



N4 Realignment

Cloonamahon to Castlebaldwin

Route Selection Report

May 2002



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Executive Summary

Introduction

The N4 National Primary Route was designated as part of the East/West Road corridor linking Dublin with the town of Sligo in the north-west (O.P.T., 1994-1999).

Under the National Roads Needs Study (July 1998) it was indicated that Collooney to Ballinacorney had phase 2 needs, this means that traffic would not be able to maintain an average inter-urban speed of 80kph (50mph) after this period, therefore it was scheduled for improvement during the years 2005-2009.

Under the National Development Plan 2000-2006, Section 4.12 it is stated:

‘The development strategy for national roads will include further major improvements on N4 (Kinnegad to Sligo)’.

The Sligo County Development Plan, 1999-2004, states that is proposed to undertake realignment of the N4 from Doorly to Castlebaldwin.

The National Road Needs Study recommends a standard two lane road for this 12km section. Under the Irish Design Manual for Roads and Bridges (IDMRB) a standard two-lane road has two lanes of width 3.65m, two hard shoulders of width 2.5m and grass verges of width 3m. The proposed design speed for the road will be 100kph.

Public Consultations held to date

Consultations have been held during the following phases of this project

1. Constraints Study - 2000
2. Route Selection - May/June 2001
3. Preferred Route – March 2002

There was an overall attendance of approximately 250 people at these consultations and a total of over 220 submissions were received including two petitions from concerned groups. Private meetings with individuals and representatives of local groups were also accommodated.

Preferred Route

The preferred route (Map 1, page 6) will commence at Cloonamahon departing to the western side of the existing N4 route at Doorly and extends southwards through Knocknagroagh, Drumfin, Cloonlurg, Carrownagark, Kingsbrook and Aghalenane. At this point the preferred route travels eastwards from Aghalenane, through Ardloy and Springfield, and then veers southwards again, through Tawnagh, Cloonymeenaghan, Sheerevagh, Drumderry, bypassing Castlebaldwin village to the east and returning to the existing N4 route at Cloghoge.

The total length will be approximately 12.15km and the estimated cost will be £24.7M (€31.36). The preferred route will cross nine local roads, L-55015, L-55016, L-5502, L-1502-32, L-5402, L-54033, L-5401, L-54041 and L-1404 and the existing N4 route. It is proposed to construct five underpasses, one over-bridge and one grade separated junction on the local roads and an underpass on the existing N4 (Map 10, page 49). Local road L- 54041 in Sheerevagh will be closed and local road L-55016 in Knocknagroagh will be diverted to link up with L-55015 in Doorly. There will be one river crossing on the Drumfin river. A safety audit will be carried out on this design which may lead to some modifications to these junction proposals.

Safety of the Preferred Route

The preferred route will offer considerable advantages in terms of safety, as 43% of accidents on the existing N4 involved turning movements. The new alignment and junctions will be designed to the IDMRB standards and the number of junctions will be reduced from 18 to 3. In addition to this the removal of direct access from 64 dwelling houses and 7 business premises to the new road will greatly enhance safety for local and through traffic.

Impact of the Preferred Route

Impact on Agronomy

The preferred route will affect approximately 49 landowners. Two of these will suffer severe severance while 35 will be mildly severed. It is proposed to commission a detailed study by independent agricultural consultants on all farm holdings affected by the preferred route. The findings of this study will then be used to minimise any impact on the farming community.

Impact on houses

The preferred route will not require the demolition of any dwelling houses.

Impact on Archaeology

The preferred route does not impact directly on any known archaeological monument. One monument within 25m of the preferred route is located south of Castlebaldwin along the section of the N4 already upgraded as part of the Curlews bypass project. There may be no requirement for ground disturbance in this area and thus no impact on this monument. A programme of mitigating measures including pre-development testing and monitoring will ensure an overall neutral archaeological impact.

Impact on Ecology

The preferred route does not impact on any Natural Heritage Areas. One important ecological site, Aghalenane Lough, along the preferred route (Map 7, page 46) will need to be given special attention to minimise any impact on flora and fauna. The preferred route will result in minimal damage to ecological sites in an area that is rich in having a mosaic of wetland habitats that are difficult to avoid.

Impact due to noise and air quality

The preferred route shows a significant reduction in the comparable number of houses within 50m of the route, e.g. option 3(which generally follows the existing N4 road) has 47 houses in comparison to 7 houses for the preferred route. The preferred route has the least impact on air quality. It is significantly better than option 3 at approximately ¼ of its calculated impact.

Socio-Economic Impact

Overall the socio-economic impact will be positive as this region of south Sligo will become more accessible and there will be savings in journey times. A small number of service providers have indicated concerns that they will experience a loss of business due to bypassing of villages. Accessibility and signing will be an important feature during the detailed design stage.

Impact on landscape

The impact on the landscape will be low. The area of sensitive rural landscape northwest of Drumfin is an area of bog considered less ecologically important by Dr. Don Cotton. The preferred route will traverse this area near grade and will be appropriately landscaped as will the entire realignment.

Results of Public Consultation

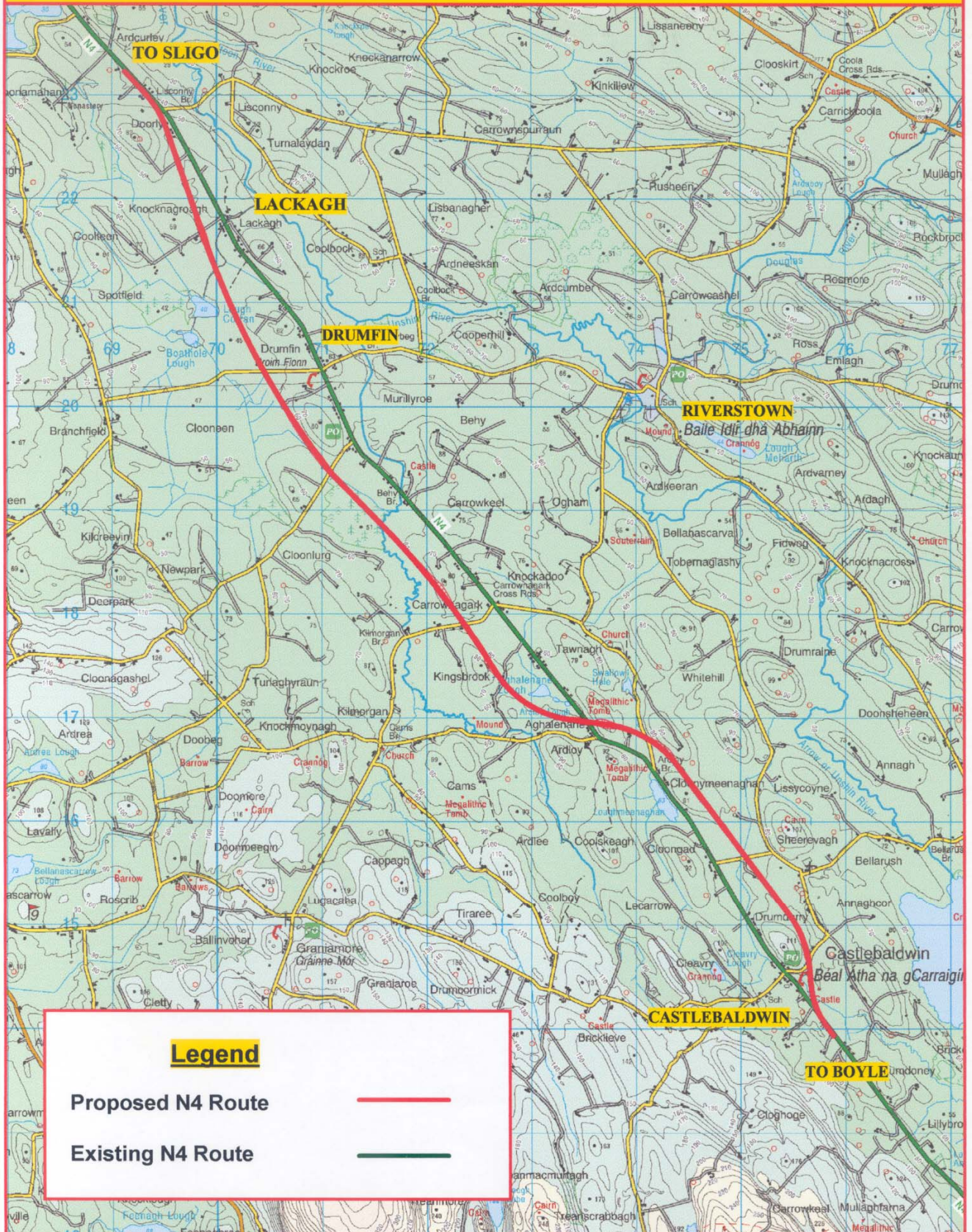
At the time of consultation for Route Selection, Option 3, which is essentially an upgrading of the existing N4 alignment had a relatively high level of support from the local community, although there was also a significant number of objections to it. The main advantage of this route relates to the reduction in land severance, but it also has considerable disadvantages in terms of safety due to the number of junctions and properties with direct access onto it and also rates poorly with respect to alignment geometry. In terms of ecology, houses removed, air quality and noise impact it is the least favourable option.

The preferred route takes into account the concerns of the public in relation to land severance and environmental issues such as archaeology and ecology. The combination of Option 2 and Option 4 addresses a large number of the concerns from the farming community and significantly reduces the archaeological implications. The preferred route does not affect the existing development pattern and national school to the west of Castlebaldwin and thus also allows for the potential upgrading to dual-carriageway standard.

Next Phase

Pending the approval of the preferred route by the members of Sligo County Council and the National Roads Authority (NRA) it is proposed to seek approval from the National Roads Authority to proceed to Phase 4 of the NRA's Project Management Guidelines, i.e. Preliminary Design / Land Acquisition Procedures.

Map 1 - N4 Realignment - Cloonamahon to Castlebaldwin



Part 1

Introduction and background information

Introduction

This route selection was carried out in accordance with the National Roads Projects Management Guidelines as published by the NRA in March, 2000. The route selection process involves a detailed technical evaluation of the scheme corridor options and the recommendation of a particular solution to the Local Authority elected members and the public.

The N4 National Primary Route was designated as part of the East/West Road corridor linking Dublin with the town of Sligo in the north-west (O.P.T.,1994-1999).

It measures 34.8km in County Sligo of which 8km between Carraroe and Collooney is dual carriageway and 8.8km south of Castlebaldwin has been realigned to full standard. It is now proposed to upgrade the remaining 12km of N4 in County Sligo.

Under the National Roads Needs Study (July 1998) it was indicated that Collooney to Ballinacorney had phase 2 needs, this means that traffic would not be able to maintain an average inter-urban speed of 80kph (50mph) after this period, therefore it was scheduled for improvement during the years 2005-2009.

Under the National Development Plan 2000-2006, Section 4.12 it is stated:

‘The development strategy for national roads will include further major improvements on N4 (Kinnegad to Sligo)’.

The Sligo County Development Plan, 1999-2004, states that is proposed to undertake realignment of the N4 from Doorly to Castlebaldwin.

Existing Road

The N4 route between Cloonamahon and Castlebaldwin currently brings all traffic through a badly aligned, narrow road with a large number of minor junctions. The carriageway width varies from 6.3m to 7.5m with an average verge width of 1.0m. It has very restricted opportunities for safe overtaking and passes through the village of Castlebaldwin which has a speed limit of 30mph. There are 18 no. junctions with local roads along the existing alignment and including the village of Castlebaldwin there are 64 houses with direct access onto the N4 National Primary route. The AADT for 1998 as given in “National Roads and Traffic Volumes” published by the NRA was 3867 with 12% HCV’s. The increasing volumes of inter-urban traffic on this strategic east-west route corridor will lead to a greater risk of road accidents and a significant loss of amenity to the local residential population.

Design Criteria

The following table shows the traffic volumes predicted under the National Road Needs Study.

Section	1995 AADT	HCV %	2019 AADT	HCV %	Saturation	HCV %
Collooney/Boyle	3000-4000	11	7000-9000	9	7500-9500	9

The National Road Needs study recommends a standard two lane road for this section. Under the Irish Design Manual for Roads and Bridges (IDMRB) a standard two-lane road has two lanes of width 3.65m, two hard shoulders of width 2.5m and grass verges of width 3m. The proposed design speed for the road will be 100kph. The proposed realignment will provide clearly identifiable overtaking sections, with passing sight distance greater than 580m, alternating with clearly identifiable non-overtaking sections. The design of the proposed realignment also endeavours to minimise the number of T-junctions and where possible to provide for local access.

Traffic Surveys

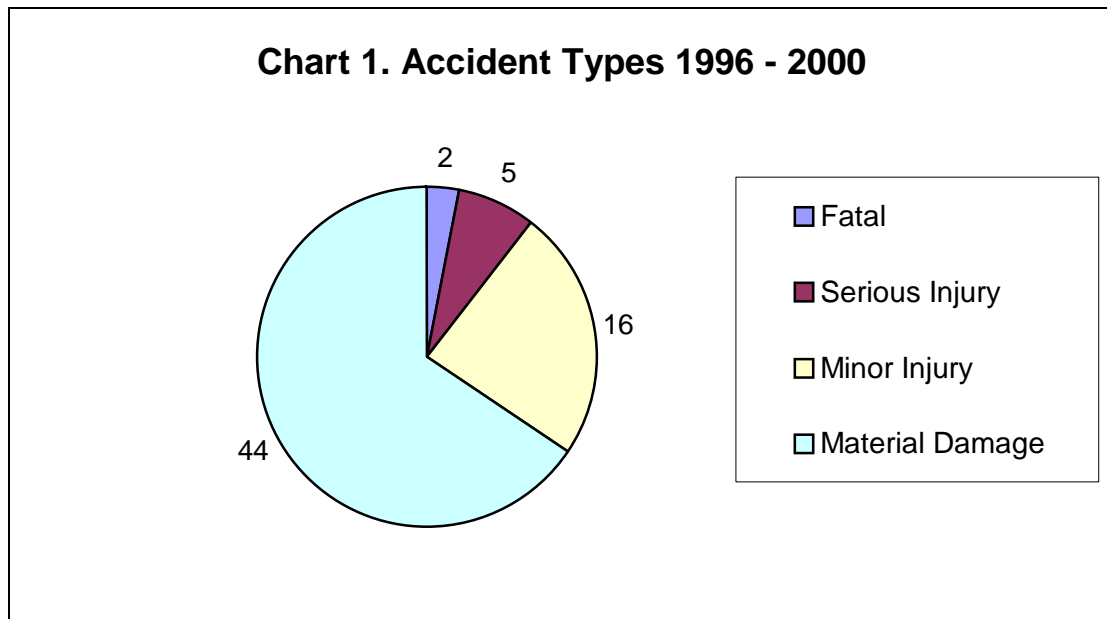
Traffic counts were taken on some local roads and the results are shown in Table 1. (see Map 9, page 48)

Local Road No.	Townland	AADT
L – 1404	Drumderry	461
L – 54041	Cloongad / Sheerevagh	159
L – 5401	Ardloy / Tawnagh	137
L – 54033	Kingsbrook	15
L – 5402	Carrownagark	205
L – 1502 – 32	Drumfin / Cloonlurg	476
L – 5502	Drumfin	164
L – 55016	Knocknagroagh	73
L – 1302	Doorly / Lisconny	314

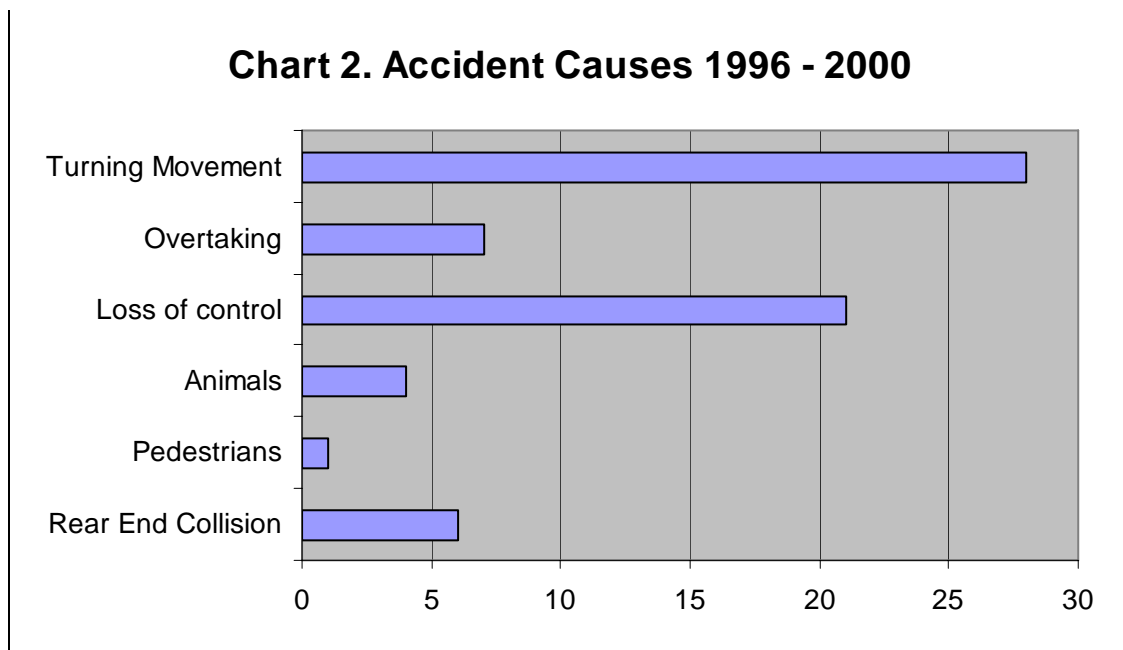
Table 1. Traffic Surveys

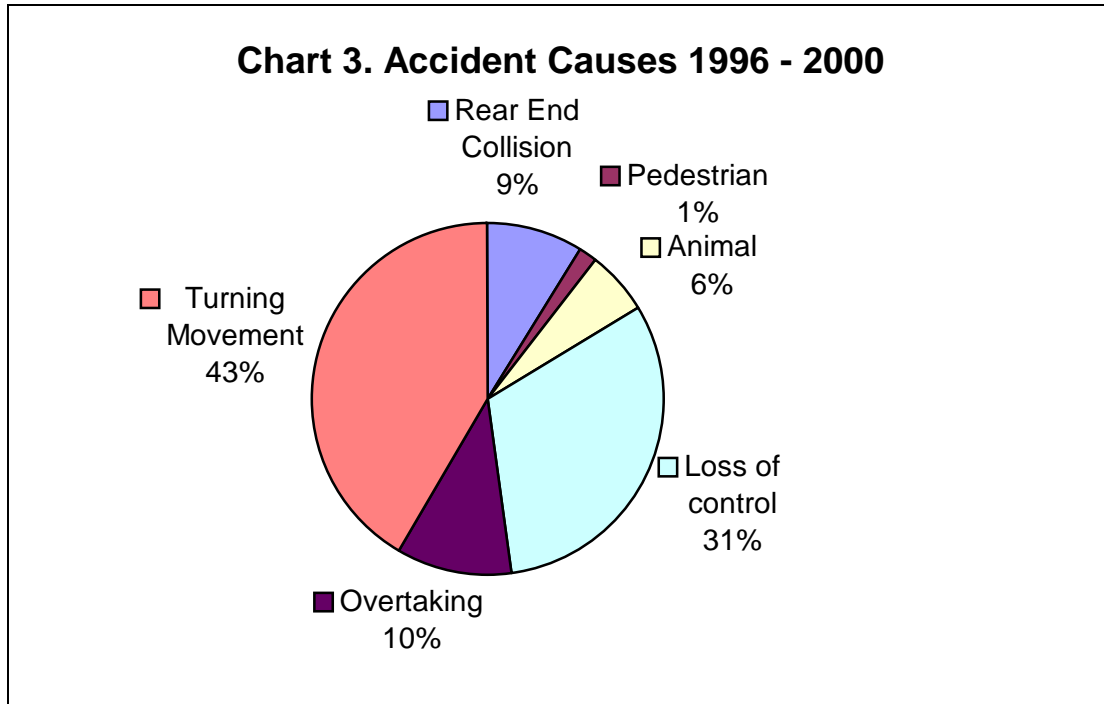
Accident Data

The total number of reported accidents for this section of the N4 from 1996-2000 was 67 of which the majority were material damage type accidents. There were 2 fatal accidents. The overall rate of personal injury accidents is approximately 15acc./100 million veh.km. The breakdown of accident types is shown in Chart 1.



The principal causes of accidents are set out in charts 2 and 3. As can be seen turning movements, usually right-hand turning movements into or out of side roads are the causes of accidents in 43% of cases.





There are a number of locations where clusters of accidents occurred with Drumfin and Lackagh showing high numbers of accidents.

History of the project

In the early part of 2000 Sligo County Council received approval from the National Roads Authority to begin route selection for the upgrading of the substandard N4 alignment from Cloonamahon to Castlebaldwin. This process commenced with the identification of a Constraints Study Area and as much information as possible was collected in order to determine what constraints (physical, legal, environmental, etc.) exist which could affect the design of the scheme, delay progress and influence cost. Submissions were invited from members of the public living within the constraints study area. The Constraints Study Report was completed in November 2000.

During the early part of 2001, Sligo County Council identified 5 route options following assessment of the information and consideration of the submissions received during the constraints study process. A public consultation was held during May/June 2001 and a brochure with a map and information was distributed to the public through An Post and submissions were invited.

A preferred route was then identified (Map 1, page 6) and a public consultation for this route was held over two days in Collooney and Ballinafad on the 8th and 9th March 2002 respectively.

Part 2 of this report sets out the details of this process.

Part 2

Route Selection

Description of Route Options

Five route options were presented at the route selection consultation as shown on Map 2, page 41.

Option 1:

Option 1 leaves the existing N4 at Doorly and passes through the Townlands of Knocknagroagh, Drumfin, Cloonlurg, Knockmoynagh, Kilmorgan, Cams, Ardlee, Coolskeagh, Lecarrow and Cleavry before bypassing the village of Castlebaldwin to the South West and returns to the existing N4 at Cloghoge Upper. The total length is 12.32 km. The Design manual for roads and Bridges (DMRB) recommends that the geometry of the road be such that there are clearly defined Overtaking sections with passing sight distance of greater than 580m, alternating with clearly identifiable non-overtaking sections. Under these criteria this option provides 54.2% passing sight distance. It is proposed to provide under bridges at the following local roads; L-15021-0, L-1404-0 and L-58015-0. Cross roads or T-Junctions will be provided at junctions with local roads L-1302-0, L-55016-0, L-5502-0, L-5402-0, L-5403-0, L-54051-0. In all there will be 7 junctions with unrestricted right hand turning. There will also be 8 properties with direct access to the new road.

Option 2:

Option 2 leaves the existing N4 at Doorly and heads west of the existing N4, passing through the Townlands of Knocknagroagh, Drumfin, Cloonlurg, Carrownagark, Kingsbrook, Aghalenane, Cams, Ardloy, Coolskeagh, Lecarrow and Cleavry before bypassing the village of Castlebaldwin to the South West and returning to the existing N4 at Cloghoge Upper. The total length is 12.125 km. The Design manual for roads and Bridges (DMRB) recommends that the geometry of the road be such that there are clearly defined Overtaking sections with passing sight distance of greater than 580m, alternating with clearly identifiable non-overtaking sections. Under these criteria this option provides 62.2% passing sight distance. It is proposed to provide under bridges at the following junctions; L-15021-0, L-5402-0, L-1404-0 and L-58015-0. Crossroads or T-Junctions will be provided at junctions with local roads L-1302-0, L-55016-0, L-5502-0, L-5402-0, L-5403-0, L-54051-0. In all there will be 7 junctions with unrestricted right hand turning. There will also be 8 properties with direct access to the new road.

Option 3:

Option 3 leaves the existing N4 at Doorly and bypasses the small village of Lackagh to the East and rejoins the existing road at Drumfin. It then follows the existing road all the way to Castlebaldwin passing through the village. The total length is 11.86km. The Design manual for roads and Bridges (DMRB) recommends that the geometry of the road be such that there are clearly defined Overtaking sections with passing sight distance of greater than

580m, alternating with clearly identifiable non- overtaking sections. Under these criteria this option provides 47.3% passing sight distance. All junctions on the existing N4 will be upgraded to provide access to the new design. In all there will be 18 junctions with unrestricted right hand turning. There will be 38 properties plus the entire village of Castlebaldwin with direct access to the new road.

Option 4:

Option 4 leaves the existing road at Doorly and heads South East through the townlands of Lackagh, Drumfin, Murillyroe, Behy, Carrowkeel, Knockadoo, Carrownagark, Tawnagh, Cloonymeenaghan, Sheerevagh and Drumderry. It bypasses the village of Castlebaldwin to the North East before rejoining the existing N4 at Cloghoge Upper. The total length is 11.87km. The Design manual for roads and Bridges (DMRB) recommends that the geometry of the road be such that there are clearly defined Overtaking sections with passing sight distance of greater than 580m, alternating with clearly identifiable non-overtaking sections. Under these criteria this option provides 68.39% passing sight distance. It is proposed to provide under bridges at the following junctions; L-1401-0, L-54013-0, L-5401-0, and L-1404-0. Crossroads or T-Junctions will be provided at junctions with local roads L-1302-0, L-54016-0, L-54017-0, L-54041-0. In all there will be 5 junctions with unrestricted right hand turning. There will also be 9 properties with direct access to the new road.

Option 5:

Option 5 leaves the existing road at Doorly and heads South East through the townlands of Lackagh, Drumfin, Murillyroe, Behy, Carrowkeel, Ogham, Tawnagh, Whitehill, Cloonymeenaghan, Sheerevagh and Drumderry, bypassing the village of Castlebaldwin to the North East before rejoining the existing N4 at Cloghoge Upper. The total length is 11.91km. The Design manual for roads and Bridges (DMRB) recommends that the geometry of the road be such that there are clearly defined Overtaking sections with passing sight distance of greater than 580m, alternating with clearly identifiable non-overtaking sections. Under these criteria this option provides 55.08% passing sight distance. It is proposed to provide under bridges at the following junctions; L-1401-0, L-5401-0 and L-1404-0. Crossroads or T-Junctions will be provided at junctions with local roads L-1302-0, L-54016-0, L-54041-0. In all there will be 4 junctions with unrestricted right hand turning. There will also be 7 properties with direct access to the new road.

Impact on Archaeology

The area around the N4 in County Sligo is rich in Archaeological sites (Map 3, page42). Mr. P. O'Donovan, Archaeologist, carried out a baseline study of archaeological assets, within the general constraints study area (Appendix 1). This report is based on a desktop study with the principal source of reference being, 'Record of Monuments and Places – County Sligo' that was issued in 1995 by The Commissioners of Public Works in Ireland (National Monuments and Historic Properties Service). He recommended that a full-scale archaeological excavation should be carried out if the ground is disturbed within 25m of an archaeological site and that trial trenching should be carried out if the ground is disturbed between 25m and 50m of the outer extent of an archaeological site. Following the selection of five route options, and consultation with Mr. Roger Linnard, Project Archaeologist, Mr. Markus Casey, Archaeologist, was commissioned to carry out a detailed archaeological assessment using aerial photography and a field study of all options (Appendix 1). The comparative results of Mr. Casey's report based on listed monuments is summarised in Table 2.1.

Proposed Route	No. of listed monuments within 25 metres	No. of listed monuments between 25m and 50m
Option 1	2	0
Option 2	2	0
Option 3	4	0
Option 4	3	4
Option 5	3	3

Table 2.1: Impact of route options on listed archaeological monuments

The procedures for the assessment of the impacts on archaeology during route selection were discussed with Mr. Brian Duffy, Senior Archaeologist, Duchas.

Impact on Ecology

Dr. Don C.F. Cotton was commissioned to examine the constraints study area and in his report he identified parts of three “proposed Candidate Special Areas of Conservation”(pCSAC), and nine areas of ecological interest (Map 4, page 45), all within the constraints area (Appendix 2). Dr. Cotton then assessed the impact of each of the five route options independently (Appendix 2). He considered Options 4 and 5 to be the most desirable whilst Option 3 is the least desirable. His report is summarised in Table 2.2:

Route Option	Comments
Option 1	No problem if care taken
Option 2	Acceptable, extra care needed.
Option 3	Serious damage to a sensitive site
Option 4	Minimal Impact
Option 5	Minimal Impact

Table 2.2: Impact of route options on ecology.

Discussions also took place with Mr. Dave Duggan, Deputy Regional Manager, National Parks and Wildlife, Duchas, and with, Ms. S. Shiels, Senior Environmental Officer, N.W. Regional Fisheries Board. Their principal concerns related to the Unshin river and the possible drainage of wetlands.

Impact on Land and Dwellings

Mr. John Murphy, B.Agr., Sc. Prepared a report which considered the impact the route options would have in relation to severance of farms (Appendix 3). His conclusions are summarised in Table 2.3 where a rating of 1 indicates least severe impact and a rating of 5 indicates most severe impact. The table also shows the number of dwelling houses that would be required for demolition by each route.

Route Option	Severance Rating	No. of Houses Required
Option 1	3	3
Option 2	5	3
Option 3	1	6
Option 4	2	0
Option 5	4	1

Table 2.3 Impact of route options on farms and houses

Impact on Air quality

The compounds released to the air by motor vehicles are involved in a wide variety of environmental effects over different geographical ranges and time periods. Some compounds have an immediate and very local effect. For instance a plume of black smoke is instantly unpleasant to those who see it. On a longer time-scale, repeated exposure to black smoke can cause soiling to buildings and materials in its vicinity. There are some compounds that have the potential to damage either health or the environment or both. Geographically the main direct effects are limited to the area near to the road.

The principal pollutants emitted by motor vehicles are carbon monoxide, hydrocarbons such as benzene and 1,3 butadiene, nitrogen dioxide and particulate matter, as is seen in black smoke.

A new road project may change traffic flows in a locality in a number of ways, with corresponding impacts on air quality. In some cases the overall effect will be beneficial. If a project relieves congestion it can cause vehicles to operate in ways that produce less emissions, so reducing overall pollution levels. This occurs because vehicles operate most efficiently and produce least pollution when they are driven in freely flowing traffic at moderate speeds. If traffic is re-routed the locations where pollution levels are highest will change, and may be transferred away from heavily populated areas where more people would feel the effects.

In recognition of the contribution of vehicle emissions to air pollution, motor vehicles are now subject to emission limits and these will be made progressively more severe in the coming years.

The Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, Annex 1, Localised Air Quality Assessment sets out Air Quality Standards for Assessment of Forecast Concentrations and also a methodology for estimating levels of Carbon Dioxide, Oxides of Nitrogen, Non-methane hydrocarbons and total suspended particulates concentrations at sites along a route.

Using these methods concentrations of pollutants have been estimated for a location 10m from the centre of the road for the years 1996,2005 and 2020 from traffic details as set out in Table 2.4

Year	AADT	Average speed (km/hr)	% HCV
1996	3500	80	11
2005	5698	100	10
2020	8000	80	9

Table 2.4

Table 2.5 shows the results of these calculations and also sets out the Air Quality Standards.

	Carbon monoxide (ppm)	Hydrocarbons (ppb)		Oxides of Nitrogen (ppb)			Particulates (mg/m ³)
	Maximum 8-hour	Annual average benzene	Annual average 1,3 butadiene	Annual average NO ₂	98%ile of hourly NO ₂	Maximum hourly NO ₂	99%ile of 24-hour values
1996	2.216	0.401	0.080	21.232	53.080	106.160	62.701
2005	1.611	0.284	0.057	16.788	41.970	83.940	49.537
2020	1.312	0.249	0.050	13.705	34.263	68.525	45.420
Standard	10	5	1	21	105	150	50

Table 2.5: Estimates of concentrations (including background) for comparison with air quality standards.

It can be seen that even as traffic volumes more than double pollution concentrations are likely to be lower than present day levels because of reductions in emissions from vehicles.

Generalised local impact assessment

In general all properties within 200m of a road will experience some change in air quality due to vehicle emissions. The DMRB recommends a generalised appraisal of route options by banding properties up to 200m from roadside, with pollutant weightings given to each band, so that total numbers and total changes in pollution levels can be compared. Table 2.6 shows the number of houses within 0-50m, 50-100m, and 100-200m of the existing and proposed route options.

ROUTE	0-50	50-100	100-200	PM	NO ₂
PM weighting	1	0.65	0.55	Weighted total	Weighted total
NO ₂ weighting	1	0.8	0.65	No. of houses (0-200m)	No. of houses (0-200m)
Option 1	11	11	17	28	31
Option 2	13	8	22	30	34
Option 3	46	19	36	78	85
Option 4	6	9	22	24	28
Option 5	12	13	22	33	37

Table 2.6 No. of houses within bands

This assessment indicates that option 3 affects the most properties from the point of view of reduction in air quality, while option 4 has the least impact.

Impact due to Noise

The sources of noise from a traffic stream can be separated into two components. The first is generated by the engine, exhaust system and transmission and is the dominant source when traffic is not flowing freely. The second noise source component is generated from the interaction of tyres with the road surface and the dominant noise source under free flow traffic conditions at moderate to high road speeds and contributes a significant proportion of high frequency noise. Noise levels will vary depending on vehicle speed, the road surface and whether the surface is wet or dry.

The noise from a stream of traffic at a reception point at any one instant is an aggregation of noise from each of many vehicles at various distances. Among factors that influence a basic traffic noise level are traffic flow, speed and composition (% heavy commercial vehicles), road gradient and road surface characteristics. Other factors such as distance from noise source, the nature of the intervening ground surface and the presence of obstructions will also affect the noise level at a particular reception point.

Units of measurement

A sound wave travelling through air produces pressure fluctuations in the atmosphere, which are detected by the human ear to produce the sensation of hearing. As the range of sound pressures from the minimum detectable to the onset of pain is vast it is convenient to measure sound in terms of a logarithmic ratio of sound pressures, which is expressed as decibels (dB).

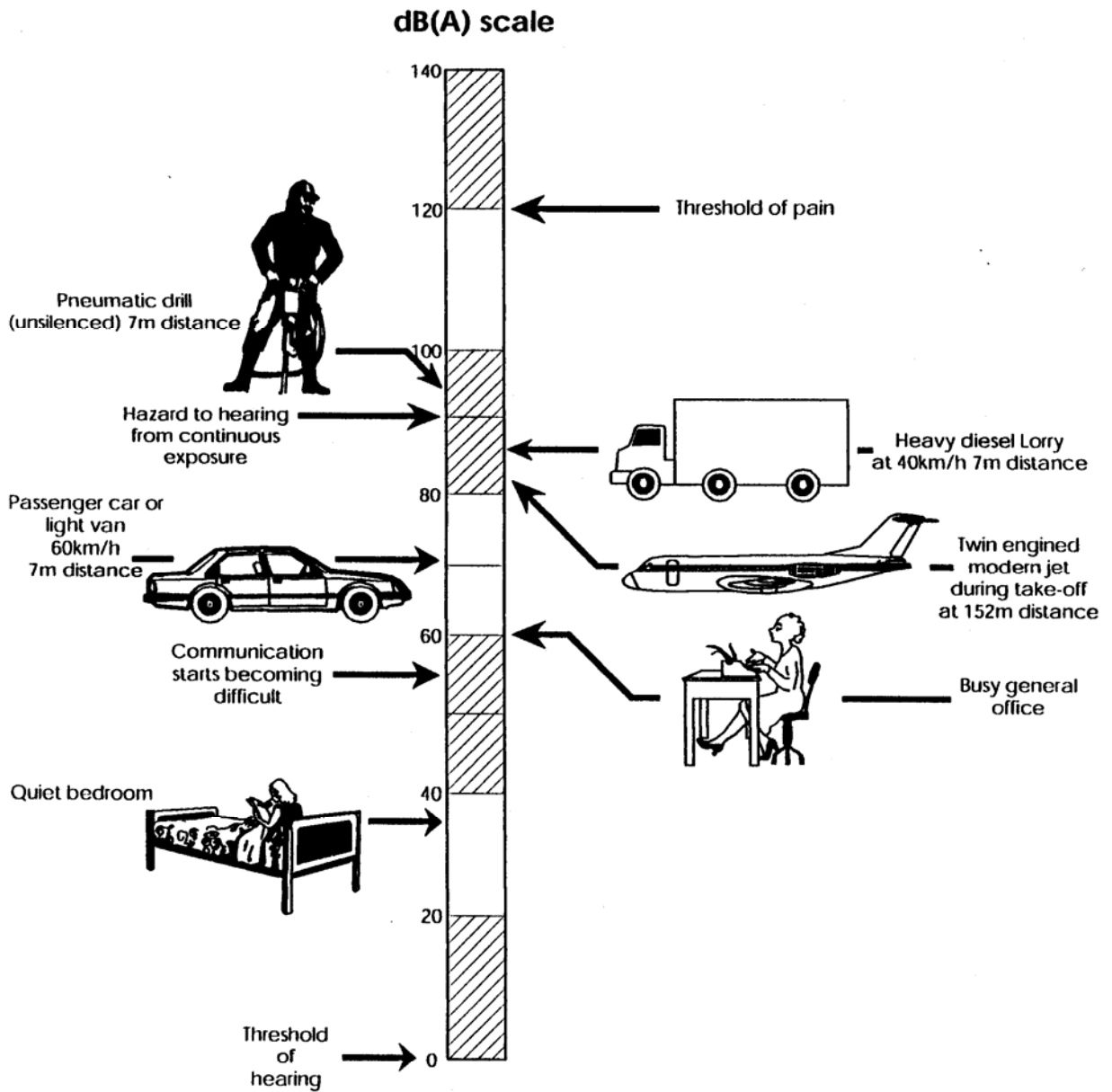
The audible range of sound can be covered within the range of 0 dB (the threshold of hearing) to 120 dB (the threshold of pain). Doubling the energy level (for example the volume of traffic) increases the noise level by 3 dB.

The sensitivity of the human ear to different frequencies in the audible range is not uniform. Experience has shown that in order to rank the noisiness of road vehicles the sound pressure level has to be adjusted to give comparatively more weight to the frequencies, which are detected most readily by the human ear. The 'A' weighting has been found to give one of the best correlations with the perceived noisiness of traffic. An indication of the level of some common sounds on the dB(A) scale is shown on Figure 1, (page 20), (Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7 – Traffic noise and vibration).

The noise from a traffic stream is not constant but varies from moment to moment and it is necessary to use an index to arrive at a single-figure estimate of the overall noise level for assessment purposes. The index recommended to assess traffic noise is $LA_{10,18h}$ which is the arithmetic mean of the noise levels exceeded for 10% of the time in each of the 18 one hour periods between 6am and midnight .

Nuisance from traffic noise

The World Health Organisation definition of noise nuisance is 'A feeling of displeasure provoked by noise'. The nuisance caused by noise usually affects



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Figure 1. The level of typical common sounds on the dB(A) scale

people in their homes, in the streets or in areas of open space that are used for recreational purposes.

Attempts to measure noise nuisance usually make use of questionnaire surveys. These surveys have revealed that individuals vary considerably in their sensitivity to noise and this is reflected in their ratings of traffic noise nuisance. In addition it has been found that attitudes to traffic noise are also related to satisfaction with the neighbourhood in general.

Surveys also indicate that people are more sensitive to abrupt changes in traffic noise such as those associated with new road schemes and that in the period following a change in traffic flow, people may find benefits or disbenefits when the noise changes are as small as 1dB(A) – equivalent to an increase in traffic flow of 25% or a decrease in traffic flow of 20%. These effects last for a number of years. Figure 2, (page 22), (from DMRB Traffic Noise and Vibration) shows the relationship between noise exposure and noise nuisance. Nuisance here is measured as the percentage of people bothered by traffic noise (i.e. those who say they are “very much” or “quite a lot” bothered on a four point worded scale). Figure 3 (page 23) gives the change in nuisance perceived soon after a change in noise.

Standards

In Britain it is considered that there is an entitlement to noise insulation treatment when the following three conditions are met:

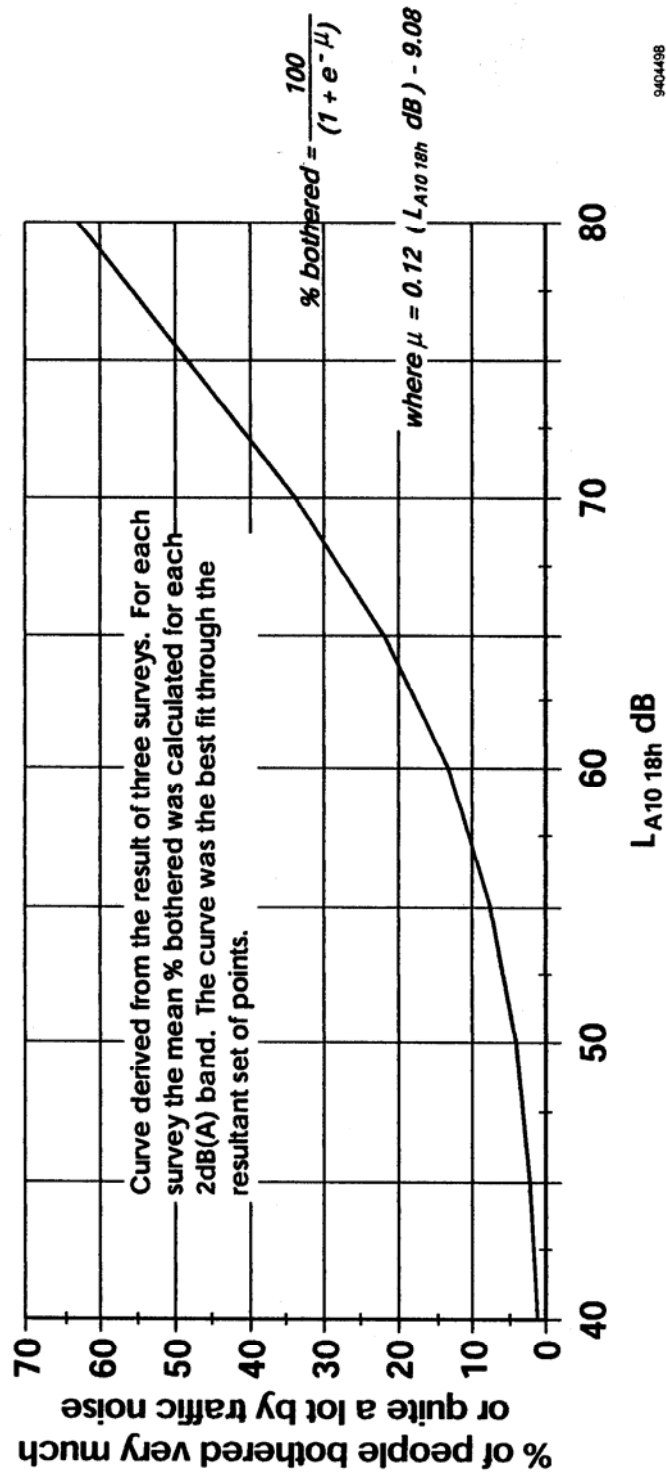
1. The combined expected maximum traffic noise level from the new or altered highway together with other traffic in the vicinity must not be less than 68 dB(A) LA10(18hour)
2. The relevant noise level is at least 1.0 dB(A) more than the prevailing noise level before the construction works were begun.
3. The contribution to the increase in the relevant noise level from the new or altered highway must be at least 1.0 dB(A).

There are no national standards in Ireland and each situation is considered on an individual basis.

Impact of Route Options

All options will bring benefits to some householders as noise levels will be reduced and will disadvantage others as they experience an increase in noise levels. In order to carry out a preliminary comparison of route options the number of houses within 300m of the five different route options have been counted. These bands have been divided into 0-50m, 50-100m, 100-200m, and 200-300m strips as shown in Table 2.5. When a route has been selected and more detailed design is being carried out ambient and predicted noise levels will be measured and calculated for individual properties.

Estimation of traffic noise nuisance Steady state or before noise change



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Figure 2

Estimation of traffic noise nuisance

Change in % bothered very much or quite a lot by traffic noise.

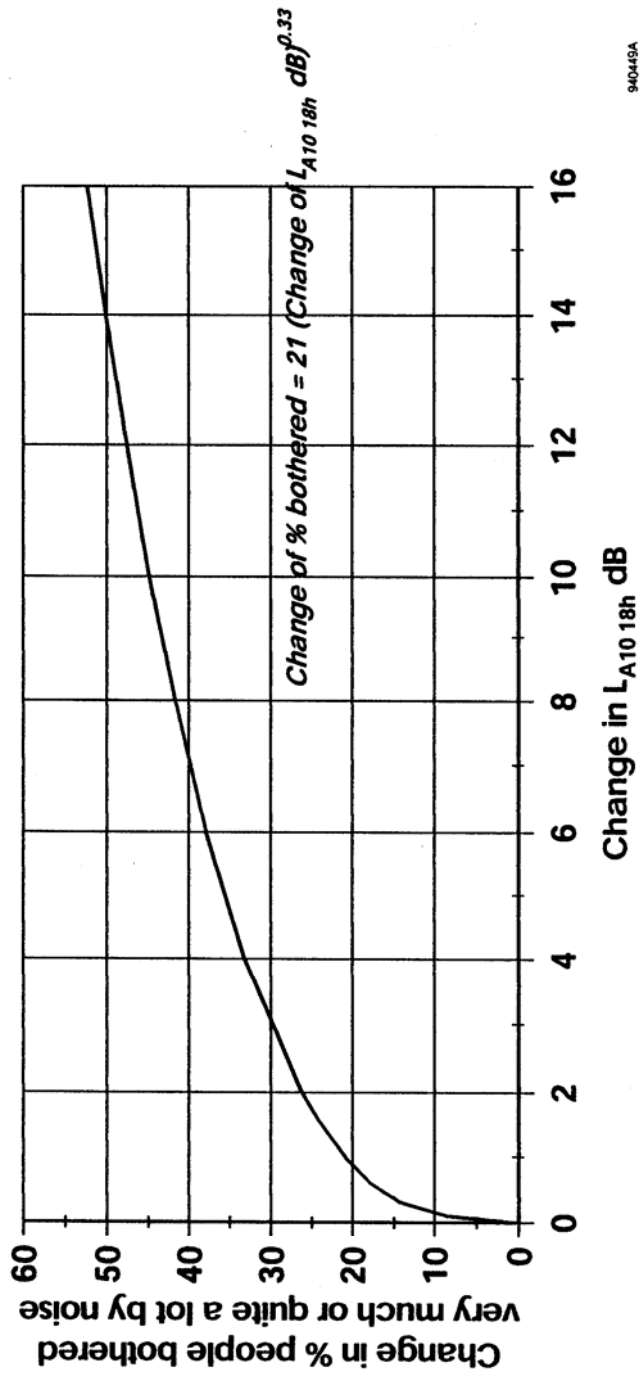


Figure 3

ROUTE	0-50	50-100	100-200	200-300
Option 1	11	11	17	27
Option 2	13	8	22	40
Option 3	46	19	36	14
Option 4	6	9	22	37
Option 5	12	13	22	26

Table 2.5 No. of houses within bands

The number of houses within the bands is generally similar for route options 1,2, and 5. There would be 65 houses within 100m of option 3 while option 4 is the most advantageous with only 15 houses within 100m of the proposed route.

Impact on Landscape

The route options are located within an area which is generally classified as Normal Rural Landscape as shown on Map 5, page 44, which is an extract from the County Development Plan. It does include one area that is classified as Sensitive Rural Landscape. This is a bog area. A scenic route passes through Castlebaldwin in a south-west/north-east direction.

The most distinctive features of the landscape in this area are drumlins and small lakes that generally lie along a north-west to south-east axis. A particularly fine group of drumlins is seen north and east of Riverstown. Travelling in a southern direction there are views of Kesh Corran and the Bricklieve Mountains to the southwest and intermittent views Carran Hill to the east. To the north the Ox mountains, Crockauns, Killerry Mountain and Benbulbin are all visible in fine weather.

A road which follows contours rather than cutting across them is likely to be more visually pleasing and therefore it is proposed to align the road between the drumlins rather than cutting through them. In order to reduce the impact of the road on the landscape it is proposed to provide a road which is, where possible within the constraints of IDMRB, graceful and free flowing and in harmony with the landscape. This will be done by providing large radius horizontal curves, long vertical curves and where possible, co-ordinating horizontal and vertical curves. Where the road is in cut and fill it is proposed to soften the effect of steep banks by rounding the tops and bottoms of them. It is proposed that fence lines will follow a flowing alignment rather than take a sudden change of direction at cuttings and embankments.

Landscaping in rural areas will include planting of trees and shrubs similar to those native to the area and verges will be specially developed as wildflower reserves. Any areas of land not suitable for return to farmers will be planted with native hardwood trees and allowed to develop into nature reserves, if possible.

There will be no major bridges required on any of the route options, though small bridges or underpasses may be required over local roads and the Drumfin river. At all stages in the design of stream crossings and underpasses the aesthetics will be reviewed.

Route Options

All options generally follow the contours of the land with no large cuts or embankments.

Option 1 passes close to Lough Corran at grade and then crosses over the Cloonlurg - Drumfin road. It cuts through a drumlin in Cams to provide access to local roads. It passes by Cleavry Lough on raised embankments to provide an underbridge on the Castlebaldwin – Ballymote road.

Option 2 also follows land contours, passing Lough Corran and crosses the Cloonlurg – Drumfin road on an embankment. It bridges over the Drumfin river and passes through an area of cut in Carrownagark. It crosses a local road into Kingsbrook and rejoins the alignment of option 1 in Coolskeagh.

Option 3 generally follows the existing road alignment. It has no bridges over local roads and so it does not impact greatly on existing views. It veers from the existing road at grade through Lackagh and Drumfin. It also leaves the existing N4 in Ardloy and passes along the fringes of Loughmeenaghan in Cloonmeenaghan.

Option 4 follows a flowing alignment with large radius curves. It runs parallel to the path of the Unshin river through Lackagh and crosses the Drumfin – Riverstown road on an embankment. It bridges over a local road in Carrownagark and is in cut passing a ringfort in Tawnagh. It is on a raised embankment to cross another local road in Tawnagh and then runs along the eastern side of a large drumlin in Drumderry. It then bridges over the Castlebaldwin – Heapstown road returning to the N4 at Cloghoge.

Option 5 follows the route of option 4 to the Drumfin – Riverstown road then veering east through Carrowkeel in cut and bridging a local road in Tawnagh onto an embankment. It then follows the contours through Tawnagh and Cloonmeenaghan with large radii curves and rejoins option 4 in Drumderry.

Socio- economic Impacts

The route options are located to the southeast of Sligo county, which is a region that has been suffering from the visible signs of rural decline over many years.

Castlebaldwin is the only village along this section of the existing N4 route that is the subject of this realignment project. It has a furniture factory, a filling station and car dealership, a Post Office, two shops and a public house. There is also a repairs and service garage and a panel beaters facility.

There is a scenic walk commencing in Castlebaldwin, the Miner's Way and Historical Trail, which is a waymarked long distance walking route through Counties Leitrim, Roscommon and Sligo.

There is an Art Gallery with picture framing service and art classes located beside the N4 in the townland of Tawnagh. There is a car servicing and repair facility located on local road L- 1502-32 close to the N4 at Drumfin and a public house along the N4 at Knocknagroagh. There is a B&B located along the N4 in Drumfin and a boarding kennels and dog training school in Clooneen.

The Teeling and District Conservation and Gun Club have access to the habitats of a good variety of game birds on the western side of the existing N4 route.

The Lough Arrow area to the south is highly scenic and rich in archaeology with the Carrowkeel Megalithic Complex located just 6km southwest of Castlebaldwin. Lough Arrow is a well-known brown trout fishery and is undergoing continuous development by the N W Regional Fisheries board. In 1995 the Sligo Rural Renewal Project was set up and the Lough Arrow area was examined as a pilot project. The area extends east to the R284, which is the Sligo/Cavan road, and south to Ballinafad. Appendix 3A is extracted from the Sligo Rural Renewal Project Summary Findings. An official of Sligo County Council was a member of the steering committee. It gives a detailed profile of the Lough Arrow area.

There is a limited amount of tourist accommodation in the area and tourism overall is still underdeveloped in the area.

There is a National Field Study Centre near completion in Ballinafad at present which will be a residential facility and provide a range of courses and holiday programmes in archaeology, biology, geology, ornithology, general culture, music, dance, literature, local history and folklore.

The County Development Plan, 1999-2004, states that is proposed to undertake realignment of the N4 from Doorly to Castlebaldwin.

There is no specific mention of Castlebaldwin in the County Development Plan, nor is it included among those villages which are considered to be within convenient commuting distance of Sligo and are to have local area action

plans prepared for them. The general settlement strategy policy for the county is to encourage new development to locate in existing towns and villages where the basic social and infrastructural services are available and where such services may be provided or expanded on an economic basis.

While the socio-economic impact on a small number of individuals may be negative, e.g. partial loss of passing trade for the filling station, overall the impact is likely to be positive as the area becomes more accessible both for tourism, industry and services. In addition, living conditions and rural amenity will be enhanced for the majority of residents in this region following the realignment of through traffic.

Estimated cost and cost benefit analysis

Cost estimates (Table 2.6) were based generally on figures set out in the National Roads Needs Study but with differentiation made for bad ground conditions, number of archaeological sites affected, number of houses affected and number of road bridges and underpasses proposed for the different route options.

Proposed Route	Cost (£M)
Option 1	25.4
Option 2	24.2
Option 3	19.1
Option 4	22.6
Option 5	22.9

Table 2.6 Estimated Cost

Cost benefit analysis (Table 2.7) was carried out using COBA and default data in COBA was used except for discount rate where a figure of 5% was used and traffic growth figures were used as set out in the National Roads Needs Study. As the analysis is based on British figures for such things as fuel costs, vehicle mix, occupancy rates, value of time, accident costs, accident rates and economic growth rates, etc, the results must be viewed accordingly and are therefore intended for comparison purposes only.

Proposed Route	Benefit (£M)
Option 1	11.0
Option 2	12.9
Option 3	11.8
Option 4	15.1
Option 5	14.7

Table 2.7 Estimated Cost Benefit Analysis

Public Consultation

A public consultation for route selection was held during the period 14th May 2001 to 15th June 2001. Due to restrictions in place in relation to foot and mouth disease, Sligo County Council was advised by the Department of Agriculture not to hold a public consultation in the locality, as would be common practice. Information and drawings of the five route options were on public display in the reception area of the County Council offices at Riverside, Sligo. Consultations with members of the technical staff were also arranged by appointment during this period. An Post distributed approximately 600 brochures and a notice was placed in the local newspaper.

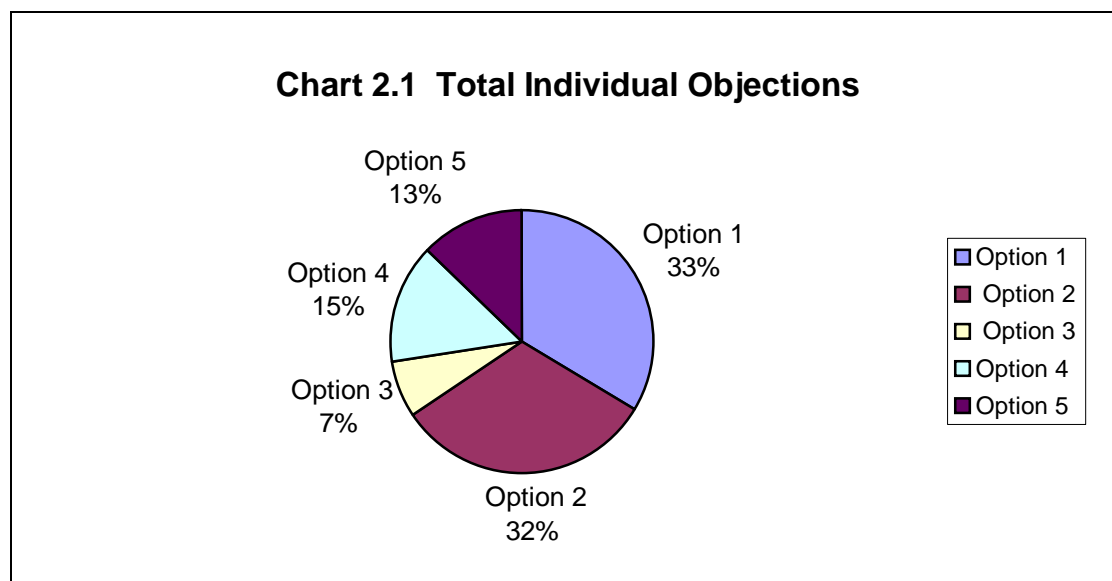
Approximately 140 people attended the public consultation. The closing date for submissions was 22nd June 2001. In all approximately 160 submissions were received.

The individual objections can generally be classified as set out in Table 2.7

Reason for objection:	Option 1	Option 2	Option 3	Option 4	Option 5
Direct impact on agricultural holdings	20	18	7	21	17
Direct impact on house	2	2	1	1	1
Direct impact on garden	0	0	0	1	0
Impact due to close proximity to house	15	9	4	8	4
Non-specific objection	7	10	2	5	8
General objection	4	6	2	4	4
Environmental Impact	51	38	6	18	19
Safety concerns	22	18	8	1	1
Impact on business	8	7	0	2	2
Impact due to closing of road access	75	69	0	11	10
Impact on family	2	1	0	1	0

Table 2.7 Individual objections to proposed route options

The total number of individual objections to each of the proposed route options on a percentage basis is shown on Chart 2.1

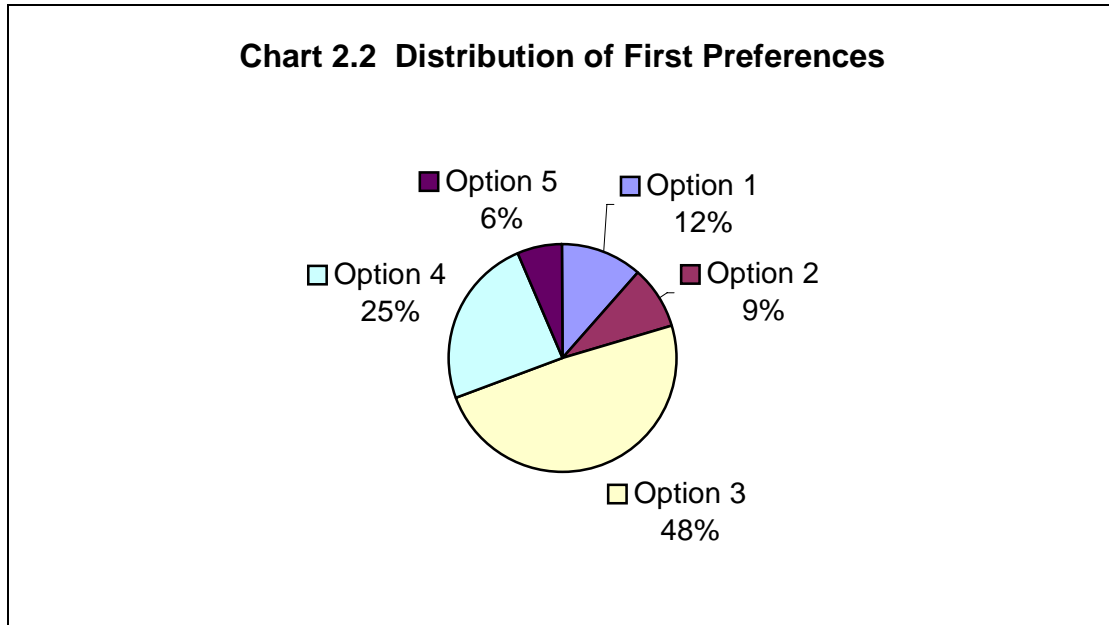


At the time of the public consultation questionnaires were handed out which asked people to rank the options in order of preference. The preferences are classified in the Table 2.8

Route Options:	Option 1	Option 2	Option 3	Option 4	Option 5
1 st preference;	18	14	75	38	10
2 nd preference;	14	15	18	52	31
3 rd preference;	11	10	31	12	65
4 th preference;	11	77	13	11	9
5 th preference;	80	17	8	17	14

Table 2.8 Preferences for proposed route options

The distribution of first preferences for each of the proposed routes expressed in percentages is shown on Chart 2.2. It should be noted that objections and preferences for route options might be influenced by the population distribution in the region.



As part of the consultation process people were also invited to rank in order of importance various criteria that would be taken into account in the selection of a preferred route. The 1st, 2nd and 3rd rankings are classified in Table 2.9

Criteria	Ranked No. 1	Ranked No. 2	Ranked No. 3
Improving traffic conditions	6	14	9
Improving road safety	40	9	18
Improving quality of environment of existing dwellings	0	10	10
Minimising impact on people living near the selected route	39	27	20
Minimising effect on agriculture	22	23	21
Minimising effect on archaeological sites	1	0	12
Minimising demolition of houses	8	15	10
Minimising impact on flora and fauna	4	11	11
Minimising impact on the landscape	11	17	7
Minimising impact on commercial activities	1	1	8
Value for Money	4	0	5

Table 2.9 Ranking of various criteria

Submissions were also received on behalf of three groups and one club.

The 'South Sligo Community' group submission, signed by 202 individuals expressed concerns in relation to option 1 and option 2. They expressed concern about environmental issues and the impact on daily life of those living in close proximity to these options. They are concerned about the implications for Cloghogue National School and the future development of Castlebaldwin. They are concerned about the accuracy of information presented and the subsequent analysis and reports. They are concerned about local access and possible road closures. The group listed concerns in relation to the impact of these routes on the ecology and landscape of the area.

The 'N4 Realignment Action Group' with 47 listed members, stated that they were a representative group of residents living on the eastern side of the existing N4, from Lackagh to Castlebaldwin. Their concerns refer to option 4 and option 5, and relate primarily to the implications of this development for agriculture and the residents of their community. Issues of severance and access, as well as social, environmental, ecological and archaeological effects were highlighted in this submission.

The 'Save the Curlew' group submission, signed by 81 individuals expressed concerns about the impact of proposed route options 4 and 5 on bird life in the Murillyroe to Cloonymeenaghan area with particular concern for the curlew.

The 'Teeling and District Conservation and Gun Club' submission on behalf of five members, expressed concerns on ecological issues relating to option 1 and option 2.

Recommendation for Preferred Route

Taking into account all submissions, reports and information collated, a preferred route was selected as outlined in Part 3 of this report.

Part 3

Preferred Route

A public consultation on the preferred route was held at the following times and locations:

Teeling Sports & Leisure Centre (GWI Complex),
Rathrippon, Collooney, Co. Sligo.

Friday, 8th March, 2002
3.00pm to 7.00pm

National Field Study Centre, Ballinafad,
Co. Sligo

Saturday, 9th March, 2002
10.00am to 2.00pm

Preferred Route – Cloonamahon to Castlebaldwin

For comparison purposes the results of the studies and public consultation can be ranked with a ranking of 1 indicating the least impact or most favourable result and a ranking of 6 indicating the greatest impact or least favourable result. Table 3.1 categorises the results for each route option:

Option	1	2	3	4	5	Preferred
Passing sight >580m	4	2	6	1	3	5
No. of Junctions	4	4	6	3	2	1
No. of Accesses	3	3	6	5	2	1
Estimated Cost	6	4	1	2	3	5
Estimated Benefit	6	4	5	1	2	3
Impact on Ecology	4	5	6	1	1	3
Impact on Archaeology	2	2	4	6	5	1
Houses Removed	4	4	6	2	3	1
Air Quality	3	4	6	2	5	1
Noise Impact (0-50)	3	5	6	1	4	2
Impact on Landscape	6	6	1	2	2	4
Ground conditions	6	4	1	2	3	5
Public Preference	3	4	1	2	5	N/A

Table 3.1 Ranking of studies and public consultation

Option 3, which is essentially an upgrading of the existing N4 alignment had a relatively high level of support from the local community, although there was also a significant number of objections to it. From a financial perspective it is particularly advantageous as it is between £3.5M and £6.3M cheaper than the other options. However it has considerable disadvantages in terms of safety due to the number of junctions and properties with direct access onto it.

Option 3 also passes through the village of Castlebaldwin that has a 30mph speed limit and therefore would reduce any benefits in terms of time and fuel savings. It also rates poorly with respect to alignment geometry and has the lowest percentage of passing sight distance greater than 580m at 47.3%. In relation to land severance option 3 has obviously the least impact, however in terms of ecology, houses removed, air quality and noise impact it is the least favourable option.

Option 4 appears to be the 2nd preference in terms of public opinion and also rates highly under several criteria but has a significant negative impact on archaeology. It also causes severe severance to a number of farms along its route and received the largest number of objections from the farming community. It has the best geometric alignment, and the least impact in terms of air quality, noise and houses removed. It is proposed to utilise the approximate alignment along the southern part of option 4, from Tawnagh with some minor adjustments to reduce any negative impacts. This proposal will avoid the majority of severance issues along option 4 and also significantly reduce the archaeological implications.

Option 1 received the third highest first preferences, but also the most fifth preferences by far, in excess of four times more than any of the other options. It also received the most individual objections at 112. It is the longest and most expensive route and rates lowest in terms of ground conditions and second lowest in terms of alignment geometry and passing sight distance after option 3.

Option 2 received 69 objections on the basis of closing local roads, 33 of these related to the proposed closure of local road L – 5502, known locally as the ‘bog line’ road. Option 2 has the second best geometric alignment with percentage passing sight distance greater than 580m of 62.2%, and the least archaeological impact of the five options. Apart from issues of local access and the environment, the proximity of option 2 to Cloghoge national school was of concern to a lot of people. It is proposed to use the general alignment along the northern part of option 2 from Aghalenane, whilst maintaining access along all local roads on this section of the preferred route.

This proposed combination of option 2 and option 4 will require a new section of carriageway of similar design standards to connect these two routes in an east – west direction through the townlands of Aghalenane, Ardloy, Springfield and Tawnagh. This section of the preferred route will crossover the existing N4 route by means of an over-bridge. Apart from access at both ends of the preferred route, i.e. at Castlebaldwin and at Cloonamahon the only other junction access will be at local road, L – 1502-32, known locally as the Ballymote road.

In summation the realigned road will depart to the western side of the existing N4 route at Doorly and extends southwards through Knocknagroagh, Drumfin, Cloonlurg, Carrownagark, Kingsbrook and Aghalenane. At this point the preferred route travels eastwards from Aghalenane, through Ardloy and Springfield, and then veers southwards again, through Tawnagh, Cloonymeenaghan, Sheerevagh, Drumderry, bypassing Castlebaldwin village to the east and returning to the existing N4 route at Cloghoge.

It is proposed to construct five underpasses, one over-bridge and one grade separated junction on the local roads and an underpass on the existing N4 (Map 10, page 49). Local road L- 54041 in Sheerevagh will be closed and local road L-55016 in Knocknagroagh will be diverted to link up with L-55015 in Doorly. There will be one river crossing on the Drumfin river. A safety audit will

be carried out on this design which may lead to some modifications to these junction proposals.

Cost and Cost Benefit of the Preferred Route

Proposed Route	Cost (£M)
Option 1	25.4
Option 2	24.2
Option 3	19.1
Option 4	22.6
Option 5	22.9
Preferred Route	24.7

Table 3.2 Estimated Cost

The estimated cost (Table 3.2) of the preferred route is greater than either option 2 or option 4 because of the additional bridge structures and underpasses required to facilitate access along local roads. Poor ground conditions have also influenced the cost of the preferred route. Comparative figures for the estimated cost benefit are shown in Table 3.3.

Proposed Route	Benefit (£M)
Option 1	11.0
Option 2	12.9
Option 3	11.8
Option 4	15.1
Option 5	14.7
Preferred Route	13.0

Table 3.3 Estimated Cost Benefit Analysis

The need to combine option 2 and option 4 for the preferred route means that it is longer and it has a bendiness index almost double in value to that of option 4. These criteria will impact on such items as added fuel costs and value of time thus reducing the cost benefit figure.

Impact of the Preferred Route

Impact on Archaeology

The number of monuments within 25m and within 25m and 50m of the preferred route is shown in Table 3.4

Proposed Route	No. of listed monuments within 25 metres	No. of listed monuments between 25m and 50m
Option 1	2	0
Option 2	2	0
Option 3	4	0
Option 4	3	4
Option 5	3	3
Preferred Route	1*	1

Table 3.4 Impact of route options on listed archaeological monuments

These comparative figures indicate the preferred route (Map 6, page 45) is the most favourable option from an archaeological perspective. Due to the distribution of known archaeological monuments the predicted impact of the preferred route on the cultural heritage of the existing environment will be slight. A programme of mitigating measures including pre-development testing and monitoring will ensure an overall neutral archaeological impact.

*The monument within 25m of the preferred route is located south of Castlebaldwin along the section of the N4 already upgraded as part of the Curlews bypass project. There may be no requirement for ground disturbance in this area and thus no impact on this monument.

Impact on Ecology

Dr. Don Cotton has prepared a report and has identified one important ecological site, Aghalenane Lough, along the preferred route (Map 7, page 46) which will need to be given special attention to minimise any impact on flora and fauna. Dr. Cotton has recommended mitigating and remedial measures that will further reduce any negative impacts. The preferred route will result in minimal damage to ecological sites in an area that is rich in having a mosaic of wetland habitats that are difficult to avoid.

Impact on Agronomy

The preferred route will reduce the impact on some farms but does not eliminate all severance issues. A report was prepared by Mr. John Murphy, Agronomist, (Appendix 3), and states that the preferred route will affect approximately 49 landowners. Two of these will suffer severe severance while 35 will be mildly severed.

Impact on dwelling houses.

The preferred route will not require the demolition of any dwelling houses.

Impact due to noise

Table 3.5 compares the number of houses within the different distance bands as described in the earlier section on noise.

ROUTE	0-50	50-100	100-200	200-300
Option 1	11	11	17	27
Option 2	13	8	22	40
Option 3	46	19	36	14
Option 4	6	9	22	37
Option 5	12	13	22	26
Preferred Route	7	4	20	49

Table 3.5 No. of houses within bands

The preferred route shows a significant reduction in the comparable number of houses within 200m of the route, e.g. option 3 has 101 houses in comparison to 31 houses for the preferred route

Impact on Air Quality

The weighted totals for particulates and NO₂ are shown in Table 3.6 for all houses within 200m of the preferred route.

ROUTE	0-50	50-100	100-200	PM	NO₂
PM weighting	1	0.65	0.55	Weighted total	Weighted total
NO ₂ weighting	1	0.8	0.65	No. of houses (0-200m)	No. of houses (0-200m)
Option 1	11	11	17	28	31
Option 2	13	8	22	30	34
Option 3	46	19	36	78	85
Option 4	6	9	22	24	28
Option 5	12	13	22	33	37
Preferred Route	7	4	20	21	23

Table 3.6 Impact on Air Quality

The preferred route is the most favourable option, with the least impact on air quality. It is significantly better than option 3 with at approximately ¼ of its calculated impact.

Impact on landscape

The impact on the landscape will be low (Map 8, page 47). The preferred route crosses a scenic route beside Castlebaldwin in a northwesterly direction. The views from this scenic route are to the southeast onto a landscape classified as visually vulnerable. The area of sensitive rural landscape northwest of Drumfin is an area of bog considered less ecologically important by Dr. Don Cotton (Map 7, page 46). The preferred route will traverse this area near grade and will be appropriately landscaped as will the entire realignment.

Socio-economic impact

Overall the socio-economic impact will be positive as this region of south Sligo will become more accessible with shorter journey times and an improved level of service on this route. The new alignment and junctions will be designed to the IDMRB standards and the number of junctions will be reduced from 18 to 3. In addition to this the removal of all direct access from properties will greatly enhance safety for local and through traffic. A number of local businesses expressed concern during the public consultation in relation to possible negative impacts on their business. Some of these concerns have been addressed by facilitating through traffic on local roads with the construction of underpasses. Concerns about loss of business due to bypassing will be considered when detailed designs on accessibility and signing are in progress.

Public Consultation

A public consultation on the preferred route was held on the 8th March 2002 and 9th March 2002 in Collooney and Ballinafad respectively. Approximately 110 people attended the public consultation and the closing date for submissions was 12th April 2002.

In all 65 submissions were received from members of the public. Of these 35 had no objection including the 'N4 Realignment Action Group'. The proposed diversion of local road L-55016 at Lackagh to link up with local road L-55015 received 17 objections from residents and landowners that use L-55016 for access. The remaining 13 submissions are sub-classified in Table 3.7 below.

Reason for objection:	Preferred Route
Direct impact on agricultural holdings	11
Impact due to close proximity to house	3
Impact on business	1
Impact due to closing of road access	2

Table 3.7 Classification of objections to Preferred Route.

The proposed closing of local road L-54041 in Cloongad/Sheerevagh, known locally as the 'bog road' received 2 objections.

The possible implications for access to a licenced premises was the subject of the only objection from the business community.

The three objections on the basis of close proximity to house relate to dwelling houses located approximately 38m, 40m and 62m from the edge of the preferred route carriageway.

Eleven landowners objected to the impact of the preferred route on their holdings. The Agronomy report has categorised two holdings with moderate to severe severance and two with severe severance. From these four landowners one has objected to the preferred route, one has stated that they have no objection to the preferred route and the remaining two have made no submission. It is proposed to commission a detailed study by independent agricultural consultants on all farm holdings affected by the preferred route. The findings of this study will then be used to minimise any impact on the farming community.

Submissions were also received from the following prescribed bodies; An Taisce, Duchas, and The North Western Regional Fisheries Board. Copies of these submissions are included in Appendix 3B.

Budget

The estimated cost of the proposed realignment is £24.7M (€31.36). Costs are based generally on figures set out in the National Roads Needs Study but with differentiation made for poor ground conditions, number of bridges and underpasses and archaeological costs etc..

Cost benefit analysis was carried out using COBA and default data in COBA was used except for discount rate where a figure of 5% was used and traffic growth figures were used as set out in the National Roads Needs Study. As the analysis is based on British figures for such things as fuel costs, vehicle mix, occupancy rates, value of time, accident costs, accident rates and economic growth rates, etc, the results must be viewed accordingly and are therefore intended for comparison purposes only. The preferred route gave an indicative benefit of £13M (€16.51M).

The final estimated cost will be further refined at preliminary design stage as details of the vertical alignment design and junction strategy, etc. are finalised.

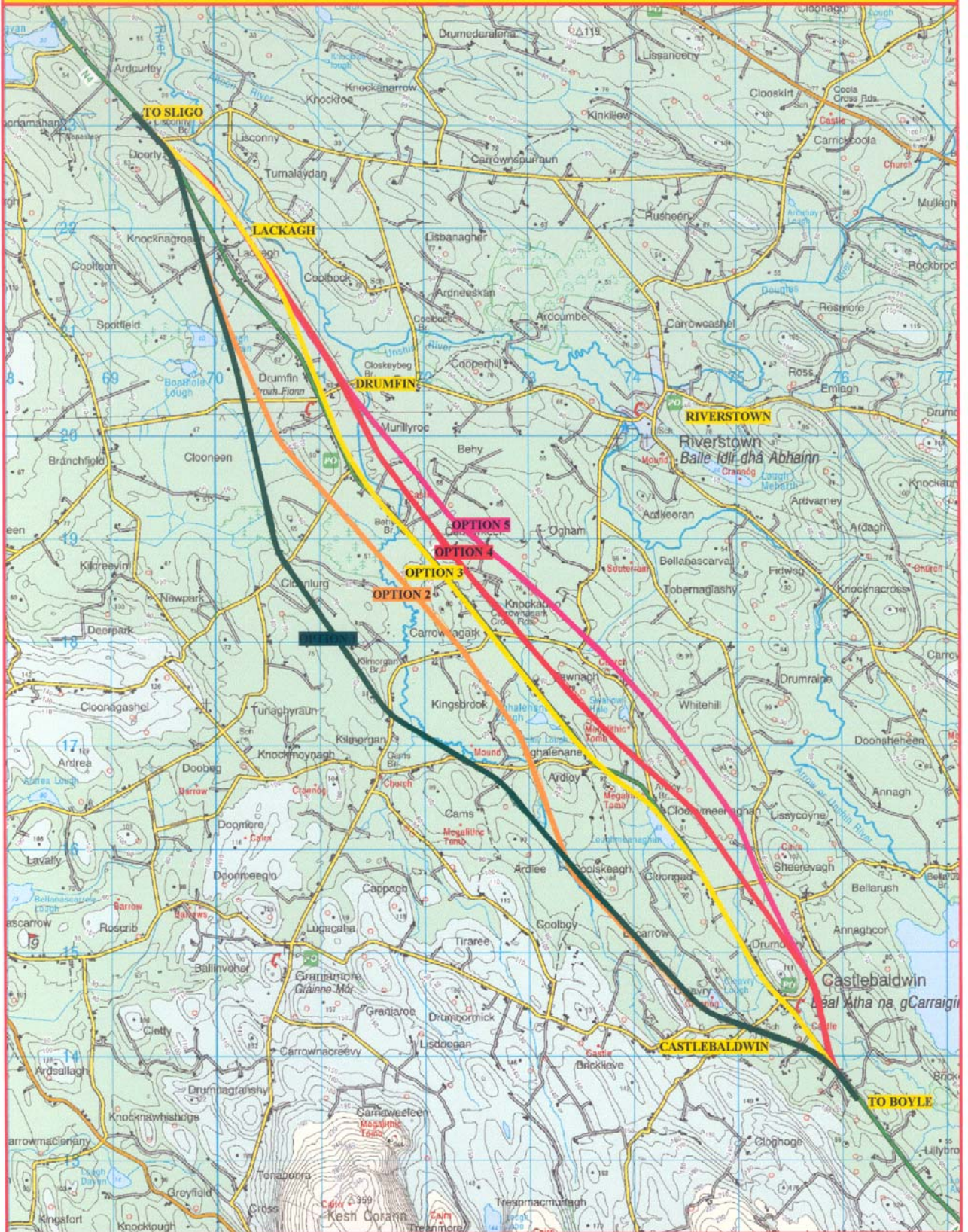
The estimated cost of land/property acquisition is £2.0M (€2.54)

The estimated cost of design, including technical reports etc., is £1.5M(€1.9M)

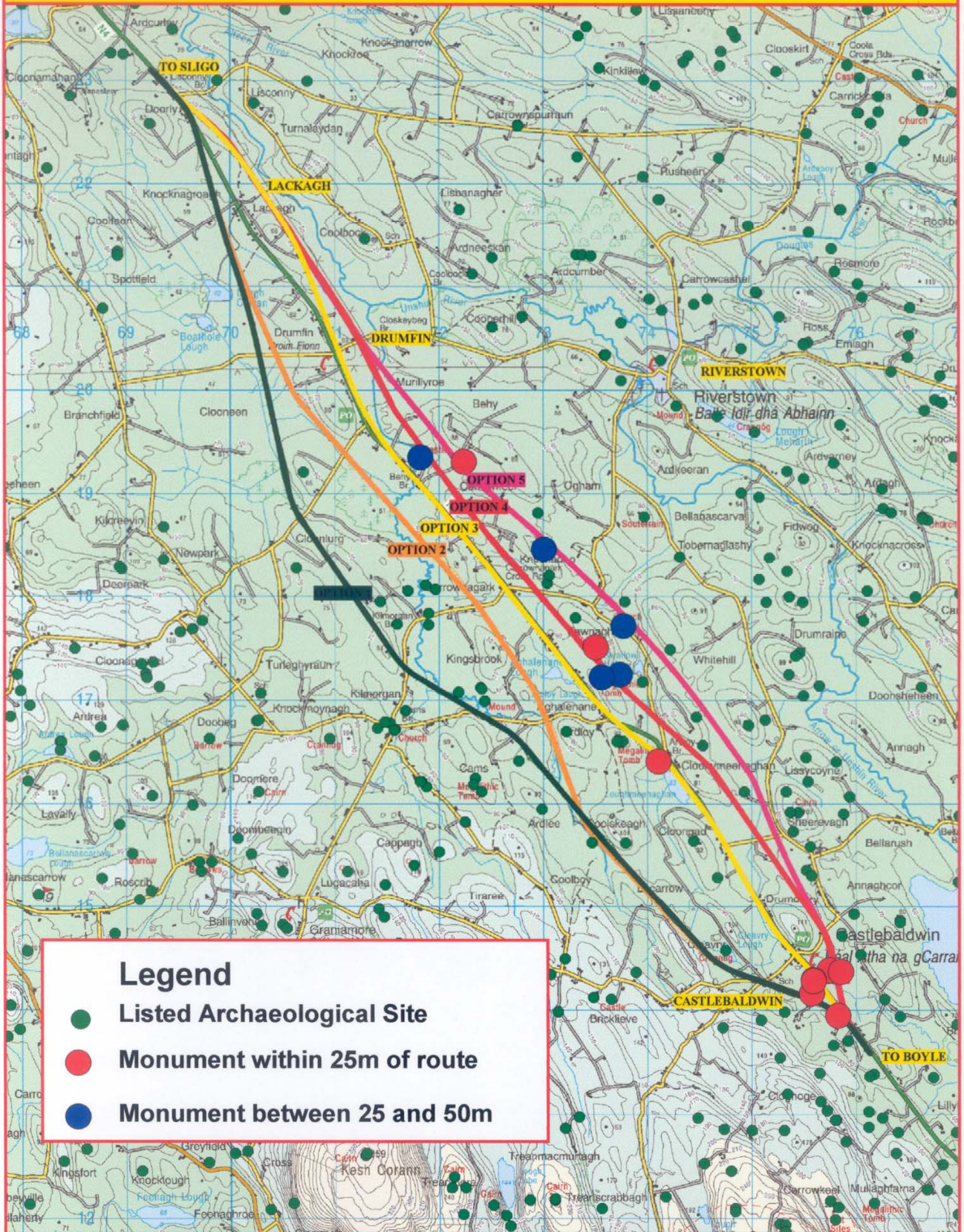
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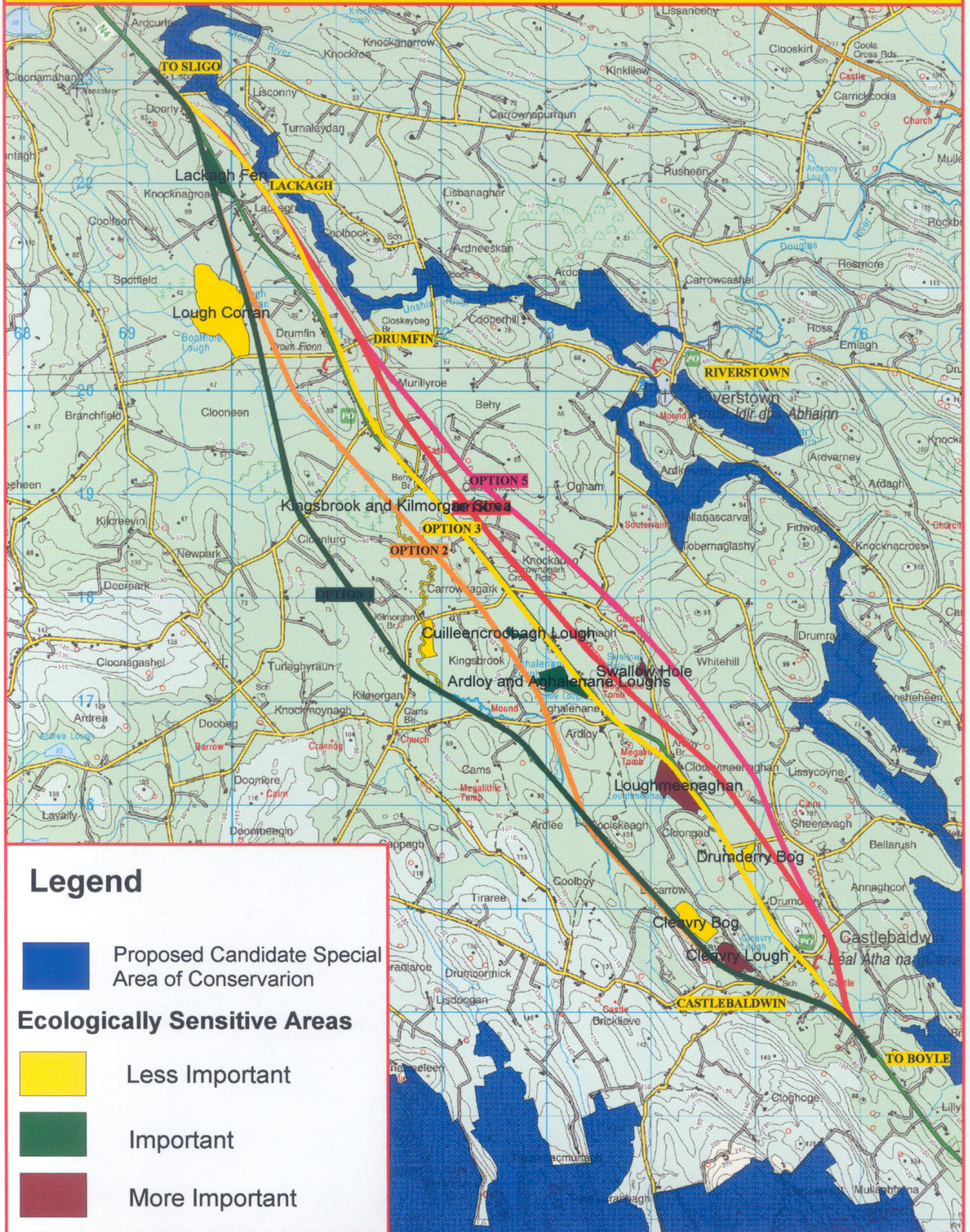
Map 2 - Route Options - Cloonamahon to Castlebaldwin



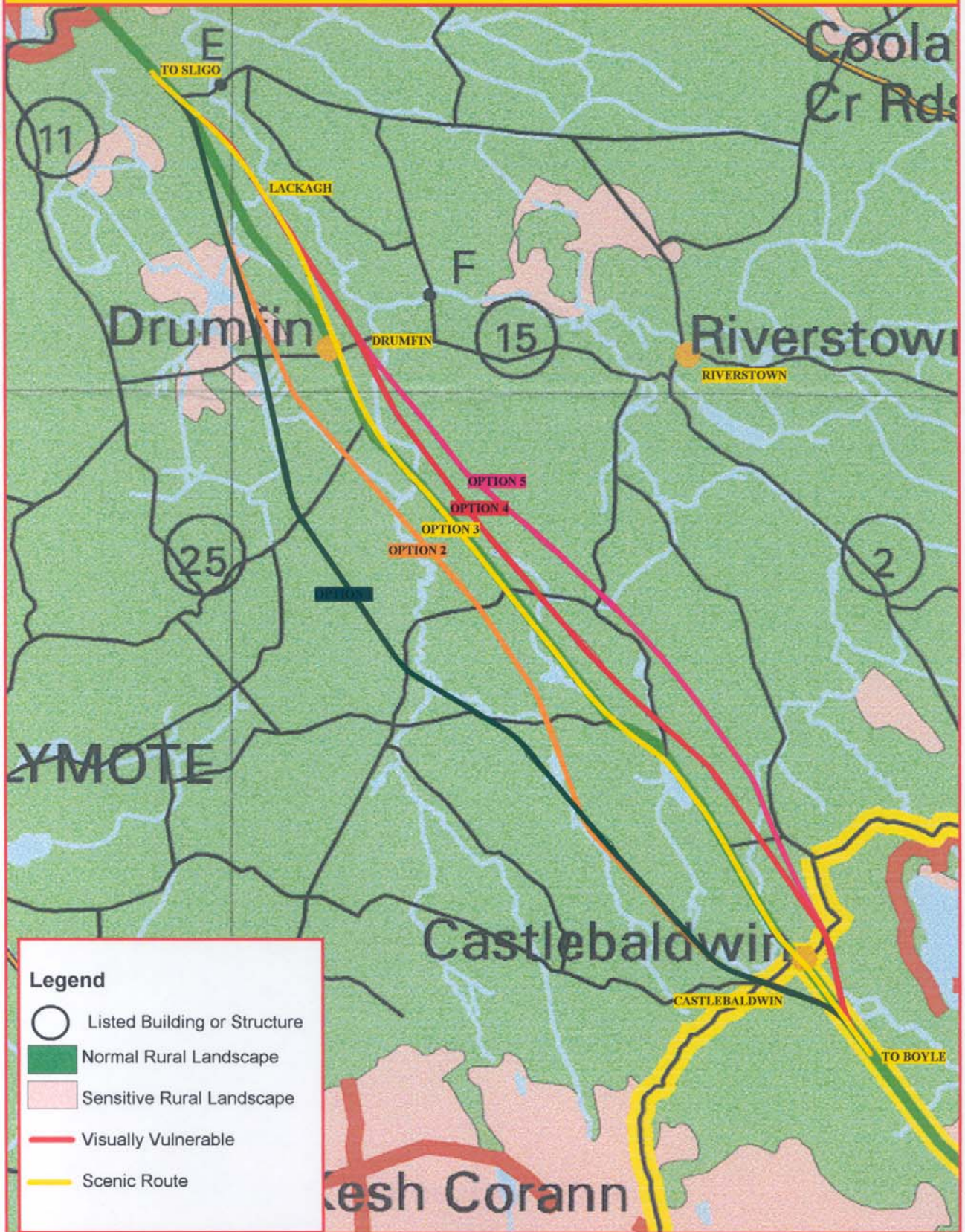
Map 3 - Route Options - Cloonamahon to Castlebaldwin Impact of Route Options on Archaeological Sites



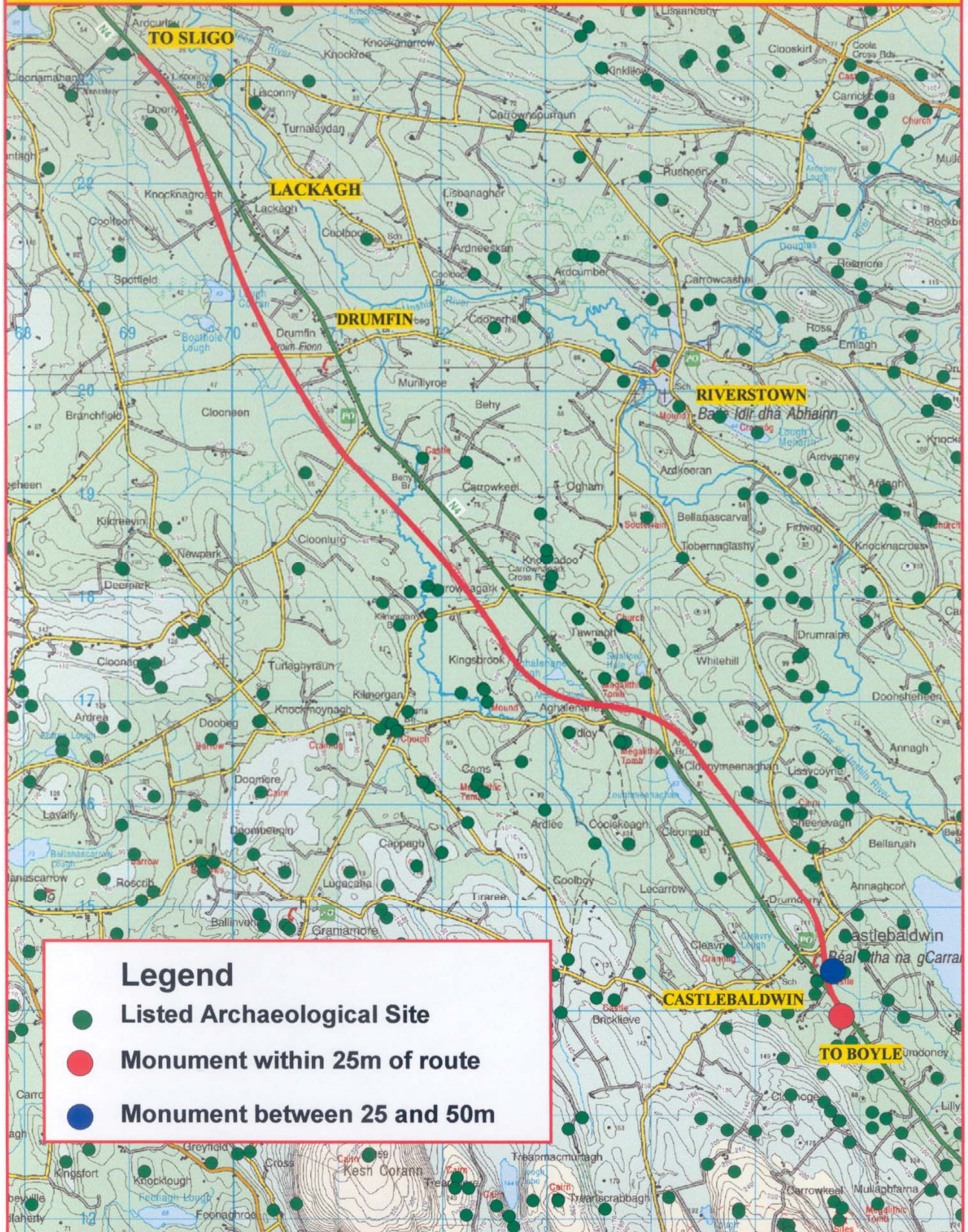
Map 4 - Route Options - Cloonamahon to Castlebaldwin Impact of Route Options on Ecological Sites

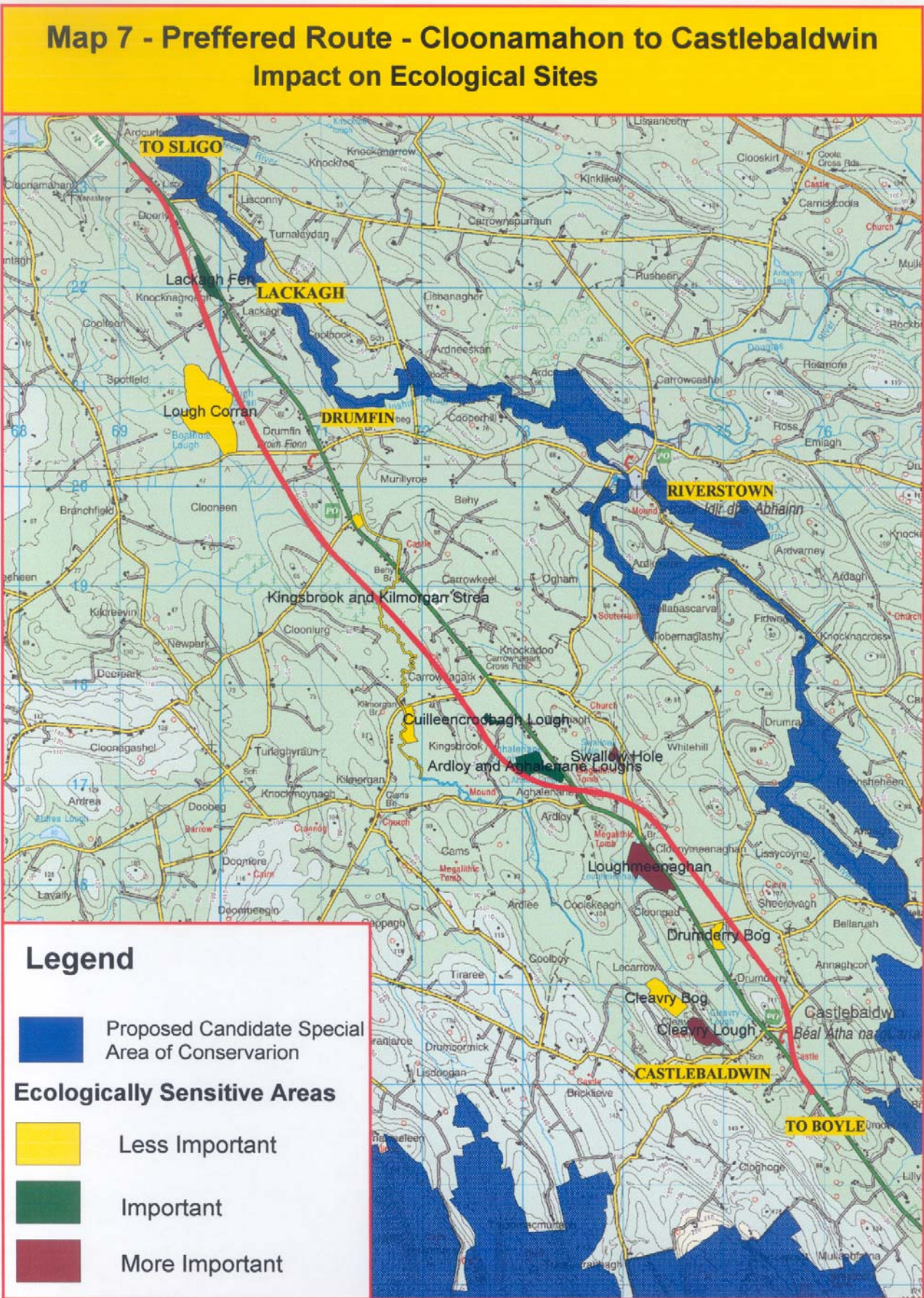


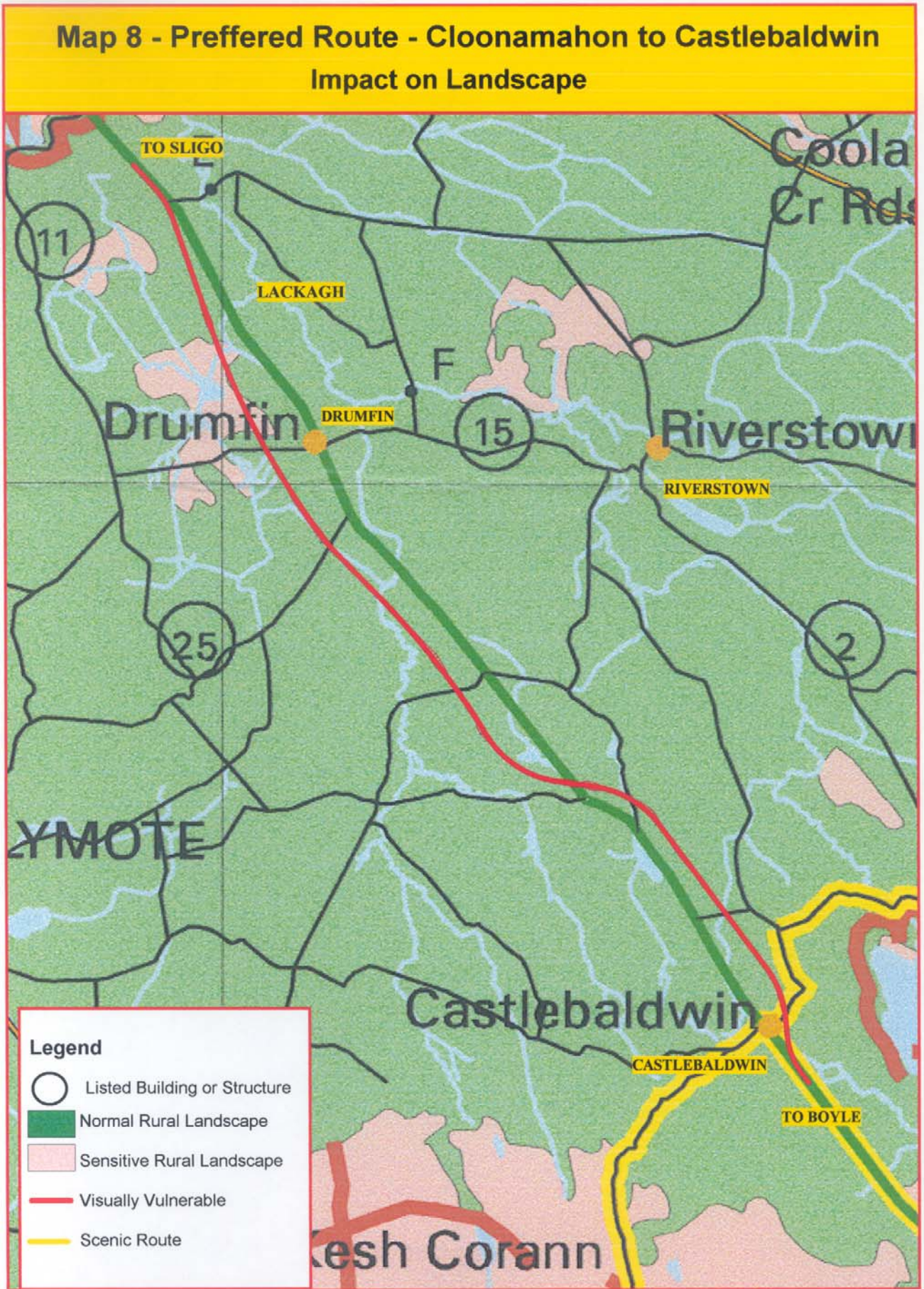
Map 5 - Route Options - Cloonamahon to Castlebaldwin Impact of Route Options on Landscape



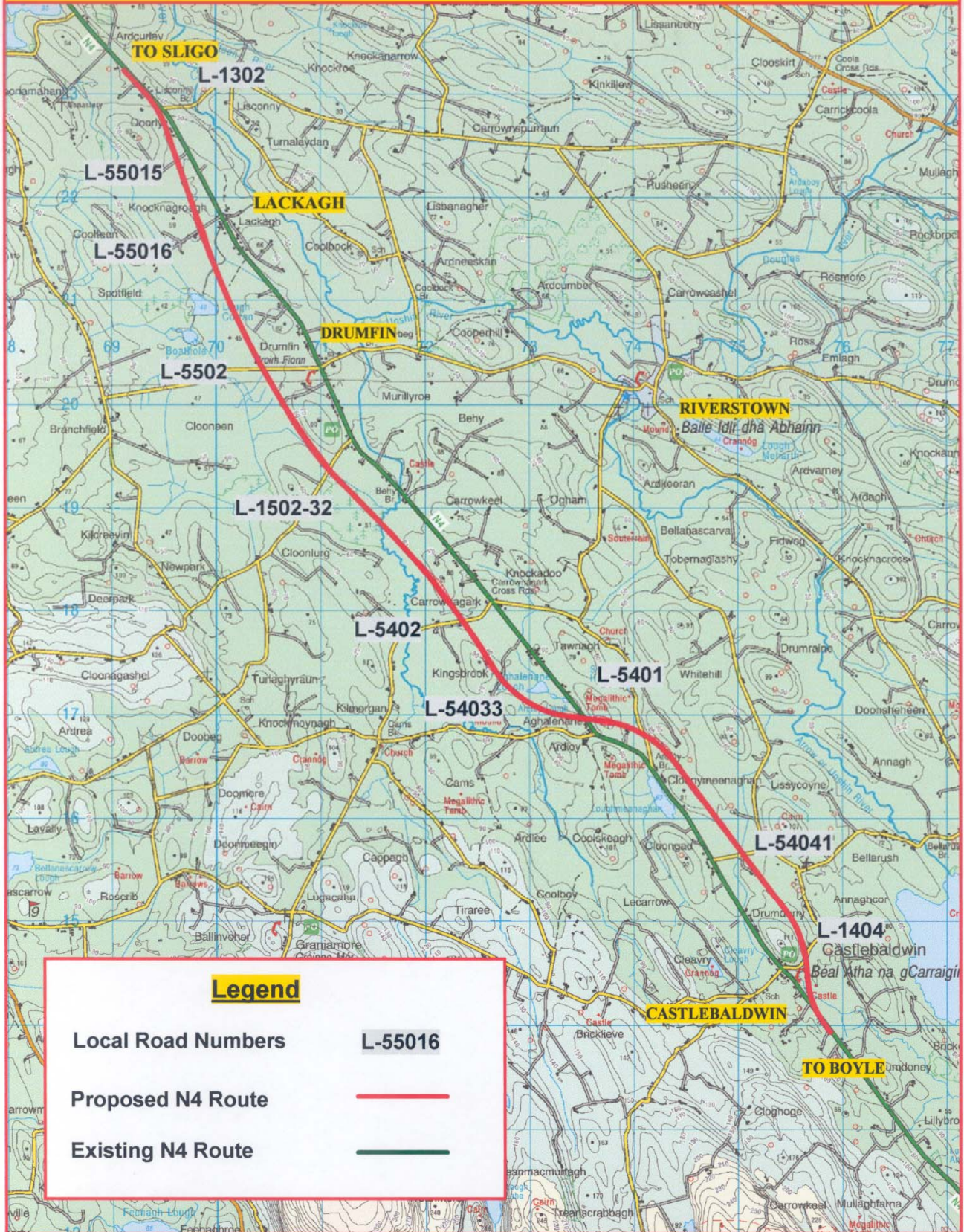
Map 6 - Preferred Route - Cloonamahon to Castlebaldwin Impact on Archaeological Sites







Map 9 - N4 Realignment - Cloonamahon to Castlebaldwin Local Road Numbers



Map 10 - N4 Realignment - Cloonamahon to Castlebaldwin Junction Strategy

