Chapter 3 Description of Proposed Scheme

3.1 General Description of Scheme

3.1.1 Route

The proposed N9 Kilcullen to Powerstown Scheme will provide a new high quality dual carriageway road for the N9 between the southern end of the existing M9 Motorway at Kilcullen in County Kildare and the existing N9 at Powerstown, south of Carlow Town, in County Carlow. The alignment of the Mainline is presented in Figures 3.1 to 3.30 in Volume 2. The length of the new road is 46.2 kilometres.

The scheme includes a new single carriageway link road between Athy Town and the existing N9 just north of the N9 / R747 junction, between Ballitore and Timolin. (See Figures 3.31 to 3.38 in Volume 2) The Athy to R747 Link Road is 11.2 kilometres in length. This link road will intersect the proposed N9 dual carriageway at Mullamast, where a grade separated junction will be provided.

Two other single carriageway Link Roads are also included in the scheme. These are:

- N9 – N78 Link Road in Section A - Length = 1200 metres (See Figure 3.39 in Volume 2)
- Realigned N9, SW of Junction 3, in Section B - Length = 1360 metres (See Figure 3.40 in Volume 2)

Grade separated junctions have been included in the scheme to provide access onto the proposed N9 dual carriageway where it crosses existing National Primary and National Secondary Roads, as well as at the proposed Athy to R747 Link Road. (See Figures 3.41 to 3.50 in Volume 2). No other public access onto the dual carriageway will be provided. Existing Regional and Local Roads will in general be diverted over or under the proposed new road. (See Figures 3.51 to 3.64 in Volume 2 for details of the road realignments)

The proposed bridge that will carry the existing N9 National Primary Road over the proposed N9 dual carriageway at Usk Little is heavily skewed (43.6 deg) and as a consequence the bridge length will exceed 100 metres. As such, this bridge is designed as a "prescribed type of road development" in S.I. No 119 of 1994, paragraph 8 (See Section 1.3.1) and it therefore requires a separate Environmental Impact Assessment. The structure has therefore been addressed in each Chapter of this Environmental Impact Statement for the Scheme and, where appropriate, under each heading of the Environmental Impact Statement. A plan and elevation for the proposed bridge carrying the existing N9 National Primary Road over the proposed N9 dual carriageway at Usk Little are included in Figure 3.69 (Volume 2).

3.1.2 Function of the Proposed Scheme

The proposed N9 Kilcullen to Powerstown Scheme is intended to achieve the aspirations of the National Development Plan 2000 to 2006, and is of both National and Regional importance. At National level it constitutes part of the National Primary Route between Dublin and Waterford, while at the Regional level, the route provides access to towns and communities within the catchment of the route.

To enable the new road to provide access at a Regional level, 5 grade-separated junctions have been included in the scheme where the proposed scheme crosses existing and proposed National Primary and Secondary roads.

The Athy to R747 Link Road will provide improved access between Athy and Dublin and the eastern counties, in recognition of Athy's designation as a Secondary Development Centre in the Greater Dublin Area. The new road also forms part of a strategic link between Athy, and Baltinglass in County Wicklow.

3.1.3 Route Description

The N9 Kilcullen to Powerstown Scheme tends in a general north-south direction between Kilcullen, at the northern limit of the scheme, and Carlow, which it by-passes on the east side of the town. The road then heads in a south-westerly direction to the southern limit at Powerstown, south of Carlow Town. The route description follows the 4 geographical sections identified in Chapter 1 of this report.

Section A	Kilcullen to Mullamast	Ch. 78,500 – Ch. 62,000
Section B	Mullamast to Prumplestown	Ch. 62,000 – Ch. 50,000
Section C	Prumplestown to Powerstown	Ch. 50,000 – Ch. 32,300
Section D	Athy to R747 Link Road	

The proposed N9 is designated a High Quality Dual Carriageway and has been designed to be consistent with a design speed of 120 kph. The single carriageway Athy to R747 Link Road has been designed to a National Road standard with a design speed of 100 kph.

In general, the route passes through the rural areas of counties Kildare and Carlow. The route crosses flat and gently undulating land starting at the southern end of the M9 Motorway at Kilcullen, passing to the west of Castledermot and around the eastern side of Carlow Town, terminating on the existing N9 near the landfill site at Powerstown, south of Carlow Town.

The terrain generally lies at levels between 70 metres and 115 metres above Ordnance Datum (AOD). However a short length of the route rises to levels of 150 metres AOD where the route traverses Mullamast Hill and Nine Tree Hill, southwest of Ballitore, while at Powerstown the land falls to a level of 45 metres AOD at the approaches to the River Barrow.

The land use is predominantly agricultural, the majority of this being tillage, though dairy farming and grassland operations with some equestrian enterprises are also evident. A number of disused and working quarries are to be found adjacent to the road corridor. One-off residential plots are also common along the numerous roads crossed by the new road alignment. Some small communities are also passed by the new road.

Section A Kilcullen to Mullamast Ch. 78,500 – Ch. 62,000

Section A commences at the end of the existing M9 Motorway at the grade separated M9 / N78 junction at Kilcullen (Junction 1) and runs in a generally southerly direction to just south of Junction 2 at Mullamast, a distance of 16.5 kilometres. This section of the route runs through open farmland over most of the route, and passes close to residential communities, south of Kilcullen.

At Junction 1 at Kilcullen, the new N9 dual carriageway ties into the existing M9 Motorway cross-section just south of the existing N78 overbridge. Although the

existing bridge and slip road ramps are being retained, the south facing slip roads will need to be realigned to suit the geometry of the proposed N9 Kilcullen to Powerstown Scheme. No work is proposed for the elevated junction on the N78.

The existing N9 single carriageway road will be severed by the new dual carriageway, and a new link road is to be provided to connect it to the N78 at a major / minor junction, approximately 700 metres southwest of Junction 1. The new link road, which totals 1200 metres in length, will maintain the function of the existing N9 as a local connector / distributor road (see Figure 3.39 in Volume 2).

South of Kilcullen, the landform is mainly flat to gently undulating with the Mainline passing through flat low-lying land (115 metres AOD to 120 metres AOD) to the east of the hills at Knockailline and Old Kilcullen and generally west of the Kilcullen Stream. The route tends to the east of the existing N9, south of Junction 1, and then heads south, being separated from the existing N9 by less than 1 kilometre. The road cuts through the shoulder of a shallow rise just northwest of Yellowbogcommon where it crosses under the realigned L6079 Local Road, and then descends to follow the valley of the Kilcullen stream, skirting round the eastern side of Cartersbog. At Cartersbog / Yellowbogcommon the road crosses under the realigned L6089 Local Road, and then heads towards Baronsland, passing just to the west of the crossroads. Here, the L6090 Local Road is raised to cross over the dual carriageway, which then continues south, cutting into the sandy gravely ridge that typifies the terrain south of Baronsland.

In the townlands of Calverstown and Narraghmore, Brewel Hill rises up to the east of the Mainline, and the route veers to the west to skirt round Brewel Hill, crossing under the existing N9 at Usk Little.

The proposed bridge that will carry the existing N9 National Primary Road over the proposed N9 dual carriageway at Usk Little is heavily skewed (43.6 deg) and the bridge length will exceed 100 metres. Plans and Elevation for the proposed Existing N9 Overbridge at Usk Little are included in Figure 3.69 (Volume 2).

Immediately southwest of the bridge over the dual carriageway at Usk Little, the new road passes through a former sand / gravel quarry, which is currently being backfilled as a licensed landfill site.

South of the former quarry the road continues in a southerly direction on the west side of the existing N9 at near ground level through open farmland until Ballymount, where the road rises to cross over the L6095 Local Road. The Mainline then descends to pass close to the eastern edge of the Narraghmore Bog (101 AOD), on a combination of shallow embankment and cutting. The dual carriageway continues south passing through flat open farmland, crossing under the realigned L8015 Narraghmore Road and then to Coolavash, where it rises to cross over the L8014 Local Road. The dual carriageway then crosses under the realigned R415 Regional Road, approx. 500 metres to the west of Crookstown Lower.

From Crookstown Lower the road climbs onto the higher ground to the west of Ballitore, and then cuts through the eastern side of Nine Tree Hill in a deep rock cutting, before crossing under the realigned L8025 Local Road at the southern end of the cutting. The land crossed at Nine Tree Hill is the highest point on the route at 150 metres AOD. The alignment then crosses a shallow valley before cutting into the ground to cross under the L8027 Mullamast Local Road, which is situated over the northern slip roads of Junction 2 at Mullamast.

Junction 2 is the grade-separated junction between the N9 dual carriageway and the Athy to R747 Link Road. The proposed dual carriageway is formed in cutting below the Link Road. The L8027 Mullamast Local Road crosses over the northern end of the slip roads at Junction 2. From here the Mainline descends the slopes south of Mullamast for a length of 900 metres to the end of Section A. The land continues to slope gently downwards towards the River Greese in Section B, beyond the end of this section.

The N9 alignment crosses 9 Local Roads, 1 Regional Road and 1 National Primary Road (the N9) over the 16.5 kilometres of Section A. With the exception of the L6091 Local Road at Baronsland, each of these roads will be provided with a grade separated crossing of the N9 dual carriageway. At Baronsland, the L6097 will be diverted to connect to the L6090, on the west side of the Mainline rather than provide it with a separate bridge crossing.

Section B Mullamast to Prumplestown Ch. 62,000 – Ch. 50,000

Section B runs from just south of Junction 2 at Mullamast to just south of Junction 3 on the existing N9 at Prumplestown, a length of 12 kilometres. This section of the route runs through open farmland and crosses the valleys of the River Greese and the River Lerr.

From Mullamast the road heads in a southerly direction, descending to cross the River Greese near Belan at a level of 77 metres AOD. The road first crosses the L4004 Broomfield Road in a shallow cutting and then crosses the line of Broomfield Lane (L8041) at near ground level. It is proposed to divert this minor Local Road along the east side of the dual carriageway and connect it to the Broomfield Road realignment immediately east of the overbridge.

The N9 crosses under the L8042 Local Road realignment at Pill Lane, on the north bank of the River Greese, and then rises to cross over the River Greese with a single span bridge. The River Greese is prone to flooding, and flood relief culverts will be required across the flood plain.

South of the River Greese, the new road passes close to the west side of Ballynamony where it crosses under the realigned L8049 Local Road and then the realigned L8050 Local Road at Church Hill, where it also crosses the 150 millimetre diameter Athy to Ballyvass Gas Transmission Main. The road then climbs past the east side of Ballyvass Hill, passing through the eastern edge of an active sand / gravel quarry. Immediately south of the quarry the road crosses the 450 millimetres diameter Cork / Dublin Gas Transmission Main. The 2 gas pipelines will need to be diverted as part of the scheme.

The road then passes to the east of Burrow Hill, reaching a high point at 91 metres OD near Coolane where it enters a cutting to pass under the R418 Regional Road. The road continues in cutting as it descends slowly into the valley of the River Lerr, crossing under the L4004 Local Road at Woodlands East, and under the realigned L4011 Local Road at Woodlands West on the north bank of the River Lerr.

The road crosses the River Lerr south west of Castledermot on a low level clear span bridge, 70 metres AOD, and then rises gently as it crosses open fields towards Junction 3 on the existing N9 at Prumplestown.

Junction 3 is located approximately 7 kilometres northeast of Carlow Town, and 2.5 kilometres southwest of Castledermot, and will provide a connection to the new

dual carriageway for both communities, as well as connecting to the R418 Regional Road which serves Tullow. The junction is designed with the main road raised on embankment to cross over the existing N9, and with a dumbbell junction layout constructed at near ground level to minimise disruption to traffic on the existing N9.

The route continues south of Junction 3 for some 500 metres to the southern end of Section B, passing around the western side of Barnhill.

As part of the scheme, the existing N9 will be widened to a standard single carriageway (S2) cross-section over a length of 1,360 metres southwest of Junction 3 to near the Carlow / Kildare County boundary, where the road has already been improved to the full cross-section. (See Figure 3.40 in Volume 2) This section of road is predicted to carry 11,385 AADT (Annual Average Daily Traffic) in the design year, 2022.

Section B includes crossings of the River Greese at Belan and the River Lerr at Woodlands West. Both river crossings would be constructed with the sub-structure clear of the river channels.

The road crosses 7 Local Roads, 1 Regional Road and 1 National Primary Road (N9) through Section B. With the exception of Broomfield Lane, each of these roads will be provided with a grade separated crossing of the Mainline, to maintain the existing road network. As indicated above, Broomfield Lane will be diverted along the east side of the N9, and will join Broomfield Road at a T-Junction, some 300 metres to the east of Broomfield Cross Roads.

Section C Prumplestown to Powerstown Ch. 50,000 – Ch. 32,300

Section C comprises the part of the route that bypasses Carlow Town on the east side. The section starts just south of Junction 3 at Prumplestown and heads in a southerly direction towards Russelstown and Johnstown before descending to cross the River Burren. The road then tends in a more westerly direction to Rathcrogue where it crosses the N80 Carlow – Wexford National Secondary Road at Junction 4, and continues to Clonmelsh, south of Carlow Town, and then joins the N9 again at Junction 5 at Powerstown. This section of the route, 17.7 kilometres in length, again passes through rural farmland but also passes close to several communities.

From Junction 3 at Prumplestown, the road heads in a generally south-easterly direction, passing to the east of Ballyburn Upper, and enters a shallow cutting where it crosses under the realigned L8092 Local Road at Barnhill, and then under the L8094 Local Road at Deerpark. From here, the road continues to rise as it heads south, cutting through the east side of the hill at Burton Hall Demesne. From this high point (100 metres AOD) the ground drops approx. 30 metres into a wetland valley in the vicinity of Russelstown, where it crosses under the realigned L6113 and L1009 Local Roads. From here, the road rises again as it heads south towards Johnstown (92 metres AOD), where it crosses over the R726 Carlow to Hacketstown Regional Road. The road then descends the northern side of the River Burren Valley in cutting, crossing under the R725 Carlow to Tullow Regional road near Bennekerry.

After crossing the River Burren (56 metres AOD), with a clear span bridge, the road rises steeply through the southern slopes of the valley in a cutting, passing under the realigned L3053 Local Road at Ballycrogue. The road then swings to the west and then south to pass between Rathcrogue and Tinryland. Junction 4 is sited at

Rathcrogue (75 metres AOD), where the new N9 dual carriageway crosses over the N80 Carlow – Wexford National Secondary Road.

From Rathcrogue the road enters a cutting, passing to the southeast of Tinryland, where it passes below the realigned L3052 Linkardstown Lane, before again bearing to the west. The new road runs through fairly flat ground at near ground level, passing under the realigned L3051 Local Road at Ballybar Upper, from where it passes round the north and west sides of the limestone quarry at Clonmelsh. The road is then formed in cutting as it passes close to the south east side of Hayes Cross, with the L3050 and L3044 diverted to form a single road crossing over the dual carriageway.

From Clonmelsh, the road heads in a south-westerly direction, rising to cross over the Dublin to Waterford railway, and then descends into cutting on the approaches to Junction 5 at Powerstown, on the east side of the River Barrow Valley.

Junction 5, which is the intersection between the proposed and the existing N9, lies approximately 7 kilometres south of Carlow Town. The junction is designed with a dumbbell junction layout, to act as a termination of the N9 Kilcullen to Powerstown scheme, and to facilitate construction of a future extension of the Scheme to Kilkenny and Waterford. The road level here will be approximately 45 metres AOD.

The new dual carriageway crosses 9 Local Roads, 2 Regional Roads and 1 National Secondary Road (N80) through Section C, as well as connecting to the existing N9 at Junction 5 at Powerstown. At Clonmelsh the L3050 will be diverted to cross over the dual carriageway, slightly to the north of the existing road. The L3044 Local Road from Muinebheag (Bagenalstown) will be diverted to join the L3050 Local Road some 300 metres to the east of Hayes Cross. Each of the other Regional and Local Roads in Section C will be provided with a bridged crossing over / under the dual carriageway.

Only 1 river, the River Burren, is crossed along Section C. Here a clear span bridge with the sub-structure clear of the river channel will be provided.

Section D Athy to R747 Link Road

The proposed Athy to R747 Link Road comprises Section D of the Scheme and runs from the N78 on the north east side of Athy to the existing N9 between Timolin and Ballitore, a length of 11.2 kilometres. The Link Road is designed as a 7.3 metre wide single carriageway road with hard shoulders. A 100 kph design speed has been applied to the alignment in this section of the scheme.

The road commences at a new roundabout junction formed on the N78, just north of the junction between the N78 and the R418 Regional Road to Castledermot. The road runs at a level of 65 metres to 70 metres AOD to the south of the Glenbawn River, passing along the northern perimeter of a zoned industrial development site, which fronts onto the R418. The road passes by Gallowshill before swinging south to cross the L4008 Local Road on the west side of Bray Upper. The road then passes round the south side of Bray Upper on embankment, and heads east parallel to the L4008 Local Road to Ballycullane.

At Ballycullane the Link Road aligns along the existing L4008 Local Road, passing Turnerstown, through the woodland at Glenbawn and then through Glenbawn. The road then diverges from the L4008 Local Road, climbing to a level of 95 metres AOD as it heads east, crossing the L8017 Local Road immediately north of the

existing crossroads at Burtown Big. The road continues to the east to Burtown Little, where it passes round the northern curtilege of the Burton Hall estate. The new road crosses the L8027 Local Road at the northeast corner of the estate, as well as the L8029 Local Road immediately to the east of the estate. The Link Road then climbs to traverse the southern edge of the Mullamast Hill, crossing the L8028 Local Road. The Link Road reaches a level of 130 metres AOD, where it passing just to the south of Mullamast, and then crosses over the N9 dual carriageway at Junction 2.

From Junction 2, the link road continues in an easterly direction, cutting through the eastern side of Mullamast Hill, from where it descends quickly into the River Greese Valley, at 90 metres AOD. The L8040 Local Road is intersected on the descent into the valley, following which the link road crosses the flood plain of the river on an embankment before crossing the River Greese, and climbing to join the existing N9 at a T-junction, approximately 120 metres north of the junction between the N9 and the R747 Regional Road.

Several Local Roads are crossed by the alignment of the Link Road and, with the exception of the L8029 Local road at Burtown Little, each of these is provided with a major / minor road junction. The Link Road also crosses over the proposed N9 dual carriageway at Junction 2 at Mullamast. The at-grade junction on the Link Road comprises a dumbbell roundabout, with one roundabout on each side of the proposed N9.

Direct frontage onto the Link Road is generally avoided except at Turnerstown and Glenbawn. Farm accesses and accesses to fields have been permitted along the Link Road, to minimise severance of farms.

The new road has one river crossing, the River Greese, some 200 metres west of the junction with the existing N9. The river is crossed by a single span bridge, with the sub-structure constructed clear of the river channel. The road also crosses a millrace 200 metres west of the main river channel. This millrace, which no longer has industrial use, will be provided with a culvert crossing under the road.

3.2 Road Design

3.2.1 Introduction

This section describes the geometric standards used in the design of the road network which generally follows the requirements of the National Roads Authority's Design Manual for Roads and Bridges (the NRA DMRB).

The design standards are listed for the different road types:

- Mainline (High Quality Dual Carriageway)
- Junctions
- Single Carriageway Roads
- Accommodation Roads / Private Accesses

3.2.2 Proposed N9 High Quality Dual Carriageway

The Mainline route is designated a High Quality Dual Carriageway and has been designed to be consistent with a design speed of 120 kph, in accordance with the geometric standards in NRA DMRB TD 9 and TD 27. These standards are similar to those of a 2 lane motorway. However in addition, in accordance with the

requirements for an all-purpose dual carriageway, provision is made at mainline structures for occasional pedestrian usage.

Design Standards

The alignment standard adopted for this scheme is the National Roads Authority Design Manual for Roads and Bridges (NRA DMRB), including NRA Standard TD 9/00 and TD 27/00.

In general, the following road cross-section applies to the Mainline:

2 x 7.0 metre carriageways

2 x 2.5 metre hardshoulders

1 x 3.0 metre central reserve incorporating 2 x 1 metre hard strips

2 x 2.0 metre grass verges

Where required, both the central reserve and verges will be subject to widening to provide adequate Stopping Sight Distance.

The preliminary design allows for a working space requirement of 5 metres, 8 metres or 10.5 metres from the top of cut / toe of embankment to the boundary fence line adjacent to Mainline sections, depending on the drainage requirements at the edge of the earthworks and on the need to provide access for drainage maintenance. The land acquisition line allows for verge and median widening and sightline requirements. The land acquisition line also allows for the working width and has been adjusted where access tracks are to be included in the road section.

The proposed road cross-section for the main carriageway is shown in Figure 3.65 (Volume 2).

The Mainline horizontal alignment design is consistent with a 120 kph design speed, and complies with to the following design criteria:

Desirable Minimum radii = 1020 metres with 5% super-elevation

Minimum radii without the application of super-elevation / transitions = 2880 metres

The Mainline vertical alignment has been developed with a desirable maximum gradient of 3% and an absolute maximum gradient of 4%. The minimum gradient for effective drainage along kerbed road sections is 0.5%, and 0.3% without kerbs.

The phasing of vertical and horizontal alignments is desirable and achieved wherever practical subject to economic / environmental constraints.

The key design criteria for the alignment of the main dual carriageway are summarised in Table 3.2.1 below.

Desirable Minimum Stopping Sight Distance (SSD) is generally provided for the Mainline in accordance with NRA TD9/00 paragraph 1.26a to 1.26d. However, where Desirable Minimum SSD cannot readily be achieved across the central median barrier without central reserve widening on certain curves, a One Step below Desirable Minimum SSD (215 metres) is provided. No relaxation below the Desirable Minimum SSD is permitted at the approaches to junctions. Central reserve widening and verge widening, where required to achieve acceptable SSD, have been included in the Preliminary Design.

Table 3.2.1 Design Standards for Horizontal and Vertical Alignment

Horizontal Curvature Criteria for 120Kph design speed	**Radius**
Minimum R without elimination of adverse camber and transitions	2880m
Desirable minimum R with 5% superelevation	1020m
One step below Desirable minimum R with 7% superelevation	720m
Vertical Curvature	**'K' Value**
Desirable Minimum Crest Curve	182
One step below Desirable Minimum Crest Curve	100
Desirable Minimum Sag Curve	53
One step below Desirable Minimum Crest Curve	37
Stopping Sight Distance	
Desirable Minimum	295m
One step below Desirable Minimum	215m

A standard carriageway crossfall of 2.5% is adopted, with super-elevation applied where necessary in accordance with NRA TD9/00. The crossfall on verges is 8%.

Minimum vertical headroom clearance of 5.3 metres is provided at structures.

Carriageway Drainage

The road drainage requirements are outlined in more detail within Section 3.5. Over the edge type drainage is assumed on embankments not exceeding 6.0 metres in height, with the surface water runoff collected at the embankment toe. On embankments where the height exceeds 6.0 metres, a kerb and gully detail can be adopted. In cuttings, a filter drain is proposed to drain both the road pavement and the earth slope / verge areas.

In super-elevated sections, where crossfall is towards the median, surface water runoff will be gathered adjacent to the central reserve barrier or by filter drains in grassed central reserve. Central reserve drains would discharge at regular intervals to main carrier drains, which would in turn discharge to selected outfalls located at low points along the road.

It is proposed to utilise a system of filter drains and open ditches constructed along the road edge for the main surface water collection. At structures and at interchanges, where filter drains may not be appropriate, kerbs and gullies with closed pipe drainage would be provided.

The road drainage system will be designed to accommodate, without surcharge, a once in 5 year storm event with a maximum runoff intensity of 50 millimetres per hour. This approach will enable the road drainage system to accommodate higher rainfall intensities for short storms.

Safety Barrier

Generally, safety barriers will be provided where -

- a hazard is located within the clear zone,
- embankments are 2 metres or greater in height,
- in the central median where the width is less than 15 metres.

Use of a concrete barrier to RCD/400/2 of the 'NRA Road Construction Details' is likely in the central reserve. However, steel barriers are also permissible as an alternative form of construction. The provision of other safety barriers will be in accordance with the NRA DMRB, TD19/02.

The provision of safety barriers in verges may require widening of the nearside verge to provide for the working width of the barrier. Widening of the verge is also required where the barrier intrudes into the sight lines required by the design.

Gaps in Central Reserve / Emergency Services Access

The proposed safety barrier in the central reserve will limit access to the opposite carriageway by the emergency services in emergencies. It is proposed that Emergency Crossovers are provided at a distance of 1.5 kilometres either side of each junction and at intervals not exceeding 4 kilometres, in accordance with NRA TD 19/02. However these gaps within the safety barrier will be sealed with a fixed steel barrier which can be removed with the correct equipment in an emergency.

In addition to gaps within the central reserve safety barrier, access is provided for the Emergency Services to both sides of the dual carriageway from the local road network at intervals not exceeding 8 kilometres. Apart from the access available at the grade separated junctions, access from the local road network will be via a 4 metre wide access lanes which are to be fitted with locked gates at the edge of the road corridor to prevent access by the general public.

3.2.3 Junctions

Grade Separated Junctions

Access onto the Mainline will be restricted to grade separated junctions, at intervals of 10 kilometres to 20 kilometres. No other public access onto the dual carriageway will be provided. The scheme provides for 4 new grade-separated junctions and retains the existing grade separated junction at Kilcullen. From North to South, these junctions are located at the southern end of the existing M9 Motorway at Kilcullen; at Mullamast where the new road crosses the proposed Athy to R747 Link Road; at Prumplestown crossing the existing N9; at Rathcrogue crossing the existing N80, Carlow to Wexford Road; and at Powerstown, south of Carlow Town, where the proposed N9 connects to the existing N9.

These grade-separated junctions will generally be designed in compliance with NRA TD22/92, with dumbbell roundabouts provided at the at-grade junctions to TD16/93. This junction layout is preferred for the scheme as it is efficient in terms of traffic capacity and land use, while also offering benefits in safety compared with Major / Minor Junctions.

Junction 1, Kilcullen

The existing junction at the south end of the M9 Motorway comprises a bridge crossing for the N78 over the M9, with four slip roads on a diamond arrangement. The junctions between the slip roads and the N78, to the east and west of the overbridges are simple Major / Minor junctions.

The projected traffic flows for the scheme in the design year (2022) indicate that the current junction layout will accommodate the revised traffic flows, and therefore no works are proposed for the layout of the junctions on the N78. However, the south facing slip roads will need to be realigned to suit the geometry of the proposed N9 dual carriageway. (See Figure 3.30 in Volume 2 for the layout of Junction 1).

The existing N9 National Primary Road will be severed by construction of the new dual carriageway, and a new 1200 metre long single carriageway road, the N9 – N78 Link Road, has been included in the scheme to connect the N9 single carriageway to the N78. The existing major / minor junction between the N78 and the L6080 Local Road to Old Kilcullen will be re-engineered to provide the junction between the N78 and the N9 – N78 Link Road, while the L6080 will be realigned to connect to the Link Road via a new major / minor junction 80 metres southeast of the junction with the N78. (See Figure 3.39 in Volume 2)

Junction 2, Mullamast

Junction 2 is the intersection between the proposed N9 dual carriageway and the Athy to R747 Link Road at Mullamast. Here the Mainline has commenced its descent into the River Greese valley, and would be formed in cutting, some 7 – 8 metres deep. The Athy to R747 Link Road would be at or slightly raised above ground level where it crosses the dual carriageway. (See Figures 3.41 and 3.42 in Volume 2).

Junction 2 will serve traffic from Athy and will also provide a connection to the Mainline for the communities in the vicinity, including Ballitore, Moone and Timolin, as well as the more rural communities in southeast Kildare. Traffic from southwest County Wicklow would also have easy access to the new road via the R747 and Junction 2.

Junction 3, Prumplestown

The proposed dual carriageway crosses the existing N9 at Prumplestown, some 2.5 kilometres southwest of Castledermot. A grade-separated junction has been included in the scheme at this point to service Castledermot and Carlow Town. The junction would also provide access to Tullow via the R418 at Castledermot, as well as the rural communities between the above towns.

The layout has been designed with the Mainline raised to cross over the junction, to minimise disruption to traffic on the existing N9 during construction, and to minimise environmental impacts. The dumbbell junction would be constructed close to ground level, with the junction offset slightly to the south of the existing road, to minimise land take as well as to preserve the trees that line the northern side of the existing N9. (See Figures 3.43 to 3.45 in Volume 2).

As part of the scheme, the existing N9 will be widened to a standard single carriageway (S2) cross-section over a length of 1,360 metres southwest of Junction 3 to near the Carlow / Kildare County boundary. (See Figure 3.40 in Volume 2)

Junction 4, Rathcrogue

Junction 4 is located where the proposed N9 dual carriageway crosses over the existing N80 Carlow to Wexford National Secondary Road at Rathcrogue.

The layout of the junction is constrained by a number of buildings, including the Tinryland GFC grounds and Rathcrogue House. As a result, the junction has been offset to the north side of the N80, which will permit the bridge and the dumbbell junction to be constructed largely independently of traffic on the N80. (See Figures 3.46 to 3.48 in Volume 2).

Junction 4 would provide ready access to the new road for traffic from the east side of Carlow Town, as well as providing a strategic link between the Midlands, Enniscorthy and Wexford in the Southeast of the Country.

Junction 5, Powerstown

Junction 5 at Powerstown forms the southern end of the N9 Kilcullen to Powerstown Scheme, where the new road re-connects with the existing N9, approximately 7 kilometres south of Carlow Town. The River Barrow is some 550 metres to the west of the existing N9, and the ground falls away some 11 metres from the N9 to the flood plain of the river. The ground also dips significantly to the south of the junction, to a tributary of the River Barrow. Immediately south of this stream, on the east side of the existing N9, lies the Powerstown landfill site.

The presence of the River Barrow flood plain, the tributary stream and the landfill site, together with the properties fronting onto the N9, constrain the layout of the junction.

The proposed junction has to fulfil the role of a temporary termination to the N9 Kilcullen to Powerstown Scheme, as well as being adaptable to suit an extension of the scheme to Kilkenny and Waterford in the South.

In the layout selected (See Figures 3.49 to 3.50 in Volume 2), the Mainline is depressed in a cutting, with the existing N9 diverted to the east of the existing road to pass through a dumbbell junction constructed over the Mainline. Slip roads would be provided to connect the dumbbell junction with the dual carriageway on the north east side, while slip road stubs would be provided on the west side of the dumbbell roundabouts to minimise disruption to traffic if the scheme is subsequently extended to the south.

The dumbbell roundabouts have been tested to ensure they are capable of carrying traffic from the N9 Kilcullen to Powerstown Scheme in the design year, as well as traffic from the Kilcullen to Waterford Scheme in the future.

Road Design Standards for Grade Separated Junctions

Slip Roads within the interchange will be designed to comply with TD22/92 and TD9/00. The key design elements are summarised below.

The Design Speed for the diverging slip road tapers will conform to the design speed for the Mainline through to the back of the nosing in accordance with TD22/92, while the Design Speed of the slip roads within the grade-separated junctions is 70 km/h. Relaxations are not permitted in the Desirable Minimum Stopping Sight Distance on the Mainline within the approaches to junctions.

The horizontal alignment of the slip roads and other elements of the junction will be developed with reference to the following design criteria:

Desirable Minimum radii for the slip roads = 360 metres with 5% super-elevation.

Minimum radius without application of super-elevation / transitions = 1020 metres.

The vertical alignment of the slip roads and other elements of the junction have been developed with a desirable maximum gradient of 4% and an absolute maximum gradient of 6%. The minimum gradient for effective drainage along kerbed road sections is 0.5%, and 0.3% without kerbs.

Figure 3.66 (Volume 2) details a typical cross-section of the junction slip roads.

A standard carriageway crossfall of 2.5% is adopted, with super-elevation applied where necessary in accordance with TD9/00. The crossfall on verges is 8%.

At-grade Roundabouts

The dumbbell junction layout between the new interchange slip roads and the National Road network utilises roundabouts designed to NRA TD16 standard. In addition, a new roundabout junction will be formed at the western end of the Athy to R747 Link Road, on the N78.

The roundabouts are designed to be the minimum size necessary to suit the overall layout, whilst both complying with NRA TD16 and ensuring satisfactory operations. Generally, a 60 metre Inscribed Circle Diameter has been adopted. Single lane slip roads have a 4 metre width, and the link between interchange dumbbells is a S2 single carriageway. Entry arm generally complies with NRA TD16.

To check capacity, the flows at the roundabouts with the heaviest traffic (Junction 5 and Junction 4) were input into the UK ARCADY computer program (version 5.0), which calculates capacities, queues and delays at roundabouts. Each roundabout in the dumbbell layout was assessed individually, and was found to operate well within its design capacity at the Design Year 2022, both in the interim Kilcullen to Powerstown Scheme and in the full Kilcullen to Waterford Scheme. This is also the case for the roundabout at the west end of the Athy to R747 Link Road.

Athy to R747 Link Road

The western end of the Athy to R747 Link Road connects to the N78 just northeast of Athy Town. Here, a three leg roundabout would be constructed just north of the junction between the N78 and the R418 Regional Road. The roundabout included in the scheme plans has been designed to allow for a future connection with the proposed Athy Outer Relief Road.

The eastern end of the Athy to R747 Link Road will join the existing N9, some 120 metres north of the existing junction between the N9 and the R747 Regional Road. A staggered ghost island junction would be provided on the existing N9, and the layout of the junction with the R747 would also be modified as part of the scheme.

The new Link Road will have a Standard Single Carriageway (S2) cross-section with hard shoulder and grass verges. Figure 3.67 (Volume 2) details a typical cross-section of a Standard Single Carriageway (S2) road.

At-grade Major / Minor Priority Junctions

The junctions between Local Roads and sections of the realigned National, Regional or Local Roads will be generally designed as simple Major / Minor Priority Junctions in accordance with NRA TD42/95. Ghost islands will be provided at those junctions where predicted traffic flows on the minor road exceeds 300 vehicles 2-way AADT in the Design Year. Clear visibility splays will be provided at all road junctions with the public road, in accordance with the standard, of a length appropriate to the design speed of the major road.

Direct vehicular accesses onto realigned Regional and Local Roads will be designed to comply with TD41/95, providing clear visibility splays and suitable for the design speed of the major road. When safety barriers are present, visibility

splays at junctions and accesses must be clear of impediments to SSD e.g. signs, safety barriers and other street furniture.

3.2.4 Side Roads

Introduction

Along the 46.2 kilometres length of the Mainline, the Mainline route intercepts numerous roads of varying class i.e.

- National Primary Routes
- National Secondary Roads
- Regional Roads
- Local Roads
- Access Tracks

Road Realignments

The National, Regional and Local Roads affected by the proposed N9 Kilcullen to Powerstown Scheme are discussed below for each section of the scheme. These roads are also listed in summary Tables 3.2.2 – 3.2.5, together with details of their location and the proposed alterations. This is followed by a brief description of the alterations of each road.

Each realignment has been designed in accordance with the standards in the NRA DMRB, and the width of the new carriageway will in all instances be at least as wide as that of the existing road.

Section A Kilcullen to Mullamast Ch. 78,500 – Ch. 62,000

L6024 Local Road

The L6024 Local Road will be realigned to avoid conflict with the N9 dual carriageway.

N9, Kilcullen

The existing N9 will be severed by the scheme just south of the existing grade separated junction at Kilcullen. To maintain the function of the existing N9 as a local connector / distributor road, a 1200 metre long link road has been provided to divert the existing N9 to the west, connecting to the N78 at a T-junction approximately 700 metres southwest of Junction 1. This junction replaces the existing junction with the L6080 Local Road, which will be diverted to connect to the proposed link road 80 metres southeast of the N78 junction. Part of the severed section of the existing N9 will be retained for access to a residential property south of the existing M9 / M78 Junction and for drainage maintenance.

L6079 Yellowbogcommon

The Local Road will be realigned horizontally to the south and raised to cross over the N9 dual carriageway. This alignment incorporates radii One Step and Two Steps below Desirable Minimum radii. Traffic will be able to use the existing road during construction of the bridge and the roadworks on the west side of the Mainline, and the existing road will then be landscaped on completion of these works. A temporary road closure may be required for construction of the section of road on the east side of the Mainline.

L6089 Cartersbog

The existing Local Road will be severed by the N9 dual carriageway. A realignment of the Local Road to cross over the dual carriageway has been included in the scheme. The overbridge will be constructed 200 metres to the north of the existing road at this point, and the realigned road would swing south to rejoin the existing road on the east side of the N9. This alignment incorporates radii which are One Step and Two Steps below Desirable Minimum radii.

The houses fronting onto the Local Road on the west side of the Mainline will now be accessed via a cul-de-sac, as would the single house fronting onto the existing road immediately east of the Mainline. A hammerhead turning area would be provided on the severed section of the L6089, east of the Mainline.

L6090 and L6091 Baronsland

The L6090 Local Road will be realigned to the south of the existing road to improve the alignment, and raised to cross over the N9 dual carriageway. A short length of the existing road on the northwest side of the Mainline would be retained for access to properties.

The L6091 Local Road will be realigned horizontally to the west of the existing road, to connect to the L6090 some 500 metres south west of the bridge over the proposed N9. The severed section of the L6091 on both sides of the Mainline will be retained for access to lands and for drainage maintenance.

L6096 Usk Little

An at grade realignment of the L6096 Local Road to the south of the existing road is required to relocate the junction with the existing N9 to the south of the proposed overbridge for the existing N9. A 150 metre length of this road would be retained for access purposes.

N9 Usk Little

The existing N9 will be reconstructed on line where it crosses the proposed N9 dual carriageway. Some additional land will be acquired along the east side of the existing road for use as a temporary diversion during construction of the bridge and roadworks. This may be returned to the landowners on completion.

Calverstown Little

The access road servicing several residences on the west side of the existing N9 will be severed by the proposed N9 dual carriageway. The access will be replaced with a new road, approximately 40 metres south of the existing road. The new road will be raised to cross over the N9 dual carriageway. It is proposed to retain the existing road on the east side of the Mainline for use by the Emergency Services to access the Mainline in emergency, while on the west side of the Mainline a new track will be provided to the edge of the N9 for use by the Emergency Services.

L6095 Ballymount

The existing L6095 Local Road will be reconstructed on line where it passes through the N9 underbridge.

L8015 Narraghmore

The L8015 Local Road will be realigned to the north of the existing road and raised to cross over the N9 dual carriageway. The existing road will be used to pass

traffic during construction of the new bridge and road diversion, following which the road would be landscaped.

L8014 Coolavash

The existing L8014 Local Road will be reconstructed on line where it passes through the N9 underbridge.

R415 Crookstown

The R415 Regional Road will be realigned to the south of the existing road to improve the alignment, and raised to cross over the N9 dual carriageway, which would be constructed in a shallow cutting at this location. Some additional land will be acquired along the south side of the Regional Road for use as a temporary diversion. Following completion of the works the temporary diversion will be partly retained for access to farm lands on the west side of the Mainline. The remaining length of the temporary diversion would be returned to the landowner, while part of the Regional Road would be broken up and landscaped. The remaining length of the Regional Road on the west side of the Mainline would be retained for access.

L8025 Nine Tree Hill

The L8025 Local Road will be realigned to the north of the existing road to cross over the N9 dual carriageway, which will be constructed in a deep cutting. The realigned L8025 will be constructed at near ground level, but higher up the slope than the existing road. The existing L8025 would be used to pass traffic during construction of the new bridge and road realignment, and would be retained on completion of the works for access to residences, lands and drainage areas.

L8027 Mullamast

The L8027 Local Road at Mullamast will be realigned slightly to the north of the existing road, and raised slightly to cross over the N9 dual carriageway, which will be in cutting at this location. Some additional land will be acquired along the south side of the Local Road for use as a temporary diversion, and following completion of the works the temporary diversion and the severed Local Road would be broken up and landscaped.

Table 3.2.2 Summary of Road Realignments in Section A

Road Ref	Road Name	Townland	Chainage	Description
L6024	–	Common	78,000	Realigned horizontally
N9	–	Common	77,800	Realigned to west of N9 dual carriageway to connect to N78
L6079	Yellowbogcommon	Yellowbogcommon, Knockaillin, Knockbounce	77,308	Realigned horizontally and raised to cross over N9 dual carriageway
L6089	Cartersbog	Yellowbogcommon, Cartersbog	76,400	Realigned horizontally and raised to cross over N9 dual carriageway
L6091	Baronsland	Killinane	74,350	Realigned to the west of the N9 dual carriageway
L6090	Baronsland	Baronsland	73,960	Realigned horizontally and raised to cross over N9 dual carriageway
L6096	Usk Little	Usk Little	72,000	Realigned horizontally to south
N9	–	Usk Little	71,900	On line reconstruction at overbridge
	Calverstown Little	Calverstown Little	71,577	Access road realigned to the south and raised to cross over the new N9
L6095	Ballymount	Ballymount	70,500	On line reconstruction through bridge under N9 dual carriageway
L8015	Narraghmore	Narraghmore, Blackrath, Inchaquire	68,725	Realigned horizontally and raised to cross over N9 dual carriageway
L8014	Coolavash	Narraghmore	67,300	On line reconstruction through bridge under N9 dual carriageway
R415	Crookstown	Boleybeg, Crookstown Lower, Narraghmore	66,450	Realigned horizontally and raised to cross over N9 dual carriageway
L8025	Nine Tree Hill	Ballitore, Mullamast	64,850	Realigned horizontally and raised to cross over N9 dual carriageway
L8027	Mullamast	Mullamast	63,420	Realigned horizontally and raised slightly to cross over N9 dual carriageway

Section B Mullamast to Prumplestown Ch. 62,000 – Ch. 50,000

L4004 Broomfield Road

The existing L4004 Local Road will be raised to cross over the N9 dual carriageway. The realigned Broomfield Lane will join the L4004 at a new major / minor junction, east of the overbridge. Some additional land will be acquired along the south side of the Local Road for use as a temporary diversion. This may be returned to the landowner on completion.

L8041 Broomfield Lane

Broomfield Lane will be diverted along the east side of the N9 dual carriageway, over a length of 815 metres. At the north end it will be raised to join the L4004 diversion at a new junction, east of the proposed overbridge, and some 330 metres east of the Broomfield Cross Roads.

The section of Broomfield Lane south of Broomfield Cross Roads on the west side of the N9, will be retained to provide access to agricultural lands.

L8042 Pill Lane

The L8042 Local Road at Pill Lane will be severed by the proposed dual carriageway. The Local Road will be realigned 140 metres to the south and raised to cross over the N9 dual carriageway. The existing road will be retained on the west side of the N9 to provide access to farmlands, while on the east side of the N9, the majority of the road will be broken up and covered with topsoil.

L8049 Ballynamony

The existing L8049 Local Road will be severed by the scheme. The road will be realigned to the north of Ballynamony on a nearly straight alignment, raised to cross over the N9 dual carriageway. The existing road on the east side of the N9 will be retained to provide access to the community and to farmlands. A hammerhead turning area would be provided on the severed section of the L8049, just west of the stream crossing.

L8050 Church Hill

The L8050 Local Road will be realigned to the north and south of the existing road, and raised to cross over the existing N9. East of the N9, the realignment would be to the north of the existing road, which will be broken up and covered with topsoil on completion of the scheme. On the west side of the N9, the road will be retained to provide access to a residence and farmlands. The existing access to the sand / gravel quarry on Ballyvas Hill will be realigned along the west side of the N9 dual carriageway.

Access to the N9 for use by emergency services would be provided from the existing Local Road on the east side of the Mainline, and from the realigned access track to the quarry on the west side.

R418 Coolane

The R418 Regional Road will be reconstructed, mainly on line, where it crosses over the N9 dual carriageway which will be in a deep cutting at this location. Some additional land will be acquired along the south side of the Regional Road for use as a temporary diversion during construction of the bridge and roadworks. This may be returned to the landowners on completion.

L4009 Woodlands East

A short length of the L4009 Local Road will be reconstructed on line where it crosses over the N9 dual carriageway, which will be formed in a deep cutting at this location. Some additional land will be acquired along the north side of the Local Road for use as a temporary diversion. This may be returned to the landowners on completion.

L4011 Woodlands West

The L4011 Local Road will be realigned initially to the south of the existing road on the east side of the N9, to improve the alignment, and then to the north of the existing road where it crosses over the N9 dual carriageway and on the west side of the N9. The Local Road will be raised to cross over the dual carriageway. Some additional land between the existing road and the River Lerr on the east side of the Mainline will be acquired for use as a temporary diversion during construction of the roadworks. This may be returned to the landowner on completion. On the west side of the Mainline, the existing Local Road will be retained as access to drainage works for maintenance.

N9 Prumplestown

The existing N9 will be realigned to the south of the existing road to connect to the dumbbell roundabouts on the east side of the new dual carriageway at Junction 3.

Realigned N9 – Junction 3 to Carlow

On the west side of the junction, the existing N9 would be improved to a full S2 cross-section over a length of 1360 metres to near the Carlow County boundary, by widening the road on the southeast side.

The L4012 Local Road, the northern leg of the Prumplestown Cross Roads, will be realigned slightly to the north of its existing alignment to form a staggered junction on the Realigned N9.

Table 3.2.3 Summary of Road Diversions in Section B

Road Ref	Road Name	Townland	Chainage	Description
L4004	Broomfield Road	Moone	61,493	Raised to cross over N9 dual carriageway
L8041-0	Broomfield Lane	Moone	60,940	Realigned to east of N9 dual carriageway to connect to L4004 realignment
L8042	Pill Lane	Belan	58,472	Realigned to south and raised to cross over N9 dual carriageway
L8049	Ballynamony	Ballynamony, Belan, Ballyvass	57,400	Realigned to north and raised to cross over N9 dual carriageway
L8050	Church Hill	Ballyvass	56,164	Realigned and raised to cross over N9 dual carriageway
R418	Coolane	Coolane	54,582	On line improvement to cross over N9 dual carriageway
L4009	Woodlands East	Woodlands East	53,050	On line improvement to cross over N9 dual carriageway
L4011	Woodlands West	Woodlands West, Halfmiletown	51,640	Realigned to north and raised to cross over N9 dual carriageway
N9	Junction 3	Prumplestown	50,500	Realigned to southeast of existing road to connect to proposed dumbbell roundabouts at Junction 3
N9	N9 Realignment	Prumplestown, Gorteenvacan	50,500	1360 metre widening of existing N9, online and to the south of the existing road.
L4012	N9 Realignment	Prumplestown	50,500	Realigned over 280m to form a junction with the N9 Realignment, 50 metres to the north of the existing crossroads.

Section C Prumplestown to Powerstown Ch. 50,000 – Ch. 32,300

L8092 Barnhill

The L8092 Local Road will be realigned to the north of the existing road, connecting to the L4012-2 Local Road at a new junction, some 220 metres north of the existing junction, to improve visibility of the major / minor junction. The realigned Local Road will be raised to cross over the dual carriageway, which will be formed in a shallow cutting at this location.

The existing road on the west side of the dual carriageway will be retained to provide access to farmland as well as to provide access to drainage pollution control / attenuation ponds on the N9 dual carriageway to the south. The existing road on the east side of the Mainline will be retained to provide access.

L8094 Deerpark

The L8094 Local Road will be realigned slightly to the north to improve the alignment, and raised to cross over the N9 dual carriageway. Some additional land will be acquired along the south side of the Local Road for use as a temporary diversion. This may be returned to the landowners on completion.

L6113 Russelstown North

The L6113 Local Road will be realigned slightly to the south, and raised slightly to cross over the N9 dual carriageway which would be formed in a shallow cutting at this location. The existing road will be used to pass traffic during construction of the bridge and the Local Road realignment, and the road on the west side of the Mainline would be retained to provide access to a residence and farm buildings

Residences on the east side of the Mainline would be connected directly to the realigned Local Road.

L1009 Russelstown South

The L1009 Local Road would be realigned up to 100 metres to the south of the existing road to provide a reduced skew crossing of the Mainline. The realigned road would be raised to cross over the N9 dual carriageway and the existing road would be removed on both sides of the Mainline. The redundant sections of the existing road would be broken up and landscaped on completion.

The stream that crosses the Local Road 230 metres to the west of the Mainline will be diverted along the north side of the realigned Local Road and then along the west side of the N9 to join the Palatine River.

R726 Johnstown Road

The N9 dual carriageway will be raised to cross over the R726 Regional Road, which will be realigned over a 450 metre length to improve the alignment of the road. Residences on the east side of the Mainline would be reconnected directly onto the realigned road, while a new access will be provided for Johnstown House, to the west of the Mainline crossing.

R725 Bennekerry Road

The R725 Regional Road will be reconstructed on line with an improved alignment where it crosses the N9 dual carriageway, which would be constructed in a deep cutting at this location. Some additional land will be acquired along the north side of the Regional Road for use as a temporary diversion during construction of the bridge and roadworks. This may be returned to the landowner on completion.

L3053 Ballycrogue Road

The L3053 Local Road will be realigned slightly to the north of the existing road and raised slightly to cross over the N9 dual carriageway, which would be constructed in a shallow cutting at this location. Some additional land will be acquired along the south side of the Local Road for use as a temporary diversion during construction of the bridge and roadworks. This may be returned to the landowner on completion.

N80, Junction 4, Rathcrogue

On the northwest side of the Mainline, the N80 will be realigned over a length of 400 metres on the northeast side of the existing road to connect to the north roundabout of Junction 4. The existing road would be retained to provide access to property, farmland and drainage areas.

A footpath / cycleway will be provided along the south side of the realigned road and through the bridge under the Mainline, and extended to connect to the existing N80 immediately southwest of the south roundabout.

The entrance driveway to Rathcrogue House would be realigned along the northwest side of the Mainline, and would take access from the north roundabout.

On the southeast side of the Mainline, the N80 will also be realigned over a length of 380 metres, on the northeast side of the existing road, to connect to the south roundabout of Junction 4.

The existing road will be retained over a length of 140 metres to provide access to the Tinryland GAA, which is located close to the junction.

L3052 Linkardstown Lane

The L3052 Local Road will be realigned slightly to the south of the existing road to improve the alignment, and raised slightly to cross over the N9 dual carriageway which would be constructed in cutting at this location. The existing road will be retained to pass traffic around the works during construction of the bridge and the roadworks on the west side of the Mainline. The road will then be landscaped on completion of the scheme. In order to construct the short section of new road on the east side of the bridge, the Local Road will be closed to traffic for a short duration of approximately 8 weeks. A safe passage for pedestrians and cyclists would be provided during this period, while vehicular traffic would be able to use the existing road network to bypass the roadworks.

L3051 Ballybar

The L3051 Local Road will be realigned slightly to the north of the existing road and raised to cross over to the N9 dual carriageway. The existing road would be retained over a short length on the south side of the Mainline to provide access to residences and farmlands. Some additional land will be acquired along the south side of the Local Road, for use as a temporary diversion during construction of the bridge and roadworks. This may be returned to the landowners on completion.

L3050 Ballybannon Road, Clonmelsh

The L3050 Local Road will be realigned slightly to the north west of the existing road and raised slightly to cross over the N9 dual carriageway, which will be lowered into cutting at this location. At the west end, the realignment will connect to an improved layout to the cross roads at Hayes Cross. Some additional land will

be acquired along the south side of the Local Road, for use as a temporary diversion during construction of the bridge and roadworks. This may be returned to the landowners on completion.

L1008 Milford Road, Clonmelsh

The L1008 Local Road will be reconstructed on line over a length of 80 metres as part of the revised layout at Hayes Cross.

L1020 Carlow Road, Clonmelsh

The L1020 Local Road, on the north side of the cross roads at Hayes Cross (on the L3050 / L1008 Local Roads) will be reconstructed on line over a length of 80 metres as part of the revised layout at Hayes Cross.

L3044 Ballyloo Road, Clonmelsh

The Local Road on the south side of the existing junction will be realigned along the east side of the Mainline, to connect to the realigned L3050 east of the overbridge and some 230 metres east of Hayes Cross. The existing road on the north side of the Mainline will be reconstructed on line and retained as access to residential property.

N9, Junction 5, Powerstown

The existing N9, north of Junction 5, will be realigned over a length of 400 metres, slightly to the east of the existing road to connect to the north roundabout of the grade separated junction. The existing road will be used to pass traffic during construction of the realignment and will be retained over a short length to serve as access to properties on the west side of the road. The remaining length of road will be broken up and landscaped.

South of Junction 5, the existing N9 will be realigned over a length of 830 metres. From the southern tie-in the realignment lies on the west side of the existing road, and crosses the line of the existing road after 600 metres, bearing to the northeast to connect to the south roundabout of Junction 5. A short length of the existing road in front of the landfill site would be retained to provide access to this operation, and the remaining length broken up and landscaped.

A new structure will be provided under the realigned road to take the flow of the existing stream which passes along the northern boundary of the landfill site.

Table 3.2.4 Summary of Road Diversions in Section C

Road Ref	Road Name	Townland	Chainage	Description
L8092	Barnhill	Ballyburn Lower	49,900	Realigned to the north and raised to cross over the N9 dual carriageway
L8094	Deerpark	Deerpark, Ballyhade	47,950	Raised to cross over N9 dual carriageway
L6113	Russelstown North	Russelstown, Burtonhall Desmesne	46,000	Realigned to south and raised to cross over N9 dual carriageway
L1009	Russelstown South	Ardnehue	45,220	Realigned to south and raised to cross over N9 dual carriageway
R726	Johnstown Road	Johnstown	43,330	Realigned to pass under the N9 dual carriageway
R725	Bennekerry Road	Busherstown	41,710	Reconstructed on line to cross over the N9 dual carriageway
L3053	Ballycrogue	Moyle Big, Ballycrogue	40,695	Realigned slightly to north and raised to cross over N9 dual carriageway
N80	Junction 4	Rathcrogue, Kilmeany	38,665	Realigned to the northeast of the existing road to connect to the roundabouts of the grade separated junction
L3052	Linkardstown Lane	Linkardstown, Tinryland	36,960	Realigned to north and raised slightly to cross over the N9 dual carriageway
L3051	Ballybar	Ballybar Lower, Ballybar Upper	35,890	Realigned to east and raised to cross over N9 dual carriageway
L3050	Ballybannon Road	Ballybannon	34,190	Realigned to north east and raised to cross over N9 dual carriageway
L1008	Milford Road	Ballybannon	34,190	Reconstructed on line
L1020	Carlow Road	Ballybannon	34,190	Reconstructed on line
L3044	Ballyloo Road	Ballybannon, Clonmelsh	34,190	Realigned along southeast side of the N9 dual carriageway
N9	Junction 5	Cloghristick, Powerstown	32,350	Realigned to the east of the existing road, north of the junction. Realigned over 830 metres, south of the junction

Section D Athy to R747 Link Road

N78 Ch. 1,000

The existing N78 will be realigned over a length of 550 metres just north of the R417 Realigned Road between Castledermot and Athy, to form a three-legged roundabout junction with the Athy to R747 Link Road. Existing private accesses will be retained on the realigned road.

L4008 Ch. 2,430

The proposed Athy to R747 Link Road crosses the L4008 Local Road on a heavy skew at Ch. 2,230. The Local Road will be realigned over a length of 150 metres on the north and south sides to form a staggered major / minor junction with the new link road.

L4008 Ch. 4,500

The Athy to R747 Link Road is aligned over the existing L4008 Local Road for a length of 1,500 metres north of Ch. 4,600. The Local Road will be realigned over a length of 150 metres to form a major / minor junction with the new Link Road.

L8072 Ch. 5,040

The existing Local Road will be reconstructed on line over a length of 80 metres to form a major / minor junction with the Athy to R747 Link Road.

L8073 Ch. 5,720

The Local Road will be realigned slightly to the west to form a major / minor junction with the Athy to R747 Link Road.

L4008 & L8017 Ch. 6,200

The Local Roads on the north and west side of Burtown Cross roads will be rationalised. The western leg will be realigned over a length of 80 metres to form a major / minor junction with the Athy to R747 Link Road at Ch. 6,220. The Local Road to the north of the cross-roads will be severed by the new Link Road, and the portion on the south side of the new road will be retained as private access to the dwelling at Ch. 6,330, south. The L8017 Local Road on the north side of the Athy to R747 Link Road will be realigned to form a major / minor junction with the link road at Ch. 6,360.

L8027 Ch. 7,500 – Ch. 8,100

The existing L8027 Local Road will be severed where it crosses the proposed Athy to R747 Link Road between Ch. 7,900 and Ch. 8,200. The road on the south side of the Link Road will be realigned over a length of 200 metres to form a major / minor junction with the link road at Ch. 7,560.

The section of the existing Local Road between Ch, 7,560 and Ch. 7,800 will be retained as private access and will be connected to the realigned section of the L8027, approx. 60 metres south of the junction with the link road. A hammerhead turning area will be provided where the road is severed at Ch 7,800.

L8027 Ch. 8,100 – Ch. 8,300

The existing L8027 Local Road will be severed where it crosses the proposed Athy to R747 Link Road between Ch. 7,900 and Ch. 8,200. A hammerhead turning area will be provided on the north side of the Link Road where the Local Road is severed, at Ch. 8,180. The properties fronting onto this severed section of road

between Ch. 8,200 and Ch. 9,000 on the north side of the Link Road will be able to access the Link Road via a junction at Ch. 9,030.

L8029 Ch. 8,220

The existing Local Road will not be connected to the Athy to R747 Link Road. Instead, traffic will be diverted to join the new Link Road via the junction with the L8028 at Ch. 8,980. A hammerhead turning area will be provided where the L8029 is severed, just south of the new Link Road.

L8028 Ch. 9,000

The proposed Athy to R747 Link Road crosses the L8028 Local Road at Ch. 9,000. The Local Road will be realigned over lengths of 100 – 150 metres to form a staggered major / minor junction on the Link Road.

L8040 Ch. 12,090

The Athy to R747 Link Road crosses the existing L8040 Local Road on a slight skew at Ch. 12,090 on the south side of Mullamast Hill. The Local Road will be realigned over a length of 150 metres on the north and south of the new Link Road to form a staggered major / minor junction.

Old N9 Ch. 13,340

The old N9 will be severed by the new Athy to R747 Link Road, with no connection between the existing road and the new Link Road. Access to the old N9 will however be provided by field access ramps and gates. Hammerhead turning areas will be provided near the ends of the severed sections of road. Local traffic has alternative routes to access the existing N9 within a short distance, so severance will be minimal.

N9 Ch. 13,450

The Athy to R747 Link Road will connect to the existing N9 at a new major / minor junction at the eastern end of the Link Road. A ghost island staggered junction will be formed on the N9 with the Athy to R747 Link Road and the existing R747 Regional Road approximately 120 metres to the south.

Table 3.2.5 Road Diversions in Section D

Road Ref	Townland	Chainage	Description
N78	Gallowshill	1,000	Realigned to form a roundabout junction with the Athy to R747 Link Road
L4008	Foxhill, Bray Upper	2,430	Realigned on the north and south side of the Link Road to form a staggered major / minor junction
L4008	Ballycullane, Tumerstown	4,500	Realigned over 150m to form a major / minor junction on the north side of the Athy to R747 Link Road
L8072	Turnerstown, Ballycullane	5,040	Reconstructed on line to form a major / minor junction on the south side of the Athy to R747 Link Road
L8073	Inch	5,720	Realigned over 120m to form a major / minor junction on the north side of the Athy to R747 Link Road
L4008	Burtown Big	6,200	Realigned over 100m to form a major / minor junction on the south side of the Athy to R747 Link Road
L8017	Burtown Big	6,350	Realigned on north side to form a major / minor junction with the Athy to R747 Link Road. Severed on the south side of Athy to R747 Link Road and retained as access to property.
L8027	Burtown Little	7,560	Realigned over 200m to form a major / minor junction on the south side of the Athy to R747 Link Road. Existing road severed to the east
L8027	Mullamast	8,200	Severed on the north side of the Athy to R747 Link Road
L8029	Mullamast	8,220	Severed on the south side of the Athy to R747 Link Road
L8028	Moone	9,000	Realigned to form a staggered major / minor junction on the Athy to R747 Link Road
L8040	Mullamast, Moone	12,090	Realigned to form a staggered major / minor junction on the Athy to R747 Link Road
Old N9	Ballitore, Timolin	13,340	Severed on both sides of the Athy to R747 Link Road
N9	Ballitore, Timolin	13,450	New major / minor junction formed on the existing N9

Design Standards

All of the roads intercepted by the proposed dual carriageway are single carriageway roads. In addition, a number of Rights of Way (RoW) will be severed. Wherever possible, the design has minimised the community severance by ensuring that the affected local roads are maintained. In most cases, the local road and the right of way would be maintained by providing a diversion over / under the proposed dual carriageway.

In some locations, extensive realignment of intercepted routes will be necessary, while at others the existing road would be reconstructed virtually on line. In addition, an 11.2 kilometre single carriageway link road from Athy to the existing N9, near to the junction with the R747, will be provided. A 1200 metre link road connecting the existing N9 to the N78 at the northern end of the scheme, and a 1360 metre improvement of the existing N9 southwest of Junction 3 are also included in the scheme.

Regional roads have typically been designed with 7.0 metre wide carriageways and alignments compatible with 85 kph Design Speeds, while Local Roads have been designed with 5.5 – 6.0 metre wide carriageways and 60 kph Design Speeds.

With due regard to the sometimes substantial environmental and land-use constraints, the geometric design of the realigned side roads and new link roads has been developed using the design speeds indicated in Table 3.2.6 as desirable:

Table 3.2.6 Road Class and Desirable Design Speeds

Road Class	Desirable Design Speed
National Primary Routes	100kph
National Secondary Roads	100kph
Regional Roads	85kph
Local Roads	60kph

To limit land severance, infrequently used Local Roads intercepted by the Mainline have in some cases been realigned using a desirable design speed of 50 kph. In extreme cases, where the application of formal design standards is not achievable, a lower standard has been adopted. Access tracks are discussed in Section 3.2.6.

The Athy to R747 Link Road, the N9 – N78 Link Road and all roads intercepted by the Mainline are single carriageways, and the horizontal and vertical alignment design is subject to certain restrictions and objectives outlined in the NRA TD9/00 to avoid sections of road with dubious overtaking.

In general a minimum grade of 0.5% has been adopted to ensure effective drainage. However, a lower grade can be accepted with over the edge drainage and on some short sections of crest curves. A maximum vertical grade of 5% is desirable. However with a relaxation this can be increased to 6%.

Table 3.2.7 indicates the carriageway, verge and hardshoulder width appropriate for each road class.

Table 3.2.7 Open Road Cross-Section

Road Class	Carriageway Width	Hardshoulder Width	Verge Width
National and Link Routes	7.3m	2.5m	3.0m
Regional Roads	7.0m	N/a	3.0m
Local Roads	5.5 – 7.0m	N/a	3.0m

The preliminary design has been developed on the basis of providing a working space requirement between the earthworks and the boundary fence line of 5 metres for National Routes / Link Roads and 3 metres for Regional / Local Roads. The land acquisition lines allow for access tracks, verge and median widening and sight line requirements.

Refer to Figures 3.67 and 3.68 (Volume 2) for typical cross-section details of the single carriageway roads.

In accordance with NRA TD27/00, the minimum vertical headroom clearance is required to be 5.3 metres.

Provision of carriageway drainage on link roads and side road realignments is as described in section 3.2.2 above.

In general, the provision of safety barriers on link roads and side road realignments will be in accordance with section 3.2.2.

The provision of barriers may require widening of the verge to provide a working width for the barrier. Verge widening will also be required where the provision barrier intrudes into the sight lines assumed in the design.

3.2.5 Existing N9 (National Primary Road)

Once the N9 Kilcullen to Powerstown Scheme is opened to traffic, the existing N9 over the length of the scheme is likely to lose its status as a National Primary road. The road width and the alignment will not however be changed, except where the existing N9 is realigned as part of the scheme. The proposed N9 dual carriageway will be taken over or under the existing road by means of bridges at Usk Little and at Junction 3 at Prumplestown. Although the section of the existing N9, immediately south of Junction 1 will be severed, a new link road to the N78 will maintain the through route to traffic. Access to existing frontages along the existing N9 will be retained.

3.2.6 Accommodation Roads / Access to Private Property

General

Accommodation Roads and Accesses to Private Property will be provided where existing facilities have been severed by the new scheme. These will have a typical minimum paved width of 4.0 metres, with 1.0 metre wide verges, with passing bays provided at intervals where required.

Where direct access to fields or dwellings is provided as part of this scheme, the access layout will be in accordance with TD 41/95. At field or dwelling accesses adjacent to roads on embankments or in cuttings, a desirable maximum grade of

10% with a 5 metre long level (max grade 3%) section at the road edge is provided wherever possible.

3.3 Earthworks

3.3.1 Geology

Silurian sandstone and siltstone rock are the oldest rocks encountered in the area and underlie the Mainline route from Kilcullen, as far south as Mullamast. Lower Carboniferous Limestones overlie the Silurian mudstones uncomformably. They form a parallel banded outcrop sequence, which becomes progressively younger towards the west. Lower Carboniferous Limestones underlie the area as far as Coolane / Ballyvass, which extends onto deeply weathered Granite. The Granite extends to beyond Tinryland. At Ballybar Upper the route is once again underlain by the Lower Carboniferous Limestone strata.

Lower Carboniferous Limestones also underlie the Athy to R747 Link Road from Athy, in the west, as far as Burtown Little, before crossing onto the Lower Carboniferous Mudstones, Sandstones and Siltstones and Lower Palaeozoic rocks for the remainder of the route.

The superficial deposits overlying the bedrock are of glacial origin. These materials comprise a mixture of granular deposits and interbedded clays and glacial till (boulder clay). Drift geology is generally of a considerable thickness, typically 5 metres – 20 metres, and up to 37 metres thickness in places. Localised peat, laminated clay and silty alluvium deposits also occur, particularly in the vicinity of the River Greese and it's many streams and tributaries.

3.3.2 Earthworks Design

During July to October 2002 and in April / May 2003, a preliminary Ground Investigation was undertaken along the length of the route to establish the existing ground conditions. This section addresses the earthworks cuttings and embankments and the reuse of materials.

Classification of Material

Fill materials to be used in earthworks must satisfy certain acceptability criteria detailed in the NRA Specification, including moisture content, plasticity, density, CBR, strength and grading.

The Sands and Gravels are expected to be classified for re-use as General Granular Fill. Some of these deposits may also be suitable as selected granular fill to structures and possibly for capping and sub-base materials.

Sandy Gravelly Clays and the fine grained Siltstone and Mudstones would be classified for re-use as General Cohesive Fill. However, these materials are susceptible to deterioration with increase in moisture content and poor handling.

The Limestones, Sandstones and Granites will make good General Granular Fill materials but additionally may also be valuable resources for Selected Fills such as capping, sub-base and roadbase aggregates. These materials will require crushing and processing to satisfy the requirement of the specification for each of these selected fills. However, the contractor may decide to import selected fills from locally available resources if this is commercially advantageous.

The assessments given in the following sections regarding material classification are preliminary, and further examination will be required at Detailed Design Stage following the Main Ground Investigation. The discussion on reuse of materials below is primarily based upon the distributions of moisture content found during the Preliminary Ground Investigation and does not take into account potential for improvement due to addition of lime or cement. The final decision on re-use of materials excavated from cuttings or imported to the site is likely to be influenced by strategic and economic factors.

The depths of earthworks cutting and height of embankment construction are approximate, and are subject to review during the detail design stage following receipt of more detailed ground investigation data.

Cuttings General

The proportion of acceptable earthwork material to be excavated from the cuttings has been assessed as 85 – 95% for deposits of clean Sands, Gravels and Granites, and 50 – 80% for the sandy gravelly Clays and clayey gravelly Sands. The lower proportions of acceptability occur in the wetter deposits in the top 1 – 2 metres below ground surface which are more readily influenced by prevailing weather conditions.

Based on the findings of the Preliminary Ground Investigation the ground conditions are generally believed to be acceptable for forming the proposed earthworks cuttings with side slopes of 1 vertical to 2 horizontal with an adequate factor of safety in the sandy gravelly boulder clay / sand and gravels soil overburden. Steeper cutting side slopes are likely to be suitable in the bedrock.

Geotechnical investigations indicate a variable weathering profile within the Granite, but hard rock has also been found some metres above the cutting formation level. Digging by ripping appears feasible for the highly weathered and moderately weathered Granites respectively. However, due to the weathering process 'corestones' of stronger rock are likely to exist within these layers. Blasting will be required to form cut slopes and excavate the Strong rock. To facilitate construction in the hard rock, pre-split blasting techniques are likely to be used in conjunction with side slopes of 50 degrees or steeper. Consideration will need to be given at the carriageway level to the requirements of rock traps and sightline for such steeper slopes.

The Preliminary Ground Investigations indicated groundwater is generally encountered at depths varying between 2 – 15 metres, and sections of the cuttings may be formed below the current groundwater level. Interceptor ditches, batter and filter drains will be required to deal with any groundwater flow where water inflows occur during construction and operation.

Embankments General

Many small embankments are required along the alignment with typical heights of less than 3 metres, with higher embankments required at the locations described below. Side slopes for embankment construction will depend on the quality of available fill material, and it is expected that slopes of 1 vertical to 2 horizontal will be satisfactory given the likely materials excavated along the route.

Section A Kilcullen to Mullamast Ch. 78,500 – Ch. 62,000

Cuttings

The significant cuttings in Section A consist of a cutting up to 10 metres in depth consisting of granular material with inter-bedded boulder clay deposits at Calverstown (Ch. 71,570 – Ch. 73,580), a sandstone rock cutting up to 18 metres in depth at Nine Tree Hill (Ch. 64,460 – Ch. 65,150), and an excavation up to 6 metres in depth in sandy gravelly clays and inter-bedded granular material at Mullamast (Ch. 62,550 – Ch. 64,140).

Embankments

Many small embankments are required along the alignment in Section A with typical heights of less than 3 metres. The most significant embankments along the Mainline are at Ballymount (Ch. 69,620 – Ch. 71,000) where an embankment up to 8 metres in height is proposed, at Coolavash (Ch. 67,050 – Ch. 68,020) with an embankment up to10 metres in height, and an embankment north of Nine Tree Hill, (Ch. 65,150 – Ch. 65,700) up to 6 metres in height.

Usk Little Landfill

An old quarry site is located at Ch. 71,650 – Ch. 71,820. This site is currently operating as a landfill site taking construction and demolition waste under a licence granted by Kildare County Council. The Preliminary Ground Investigation indicates Made Ground to approximately 10 metres depth, with the groundwater below proposed road formation level. The Preliminary Ground Investigation also indicates the presence of soil contamination in some areas of the site with elevated levels of contaminants such as Heavy Metals and Polycyclic Aromatic Hydrocarbons (PAH's). Some test results exceeded Dutch Standard Trigger levels for these contaminants.

Even without the presence of contaminants the material in the landfill has arisen from construction and demolition waste and having a variety of constituents is unlikely to be suitable as engineering fill.

The vertical alignment of the dual carriageway requires that much of this material will need to be excavated to achieve road formation level and consequently classification of this material as a hazardous waste will impact on the disposal costs and may require licensing by the Environmental Protection Agency. A detailed environmental investigation will need to be undertaken as part of the Main Ground Investigation, prior to preparing the detailed design to further assess the economic and environmental impact of this material.

In the event that substantial extents of the Made Ground are shown to be a hazardous waste, with associated high disposal costs, it may be necessary to minimise excavation volumes. In such circumstances steeper slopes may be achieved by employing soil nailing or retaining walls constructed using top down techniques.

As the material is highly variable and poorly consolidated the Preliminary Design has assumed that any unsupported side slope required in these deposits are constructed at inclinations of 3 horizontal to 1 vertical to ensure adequate stability.

Section B Mullamast to Prumplestown Ch. 62,000 – Ch. 50,000

Cuttings

The most significant cutting proposed in this section of the route occurs between Coolane and Woodlands West (Ch. 51,980 – Ch. 54,790), almost 3 kilometres in length to depths of up to 9 metres. The excavation will encounter mainly sandy gravelly Boulder Clays with pockets of Sands and Gravels. However, over a 700 metre length (Ch. 52,500 – Ch. 53,200) the excavations in the cutting are likely to encounter Granite in the lower 2 metres. The excavations are thought to be predominantly highly weathered Granite and granite Sand, but due to the highly variable weathering profile in these rocks, areas of strong rock are likely. Given the small extent of hard Granite anticipated, it is concluded that only limited blasting will be required in the rock cut excavations.

At Ballyvass (Ch. 55,340 – Ch. 55,860) the excavations will be formed in sandy gravelly Clay and Sand and Gravel deposits to depths of up to 9 metres.

Embankments

The significant embankment in the section is to be located at Junction 3 at Prumplestown (Ch. 50,000 – Ch. 52,000). The maximum height is around 9 metres. Other embankments would be constructed where the route crosses the River Greese at Belan and the River Lerr at Woodlands West

Section C Prumplestown to Powerstown Ch. 50,000 – Ch. 32,300

Cuttings

The principle cuttings proposed along this section of the route are:

Russelstown North (Ch. 45,940 – Ch. 47,170) where the cutting will extend to depths of up to 12 metres. At the southern end of the cutting excavations will pass through Sand layers, inter-bedded with sandy gravely Clay, while in the northern portion sandy gravelly Clays overlie Granite at shallow depth. Areas of hard Granite are likely, and it is anticipated that blasting will be required in the rock cut excavations.

Bennekerry (Ch. 41,200 – Ch. 42,890), where cuttings up to 9 metres will be formed in Glacial Till, sandy gravely Clay, weathered Granite sands and gravels, and Granite. The depth to granite rock is variable, with in some places only 2.5 metres of overburden. Areas of hard Granite are likely, and it is anticipated that blasting will be required in the rock cut excavations.

Ballycrogue (Ch. 39,620 – Ch. 40,760), where cuttings in Gravel, Glacial Till and Granite will be formed to depths of up to 9 metres. Water bearing weathered granite sands and gravels were encountered at relatively shallow depths in places.

Linkardstown / Tinryland (Ch. 36,420 – Ch. 37,730), where a cutting up to 7 metres in depth is proposed in glacial till overlying Granite at depths of between 2.4 to 7 metres. Strong Granite is expected to be encountered in the central part of the cutting over a length of 400 metres, and blasting will almost certainly be required over part of this length to excavate the rock. Elsewhere, slopes are to be formed in the Glacial Tills.

Embankments

Many small embankments are required along the alignment in this section with typical heights of less than 3 metres. However, embankments up to 6 metres high

will be required at the River Burren crossing at Ch. 41,100, while embankments 9 metres high will be required at Junction 4 (Ch. 37,730 – Ch. 39,620) and at the Clonmelsh Railway crossing (Ch. 32,300 – Ch. 33,960).

Section D Athy to R747 Link Road

Along the western end of the Athy to R747 Link Road the proposed new road will be largely at grade or on shallow earthworks. Cuttings are proposed through sandy gravelly Boulder Clay between Ch. 7,000 – Ch. 7,450 to a depth of 6 metres, and just west of Mullamast cross roads (Ch. 8,700 – Ch. 9,100) the route will cut through Sandstone / Siltstone to a depth of 7 metres. The most significant cutting lies east of Mullamast between Ch. 11,390 – Ch. 12,140 where excavations up to 12.5 metres in depth are expected in Sand and Gravel.

Several small embankments are proposed along the Athy to R747 Link Road. The most significant fill areas occur at Ch. 2,250 – Ch. 3,400 to a height of 5 metres, Ch. 6,400 – Ch. 6,980 to a height of 6 metres, Ch. 9,100 – Ch. 9,620 at the western approach to the Junction 2 interchange with the proposed N9 to a height of 6 metres, and from Ch. 12,140 – Ch. 13,450 at the tie in to the existing N9.

3.3.3 Earthwork Mass Haul

The mass haul for the Mainline alignment indicates a total volume of cutting of approximately 4.17 million cubic metres (m^3), of which some 660,000 m^3 is likely to be in rock cutting, and 770,000 m^3 is likely to be classified as unsuitable for reuse in structural embankment construction (designated U1 material). Earthworks fill required for the Mainline is 3.72 million m^3. The equivalent figures on the Athy to R747 Link Road are 403,000 m^3 of cutting, of which some 21,000 m^3 is likely to be rock cutting, and 50,000 m^3 is likely to be classified as unsuitable (U1) material. Earthworks fill is approximately 435,000 m^3.

It can be seen that there is a deficit in overall fill volume required for the Mainline of almost 310,000 m^3, and that the Mainline excavations will generate 770,000 m^3 of unsuitable material. The deficit of fill material could be obtained from the numerous sand / gravel quarries along the route. Alternatively the deficit could be sourced by processing some of the U1 materials encountered in the cuttings.

The U1 material is assessed as having too high a moisture content to render it as an acceptable engineering material. However, much of the glacial till material that has a high moisture content could be improved by mixing with lime to reduce the moisture content. It should therefore be possible to eliminate the deficit in the earthworks balance by improvement of the U1 material, while approximately 50% of the U1 materials will be required for construction of amenity bunds and in landscaped areas.

The railway line crossing at Clonmelsh at Ch. 33,440 forms a barrier to haulage of earthwork materials from the north. The net effect of this is that there is a fill deficit in the section Ch. 32,250 to Ch. 33,440 of approximately 300,000 m^3.

Although the mass haul diagram indicates that the Mainline earthworks are roughly in balance between Ch. 38,000 and Ch. 78,500, the earthwork balance does not take account of the sourcing of selected fill for sub-base and road pavement construction.

It is probable that some of the Sands and Gravels, Limestone, Sandstones and Granites encountered in the cuttings will be used for capping, sub-base or other road construction materials.

The capping requirements are included in the volumes of the earthworks balance as overall volumes (500,000 m^3 along the Mainline and 60,000 m^3 on the Athy to R747 Link Road). Assuming the capping requirements are sourced from materials won from the site, this would leave a potential 100,000 m^3 of rock materials available for other uses, possibly as road construction materials. Use of this rock material for non-earthwork operations would generate a corresponding increase in the fill deficit.

Ultimately the strategy that will be adopted is likely to be a combination of borrowing materials to make good a local deficit in available suitable fill material, some improvement of material classified as U1 due to its high moisture content, and removal of unsuitable material off site as reinstatement of land for agricultural use. The refined earthworks strategy will be prepared at Detailed Design Stage following receipt of the data from the Detailed Ground Investigation.

The earthworks assessment shows that there is a considerable surplus of topsoil generated along the route, of which some can be used in the planting and landscaping measures. The volume of surplus topsoil can be reduced if the topsoil is left in-situ beneath embankments where the height of fill exceeds 3 metres. This could reduce the surplus topsoil quantity on the Mainline by as much as 155,000m^3, and would have the added benefit of also halving the cumulative fill deficit.

3.4 Bridges and Structures

3.4.1 Introduction

There are a total of 26 road overbridges, 5 road underbridges, 4 river bridges, a railway bridge, 3 access / accommodation overbridges, 4 accommodation underpasses and 68 significant drainage culverts to be constructed as part of the scheme.

Note: An ***overbridge*** carries another road over the proposed N9
An ***underbridge*** allows another road to pass under the proposed N9

The road overbridges have been detailed as typically having three spans with no support in the central reserve. This should not preclude other general arrangements for the bridges. Although bridges using pre-cast concrete beams and in-situ concrete deck construction have generally been indicated, the bridge decks may be of pre-cast beam and slab, in-situ concrete deck, in-situ concrete construction or steel concrete composite construction.

Road underbridges can be divided into 3 categories, bridges carrying the Mainline over National Roads, as at Junction 3 and Junction 4, bridges carrying the Mainline over Regional Roads and bridges carrying the Mainline over Local Roads. Underbridges are proposed as single span structures. However, the underbridges over National Roads are proposed to be open elegant structures befitting the high volumes of traffic flow at the junctions, while the underbridges across Regional and Local Roads would have a simpler form of construction. Again the deck construction could be of pre-cast concrete beams and in-situ concrete deck, in situ

concrete construction or steel concrete composite construction. Reinforced earth panels may be used to form the sub-structure on the Local Road crossings.

It is considered that the form of construction of the Mainline crossing over the railway at Clonmelsh would be of a similar form to the Local Road crossings. The river bridges would be formed with the sub-structure constructed out of the river channels, while the deck construction could be one of the forms described above.

Table's 3.4.2, 3.4.3, 3.4.4 and 3.4.5 below list the bridges and the main culvert structures in each section of the road.

3.4.2 Bridges in Excess of 100 metre Length

With the exception of the overbridge carrying the existing N9 over the proposed Kilcullen to Powerstown dual carriageway, all the structures listed in Tables 3.4.2 to 3.4.5 inclusive are less than 100 metres in length. The overbridge at Usk Little is heavily skewed (43.6 deg) and as a result the overall length of the structure is some 135 metres. This bridge is likely to be constructed as a three span structure, as indicated in the proposed details in Figure 3.69 (Volume 2). The cross-section is given in Table 3.4.1.

Table 3.4.1 Usk Little Overbridge Cross-sections

Bridge Number	Class of Road	Carriageway Width (m)	Hard Shoulders (m)	Footways (m)	Parapet Plinths (m)	Total Width of Deck (m)
A10	National	7.3	2.5	Varies – 1.5m min	2 x 0.5	19.2

3.4.3 Principal Structures for Section A Kilcullen to Mullamast Ch. 78,500 – Ch. 62,000

Table 3.4.2 Principal Structures for Section A Kilcullen to Mullamast

Structure Number	Structure Name	Approx Chainage	Bridge Type
Structure No A1	Athy Link Overbridge (Junction 2)	62,873	Athy to R747 Link Road over Mainline
Structure No A2	Mullamast Road Overbridge	63,421	Local Road L8027 Over Mainline
Structure No A3	Nine Tree Hill Overbridge	64,580	Local Road L8025 Over Mainline
Structure No A4	Nine Tree Hill Accommodation Overbridge	65,052	Local Access Road Over Mainline
Structure No A5	Crookstown Overbridge	66,453	Regional Road R415 Over Mainline
Structure No A6	Coolavash Underbridge	67,300	Local Road L8014 Under Mainline
Structure No A7	Narraghmore Overbridge	68,725	Local Road L8015 Over Mainline
Structure No A8	Ballymount Underbridge	70,490	Local Road L6095 Under Mainline

Table 3.4.2 Principal Structures for Section A Kilcullen to Mullamast (contd.)

Structure Number	Structure Name	Approx Chainage	Bridge Type
Structure No A9	Calverstown Little Overbridge	71,577	Local Access Road Over Mainline
Structure No A10	Overbridge at Existing N9	71,900	National Road Over Mainline
Structure No A11	Baronsland Overbridge	73,960	Local Road L6090 Over Mainline
Structure No A12	Cartersbog Overbridge	76,400	Local Road L6089 Over Mainline
Structure No A13	Yellowbogcommon Overbridge	77,308	Local Road L6079 Over Mainline

3.4.4 Principal Structures for Section B Mullamast to Prumplestown Ch. 62,000 – Ch. 50,000

Table 3.4.3 Principal Structures for Section B Mullamast to Prumplestown

Structure Number	Structure Name	Approx Chainage	Bridge Type
Structure No B1	Prumplestown Underbridge (Junction 3)	50,530	National Road (Existing N9) Under Mainline
Lerr River Flood Relief Culverts			
Structure No B2	Lerr River Underbridge	51,540	Mainline over River
Structure No B3	Woodlands West Overbridge	51,625	Local Road L4011 Over Mainline
Structure No B4	Woodlands East Overbridge	53,050	Local Road L4009 Over Mainline
Structure No B5	Coolane Accommodation Overbridge	54,390	Accommodation Access Road Over Mainline
Structure No B6	Coolane Road Overbridge	54,528	Regional Road R418 Over Mainline
Structure No B7	Church Hill Overbridge	56,164	Local Road L8050 Over Mainline
Structure No B8	Ballynamony Road Overbridge	57,400	Local Road L8049 Over Mainline
Greese River Flood Relief Culverts			
Structure No B9	Greese River Underbridge	58,090	Mainline over River
Structure No B10	Pill Lane Overbridge	58,472	Local Road L8042 Over Mainline

3.4.5 Principal Structures for Section C Prumplestown to Powerstown Ch. 50,000 – Ch. 32,300

Table 3.4.4 Principal Structures in Section C Prumplestown to Powerstown

Structure Number	Structure Name	Approx Chainage	Bridge Type
Structure No B11	Agricultural Underpass	60,440	Agricultural Access Under Mainline
Structure No B12	Broomfield Road Overbridge	61.493	Local Road L4004 Over Mainline
Structure No C1	Powerstown Overbridge (Junction 5)	32,350	Junction 5 N9 Link and National Primary Road Over Mainline
Structure No C2	Accommodation Underpass	32,885	Access Road Under Mainline
Structure No C3	Clonmelsh Railway Underbridge	33,450	Railway Under Mainline
Structure No C4	Ballybannon Overbridge	34,190	Local Road L3050 Over Mainline
Structure No C5	Ballybar Overbridge	35,890	Local Road L3051 Over Mainline
Structure No C6	Linkardstown Lane Overbridge	36,960	Local Road L3052 Over Mainline
Structure No C7	Linkardstown Accommodation Overbridge	37,245	Access Road Over Mainline
Structure No C8	Rathcrogue Underbridge (Junction 4)	38,663	Junction 4 N80 Link and National Secondary Road Under Mainline
Structure No C9	Ballycrogue Overbridge	40,695	Local Road L3053 Over Mainline
Structure No C10	Burren River Underbridge	41,040	River Under Mainline
Burren River Flood Relief Culverts		41,040	
Structure No C11	Bennekerry Overbridge	41,710	Regional Road R725 Over Mainline
Structure No C17	Agricultural Underpass	43,170	Agricultural Access Under Mainline
Structure No C12	Johnstown Underbridge	43,330	Regional Road R726 Under Mainline
Structure No C13	Russelstown South Overbridge	45,220	Local Road L1009 Over Mainline
Structure No C14	Russelstown North Overbridge	46,000	Local Road L6113 Over Mainline
Structure No C15	Deerpark Overbridge	47,950	Local Road L8094 Over Mainline
Structure No C16	Barnhill Overbridge	49,900	Local Road L8092 Over Mainline

3.4.6 Principal Structures for Section D Athy to R747 Link Road

Table 3.4.5 Principal Structures for Section D Athy to R747 Link Road

Structure Number	Structure Name	Approx Chainage	Bridge Type
Structure No D1	Agricultural Underpass	12,440	Agricultural Underpass
River Greese Mill Race Culvert			
River Greese Flood Relief Culverts			
Structure No D2	Greese River Underbridge	13,260	Mainline over River Greese

3.5 Drainage

3.5.1 Existing Conditions

The N9 Kilcullen to Powerstown Scheme crosses flat and gently undulating land. The terrain generally lies at levels between 70 metres and 100 metres above Ordnance Datum (AOD). However a short length of the route rises to levels of 150 metres AOD where the route traverses the Mullamast Hill and Nine Tree Hill, southwest of Ballitore, while at the southern end of the scheme the ground level reduces to 45 metres AOD at the approaches to the River Barrow.

The existing drainage of this area is characterised by field perimeter ditches, which connect to the numerous small streams that cross the alignment. These streams in turn drain into the major river catchments. At the northern end of the scheme the land near Kilcullen drains to tributaries of the River Liffey, while south of Baronsland all of the land drains to the River Barrow, or to the Rivers Greese, Lerr and Burren, which are all tributaries of the River Barrow. The existing roads in the area usually drain directly into the existing ditch and stream network.

East from the town of Athy, the existing landform to the south of the Glenbawn River is mainly flat, running at a level of 65 metres to 70 metres AOD. Further east, the Link Road traverses higher ground as it passes round the southern slopes of Mullamast (135 metres AOD), and then falls rapidly towards the Greese River Valley, where the valley floor has a level of 91 metres AOD.

3.5.2 Drainage Principles

The design and construction of the N9 Kilcullen to Powerstown Scheme must make provision for:

- the continued drainage of the area during the construction stage;
- the runoff from the carriageways and earthworks of the new road.
- the maintenance or improvement of the existing drainage network.

Surface Water Collection

It is proposed to utilise a system of filter drains and open ditches constructed along the road edge for the main surface water collection.

Cut-off filter drains or ditches are also to be provided:

(a) at the top of cutting slopes where the adjoining land slopes towards the cutting, and

(b) at the bottom of embankment slopes where the adjoining land slopes towards the embankment and / or where over the edge drainage is used.

These cut-off drains or ditches will, where possible, discharge to existing watercourses and not necessarily to the road drainage system.

Where the road is in cut, any intersecting streams and ditches that need to be diverted away from the road will be connected into the road drainage system.

Some stretches of the new road traverse very flat land where a sufficient fall for a filter drain may not be possible. In these areas a ditch along the toe of the embankment is proposed.

The road surface water run-off would generally be collected by way of filter drains. Where the road is on embankment, not exceeding 6.0 metres in height, the carriageway drainage may be taken over the edge of the embankment and collected in filter drains situated at the bottom of the slope. On embankments where the height exceeds 6.0 metres, a kerb and gully detail with closed pipes is likely to be used. Where the road is in cutting, a filter drain is proposed to drain both the road pavement and the earth slope / verge areas.

Lengths of kerbed and gully drainage would be provided at structures and junctions and at other areas where filter drains would be inappropriate. In these areas, fully enclosed drainage systems would generally feed into the filter drain network.

In super-elevated sections, where crossfall is towards the median, surface water runoff will be gathered by gullies adjacent to the central reserve barrier or by filter drains where a widened grassed central reserve is available. Central reserve drains will discharge at regular intervals to main carrier drains, which will in turn discharge to selected outfalls located at low points along the road.

Design Storms

The road drainage system will be designed to accommodate, without surcharge, a once in 5 year storm event with a maximum runoff intensity of 50 millimetres per hour. This approach will enable the road drainage system to accommodate higher rainfall intensities for shorter storms.

Road Drainage Outfalls

The suitability of watercourses for use as a receiving water for the road drainage has been assessed by comparing the flow characteristics of the watercourse with the estimated flow in the proposed outfall. A suitable receiving watercourse is considered to be one where the combined flows from the natural catchment and from the road, do not generally exceed the peak flow in the watercourse resulting from the natural catchment alone. The locations of the proposed drainage outfalls are shown on the road layout drawings in Figures 3.2 to 3.64 (Volume 2).

Attenuation and Pollution Control

The filter drains by their nature reduce the maximum rate of discharge from the road into the drainage system. Even with the attenuation afforded by the filter drain system, there are several places along the proposed road where the combined discharge from the road and the natural catchment would exceed the capacity of the watercourse, and here facilities for temporary storage of surface water runoff

will be incorporated as part of the scheme proposals, in order not to overcharge those natural streams.

Pollution control will be provided at all discharge points for surface water run-off from the Dual Carriageway to prevent contamination of the receiving water course. The interceptors are also effective in containing accidental spillages.

Culverts and River Crossings

Streams or drainage ditches which cross the route will be culverted by means of piped culverts, box culverts or other culvert sections. Culverts have been sized to accommodate the flow generated by a once in 100 year storm event. The minimum culvert size which has been adopted along the Mainline is 900 millimetre diameter pipe to culvert minor drainage ditches which are normally dry. For more significant drainage ditches, which have permanent water flow, a minimum culvert size of 1200 millimetre diameter pipe has been used.

In rivers and streams containing fish, arch culverts will generally be provided to minimise disturbance of the watercourse, the inverts of closed culverts will be constructed below the stream bed level, to simulate a natural stream character and to maintain a low flow channel.

For the purpose of culvert sizing, streams which drain a catchment greater than 20 square kilometres upstream of the road crossing have had their flows estimated by the method detailed in the Institute of Engineers of Ireland (IEI) publication "Flood Estimation Following The Flood Studies Report". The locations of culverts are shown on the road layout drawings in Figures 3.2 to 3.64 inclusive (Volume 2).

At watercourse crossings where bridges are required the catchment area is generally significantly in excess of 20 square kilometres. Each crossing has been separately identified and span arrangements have been defined by 100 year flood flows calculated using the IEI publication "Flood Estimation Following the Flood Studies Report". The river bridges will be designed to avoid forming the structural foundations within the watercourse.

3.6 Pedestrian and Cycling Provision

The N9 Kilcullen to Powerstown Scheme is designated as an all-purpose National Primary Road, and as such is available for use by pedestrians and cyclists. Cyclists will be able to use the hard shoulder throughout the length of the scheme, while pedestrians will be allowed to use the verge. Provision will be included on all river and rail bridges and on bridges carrying the dual carriageway over other roads for a 1.5 metre wide footpath adjacent to the parapet on both sides of the bridge. At bridges crossing over the dual carriageway, pedestrians walking along the dual carriageway will continue to use the verges, while the hard shoulders will be available for use by cyclists.

Bridges carrying National, Regional and Local Roads over the dual carriageway will include a 1.5 metre wide footpath on both sides of the bridge adjacent to the parapet.

Specific measures have been included in the diversion of the N80 at Junction 4 at Rathcrogue, where a significant number of cyclists and pedestrians has been identified, for a pedestrian / cycle route along the south side of the N80 and through

the junction, to provide a safe passage segregated from road traffic. Refer to Figures 3.6 & 3.46 in Volume 2 for details of the road layout in this area.

3.7 Signing and Lighting

3.7.1 Signing

Road signage will be provided in accordance with national guidelines and regulations. The proposed N9 dual carriageway will be provided with Advance Direction Signs to advise drivers on directions to regional and local destinations. The sign faces for the Mainline will be designed for a design speed of 120 kph and for an all-purpose dual carriageway.

All other affected roads will be signed as appropriate to the road classification and destination. The sign faces for the link roads (Athy to R747 Link Road, N9 – N78 Link Road and the other realigned N9 and N80 sections of road) will be designed for a design speed of 100 kph.

3.7.2 Lighting

For the safety of road users road lighting will be provided at the following locations:

- At Junctions 1, 2, 3, 4 and 5:
  Along the full length of the Mainline between the diverge and merge slip roads, and 150m in advance of the taper, along the merge / diverge taper, auxiliary lane and nosing, along the slip roads, at the roundabout at-grade junctions and along the approaches to the roundabout junctions on the Link Roads.
- At the Athy Link / N78 Roundabout Junction and along the approaches to this roundabout junction, tieing in with the existing road lighting in this area.
- At the N9 – N78 Link Road ghost island junction with the existing N78. Also the ghost island junction between the Athy to R747 Link Road and the existing N9 is to be lit.
- Along the full length of the realigned N80 by Junction 4 and for a minimum distance of 150 metres west and east of the realigned road tie-ins.

In addition road lighting is to be provided at the following locations:

- To provide continuity with existing lit sections of road affected by the proposed N9 Kilcullen to Powerstown Scheme;
- Where appropriate for the safety and amenity of pedestrians, cyclists and equestrians;
- Elsewhere where it is desirable to improve safety and / or amenity for the community or drivers.

Main road lighting provided would utilise high pressure sodium lanterns, fully cut-off, to minimise night time visual intrusion in accordance with British Standard BS5489 – Road Lighting and Commission Internationale de l'eclairage C.I.E. 115-1995 Recommendations for lighting of Roads for Motor and Pedestrian Traffic.

3.8 Accommodation Works

In general the main accommodation works identified have the following purposes:

- Maintenance of access to a local road;

- Provision of access to land severed by the N9 Kilcullen to Powerstown Scheme;
- Re-provision of boundary fences, walls etc.
- Re-provision of farm facilities;

In addition to the above there are a number of significant accommodation works, which would be provided as part of the scheme:

Section A Kilcullen to Mullamast Ch. 78.500 – Ch. 62,000

The following accommodation structure will be provided in Section A.

Nine Tree Hill Accommodation Overbridge, Ch. 65,052

The N9 Kilcullen to Powerstown Scheme would sever the main access to the farmhouse on the west side of the alignment at Ch. 65,052, and an accommodation overbridge has been included as shown on Figures 3.22 & 3.60 (Volume 2).

Section B Mullamast to Prumplestown Ch. 62.000 – Ch. 50,000

The following accommodation structures will be provided in Section B.

Broomfield Accommodation Underpass, Ch. 60,440

The N9 Kilcullen to Powerstown Scheme severs agricultural landholdings such that significant severance would occur if some grade separated access provision were not included. In this case a 5.0 metre wide x 4.0 metre high accommodation underpass has been included to provide an access for limited agricultural machinery. See Figure 3.19 (Volume 2).

Access through River Greese Underbridge, Ch. 58,090

The route for the N9 Kilcullen to Powerstown Scheme severs agricultural landholdings on the north side of the River Greese, such that significant severance would occur if some grade separated access provision were not included. In this case the crossing of the River Greese has been enhanced to provide an access for limited agricultural machinery. See Figure 3.18 (Volume 2).

Coolane Accommodation Overbridge, Ch. 54,390

The N9 Kilcullen to Powerstown Scheme would sever the main access to the farm on the west side of the alignment at Ch. 54,300, and an accommodation overbridge has been included as shown on Figures 3.15 & 3.57 (Volume 2).

Section C Prumplestown to Powerstown Ch. 50.000 – Ch. 32,300

The following accommodation structures will be provided in Section C.

Busherstown House Accommodation Underpass, Ch. 43,170

The N9 Kilcullen to Powerstown Scheme severs agricultural landholdings such that significant severance would occur if some grade separated access provision were not included. In this case a 3.5 metre wide x 3.0 metre high accommodation underpass has been included to provide an access for animals. See Figures 3.9 & 3.53 (Volume 2).

Access through River Burren Underbridge, Ch. 41,040

The route for the N9 Kilcullen to Powerstown Scheme severs agricultural landholdings such that significant severance would occur if some grade separated

access provision were not included. In this case the crossing of the River Burren has been enhanced to provide an access for limited agricultural machinery on both sides. See Figure 3.7 (Volume 2).

Linkardstown Accommodation Overbridge, Ch. 37,245

The N9 Kilcullen to Powerstown Scheme would sever agricultural landholdings such that significant severance would occur if some grade separated access provision were not included. An accommodation overbridge has been included as shown on Figure 3.5 & 3.52 (Volume 2).

Accommodation Underpass, Ch. 32,885

The N9 Kilcullen to Powerstown Scheme severs agricultural landholdings such that significant severance would occur if some grade separated access provision were not included. In this case a 5.0 metre wide x 4.0 metre high accommodation underpass has been included to provide an access for limited agricultural machinery. See Figures 3.2 & 3.49 (Volume 2).

Section D Athy to R747 Link Road

The following accommodation structure will be provided in Section D.

Accommodation Underpass, Athy to R747 Link Road, Ch. 12,450

The Athy to R747 Link Road severs a dairy farm such that significant severance would occur if some grade separated access provision were not included. In this case an accommodation underpass with a 3.2 metre wide x 3.5 metre high clearance envelope has been included to provide an access for animals. pedestrian access has also been provided on both sides of the clearance envelope. See Figure 3.37 (Volume 2).

3.8.1 Farm Accommodation Roads

Several landholdings have been severed along the route of the N9 Kilcullen to Powerstown Scheme. In many cases provision of a farm accommodation road was found to be warranted after assessing the size of the severed land against the cost of provision of a new access track. These farm accommodation road facilities have been included in the scheme and land for the accesses is included in the CPO. Where provision of a farm accommodation road has been found not to be economically feasible, then the severed lands would be compulsorily acquired for the N9 Kilcullen to Powerstown Scheme.

3.9 Utilities

3.9.1 Introduction

The construction of the N9 Kilcullen to Powerstown Scheme would affect existing public and private utilities in the area where they cross the Mainline, link roads and side roads. Conflict locations along the route have been identified, and the Scheme provides for the temporary and permanent diversion of the affected utilities.

3.9.2 Telecommunications

Along the route of the N9 / N10 scheme, telecommunication service is supplied by the following service providers, Eircom, Vodafone, O2 and Meteor.

A comparison of the route of the proposed scheme and the Vodafone, O2 and Meteor networks indicates that there are no conflicts with the digital mobile phone suppliers. However, Eircom overhead and underground cables are present on many of the roads crossed by the proposed dual carriageway.

Eircom – Trunk Network

The Eircom trunk network is managed by area offices and supplied underground via fibre optic cables or pulse code modulation (PCM) cables. This network is generally routed along the major roads. A comparison of the route of the N9 Kilcullen to Powerstown Scheme and Eircom Trunk Plant revealed conflicts at the following locations:

Ch. 63,4000 at Mullamast

At mainline Ch. 63,400, the mainline crosses beneath the L8027 Local road. The Local road carries an Eircom PCM truck cable. This cable will be diverted to the realigned Local road. A temporary diversion of the cable will also be required.

Ch 53,055 at Woodlands East

At Ch. 53,055, the mainline crosses under the L4009 Local road. The Local road carries a fibre optic Eircom trunk cable in a concrete duct at the location. This cable will be diverted to the realigned Local road via 2 x 125 millimetres OD uPVC ducts. A temporary diversion of the cable will also be required.

Ch. 43,300 at Johnstown

At Ch. 43,300, the mainline crosses over the R726 Regional Road at Johnstown via an underbridge. The R726 carries a fibre optic Eircom trunk cable. This cable should be unaffected by the scheme.

Ch. 32,300 at Powerstown

At Junction 5, the mainline intercepts the existing N9, carrying a 24-fiber optic Eircom trunk cable. This will be diverted to the new link road overbridge via 4 x 125 millimetres OD uPVC ducts. A temporary diversion of the cable will also be required.

Athy Link / N78-Link Road Roundabout

At the roundabout junction between the N78 and the Athy to R747 Link Road, the existing N78 National Road carries a optic fibre Eircom trunk cable. This cable will be diverted to the verge of the realigned road.

Athy to R747 Link Road Ch. 2,450, Ch. 4,500, Ch. 6,200 and Ch. 8,000

At Ch 2,450, the link road crosses the L-4008-2 Local road. The Local road carries a PCM Eircom trunk cable. The link road also crosses this Local road at Ch. 4,500, Ch. 6,200 and Ch. 8,000 along the route. The PCM cable will be diverted into the verge of the link road between Ch. 2,450 and Ch. 8,000.

Athy to R747 Link Road Ch. 13,320

At Ch. 13,320, the link road crosses an Eircom PCM truck service. This service will be re-laid to suit the Link road alignment.

A lead-in period of 2-months in advance of road construction is required for trunk service diversions.

Eircom – Customer Service Network

The Eircom customer service network is managed by area offices and supplied via overhead and underground copper cables of varying size. The customer service network is routed along all classes of existing road network. A comparison of the route of the N9 / N10 scheme and the Eircom customer service network revealed conflicts at 28 locations along the Mainline and associated side road diversions, and at only 1 location along the Athy to R747 Link Road.

A lead-in period of 1 month in advance of road construction is required for customer service diversions.

3.9.3 Electrical Equipment (Electricity Supply Board (ESB))

The ESB is sub-divided into four separate groups; ESBI (concerned with 110kV and 220kV supply), ESB 38kV and 10KV, ESB Low Voltage and ESB Transmission Sub-station.

A comparison of the route of the N9 / N10 scheme and the ESBI plant revealed a conflict at Ch. 43,850 with the Carlow to Portlaoise 110kV line. The proposed Mainline is in a 3 metre depth of cutting at the conflict location. Diversion will involve removal of 1 pole and installation of 2 new poles at the limits of the road reservation.

The ESB distribution network carries 38kV, 10kV and low voltage electricity and is managed by ESB area offices. A comparison of the route of the N9 / N10 scheme and the 38kV and 10kV ESB network in Carlow and Kildare revealed 7 conflicts with the 38KV and 27 conflicts with the 10KV lines requiring either overhead or underground diversions. These will mainly follow the line of the side road realignments.

A lead-in period of 12 months in advance of road construction is required for 38kV diversions and a period of 6 months is required for 10kV/LV diversions.

3.9.4 Gas Supply (Bord Gais)

The Bord Gáis Transmission network is managed by Bord Gáis Éireann in Cork. The supply is via a small number of high pressure transmission mains. A comparison of the route of the proposed N9 Kilcullen to Powerstown Scheme and the Transmission network revealed conflicts at the following locations:

Ch. 54,940 – Ch. 55,270 (Coolane)

The Mainline is coincident with the 450 millimetre diameter Cork to Dublin Transmission Gas Main. The Mainline is on 5 – 6 metres of embankment at the location. An extensive diversion of the transmission main will be required parallel with the Mainline on its west side for a distance of 300 metres approximately and a new perpendicular crossing of the Mainline via a higher specification pipe.

Ch. 56,025 (Church Hill)

The Mainline crosses the 150 millimetre diameter Ballyvass to Athy Transmission Gas Main. The Mainline is at-grade at the location of the crossing. The conflict requires a diversion of the 150 millimetre diameter main to a higher specification pipe parallel to the existing.

A lead-in period of 12 months in advance of road construction is required for diversions of the Gas Transmission Networks.

No conflicts have been identified between the route of the scheme and the existing Bord Gais Distribution Network.

3.9.5 Water Supply (Kildare County Council and Carlow County Council)

The water supply along the proposed route is supplied by Kildare and Carlow County Councils or by private group water schemes. Where the N9 Kilcullen to Powerstown Scheme crosses water distribution pipes in minor roads, the small diameter watermains would be diverted along the realigned roads and through the bridge structures as appropriate.

Only two major water supply pipelines have been identified in the vicinity of the scheme which may need diversion. These are a 27" diameter pre-stressed concrete watermain located at Mainline Ch. 77,355, just north of the Yellowbogcommon Road. This water main would need to be diverted and protected under the N9 dual carriageway. However, a proposed replacement pipe might be installed by the authority prior to commencing the scheme construction, in which case a diversion of the existing main might no longer be required. The other water pipeline that may affect the scheme is a proposed new 500 millimetre diameter pipeline in the N78 north of Athy.

Provision will also be made for future planned services by the inclusion of ducts within the side road bridges or by provision of conduits under the dual carriageway for larger diameter watermains.

3.9.6 Sewerage and Drainage (Kildare County Council and Carlow County Council)

Along the route of the N9 / N10 scheme, foul and surface water drainage systems are managed by the relevant local authority i.e. Kildare and Carlow County Council. No significant conflicts between the scheme and the existing network have been identified.