-13 passes to the west of Ballyvally House and remains to the west of the other residential houses north of Ballyvally House.

5.3 Evaluation of the Initial Route Options

5.3.1 The depth of cutting is a serious issue on the northern end of the town as a result of the steep escarpment. While the initial route options were based on preliminary topographical data, route options that were anticipated to generate cuttings in excess of 20m, based on the topographical survey information available, were considered as non-viable at this initial stage. This decision results in the deletion of 6 of the initial route options at the northern end (Routes K-1, K-2, K-3, K-4, K6 and K-7). Route option K-5 could also have been discounted for this reason. However this option was retained as it was considered important to include an option with a northern tie-in point further to the south on the R463.

5.3.2 The number of houses identified as being directly affected (i.e. to be demolished) at this early stage varied from none (Routes K-3, K-10, and K-12) to 5 (Route Option K-8). As other options of a similar nature were readily available, it was considered reasonable that Route Option K-8 could be deleted at this initial stage.

5.3.3 The length of the proposed initial bypass options ranges in length from 1.84km (Route Option K-1) to 3.60km (Route Option K-13). The shortest route not already deleted because of other considerations was 1.90km in length (Route Option K-5). While Route Option K-13 may have proven to be uneconomic and have greater environmental impacts, it was not considered appropriate to delete it at the initial stage.

5.3.4 It should be noted that the Constraints Study Area (refer to Chapter 3) was identified and agreed after the elimination of initial route option K-3 as described in Section 5.3.1 above. The Constraints Study Area is shown on Fig 5.1A.

5.4 Route Options to Bring Forward for Further Evaluation

5.4.1 Several of the initial route options for the Killaloe Bypass were considered to be non-viable as discussed above although some parts of the routes offered some value. In addition some of the remaining routes had elements that are common with other routes options. Accordingly the following discussion explains the reasoning for the selection of the route options for further evaluation during the Route Selection Stage.

5.4.2 Route Options at the Northern End brought forward were as follows:

- i) Route Options K-12 and K-13, west and north of Ballyvally House;
- ii) Route Options K-5, K-9, K-10 south and east of Ballyvally House.

5.4.3 Route Options in the middle portion brought forward were as follows:

- i) Route Options K-1, K-2 and K-4 at the location closer to the town;
- ii) Route Options K-7 at the location further west.

5.4.4 Route Options in the southern portion brought forward were as follows:

- i) Route Options K-1, K-2 and K-3 tying in directly with the Shannon Bridge Crossing;
- ii) Route Options K-11 tying in 250m west of the Shannon Bridge Crossing tie-in with the R463 South.

5.4.5 Looking at the options selected and considering that different constraints are located in different zones, the following route options were brought forward to the next stage. Refer to **Figure 5.1B**, **Figure 5.2** and **Figure 5.3** for the layout of each of the route options.

- (i) **Route Option A:** This is the most easterly route and the shortest route. Going from north to south, the route option starts off at R463 North with alignment from initial route option K-5, then following K-1 for about half its length.
- (ii) **Route Option B:** This is the second most easterly route. It starts off at R463 North with the alignment from initial route option K-9 and then follows route option K-4 for the majority of its length.
- (iii) **Route Option C:** This option starts off at the R463 North with initial route option K-10 and then shortly follows initial route option K-4.

- (iv) **Route Option D:** This option starts off at the R463 North with initial route option K-12. In the middle it links up with initial route option K-13 and at the southern end finishes up with option K-11.
- (v) **Route Option E:** This is the longest and most westerly route option. It starts off with initial route option K-13 and joins up with initial route option K-7 in the middle. It finishes at the R463 South along route option K-11.

It should be noted that the above Route Options A-E are interchangeable along the length of the corridor. For example, the northern half of Route Option A can link with the southern half of Route Option B. The alignments generated are described in the following sections.

In order to confirm the viability of some of these options a localised topographical survey was carried out in October 2008 in the vicinity of Newtown.

5.4.6 Horizontal Alignments

- (i) **Route Option A**

Commencing at the northern tie-in to the R463, this option travels south westwards for 175m approximately before curving south on a 360m radius. The route continues southwards on a 1020m radius leading to a 555m long straight. A further 360m radius brings the route in a south easterly direction before rejoining the R463 at Shantraud. The length of the option is 1.85km approximately.
- (ii) **Route Option B**

The northernmost section of this option is a composite alignment comprising a series of straights and 360m radius curves giving a general south westerly movement before travelling due south on a straight of approximately 690m in length. The route then curves south eastwards at 360m radius before rejoining the R463 at Shantraud. The option length is 2.025km approximately.
- (iii) **Route Option C**

This option commences with a triple compound curve (radius of 360m, 720m and 360m respectively) before rejoining the line of Route Option B. The route severs the main access driveway of Ballyvally Demesne. The total length of the route is 2.45km.
- (iv) **Route Option D**

This route connects to the existing R463 at a location further north than A, B or C. Commencing with a westbound straight section 215m in length, the route then curves southward behind Ballyvally House on a 255m radius which is substandard. The route continues southwards on a series of three straight sections separated by a 1020m radius right hand curve and a 900m radius left hand curve respectively. The route rejoins the R463 at a location 250m approximately from the proposed tie-in to the Shannon Bridge Crossing. This option would therefore require upgrade of the existing R463 between the two tie-in points. The total length of the option is 2.515km.
- (v) **Route Option E**

This route is a considerably longer option, tying in to the R463 some 1.5km further northwards than the other routes examined. The option commences with a straight section 1.2km long approximately travelling roughly south westwards before curving southwards on a 360m radius curve. The central section comprises two straights connected by a 1020m radius curve, before the

route heads south eastwards, rejoining the line of Option D on the approach to the R463 tie-in.

5.4.7 Vertical Alignment

(i) Route Option A

Commencing at its northern end the route rises at 8% to its highest level at Chainage 620 approximately. The route then falls to the tie-in with the R463 using a succession of downhill gradients ranging from 1.6% to 6%, connected by vertical crest and sag curves as appropriate. The levels of existing terrain result in a cut of maximum depth in the vicinity of Chainage 300 of 13m depth.

(ii) Route Option B

This route is similar to Option A in that it rises at 8% from its northern commencement point to a high point at Chainage 700 approximately. The road then falls to rejoin the R463 by way of a range of downhill sections with gradients ranging from 1.2% to 6%. The maximum depth of cut is 8m which occurs at Chainage 300 approximately.

(iii) Route Option C

This option rises at 7% from its northern commencement point to a crest at Chainage 600, then maintaining a virtually flat gradient for some 200m before descending to the R463 at gradients ranging between 0.75% and 6%. The maximum depth of cut is 3.6m approximately.

(iv) Route Option D

This option rises at 7.7% and then descends from a peak at Chainage 600 at a similar gradient. It continues its descent to the R463 on a range of gradients from 2.3% to 5.9%. The maximum depth of cutting is 15m approximately at the location behind Ballyvally House.

(v) Route Option E

This option rises at 6% for some 1.2km before descending at 2.7% to a sag point at Chainage 1600 approximately. A further peak occurs at Chainage 1900 before the option descends to its tie-in point at the R463 with gradients ranging between 1.7% and 6%. The maximum depth of cutting is some 9m.

5.4.8 Comparison of Alignments

In terms of vertical alignments, Route Options C and E are considered preferable to other options in that the gradients do not exceed 6% at any stage. Route Options A, B and D could be considered to be equal value in that they all rely on gradients in the range 7.7% to 8%. However, Route Option D is considered inferior to Route Option A and B as it requires back to back vertical alignments of 7.7% over relatively long stretches.

With regard to horizontal alignments, Route Options A, B, C and E are considered to be of equal merit in that they all achieve the Desirable Minimum Radius of 360m. Option D is disfavoured as it contains a horizontal radius of 255m at its northern end which is below the desirable minimum radius.

5.5 Public Consultation No 2

As part of the Route Selection Process, Public Consultation No. 2 was undertaken in September 2008. The objectives of the consultation were to:

- Present the route corridor options to the public;
- Inform them of the process and programme for the project;

- Invite submissions on these options;
- Gather local information, which may not be known to the design team.

Publicity

A publicity campaign was undertaken by Clare and North Tipperary County Council prior to the consultation. The consultation was advertised in the Clare Champion and the Nenagh Guardian prior to the public consultation exhibition. A public consultation leaflet and questionnaire was sent to all who had made submission in Public Consultation No 1. Advertisements were broadcast on the local radio (Clare FM and Tipp FM) prior to the exhibitions. In addition a consultation leaflet was made available at the following locations for two weeks from the 17th September 2008 to the 1st October 2008:

- Clare County Council, Áras Contae an Chláir, Economic Development & Planning, New Road, Ennis, Co. Clare;
- Killaloe Public Library, Killaloe, County Clare;
- Clare County Council, Scariff Area Office, Mountshannon Road, Scariff, Co. Clare;
- Clare County Council, South East Clare Area Office, Westbury Centre, Corbally Road, Westbury, Co. Clare;
- North Tipperary County Council, Roads Department, Civic Offices, Limerick Road, Nenagh, Co. Tipperary;
- Newport Area Office, Newport, Co. Tipperary.

The Public Consultation was held on the 17th of September at the Lakeside Hotel In Ballina, Co. Tipperary. A number of displays were available for public viewing in discovery series mapping, O.S mapping and aerial photography. A team of engineers were available to explain the scheme and answer any questions in relation to the proposal. The exhibition was held from 3pm to 8pm.

A total of 84 people signed the attendance sheet during the consultation process at the Lakeside Hotel. All attendees were asked to sign the register and the information brochure and questionnaire was made available to all.

Feedback

Throughout the consultation process, the staff at the exhibitions endeavoured to obtain as much local information as possible. The information gathered was reviewed and distributed to the relevant specialist or design team member.

Statutory and Non-Statutory Consultees

Letters of consultation were issued to a number of statutory and non-statutory consultees notifying them of the route options under consideration and inviting them to comment on the options. An information pack including the brochure and map inserts accompanied the letters.

Questionnaire Responses

The closing date for receipt of submission was the 1st October 2008. However all submission received later were recorded and taken into consideration. A total of 50 responses were received. Many of the questionnaires received were accompanied by letters and further information.

Analysis of Responses

All submissions received were evaluated and the information they contained was recorded. Where letters were received without questionnaires the details were recorded including any comments made. Any submission with information relating to any specialist area was copied to the relevant specialist or design team member, e.g. agriculture, landscape, planning, archaeology, flora, fauna and fisheries, etc.

A summary of the submissions and comments made during the public consultation process is presented as follows:

- Direct impact on homes;
- Noise, air quality and traffic impact to residences in proximity to route options;
- Negative impacts of various options on archaeology, architectural and cultural heritage;
- Negative impact of options on growth of tourism and facilities;
- Traffic impacts;
- Ecology impacts, i.e. mature woodlands, wildlife;
- Visual impact on Killaloe;
- Provision of footpaths and cycle lanes;
- Concern for impact on residential space i.e. garden, house etc;
- Maintenance of heritage town status;
- Safety aspects of routes for road users;
- Safety aspects during construction, earthworks;
- Impact on water quality;
- Loss of trees;
- Cost, engineering feasibility;
- Loss and/or severance of agricultural land;
- Flooding impacts.

Discussion

The consultation exercise informed the public of the route corridors under consideration. The material provided both at the exhibition and in the brochure appeared clearly understood. The project team obtained a considerable amount of information from the public both directly at the exhibition and through the submission of the questionnaire and letters.

The analysis of the questionnaires showed that 54% of people agreed in principle with the need for the scheme, 28% were unsure and 18% disagreed with the scheme.

6. TRAFFIC CONDITIONS

6.1 Introduction

This section records the traffic predictions that were carried out through the development of a traffic model to assess the proposed bridge crossing and bypass of Killaloe. The selected modelling tool is the S-Paramics microsimulation package. It simulates the individual components of traffic flow and congestion, and takes account of the actions and interactions of individual vehicles as they travel through a road network. It models the detailed physical road layout, and includes features such as traffic signal settings, driver behavioural characteristics and vehicle kinematics and therefore can accurately portray the variable circumstances which lead to congestion in all types and sizes of road network.

6.2 Base Model Data

Prior Modelling

A Saturn model of the traffic flows through a wide area extending from Killaloe to Castleconnell and from O'Briensbridge to the N7 based on traffic survey data from 2005 was created for a previous study on the proposed bridge crossing. A large amount of information in the form of link flows & origin-destination matrices for the years 2007 & 2022 was taken from this model.

Traffic Surveys

Traffic surveys were undertaken at 2 no. locations to the west of Killaloe in March 2008 to provide flows for routes not in the Saturn model.

The results of these surveys indicate the following make of traffic:

Motor car	65%
Light goods vehicles	27%
Agricultural tractors	1%
Buses	1%
Heavy goods vehicles	6%

Paramics Model (2007)

The main routes through the Killaloe / Ballina area were modelled in Paramics. A 30kph effective speed was assumed through the built-up areas of Killaloe & Ballina and a 70kph effective speed was assumed outside these areas. One way operation on the existing bridge with control by traffic signals on a 150 second cycle time was assumed. One-way operation requires 70 seconds per cycle to flush traffic from the bridge.

A traffic demand matrix for the simulation was created by combining the Saturn origin-destination matrix and the surveyed traffic flows. An additional amount of traffic was added to the model to represent traffic coming from or going to Killaloe & Ballina that was not represented in the Saturn model.

Future Development within Killaloe & Ballina

The County Development Plan zonings for Killaloe & Ballina were assessed & the TRICS database of traffic surveys was used to create a projection of the traffic generated by the full development of the zoned lands. This additional traffic was incorporated into the 2027 design year model.

Paramics Model (2012 and 2027)

The proposed bridge crossing and two potential bypass routes of Killaloe (Options B & E) were modelled in Paramics. An effective speed limit of 70kph was assumed for the bridge crossing and bypass options.

A traffic demand matrix was again created from the Saturn origin-destination matrix (projected to 2012 and 2027 at 4% per annum), the projected surveyed traffic flows & the projected traffic generated by the development of zoned lands.

6.3 Future Traffic Forecasts

Traffic Link Flows

Peak hourly traffic link flows on the simulated networks are shown in **Figures 6.1 to 6.6** which are included at the end of this Chapter. Approximately 450 vehicles cross the existing bridge during the peak hour in 2007. Fewer vehicles cross the bridge during the peak hour in the future scenarios compared to 2007, though slightly more traffic uses the existing bridge in Option E compared to Option B.

Traffic surveys on Shantraud / Creeveroe Road, inside the proposed bypass, show a two-way daily total of 1,353 vehicles. Following completion of the proposed bridge crossing and bypass, traffic on Shantraud / Creeveroe Road is expected to decrease to 795 vehicles per day. This decrease in traffic is a result of a significant portion of traffic to / from southwest of Killaloe is diverted onto the bypass, a small portion of traffic will approach the Town Centre via the proposed bypass instead of its current route along the R463 or across the existing bridge.

Traffic surveys on Hill Road show a two-way daily total of 258 vehicles. Following completion of the proposed bridge crossing and bypass traffic is expected to increase to 375 vehicles per day. This slight increase in traffic volumes is a result of traffic growth due to local development and the re-routing of some traffic from the Town Centre to the bypass.

Traffic volumes for the AM, PM and Annual Average Daily Traffic (AADT) for the base year and the design year of 2027 are shown in Tables 1 & 2 below for the R494 (to the south of the R494-R496 junction) and for the bypass options (the section between the R463 and the local road to Bridgetown, which is the most highly trafficked section of the bypass options).

Table 6.3.1 Traffic flows on R494

	AM vehicles per hour		PM vehicles per hour		Average Annual Daily Traffic (AADT)
	to N	to S	to N	to S	
2007 Base Year	193	347	356	168	4100
2027 Route Option B	328	666	716	318	7800
2027 Route Option E	329	652	682	292	7500

Table 6.3.2 Traffic flows on the Proposed Killaloe Bypass

	AM vehicles per hour		PM vehicles per hour		Average Annual Daily Traffic (AADT)
	to E	to W	to E	to W	
2027 Route Option B	407	330	351	411	5800
2027 Route Option E	384	334	327	412	5600

The AADT volumes have been estimated based on the AM and PM traffic volumes which have been factored up, taking into account these routes are primarily carrying commuter traffic, which results in the peak periods accounting for a higher portion of the daily total that would be expected on interurban routes.

The data also indicates that the proportion of HGV is 7.2% on the proposed bridge crossing and bypass.

The above traffic volumes estimates indicate that the proposed cross sections for both the bypass and the R494 are adequate for the design year.

Junction Analysis

The proposed junctions where the bypass intersects the R463 both north and south of Killaloe and at the junction of the R494, R496 and the proposed bridge are designed as roundabouts to provide adequate capacity for the design year traffic volumes and also provide a traffic calming gateway on the approaches to Killaloe and Ballina.

An ARCADY analysis of the roundabout proposed to replace the junction of the R494 & R496 shows that the roundabout will operate with an RFC (ratio of flow to capacity) of 0.8 during the peak hours of the future scenarios. This is considered to be an acceptable value for uncongested operation of the roundabout.

The other junctions where the proposed bypass intersects the local roads of Bridgetown Road and Hill Road are ghost island priority junctions which are considered adequate for the predicted design year traffic volumes.

Queues

The 2007 model indicated substantial queue formation on the approaches to the existing bridge. The lengths of the queues from the simulation were similar to those observed on-site. The 2027 design year simulations showed reduced queue lengths at these locations. The results are summarised in Table 3 below. Queues on the R494 Northern approach to the existing bridge decrease little in the future scenarios due to increased traffic throughput causing congestion at the roundabout to the east of the existing bridge. Queues are slightly longer for Option E compared to Option B due to the larger amount of traffic crossing the existing bridge in Option E.

Table 6.3.3 Queues at Existing Bridge

	Approach			
	R463 N	R463 S	R494 N	R494 S
2007 AM	450m	780m	200m	350m
2007 PM	475m	880m	180m	390m
2027 B AM	135m	120m	200m	120m
2027 B PM	150m	120m	180m	150m
2027 E AM	160m	110m	180m	130m
2027 E PM	170m	130m	180m	150m

Journey Times

The future models demonstrate significant savings in journey times through the Killaloe-Ballina area on journeys that can avail of the bypass & bridge crossing. However, journey times for journeys to or from the R494 to the North of Ballina remain the same or increase due to congestion at the roundabout to the east of the existing bridge. Journey times are summarised in Tables 4 and 5 below.

Table 6.3.4 2012 Opening Year Journey Times

From	To	Time (minutes)					
		2012 Do Min AM	2012 Opt B AM	2012 Opt E AM	2012 Do Min PM	2012 Opt B PM	2012 Opt E AM
R494 N of Ballina	R496	5.5	2.5	2.75	3	2.5	2.5
	R494 S of R496	5	2.25	2.25	2.5	2	2
	R463 S of Killaloe	7.75	3.5	3.75	5.25	3.5	3.75
	R463 N of Killaloe	10.25	6.75	6.75	7.75	6.75	6.75
R496	R494 S of R496	1.75	1.75	1.75	1.75	1.75	2
	R463 S of Killaloe	11.75	3	3.25	13	3	3.25
	R463 N of Killaloe	13	7	8.5	14.75	7	8.25
	R494 N of Ballina	6.75	3.25	3.25	9.5	3.25	3.25
R494 S of R496	R463 S of Killaloe	8.75	2	2.25	12	2	2.25
	R463 N of Killaloe	11.75	6.25	7.25	14	6.25	7.5
	R494 N of Ballina	5.75	2.25	2.25	8.25	2.5	2.5
	R496	1.5	1.5	1.5	1.5	1.5	1.5
R463 S of Killaloe	R463 N of Killaloe	15.25	5.25	5.5	14.5	5.25	5.75
	R494 N of Ballina	13.25	3.75	4	11.75	3.75	4.25
	R496	13.75	2.75	3	10.25	2.75	3.25
	R494 S of R496	16	2.25	2.75	12.25	2.25	2.75
R463 N of Killaloe	R494 N of Ballina	13.75	6.75	6.75	14	6.75	6.5
	R496	12	6.75	8	15.75	6.75	8
	R494 S of R496	15	6.25	7.5	15.5	6.25	7.75
	R463 S of Killaloe	15	5.5	5.75	15.25	5.5	5.75

Table 6.3.5 2027 Design Year Journey Times

From	To	Time (minutes)					
		2007 AM	2027 Opt B AM	2027 Opt E AM	2007 PM	2027 Opt B PM	2027 Opt E PM
R494 N of Ballina	R496	4.25	4.75	5.75	3	3	3.75
	R494 S of R496	3.75	4.5	5.25	2.5	2.75	3.5
	R463 S of Killaloe	6.75	5.75	6.75	5	4.25	5
	R463 N of Killaloe	9.75	9	9.5	7.5	7.5	8
R496	R494 S of R496	0	2	2	0	1.75	1.75
	R463 S of Killaloe	0	3.5	3.5	0	3.25	3.5
	R463 N of Killaloe	11.5	7.5	8.75	0	7.25	8.75
	R494 N of Ballina	4.75	3.75	3.75	5.25	5	5.25
R494 S of R496	R463 S of Killaloe	0	2	2.5	0	2.25	2.5
	R463 N of Killaloe	10.5	6.25	7.5	10.25	6.25	7.75
	R494 N of Ballina	3.75	2.5	2.5	4.25	4	4.25
	R496	0	1.5	1.5	0	1.5	1.5
R463 S of Killaloe	R463 N of Killaloe	12.75	5.5	5.75	12.75	5.75	6
	R494 N of Ballina	10.5	4	4.25	10	5.5	6
	R496	0	2.75	3.25	0	3.25	3.75
	R494 S of R496	0	2.5	2.75	0	2.75	3.25
R463 N of Killaloe	R494 N of Ballina	10.5	7.5	8.25	11.5	7.25	7.5
	R496	0	6.75	8.75	12.5	7	8.5
	R494 S of R496	12.25	6.5	8	12.5	6.5	8
	R463 S of Killaloe	12	5.5	5.75	12	5.5	5.75

6.4 Accident Analysis

Accident data has been obtained from the Shannon Bridge Crossing, Constraints Study Report, 2005 and the Ballina / Killaloe Traffic Management Strategy, 2003.

This data shows that a significant portion of accidents in the vicinity of Ballina and Killaloe occurred on the main approaches to the towns along the R463, R494 and R496. Most of these accidents occurred along tight bends and blind corners, where there was evidence that speeding was a main factor.

The proposed route options include the provision of roundabouts at the intersections with the existing regional roads at the R463 on the north and south side of Killaloe and at the intersection of the R494 and R496 on the south side of Ballina. These roundabouts will provide a traffic calming effect on the approaches to the towns.

Furthermore the reduction in through traffic at Killaloe and Ballina may result in a decrease in accidents in these urban areas.

7. ENVIRONMENTAL IMPACTS

7.1 Planning and Socio-Economic Impacts

An assessment of the socio-economic impact of the route corridor options was undertaken and is reported on in this section. The work is based on the information collected during the Constraints Study and included a study of the County Clare Development Plans, East Clare Local Area Plan and the Census of Population of Ireland for 2006 (Preliminary Figures). Consideration was also given to the North Tipperary County Development Plan. Site visits and reviews of aerial photographs were also used as part of the assessment. Assessment of the outcome of public consultations and submissions made from the public was also taken into consideration.

Each of the route corridor options is considered and leads to an overall route assessment.

Constraints identified within the study area are as follows:

- Social structure;
- Economic Structure;
- Communities and businesses;
- Housing and development;
- Tourism and amenity.

Impact on Social and Economic structure

All route options provide for a bypass of the town of Killaloe, the provision of this bypass will result in a reduction in traffic numbers within the town centre thereby reducing congestion, noise impact from existing traffic and improvements in air quality. The bypass will provide improved quality of life with reduced journey times for commuters.

Economic structure will be improved with improved access to businesses in the area, reduction in traffic will make the towns of both Killaloe and Ballina more pleasant destinations to visit and allow for development in areas that are in proximity to the bypass.

Community Severance

Severance of lands between the communities within the development is considered minor along all route options. The further west the route options (i.e. Route Options D and E) it is considered there will be less impact on the community.

All options create loss of land and severance of land for the residentially zoned area R5. The degree of severance varies from least impact as a result of Option E with greatest impact from Option A, B and C. Option E does not impact on land zoned as strategic reserve SR1 however all other options result in an impact to these lands. See **Figure 7.1.1** for East Clare Local Area Plan 2005 - 2011 Land Zoning.

Land Severance (Agricultural Use)

Much of the land crossed by all route options is agricultural in nature and will be severed as a result of the proposed scheme. Pastoral farming is the predominant land use within the study area. Option E creates the largest amount of severance due to its location furthest away from the town and also due to the length of the

scheme. Approximately 8 land holdings are severed as a result of Option E, Options A to D severs approximately 4 land holdings.

Option D is considered to be the second least favourable as the impact on individual land holding is more severe and the area of land severed is larger, than in the case of A, B and C Options.

Residential Dwellings

Some of the proposed route options will result in the loss of residential dwelling or their curtilage to the north of the town where the route rejoins the R463. Route Option A, B and C will directly impact on at least one residential dwelling located at Kincora in north Killaloe. Route Option D and E do not directly impact on any residential dwellings, although planning permission has been granted for a new dwelling at the northern end of route E (refer **Figure 7.1.2**)

Community Facilities

The majority of community facilities tend to be located to the east of the proposed route options; all route options aim to serve these facilities and improve access to the town. Route Options A, B and C will provide shorter access to facilities for both vehicular traffic and for use by pedestrians and cyclists. Facilities that will be provided with improved access include St. Anne's Community College and GAA sports grounds, docking points for the Shannon River and Killestry School. Access to sites of historical interest e.g. Brian Boru Heritage Site will be provided also via the Killaloe bypass where currently visitors have to travel through the centre of the town.

Planning Permission

Information on planning permissions granted in the last five years within the constraints area has been obtained from the county planning department. One planning application for a residential development of 53 houses located to the south of the Hill Road in Shantraud is impacted by Options B to E. As stated above, Option E impacts on one planning permission which has been granted for a single dwelling in Craglea.

Planning permissions granted and applied for in the study area has been identified in **Figure 7.1.2**.

7.2 Noise and Air Impacts

Noise and Air levels for the proposed route options are examined at this stage by determining the number of sensitive locations within a defined area. Sensitive locations are defined as residential dwellings, schools, churches, hotels etc.

The comparison between the route corridors was carried out on the basis of estimates of the number of properties within 300 metres each side of the centreline of the route corridor. The number within distance bands of 50 metres, 100 metres 200 meters and 300 metres were recorded together with the total within the 300 meters band. These totals are multiplied by an arbitrary figure (4x 50, 3x 100m, 2x 200m and 1x 300m) and summed to provide the Potential Impact Rating (PIR) of each route. This assessment is in accordance with the 'Stage 1 Assessment' described in the UK Design Manual for Roads and Bridges, Volume 11, Section 3, part 1 (Air Quality) and Part 7 (Noise); and with the National Roads Authorities 'Guidelines for treatment of Noise and Vibration on National Road Schemes'. The method provides a reasonable basis for the comparison of the air quality and noise impacts of the various options at the route selection stage.

Table 7.1 Number of Sensitive Locations (Residences) Along the Proposed Route Options

Route Options	Distance of sensitive locations from proposed route options (meters)					Potential Impact Rating				
	0-50	50-100	100-200	200-300	Total	Band1	Band2	Band3	Band4	PIR
A	9	16	50	69	144	36	48	100	69	243
B	6	12	47	50	115	24	36	94	50	204
C	6	12	46	51	79	24	36	92	51	203
D	0	7	26	38	71	0	21	52	38	111
E	2	10	14	20	46	8	30	28	20	86

Option A proves to have the strongest impact in terms of proximity to sensitive locations. This route is the closest to Killaloe and therefore is likely to have more impact on sensitive locations. Options E and Option D have the least impact on noise and air sensitive locations.

The preferred options in terms of Air and Noise impact is option E with Option D being the second preferred option. Option C and B are third preferred and the least preferred option is option A.

7.3 Aquatic Ecology

The study area is located in Hydrometric area 25 for the Lower River Shannon. The route options all traverse a number of small streams that are running from the west into Lough Derg and the River Shannon. There are five water courses in total.

These watercourses are small and are not tested for water quality by the EPA.

There is potential impact from pollution events due to all crossings of watercourses which flow into the Lower River Shannon candidate Special Area of Conservation (cSAC), Lough Derg proposed Natural Heritage Area (pNAH) and Lough Derg Specially Protected Area (SPA) (See **Figure 7.3.1**). Appropriate mitigation measures will be deployed to minimise any risk of pollution to these streams and rivers.

No significant aquatic ecological element was noted in relation to the relevant rivers to be crossed. Option E is the longest option in length and crosses two more watercourses than all other options and therefore this is the least preferred option. There is no preference between route options A to D. See **Figure 7.3.2** for details of rivers and streams within the study area.

7.4 Terrestrial Ecology

In order to carry out a comparison of the route options available a desktop study was undertaken to identify sites, species and habitats of ecological/ nature conservation interest in the vicinity of the site.

A walkover survey of the route was carried out on the 16th July 2008. All landholdings were surveyed, habitat types were identified and any features of ecological interest were noted. Habitats were also assessed for their likely importance for birds, mammals and other protected species of fauna. Signs of bird and mammal activity were noted.

Existing Environment

Sites of Conservation Importance

While not directly impacting on the following designations, route options are never the less in proximity to Lower River Shannon cSAC, Lough Derg pNHA and Lough Derg SPA. These sites are protected under the European Communities (Natural Habitats) Regulations 1997 and EU Birds Directive 1979 respectively. The wildlife (Amendment) Act 2000 also protects Lough Derg as a proposed Natural Heritage Area. See Appendix 1 for National Parks and Wildlife Site synopsis of the aforementioned sites.

The proposed routes have the potential to impact on the water supply to sensitive wetland habitats some of which are spring fed. Of particular concern are areas of EU Annex I and Annex I priority habitat fringing the lake, north of Killaloe, including Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*. Some areas of this type of woodland are outside the current pNHA boundary.

Habitats, Flora and Fauna

During the field visit to the site, a preliminary habitats survey was undertaken along each route corridor. A review of aerial photographs was also carried out in order to assist in identification of habitat types. Land parcels were classified according to 'A Guide to Habitats in Ireland' (Fossit, 2000).

Much of the study area is dominated by improved agricultural land, used mainly for pastoral farming. This land is considered common to Ireland and does not possess any significant habitat value. A number of other habitats were found along the routes and were identified on the habitats map.

Wet grassland was identified to the south west of Killaloe where all route options commence; the area is dominated by mixed grasses including Yorkshire fog, thymothy and creeping bent with sedges and stands of reeds; horsetail are common with yellow Irish, buttercup spotted orchid and ragged robin also present within the area. Wet grasslands are under threat in Ireland due to current drainage practices and are becoming increasingly uncommon. There is also a significant number of trees and scrub development along the southern section of all route options.

All 5 routes pass through an area of conifer woodland to the south. This plantation is surrounded by a thick line of deciduous trees which show evidence of historical coppicing. The habitat shows frequent signs of badger activity in this area.

As the routes move northwards the land is largely made up of improved agricultural land with large land parcels. Fields are divided by hedgerows along parts of the

route and bordering roadways which dissect the area. Many of these hedgerow systems show evidence of badger activity in the form of tracks.

To the south of Ballyvally House Route A, B and C move eastwards to join the R463. Route A and route B sever one tree line, and route C severs 2 treelines before joining the R463 to the north of the gate lodge. These treelines show evidence of mammal activity and are also known to support several species of bat.

The western extents of Ballyvally have a small conifer plantation of Sitka Spruce.

Ballyvally demesne is surrounded by mixed deciduous and conifer woodlands within which is well maintained parklands and agricultural lands. The mature treelines and woodlands provide excellent habitat for mammals; mammals known to use the area include badger, pine martin, red squirrel, hare and a number of bat species. Deer are known to use the uplands to the west of the estate.

Potential Impact of the Route Options

Route Option D is designed to avoid direct impact on Ballyvally House and skirts the west of the estate before moving east severing some mixed woodland that is part of the Ballyvally estate. Option E travels on higher ground before gradually meeting the R463 much further north of the Options A to D. This route travels through some wet grasslands and large areas of bracken, bramble and scrub as well as crossing a number of treelines bordering the Ballyvally Demesne and the stream. The route then impacts on some woodland before joining the R463.

Route Option A and B encroaches on the least area of land. These options are primarily through agricultural land that is not uncommon in Ireland and of poor ecological value.

Option D avoids much of the woodlands associated with Ballyvally house however does create some severance to the north of the estate. Option E is the longest route, where it severs most land and results in severance to wetland scrubland and woodlands to the north of the town.

Route Options A to D will impact on the area of land to the east of the R463, which is an area of mixed deciduous, and conifer woodland and scrub.

Option E will impact on a belt of mature oak dominated trees at Craglea River and again at Crag Hill where there is a mature plantation mixed deciduous trees where the route meets the R463. Option E joins the R463 in close proximity to Lough Derg SPA and pNHA.

As a result of its impact on varying types of Habitat, Route Option E is the least preferred route. Route Option A impacts on the least amount of habitat and therefore is the preferred option. Route Options B followed by Route Option C is the second and third preferred options for the proposed scheme.

7.5 Landscape and Visual

Existing Environment

The study area is located in a corridor west of Killaloe town. Within the wider landscape context the major landscape features include Lough Derg to the north, Slieve Bernagh Mountains to the west, Killaloe town to the east and the river Shannon to the east and south. On the opposite side of the valley are the Arra Mountains, and Ballina town which forms a twin township with Killaloe.

The topography can be described as a narrow valley becoming steeper the further westwards and eastward from Killaloe town one travels. Land use is agricultural, residential and silvicultural in nature, with the main landscape features or elements of the area including the backdrop of the mountains, the agricultural fields surrounded by hedgerows, mature trees and numerous waymarked walks on the Shannonside location.

In visual terms there are a number of views of particular merit due to the steep topography and close proximity to the Shannon River and Lough Derg. The East Clare Way and the Lough Derg Way are two scenic trails that cross the proposed study route. Killaloe is described as a heritage town due to its street vernacular. The areas of highest visual quality are of the valley opposite and over the River Shannon. These are of relatively high significance to residents. Where distant views are available the most significant element in such views are the Slieve Bernagh or Arra mountains.

The study area, located to the west of Killaloe is composed of rural stretch of land on the lower slopes of the Slieve Bernagh Mountains. The topography of the study area could be described as forming part of a narrow valley between the mountains of Slieve Bernagh and the Arra Mountains. In visual terms, there are a number of listed views within the study area. The scenic quality of the study area is considered high with the river Shannon at the base of the valley and views of surrounding mountain scenery. The most significant views from the study area are those of the mountains and of the river Shannon flowing out of Lough Derg. Within the study area, distant views are sometimes limited due to the screening effect of mature hedgerows and trees, conifer woodlands, intervening houses and local projections in topography from some viewpoints. Sensitive viewers groups ("Receptors") are mainly the local residences. There are some important tourist viewpoints since Killaloe is a heritage town that is been taken into consideration also.

See **Figure 7.5** for Landscape Type of Killaloe.

Potential Impact on Landscape and Visual

Each of the proposed route options has been analysed with regard to the effects each route has on the baseline landscape and visual properties. The assessment is based on this analysis. All of the proposed routes would generate negative effects on the existing landscape and visual environment.

Due to the rural sensitive receptors, there are few parts of the proposed route options that do not have visual sensitive receptors (i.e. residential dwellings, or important tourist sites) within a short distance and therefore visual impact registers particularly highly on the scale. Landscape impacts are higher where the route impacts on upland agricultural fields, historical demesnes, steeply rising embankments, field patterns and walking amenities. Removal of mature trees, hedgerows and woodlands also generate significant negative impacts.

The route options were rated for their landscape and visual impact on the study area as follows, in order of least impact and ending with the highest impact:

- (i) Route Option B;
- (ii) Route Option C;
- (iii) Route Option D;
- (iv) Route Option A;
- (v) Route Option E.

Option B is the preferred option from a landscape and visual perspective, although it has some associated negative effects. The principal advantages of this option are that the proposed route is located on the urban fringe of Killaloe town therefore has less impact on the general rural valley landscape. As in the cases of route D and E, the higher up on the mountain slopes, the greater the visibility of the road within the landscape and the greater the negative impact. Thus the number of receptors affected increases also. Route C for the most part follows the same alignment as route B however where it does vary, results in a slightly greater impact in terms of division of a historical demesne and its landscape features. The impact on Ballyvally Demesne results in the severing of the original tree lined avenue and separating the protected gate lodge from the principal house. Route A is similar to route B however it has a more significant visual impact on a larger number of visual receptors within the community. The northern access point where it is proposed that route B will commence is potentially more sympathetic to the local environs than any other routes as regards road visibility. All of the proposed route options transverse two rural roads which are way marked trails for the Lough Derg and the East Clare Way.

7.6 Geology and Hydrogeology

7.6.1 In preparation of the Route Selection Report, the geological and hydrogeological impacts of Route Options A, B, C, D and E were assessed. These alignments require significant quantities of cuttings through soil and rock in order to bring the route 'up and around' Killaloe.

Excavations for deep cuttings through steep, sloping ground are at risk of encountering both short term and long term stability problems. The route selection should avoid choosing the alignments with excessive depths or quantities in cutting on the basis of both safety and health and economic assessments. From this point of view, Options A and D are less favourable, although suitable engineering mitigation methods can be deployed to allay this concern when necessary.

To minimise the geotechnical requirements it would also be best to avoid the construction of high embankments on the low-lying ground east of the northern R463 connection. The ground there seems to be marshy and wet so differential settlements are most likely. Sites and properties along the road are generally founded on levels substantially below the roadway, so retaining structures would probably be necessary. From this point of view, Option C has the advantage over Option B.

At this stage it cannot be estimated exactly what the impacts of each of the routes might be on hydrogeological conditions. The hydrogeological impacts are assumed not to be significant as the overburden is shallow and the bedrock aquifer is known to be of poor to moderate productivity with only local importance. Any of the alignments could draw down water levels locally. A well is located at the northern end of Option D. Another well is located beside a house on the East Clare Way between Options D and E, close to several depressions or small lake features. It is assumed that Option

D would have the greatest impact on each of these wells. However it is not known whether the depth from which water is abstracted would be affected. See **Figure 7.6.1** for Existing Geology.

Below is a description of the ground and groundwater conditions encountered along each route option and a brief assessment of the geotechnical issues associated with each.

Exploratory holes and trial pits were constructed by IGSL Ltd. under direction of Roughan & O'Donovan consulting engineers between October and November 2008 (See **Figure 7.6.2**).

7.6.2 Option A

Option A is the shortest route option proposed. This option commences south of Killaloe on the R463 and follows a tight alignment closely bordering the town before rejoining the R463 at Kincora. BH's 110, 112 & 113 were constructed along this route option with BH's 112 & 113 extended with rotary follow on. Trial Pits 101, 104 & 105 were also excavated.

These borings revealed topsoil between 0 – 0.3m below existing ground level. Below the topsoil, sand and gravel deposits were revealed to a maximum depth of 7.8m below existing ground level (begl). BH112 and TP101 showed soft to firm sandy gravelly clay below the topsoil to a maximum depth of 1.6m begl. Bh101 revealed stiff to very stiff brown sandy gravelly clay from 6.2m to 15m begl where the BH was terminated.

BH's 112 & 113 were extended into rock and cores extracted. Rock head was encountered at a level of 7.8m begl in BH112 and at a level of 5.3m begl in BH113. Rock was described as moderately strong to moderately weak Siltstone/Sandstone. Total Core Recovery (TCR) ranged from 30% - 73%, Solid Core Recovery (SCR) ranged from 0 – 40% and Rock Quality Designation (RQD) ranged from 0 – 40%. Laboratory testing of the rock from BH112 recorded Point Load results of 6.9 and 8.57Mpa $I_s(50)$ at depths of 13.2m and 11m begl respectively. $I_s(50)$ being the corrected Index Strength. These results indicate a very strong rock. Point Load results on a sample from BH113 at 8.7m recorded 2.7Mpa $I_s(50)$. The strength of this sample would be described as strong. Uniaxial Compression Test result at BH112 on samples taken from 8.8m and 13.5m begl recorded strength of 79 and 115Mpa respectively. These results would indicate the rock to be strong to very strong. The above scale of strength is based on section 44.2.1 of BS 5930 1999.

The ground conditions revealed along this route option do not pose a significant challenge to road construction. The materials are suitable for stable cuttings, at grade construction and suitable for embankment construction. No major groundwater issues were revealed during the investigation. The only recorded presence of groundwater was at TP 104 & 105 where rapid groundwater ingress was recorded at 2.3m and 2.2m begl respectively. The rapid groundwater ingress is due to the very high permeability sands through which the pits were excavated and the low lying topography where they were excavated. These trial pits were excavated in low ground to the extreme south of the proposed route and therefore the groundwater encountered will not be an issue as the area will not be in a cutting. This area will most probably be in an area of embankment construction.

7.6.3 Option B

Option B follows a similar route to Option A, but follows a slightly more westerly alignment of the town before joining the R463 to the south of Ballyvally gate lodge. BH's 107, 108, 111, 112, 113 & 117 were constructed close to or along this route option with BH's 112 & 113 extended using rotary follow on. Trial pits 101, 102, 103, 104 and 105 were also excavated.

These borings revealed topsoil between 0 – 0.5m below existing ground level.

At BH107, 2.5m thickness of made ground was revealed above a firm sandy gravelly clay.

Below the topsoil soft to very stiff sandy gravelly clay deposits were revealed to a maximum depth of 4.1 m begl. TP's 103 & 104 showed sand and gravel deposits below the topsoil at the southern end of the proposed route to a maximum depth of 3m begl, where these two trial pits terminated. Below this sandy gravelly clay strata, sand and gravel deposits were revealed to a maximum depth of 7.8m begl in BH112. The only exception was to be found in BH111 where a second stiff sandy gravelly clay stratum was shown between 4.8 & 9m depth, where the BH was terminated.

BH's 112 & 113 were extended into rock and cores extracted. Rock head was encountered at a level of 7.8m begl in BH112 and at a level of 5.3m begl in BH113. Rock was described as moderately strong to moderately weak Siltstone/Sandstone. TCR ranged from 30% - 73%, SCR ranged from 0 – 40% and RQD ranged from 0 – 40%. Laboratory testing of the rock from BH112 recorded Point Load results of 6.9 and 8.57Mpa $I_s(50)$ at depths of 13.2m and 11m begl respectively. These results indicate a very strong rock. Point Load results on a sample from BH113 at 8.7m recorded 2.7Mpa $I_s(50)$. The strength of this sample would be described as strong. Uniaxial Compression Test result at BH112 on samples taken from 8.8m and 13.5m begl recorded strength of 79 and 115Mpa respectively. These results would indicate the rock to be strong to very strong.

The ground conditions revealed along this route option do not pose a significant challenge to road construction. The materials are suitable for stable cuttings, at grade construction and suitable for embankment construction. No major groundwater issues were revealed during the investigation. The only recorded presence of groundwater was at TP 103 & 104 where rapid groundwater ingress was recorded at 1.2m and 2.3m begl respectively. The rapid groundwater ingress is due to the very high permeability sands through which the pits were excavated and the low lying topography where they were excavated. These trial pits were excavated in low ground to the extreme south of the proposed route and therefore the groundwater encountered will not be an issue as the area will not be in a cutting. This area will most probably be in an area of embankment construction.

7.6.4 Option C

Option C follows the same route as option B but joins the R463 to the north of Ballyvally gate lodge. BH's 106, 108, 111, 112, 113 & 117 were constructed close to or along this route option with BH's 112 & 113 extended using rotary follow on. Trial Pits 101, 102, 103, 104 and 105 were also excavated.

These borings revealed topsoil between 0 – 0.3m below existing ground level.

Below the topsoil soft to very stiff sandy gravelly clay deposits were revealed to a maximum depth of 4.1 m begl. TP's 104 & 105 showed sand and gravel deposits

below the topsoil at the southern end of the proposed route to a maximum depth of 3m begl, where these two excavations terminated. Below this sandy gravelly clay strata, sand and gravel deposits were revealed to a maximum depth of 7.8m begl in BH112. The only exception was to be found in BH111 where a second, stiff sandy gravelly clay stratum was shown between 4.8 & 9m depth where this BH was terminated.

BH's 112 & 113 were extended into rock and cores extracted. Rock head was encountered at a level of 7.8m begl in BH112 and at a level of 5.3m begl in BH113. Rock was described as moderately strong to moderately weak Siltstone/Sandstone. TCR ranged from 30% - 73%, SCR ranged from 0 – 40% and RQD ranged from 0 – 40%. Laboratory testing of the rock from BH112 recorded Point Load results of 6.9 and 8.57Mpa $I_s(50)$ at depths of 13.2m and 11m begl respectively. These results indicate a very strong rock. Point Load results on a sample from BH113 at 8.7m recorded 2.7Mpa $I_s(50)$. The strength of this sample would be described as strong. Uniaxial Compression Test result at BH112 on samples taken from 8.8m and 13.5m begl recorded strength of 79 and 115Mpa respectively. These results would indicate the rock to be strong to very strong.

The ground conditions revealed along this route option do not pose a significant challenge to road construction. The materials are suitable for stable cuttings, at grade construction and suitable for embankment construction. No major groundwater issues were revealed during the investigation. The only recorded presence of groundwater was at TP 104 & 105 where rapid groundwater ingress was recorded at 2.3m and 2.2m begl respectively. The rapid groundwater ingress is due to the very high permeability sands through which the pits were excavated and the low lying topography where they were excavated. These trial pits were excavated in low ground to the extreme south of the proposed route and therefore the groundwater encountered will not be an issue as the area will not be in a cutting. This area will most probably be in an area of embankment construction.

7.6.5 Option D

Option D joins the R463 to the south of the town and skirts the east of Ballyvally demesne before rejoining the R463. BH's 104, 105, 114 & 117 were constructed close to or along this route option with BH 105 & 114 with rotary follow on. Trial Pits 102, 103 and 106 were also excavated.

These borings revealed topsoil between 0 – 0.5m below existing ground level.

Below the topsoil a firm to very stiff sandy gravelly clay deposits were revealed to a maximum depth of 18.3 m begl in BH 104 at the northernmost section of the proposed route. TP's 102 & 103 showed sand and gravel deposits below the topsoil at the southern end of the proposed route to a maximum depth of 3m begl, where these excavations terminated. TP 106 revealed firm blue/grey sandy silt with some peat between 0.5m & 1.5m begl.

Below the sandy gravelly clay strata in the northern section, BH 114 revealed a 1.2m thick layer of gravel at 1.4m depth. BH 114 was extended into rock and cores extracted. Probable rock head was encountered at a level of 2.6m begl in BH114. Rock was described as coarse gravel and cobble size returns of red/green siltstone/sandstone. It is not conclusive if this stratum is weathered rock head or a dense gravel deposit. TCR ranged from 13% - 33%, SCR was 0 and RQD was 0.

The ground conditions revealed along this route option do not pose a significant challenge to road construction. The materials are suitable for stable cuttings, at grade construction and suitable for embankment construction in the northern and central sections of the proposed route. The southernmost end of the proposed route reveals the presence of a firm blue grey sandy silt with peat has been recorded in TP 106. This stratum would require some type of ground improvement measure such as surcharging or excavation and replacement of the unsuitable material. No major groundwater issues were revealed during the investigation. The only recorded presence of groundwater was at TP 103, & 106 where a rapid and moderate groundwater ingress was recorded at 2.1m & 1.5mbegl respectively.

7.6.6 Option E

Option E is the longest route option, travelling northwards on higher ground to the east of Killaloe and avoiding much of Ballyvally estate before joining the R463 at the townland of Craglea. BH's 101, 102, 103, 115, 116 & 118 were constructed along this route option with BH 115 & 116 extended using rotary follow on. Trial Pit 106 was also excavated at the southern end of the proposed route.

These borings revealed topsoil between 0 – 0.5m below existing ground level.

Below the topsoil, between BH's 103 & 115, a firm to very stiff sandy gravelly clay deposit was revealed to a maximum depth of 7.4m begl in BH103, at the northernmost section of the proposed route. BH116 revealed gravel to a depth of 1.9m begl below the topsoil. BH118 revealed firm to very stiff sandy gravelly clay to a depth of 2.6m, where this BH was terminated. TP106 at the southernmost section of the proposed route, exposed firm sandy silt with peat to a depth of 1.5m begl with a further 0.6m of gravel excavated below where this excavation is terminated.

BH's 115 & 116 were extended into rock and cores extracted. BH115, the rock is described as highly weathered between 2m and 5m. Between 5m and 9m begl, where the BH terminated, the rock was described as strong to locally moderately strong sandstone. Laboratory testing of the rock from BH115 recorded Point Load results of 10.9Mpa Is(50) at a depth of 6.3m begl this sample would be described as extremely strong. Point Load results from samples taken at 8.1 and 5.5m depth at BH116 gave results of 7.3 and 3.55Mpa Is(50) respectively. These results indicate a very strong rock.

BH 116 encountered rock at 2m begl and to a depth of 5m the rock is described as red/brown sub angular gravel and cobbles of siltstone/sandstone (probable weathered rock). From 5m to 9m, where this BH is terminated, the rock is described as moderately strong to moderately weak fine grained siltstone/sandstone.

The indices for the rock in both BH's between 2 & 5m depth give a TCR ranging from 27% - 33%, SCR was 0 and RQD was 0. The rock between 5m and 9m depth give a TCR ranging from 67% - 100%, SCR ranging from 20% - 100% and RQD ranging from 20% - 100%.

The ground conditions revealed along this route option do not pose a significant challenge to road construction. The materials are suitable for stable cuttings, however the presence of rock at shallow depth may require at a minimum, to be mechanically broken to the required level or blasting may be required to extract the material. The route may be suitable for at grade and embankment construction, except for the southernmost end of the proposed route where the presence of a firm blue grey sandy silt with peat has been recorded. This stratum would require some type of ground improvement measure such as surcharging or excavation and

replacement of the unsuitable material. No major groundwater issues were revealed during the investigation. The only recorded presence of groundwater was at TP 106 where moderate groundwater ingress was recorded at 1.5m begl. This groundwater ingress is due to the very high permeability gravels through which the pits were excavated and the low lying topography where they were excavated. These trial pits were excavated in low ground to the extreme south of the proposed route and therefore the groundwater encountered will not be an issue as the area will not be in a cutting. This area will most probably be in an area of embankment construction.

7.6.7 Ranking of Options

Based on the conditions reported above, Route Options A, B and C are considered to be of equal ranking in terms of the effect on earthworks. Option D is ranked lower than these three options, because of the deep cutting required within Ballyvally Demesne. Option E is the least favoured because of the potential difficulties and cost associated with rock excavation on that option.

7.7 Drainage

For the Killaloe Bypass section of the scheme the following watercourses will be affected:

- (i) Stream flowing in an easterly direction at Craglea which is culverted under the R463 and outfalls to Lough Derg;
- (ii) Stream at the north end of Ballyvally Demesne and flowing through Ballyvally Estate, culverted under the R463 and flowing eastwards to Lough Derg;
- (iii) Stream flowing along northernmost entrance avenue to Ballyvally Demesne;
- (iv) Stream flowing in an easterly direction through Ballyvally Demesne, culverted under the existing R463 near the Gate Lodge and continuing through dense woodland before out-falling to the River Shannon;
- (v) Stream system at Shantraud. This is currently culverted under the R463 adjacent to the new Shantraud Woods housing estate before travelling approximately due east to drain to the River Shannon.

It is assumed that each of these streams will be capable of receiving runoff from the new roadway, provided that adequate pollution control and attenuation provision is provided in the design. It is noted that the River Shannon and Lough Derg have been designated as pcSAC and NHA areas.

At their northern end, it will be possible to outfall Options A, B or C to the streams at Ballyvally, and to attenuate flows as required. Similarly, these options can be designed to outfall at the southern end of the stream at Shantraud. It should be noted that any one of Options A, B or C may require local realignment of the stream at Shantraud together with appropriate culvert provision. This is dependent on development of the design following completion of detailed topographical survey in that area.

At its northern end runoff from Option D can drain to the Ballyvally system. At its southern end, Option D can drain to the stream at Shantraud, requiring a piped connection heading north eastwards along the existing R463.

Option E commences much further northwards than the other options and at that location would require a direct outfall to Lough Derg, with suitable control measures as described above, on the east side of the R463. The sag in the alignment at Chainage 160 of Option E would require outfall to one of the Ballyvally streams. At its southern end, Option E would outfall as described above for Option D at that location.

In terms of preference, Options A, B and C are preferred over Options D and E because of their shorter length and the associated reduced requirement for attenuation and pollution control measures together with sensitivity to aquatic ecology. On the same basis, Option D is preferred over Option E. One other result of selecting either of Options A, B or C is that they would provide better runoff interception for water from the higher ground currently affecting residents of Newtown as compared to Options D or E.

7.8 Utility Services

A Utility Services Plan has been provided in **Figure 7.8**, outlining all existing utility services found in the region. No account has been taken at this stage of any future proposals by the various statutory bodies and utility owners. The impact of the different route options A-E, together with the emerged preferred route, on existing utilities and services in the area, is discussed below:

7.8.1 Electricity

The Electricity Supply Board has a number of overhead lines traversing the area, as well as local supplies serving individual properties. Details of the ESB infrastructure within the study area can be seen in **Figure 7.8**.

There is one high voltage overhead transmission line (400kV) in proximity to the study area (Dunstown Moneypoint Line). This transmission line runs to the west of the route corridors and is located to the south of Creeveroe. With regard to the Dunstown Moneypoint high voltage transmission 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".

As route options D and E pass within no less than 150m of this line, with the remaining route options a further distance away, no further consideration of the impact of the various route options on this high voltage overhead transmission line is made at this time.

A number of medium and low voltage overhead distribution lines have been identified along the route corridors at various locations. These overhead distribution lines impact on all route options. A medium voltage distribution line (10kV), which runs west to east at Knockyclovaun, to the west of the town, conflicts with route options A, B, C, D, E. Another medium voltage distribution line (10kV) which runs north to south at Knockyclovaun, conflicts with route options A, B, C, D, whilst route option E is impacted at 3 separate locations by another medium voltage distribution line (10kV) just north of the town.

Subject to consultation with ESB, these medium and low voltage overhead crossings may be required to be diverted underground to accommodate the proposed roadworks.

7.8.2 Telecommunications

Details of the telecommunications infrastructure within the study area can be seen in **Figure 7.8**.

Eircom infrastructure consists of local overhead lines along the existing road network with some underground trunk cables in the urban areas of Killaloe. There is also a fibre optic cable commencing in Killaloe, which crosses Killaloe Bridge to Ballina. However this fibre optic cable is more than 500m east of the nearest route option.

Subject to consultation with Eircom, these local overhead lines may be required to be diverted underground to accommodate the proposed roadworks.

7.8.3 Gas

Details of the gas infrastructure within the study area can be seen in **Figure 7.8**.

Bord Gáis have a 250mm diameter distribution mains network which crosses under the River Shannon approximately 600m south of the existing Killaloe Bridge and 600m east of the nearest route option. This crossing feeds a 90mm diameter distribution mains network in Killaloe. One of these 90mm mains runs along the R463 south of Killaloe and as such impacts on all route options. Another 90mm main runs along the L3080 (Creeveroe Road) and as such also impacts on all route options.

Subject to consultation with Bord Gais, these distribution mains may be required to be diverted, or protected at their existing locations, using concrete slabs.

7.8.4 Water Services

Details of the water services infrastructure within the study area can be seen in **Figure 7.8**. The sizes of the various water services infrastructure are not currently known.

Watermains are more evident towards the town centre and as such impact more on route option A, whilst having less impact on route options B, C, D and E. One watermain at Shantraud conflicts with route option A and the emerged preferred route at both the L3078 (Hill Road) and the L3080 (Creeveroe Road). Another watermain conflicts with route option A at Knockyclovaun. A watermain runs along the R463 south of Killaloe and as such impacts on all route options including the emerged preferred route. A watermain also runs along the R463 north of Killaloe and impacts on route options A, B, and C.

Sewers are also more evident towards the town centre. One sewer at Shantraud impacts on route options A, B, C, D at the L3080 (Creeveroe Road). A sewer also impacts on route options A, B and C at Knockyclovaun.

Subject to consultation with Clare County Council, these water services may be required to be diverted, or protected at their existing locations.

7.8.5 Summary

A number of utility services exist in the vicinity of the various route options for the Killaloe Bypass. Unnecessary disturbance of these existing services can be mitigated against by ensuring that the vertical alignment of the proposed roadway is slightly above existing ground levels. However relocation of some services will be unavoidable and will enhance their maintainability.

It is noted that there is no major difference in impact among the various route options on existing services in the area. However, given that these services are more evident towards the town centre it can be reasonably stated that route options A, B, C and route do have a greater impact on existing utility services than route options D and E.

7.9 Archaeology and Architectural Heritage

This route selection report assesses the archaeological, architectural and cultural heritage importance of the landscape along the route options considered for the Killaloe Bypass.

Methodology

The examination of the route options under consideration builds on information provided by the Architectural, Archaeological and Cultural Constraints Study previously carried out for the scheme. A Desk-study expanding the information gathered during the constraints study including first edition OS and early maps, aerial photography and relevant published information.

A windshield survey was carried on the 15th July 2008 along with sites visits to verify the extent and condition of recorded sites.

Receiving Environment

The recorded monuments, protected structures and other significant architectural structures were examined on the 15th of July 2008.

- Recorded Monuments CL045, -028, -029 and 030 (standing stones) are not present at the locations indicated on mapping. The stones have in all probability been removed in recent years;
- Recorded Monument CL045-027 (enclosure also has no above ground presence;
- Recorded Monument CL045-057 (enclosure) was not visible as an earth work but this is not surprising as the monument was first recognized from aerial photography;
- Protected Structure 440 (gate lodge) was examined and conforms to the description given in Table 2 (below);
- Recorded Monument CL037 – 02001 (earthwork) was not visible above ground.
- Recorded Monument CL037-02002 (enclosure) was not visible above ground.
- Recorded monument CL037-02101 (ringfort rath/cashel)
- Recorded Monument CL037-02102 (house – early historic) was not visible above ground.
- Ballyvally House was not accessible at the time of survey.

The Ordnance Survey 1st Edition Map (surveyed 1840, published 1842) shows a pattern of field boundaries that is essentially unchanged today although some were subdivided into smaller units than are now present. The dense series of circular enclosures to the west of the proposed road routes are marked on the 1840 map, as are Ballyvally House and the associated gate lodge. The three standing stones (CL045-028, -029 and -030) are not indicated. A mill race is shown in Shantraud townland. This water feature is probably a rectified stream that supplied the mill marked as 'Manor Mills'. The five possible road routes all lie to the west of this mill race and do not impact on it.

See **Figure 7.9** for Map of Archaeology, Architecture and Cultural Heritage.

Table 7.1: Inventory of Archaeological and Architectural Heritage

Identification number	A1
Legal status	Recorded Monument
Reference number	CL045-027
Townland	Knockyclovaun
Site type	Enclosure
NGR	16880, 17318
Description	
Sources	RMP archive, 1st Edition OS 1840, 3rd Edition OS 1938 indicated. No above ground presence (site visit 15.07.08)
Approx distance from Route E	87m
Type of impact	Indirect

Identification number	A2
Legal status	Recorded Monument
Reference number	CL045-057
Townland	Knockyclovaun
Site type	Enclosure
NGR	16928, 17311
Description	
Sources	RMP archive, 1st Edition OS 1840 not marked, 2nd Edition OS not marked, 3rd Edition OS 1938 not marked, aerial photograph circular enclosure?
Approx distance from Route A, C, B	10m, 23m, 29m
Type of impact	Indirect

Identification number	A3
Legal status	Recorded Monument
Reference number	CL045-028
Townland	Creeveroe
Site type	Standing stone
NGR	16897, 17292
Description	Part of group of 3 standing stones (A3, A4 and A5)
Sources	RMP archive, 1st Edition OS 1840 not marked, 2nd Edition OS indicated not named, 3rd Edition OS 1938 'Gallán' [pillar]. No above ground presence (site visit 15.07.08)
Approx distance from Route E	18m
Type of impact	Direct

Identification number	A4
Legal status	Recorded Monument
Reference number	CL045-029
Townland	Creeveroe
Site type	Standing stone
NGR	16899, 17289
Description	Part of group of 3 standing stones (A3, A4 and A5)
Sources	RMP archive, 1st Edition OS 1840 not marked, 2nd Edition OS indicated not named, 3rd Edition OS 1938 'Gallán' [pillar]. No above ground presence (site visit 15.07.08)
Approx distance from Route E	0m
Type of impact	Direct

Identification number	A5
Legal status	Recorded Monument
Reference number	CL045-030
Townland	Creeveroe
Site type	Standing stone
NGR	16906, 17311
Description	Part of group of 3 standing stones (A3, A4 and A5)
Sources	RMP archive, 1st Edition OS 1840 not marked, 2nd Edition OS indicated not named, 3rd Edition OS 1938 'Gallán' [pillar]. No above ground presence (site visit 15.07.08)
Approx distance from Route E	38m
Type of impact	Direct

Identification number	A6
Legal status	Protected Structure
Reference number	RPS Co. Clare 440
Townland	Ballyvally
Site type	Gate lodge
NGR	169283, 173914
Description	Documentary/cartographic. Detached three-bay single storey 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 gates with keystones.
Sources	Co. Clare RPS
Approx distance from Route B, C	52m, 31m
Type of impact	Indirect

Identification number	A7
Legal status	None but should be considered as Protected Structure
Reference number	None
Townland	Ballyvally
Site type	House ?18th century
NGR	169100, 173920
Description	Documentary/cartographic. ...a square, double pile, two-storey, three bay, gable-ended house, facing north, with a central front door. There are two bay, single storeyed wings with bowed ends on either side of the front. Each of the two first floor windows juts 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.
Sources	Weir 1999, 32
Approx distance from Route C	118m
Type of impact	Indirect

Identification number	A8
Legal status	Recorded Monument
Reference number	CL037-02001
Townland	Craglea
Site type	Earthwork
NGR	16876 17517
Description	
Sources	RMP archive, 1st Edition OS 1840 not marked, 3rd Edition OS 1938not marked. No above ground presence (site visit 15.07.08)
Approx distance from Route E	70m
Type of impact	Indirect

Identification number	A9
Legal status	Recorded Monument
Reference number	CL037-02002
Townland	Craglea
Site type	Enclosure
NGR	16880 17518
Description	
Sources	RMP archive, 1st Edition OS 1840 not marked, 3rd Edition OS 1938not marked. No above ground presence (site visit 15.07.08)
Approx distance from	50m

Route E	
Type of impact	Indirect

Identification number	A10
Legal status	Recorded Monument
Reference number	CL037-02101
Townland	Craglea
Site type	Ringfort (rath/cashel)
NGR	16881 17500
Description	Greenanlaghan Fort. Circular ringfort with two rings and a fosse with an oblong heap of stones centrally. Historical associations with 1st millennium AD activity.
Sources	RMP archive, 1st Edition OS 1840, 1921 2nd Edition hachured, 3rd Edition OS 1938 indicated. Ordnance Survey Letters Vol II 1839 pp149, 220, 355, Westropp PRIA 1900-2, 444, Westropp TRIA 1896-1901, Vol 31, 688, Westropp JRSAl 1893, 191-3, Westropp PRIA 1911-12, 124, Spellisey 1987, 124, Frost 1893, 197.
Approx distance from Route E	50m
Type of impact	Indirect

Identification number	A11
Legal status	Recorded Monument
Reference number	CL037-02102
Townland	Craglea
Site type	House – early historic
NGR	16881 17500
Description	Oblong heap of stone centrally within CL037-02102
Sources	RMP archive. Ordnance Survey Letters Vol II 1839, 220, 355, Westropp TRIA 1896-1901, Vol 31, 688, Spellisey 1987, 124. Rectangular buildings built 953/Annals of the MacBruodins
Approx distance from Route E	50m
Type of impact	Indirect

Table 7.2: Impact Assessment Table

Identification No.	NGR/townland	Site type	Type of impact	Distance	Impact level
A1	Knockyclovaun 16880,17318	Recorded enclosure	Indirect	87m	Slight
A2	Knockyclovaun 16928, 17311	Recorded enclosure	Indirect	10-29m	Significant
A3	Creeveroe 16897, 17292	Recorded standing stone	Direct	18m	Significant
A4	Creeveroe 16899, 17289	Recorded standing stone	Direct	0m	Profound
A5	Creeveroe 16906, 17311	Recorded standing stone	Direct	38m	Significant
A6	Ballyvally 169283, 173914	Protected gate lodge	Indirect	31-52m	Moderate
A7	Ballyvally 169100, 173920	18th century house	Indirect	118m	Slight
A8	Craglea 16876 17517	Recorded earthwork	Indirect	70m	Slight
A9	Craglea 16880 17518	Recorded enclosure	Indirect	70m	Slight
A10	Craglea 18881 17500	Recorded ringfort	Indirect	50m	Slight
A11	Craglea 18881 17500	Recorded house site	Indirect	50m	Slight

Table 7.3: Route Option Appraisal Table

Impact level	Route A	Route B	Route C	Route D	Route E
Profound					Removal of (site of) standing stone CL045-29. Disarticulation of (site of) group of three standing stones
Significant	Area of archaeological potential associated with potential circular enclosure CL045-057	Area of archaeological potential associated with potential circular enclosure CL045-057	Area of archaeological potential associated with potential circular enclosure CL045-057		Area of archaeological potential associated with (site of) standing stone group CL045-028, 029 and 030
Moderate		Proximity to Recorded gate lodge RPS 440	Proximity to Recorded gate lodge RPS 440		
Slight			Proximity to 18 th century house and disarticulation of house from gate lodge		Proximity to enclosure CL045-027, earthwork CL037-02001, enclosure CL037- 2002, ringfort, CL037-02101, house site, CL037-02102
Preference level	Fourth preference	Second preference	Third preference	First preference	Fifth preference

Conclusions

From an archaeological and architectural perspective, the preferred route option is Route D. This route does not impinge on known archaeological or architectural monuments or structures. As with any road route through a green field landscape, there is the potential for uncovering archaeological sites with no above ground expression. Consequently, it is recommended that in conformity with archaeological best practice as outlined in National Monuments Section of the Department of the Environment, Heritage and Local Government guidelines (DAHGI 1999a and DAHGI 1999b) the chosen route should be subject to a programme of archaeological testing prior to construction. This assessment should take the form of archaeological test trenching that examines at a minimum 10% of the total area of the selected road route.

These archaeological recommendations are made subject to approval by the National Monuments Section of the Department of the Environment, Heritage and Local Government.

8. SELECTION OF PREFERRED ROUTE

8.1 Costs

During the Route Selection Study a number of possible alternative routes (A to E) for the Killaloe Bypass were considered. All route options commence at the north of the town and bypass Killaloe to the west before rejoining the R463 to the south.

Cost estimates have been carried out for route options A-E. The estimates include for the following:

- Land and property acquisition costs;
- Construction costs;
- Design and Supervision.

The construction costs are based on the construction costs of mainline and side road construction, including junctions, using typical average rates per kilometer applicable in January 2009. Additional costs have been considered where special measures such as rock excavation or other ground treatment would have to be considered.

The cost estimates for construction and design/supervision include for VAT at appropriate rates and as current in January 2009.

With regard to the costs of land and property acquisition, a land valuation agent was consulted by arrangement with Clare County Council.

The predicted costs are as follows:

Route Option A:	€11.25 million
Route Option B:	€13.45 million
Route Option C:	€14.65 million
Route Option D:	€18.25 million
Route Option E:	€26.15 million

8.2 Comparison Matrix

The preceding chapters describe how the five options A to E have been considered under a number of headings. These are presented in **Table 8.1.1** below, and under each heading considered each route option is ranked 1 (for best) to 5 (for worst). Where options are considered to be of equal merit under any particular heading, the same ranking has been assigned in the table. The rankings are consistent with the thinking presented in the relevant preceding chapter. For convenience the text reference is also given in the table.

For comparison purposes, locations in the Table where an option has scored best under any heading has been highlighted green, and red highlighting has been used where an option scored worst. For each option the number of "bests" and "worsts" has been summated. Under the headings considered, Route Option A has 12 bests and 2 worsts. Options B and C are equal under this analysis in that both offer 9 bests and no worsts. Option D has 5 bests and 3 worsts, and Route E has 7 bests and 12 worsts.

Based on the above analysis alone it was considered that Options D and E compared unfavourably to Options A, B and C. This view is confirmed when the

issues of cost and value for money are taken into account. It should be noted that in addition to the general headings under which the various routes have been considered, the severe impact of Option D on the functionality of Ballyvally Demesne is considered a significant issue. Similarly the problems associated with Option E, including severe landscape and visual impact together with possible difficulty with rock excavation, are of particular concern. For these reasons Options D and E were discounted from further consideration.

Referring to Table 8.1.1, it can be argued that Route Options A, B and C offer broadly similar advantages, although a differential of €3.4m is predicted for the costs of these options. However Option C differs considerably from Options A and B in that it severs the access avenue to Ballyvally House and separates it from the Gatelodge which is a listed structure. It is considered that such severance would seriously affect the character of the Demesne. For this reason, Option C was discounted from further consideration.

8.3 Identification of Emerging Preferred Route

Option A is the shortest route and is also the least expensive of the options considered. Option B is slightly longer than Option A and at its southern end is further to the west. As a result it will be located on the higher ground and more visible from a distance, creating an undesirable landscape and visual impact. At this location Option B also creates greater severance in the area zoned residential.

In terms of impacts on properties at the northern end, both options impact the same number of dwellings, a total of six in number. As well as causing considerable disruption to existing households, this factor generates additional cost for both these options.

On the basis of the above, consideration was given to the possibility of a slightly refined alignment which would comprise a modified version of the northern section of Option B combined with the southern section of Option A. The modification at the northern end entails a localized realignment to the west resulting in impacting on one dwelling only as compared to the six originally affected.

The anticipated cost of the modified route is €10.5m. On the basis that it offered cost savings over Options A and B, together with the other advantages outlined above, this modified route was selected as the Emerging Preferred Route for the Killaloe Bypass section of the Scheme. **Figure 8.1** shows the selected route overlaid on the original five options considered.

8.4 Public Consultation No. 3

Public Consultation No. 3 (Emerging Preferred Route Stage) was held in November 2008.

The Objectives of the consultation were to:

- Present the Emerging Preferred Route to the public;
- Further inform the public of the process and the programme for the project;
- Invite submissions on the Emerging Preferred Route;
- Gather further local information;
- Answer questions from the public;
- Consider and review the information received.

Publicity

A publicity campaign was undertaken by Clare and North Tipperary County Council prior to the consultation. The consultation was advertised in the Clare Champion and the Nenagh Guardian in advance of the public consultation exhibition at the Lakeside Hotel. A public consultation leaflet and questionnaire was sent to all who had made submissions in Public Consultation No 1 and 2. Advertisements were broadcast on the local radio (Tipp FM) prior to the exhibition. Advertisement Posters advising of the Public Consultation exhibition was displayed in a number of locations including shops and pubs in Killaloe and Ballina. In addition the consultation leaflet was made available at the following locations for two weeks from the 26th November 2008 to the 10th December 2008:

- Clare County Council, Áras Contae an Chláir, Economic Development & Planning, New Road, Ennis, Co. Clare;
- Killaloe Public Library, Killaloe, County Clare;
- Clare County Council, Scariff Area Office, Mountshannon Road, Scariff, Co. Clare;
- Clare County Council, South East Clare Area Office, Westbury Centre, Corbally Road, Westbury, Co. Clare;
- North Tipperary County Council, Roads Department, Civic Offices, Limerick Road, Nenagh, Co. Tipperary;
- Newport Area Office, Newport, Co. Tipperary.

Following a presentation to local area councillors, the Public Consultation was held on the 26th of November at the Lakeside Hotel in Ballina, Co. Tipperary. A number of displays were available for public viewing in discovery series mapping, O.S mapping and aerial photography. A team of engineers were available to explain the scheme and answer any questions in relation to the proposal. The exhibition was held from 3pm to 8pm. Comments from the members of the public who attended were recorded.

A total of 64 people signed the attendance sheet during the consultation process at the Lakeside Hotel. All attendees were asked to sign the register and the information brochure and questionnaire was made available to all.

Feedback

Throughout the consultation process the staff at the exhibitions endeavoured to obtain as much local information as possible. The information gathered was reviewed and distributed to the relevant specialist or design team member.

Questionnaire Responses

The closing date for receipt of submission was the 10th December 2008 . However all submission received later were recorded and taken into consideration. A total of 32 responses were received. Many of the questionnaires received were accompanied by letters and further information.

Analysis of Responses and Comments from Members of the Public

All submissions received were evaluated and the information they contained was recorded. Where letters were received without questionnaires the details were recorded including any comments made. Any submission with information relating to any specialist area was copied to the relevant specialist or design team member, e.g. agriculture, landscape, planning, archaeology, flora, fauna and fisheries, etc.

The recorded comments from the members of the public were also collated. A summary of the issues arising, as relates to the Killaloe Bypass is presented as follows:

- Loss of residential property;
- Impact on wildlife;
- Impact on trees;
- Impact of emerging preferred route on views from Gate Lodge and natural light;
- Traffic impact;
- Impact on Watercourse;
- Impact on Landscape;
- Noise impact, request noise barriers, low noise road surfacing and ample landscaping;
- Safety concerns;
- Impact on Archaeology, Architecture and Cultural Heritage;
- Proximity of emerging preferred route to town.
- Loss and/or severance of agricultural land; one landowner in particular was concerned by severance impacts from the Emerging Preferred Route

Discussion

The consultation exercise informed the public of the route corridors under consideration. The material provided both at the exhibition and in the brochure appeared clearly understood. The project team obtained a considerable amount of information from the public both directly at the exhibition and through the submission of the questionnaire and letters.

The analysis of the questionnaires showed that 72 % of people agreed in principle with the need for the scheme, 8% were unsure and 20% disagreed with the scheme.

8.5 Recommendation of Preferred Route

The comments received both during and subsequent to the Public Consultation held on 26th November 2008 have been assessed. It is considered that no new issues of significance have come to light as a result of that consultation exercise which would alter the decision to select the identified route as the basis for moving forward with the Killaloe Bypass section of the Scheme. The issues that have been raised by members of the public have been assessed and it is considered that all the matters raised have been addressed in the balanced appraisal outlined in previous chapters or alternatively can be dealt with by suitable mitigation measures at the Preliminary Design Stage for the Scheme. These measures will be set out in the Preliminary Design Report to be prepared, and would also be identified in the Environmental Impact Statement for the Scheme.

On the basis of the above, the recommended Preferred Route for the Killaloe Bypass Section of the Scheme is as presented in **Figure 8.2**.

Summary Table

Key	best		worst	
-----	------	--	-------	--

SECTION - All

Text Reference	A	B	C	D	E	
	1.8km	2.02km	2.175km	3.015km	4.04km	
Engineering						
Length of Alignment (km)	5.4.6	1	2	3	4	5
Gradients	5.4.7	3	3	1	5	1
Horizontal	5.4.6	1	1	1	5	1
Utilities	7.8	3	3	3	1	1
Junctions						
Roundabouts	Chapter 6	1	1	1	4	4
Drainage	7.7	1	1	1	4	5
Earthworks (major)	7.6.7	1	1	1	4	5
Traffic Functionality	Chapter 6	1	1	1	4	5
Effect on Humans						
Acquisition						
Houses	7.1	5	3	3	1	1
Granted Planning Applications	7.1	1	1	1	1	5
Land Acquisition	7.1	1	2	3	4	5
Severance (Community)	7.1	3	3	3	2	1
Noise/Air Quality (no. of dwellings within)	7.2	5	4	4	2	1
Natural Environment						
Ecology						
Terrestrial	7.4	1	2	3	4	5
Aquatic	7.3	1	1	1	1	5
Archaeology	7.9	4	2	3	1	5
Architectural Heritage	7.9	1	2	5	4	3
Landscape and Visual	7.5	4	1	2	3	5
Economics						
Cost	8.1	1	2	3	4	5
Agriculture (Land Severance)	7.1	1	1	1	4	5
Total Best		12	9	9	5	7
Total Worst		2			3	12

Table 8.1.1

9. R494 UPGRADE

9.1 Introduction

The existing regional road, between the R494/R496 junction and the R494 junction with the existing N7 north of Birdhill, has a sub-standard cross-section and poor horizontal and vertical alignment. The proposal for rectifying the substandard road is an on-line improvement wherever possible with localised realignment elsewhere. This section of the report outlines the design development for the R494 Upgrade. In the description of the road, distances are the distances from the existing R494/R496 junction and the roadway to the N7 is generally south of this junction.

9.2 Design Development

As outlined previously, the cross-section of the proposed road is that of a "Reduced Single Carriageway" as per TD27 of the DMRB. The design speed is generally taken to be 85kph. The following outlines the design development of the road in sections starting with the R494/R496 junction.

9.2.1 R494/R496 Junction

The Shannon Bridge Crossing Study determined that a roundabout junction is required at the R494/R496 junction in order to facilitate the river crossing. The location of the proposed roundabout is in a built-up residential area and these houses and their access requirements place severe constraints on the design layout. The chosen inscribed circle diameter (ICD), is 32 metres and is the smallest feasible ICD. Cyclist and pedestrian facilities are provided through the roundabout and for a distance of about 150m south of the junction. Land acquisition is required together with the regrading of many of the driveways to the existing houses. The design layout is being developed so that no direct access to a house is provided from the roundabout junction and that house access from the roadway should be as far as possible from the junction. Minor alignment works in the vicinity of the junction will be required to the R496 and the R494 north of the junction.

9.2.2 R494 Upgrade within 0.6km of the Junction

The existing roadway is to be improved by widening and improving the alignment. Where possible it has been considered desirable to widen generally on one side rather than to do the widening on both sides as this would affect the boundaries and hedgerows on both sides.

9.2.3 R494 Upgrade between 0.6km and 1.1km of the Junction

Along this section of the R494, there are boundary walls/accesses/mature trees along the eastern side and a wooded area generally along the western side. Where possible the developing design retains the boundary treatment on the eastern side and encroaches into the wooded area on the western side.

9.2.4 R494 Upgrade between 1.1km and 1.5km from the Junction

Because of the severe horizontal bend on the existing alignment, the proposed roadway design is off-line in this area, west of the existing roadway.

9.2.5 R494 Upgrade between 1.5km and 2.3km from the Junction

The main feature along the existing roadway in this area are the relatively new single houses located directly off the road but with their boundary walls set back. The design of the upgrade will generally fit between the set-back boundary walls with widening of the roadway on both sides.

9.2.6 R494 Upgrade between 2.3km and the tie-in with the recently completed N7/R494 Roundabout

The roadway in this area needs to cross the Kilmastulla River and the Railway line and to fit between numerous single houses and an industrial estate. The design also needs to consider the disruption to traffic during the construction phase.

The initial option was to locate the new railway bridge west of the existing railway bridge and close to the existing river bridge. This resulted in the earthworks severely impacting on the 4 houses to the west of the existing road located between the railway line and the river. As a result, the proposed alignment is now located at the location of the existing railway bridge. The alignment results in a significant encroachment onto the industrial estate lands including the grassed open space adjacent to the existing entrance and restricts movement to loading areas at one industrial unit. Plans currently exist to use this grassed open space as a soccer pitch and the alignment that will be developed at Preliminary Design Stage will seek to mitigate these impacts.

APPENDIX A

FIGURES

Figure 3.1	Constraints Study Area
Figure 5.1A	Killaloe Bypass – Initial Route Options to Establish the Constraints Study Area
Figure 5.1B	Killaloe Bypass – Route Options for Further Evaluation
Figure 5.2	Killaloe Bypass Route Options – Aerial Photography
Figure 5.3	Killaloe Bypass Route Options
Figure 7.1.1	East Clare Development Plan 2005-2011- Zoning
Figure 7.1.2	Killaloe Bypass - Planning Applications
Figure 7.3.1	Conservation Designations
Figure 7.3.2	Watercourses – Killaloe Bypass Section
Figure 7.5	Landscape Type
Figure 7.6.1	Geology
Figure 7.6.2	Ground Investigation - Exploratory Hole Layout Plan
Figure 7.8	Killaloe Bypass – Utility Services Plan
Figure 7.9	Archaeology, Architecture & Cultural Heritage
Figure 8.1	Killaloe Bypass – Route Options and Emerging Preferred Route
Figure 8.2	Killaloe Bypass – Preferred Route



LEGEND:

ROUTE OPTION A	
ROUTE OPTION B	
ROUTE OPTION C	
ROUTE OPTION D	
ROUTE OPTION E	
SHANNON BRIDGE CROSSING	



NDP
National Development Plan 2007 - 2013

Ag Roinn Ionpair
Turasoineachta agus Spóirt
Department of Transport,
Tourism and Sport

No.	Revision	Date	By	Chkd	App'd
	Stage				
		DEC 08			MC
PRELIMINARY					
APPROVAL					
TENDER					
CONSTRUCTION					

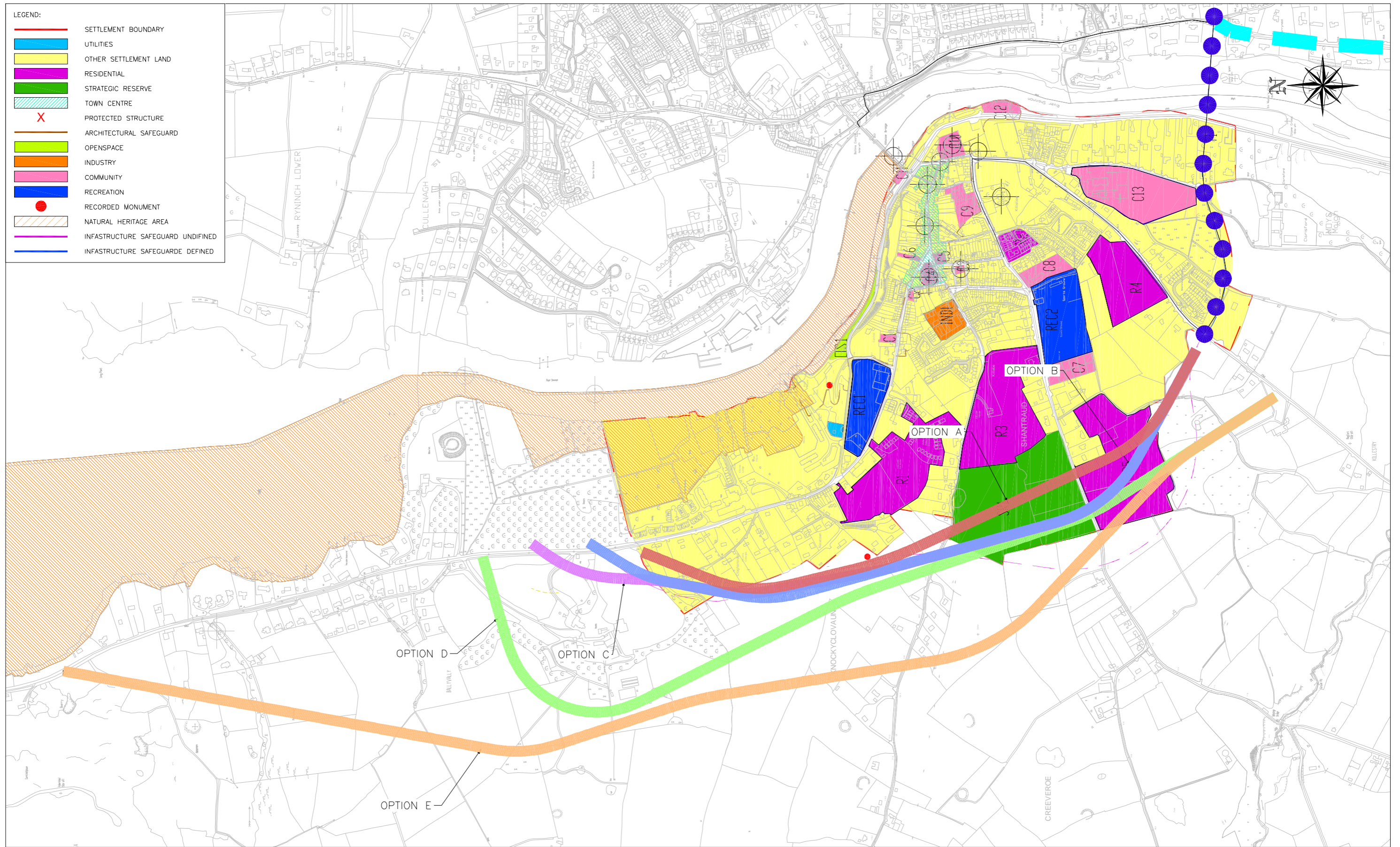
Roughan & O'Donovan
Consulting Engineers
Civil - Structural - Transportation - Environmental

Arena House, Arena Road,
Sandyford, Dublin 18.
Tel : +353 1 294 0800
Fax : +353 1 294 0820
e-mail : info@rod.ie
www.roughanodonovan.com

Project Title KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title KILLALOE BYPASS ROUTE OPTIONS AERIAL PHOTOGRAPHY			
Drawn: LA	Job No: 07-527	Drawing No: FIGURE 5.2	Rev: -
Scale: 1:5000 (A1)	Date: MAR '09		

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



NDP
National Development Plan 2007 - 2013

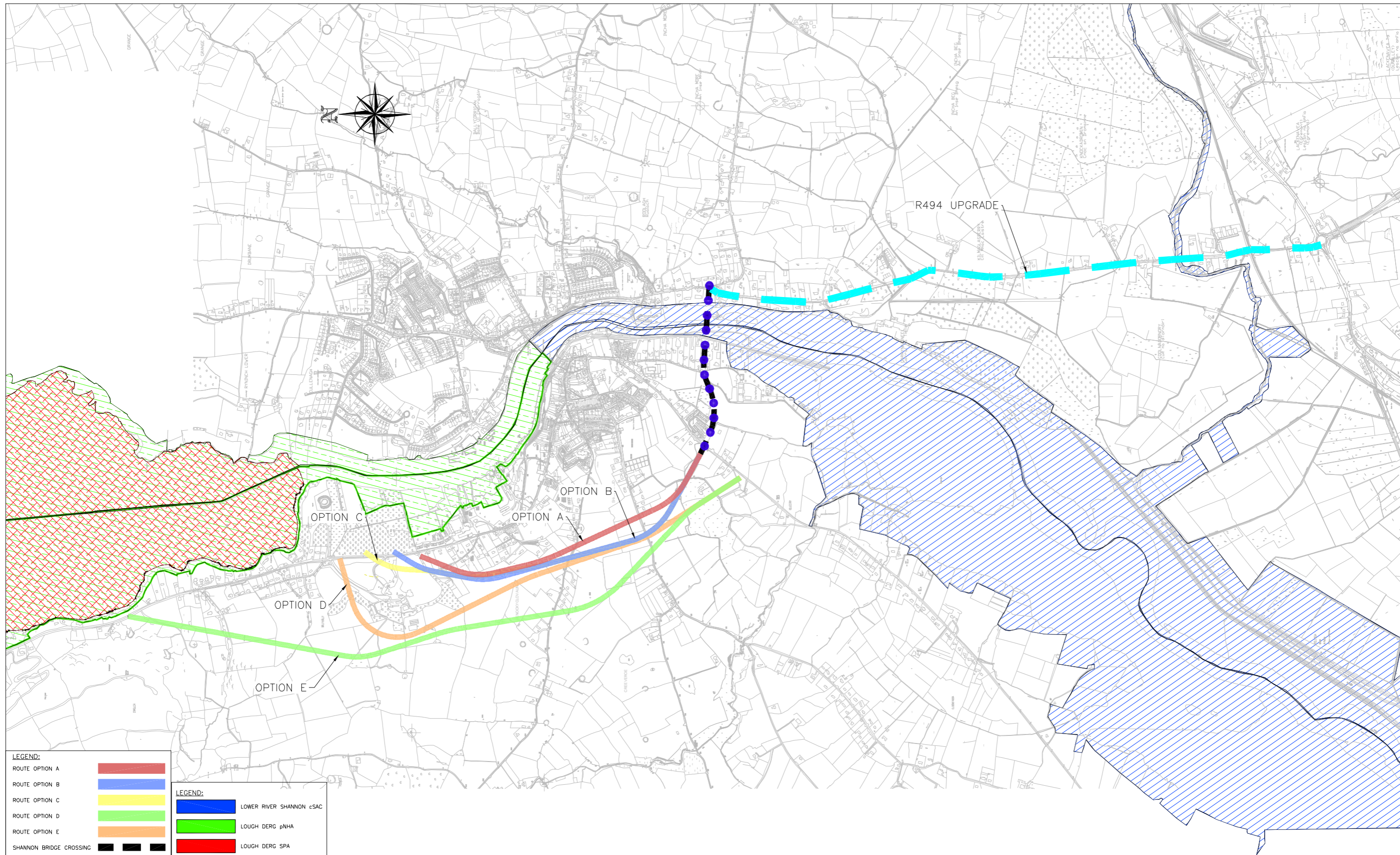
An Roinn Ionpair
Turasoineachta agus Spóirt
Department of Transport,
Tourism and Sport

No.	Revision	Date	By	Chkd	App'd
	Stage	Date			
	PRELIMINARY	DEC 08		MC	
	APPROVAL				
	TENDER				
	CONSTRUCTION				

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

Arena House, Arena Road,
Sandyford, Dublin 18.
Tel : +353 1 294 0800
Fax : +353 1 294 0820
e-mail : info@rod.ie
www.roughanodonovan.com

Project Title KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title EAST CLARE LOCAL AREA PLAN 2005-2011 ZONING			
Drawn: LA	Job No: 07-527	Drawing No: FIGURE 7.1.1	Rev: -
Scale: 1:4000 (A1)	Date: MAR '09		

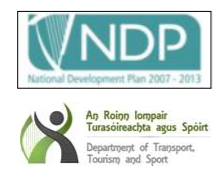


LEGEND:

ROUTE OPTION A	
ROUTE OPTION B	
ROUTE OPTION C	
ROUTE OPTION D	
ROUTE OPTION E	
SHANNON BRIDGE CROSSING	

LEGEND:

	LOWER RIVER SHANNON eSAC
	LOUGH DERG pNHA
	LOUGH DERG SPA



Ordnance Survey Ireland Licence No EN 0006512
 © Ordnance Survey Ireland and Government of Ireland.

Feb 07, 2012 - 11:30am Drawing Location: L:\acaddwg\2007\07527\Drawings\Reports\Route Selection Report Final\Fig 7.3.1.dwg

No.	Revision	Date	By	Chkd	App'd
	Stage				
PRELIMINARY					
APPROVAL		DEC 08	MC		
TENDER					
CONSTRUCTION					

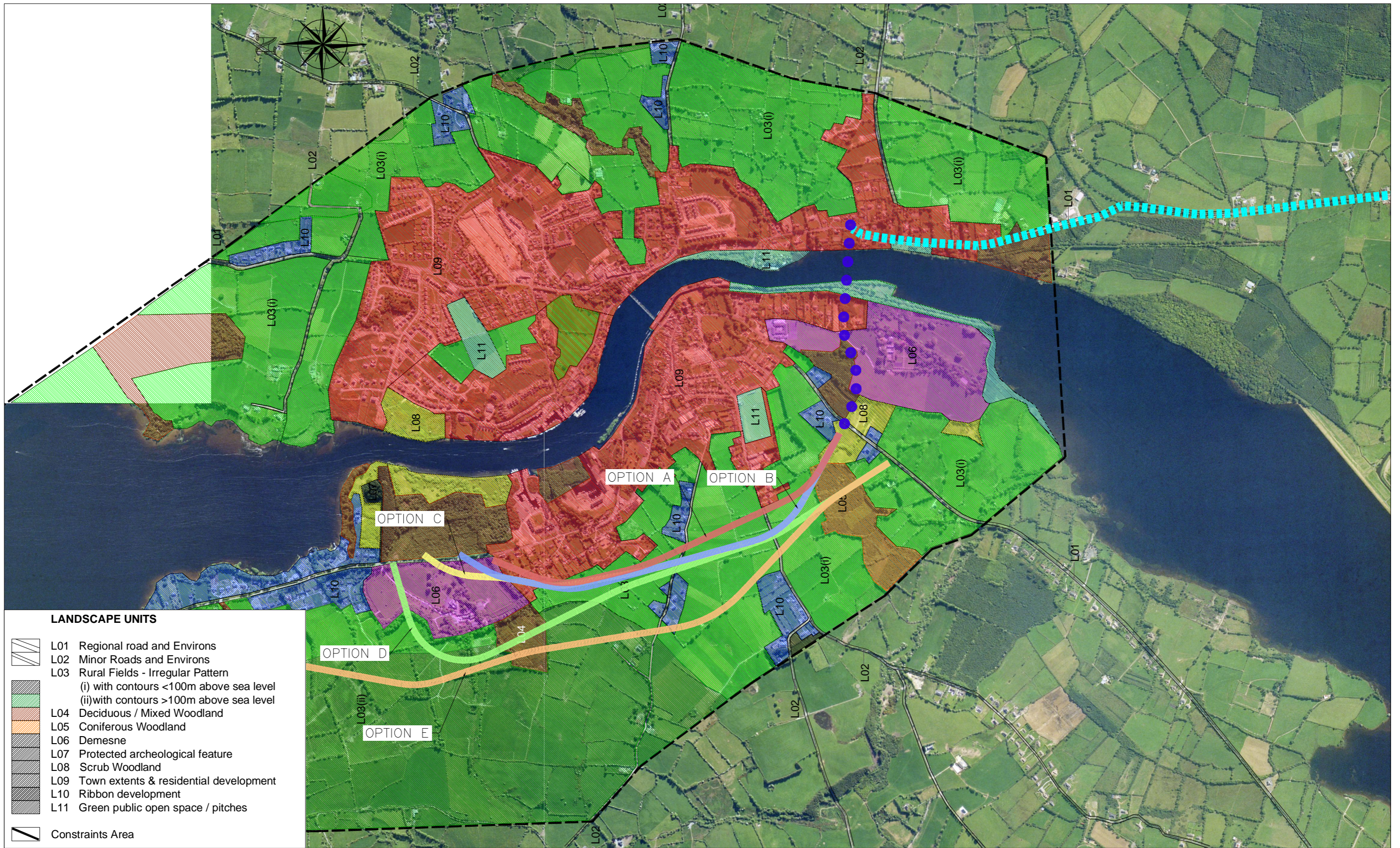
Roughan & O'Donovan
 Consulting Engineers
Civil - Structural - Transportation - Environmental

Arena House, Arena Road,
 Sandyford, Dublin 18.
 Tel : +353 1 294 0800
 Fax : +353 1 294 0820
 e-mail : info@rod.ie
 www.roughanodonovan.com

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

Project Title KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT			
Drawing Title CONSERVATION DESIGNATIONS			
Drawn: LA	Job No: 07-527	Drawing No: FIGURE 7.3.1	Rev: -
Scale: 1:10000 (A1)	Date: MAR '09		

DO NOT SCALE USE FIGURED DIMENSIONS ONLY

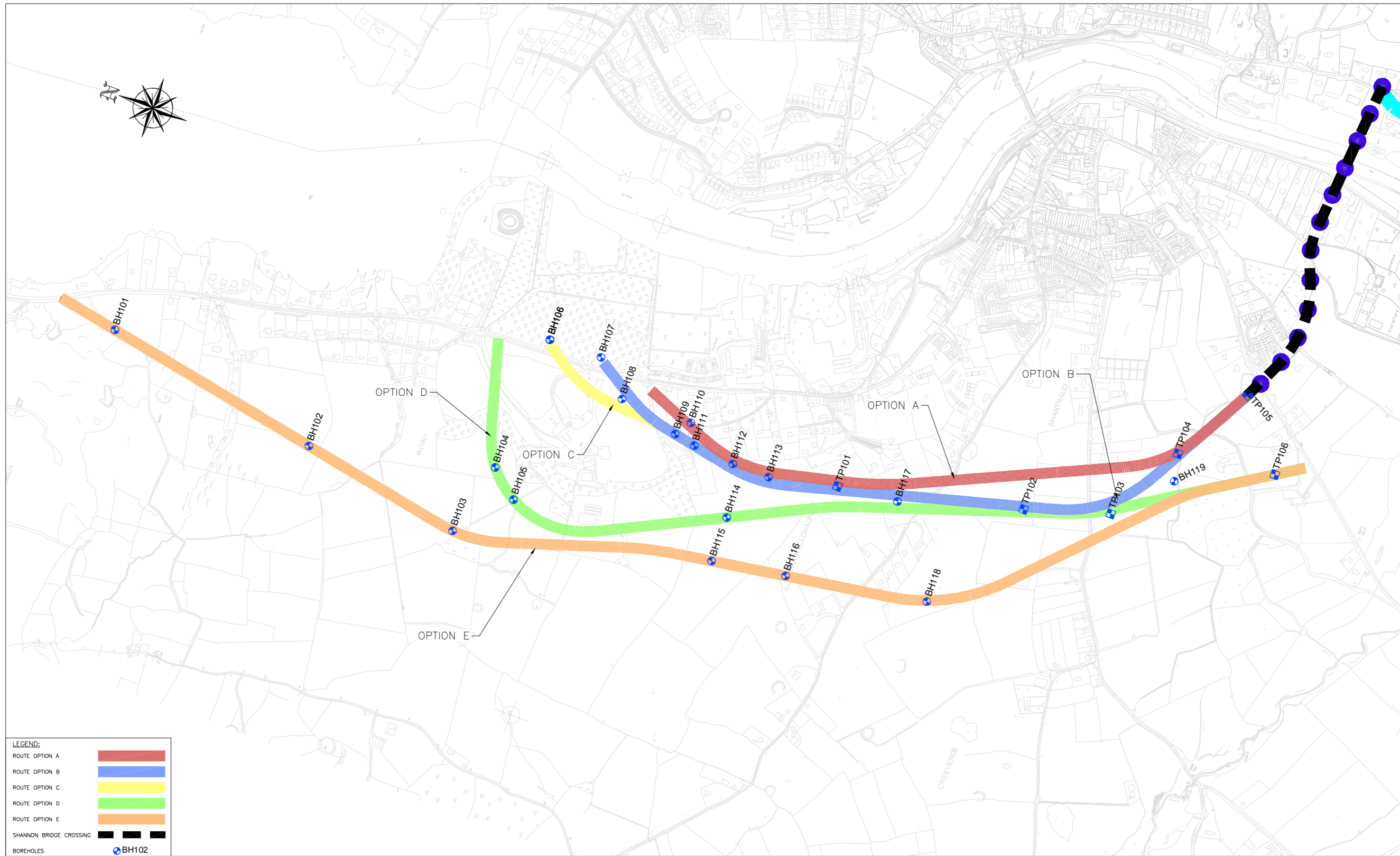


No.	Revision	Date	By	Chk'd	App'd
	Stage				
PRELIMINARY					
APPROVAL					
TENDER					
CONSTRUCTION					

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

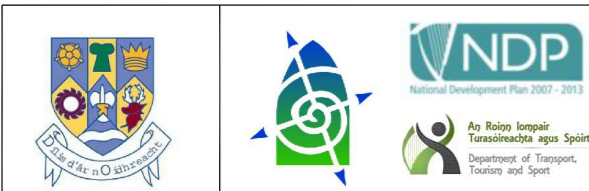
Arena House, Arena Road,
 Sandyford, Dublin 18.
 Tel : +353 1 294 0800
 Fax : +353 1 294 0820
 e-mail : info@rod.ie
 www.roughanodonovan.com

Project Title	KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT		
Drawing Title	LANDSCAPE TYPE		
Drawn:	LA	Job No:	07.527
Scale:	1:10000 @ A1	Date:	MAR '09
Rev:		Drawing No:	FIGURE 7.5



LEGEND:

ROUTE OPTION A	
ROUTE OPTION B	
ROUTE OPTION C	
ROUTE OPTION D	
ROUTE OPTION E	
SHANNON BRIDGE CROSSING	
BOREHOLES	

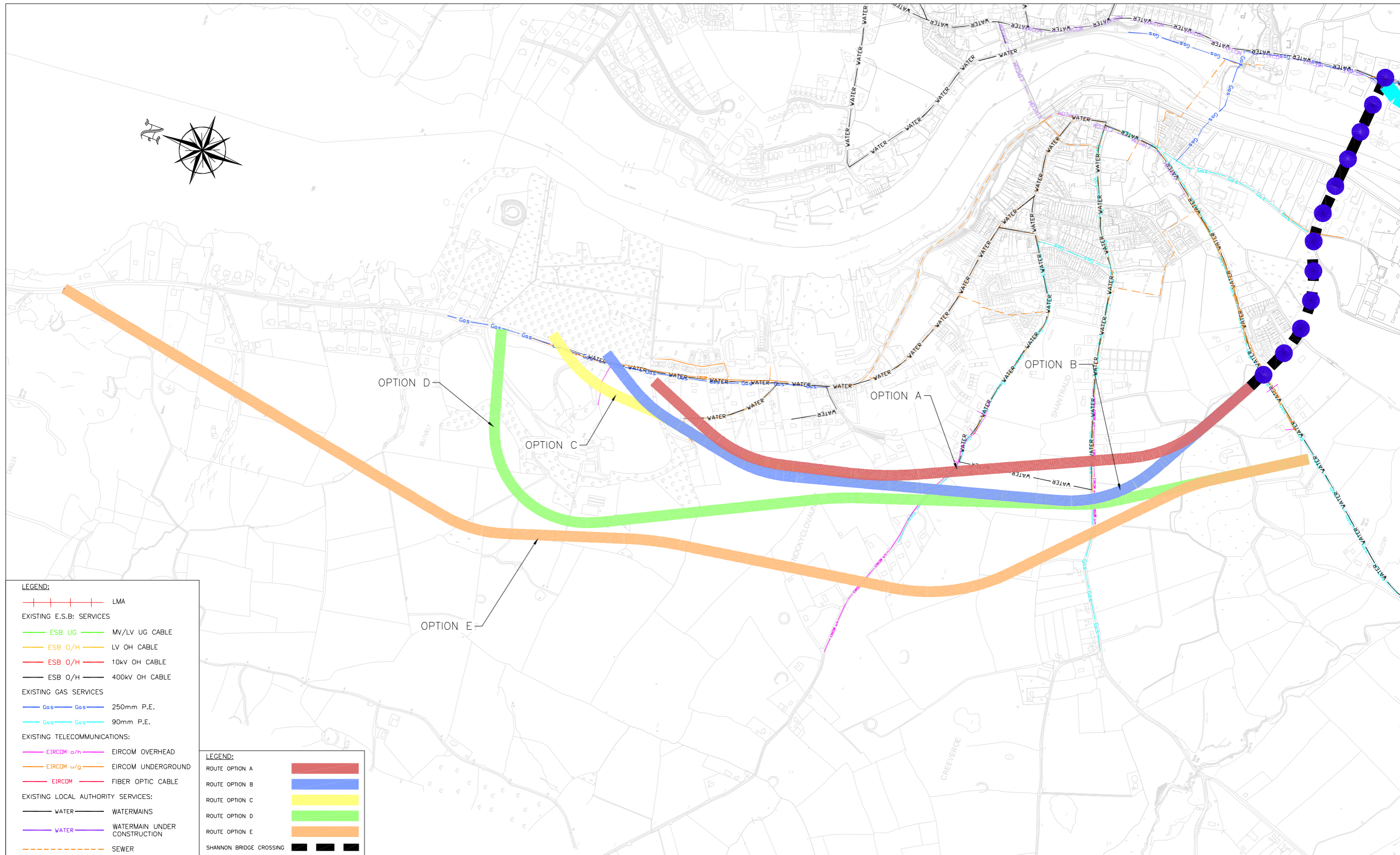
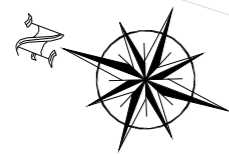


No.	Revision	Date	By	Chkd	App'd
	Stage	Date			
		DEC 08			MC
PRELIMINARY					
APPROVAL					
TENDER					
CONSTRUCTION					

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

Arena House, Arena Road,
 Sandyford, Dublin 18.
 Tel : +353 1 294 0800
 Fax : +353 1 294 0820
 e-mail : info@rod.ie
 www.roughanodonovan.com

Project Title				KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT	
Drawing Title				GROUND INVESTIGATION EXPLORATORY HOLE LAYOUT PLAN	
Drawn:	LA	Job No:	07-527	Drawing No:	FIGURE 7.6.2
Scale:	1:5000	Date:	MAR '09	Rev:	-



LEGEND:

+	+	+	+	LMA
EXISTING E.S.B. SERVICES				
—	—	—	—	ESB UG MV/LV UG CABLE
—	—	—	—	ESB O/H LV OH CABLE
—	—	—	—	ESB O/H 10kV OH CABLE
—	—	—	—	ESB O/H 400kV OH CABLE
EXISTING GAS SERVICES				
—	—	—	—	Gas 250mm P.E.
—	—	—	—	Gas 90mm P.E.
EXISTING TELECOMMUNICATIONS:				
—	—	—	—	EIRCOM o/h EIRCOM OVERHEAD
—	—	—	—	EIRCOM u/g EIRCOM UNDERGROUND
—	—	—	—	EIRCOM FIBER OPTIC CABLE
EXISTING LOCAL AUTHORITY SERVICES:				
—	—	—	—	WATER WATERMANS
—	—	—	—	WATER WATERMAIN UNDER CONSTRUCTION
—	—	—	—	SEWER

LEGEND:

—	—	ROUTE OPTION A
—	—	ROUTE OPTION B
—	—	ROUTE OPTION C
—	—	ROUTE OPTION D
—	—	ROUTE OPTION E
—	—	SHANNON BRIDGE CROSSING

		Arena House, Arena Road, Sandyford, Dublin 18. Tel : +353 1 294 0800 Fax : +353 1 294 0820 e-mail : info@rod.ie www.roughanodonovan.com	Project Title KILLALOE BYPASS, SHANNON BRIDGE CROSSING & R494 IMPROVEMENT	
			Drawing Title KILLALOE BYPASS - UTILITY SERVICES PLAN	
Drawn: LA Job No: 07-527 Drawing No: FIGURE 7.8 Rev: -		Scale: 1:5000 Date: MAR '09		

APPENDIX B

Phase 3 Route Selection Questionnaire

PHASE 3 ROUTE SELECTION

QUESTIONNAIRE

Project Route/Name: R494 Improvement, Shannon River
Crossing, Killaloe Bypass

Project Ref No:
07.527

Yes No

**1. Has the study carried out the following tasks and are they covered in the report:
(if 'No', please clarify why not)**

(a) Design Standards / Criteria

(i) Have the agreed standards/criteria been detailed in the report? Yes

(b) Traffic Surveys

(i) Counts on Main/Minor Roads? Yes

(ii) Origin/Destination Survey? Yes

(iii) Traffic Management Survey? Yes

(iv) Reconciliation with the Needs Study / National Development Plan? Yes

(v) Road Type / Design Criteria?

- design speed (major/minor roads)? Yes

- junction types? Yes

(vi) Special structural loading / clearance requirements? Yes

(vii) Exceptional circumstances associated with this scheme like the provision
of a traffic model? Yes

(c) Route Options

(i) Geometry? Yes

(ii) Junctions? Yes

(iii) Geotechnical Features? Yes

(iv) Drainage? Yes

(v) Minor Roads Yes

(vi) Construction Issues? Yes

(vii) Structures? Yes

(viii) Pedestrians/Cyclists? Yes

Yes No

(d) Environmental Impacts

(i) Environmental Impact Statement

- Does the report include a section establishing the need, or otherwise, of an EIS? Yes
- Is an EIS necessary? Yes
- If an EIS in not envisaged, has such been agreed with the NRA? N/A

Have the following been assessed for impact?

- (ii) Archaeology Yes
- (iii) Flora / Fauna Yes
- (iv) Air Yes
- (v) Noise Yes
- (vi) Socio-Economic Impacts (to include a discussion relating junction locations to socio-economic impacts) Yes
- (vii) Aesthetics Yes
- (viii) Construction Impacts including:
- Quarries No
 - Tips No
 - Site Plant No
 - Others? (*Describe separately*)
- (ix) Water Quality/Groundwater/Wetlands? Yes
- (x) Land Issues/Impacts/Cost Implications? Yes
- (xi) Amenities? Yes
- (xii) Habitats? Yes
- (xiii) Surveys on sites identified on route options? Yes
- (xiv) Has a matrix of routes showing evaluation of impacts on each of the main environmental considerations been included? Yes
- (xv) Have likely affected parties, private and public, been communicated with formally, been met and responded to? (*list such parties and attach minutes as appropriate*). Yes

Yes No

(e) Budget

- (i) Option Cost & Cost/Benefit? Yes
- (ii) Overall Costs
- Land/Properties? Yes
 - Design? Yes
 - Construction? Yes
- (iii) Does the Report contain a comprehensive chapter on the scheme budget as outlined in this phase description? Yes

Comments

*The completed questionnaire should be submitted,
together with the following;*

- **An A4 Colour Schematic Drawing of the recommended route corridor in loose hardcopy and electronic format.**
Route Corridor Selection Report
- **Updated Project Reporting System :**
 - **PM-1 - Phase 1 Overall Project Programme Form**
 - **PM-3 - Phase 3 Route Selection Monitoring Chart**

Approval is hereby sought to proceed to Phase 4 (Preliminary Design/Land Acquisition Procedures)

Signed: _____

DO Project Engineer: _____

Date: _____

R494 Improvement, Shannon River Crossing, Killaloe

Bypass

Route Selection Stage

Supplementary Comments to be read in conjunction with NRA Project Management Guidelines Phase 3 Route Selection Questionnaire

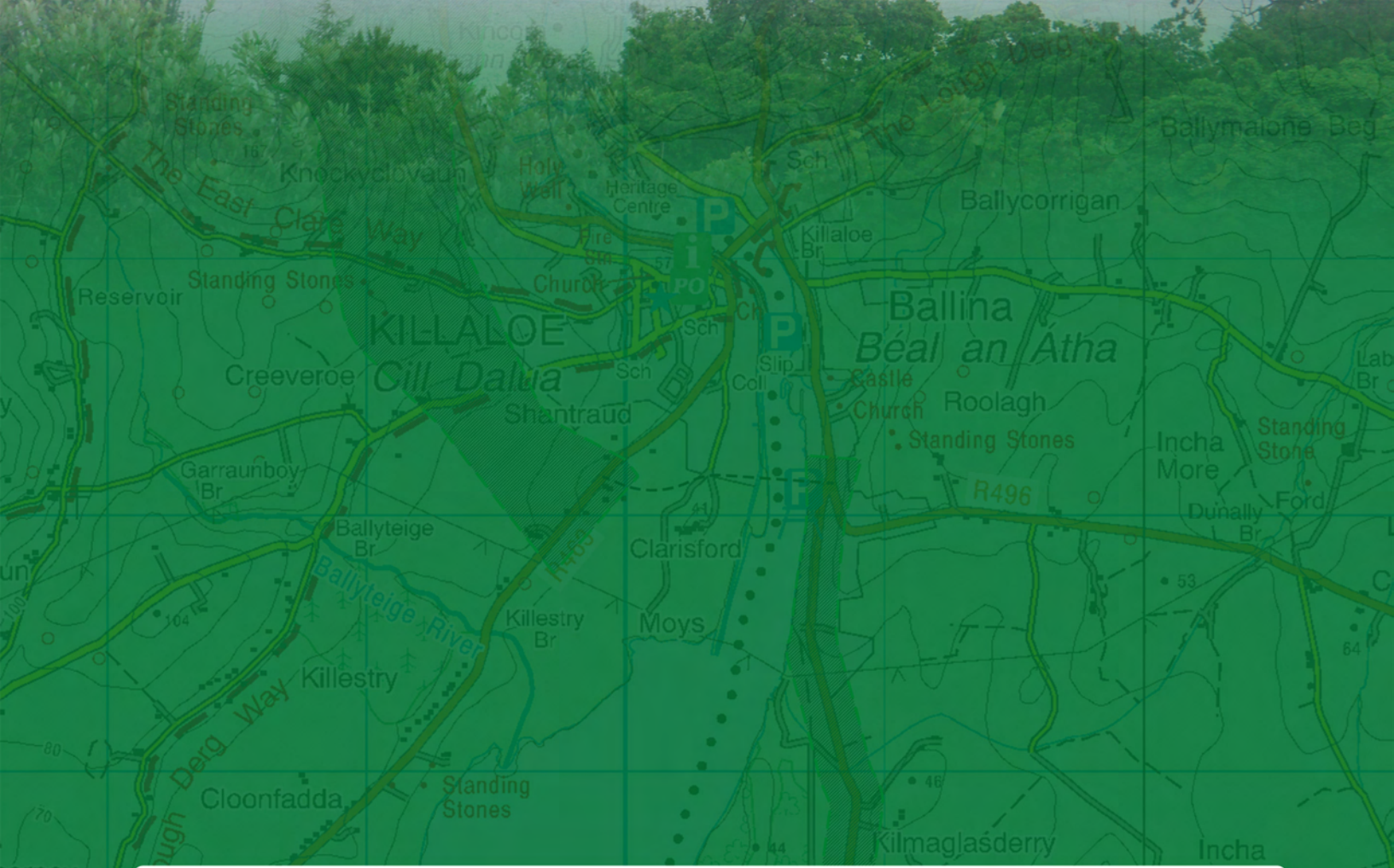
Item	Description	Comment
1 (d) (viii)	Construction Impacts including: Quarries, Tips and Site Plant	The construction impacts will be considered as part of the EIS.



Clare
County Council



North Tipperary
County Council



Department of Transport
An Roinn Iompair



Roughan &
O'Donovan
CONSULTING ENGINEERS