Sligo County Council

Business Case

N4 Collooney to Castlebaldwin






PKS Reference:	*SO/01/150*
Phase	*Preliminary Design*
Issue Date:	*11-02-2013*

Chapter 4
Consideration of Options






4 Consideration of Alternatives

4.1 Constraints

The Constraints Study was carried out during the early stages of the planning of the project (February 2000 – November 2000) with the objective of gathering as much background information relating to the study area as possible. This data collection was focused on determining the constraints including physical, environmental and engineering constraints that exist and could affect the location, design and progress of the scheme.

The report recorded the collection of data to the end of November 2000. Environmental and engineering constraints were researched and recorded. The size of the scheme, approximately 11 kilometres in length, and extent of the initial study area resulted in a staged approach to data collection.

The first Public Consultation (PC1) was undertaken during August 2000 and presented the Constraints Study Area for the proposed project.

4.2 Definition of Alternatives

PAG Unit 4.0: Definition of Alternatives outlines the alternatives that need to be considered when selecting route corridor options.

- Do-Minimum Alternative;
- Traffic Management Alternative; and
- Major Scheme Investment Alternative

4.2.1 Do Minimum Alternative

The Do-Minimum alternative provides the baseline for establishing the economic, integration, safety, environmental and accessibility impacts of alternatives. The PAG indicates that the Do-Minimum alternative should include maintenance of the existing infrastructure and any additional transportation facilities or services that are either committed or planned within the appraisal period.

As part of this assessment no additional transportation facilities or services are included in the Do-Minimum alternative however maintenance costs for the resurfacing of the road have been included in the cost exercise as set out below.

Table 4.1 – Maintenance Cost for Do Minimum

Maintenance Item	Cost
N4 Castlebaldwin Pavement Renewal	€491,086
N4 Carrownagark Pavement Improvement Scheme	€1,002,232
N4 Collooney to Carrownagark Pavement Overlay Scheme	€3,936,796
Installation of Safety Barrier along existing N4 Alignment	€200,000
Total	**€5,630,115**

4.2.2 Traffic Management Alternative

The Traffic Management Alternative represents alternatives that seek to respond to transportation problems by maximising the values of existing infrastructure.

The Traffic Management alternative considered as part of the proposed scheme investigated the potential of an on-line upgrade of the existing N4 route which would be capable of delivering the required levels of service and safety in accordance with the applicable design standards. The analysis of improving each section of the N4 was as follows:

4.2.2.1 Upgrade of Existing N4 - Through Castlebaldwin

Due to the confined and urban nature of the existing N4 through a number of villages and townlands an on-line upgrade of the existing route was not considered feasible or desirable. Widening of the existing road and installation of sufficiently sized junctions to ease traffic flows would require acquisition of houses and businesses on a significant scale. The requirement to maintain the 50kph speed limit through Castlebaldwin would significant impact upon potential journey time savings from the scheme. In addition the alignment geometry is poor in terms of passing sight distance with only 47% of the corridor having a passing sight distance greater than the target 580m. Due to the predicted increases in traffic along the route and the major constraints to local improvement, an on-line widening scheme alternative was not considered viable in terms of delivering the required levels of service.

Figure 4.1 – Castlebaldwin Village on the N4

Figure 4.2 – Castlebaldwin Village on the N4

4.2.2.2 Upgrade of Existing N4 – Castlebaldwin to Collooney

The high level frequency of existing access, junctions and properties fronting onto the existing N4 mean that the constraints to improvement and impacts that would result from seeking to achieve appropriate road design standards along this section of the N4 were considered to make such a proposal impractical. The required number of property acquisitions and direct impacts on many others would be unacceptable.

Figure 4.3 – On road access on N4 North of Drumfin

Figure 4.4 – On road access on N4 in Drumfin

4.2.3 Major Scheme Investment Alternative

A major scheme alternative was developed as an offline Type 2 Dual Carriageway from Collooney to Castlebaldwin. The proposed scheme comprises 11.2km of offline realignment from Doorly to Cloghoge Lower, 2.6km of online overlay improvement from the N4/N17 Toberbride roundabout to Doorly and numerous side road and existing road improvements resulting in a total scheme length of 14.7km along the mainline. In order to provide access/egress from the local roads/dwellings along the online upgrade section a single carriageway parallel access road is proposed to the east of the existing N4 between Toberbride Td. and Doorly Td. The access road connects to the eastern arm of the Toberbride Roundabout and the existing N4 at Doorly Td. Dwellings on the western side of the N4 can access the East parallel road via Doorly north underbridge and a proposed western parallel link road. The scheme also includes a further 9km of local link roads and 5km of farm and attenuation access roads. The scheme also includes an at-grade roundabout junction at Castlebaldwin and a grade separated interchange at the Ballymote Road in Cloonlurg Td.

4.3 Definition of Preferred Scheme

4.3.1 Definition of Options

The Route Selection phase was undertaken by Sligo County Council and commenced on completion of the constraints study. This phase involved the production of a number of route options that had the potential to meet the scheme objectives. Public Consultation (PC2) was held for the Route Options during May/June 2001.

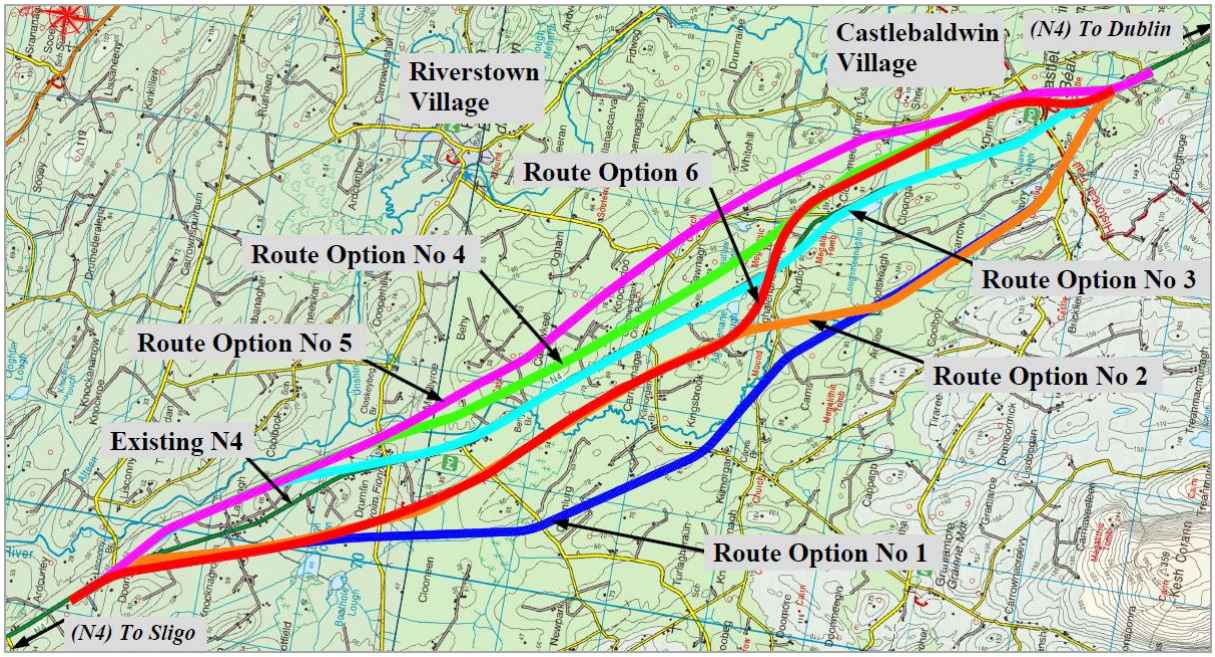

Figure 4.5 – Options considered as part of the Route Selection process

A further Public Consultation (PC3) was held for the Preferred Route in March 2002. The Preferred Route was adopted by the Elected Members of Sligo County Council in July 2002.

4.3.2 Shortlisting of Options

As outlined above the Route Selection stage of the project was undertaken by Sligo County Council. In total, six potential routes were identified along the Collooney to Castlebaldwin Corridor as per Figure 4.5. These included a number of offline routes plus an online upgrade option. Due to the relative similarities and anticipated similarities in terms of traffic volumes the routes were shortlisted by Sligo CC based on their deliverability, costs etc.

The following table is extracted from the Sligo County Council Route Selection Report. The table outlines the findings of the Route Selection and Public Consultation process. For comparison purposes the results 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 4.2 categorises the results for each route option:

Table 4.2 – Overview of the findings from the Route Selection Process

Option	1	2	3	4	5	6
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

Following the Route Selection process Option 6, which is a combination of Options 2 and 4 emerged as the preferred route based on the above criteria and public consultation.

4.3.3 Selection of Preferred Scheme

The preferred alignment, as shown below, emerged from the Route Selection process. Following the identification a detailed assessment of the junction layout and road type was undertaken as set out below.

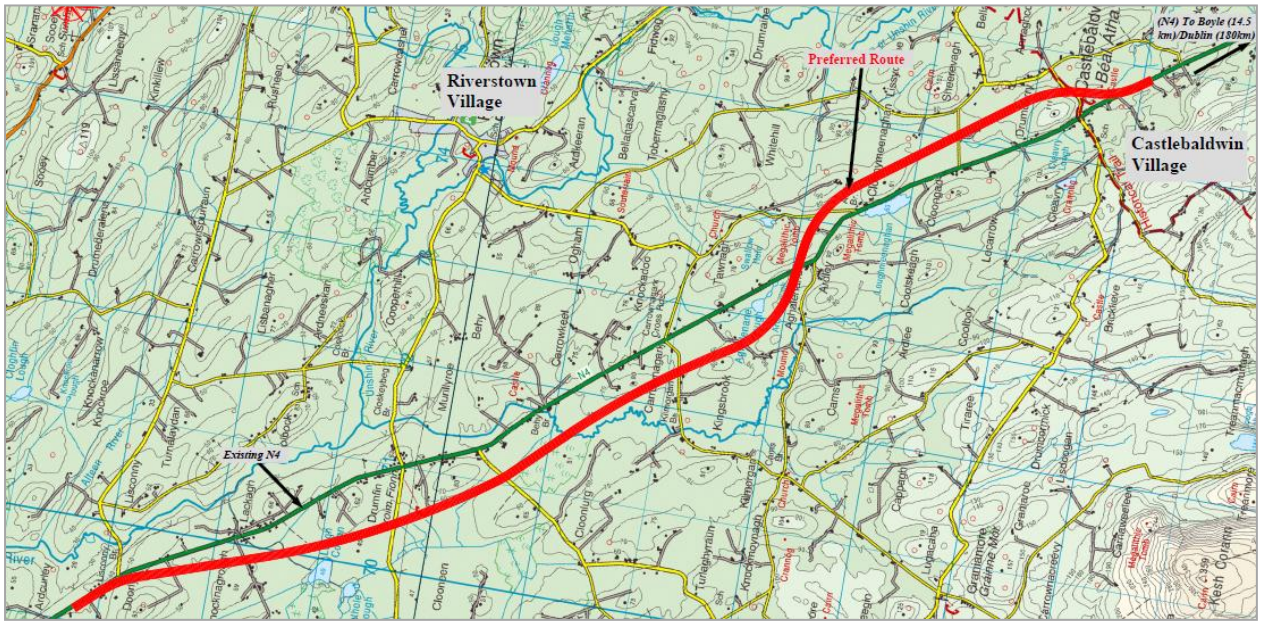

Figure 4.6 – Preferred Route

4.3.4 Incremental Analysis of Road and Junction type

A detailed incremental analysis of the road type along the proposed corridor was undertaken. The impacts of the inclusion of a junction at Ballymote was assessed in addition to the junction type at Ballymote should a junction be included as part of the scheme. The full details are the analysis is presented in the Traffic Modelling Report which is included as Appendix B of this report, the headline findings are presented below;

Ballymote Junction

The analysis found that the inclusion of a junction at Ballymote provided additional benefits to the scheme as outlined below;

- Traffic flows on the proposed N4 mainline increased by between 4 – 6%;
- The inclusion of the junction results in a reduction in overall travel time in the study area;
- Overall benefits derived from safety and economic impacts are envisaged to outweigh additional costs associated with the inclusion of the junction;
- Traffic distance increases slightly as traffic uses longer but faster routes;
- Due to its location on a National Primary a grade separated junction would be more appropriate than a roundabout for safety reasons;

The rationale behind the above findings is included in the Traffic Modelling Report (TMR).

Mainline Road Type

This section of the report sets out the incremental analysis undertaken to assess the most suitable road type for the proposed N4 Collooney to Castlebaldwin scheme in particular the

Castlebaldwin and Doorly section and the Doorly to Toberbride section. This analysis was supported by the traffic models developed as part of this project.

The National Roads Authority (NRA) TD9 states that a Type 3 Single Carriageway road (as per existing N4) will operate at LOS D up to an AADT of 5,000. The NRA Project Appraisal Guidelines (PAG Unit 4: Definition of Alternatives) suggests that the AADT flow outlined in NRA TD9 should only be treated as a guideline and not as a definitive means in the selection of carriageway type. During the course of the planning of the N4 scheme two road types were considered, Type 1 Single Carriageway and Type 2 Dual Carriageway the characteristics of which are outlined in Table 4.3.

Table 4.3 – Road Type Characteristics from NRA TD9

Type of Road	Capacity (AADT) for Level of Service D	Edge Treatment	Access Treatment	Junction Treatment at Minor Road	Junction Treatment at Major Road
Type 1 Single Carriageway (S2) (7.3m)	11,600	2.5m hard shoulders Footways/Cycle Tracks where required	Minimise number of accesses to avoid standing vehicles and concentrate turning movements.	Priority junctions, with ghost islands where necessary.	Ghost islands or roundabouts
Type 2 Dual 4. Divided 2 +2 Lanes (2x7.0m) Carriageways.	20,000	0.5m hard strips	No gaps in the central reserve. Left in / Left out	No gaps in the central reserve. Left in / Left out	At-grade roundabouts and compact grade separation

Doorly to Toberbride Section

The Peer Review process undertaken in early 2013 suggested that the inclusion of the Single Carriageway section on the N4 between Doorly and Toberbride may impact upon the long term connectivity and level of service provided by the N4. This would be particularly evident as the N4 to the south and north of this section is proposed as Dual Carriageway.
The accident rates associated with both carriageway types was formulated by calculating the million vehicle kilometres (mvkm) on the carriageway based on the traffic flow and length of the road as set out in Unit 6.11 of the PAG. The accident rate was then proportioned into fatal, serious and minor rates for both accidents and casualties per accident. These rates were applied to the costs associated with accident and casualties to find the total cost.

Table 4.4 - Accident Rates by Road Type

Road Type	Accident rate PIA/mvkm
Speed Limit	> 60 kph
	PIA/mvkm
2 Lane Single Carriageway	0.111
Dual Carriageway	0.056

**Extracted from Unit 6.11 of NRA's PAG*

Details of the assessment can be found in Appendix A.2 of the Traffic Modelling Report. Some of the key findings are outlined below.

- The Type 2 Dual has significantly lower (50%) accident rates than the Type 1 Single as per Table 4.4;
- With maximum AADT flows in the region of 11,000 on the online retrofit section for the design year of 2032, both the Type 2 Dual and Type 1 Single can cater for forecast traffic flows;
- The analysis suggests that the Dual Carriageway option will result in significant journey time savings when compared to the Single Carriageway option;
- In addition, travel distance and average speed remain reasonably constant for both road types;
- Local traffic which currently has access directly onto the N4 will experience a slight disbenefit as they must utilise the eastern Parallel Link Road to access the N4 at Toberbride;
- A costing exercise was undertaken by Sligo County Council to ascertain the approximate difference in cost for providing a single or dual carriageway. It was found that due to the extensive parallel roads, access roads, underbridges etc required the Dual Carriageway option would be approx €22.2 million ex VAT more expensive than the Single Carriageway option. Based on a Total Budget Cost of €80.67 million for the Single Carriageway option this equates to an increase in costs of approximately 28%.

Overall the analysis shows that the inclusion of a Dual Carriageway in place of a Single Carriageway together with the inclusion of a parallel link road and access closures on the N4, would result in significant accident benefits. In addition, users would experience significant travel time savings as a result of increased capacity and reduced travel times. However it should be noted that the inclusion of Dual Carriageway in place of a Single Carriageway may result in a slight disbenefit to the overall BCR of the scheme due to the significant costs involved however the overall N4 scheme will still return a positive BCR and will ensure future network connectivity and level of service provision is maintained on the N4.

Castlebaldwin to Doorly Section

An incremental assessment of road type was undertaken using the transport models developed as part of the project. The characteristics of the two road type options are shown in Table 4.3 above. Details of the incremental assessment can be found in Appendix A.2 of the Traffic Modelling Report.
Following the assessment it was decided by Sligo County Council to progress with a Type 2 Dual Carriageway. The key findings of the assessment are outlined below;

- The Type 2 Dual has significantly lower (50%) accident rates than the Type 1 Single as per Table 4.4;
- With maximum AADT flows in the region of 11,000 on the online retrofit section for the design year of 2032, both the Type 2 Dual and Type 1 Single can cater for forecast traffic flows;
- The analysis suggests that the Dual Carriageway option will result in daily journey time savings of over 28 hours in 2032 when compared to the Single Carriageway option, equating to a daily journey time saving of approx 3-4%.
- In addition, travel distance and average speed remain reasonably constant for both road types;
- The National Roads Authority (NRA) TD9 gives a guideline that a Type 1 Single Carriageway road will operate at LOS D up to an AADT of 11,600. The demand forecasts suggest that the proposed N4 Collooney to Castlebaldwin corridor will reach an AADT of 11,600 in 2017 north of the new road tie-in point and in 2037 south of the tie-in point.

- A costing exercise was undertaken by Sligo County Council to ascertain the approximate difference in cost for providing a single or dual carriageway. It was found that the Dual Carriageway option for the Castlebaldwin to Doorly section would be approx €2.5 – 3 million ex VAT more expensive. Based on a Total Budget Cost of €80.67 million for the Single Carriageway Option this equates to an increase in costs of approximately 3-4%.