



N4 COLLOONEY TO CASTLEBALDWIN PROPOSED ROAD DEVELOPMENT

BRIEF OF EVIDENCE

SLIGO COUNTY COUNCIL

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Sligo County Council,
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1 INTRODUCTION

1.1 General

I Bernard Scott will be presenting the engineering brief which has been prepared by myself in conjunction with my colleague Fergus Meehan. We are both Chartered Engineers and our responsibilities in terms of the evidence provided is described in Section 1.3 of this brief.

I am responsible for the project management of the *Proposed Road Development*. I am a member of Engineers Ireland. I graduated from IT Sligo in 2000 with a Bachelor of Engineering in Civil Engineering and a Diploma in Water Engineering. I have over 14 years experience in the project management, design and construction of national and regional road projects in counties Sligo, Louth and Leitrim. I have been involved with the planning of a number of national road developments through various stages of the NRA Project Management Guidelines over the past 8 years. I have also carried out the role of Project Liaison Officer on a number of national road projects over this period.

My colleague Fergus Meehan is responsible for the development and management of the Environmental Impact Statement, including specific reports contained therein, and is also responsible for aspects of the proposed design. Fergus graduated from IT Sligo in 2001 with a Bachelor of Engineering in Civil Engineering and a Diploma in Water Engineering, he also holds a Post Graduate Diploma in Environmental Engineering from Trinity College Dublin which was awarded in 2009. Fergus has over 13 years experience in the project management, design and construction of national road projects principally in counties Mayo, Roscommon and Sligo. He has also over the last 6 years been responsible for the design and environmental management of the major national road projects being proposed by the in-house design team of Sligo County Council to the National Roads Authority.

1.2 Project Team

The proposal being put forward is the result of a Design, Environmental Impact Statement (EIS) and Compulsory Purchase Order (CPO) developed and managed by a project team from within Sligo County Council. This team relied upon advice from external sub-consultants principally in relation to topics such as Geotechnical, Flooding and Drainage.

In addition to the members described in section 1.1; others who form part of the design team and whom are available to provide back up support during cross examination include:

| Name | Qualifications |
|---|-------------------------------|
| - Donagh Henry (CPO and Drainage Design): | BEng, Dip Water, MIEI. |
| - Conor O Donnell (Geotechnical): | BA, BAI, MS, C.Eng. MIEI. |
| - Tony Cawley (Flooding and drainage): | B.E., M.Eng. Sc, C.Eng. MIEI. |

1.3 Aspects of the Brief – Slide 1

This Brief of Evidence is broken into three parts:

Part 1: Need for and General Overview of the proposal;

Part 2: Environmental Considerations, Project Controls and other EIS related information;

Part 3: Submissions and Conclusions.

During cross examination I will in general deal with questions on items relating to Part 1 while Fergus will deal with questions on items contained in Part 2. We may consult from time to time on various questions, or, in specialised circumstances require consultation with those design team members described in section 1.2 of this brief.

1.4 Supplemental Evidence

This evidence will also be supplemented by input from Shane Dunny, a traffic consultant with AECOM.

PART 1

2 NEED FOR THE *PROPOSED ROAD DEVELOPMENT*

2.1 Background – Slide 2

The N4 National Primary Route is part of the East/West road corridor linking Ireland's largest transportation node (Dublin) with the largest transportation node in the North-West (Sligo). It measures circa 34.8km in County Sligo of which circa 11.6km between Sligo Town and Collooney is Type 1 Dual Carriageway with circa 8.8km south of Castlebaldwin having already been realigned to Standard Single Carriageway standard as part of the development of the N4 Curlews Bypass.

2.2 The Existing Road Network

The stretch of road proposed to be replaced herein constitutes one of the few sections of the N4 between Dublin and Sligo which is not of a standard commensurate with the National Roads Authority Design Manual for Roads and Bridges (NRA DMRB); furthermore, with the exception of its northern limits, this particular section has not received any significant improvements (with the exception of localised minor improvements) since its change of designation from a Trunk Road to a National Primary Route in 1977 and has very restricted opportunities for safe overtaking. Consideration of the existing road conditions and expected traffic growth reveal that the existing N4 has a poor safety record, provides a poor level of service and will in the no-scheme world experience increasing traffic congestion in the future with all of these problems exacerbated by the significant sections of poor alignment, reduced cross section, frequent junctions with local roads and numerous properties with road frontage. The roadway is particularly dangerous at night and during poor weather conditions given its unforgiving characteristics.

A combination of the above has resulted in the subject section of road being identified in the European Road Assessment Programme (EuroRAP) publication as having a 'Medium' risk rating.

2.2.1 Accident Statistics – Slide 3

Turning to Safety, over the period 1996 to 2011 the recorded casualties on the section of the N4 under consideration are as follows:

- 8 fatalities;
- 8 serious injuries;
- and 56 minor injuries.

There have also been a large number of material damage collisions during this period which were reported to An Garda Síochána but are not collated by the Road Safety Authority. Sligo County Council has collated this information from 2008 to 2011 to give an indication of the numbers of material damage collisions which occur along the route. From this review the average recorded equates to 34 per year. Taking the national average under reporting factors into account this figure would increase to 102 collisions per year which equates to approximately a collision every 3.5 days.

Such is the severity of the rate of collisions on the route in combination with the weekly unreported accidents and near misses that a local action group was set up in 2009 to campaign for the upgrade of this section of the N4. To demonstrate the extent of fatal casualties that have occurred along the existing route, this group have erected white crosses along roadside verges indicating 30 fatalities which have occurred at different locations along the section of the route in question over approximately forty years.

The assessment of collisions along this section of the N4 highlighted that the majority of accidents are attributed to head on collisions, single vehicle or rear end collisions involving trees or ditches. These type of collisions reflect the poor alignment and gradients along this roadway. It is an objective of the development to reduce the frequency of collisions on the N4. The ongoing collisions are as a result of the lack of safe overtaking opportunities, which lead to driver frustration and inappropriate risk taking, right turn conflicts at the numerous local road junctions and accesses as well as the poor visibility and alignment of the existing N4.

2.3 Objectives of the *Proposed Road Development*

The primary objective of the *Proposed Road Development* is to provide a high quality, all purpose road, for the transport of people and goods in safety and comfort, in accordance with national, regional and local objectives.

The project objectives include the following: -

- To improve road safety for all road users and to reduce the frequency and severity of collisions on the N4.
- To address the deficiencies in the existing road network (local and national);
- To alleviate traffic congestion and eliminate a traffic bottleneck on the National road network in order to reduce journey times and improve journey time reliability both of which will generate positive economic benefits to businesses and consumers;
- To achieve relevant objectives set out in National, Regional and Local Planning policies;
- To improve access and connectivity to peripheral areas thereby assisting in reducing the sense of rural isolation and promoting social inclusion; and
- To cater for existing and future traffic volumes.
- The high level of braking and accelerating due to the gradient and alignment along this section of the N4 has an environmental impact on air quality and noise. This section of the N4 carries significant traffic volumes and has extensive residential frontage resulting in significant noise, air and visual impacts. In addition, the narrow cross section on some sections of the N4 severely restricts pedestrian and cycle movements resulting in severance for this class of user. An objective of the scheme is to reduce these impacts particularly in Castlebaldwin, Drumfin, Lackagh and other built up locations.
- The development will improve road based public transport at both a local, regional and national level, by improving safety along this section of the corridor. It is an objective of the *Proposed Road Development* to generally improve quality of life and improve accessibility to work, education and other activities. Bus Eireann operate daily services between Sligo and Dublin which utilise this section of deficient roadway. Local bus operators who provide services to and from Sligo also utilise this section of roadway. The *Proposed Road Development* would have a positive benefit to these services in terms of time and fuel savings as well as improved safety. Local bus operators also provide school run services along this section of road. This is extremely dangerous as children are forced to walk on the very narrow verges to and from their collection points. These collection points are invariably located at junctions and river bridges to allow the bus to pull in slightly off the mainline carriageway.
- To improve facilities for Non-Motorised Users such as pedestrians and cyclists.

Users of the current N4 route making short local trips will find it safer to access and exit the road network as a result of the substantial decrease in traffic volumes and the lower speed limit on what will be the re-designated local road. The provision of a Compact Grade Separated Junction (CGSJ), a roundabout and the removal of numerous private and minor access points means that dangerous at-grade crossing manoeuvres will be eliminated.

2.4 Deficiencies of the Existing Road Network – Slide 4 to 16

The main deficiencies of the existing road network are described under the following headings: -

2.4.1 Alignment

The section from the N4/N17 Toberbride Roundabout to Doorly Townland (Td), which is circa 2.62km in length and which shall be referred to as the Online Section for the purposes of this brief, was designed and constructed in the 80's and meets some of the current design criteria required for a 100kph design speed.

The horizontal and vertical alignment of the existing N4 from Doorly Td. to Cloghoge Lower Td., section which is circa 11.7km in length, and which will be referred to as the Offline Section, provides a stopping and passing sight distance that is completely inadequate over much of the route for the permitted maximum speed limit which is 100kph.

2.4.1.1 Horizontal Alignment

There are two horizontal curves along the existing online section that have radii which are not recommended to be used for single carriageway design, with a design speed of 100kph as they lead to long dubious overtaking sections.

To give an indication of the deficiency of the existing route between *Doorly Td.* and *Cloghoge Lower Td.*, it has been recorded in terms of horizontal geometry that some 15 of the 27 curves along this section are within a range which would be considered significantly substandard.

2.4.1.2 Vertical Alignment

Similarly, in terms of vertical alignment between *Doorly Td.* and *Cloghoge Lower Td.*, 27 of the 79 curves along the route are within a range which would be considered to be significantly substandard.

2.4.1.3 Overtaking Opportunities and Stopping Sight Distance

The online section from the N4/N17 Toberbride Junction to *Doorly Td.* has been assessed in terms of Overtaking Value as having 0% in the southerly direction and 16.6% in a northerly direction.

The existing road from the N4/N17 Toberbride Roundabout to the south side of the *Proposed Road Development* in *Cloghoge Lower Td.* has been assessed in terms of Overtaking Value and Stopping Sight Distance; the results of which are outlined below:-

- Only 10.9% of route has adequate Overtaking Value.
- 28.3% of route has substandard stopping sight distance.

The lack of overtaking opportunities and stopping sight distance in combination with frequent junctions and accesses, many of which have restricted visibility is an unacceptable situation with regard to road safety.

The limited lengths of hard shoulder and verges coupled with agricultural activities which regularly occur further limit the opportunities for vehicles to overtake as slower moving agricultural vehicles cannot move into a hard shoulder or verge to allow other vehicles to pass, resulting in long tailbacks particularly during spring and summer months. Similarly, vehicles that break down cause delays as there are limited opportunities to pass a stationary vehicle.

2.4.2 Cross Section

The existing N4 carriageway between the N4/N17 Toberbride Roundabout and Doorly Td. which is circa 2.62km in length is similar in width to a Type 1 Single (S2) Carriageway with widths of approx. 7.3m and hardshoulder width of approx. 2.5m. However, the hardshoulder width reduces in some cases to allow for a right turn lane and land restrictions. The verge width varies from 0.5m to 4m.

The section from Doorly Td. to Cloghoge Lower Td., which is circa 11.7km in length, is extremely sub-standard. It brings 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. Much of this section compares in width to a Type 3 Single Carriageway (S2). There are continuous centreline road markings over much of its length which leads to very restricted opportunities for safe overtaking. The existing N4 passes through the village of Castlebaldwin which has a speed limit of 50kph.

When collisions occur along the existing N4, it is necessary for the Emergency Services to divert all traffic onto the surrounding local road network taking long diversion routes for prolonged periods of time. This local network is not fit for this purpose and as a result collisions often occur along the diversion route causing further delays. In the unfortunate situation of a fatal collision the existing N4 must be closed for Garda analysis for a day or more in some instances.

2.4.3 Junctions and Traffic Capacity

2.4.3.1 Junctions

From the N4/N17 Toberbride roundabout to the south tie-in location at Cloghoge Lower Td. there are individual accesses and junctions to the following:

- 24 junctions: 8 of which are located on the online section and one of which is a cross road junction.
- 78 houses: 8 of which are located on the online section.
- 152 field accesses: 22 of which are located on the online section.

This is equivalent to 18 junctions and accesses per kilometre.

Included in the 24 junctions are 4 crossroad junctions which are located in the townlands of *Mullaghna Breena*, *Drumfin*, *Carrownagark* and *Cleavry* in Castlebaldwin Village. The vast majority of the junctions along the route are substandard in terms of geometry and sightline visibility.

Furthermore, all of these junctions except for two are simple junctions with no provision for right turning vehicles to stop without obstructing the flow on the National Primary Road adding to the delays and poor safety record along this section of the N4.

As outlined above, there are a large number of field entrances with direct access onto the existing N4. From a safety perspective, field accesses are especially problematic as they encourage slow moving and frequently heavy agricultural traffic onto the high-speed national primary network.

2.4.3.2 Traffic Capacity

This section of the N4 carries both long distance traffic from the east of the country to Sligo and significant regional inter-urban traffic flows. The capacity of the existing infrastructure is not sufficient to meet these demands resulting in significant traffic congestion, particularly at peak hours.

The increasing volumes of inter-urban traffic on this strategic east-west route corridor will lead to a greater risk of road collisions and a significant loss of amenity to the local residential population. The rural sections of the existing route are deficient in traffic capacity due to the proliferation of vehicular entrances and inadequacies in cross section and alignment. The risk of collisions will increase as vehicles seeking to access the N4 from side roads will find fewer opportunities to do so and may through frustration take unnecessary risks.

The volume and composition of the traffic using the N4 coupled with the seriously deficient cross-section along the rural section of the road poses a safety risk to all road users, particularly vulnerable road users. Those with direct access onto the route and those taking access from the local road network in nearly all cases have deficient sight visibility. In addition, the increase in traffic will give rise to an increase in noise nuisance and community severance.

During the development of the traffic model prepared by Aecom, traffic flows have been identified along the route of the existing N4 and associated routes that connect to the N4. The traffic volumes were identified for the Base Year (2008), being the date of calibration of the model against existing flows, a potential Opening Year (2017), the earliest date that the proposed road improvement could be delivered, and what is referred to as the Design Year (2032), 15 years after the opening of any such road improvement.

Initially the existing and predicted traffic flows along the N4 and associated routes were assessed for each of these years for a situation where no new road development was proposed (Do-Minimum Scenario). Traffic levels vary from day to day and at different times of year, depending on school terms, tourist activity, etcetera. For road planning purposes traffic surveys are averaged over the year and quoted as the average total number of vehicles over the 24 hour period. Based on the figures from the traffic model for the development, the traffic flow figures in Annual Average Daily Traffic (AADT) for the existing N4 at various locations are outlined in Table 3-12 as shown on **Slide 17**. The capacity of the existing network is assessed based on the Base Year

2008 flows and assuming provision of a minimum Level of Service D (LOS D). LOS is a technical concept which attempts to describe the travel experience in terms of operating speed, the ability to overtake traffic safely, traffic congestion, overall safety as well as driver and passenger comfort. LOS D is deemed to be the level of service at which passing becomes extremely difficult, with 'shock waves' beginning to affect the overall flow.

The existing road is equated in width to design cross sections available for road design in order to assess the capacity along the road. As can be seen, the section from the N4/N17 Toberbride Roundabout to *Doorly Td.* has reached 90% capacity, with the section from *Doorly Td.* to Castlebaldwin Village exceeding capacity by 92%. Section 3 has reached 66% of capacity.

In the National Road Needs Study, the NRA's objective for road planning purposes was to achieve a minimum LOS of D, equivalent to an 80kph inter-urban journey speed on the network, which is defined as the point at which the ratio of traffic flow to capacity is starting to result in difficult overtaking, with 75% of journeys being delayed by slower vehicles, resulting in platoons of five to ten vehicles forming. The average end to end journey speed that results from these conditions is 80kph.

Traffic count surveys show traffic volumes on the existing N4 in the base year 2008 of 10,400 AADT at *Toberbride Td.* and 7,600 AADT at *Castlebaldwin Td.* The traffic model predicts that these figures will increase to 13,000 and 9,500 AADT respectively in a design year of 2032 in a Do-Minimum Medium Growth Scenario.

Table 3-13 as shown on **Slide 18** illustrates the predicted 2032 traffic flow figures based on a Do-Minimum Medium Growth scenario for the existing N4 at the same locations as in Table 3-12. The capacity of the existing network is assessed based on these flows assuming a minimum Level of Service D. As can be seen from this assessment, the only section which will have spare capacity is south of Castlebaldwin Village. The capacity on the majority of the existing network is exceeded and in the case of the section from *Doorly Td.* to Castlebaldwin village, the predicted traffic levels are over double the estimated capacity which the existing infrastructure can accommodate based on a minimum Level of Service D.

2.4.4 Pedestrians and Cycle Facilities

There are no existing provisions for pedestrians or cyclists along the route and indeed given the very narrow and poor alignment, cyclists and pedestrians cannot use this section of roadway safely. This section of road is also used for school runs and a number of children are collected and dropped off at various locations along the route. This requires the bus to stop on the carriageway thereby creating tailbacks and also dangerous overtaking manoeuvres. Children are collected and dropped off on the narrow grass verges and are forced to use this to get to their respective houses.

2.5 Strategic Fit and Priority within National Roads Programme

This section assesses the impacts on national, regional and local planning policies for the realignment. It includes a review of the NRA National Roads Needs Study, National Spatial Strategy for Ireland 2002-2020: People, Places and Potential, the Regional Planning Guidelines for the Border Region (2010-2022), Smarter Travel (A Sustainable Transport Future. 2009-2020), Infrastructure Investment Priorities 2010-2016, the Sligo County Development Plan (2012-2017), the recently published TEN-T Trans European Transport Network and the National Development Plan 2007-2013.

2.5.1 The National Road Needs Study, 1998

The original basis for the current proposal was highlighted in a report produced by the NRA, entitled *The National Road Needs Study* (NRNS) in 1998. This study assessed the adequacy and performance of the national road network on the basis of the ability of existing roads to deliver a quality level of service consistent with the efficient movement of traffic. The study represented a comprehensive assessment of the network against the average inter-urban speed of at least 80kph, which is categorised within the report as a Level of Service (LOS) D objective. As previously outlined, the LOS is a technical concept which attempts to describe the travel experience in terms of operating speed, the ability to overtake traffic safely, traffic congestion, overall safety as well as driver and passenger comfort.

The N4 realignment from Collooney to Ballinafad was identified at that time as having 'Phase 2' needs. This meant that the existing road was considered to be no longer able to provide the minimum level of service D, equivalent to an inter-urban travel speed of 80kph. By realigning the road, the level of service would be improved; therefore it was scheduled at that time for improvement during the years 2005-2009. The study recommended a standard 2 lane road for this section. (Carriageway lanes of 3.65m, two hard shoulders of width 2.5m and grass verge of width 3m.)

It is worth noting, at the time of this study Annual Average Daily Traffic (AADT) along this section of road ranged between 3,000 and 4,000. The study projected that traffic levels along this section would increase to between 7,000 and 9,000 by 2019. As can be seen from the traffic modelling report prepared by Aecom, base year 2008 AADT along the existing route ranged from 7,600 to 10,400 and therefore already exceed the projected 2019 figures outlined in the National Roads Need Study.

2.6 Road Development Policy

2.6.1 National Spatial Strategy for Ireland 2002-2020: People, Places and Potential

Although currently under review, the National Spatial Strategy (NSS), published in November 2002, is a 20 year broad planning framework for the entire country, identifying development patterns for different areas, and setting indicative policies for the location of different types of development in the future.

The NSS has identified transportation and roads as key elements within the infrastructure of the country. The NSS recognises that highly developed infrastructures are features of strong economic performance and balanced regional development. The NSS supports the implementation of the road investment programme outlined within the NDP by recognising that it is a key element in improving regional accessibility and regional development.

On Map 10 as shown on **Slide 19**, the N4 is identified as a National Transport Corridor, providing road access between the gateways of Sligo and Dublin, and to hubs and other areas in the vicinity of the Border.

The proposed development supports the NSS in terms of improved connectivity between key economic centres in terms of the road network.

2.6.2 Regional Planning Guidelines for the Border Region, 2010-2022

The new Regional Planning Guidelines are prescriptive in setting out a planning framework for the proper planning and development of the Region and ensuring that we provide sustainable communities for our citizens in the coming years. The Guidelines provide a long term planning framework for the Region and are closely aligned with the National Spatial Strategy and National Development Plan in Ireland and the Regional Development Strategy in Northern Ireland.

There have been significant improvements in terms of road access in the Border Region over recent years, for example, completion of the M1 (Dublin to Border) and M3, sections of the N2 and N4/M4. Further development of the key transport corridors traversing the Border Region, and linking the Gateways and main development centres north of the border, still remain to be completed.

The N4 Colloney to Castlebaldwin Realignment is listed as one of the major schemes in planning which will have a significant influence on the Border Region over the coming years.

2.6.3 Smarter Travel, a Sustainable Transport Future (2009-2020)

Smarter Travel, a Sustainable Transport Future (2009-2020) is a new transport policy for Ireland introduced by the Government in 2009 to:

- Enhance our communities;
- Improve our environment;
- Make our economy more efficient and competitive, and;
- Significantly add to the equality of life for all our citizens.

The policy document sets out 49 actions identified to achieve these objectives. Development of the N4 Collooney to Castlebaldwin realignment supports a number of those objectives and actions, insofar as:

- The development will ease congestion and pressures on the existing N4 and local road network. This will provide a safe environment and thus allow for the promotion of local commuting by walking and cycling;

The reduction in traffic volumes predicted for the existing N4, due to the transference of most traffic to the new alignment, will lead to emission reductions and an improvement of air quality for people living alongside the existing road and in particular to those people living in Castlebaldwin, while also rendering the existing roadway more attractive for use by cyclists including in particular by the incorporation of a stretch of cycleway as discussed in more detail below.

2.6.4 Infrastructure Investment Priorities 2010-2016

The Government published its [Infrastructure Investment Priorities 2010-2016](#) on July 26, 2010. This document outlines the financial framework for capital investment in the period 2010-2016. In relation to the Atlantic Corridor the document states:

“Ireland’s transport network has been transformed in recent years and investment between now and 2016 will build on these achievements. In total some €12 billion will be invested in building a sustainable and economically valuable transport system – the largest single area of investment. Continued investment in the remaining road networks will include completion of the major inter-urban routes, progression of the Atlantic Corridor, the N11, the cross-border route linking Dublin to Derry and Donegal and other strategic routes.”

Given that the N4 from Sligo to Dublin is identified as a strategic radial corridor in the National Spatial Strategy, the improvement of the section in question complies with this policy document.

2.6.5 Sligo County Development Plan 2011-2017

The Sligo County Development Plan 2011-2017 sets out an overall strategy for the proper planning and sustainable development of County Sligo. It is a stated objective of Sligo County Council to bring National Roads up to appropriate standards, as resources become available, in order to develop a safe and comprehensive road system for the county. The N4 Collooney to Castlebaldwin Realignment is listed in Table 8.B of the Sligo County Development Plan which lists strategic road proposals for the National Roads network in County Sligo.

2.6.6 TEN-T Trans European Transport Network

The TEN-T Trans European Transport Network which was the subject of Regulation (EU) No. 1315/2013, provides for the TEN-T Trans European Network and requires the development of a core network by 2030 with a connecting comprehensive network of express routes incrementally by 2050. The comprehensive network includes a requirement for Ireland to upgrade the full length of the N4, including the section proposed to be replaced herein to express route standard.

2.6.7 National Development Plan 2007-2013

The National Development Plan (NDP) 2007-2013 although now defunct re-affirmed that there would be major improvements on national primary routes. Chapter 3 on Regional Development identifies the need for a major programme of investment under the plan in infrastructure with a particular focus on addressing deficits in the various National Spatial Gateway areas. In relation to the Sligo Gateway and specifically to the N4 it states:

Sligo is a Gateway in the Border Region which occupies a point between the West of the country and the Northwest. With a population of over 20,000 people in 2002, it is by far the largest centre in the area. The population of Sligo County grew by 4.6% to 60,863 persons between 2002 and 2006. Sligo’s strengths include a scenic setting and hinterland, recent completion of the inner relief road, and various upgrades to the M/N4 road, the Sligo Institute of Technology, Regional Airports in Sligo and relatively nearby in Knock and strong private investment activity, particularly in the retail and leisure areas. Development challenges principally include implementing measures to bring about increased private housing development and rapid population growth within the Gateway. Key development issues and investment requirements over the period of the Plan include:

..... Completion of the remaining sections of the N4 requiring upgrades;...

The development is also identified as a key objective in relation to the Development of the Rural Environment as set out in Chapter 4 of the NDP where it states:

...The upgrading of national primary and secondary routes with particular regard to enhancing connectivity for rural areas within the Gateway/Hub town catchments;...

The development is also set out as a priority in relation to Economic Infrastructure (Chapter 7):

..To create a road network, in line with the timetable in Transport 21, that will see the completion of the major inter-urban routes and will upgrade links generally between the National Spatial Strategy Gateway Centres and improve the non-national road network;..

2.7 Appraisal and Management of Capital Expenditure Proposals

In relation to Need for the Proposed Development, a Framework of five common appraisal criteria flow down from the Department of Finance Guidelines on the Appraisal and Management of Capital Expenditure Proposals in the Public Sector, through the Department of Transport Guidelines on a Common Appraisal Framework for Transport Projects and Programmes, to the National Roads Authority Project Appraisal Guidelines. These five criteria are Economy, Safety, Environment, Accessibility & Social Inclusion, and Integration. I therefore plan to consider the need for the proposed development under each of these five headings.

2.7.1 Economy

The economic drivers for the proposed road are to reduce inter-urban journey times and improve journey time reliability, all of which are barriers to economic development of the region. When comparing the economic performance of the existing infrastructure with the proposed road it has been demonstrated that, over the 30 year appraisal period between 2017 and 2047, the proposal will reduce time spent in traffic delays by approximately 2.736 million hours which equates to 114,000 days.

2.7.2 Safety

As already outlined, over the period 1996 to 2011 the recorded casualties on the section of the N4 under consideration include the following:

- 8 fatalities;
- 8 serious injuries;
- and 56 minor injuries.

The reduction in accidents that can be anticipated in the full study area as a result of the proposed development over the 30 year period between 2017 and 2047 are as follows:

- 27 fatalities; (an average of 1 fatality per annum)
- 87 serious injuries; (an average of 2.9 serious injuries per annum)
- and 897 minor injuries. (an average of 29.9 slight injuries per annum)

The proposed route will replace the existing deficient section of the N4 with a Type 2 Dual Carriageway. This will reduce the accident rate, due to a higher accident rate for single carriageway roads, and an increasing risk of certain types of accidents, such as fatal and serious injury accidents as a result of overtaking head on collisions. The Type 2 Dual Carriageway also has the benefit of separating local traffic from national traffic and does not allow for right turning movements such as those which would be required at Ghost Islands on a Single Carriageway road.

2.7.3 Environment

The provision of the *Proposed Road Development* will bring benefits to the existing environment in this area of County Sligo. This will include *inter-alia*:

- A reduction in Noise and Vibration impacts for those numerous properties which are currently adjacent to the existing N4.

In addition, considering that the *Proposed Road Development* will be constructed to the increasingly high standard of environmental mitigation practice, there are numerous benefits which will arise to the existing environment. This is particularly true in the case of the management and treatment of road runoff which is currently being discharged untreated and un-attenuated to the Unshin River cSAC/pNHA and the Lough Arrow cSAC/pNHA/SPA. The provision of infrastructure to treat this runoff will have ensuing benefits for the aquatic flora and fauna of these important biodiversity sites.

2.7.4 Accessibility and Social Inclusion

The *Proposed Road Development* will improve road based public transport at a local, regional and national level, by improving safety along this section of the N4 corridor.

The transfer of traffic off the existing N4 will greatly improve the quality of life for properties within the vicinity of the existing route, allowing ease of access to both the local and national network which will improve accessibility to work, education and other activities.

2.7.5 Integration

The *Proposed Road Development* is intended to integrate the recent investments in the N4 and the Major Inter Urban corridors, namely the M4, as part of a strategy to provide a consistent quality road link between Dublin and Sligo.

3 PROJECT DEVELOPMENT

3.1 General Overview

The development of the project has spanned a considerable period of time. During 2000, a Constraints Study was carried out and subsequently in 2001/2002 an initial Route Selection Study was undertaken. No further development of the route took place until 2006 when the project planning phase was re-activated. Considering the time lag since the inception of the project, a comprehensive review of the initial route selection stage was undertaken. This process culminated in the preparation of a Route Selection Addendum report which supplements information gathered during the Route Selection Stage. This report provides an overview of the alternatives and how they compare with the *Proposed Road Development* from a current day perspective. The Preliminary Design stage of the project was advanced during 2006 to 2013 and culminated in December 2013 with the publication of the Compulsory Purchase Order, Environmental Impact Statement and Natura Impact Statement which are the subject of this Oral Hearing.

3.2 Consultation

During the early part of 2001, Sligo County Council identified five 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 detailed appraisal of each option was carried out to identify a preferred option. A preferred route was then identified and a public consultation in relation to the this route was held in March 2002. The route selection report was completed in May 2002 and adopted by the Elected Members of Sligo County Council in July 2002 and subsequently approved by the NRA.

3.3 Consideration of Alternatives

3.3.1 Consideration within the Environmental Impact Statement (EIS)

The EIS for the *Proposed Road Development* sets out the alternatives considered during the initial planning stages including the Route Options considered in the Route Selection Report (Section 3.1.1.1 of the EIS).

There have been numerous changes to NRA standards since the emergence of the Preferred Route; these changes have resulted in modifications to the route as outlined in the following paragraphs.

3.3.1.1 Road Type

The rationale which determined the evolution of the road type from the time of Route Selection to the current time stems from the NRA's consideration of new road types in the mid part of the 2000's. This was in acknowledgement of the fact that there was a large gap, in terms of capacity, cost and safety, between the Standard Single Carriageway and a Dual Carriageway with at grade junctions.

This led the NRA to develop other new divided road categories, which provided a capacity range between that of a single carriageway and a dual carriageway, i.e. between 11,600 and 26,500 AADT. This resulted in the development of the Type 2 Dual Carriageway which was piloted on the N4 Dromod/Roosky Bypass and incorporated into the DMRB in 2007. This type of road was derived principally from the Swedish experience of similar roads which provided the following benefits over a Standard Single Carriageway Road:

- Segregation benefits of a dual carriageway;
- Reduction in the severity of all accidents;
- Reduction in number of head on collisions;
- Reduction in driver frustration by provision of overtaking opportunities;
- Elimination of uncontrolled right turning movements;
- Controlled access onto national routes.

3.3.1.2 Junction Strategy

In terms of junction strategy, the National Roads Authority Design Manual for Roads and Bridges (NRA DMRB) has evolved in terms of design standards since the period of the Route Selection Process. In this regard the DMRB now restricts provision of Major/Minor priority junctions to situations where the design flow in the minor road is not expected to exceed about 300 vehicles 2 way AADT, and that on the major road is not expected to exceed 13,000 vehicles 2-way AADT; moreover, cross roads are now prohibited for proposed new developments. In relation to direct access, the NRA DMRB (TD 41/42 12) states that:

there is a potential saving in collisions where there is a reduction in the number of lightly trafficked direct accesses and minor junctions made directly on to each national road. Such accesses can be joined together with a link or service road before they join the main carriageway of the national road. Options for such indirect connections should always be explored, as should providing the access from the local road network.

The local road treatments/junction arrangements at the time of the Preferred Route selection and the current status following the design of the *Proposed Road Development* are the same in all but three cases as follows:

- The L-55016-0 which was proposed to be closed is now proposed to be linked via an overbridge across the proposed mainline.
- It is proposed to provide an overbridge in place of an underbridge on the L-5502-0.
- A roundabout junction is proposed on the L-1404-0 in place of an overbridge.

3.3.2 Route Options

In all five route options consisting of Standard Single Carriageway cross section were considered during the Route Selection Stage. Each route commenced in the townland of *Doorly* and tied back into the N4 at *Carrowkeel (ED Templevanny)*. These options were all considered within the Constraints Study area which is indicated in Fig. 2.1 of Volume 3 of the EIS and illustrated on **Slide 20**. The Route Options are indicated on Fig. 3.1 of Volume 3 as illustrated on **Slide 21**.

Following assessment of the route options, the optimal or Preferred Route was considered to be a combination of Options 2 and 4, including the northern part of Option 2 to a point at *Aghalenane Td.* and continuing with the southern part of Option 4. This is illustrated on **Slide 22** which shows Figure 3.2 of the EIS.

The *Proposed Road Development* is an evolution of this Preferred Route through the design and early Environmental Impact Assessment stages of the project and is described in the EIS as Option 6+ (with Option 6 being the Preferred Route).

Public Participation in the Route Selection Process included two separate public consultations. The first consultation was based on the initial 5 route options and was held during the period 14th May 2001 to 15th June 2001.

The second consultation presented the Preferred Route Corridor to the public in March 2002. The results of this consultation allowed for modifications to be made to the Preferred Route prior to its adoption by Sligo County Council.

To inform the Public on the status of the N4 Collooney to Castlebaldwin Road Project since the Public Consultation in 2002, two Public Information days were held in June 2012 and October 2013.

An addendum to the Route Selection Report examined the alternatives and how they compare to the *Proposed Road Development* from a current day perspective. A comparison was undertaken on each route option. They were scored on a seven point scale ranging from High Preference to Low Preference. The scores were then compared to identify the Preferred Route. Considering information available from the original Route Selection Report supplemented further by information gathered during the period of the addendum assessment; it is considered that the proposal in its current form is the optimum location for the *Proposed Road Development*.

3.3.2.1 The Online Upgrade (Section from the N4/N17 Toberbride Junction to Doorly Td.)

The alternatives in terms of the mainline alignment on the section between *Collooney/Toberbride Td.* and *Doorly Td.* were dictated by:

- the current provision of a horizontal alignment which is adequate to accept the geometry of a Type 2 Dual Carriageway; and
- the constraints which occur to the east and west of the existing N4 meaning an offline alternative was not viable. These constraints include Markree Demesne, clusters of houses in *Mullagh nabreena Td.* to the east and Toberscanavan Loughs to the west.

The layout and configuration of the local area network were dictated initially by the objective to separate the local traffic from the national traffic, thus ensuring the consistency of the Type 2 Dual Carriageway is maintained for the overall length of the route.

A value engineering exercise which considered costs, access arrangements and local journey travel impacts was carried for this section of the route, the result of which is described further in Chapter 4 of this Brief.

3.4 Design Stage

The N4 Collooney to Castlebaldwin *Proposed Road Development* has been developed through an iterative process that in the first instance sought to avoid adverse environmental impact. Where avoidance was not possible every effort was made to minimise the impact. Mitigation measures were developed by the Design team in a collaborative manner and in consultation with all specialists. Specific mitigation measures have been incorporated into the *Proposed Road Development* in order to reduce potential adverse environmental impacts.

Numerous project workshops were conducted throughout the project development stage. The project design team and all environmental and technical specialists attended each of these workshops. This process helped to facilitate and promote close interaction between the various project team members.

Preliminary ground investigation and topographical surveying was carried out which informed the design process.

The proposed road was developed between 2007 and 2013 and was informed by ongoing assessments carried out by the various specialists as well as discussions at the various workshops.

The lands necessary for the construction of the *Proposed Road Development* have been identified and are included in the Compulsory Purchase Order (CPO).

4 ROAD TYPE, JUNCTION STRATEGY AND TRAFFIC

4.1 Type of Road Cross Section

Having clearly identified the need to bring this section of the N4 up to modern design standards, suited to the existing and projected traffic flows, the next step was to establish the appropriate road type for any new infrastructure. The selection of the road type is related to traffic flows, the target minimum level of service and the desire to provide consistency of road type for long distance journeys.

The mainline realignment will comprise two separate forms of Road Type with the change in cross section defined by a roundabout in the townland of *Castlebaldwin*. A Type 2 Dual Carriageway is proposed for the majority of the mainline realignment. It extends from the north end of the *Proposed Road Development*, at which point it ties into the existing N4 Collooney to Sligo Dual Carriageway via the existing N4/N17 Toberbride Roundabout, to the proposed Castlebaldwin Junction which is located near the southern end of the *Proposed Road Development*.

The Type 2 Dual Carriageway road type was developed by the National Roads Authority (NRA) as a response to the higher level of accidents experienced on single carriageway roadways in comparison to divided carriageways but for use in situations where the traffic levels could not justify a Standard Dual Carriageway.

By way of comparison, Fig. 3.3 on **Slide 23**, which is an extract from Volume 3 of the EIS demonstrates figuratively and through the use of specially developed photomontages, the relatively modest cross sectional difference between the Standard Single Carriageway and the Type 2 Dual Carriageway. A Type 1 Dual Carriageway is also shown at the bottom of the Figure to demonstrate its dimensional difference with the Standard Single Carriageway.

As can be seen, the Type 2 Dual cross section provides two lanes in each direction, but dispenses with the hard shoulder, and has a narrower central median of 1.5metres with a segregation barrier. The absence of the hard shoulders means that the capacity of this road type is limited to that which could be squeezed onto one lane when necessary, but by providing continuous overtaking opportunities, a higher level of service is maintained as traffic levels increase, together with considerable safety benefits. The continuous overtaking provision at lower traffic flows facilitates the use of compact grade separated junctions, where turning traffic is required to slow down on the approach to the junction, rather than the expansive full grade separated junctions associated with high speed exits from motorways.

The final section of the route from the Castlebaldwin Junction south to the tie in location with the existing network will be Type 1 Single Carriageway and shall be commensurate with the existing improved section (Curlew Mountains Bypass) of the National Primary route at *Cloghoge Lower Td*.

4.1.1 Type 2 Dual Carriageway Cross Section dimensions

The proposed Type 2 Dual Carriageway cross section provided between the 2 aforementioned roundabouts consists of a paved width of 16.5m within an overall cross sectional width of 21.5m. The overall section comprises:

- 2 x 7m paved two-lane carriageway sections;
- 2 x 0.5m paved hard strips;
- 1.5m paved central median with a segregating safety barrier;
- 2 x 2.5m grass verges.

An example of this relatively new Type 2 Dual Carriageway is the N4 Dromod – Roosky bypass which is shown on **Slide 24**.

4.1.2 Type 1 Single Carriageway Cross Section dimensions

The proposed Standard Single Carriageway cross section provided to the south of the Castlebaldwin Junction (roundabout) consists of a paved width of 12.3m within an overall cross sectional width of 18.3m. The overall section comprises:

- 2 x 3.65m paved single-lane carriageway sections;
- 2 x 2.5m paved hard shoulders;
- 2 x 3m grass verges.

4.1.3 Section 1: N4/N17 Toberbride Roundabout to Castlebaldwin Junction

Approximately 13.82km of the proposal consists of a Type 2 Dual Carriageway commencing at the existing N4/N17 Toberbride roundabout in the townland of *Collooney/Toberbride* and extending to a proposed roundabout in the townland of *Castlebaldwin*. This section of the *Proposed Road Development* includes a full online upgrade of the existing N4 between its commencement point at the N4/N17 Toberbride roundabout and circa Ch. 2,430m in *Doorly Td.* where it begins to divert offline.

The Type 2 Dual Carriageway road consists of two lanes in both directions. For safety reasons a 4 lane undivided road is considered unacceptable on rural sections of the network where a 100kph speed limit applies. Therefore, on this type of road it is proposed to use a segregating barrier within the paved median to separate the traffic streams. Cyclists and pedestrians will be encouraged by signage to use an alternative route, for example the existing N4.

Lay-bys will be provided corresponding to Type D as per NRA DMRB TD 69/10 and as illustrated on **Slide 25** which will be 4m wide and 30m long with a 45m diverge taper and a 25m merging taper. These lay-bys will be provided at locations of not more than 2.5km centres along the mainline of the *Proposed Road Development*.

For safety reasons, hard standings within verges will be provided for emergency breakdown usage. These hard standings will be a minimum of 1.2m wide and will be of light construction such as compacted cement bound granular material.

The road is designed so as to minimise the number of junctions and to provide drivers with straight forward junction layouts. There will be no gaps provided in the central reserve and there will be no direct access from land or houses onto the road.

4.1.4 Section 2: Castlebaldwin Junction to tie-in with Existing N4

The *Proposed Road Development* will tie back into the existing N4 to the south of the aforementioned roundabout with a Standard Single Carriageway alignment measuring approximately 0.89km in length before its conclusion in *Cloghoge Lower Td.* The section of road which is proposed to be Standard Single Carriageway will be commensurate with the existing improved section (N4 Curlews Bypass) of the National Primary route at *Cloghoge Lower Td.* This consists of a single carriageway and hard shoulder in each direction.

4.2 Justification of Road Cross Section

4.2.1 General

The cross sections on the *Proposed Road Development* mainline are to cater for the predicted AADT, the type and character of the existing road into which the new road ties into and the requirements of the NRA DMRB. The process of determining the proposed cross section also takes account of journey time and accident savings as previously outlined.

The selection of the Road Type for the *Proposed Road Development* was based on an incremental analysis approach. This was in recognition of the fact that Annual Average Daily Traffic (AADT) threshold flows outlined in Table 6/1 of NRA DMRB TD 09/12 and as shown on **Slide 26** should be used as a guide only in the selection of different road types. The traffic capacity increases as the road width increases, with wider traffic lanes and the addition of hard shoulders and additional traffic lanes.

It should be noted that the AADT threshold figures outlined in Table 6/1 of NRA TD 09/12 are based on the provision of a minimum Level of Service D which as previously outlined is deemed to be the level of service at which passing becomes extremely difficult, with 'shock waves' beginning to affect the overall flow. Level of Service is a term that was adopted in the National Road Authority (NRA) *National Roads Needs Study, 1998*. The NRA in this document set a target of ensuring that the national road network provides a minimum level of service D, which is defined as the point which the ratio of traffic flow to capacity is starting to result in difficult overtaking, with 75% of journeys being delayed by slower vehicles, resulting in platoons of five to ten vehicles forming. The average end to end journey speed that results from these conditions is 80kph. Note that this is the target minimum level of service. Clearly it is desirable to achieve better than this when possible.

Finally, having selected a road type which can be expected to comfortably achieve the required minimum level of service, there is a requirement to go back and test the route where predicted traffic levels have the potential to be accommodated on a reduced cross section. This is known as incremental analysis, testing the additional benefits associated with the increased capacity against the associated additional cost.

4.2.1.1 Incremental Analysis

The incremental analysis which will be discussed further in Section 4.6 was carried out by Aecom in consultation with the design team and was supported by the traffic models developed as part of the project. Having regard to the provisions of NRA TD 09/12 and considering the range of traffic figures currently using and predicted to use the *Proposed Road Development*, it was determined that the most appropriate road types to consider would be the Type 1 Standard Single Carriageway or the Type 2 Dual Carriageway. The analysis thus sought to compare these two road types.

The analysis determined construction cost benefits will largely be outweighed by the lifetime benefits of the Type 2 Dual carriageway over the Type 1 Single Carriageway.

4.2.1.2 Conclusion

Therefore, in summary and as shown on **Slide 27**, development of a Type 2 Dual Carriageway will provide the following advantages over a Type 1 Single Carriageway:

- Increased safety benefits and removing the likelihood of head-on collisions;
- Removing right turning conflicts (compact grade separation and roundabouts proposed);
- An improved Level of Service;
- Allows safe overtaking;
- Consistency and continuance of road layout;
- Expected economic savings over the lifetime of the scheme due to increased journey time and reduced accident figures;
- Ensuring that pedestrians, cyclists and agricultural vehicles can use routes that are away from the strategic road network;

- Improving visibility and general road conditions; and
- Improving the safety of the roadside in the event of single-vehicle collisions.

Considering the foregoing as well as the Incremental Analysis carried out by Aecom, a Type 2 Dual Carriageway road type was selected for the *Proposed Road Development* between the existing N4/N17 junction (*Collooney/Toberbride Td.*) and *Castlebaldwin Junction*. This ensured consistency of cross section providing an unbroken dual carriageway layout between Sligo town and *Castlebaldwin Junction*.

A Type 1 Single Carriageway is proposed from the *Castlebaldwin Junction* to tie into the existing N4 further south which is currently a Type 1 Single Carriageway cross section that was constructed as part of a Road Development referred to as the N4 Curlews Bypass which was completed in the late nineties.

4.2.2 Section 1: N4/N17 Roundabout to Castlebaldwin Junction

4.2.2.1 Online Section - Collooney/Toberbride Td. to Doorly Td.

4.2.2.1.1 Mainline

The existing section of the N4 from the N4/N17 Toberbride Junction to *Doorly Td.* was constructed on what was a combination of online and offline realignment which was opened to traffic in the 80's. The road cross section and geometry meet some of the current design standards for a Type 1 Single Carriageway. However, some horizontal curvature leads to areas of dubious overtaking. Some of the junction configurations do not comply with current design standards for a National Road. There is an at-grade cross road junction at the L-7612-0 and the L-76121-0 which is not permitted under the current design standard for at-grade junctions as defined in NRA TD 41-42/11, Clause 2.34.

The Base Year AADT along this section of road is 10,400, which is near the limit of the design capacity based on the minimum LOS D for the Type 1 Single Carriageway. With predicted traffic volumes of between 12,600 and 15,100 AADT in the Design Year of 2032 based on low growth and high growth respectively, for the Do Minimum scenario, this volume will exceed this roads design capacity based on LOS D by between 9% and 30%, leading to increased congestion and a reduced Level of Service. As traffic levels increase and the level of service reduces, overtaking opportunities will reduce even further, which will lead to greater driver frustration and potentially more dangerous overtaking manoeuvres, and therefore safety will inevitably be further compromised. In light of the above, it is evident that the existing single carriageway does not have sufficient capacity for future traffic needs. Therefore, a Type 2 Dual Carriageway was selected for this section.

There are frequent junctions and frontage access along this section and therefore it is considered that a Type 2 Dual Carriageway is the most suitable cross section. This allows additional capacity for a minimal amount of landtake. It also allows consistency of cross section as the N4 north of the N4/N17 roundabout is a Type 1 Dual Carriageway as already outlined. The Type 2 Dual Carriageway offers a potentially feasible and cost effective solution to meeting the predicted traffic demands. As already outlined, an incremental analysis was carried out by Aecom to determine the most cost effective cross section which also determined that a Type 2 Dual Carriageway was the most economically viable solution.

As already outlined in Section 3.3.2.1, the alternatives in terms of the mainline alignment on the geometrically improved section between *Collooney/Toberbride Td.* and *Cloonamahan Td.* were dictated by:

- the current provision of a horizontal alignment which is adequate to accept the geometry of a Type 2 Dual Carriageway; and
- the constraints which occur to the east and west of the existing N4 meaning an offline alternative was not viable. These constraints include Markree Demesne, clusters of houses in *Mullaahnabreena Td.* to the east and Toberscanavan Loughs to the west.

In light of the above, an Offline Realignment was not considered any further on this section.

4.2.2.1.2 Treatment of Local Road Network

The layout and configuration of the local area network were dictated initially by the objective to separate the local traffic from the national traffic, thus ensuring the consistency of the Type 2 Dual Carriageway is maintained for the overall length of the route.

Given the number of existing road junctions, house accesses and farm accesses, design options were investigated to determine a suitable manner to treat same. Three feasible route options were identified and considered. An analysis of these options is included in the Addendum to the Route Selection Report.

Following the assessment, it was determined that the preferred treatment of the existing local road junctions, house accesses and field accesses could be achieved via a combination of parallel roads together with bridging over or under the proposed mainline where necessary to maintain local road connectivity. This proposal which is further described in Section 4.3 has the following benefits:

- It allows connection of the existing N4 to the N4\N17 Toberbride Junction via an Eastern Parallel Link Road, thereby providing a separate network for treatment of local traffic from Riverstown and its surrounding hinterlands which has safety benefits.
- It complies with the objectives of the *Proposed Road Development* whereby users of the current N4 route making short local trips will find it safer to access and exit the road network as a result of the substantial decrease in traffic volumes and the lower speed limit on what will be the re-designated local road.
- As this option allows access between the existing N4 and proposed N4 at both the north and south ends, the existing N4 and proposed eastern parallel link road can be used both as a traffic diversion route and for accident and emergency responses, particularly when it becomes necessary to divert traffic off the mainline.
- Cycle/Pedestrians can utilise this network safely given the large reduction in traffic in addition to the fact that it is proposed to provide a 3m combined cycleway on the eastern side of the eastern parallel access road. It is an objective in the Sligo County Development Plan to provide facilities in this regard and therefore consideration may be given as part of a future development to provide a cycleway from the south end of the proposed eastern parallel link road to Castlebaldwin Village.

4.2.2.2 Offline Section (Doorly Td. to Castlebaldwin Junction)

In the Do-Something scenario, traffic levels along this section are predicted to range from 9,300 to 9,400 AADT in the Design Year based on NRA Medium Growth Rates. This would indicate that a Type 1 Single Carriageway would have reached 81% of capacity based on provision of the minimum required level of service D as previously discussed which is determined to be 11,600 AADT as outlined in Table 6/1 of NRA TD 9/12.

However, based on the High Growth scenario, if a Type 1 Single Carriageway was adopted in place of a Type 2 Dual Carriageway for the road, it is predicted that it would be functioning at 93% of its capacity for the minimum LOS D in the Design Year of 2032. This would result in insufficient residual capacity for further traffic growth beyond the Design Year or any variance in traffic growth.

As outlined in Section 4.2.1.1, an incremental analysis was carried out by Aecom to determine the most cost effective cross section. This determined that a Type 2 Dual Carriageway was the most economically viable solution taking into account the additional cross section width required to provide same is only 3.2m. As previously outlined; the analysis determined construction cost benefits will be outweighed by the lifetime benefits of the Type 2 Dual carriageway over the Type 1 Single Carriageway, insofar as:

- Accident Reduction Benefits are projected to be significantly higher, due to a lower accident rate for dual carriageway roads, and a lower risk of certain types of accidents, such as fatal and serious injury accidents as a result of the removal of head on collisions.
- The Type 2 Dual Carriageway has the benefit of separating local traffic from national traffic and does not allow for right turning movements such as those which would be required at Ghost Islands on a single carriageway. Head on collisions on the Type 2 Dual Carriageway are reduced insofar as overtaking movements requiring a vehicle to enter the opposing lane of traffic is eliminated.
- Average Journey Speeds are projected to be lower on the single carriageway as a result of fewer opportunities to overtake slower moving vehicles. As a result of this, vehicle drivers will be forced to

adjust their speeds more frequently, resulting in higher fuel consumption and therefore higher vehicle operating costs.

4.2.3 **Section 2: Castlebaldwin Junction to tie-in with Existing N4**

As outlined in Section 4.1.4, it is proposed that the *Proposed Road Development ties back* into the existing N4 to the south of the proposed Castlebaldwin Roundabout with a Standard Single Carriageway alignment measuring approximately 0.89km in length before its conclusion in *Cloghoge Lower Td*. The section of road which is proposed to be Standard Single Carriageway will be commensurate with the existing improved section (N4 Curlews Bypass which was constructed in 1998/99) of the National Primary route at *Cloghoge Lower Td*. This consists of a single carriageway and hard shoulder in each direction.

4.3 Description of Alignment

4.3.1 Section 1: N4/N17 Roundabout to Castlebaldwin Junction

The initial section of the *Proposed Road Development* includes a full online upgrade of the existing N4 between its commencement point at the N4/N17 Toberbride roundabout and circa Ch. 2,430m where it begins to divert offline. This online section includes:

- Widening of the existing Standard Single Carriageway road to a Type 2 Dual Carriageway cross sectional width;
- Modification of the vertical curvature of the existing N4 to provide cover for an underbridge and culverts;
- Closure of all existing direct accesses on the route and collection of the severed local network west to east and *vice-versa* via the following:
 - A parallel link road east of the proposed N4 (eastern parallel link road) which will tie the existing N4 into the existing N4/N17 Toberbride roundabout via an additional roundabout, and additional link described below, provided in the townland of *Toberbride* and located to the south-east of the existing business/enterprise estate. The link road measures circa 2.950km in length and will over this distance collect the L7611-0, the L-76121-0, numerous residential and agricultural accesses while also accommodating the provision of a 3m wide cycle track. In general it follows the existing topography as closely as possible with the exception of a fill section located in the vicinity of the *Toberbride/Mullaghna Breena* townland boundary which is required to maintain a suitable vertical gradient.
 - The aforementioned link will tie into the existing N4/N17 roundabout via the Toberbride East-West Link which will utilise and upgrade an existing private road between the aforementioned roundabout and the Toberbride (East) Junction. This link measures circa 320m in length;
 - A link measuring circa 260m in length between the aforementioned eastern parallel link road and the L-7611-0 which will itself receive minor improvements. This link will cross on embankment over the proposed N4 via an overbridge referred to as Toberbride Overbridge;
 - A western parallel link road between a proposed roundabout (Cloonamahan Junction, North) in the townland of *Cloonamahan* which will connect the L-3606-9, which will itself receive localised improvements, with an additional roundabout provided south-west of the proposed N4 in the townland of *Doorly* referred to as Doorly Junction. This link will also collect the L-14019-0 and some residential and agricultural accesses, it will be connected underneath the proposed N4 to the eastern parallel link road via the Doorly Underbridge (North);

Slide 28 and 29

Before diverting offline, the online section from its commencement point travels in a southerly direction, where at circa Ch. 280m it intercepts the aforementioned link between the L-7611-0 and the eastern parallel link which is designed to pass over the proposed N4 on an overbridge, embankments and approach road measuring some 260 metres in length (Toberbride Overbridge). The proposed mainline begins to change direction at circa Ch. 700m to a more south-easterly one passing to the east of Toberscanavan Loughs at circa Ch. 1,300-1,550m before passing over the aforementioned link between the eastern and western parallel links at circa Ch. 2,500m which is accommodated by a road underbridge (Doorly Underbridge, North).

The online upgrade concludes at circa Ch. 2,430m and the realignment continues with an offline section which is described below:

Slide 29 & 30

The alignment diverts offline in a south-south-easterly direction at circa Ch. 2,430m in the townland of *Doorly*. The proposed route continues to pass over the L-55015-0 which will be maintained via an underbridge referred to as Doorly Underbridge, South, in order to restore access to agricultural land to the south-west of the proposed alignment. It then continues in a south-south/easterly direction passing to the west of Lackagh Fen and continuing through the townlands of *Doorly* and *Knocknagroagh*, where at circa Ch. 4,020m the local tertiary road L-55016-0 is realigned and designed to pass over the proposed N4 on an overbridge (Knocknagroagh Overbridge) and embankments. This local road is being realigned northwards to form a

Major/Minor priority junction with the existing N4 approximately 30 metres north north-west of its existing location

Slide 30

The proposed N4 design continues through a more south-easterly direction across agricultural land to circa Ch. 4,440m in the townland of *Knocknagroagh* where it passes over the Turnalaydan Stream (or Lough Corran Outflow). A river diversion and clear span river bridge is being provided at this location.

Slide 30 & 31

It continues to pass to the East of Boathole Lough and Lough Corran while maintaining a south-easterly direction through agricultural and bog land in the townland of *Drumfin*, where at circa Ch. 5,570m the local secondary road L-5502-0 (known locally as the Bog Road) is realigned and designed over circa 500m to pass over the proposed N4 on an overbridge (Drumfin Overbridge, North) and embankments.

Slide 31

The design continues to maintain its direction passing through agricultural land in the townland of *Drumfin* where at circa Ch. 6,600m the local primary road L-1502-32 is realigned and designed over circa 700m to pass over the proposed N4 on an overbridge (Drumfin Overbridge, South) and embankments. This point provides a strategic location for the only junction on the Type 2 Dual Carriageway which is provided in the form of a Compact Grade Separated Junction allowing access to the rural hinterland including the nearby towns of Ballymote and Riverstown.

Slide 31 & 32

Continuing in a more south-easterly direction the design passes through the townland of *Cloonlurg* across some agricultural land but mainly forestry. It passes under a 220 kV line at circa Ch. 7,120m which will be required to be raised in advance of the main construction contract. At circa Ch. 7,360m it crosses a river marked on OSi maps as the Arrow or Unshin River but known for the purposes of the EIS as the Drumfin River on embankments. A clear span river bridge is being provided at this location.

Slide 32

The alignment maintains its general direction passing through agricultural land in *Carrowkeel* and *Carrowmagark* to circa Ch. 8,630m where it crosses on embankment over local secondary road L-5402-0. The local road will remain online and will be directed under the proposed N4 via an underbridge, referred to as Carrowmagark Underbridge.

Slide 32 & 33

The alignment continues through agricultural land and some recently planted forestry in *Kingsbrook Td.* to circa Ch. 9,300m where it crosses on embankment over local tertiary road L-54033-0. The local road is being realigned slightly to the east and will be directed under the proposed N4 via an underbridge, referred to as Kingsbrook Underbridge.

Slide 33

The alignment changes to a more easterly direction via the application of a left hand horizontal curve through *Aghalenane Td.* passing Aghalenane & Ardloy Loughs which are to the north-east of the proposed route. It continues through *Kingsbrook* and *Ardloy Td.* to circa Ch. 10,220m where it crosses on embankment over the existing N4. The existing N4 which has been recently realigned will pass under the proposed realignment via an underbridge, referred to as Ardloy Underbridge. At circa Ch. 10,800m the alignment crosses on embankment over local secondary road L-5401-0. The local road will remain online and will be directed under the proposed N4 via an underbridge, referred to as Tawnagh Underbridge.

Slide 34

The alignment's direction gradually changes to a south-easterly one via a right hand horizontal curve through the townlands of *Springfield* and *Tawnagh* and continues to maintain this direction passing through agricultural land in the townlands of *Cloonymeenaghan* and *Sheerevagh* to circa Ch. 12,330m where it crosses on low embankment over local tertiary road L-54041-0. This local road is being closed as alternative access to the surrounding hinterland is available via local primary road L-5404-0.

Slide 34 & 35

The alignment continues in a south-easterly direction through agricultural land in the townlands of *Sheerevagh* and *Drumderry* where a right hand horizontal curve gradually begins to change its direction to a more southerly one severing local road L-1404-0 at circa Ch. 13,530m. A roundabout referred to as Castlebaldwin Junction is proposed at circa Ch. 13,630m in the townland of *Castlebaldwin* which allows for the re-linking of

the aforementioned local road providing an access point to Castlebaldwin and the surrounding hinterland. This point marks the end of the Type 2 Dual Carriageway.

4.3.2 Section 2: Castlebaldwin Junction to tie-in with Existing N4

Slide 35

The tie-in to the existing national primary network will be via a Standard Single Carriageway, measuring approximately 0.89km in length, re-commencing from the aforementioned roundabout. The alignment continues from the roundabout in a southerly direction passing Castlebaldwin House, which is National Monument no. 373 as defined within the EIS, to the east before continuing through agricultural land in the townland's of *Castlebaldwin* and *Cloghoge Upper*. It ties back into the existing N4 in a south easterly direction in the townland of *Cloghoge Lower* concluding at circa Ch. 14,522m.

4.4 Junction Strategy and Treatment of Existing Local Network

4.4.1 General

The primary function of the National Road Network is to cater for medium to long distance travel between regions and population centres in a safe and efficient manner. As a secondary function, the network caters for local and short distance traffic. In general, there are positive safety benefits in grade separating the national and local road networks. TD41-42/11 states, '*direct vehicular access onto national roads should be avoided as far as practicable.*'

The *Proposed Road Development* has been designed in a manner which is consistent with the above principles, in this regard and for safety reasons it is considered that local traffic where possible should not be routed onto the national route. Moreover in order to accommodate this, attention has been had within the proposal to provide a separate and independent local road network providing reasonable access to lands, dwellings and to preserve safety and capacity on the national road network.

In order to retain route capacity and safety on the National route; the following principles were adopted and proposed in relation to direct access onto the N4: -

- Access onto the road is restricted to junctions.
- The numbers of junctions are limited to provide access into the main towns/villages only.
- Side roads are rationalised wherever possible so that the main side roads are taken over or under the main road and minor side roads or side roads where there is a close alternative route are closed.
- A roundabout will be provided at *Castlebaldwin Td.* where the cross section changes on the mainline tie-in point. This is broadly in cohesion with recommendations of NRA TD41-42/11 which outlines that where there is a change in road type, a roundabout should always be used at the first major junction in order to emphasise to drivers the changed character of the road. This has been found to reduce collisions. The roundabout will also provide a dual purpose of providing access to Castlebaldwin village and surrounding towns/villages and hinterlands.
- Where additional junctions are considered on the Type 2 Dual Carriageway Section, these will be in the form of Compact Grade Separation which with the provision of suitable merging and diverging provide slight safety benefits over Roundabouts while also improving journey time benefits along the route. Consideration of turning traffic was also taken into account in determining the junction type and location adopted. It is proposed to provide a CGSJ at the intersection of the L-1502-32 Ballymote Road.
- Access tracks will be provided off the existing side road network to connect to severed lands as a result of the proposed road realignment in instances where it is viable to provide such access.

Taking the above principles into account and following traffic modelling and capacity checks it is proposed to provide a grade separated junction at the Ballymote Road (L-1502-32) and a roundabout at the Castlebaldwin Junction. As previously outlined, the roundabout at the Castlebaldwin Junction provides an effective means of reducing the cross section from Type 2 Dual Carriageway to a Single Carriageway cross section. A Type 1 Single (S2) Carriageway is proposed from the Castlebaldwin Junction south to the tie into the existing N4 at *Cloghoge Lower Td.*

4.4.2 Mainline Junction Strategy

4.4.2.1 **Proposed tie in to existing N4/N17 Roundabout (Toberbride Junction)**

It is proposed to tie into the existing southern arm of the N4/N17 Toberbride Roundabout as shown on **Slide No. 36**. The northern approach to this junction is a Type 1 Dual Carriageway which links to Sligo City. The southern approach shall be widened to accommodate a Type 2 Dual Carriageway cross section. Localised widening is also proposed on the westbound exit (N17 exit) from the roundabout to take account of the extra lane being provided on the southern approach. Localised widening and improvements are also proposed on the eastern link of the roundabout to bring it in line with design requirements. Provision for pedestrians and

cyclists crossing the Dual Carriageway will be provided by incorporation of refuge islands and drop kerbs. This junction provides a connection to the existing road network.

4.4.2.2 Proposed Compact Grade Separated Junction - Intersection of N4/L-1502-32 in Drumfin Td. (Drumfin/Cloonlurg Junction)

The proposed N4 will cross the L-1502-32 in the townland of *Drumfin* as shown on **Slide No. 37**. The L-1502-32 is an important local primary road in the local area as it links traffic from the existing N4 to Ballymote town. Ballymote is located 24 km (15 miles) to the south of Sligo City, in the south-east of the County, and is one of Sligo's largest towns. There is no direct access via national routes to Ballymote. The national roads serving the Ballymote catchment area are the N4 and N17. This junction will also provide access to the proposed N4 for traffic travelling to and from Riverstown and its surrounding hinterlands. The traffic report prepared by Aecom for the development shows AADT figures for the design year on the L-1502-32 east of the proposed compact connectors roads ranging from 1,800 to 2,200 depending on which NRA growth scenarios is chosen. To the west of the proposed junction AADT figures range from 2,000 to 2,400 depending on which NRA growth scenarios is chosen. The approach was taken to provide a junction at this location in accordance with the recommendations outlined in NRA DMRB TD10/07. Section 2.27 of this document recommends that compact grade separation should be used where the design year side road flow is between 1,000 and 3,000 AADT. The junction has been designed in accordance with TD 40/94 taking into account NRA addendum to this document. Traffic projections on the compact connector roads (Turning Traffic) show AADT flows of between 1300 and 1500 in the design year of 2032 which suggests that this junction is justified at this location.

4.4.2.3 Proposed Roundabout at Castlebaldwin Td. (Castlebaldwin Junction)

It is proposed to provide a roundabout junction at the intersection of the proposed N4 and the L-1404-0 at approx Ch. 13,600 as shown on **Slide No. 38**. This provides for a change in cross section type from Standard Single Carriageway to Type 2 Dual Carriageway. It will also facilitate access to Castlebaldwin Village and the surrounding hinterland. Provision for pedestrians and cyclists crossing the link road will be provided by incorporation of refuge islands and drop kerbs. As outlined, the proposed cross-section for the mainline changes at this junction from a Type 2 Dual Carriageway to a Standard Single Carriageway in a southerly direction which ties into the existing single carriageway cross section which exists south of the *Proposed Road Development*.

The junction is a 4-arm roundabout connecting the *Proposed Road Development* to the north and south and the proposed realigned L-1404-0 to the east and west. The roundabout will have an Inscribed Circle Diameter of 60.0m. The circulatory width will be 7.3m wide.

4.4.3 Side Road Junction Strategy

There are three new roundabout junctions proposed on side roads which are as follows:

- Toberbride (East) Junction;
- Cloonamahan Junction (North);
- Doorly Junction.

4.4.3.1 Proposed Toberbride (East) Junction

As shown on **Slide 39**, a roundabout is proposed in the existing Toberbride Business Park. It is proposed to realign slightly and upgrade the East-West Link which currently serves as an access to the Toberbride Business Park. This link road will now serve as a link to the proposed Eastern Link road from the N4/N17 Toberbride roundabout. The roundabout is located at the intersection of the upgraded East-West link with the proposed Eastern Parallel Link road. The junction is a 3-arm roundabout and shall have an Inscribed Circle Diameter of 34.6m. The circulatory width will be 5.40m wide. A third arm is proposed to the northeast to serve an existing farm access. Lands to the southeast of the proposed roundabout are currently zoned as Business and Enterprise.

4.4.3.2 Proposed Cloonamahan Junction (North)

As shown on **Slide 40**, a roundabout is proposed at the intersection of local road L-3606-9 and the proposed Western Parallel link road. The junction is a 2-arm roundabout and shall have an Inscribed Circle Diameter of 28m. The circulatory width will be 5.40m wide.

Alternative designs were investigated to treat the connection of the proposed Western Parallel Link Road and the L-3606-09. Following review the only possible feasible option available was to provide a sweeping curved realignment to the rear of the existing Transient Halting Site which would connect the proposed Western Parallel Link road with the existing L-3606-09. However, following further investigation it became apparent that this option was not feasible for the following reasons:

- Would create a dangerous point on the local road L-3606-09 to the west where the newly designed section would tie into an existing very poor horizontal section of the local road. It was the Design Teams opinion that this would lead to safety issues at this location;
- Would impact directly on a possible upgrade to the adjacent Transient Halting Site. It is a stated objective of the Sligo County Development Plan to upgrade facilities at this location to a Halting Site.
- This option would require significant earthworks due to the topography of the existing ground and therefore it was determined to be approximately 50% more expensive than the option chosen.

It was felt considering the low speed nature of the local road in addition to the low predicted AADT figures that a compact roundabout north of the aforementioned Transient Halting Site would adequately cater for movements from the L-3606-9 onto the proposed western parallel link.

4.4.3.3 Proposed Doorly Junction

As shown on **Slide 41**, a roundabout is proposed at the intersection of the Doorly Underbridge (North) link with the proposed Western Parallel Link Road. The junction is a 4-arm roundabout and shall have an Inscribed Circle Diameter of 34.6m. The circulatory width will be 5.40m wide. A third arm is proposed to the southwest to serve an existing house and farm access. A fourth arm is proposed on the southeast side which serves as a farm accommodation access road.

4.4.3.4 Proposed Major/Minor Junctions on Realigned Side/Link Roads.

A number of Major/Minor Priority junctions are proposed along the *Proposed Road Development* which are as follows:

- Toberbride Overbridge link with the proposed Eastern Parallel Link road.
- Toberbride Overbridge Link with the existing local road L-7611-0.
- Local road L-76121-0 with the proposed Eastern Parallel Link Road.
- Local road L-14019-0 with the proposed Western Parallel Link Road.
- Local Road L-55015 with the existing N4 in *Doorly Td.*
- Local Road L-55016 with the existing N4 in *Knocknagroagh Td.*
- Local Road L-1404 with the existing N4 in *Cloghoge Upper Td.*

4.4.4 Interface with Existing Road Network

The proposed route crosses Local Primary, Secondary or Tertiary Roads with the exception being the crossing over the existing N4 National Road at Ardloy. The local roads service the farming and residential community as well as providing access to Ballymote, Riverstown and Castlebaldwin.

Due consideration of each minor road's importance, both to the individual and to the local communities were taken into account during the preliminary design process. In conjunction with the road's AADT, location and use, a decision was made in relation to modifications required for each road.

These modifications may take the form of the following:

- An adjustment to the vertical alignment to accommodate an overbridge or underpass.
- A horizontal realignment of the local road to tie into an adjacent local road, roundabout or Compact Grade Separated Junction in an attempt to reduce the number of accesses onto the proposed road.
- The closure of the local road at the location of its intersection with the mainline. Where closure of the local road entails a significant diversion length to a significant number of road users and local conditions permit, consideration was given to the construction of a new link road from the severed road to an adjoining local road in order to mitigate the impact of the road closure.

Between its two tie-in points with the existing N4, the *Proposed Road Development* intersects a total of 19 roads including the existing N4 (at 2 locations) and 17 local roads. Due consideration to each road's importance, both to the individual and to the local communities were taken into account during the route selection and design process. During the design of the *Proposed Road Development* a preference was given to the grade separation of the local and national road networks in order to maintain existing community links.

Of the 17 local roads intersected by the proposed route (and in addition to localised widening to the L-7611-0/L-7612-0) the following outlines measures proposed:

- Little or no alteration to the existing local road network in 5 cases;
- Minor alteration to the existing local road in 4 cases;
- Alteration to the existing local road in 4 cases;
- Road closure with alternative link *via* alteration to the existing local road in 5 cases;
- There will be 1 no. road closure where the Link will not be re-established in the case of the L-54041-0; however, a nearby alternative is available via the L-5404-0, L-1403-0 and the L-1404-0.

Considering the foregoing there will be a requirement for Extinguishments of Public Rights of Way on local roads in the cases described in the CPO Schedule Part 3 for the *Proposed Road Development*. The re-establishment of links will occur in all cases with the exception of the L-54041-0 as described above.

A Compact Grade Separated Junction (Drumfin/Cloonlurg Junction) is proposed at the L-1502-32, while a roundabout (Castlebaldwin Junction) is proposed at the realigned L-1404-0 as outlined in Section 4.4.2.

4.4.5 Other Road cross sections

The proposed cross-sections of realigned local roads, compact connector roads and access tracks are shown on Figure 4.4.2 of **Slide 42** which is an extract from Volume 3 of the EIS. In the case of local roads and compact connector roads, these generally consist of carriageways in each direction with hard strips; that is with the exception of the Eastern Parallel Link which will be provided with a 3m cycle track (two way) adjacent to the south bound carriageway. The access tracks generally consist of a 4m road with pull in bays at between circa 200m to circa 250m centres.

4.5 Compulsory Purchase Order

The land required for the development of the *Proposed Road Development* herein has been included in the Compulsory Purchase Order (CPO) which is also before the Board for confirmation with or without modification. The acquisition of the land proposed to be acquired is necessary in my opinion for the development of the road project in question and the realignment of existing roads and the provision of the necessary drainage works and ancillary works and services.

4.6 Traffic Analysis

I now call upon Shane Dunny, Chartered Engineer who is an Associate Director with AECOM to present his brief of evidence.

PART 2

5 INFRASTRUCTURAL PROVISIONS AND ENVIRONMENTAL DESIGN FEATURES

5.1 Infrastructural Provisions

5.1.1 Structures

There are a total of 18 principal structures provided for within the *Proposed Road Development* including:

- 4 no. road overbridges;
- 6 no. road underbridges;
- 2 no. clear span river bridges;
- 2 no. retaining walls (or reinforced earth structure) with a height in excess of 1.5m;
- 1 no. intermediate support ESB tower; and
- 3 no. noise barriers with a height greater than 3m.

In addition there will be a number of minor structures provided for. These will generally be developed through the detailed design stage; however in order to provide a description of the whole *Proposed Road Development*, it is considered that they may include:

- Approximately 77no. drainage culverts;
- Noise barriers provided at 3 locations ranging in height from 1.5 to 2.0m (in addition to the higher noise barriers referred to in the preceding section);
- Cantilever road signs provided at each approach to the Compact Grade Separated Junction;
- Retaining walls less than 1.5m in height:

5.1.1.1 Principal Structures

5.1.1.1.1 Overbridges

Overbridges proposed will be 3 span structures provided with 5.3m headroom. They will maintain the Type 2 Dual Carriageway under the local road with an additional 4.5m lateral clearance from the edge of the nearside carriageway. **Slide 43**; Table 4-5 which is an extract from Volume 2 of the EIS outlines the location of these structures with the maximum design criteria of the local road also outlined.

5.1.1.1.2 Underbridges

Underbridges proposed will be simple structures, provided to maintain the local road link under the proposed N4 which will maintain its full cross section throughout. **Slide 44**; Table 4-6 which is an extract from Volume 2 of the EIS, outlines the location of these structures with the maximum design criteria of the local road also outlined.

5.1.1.1.3 River Bridges

There are 2 no. locations where the proposed route crosses streams/rivers which will require a clear span bridge for crossing. These structures will be of a simple form and similarly to the road underbridges will maintain the proposed N4 cross section. **Slide 45**; Table 4-7 which is an extract from Volume 2 of the EIS, outlines the location of these structures together with the design characteristics calculated.

5.1.1.1.4 ESB Tower

The 220kV Flagford to Srananagh overhead transmission line passes over the proposed route at c. Ch. 7,120m in the townland of *Cloonlurg*. In order to maintain the required 9m clearance an additional Intermediate tower

is required adjacent to the proposed route. This will maintain the existing plan profile of the transmission line but will increase the vertical clearance over the proposed route as indicated in Fig. 4.6, Volume 3 of the EIS. The tower provided will be consistent with other intermediate towers on the existing transmission line which have been developed by the ESB in order to reduce the visual impact of the line. The height of the new intermediate tower will be approximately 29m above existing ground level. The lower most cable stay will be hung at a point of approximately 6.7m from the top of the tower.

5.1.1.1.5 Noise Barriers

The mitigation section of Chapter 8 (Volume 2, Noise and Vibration) specifies locations where Noise Barriers are required in order to ameliorate noise impacts to various properties. These barriers will be either of an earthen berm construction or be a proprietary barrier system.

There are three locations along the length of the *Proposed Road Development* where barrier heights will be in excess of 3m; these occur between circa Ch. 980m and 1,030m, Ch. 4,060m and 4,200m, and, Ch. 12,410m to 12,610m.

5.1.1.1.6 Retaining Walls/ Reinforced Earth Structures

Retaining walls (or reinforced earth structures) are proposed to limit the earthworks limits in the locations and for the reasons described below:

- In the townland of *Toberbride*: a retaining wall (or reinforced earth structure) ranging in height from circa 3.25m to 3.5m is proposed between circa Ch. 145m and circa Ch. 165m;
- In the townland of *Ardcurley/Cloonamahan*: a retaining wall (or reinforced earth structure) ranging in height from circa 1.5m to circa 3m is proposed between circa Ch. 1,400m and circa Ch. 1,630m.

5.1.2 Lighting and Signage

5.1.2.1 Lighting Overview

It is proposed to provide lighting at specific locations in order to assist road users at night to comprehend the new layout and to avoid driver confusion. The reasons for providing lighting are: -

- To clearly define and introduce the new road type to road users;
- To highlight areas where mixed traffic is likely to be present in order to improve road safety and reduce the potential for conflict at night;
- To improve driver comfort and reduce fatigue;

5.1.2.1.1 Proposed Lighting

It is proposed to provide lighting to traffic route standard at the following locations:

- Toberbride (East) Junction: On the East\West Link Road and the Eastern Parallel Link approaches;
- Cloonamahan Junction (North): On each of the approaches;
- Doorly Junction: On the Western Parallel link, Doorly Underbridge (North) and South Eastern Farm Access Road approach;
- Drumfin/Cloonlurg Junction (CGSJ): On each of the mainline approaches and for the full length of each of the Compact Connector Roads;
- Castlebaldwin Junction (roundabout): On each of the mainline approaches and for the full length of the L-1404-0 connection to the existing N4, additionally on the L-1404-0 approach from the north-east.

5.1.2.1.2 Lighting Design

The lighting installation shall be designed in accordance with ISEN 13201-2: 2003 Road Lighting Part 2: Performance Requirements and BS 5489-1: 2003 Code of practice for the Design of Road Lighting, Part 1:

Lighting of Roads and Public Amenity Areas. The installation of lighting columns is to comply with the requirements of Series 1300 and 1400 of the 'Specification for Road Works' as published by the NRA.

The design of lighting columns shall include the following:

- Lighting columns in the design shall be of slim galvanised steel construction with tubular outreach brackets to support the lanterns;
- The mounting height of the lanterns will be dictated by the overall road width and the Lighting Class applicable to the various category of road. In any case, columns will have a mounting height no higher than 12 metres;
- The lanterns will be fully cut off "Flat Glass" lanterns with Electronic control gear and LED lamps or similarly approved. They will be installed with zero tilt to minimise glare and light spill;
- As far as practically possible, lighting will be directed away from residential properties;
- All cabling associated with lighting will be located underground.

5.1.2.2 Route Signage and Road Markings

Traffic signage, including regulatory, warning and directional signs, are to be implemented following consultations with the NRA in compliance with the relevant standards, specifications and guidelines of the NRA, Department of Transport, Tourism and Sport, and the Department of the Environment, Community and Local Government, including:

- The junctions on the *Proposed Road Development* will require a network of signage to convey the necessary information to the driver and to improve the safety of the road and junction arrangement. This signage will include advance directional signage at 2km, 1km and 500m distance prior to the junction, as well as the junction off sign and route confirmation sign following the junction. These signs will be in conjunction with any regulatory signage required which will be addressed during the detailed design stage;
- New information signs will also be required to direct traffic approaching from the existing N4 to the *Proposed Road Development*. There will also be a requirement to remove, relocate or amend existing signage on the local surrounding network;
- Signage for facilities/tourist locations may also be required, and must be in accordance with NRA policy documents and standards.

The proposed road signage will be examined in more detail during the detailed design stage. All of the proposed signs will be accommodated within the landtake of the *Proposed Road Development* or alternatively within existing road corridors controlled by the Local Authority.

5.1.3 Facilities for non-motorised road users

The provision of safe and adequate facilities for non-motorised road users (NMU's) is an important aspect of any new road development. In recognition of this, the *Proposed Road Development* considers specific measures for NMU's including the following:

- To encourage the use of the existing route via signage provision;
- Provision of a 3m wide cycle track (two way) adjacent to the south bound carriageway on the Eastern Parallel Link which connects the existing N4 to the Toberbride (East) Junction;
- Provision of traffic islands and associated footpaths at entry/exits from the Castlebaldwin Junctions;
- Provision of traffic islands and associated footpaths at entry/exits from the Drumfin/Cloonlurg Junction (CGSJ) of both the north and south bound Compact Connector Roads where they meet the L-1502-32;
- Provision of footpaths on all road, over and underbridge structures;
- A section of the L-1404-0 which is part of the Beara Breifne Way (a historical trail which follows the line of the march of O'Sullivan Beara in 1602) is severed by the *Proposed Road Development* at approximately Ch. 13,530m. The design in considering this trail proposes a 2m wide walking track to re-link pedestrians (over the shortest length possible) via an uncontrolled pedestrian crossing back into the historical trail. An outline of this design measure is provided in Fig. 4.10 contained within volume 3 of the EIS and as shown on **Slide 46**.

Existing travel patterns are based around the existing road network where there are no facilities such as footpaths/footways except at Castlebaldwin village. As a result there is presently significant exposure to risk for these groups of road users and low amenity due to the narrow road cross section and the proximity of traffic.

The existing N4 will be retained and will act as an 'all-purpose' road, providing an alternative for non-motorised road users. It should be noted that the relatively high traffic volumes currently being experienced on the existing N4 discourage pedestrian and cyclist usage as there is no footpath or hard shoulder provision and is therefore particularly unsuitable and extremely unsafe for pedestrian, cyclist or equestrian use. However, the new *Proposed Road Development* will significantly reduce the traffic flow on the existing N4, which shall be retained for local traffic. The removal of through traffic from the existing N4 will have a safety benefit for NMU's, especially in the village of Castlebaldwin. The hinterland is rural in nature and there seems to be little evidence of any major pedestrian or cyclist usage that warrants the provision of user facilities along the existing N4 at present.

Where the new proposed route crosses existing side roads, these routes will for the most part be retained via an underpass or an overbridge structure and allowance will be made for pedestrians and cyclists where required at these locations.

5.1.4 Utilities and Services

In addition to the impact on the 220kV Flagford to Srananagh overhead transmission line, the construction of the *Proposed Road Development* will generally result in some limited impact on existing utilities.

Those companies and organisations whose plant may be affected have been consulted during the development of the project.

The disruption of utilities along the route has the following implications for the design and construction of the project:

- It will be necessary to re-route sections of existing services, with connections back to the existing apparatus at the terminal points of these services;
- Provision shall be made for proposed additional services and extensions to existing networks, in particular at bridge crossings;
- For existing services, it may be necessary to maintain these services as far as possible during construction. This may entail temporary service diversions and/ or staging of works during the construction phase;
- At detailed design stage, all existing services will be confirmed on site and the various utility companies and local authorities shall be consulted to confirm any additional and amended service infrastructure.

5.2 Environmental Design Features

During the design and EIA process, certain criteria were applied to the *Proposed Road Development*. These included the initial design measures applied and additional features which have been incorporated into the design in order to assess the environmental effects and where possible, reduce the likelihood of significant effects. This section of the brief outlines the measures which have influenced the environmental assessment.

5.2.1 Road Surface

Pavement design will be developed by the Contractor in accordance with the NRA Design Manual for Roads and Bridges and the NRA Specification for Roadwork's during the detailed design stage. For the purposes of Environmental Impact Assessment the design has considered the surface course materials to be as follows:

- Hot Rolled Asphalt on the:
 - o Proposed N4 carriageways, hard shoulders and hard strips;
 - o Roundabouts and their approaches; and
 - o Compact Connector Roads which form part of CGSJs;
- Surface Dressing on:
 - o Realigned local roads; and
 - o Access Tracks;

5.2.2 Operational Stage Water Quality

Considering the *Proposed Road Developments* proximity to important ecological sites including the designated sites of the Unshin River cSAC/pNHA and the Lough Arrow cSAC/pNHA/SPA; detailed consideration has been had as to how the road runoff from the *Proposed Road Development* is to be treated prior to discharge to the receiving watercourses. The following provides an overview of the infrastructure proposed.

5.2.2.1 Road runoff surface water drainage and treatment

Development of the road surface-water drainage system evolved through due consideration of the quality and quantity of water being discharged to the receiving environment, the sensitivity of the bedrock geology in the area and the biodiversity of the surrounding environment which is populated with numerous undesignated ecological wetland sites.

In this regard the principle of Sustainable Drainage Systems (SUDS) has been applied as far as is reasonably practicable. This principle seeks to maximise the environmental benefits of the drainage system through quality and quantity control within a system which attempts to mimic the processes that occur in nature, additionally it is foreseen that the drainage design developed in this manner will blend in more harmoniously within the existing landscape considering the biodiversity values of the surrounding environment. The design of the drainage system has considered SUDS in terms of the conveyance system and the quality/quantity treatment system adopted. The system will be sealed as outlined in section 4.8.2.2.3 of the EIS where risks are identified in relation to karstified bedrock or aquifer vulnerability.

5.2.2.1.1 Conveyance System

The conveyance system of the *Proposed Road Development* has been developed throughout as Surface Water Channels. Over the edge drainage was generally avoided (with the exception of local roads and access tracks as described below) considering the sensitivity of the Hydro-geological environment which the *Proposed Road Development* occurs within and the localised flood plains which it intercepts.

Grassed Surface Water Channels will be used in cut sections and on embankments of less than 1.5m in height. The system is shown figuratively in Fig. 4.7.11 contained within Volume 3 of the EIS and as shown on **Slide No. 47**, it provides the SUDS components of Pre Treatment through the use of collector gullies and Source Control via the grassed channel itself. Where Grassed Surface Water Channels are not permissible Concrete Surface Water Channels are proposed.

The road drainage system has been developed in a manner so that as far as is reasonably practicable surface water emanating from a particular water body catchment area would be returned to that catchment following

treatment (Site Control). The conveyance system of side roads will also where practicable adopt the system described above. However as already mentioned, there are instances where Kerb and Gully and over the edge drainage will be more appropriate. The conveyance system for access tracks will generally be an over the edge system discharging directly to the watercourse.

5.2.2.2 Surface Water Treatment

5.2.2.2.1 *Identified Outfalls to be protected*

The *Proposed Road Development* is located wholly within the Western River Basin District (WRBD), which is a largely rural area with many high quality waters and protected sites that depend on water. The WRBD is defined as the physiographical region within hydrometric areas 29-35 that drain into the Atlantic Ocean. It covers an area of 12,193km², comprises 89 river catchments with over 14,200km of river and contains the sub-catchment of the Unshin River and its sub-catchments including Lough Arrow. The *Proposed Road Development* is entirely located in Hydrometric Area 35 and crosses drains and streams which discharge to the Unshin River and Lough Arrow.

A total of 15 outfalls will accept treated and attenuated road runoff. These outfalls discharge via the aforementioned drains and streams to the Unshin River catchment in fourteen cases and to Lough Arrow catchment in one case. The outfall points generally occur some distance upstream from the designated sites, the closest ones being;

- Outfall number 03 occurring within the townland of *Ardcurley/Lackagh* a distance of approximately 130m upstream from the boundary of the Unshin River cSAC/pNHA;
- Outfall number 05 occurring within the townland of *Knocknagroagh* a distance of approximately 170m upstream from the boundary of the Unshin River cSAC/pNHA;
- Outfall number 06 occurring within the townland of *Knocknagroagh* a distance of approximately 300m upstream from the boundary of the Unshin River cSAC/pNHA.

Treatment measures adopted

At each of the aforementioned outfall points the following control measures will be implemented as part of the drainage design. These measures will include:

- Petrol interceptors;
- Spill Containment Measures; and
- Constructed Wetlands/attenuation facilities.

Constructed wetlands/attenuation pond facilities will provide for treatment volumes within a permanent pool in addition to attenuation controls for the 1 in 100 year storm providing a peak discharge rate equivalent to the existing Greenfield Runoff Rate. These ponds are designed to replicate as far as it reasonably practicable the various natural wetlands which are interspersed within the vicinity of the *Proposed Road Development*. In this regard and to facilitate treatment, the ponds will be planted with among other things Reeds and Bulrush for treatment purposes. The dimensional design of the ponds was established with reference to the *Greater Dublin Strategic Drainage Study* (undertaken by Dublin City Council). Section 4.8.2.2.2.3 of the EIS (volume 2) describes this design in detail which considers:

- Volume of Runoff;
- Rate of Runoff; and
- Quality of Runoff.

In addition to the new ponds proposed as part of the drainage design, two further ponds will be utilised as part of the project. These include existing ponds in the townlands of Toberbride and Ardloy; both ponds will be integrated to become vegetative systems.

5.2.3 Lough Corran Outflow (or Turnalaydan Stream Diversion)

Due to the meandering nature of the Lough Corran Outflow (or the Turnalaydan Stream) as it passes under the alignment, consideration was given during the design process to realign the stream locally as it passes under the alignment. Following an onsite meeting with IFI representatives and subsequent office meetings with the IFI and the NPWS it was considered that such a diversion could improve the fisheries value of this tributary of

the Unshin River cSAC and is so proposed as part of the current proposal. This is shown figuratively in Fig. 4.7.12 contained within Volume 3 of the EIS and as shown on **Slide No. 48**.

The channel shall be free of any erosion potential prior to its opening. The opening shall be carried out in a carefully controlled manner in accordance with the principles set out in the Erosion and Sediment Control Plan and with the mitigation measures set out in Chapters 12 and 14 of the EIS. The opening shall also be carried out under the supervision of the Environmental Assurance Officer and an IFI representative.

Should the contractor require deviating from this proposal during the detailed design stage then the alternative structure across the existing stream shall be clear span with adequate clearance to avoid any in stream works or permanent structural features within 3m of the top of the river bank.

5.2.4 Geotechnical

5.2.4.1 Road embankment design in soft ground areas

Based on Preliminary Ground Investigation Contracts carried out for the *Proposed Road Development* and the subsequent preparation of a Preliminary Geotechnical Interpretive Report, it has been identified that there are areas along the route of the *Proposed Road Development* where soft ground conditions will be encountered which are unsuitable to support the weight of the road embankment.

It will be a matter for the contractor to determine the appropriate construction techniques to deal with these ground conditions during the detailed design and construction stage. However, in order to ensure a full assessment of the environmental impacts, the most potentially environmentally significant method of dealing with same has been assessed. This is that the soft material unsuitable for supporting the weight of the proposed route would be dug out and replaced with suitable fill material. This allows the engineering, environmental and monetary impacts of the *Proposed Road Development* to be determined and in particular to facilitate the Environmental Impact Assessment to be completed on a reasonable basis reflecting general practice within the industry.

5.2.5 Specific Design Mitigation Measures

5.2.5.1 Sensitive Locations

During the development of the EIS for the *Proposed Road Development* numerous sensitive locations were identified including undesignated ecological sites and ground water supply systems. In order to protect these features, and to, reduce the 'likelihood of significant effects' modifications have been applied to the design. These carefully considered discrete changes included:

- Modifications to the horizontal alignment to:
 - o Avoid and reduce direct impacts on ecologically sensitive undesignated sites; and
 - o To reduce the volume of peat required to be excavated during the course of construction works.
- Specific considerations in terms of the vertical alignment to:
 - o Avoid indirect impacts on ecologically sensitive undesignated sites; and
 - o To avoid/reduce potential interception of groundwater contributions to Carrownagark Group Water Supply scheme.

In addition to these modifications specific geotechnical measures were also applied in areas to avoid the potential for indirect impacts.

These measures have been developed in consultation with the various experts undertaking the assessment presented in the EIS and with representatives of the NPWS.

5.2.5.2 Landscape Infill Site

The Landscape and Visual Impact Assessment Chapter of the EIS, has, as part of landscape mitigation, proposed that an area of severed agricultural land to the north-east of Castlebaldwin be graded to blend in with the existing and proposed public roads which bound it.

This landscape mitigation requires the low lying land to be raised to match the profile of the embankments of the existing and proposed public roads as outlined in plan format in **Slide No. 49**. The area will then be top soiled and planted with woodland and shrub planting, wild flower meadow and parkland grass. Any existing

land drainage systems within the area will be backfilled with drainage material and diverted to the maintained watercourse (Drumderry Stream) to ensure any potential groundwater seepages are intercepted.

In accordance with the NRA Specification for Roadworks; the appropriate material to infill this site will be Class 4 Landscape Fill.

The landscaping of the site (which is described in chapter 10 of the EIS) will include a hardstand viewing area offering a view of the Castlebaldwin Fortified House. Incorporated into this will be tourist information boards on the Castlebaldwin Fortified House, the Carrowkeel passage tomb cemetery and the Beara Breifne way.

5.2.6 **Flooding**

The design of the *Proposed Road Development* had due regard to the OPW publication *The Planning System and Flood Risk Management: Guidelines for Planning Authorities, (2009)*.

This involved the undertaking of a Flood Risk Assessment on behalf of the Road Authority by Hydro Environmental Ltd. which is included as appendix 4.2 to the EIS (volume 4).

Hydraulic models were undertaken for the main watercourses crossed by the *Proposed Road Development*.

Following the implementation of identified Flood Risk Mitigation measures including in certain cases weir controls, flood conveyance culverts and minor improvements to existing channel conveyance systems, there are no significant impacts identified.

The Flood Risk Assessment has also checked the adequacy of minor culverts. This revealed all culverts were adequately sized to convey flood waters.

6 CONSTRUCTION OF THE PROPOSED ROAD DEVELOPMENT

6.1 Outline

In assessing environmental effects, activities during the construction phase often play a significant but albeit temporary role in the impact assessment process. In addition to the activity itself, this includes the materials produced and the materials required to undertake the project.

In order to effectively control this stage of the project and ensure 'the likelihood of significant effects' are reduced as far as practicable, thresholds have been set for some aspects of construction activity while in other instances procedures and controls have been put in place. The following section briefly outlines the main provisions made.

6.2 Programme and Contract

Subject to satisfactory completion of the statutory procedures and to the availability of finance, it is anticipated that construction work will commence in 2015.

It is expected that the *Public Works Contract for the Provision of Civil Engineering Works Designed by the Contractor (PW-CF4)* issued by the Department of Finance will be the form of Contract to be used for the *Proposed Road Development*. The use of this type of Contract is based on a clear definition of requirements and a comprehensive output specification which effectively transfers a significant portion of risks to the Contractor. It also however encourages the contractor to utilise innovative designs and construction techniques which will improve the quality of the end product. No change of designs or construction techniques which would result in any significant increase in environmental impacts beyond those predicted and assessed herein would be permitted on foot of the development consent if granted on foot of this application. This method does allow however for potential further reduction of impacts by virtue of improvements in such designs or techniques.

The construction period is anticipated to last approximately 2 years. Normal hours of work will be Monday to Saturday 07:00 to 19:00 hours unless specific restrictions are placed on certain activities within certain chapters of the EIS. Certain operations may however be carried out outside of these hours with the permission of the contracting authority.

Where restrictions are placed on the Contractor due to seasonal constraints, as for example in the case of felling of trees, consideration will be given to advance works being undertaken where appropriate.

6.3 Earthworks Volumes

The design stage of the *Proposed Road Development* has identified that earthworks balancing (Cut : Fill) when applied exclusively to the material won and generated in the course of the various design elements would lead to a significant deficit of fill material and a significant surplus of spoil material generated. This is mainly as a consequence of:

- The fill design requirements for:
 - o Underbridges, overbridges, and watercourse culvert crossings;
- The undulating topography;
- The environmental need to avoid cutting into the groundwater table (and saturated bedrock) in sensitive locations;
- The characteristics of the drumlin deposits which the *Proposed Road Development* intercepts, insofar as the preliminary Ground Investigation results indicate that the material excavated from the upper surfaces of road cuts generally appears to be unsuitable for road construction purposes;
- The interception of areas of soft ground along the route which will require to be excavated from underneath proposed road embankments and replaced with suitable fill material;

It is envisaged that the construction of the N4 Collooney to Castlebaldwin *Proposed Road Development* will require the excavation (from cut sections and areas of soft ground underneath embankments) of approximately 1.4 million m³ of earthworks materials. The following provides an outline of the components of this material and the other material likely to be produced as a result of the *Proposed Road Development*; quantifications made are approximate and exclusive of material win or material deposit which is likely to arise from the spoil repositories/borrow pits which will be described later in section 6.4 of this brief.

6.3.1 Material won during the course of road excavations

Topsoil depths through the project vary depending on the underlying material. In mineral soil areas the topsoil depth is typically between 0.1m and 0.2m. The total topsoil quantity is expected to be approximately 164,000m³ and this is considered sufficient for landscaping purposes throughout the *Proposed Road Development*.

Acceptable Material (excavated material suitable for re-use in structural embankments) can be recovered from the cut areas subject to proper construction management. Based on the design, there is potential to recover approximately 559,000m³ of material from road cuts. This material can be reused in embankments (mainline and side roads), constructed wetland attenuation facilities or other infrastructure requiring the provision of earthen bunds.

Rock is likely to be encountered in some road cuttings, and will yield approximately 27,300m³ of suitable material for processing into General Granular Fill.

6.3.2 Surplus unsuitable material arising during the course of road excavations

The remaining material in its excavated state amounting to approximately 809,000m³ is estimated to be unsuitable for incorporation within the proposed road embankments.

The unsuitable material is broken down into two categories which are as follows:

- Peat and soft alluvial or organic clay excavated predominately from underneath proposed road embankments;
- Cohesive subsoil material excavated predominately from the upper surfaces of drumlin hills which the *Proposed Road Development* intercepts (i.e. road cuts).

In establishing methods to deal with this material the design team have prepared a Spoil Management Report which will be discussed in section 6.4. The spoil material estimated to be generated (following its appropriate use in landscape areas) as a result of the aforementioned characteristics consists of Subsoil (c. 177,000m³), Peat (c. 307,000m³) and Organic Clays (c. 223,000m³).

6.3.3 Material sourcing

There will be no requirement to import topsoil for the *Proposed Road Development*. There is a deficit of approximately 649,000m³ suitable material (assuming no processing) for road embankment construction above ground level with a further requirement of approximately 144,000m³ of capping material. Additionally, the excavation of unacceptable material below formation level will require the placing of approximately 239,000m³ of rock fill, and approximately a further 206,000m³ of suitable material. Based on the foregoing, the total fill requirements are estimated to be c. 1,238,000m³.

6.4 Spoil Management

6.4.1 Outline of approach

Considering initially the spoil material generated, a Spoil Management Report was prepared by the design team. The principle purpose of this report was to establish a method which would allow the requirements of section 50(3) (a) and (c) of the Roads Act, 1993 (as amended) to be met; which relates to the information which is to be contained in an Environmental Impact Statement.

This report established the most appropriate approach and techniques to deal with spoil material generated by the *Proposed Road Development* to be spoil repositories/borrow pits contained within the CPO. This was established based on a tiered approach beginning initially with a broad investigation which looked at over 60 areas of land in the vicinity of the *Proposed Road Development*. The broad investigation evolved into a Range

of Options which were then assessed in principle from an environmental perspective. The optimum solutions established from this Range of Options were considered to be the aforementioned spoil repositories/borrow pits. There were a number of reasons for this including:

- (1) They are within or directly adjacent to the *Proposed Road Development*;
- (2) The material is stored predominately below ground level, therefore:
 - a. There is no risk of impacting on flood plains;
 - b. There is no risk of a material slide;
- (3) Considering the depth of material which they can accept, they have a much smaller land area requirement when compared with the other options;

Additionally and equally as important; in terms of the Spoil Repositories/Borrow Pits, the report examined the need for such infrastructure in terms of material resource requirements. This revealed that there was a very justifiable need for borrow pits to be included within the limits of the *Proposed Road Development* and as such the limits of the CPO were extended to include their provision thus providing what is effectively a maximum envelope on the nature of this *Proposed Road Development*, its impacts and mitigation. This is done, notwithstanding the fact, that it will be the contractor's prerogative to determine onsite dimensions based on the detailed ground investigation.

The following briefly describes the various categories of spoil repositories proposed.

6.4.1.1 Spoil Repository landscape infill sites

These are suitable sites which have been identified within lands required for land severance reasons. In general these lands are sites:

- Which are flat or basin shaped;
- Which lend themselves to grading down and blending in of road construction embankments;

These lands are to be filled to a depth (determined by the characteristics of each specific site) with the 'unsuitable' soil, subsoil material and where appropriate peat material. The perimeter edge of the graded lands shall be no greater than 1V:4H, sloping down to existing ground levels, onto road construction embankments or onto containment berms which shall have side slopes of 1V:4H.

6.4.1.2 Spoil Repository/Borrow Pits

The Spoil Management Report sets out two separate schematic configurations for the spoil repository/borrow pits, it also establishes performance requirements which mainly relate to the final landform or landscape perspective which the pits will provide.

The configuration of spoil repository/borrow pits were developed in consideration of a number of factors including among other things landscape & visual impacts, ecological and geotechnical stability. They were sited so that they would allow re-grading back into the existing topographical landscape.

In this regard Type 1 Spoil Repositories/Borrow Pits were selected for backfilling predominately with glacial till material excavated during the course of the construction works and considered unsuitable for the construction of road embankments while Type 2 Spoil Repositories/Borrow Pits were selected for backfilling predominately with peat and alluvial or organic clays.

6.4.2 Material win from proposed borrow pits

The material to be won from the spoil repository/borrow pit sites is a significant consequential advantage of the approach adopted. The material win from the borrow pits as dictated in the EIS will equally balance the spoil material which is available to backfill the appropriate pits.

This will aid to balance the deficit quantities which have been outlined in section 6.3 of this brief.

6.4.3 Alternatives and Spoil Material Remaining

The Spoil Management Report through analytical calculations outlines that if the sites which have been included wholly within the confines of the *Proposed Road Development* transpire to maximise the extents

described in the report, there may remain potential that a surplus balance of approximately 72,000 m³ of peat and approximately 7,000m³ of organic clay material could remain.

It may be a case that the vertical limits of the borrow pits described are maximised further by the contractor during the detailed design/construction phase of the project thus reducing these quantities. Notwithstanding this, in recognition of the aforementioned balance and the assumptions contained within the report (which are reflective of the stage of design and consent), other considerations are provided including alternative construction techniques and the potential application of the Waste Hierarchy.

6.5 Construction and Demolition Waste Management Plan

An Outline Construction and Demolition Waste Management Plan has been prepared for the *Proposed Road Development* and is included as Appendix 4.4 of Volume 4. This plan initiates the Construction and Demolition Waste Management process and an obligation as part of the contract documents for the project will be placed on the Contractor to develop, maintain and operate a more detailed Construction and Demolition Waste Management Plan.

The Outline plan addresses the following aspects of the project:

- Analysis of the waste arising/material surpluses;
- Waste handling and methods identified for the prevention, reuse and recycling of wastes;
- Material handling procedures;
- Roles including training and responsibilities for C&D waste; and
- Waste Auditing protocols;

6.6 Temporary Access and Construction Traffic

Construction traffic will be generated by movement of material, equipment and supply vehicles. A small amount of traffic will be generated by site personnel.

Primary access to the site for all construction vehicles will be provided from the existing N4. Access points will be available throughout the online section between *Toberbride* and *Doorly* and to the offline section at *Doorly*, *Ardloy* and *Castlebaldwin*. The route is a National Primary Route and, generally, of sufficient width and condition to accommodate construction traffic without causing adverse effects to nearby property or delays for road users. It is anticipated that construction traffic will also use a haul road along the road corridor itself, for access. The use by construction traffic of local roads L-55015-0, L-55016-0, L-5502-0, L-1502-32, L-5402-0, L-54033-0 and the L-5401-0 will be limited to activities associated with construction of the bridges (and in the case of the L-5502-0 initial access to the Spoil Repository/Borrow Pit sites).

The L-5502-0 is likely to be closed for a period during construction to facilitate works at the spoil repository/borrow. This road closure is likely to be required for a period of between 6 to 9 months.

Vehicle movements will be required for the movement of material on haul roads within the site boundary. At the peak construction times this may result in approximately 200 traffic movements a day (approximately 30 movements an hour).

In order to minimise disruption, a traffic management plan for the construction period will be developed. Construction vehicles will be restricted to the construction corridor where possible and will only use local roads as outlined above.

The Contractor will be responsible for daily inspection and maintenance of roads to ensure that they are free of construction debris, dust and mud.

6.7 Temporary Road Diversions

The locations where local roads require temporary diversions during construction of the realignment are listed in table 4-15 of the EIS (volume 2). These diversions will in most cases be accommodated within the land-take required for construction of the *Proposed Road Development*. However, there are localised instances where the diversion may be via alternative routes on the local road network. All diversion routes will be properly sign posted.

6.8 Construction Stage Water Quality Considerations

An Erosion and Sediment Control Plan (contained within appendix 4.5 in volume 4 of the EIS) has been prepared as a method of water quality mitigation to offset potential Construction Stage pollution impacts from the *Proposed Road Development* to adjacent watercourses including the Unshin River cSAC/pNHA and Lough Arrow cSAC/pNHA/SPA and their respective tributaries/inflow streams.

The Plan is intended to inform the Construction Stage Erosion and Sediment Control Plan which, in turn, will form an integral part of the Environmental Operating Plan (to be developed by the contractor) for the *Proposed Road Development*. In particular, the mitigation, control, monitoring and emergency measures for the *Proposed Road Development* in relation to Erosion and Sediment Control are described in the document. The Plan is also used to:

- Inform the Hydrological & Hydro-geological and in turn the Flora, Fauna & Fisheries Impact Assessments; and
- Ensure sufficient lands have been included within the CPO to treat sediment runoff during the Construction Stage for the *Proposed Road Development*;

The main body of the report (appendix 4.5 of volume 4) is guided by the technical guidance document, *Control of water pollution from linear road projects*, published by CIRIA (C648). Additionally plans prepared by other design offices for similar projects were reviewed and considered.

6.9 Monitoring of Environmental Commitments

The environmental commitments outlined in the EIS, NIS and any subsequent An Bord Pleanála approval conditions will be included within the contract documents as a requirement of the construction contract with the contractor. The Local Authority will appoint an Environmental Assurance Officer who shall be responsible for among other things:

- (1) Ensuring that the measures included in the Environmental Operating Plan (EOP) consider the full gamut of environmental commitments contained within the EIS;
- (2) Ensuring that the method statements and environmental measures detailed in the EOP are implemented on site via regular auditing procedures;
- (3) Ensuring that the controls described in the Erosion and Sediment Control Plan will be adhered to;
- (4) Ensuring that the approach and objectives of the Spoil Management Plan are adequately adhered to;
- (5) The auditing of Waste Management practices carried out under the Construction and Demolition Waste Management Plan.

The Environmental Assurance Officer will be delegated powers under the contract sufficient for any appropriate instructions to be issued.

6.10 Operation and Maintenance

During a period of 24 months after construction, remedial and maintenance works will be undertaken as required. During the period of establishment, landscaping maintenance will be carried out.

Routine maintenance on National Primary Roads is normally undertaken by the Local Authority. In general, routine maintenance comprises grass cutting, road sweeping, gully emptying, street light maintenance and landscape maintenance. A separate maintenance procedure will be adopted to maintain the central barrier within the Dual Carriageway road sections.

7 Cumulative Impacts and Interrelationships

7.1 Cumulative Impacts

This main Cumulative Impacts considered within the EIS include:

- In relation to other road upgrade works:
 - o Existing and potential upgrades to other sections of the N4 National Primary Route;
 - o Upgrades to the nearby N17 including the potential N17 Collooney to Tobercurry Bypass realignment and the N17 Tobercurry Bypass realignment;
- In relation to potential offsite construction activities as a result of the *Proposed Road Development*:
 - o Although considered unlikely there remains a possibility as described in the EIS that there may be a requirement to treat a portion of the onsite generated spoil material offsite. Section 10 of the Spoil Management Report examines the most likely sites outside the CPO which the contractor might consider if an offsite approach was required for any particular reason. The utilisation of the sites which includes conifer plantations and low lying agricultural lands is considered in each of the relevant impact assessment chapters of the EIS in a Macro sense in terms of *Indirect* and *Cumulative* Impacts.

The foregoing is considered in each of the relevant chapters of the EIS. It can be concluded based on these assessments that there will be no significant cumulative effects arising as a result of the construction and operational phases of the *Proposed Road Development*.

7.2 Interrelationships

In addition to the assessment of impacts on individual topics, the inter-relationship between each chapter was also taken into account as part of the EIS. This was facilitated through:

- Ongoing interaction between the design team and specialist sub consultants;
- Discussions at workshops and EIA progress meetings; and
- Direct consultation between the various sub consultants, e.g. Landscape and Visual consultant corresponding with the Flora, Fauna and Fisheries consultant regarding landscape planting to compliment ecological mitigation requirements, etc.

Where a potential exists for interaction between two or more environmental topics, the relevant specialists have taken the potential interactions into account when making their assessment and where possible complementary mitigation measures have been proposed. Table 5-3 of the EIS (volume 2) gives an indication of the initial identification process in determining where there may have been a potential for an interrelationship to occur.

8 Errata and Addenda to the EIS

8.1 Errata

A number of corrections have been made to the EIS. These are available in the **Errata Sheet No. 01** provided to the board and placed on the public information table at the rear of the room.

8.2 Addenda to the EIS

A number of additional commitments have been made to the EIS. These are available in the **Addenda Sheet No. 01** provided to the board and placed on the public information table at the rear of the room.

PART 3

9 Submissions

9.1 General

A total of 98 submissions have been received by An Bord Pleanála in response to the publication of the CPO, NIS and EIS for the *Proposed Road Development*.

The submissions comprise:-

- 5 submissions from Statutory Bodies, namely An Taisce, Health Service Executive (HSE), Inland Fisheries Ireland (IFI), Department of Arts, Heritage & the Gaeltacht and Geological Survey of Ireland (GSI).
- 81 submissions were lodged by affected land and property owners.
- 5 submissions were lodged by other parties, namely Sydney & Olive Taylor, Rea Agri Environmental Consultants Ltd., Martin & Rea, Barry Walsh and Peter Sweetman.
- 7 submissions were lodged by other parties, namely Sligo Chamber, IDA Ireland, Cromleach Lodge Country House, Cleveragh Park Management, Cllr. Gerard Mullaney, Aurivo Co-operative Society Ltd. and Sligo Tourism which are showing support for the *Proposed Road Development*.

9.2 Submissions by Public Bodies

Detailed written responses have been prepared and forwarded to the 5 Statutory Authorities noted above. It is proposed to submit a copy of the responses to the Board at the commencement of this Oral Hearing.

9.3 Submissions by affected Land and Property Owners

Detailed written responses have been prepared in respect of all land and property owner submissions received. It is proposed to submit the responses to the Board at the commencement of this Oral Hearing. A copy of the responses will be made available during the hearing to each private individual who made a submission.

The main issues raised by land and property owners are summarised below and are considered either in this evidence or in the detailed individual responses prepared. In many cases the issues will also be addressed as part of the separate CPO compensation process.

- Direct impacts on land and property, access arrangements and other accommodation works;
- Impacts associated with privacy, noise and vibration, drainage and services;
- Queries in relation to Safety Barrier provision and location of Construction Compounds;
- Excessive landtake.

9.4 Submissions by Other Parties

Detailed written responses have been prepared in relation to those received from Sydney & Olive Taylor, Rea Agri Environmental Consultants Ltd., Martin & Rea, Barry Walsh and Peter Sweetman. It is proposed to submit the responses to the Board at the commencement of this Oral Hearing. A copy of the responses will be made available during the hearing to each private individual who made a submission.

9.5 Submissions by Other Parties (Positive Submissions)

Responses were not prepared in relation to the 7 positive submissions received as in general these submissions are showing support for the *Proposed Road Development*.

10 Conclusions

Firstly, may I firstly acknowledge the disturbance that will be caused to those living and working in the vicinity of the *Proposed Road Development*, most particularly to those whose primary residence is proposed to be acquired. Various specialists will present their assessments of the impact of the *Proposed Road Development* on the environment in a local, regional and national context, but the impact on individuals is personal to them and cannot be diminished by comparison to the wider context.

While acknowledging these personal impacts, they are unfortunately necessary in order to address the deficiencies of the existing national primary route in question in terms of alignment, capacity and safety. As can be seen from the 30 white crosses erected along the route to denote lives lost, this section of roadway is extremely dangerous and is not fit for purpose.

As already outlined, over the period 1996 to 2011 the recorded casualties on the section of the N4 under consideration include the following:

- 8 fatalities;
- 8 serious injuries;
- and 56 minor injuries.

The reduction in collisions predicted as a result of the proposed development over the 30 year period between 2017 and 2047 is as follows:

- 27 fatalities;
- 87 serious injuries;
- and 897 minor injuries.

Furthermore, it is estimated over the 30 year appraisal period between 2017 and 2047, the proposal will reduce time spent in traffic delays by approximately 2.736 million hours which equates to 114,000 days.

As outlined above, the proposed development is needed to address a notable road safety deficiency. The *Proposed Road Development* would achieve this through provision of a safer cross section and alignment which would virtually eliminate head-on collisions, significantly reduce the severity of single vehicle accidents, and lead to safety improvements for those who would continue to use existing roads by reducing traffic volumes on those roads.

Without the proposed development, the existing road network will become increasingly overloaded leading to congestion and platoons of traffic which in turn will lead to increased collision rates as outlined above.

The proposed development will provide for the separation of local and strategic through traffic and will bring benefits to the local communities of this area by removing close to 80% of traffic at Drumfin from the existing N4 and in the order of 89% of traffic from the village of Castlebaldwin. This provides significant benefits to the houses (approx 70 no.) located on the existing N4 between Doorly Td. and Castlebaldwin Village particularly in terms of noise.

The Proposed Development will reduce community severance within the village of Castlebaldwin.

The provision of separate facilities for vulnerable road users (approx. 3.5km in total) will provide a much safer environment for all road users. In addition, vulnerable road users shall be able to use the existing N4 road network given the large reduction in traffic as a result of the *Proposed Road Development*.

The provision of separate infrastructure from the existing N4 will allow the existing N4 to be utilised for traffic diversions in emergency situations.

I believe that, as a result of all the design work that has been undertaken over the past 13 years, the proposed development represents the most appropriate solution striking the necessary balance between impacts on the

environment, and those individuals who will be directly affected by the proposal, with needs of the society as a whole.

The *Proposed Road Development* is in the interests of the Common Good and is economically robust. I confirm that the lands identified in the CPO are necessary for the construction of the proposed road.

National and Regional Planning and Development Policy and Infrastructure Development Plans have identified the need to upgrade the N4 route. As recently as the 19th November 2013 the European Parliament gave final approval to the TEN-T Trans European Transport Network. This requires the development of a Core Network by 2030, with a connecting comprehensive network of express routes to be delivered incrementally by 2050. This comprehensive network includes a requirement for Ireland to upgrade the full length of the N4 to express route standards. The delivery of the proposed development forms a part of this commitment.

I now call upon Stephan Ward, A/Senior Executive Planner with Sligo County Council to present his brief of evidence, to be followed by the team of specialists who will present their assessments of the environmental impact of the proposed development.