

Chapter 4 Description of the Proposed Road Development

It is envisaged that the construction phase in the scheme development will be carried out under a Design and Build Contract. As a result the detailed design for the scheme will be completed by the design and build contractor and may therefore vary in precise line, level and detail from the proposals set out in this report, as modifications may be made to avail of opportunities to improve the design provided this has no significant adverse environmental effects. However, the design of the proposed road development has been developed to such an extent and in sufficient detail to prove the feasibility of the scheme and to allow for a proper and informed environmental impact assessment to be carried out of same. The design presented forms the basis for the Statutory Procedures for the scheme. This EIS, along with the identification of land requirements, together with any mitigation measures and commitments agreed at any future oral hearing or as directed by An Bord Pleanála, will form the basis of Kildare County Council's requirements for the Design and Build Contract.

4.1 Description of the Proposed Road Development

4.1.1 Scheme Overview

The section of the M7/N7 under consideration commences at Junction 11, Great Connell, where the M9 merges with the M7 and extends to Junction 8, Johnstown (refer to **Figure 1.1, EIS Volume 3**). The scheme can be considered in three sections in relation to the history of the existing infrastructure:-

- The section between Junction 11, Great Connell and Junction 10, Newhall, was constructed as part of the Droichead Nua By-Pass Scheme as a dual two lane motorway (D2M) and opened to traffic in 1994. This section has not been subject to any major maintenance since construction;
- The section between Junction 10, Newhall and Junction 9, Maudlins, was constructed under the Naas By-Pass Scheme as a dual two lane motorway (D2M) and opened to traffic in 1983. This was the first section of motorway constructed in the country and was the subject of a major pavement upgrade in 2006-2007;
- The section between Junction 9, Maudlins and Junction 8, Johnstown follows the historic alignment of the N7 national primary road which has evolved over time, the most recent upgrade involving widening from a dual two lane all purpose road (D2AP) to a dual three lane all purpose road (D3AP) as part of the Naas Road Widening scheme, completed in 2006. This scheme which extended from Junction 4, Rathcoole, to Junction 9, Maudlins, included full grade separation of the junctions. While this section remains an all purpose road with a speed limit of 100kph due to the remaining frontage access, it is in all other regards constructed to the same standards as would apply to a motorway.

The proposed scheme involves widening the dual two lane section of motorway between the merge of the M7 and M9, both dual two lane motorways, and the commencement of the dual three lane all purpose road at Junction 9 Maudlins, which will also require some minor reconfiguration of the section of dual three lane all purpose road between Junction 9, Maudlins and Junction 8, Johnstown which currently includes the lane gain/lane drop as the road passes through the Maudlins interchange.

Throughout the full length of the scheme all of the widening is proposed to be constructed within the existing median (refer to **Plates 4.1 – 4.7** below). Upgrading of the road drainage will require work within the existing verges either side of the road and construction of new attenuation ponds alongside the motorway, some of which will be located in additional lands to be acquired beyond the current road boundary. The widened motorway will follow the alignment of the existing road both horizontally and vertically. **Figures 4.1 to 4.10** in **EIS Volume 3** indicate the alignment and road boundary of the proposed scheme.



Plate 4.1 Existing two lane M7 with wide grass median, looking north east from Great Connell



Plate 4.2 Existing two lane M7 with wide grass median and planted embankments at Lewistown



Plate 4.3 Existing two lane M7 with wide grass median, looking north east toward Newhall Interchange



Plate 4.4 Existing two lane M7 with wide grass median, looking south west from Newhall Interchange



Plate 4.5 Existing two lane M7 with wide grass median, looking north east from the R407 overbridge



Plate 4.6 Existing two lane M7 with wide grass median, looking south west from the R407 overbridge



Plate 4.7 Existing N7 looking north east from Maudlins Interchange

4.1.2 Junctions

There are four existing fully grade separated junctions on the scheme (refer **Figures 4.11 – 4.14, EIS Volume 3**).

- J11 Great Connell, where the M7 and M9 merge;
- J10 Newhall, a modified dumbbell interchange with the R445 Naas to Newbridge road and providing access to the M7 Business Centre;
- J9 Maudlins, a trumpet interchange with the R445 Dublin Road, Naas; and
- J8 Johnstown, a dumbbell interchange providing local access.

The proposed scheme includes closure of the existing motorway slip roads at Junction 10 and construction of a new dumbbell interchange with the R445 Naas to Newbridge road where it crosses the M7 some 700m south of the existing interchange.

The proposed new Junction 10 will involve the construction of two new roundabouts on the R445, one either side of the existing motorway overbridge (Ch 6+700). These roundabouts will be connected to the motorway with both eastbound and westbound on and off slip roads. The roundabout on the east side of the motorway will include the provision of free flow slip roads from the M7 eastbound off slip to the R445 westbound and from the R445 eastbound to the M7 eastbound on slip.

The proposed scheme also involves local re-configuration of the merge and diverge tapers at Junction 11 to effect a lane gain/lane drop, and similar reconfiguration of the east facing merge and diverge tapers at Junction 9 to eliminate the current lane gain/lane drop arrangement.

4.1.3 Side Roads

The scheme is crossed by three Regional Roads, three local roads, three private accesses and one footbridge.

J11-J10: Two local roads, Corbally Road (Ch 1+900) and Lewistown Road (Ch 3+800), a private access road at Ladytown Farm (Ch 4+900) and the

R445 Newbridge Road(Ch 6+700) crossing which is to be incorporated into the new Junction 10 Newhall interchange.

J10-J9: Rathangan Road (Ch 7+400) which forms part of the current Junction 10 Newhall and is proposed to revert to a local road overbridge following closure of the motorway slip roads, the R409 Caragh (Ch8+450), a private access road at Osberstown (Ch 10+325), Canal Bank Road (Ch 11+150), R407 Sallins Road (Ch 11+675) and a private access road at Monread (Ch 13+075).

J9-J8 A footbridge connecting Johnstown and Kerdiffstown (Ch 14+600).

All of these side roads are currently grade separated over or under the existing M7/N7 and will be unaffected by the proposed scheme, with the notable exceptions of the new Junction 10 roundabouts on the R445 Newbridge Road (Ch6+700) and closure of the motorway slip roads to and from the Rathangan Road (Ch 7+400).

Due Way, which currently acts as a local road between the existing Bundle of Sticks roundabout on the R445 Newbridge Road and Ladytown and also as the M7 westbound on slip road is proposed to be locally realigned to the south of the proposed new interchange. As such it will no longer connect to the motorway. A proposed new roundabout on this local road will be provided to maintain access to the surrounding lands (refer **Figure 4.13, EIS Volume 3**).

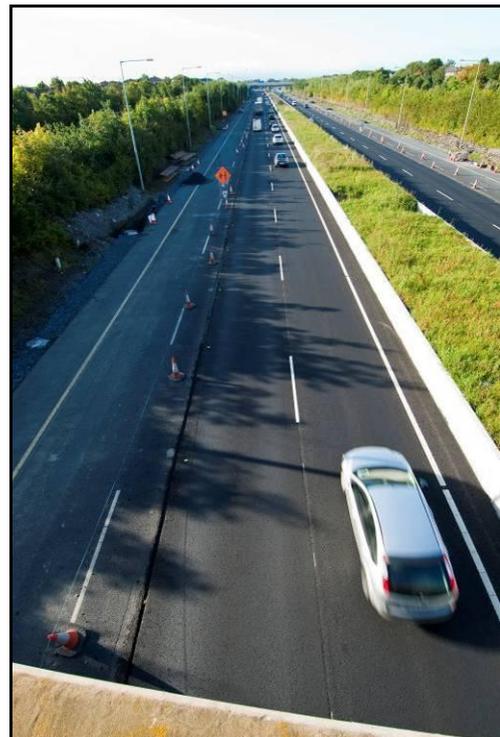
4.2 Design Standards

The standards adopted follow the requirements of the National Roads Authority Design Manual for Roads and Bridges (NRA DMRB), June 2013.

4.2.1 Motorway Cross Section

The cross section that is proposed for each carriageway is a hardshoulder of 3.0m, three traffic lanes of 3.5m each and a median hard strip of 1.0m, as required by NRA TD27. This gives a total paved width of 14.5m. Typical cross sections are illustrated in **Figure 4.15 in EIS Volume 3**.

The existing carriageway cross section comprises a hard shoulder of 3.0m, two traffic lanes of 3.65m each and a median hard strip of 1.0m, giving a total paved width of 11.3m. Therefore the additional paved width to be constructed is 3.2m per carriageway. Between J11 Great Connell and J10 Newhall the existing grass median is in the region of 12 - 15m wide. Between J10 Newhall and J9 Maudlins this reduces to be in the region of 8m. Therefore the required widening is readily accommodated within the existing median throughout. **Plates 4.8 – 4.10** below illustrate the construction and operation of the widening of the M1 between Junctions 2 and 3.



Plates 4.8, 4.9 and 4.10: M1 Widening under construction – highlighting traffic management and maintenance of two running lanes in both directions.

In accordance with NRA TD19 the new reduced width median will be provided with a continuous concrete safety barrier throughout the length of the scheme. Due to the varying width of the remaining median and the preference for concrete barriers to be provided at the minimum offset from the road to reduce the potential angle of impact by an errant vehicle, separate barriers will be provided for each carriageway. Between Ch 13+670 and Ch 14+300 there will be a level difference between the

median channel lines of the two carriageways, which will be retained by the concrete barriers.

4.2.2 Road Type and Design Speed

The existing road classification and design speeds will be maintained, as follows:-

- J11 Great Connell to J9 Maudlins: Rural Motorway with 120kph design speed;
- J9 Maudlins to J8 Johnstown: Rural All Purpose Road with 100kph design speed.

4.2.3 Carriageway Drainage

The existing carriageways are drained by a system of filter drains. Generally where the road alignment is reasonably straight the carriageway drains toward the outer verges. However on right hand bends the carriageway is super-elevated, draining towards the central median. The proposal to widen the carriageways into the median includes removal and replacement of the median drainage network.

CCTV condition surveys of the existing verge drainage was undertaken in 2012. This survey identified that a significant proportion of the old pipes between J11 Great Connell and J9 Maudlins are damaged and in need of replacement. Works associated with reconstruction of the damaged sections of pipework and upgrading of the hardshoulders are likely to result in further damage to adjoining sections of pipe. It is therefore anticipated that the complete drainage network will require replacement over this length. Between J9 Maudlins and J8 Johnstown new drainage was constructed as part of the N7 Naas Road Widening Scheme in 2006. The proposed reconfiguration of the road in this section is such that the existing drainage system will be retained where possible. Where it is not possible the drainage network in this section will be replaced.

The drainage network will take into account the increased runoff area of about 25% resulting from the widening of the carriageways. In addition the design reflects the requirement of current design standards to make allowance for an increase in rainfall intensity of 20% to 'futureproof' the network against the potential consequence of global warming. The combined effect is that the new drainage network is designed for a 54% increase in peak flows when compared to the existing system. The new drainage network includes attenuation of this increased flow in order to maintain the existing discharge rates. In order to improve the existing conditions at outfalls D, E, F and L it is proposed to construct attenuation ponds to further reduce the discharge from the motorway drainage below its current discharge rate.

In general carriageway drainage located in the outer verges will be collected through a combination of filter drains and over the edge drainage into ditches, similar to the existing situation.

The new carriageway drainage in the median will generally take the form of sealed linear drainage channels or gullies which are more suited to the narrow median and concrete safety barrier details that will result from the carriageway widening. The proposed drainage details are described in **Table 4.1** below.

Drainage of the new interchange roundabouts and slip roads at the R445 (Ch 6+700) will take a similar form to that on the mainline, and will be connected into the existing drainage system.

Table 4.1: Proposed Road Drainage Types

Chainage	Existing Drain	Proposed Drain	Existing Drain	Proposed Drain	Existing Drain	Proposed Drain
	Verge		Median		Verge	
14+750	Filter Drain	Filter Drain	Filter Drain	Sealed	Filter Drain	Filter Drain
13+700	Filter Drain	Filter drain	Filter Drain	Sealed	Filter Drain	Filter drain
11+500	Over the edge Filter drain	Over the edge Filter drain	Filter Drain	Sealed	Over the edge Filter drain	Over the edge Filter drain
10+850	Over the edge Filter drain	Over the edge Filter drain	Filter Drain	Sealed	Over the edge Filter drain	Over the edge Filter drain
10+200	Filter Drain	Filter drain	Filter Drain	Sealed	Filter Drain	Filter drain
9+200	Over the edge Filter drain	Over the edge Filter drain	Filter Drain	Sealed	Over the edge Filter drain	Over the edge Filter drain
8+850	Filter Drain	Filter drain	Filter Drain	Sealed	Filter Drain	Filter drain
8+000	Over the edge Filter drain	Over the edge Filter drain	Filter Drain	Sealed	Over the edge Filter drain	Over the edge Filter drain
7+750	Filter Drain	Filter drain	Filter Drain	Sealed	Filter Drain	Filter drain
4+900	Over the edge Filter drain	Over the edge Filter drain	Filter Drain	Sealed	Over the edge Filter drain	Over the edge Filter drain
2+950	Filter Drain	Filter drain	Filter Drain	Sealed	Filter Drain	Filter drain
0+000-2+100	Existing M7 mainline and M9 slip roads - Existing drainage retained.					

4.2.4 Cut off Drains and Ditches

The land form and existing arrangement of cut-off drains and ditches at the road boundaries will be unaffected by the proposed scheme.

4.2.5 Drainage Outfalls and Water Quality Improvement

The carriageway drainage currently discharges to local watercourses at 14 locations, identified as **Outfalls A - N on Figures 4.2 – 4.10 in EIS Volume 3**. The new drainage system will continue to discharge at these existing outfalls.

In the verges where filter drains are used for road drainage, these will reduce the discharge of sediment and suspended solids from the road to the watercourse. In the median where linear drainage channels or gullies are used, the inspection chambers will contain silt traps to collect the sediment. Petrol interceptors are proposed at all

outfalls. These will be Class 1 bypass oil and petrol separators designed to cater for 10% of the peak flow from a five year storm.

In order to limit the peak flow from the road drainage runoff and reduce it to the existing run off rates, flow restricting devices will be provided upstream of the inlet to a receiving waterbody. This will necessitate provision of temporary storage of the surface water runoff. This storage or attenuation will be provided upstream of the flow restriction by the provision of a number of lined attenuation ponds and online attenuation. A penstock/shut-off valve will be installed in the last downstream manhole before discharge to facilitate the isolation of spillage events within the online attenuation storage.

A typical detail of an attenuation pond is given in **Plate 4.11**, below. The amount of attenuation and the required volume of storage to achieve it is based on a 1 in 100 year return period. Where attenuation ponds are proposed these will include appropriate planting to facilitate further treatment of road runoff in a treatment forebay (as shown on **Plate 4.11**) or a depressed treatment basin. Typical planting which may include common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*) and amphibious bistort (*Persicaria amphibia*).

The runoff from the section between J9 Maudlins and J8 Johnstown will continue to be discharged through the petrol interceptors and attenuation ponds that were constructed as part of the Naas Road Widening Scheme in 2006.

Measures to prevent contamination of watercourses during construction of the Road Project will be required and will follow the recommendations identified in Chapter 7 Ecology and Chapter 9 Hydrology.

The following drainage outfalls have been identified:

Table 4.2: Drainage Outfalls

Outfall	Chainage	Catchment
A	1+375	Drains the existing M7 beyond the extents of the proposed development
B	3+300	Catchment from Ch 2+100 - Ch 3+300
C	4+000	Catchment from Ch 3+300 - Ch 4+250
D	4+720	Catchment from Ch 4+250 - Ch 4+900
E	6+750	Catchment from Ch 4+900 - Ch 7+100
F	7+760	Catchment from Ch 7+100 - Ch 8+000
G	8+575	Catchment from Ch 8+000 - Ch 8+575
H	8+875	Catchment from Ch 8+575 - Ch 9+200
I	9+750	Catchment from Ch 9+200 - Ch 9+800
J	10+200	Catchment from Ch 9+800 - Ch 10+350
K	10+525	Catchment from Ch 10+350 - Ch 11+000
L	11+500	Catchment from Ch 11+000 - Ch 12+250
M	13+100	Catchment from Ch 12+250 - Ch 13+600
N	13+600	Catchment from Ch 13+600 – Ch 14+750

Table 4.3 Treatment proposed at Drainage outfalls

Outfall Reference	Proposed	Volume (m3)
B	Online attenuation	1253
C	Online attenuation	990
D	Attenuation Ponds	1550
E	Attenuation Pond	5000
F	Attenuation Pond	1914
G	Online attenuation	529
H	Online attenuation	573
I	Online Attenuation	551
J	Online Attenuation	504
K	Online Attenuation	594
L	Attenuation Pond	2607
M	Online Attenuation	1236
N	Attenuation Pond	Existing

Access to the perimeter access tracks around the ponds at outfalls D, F and L will be provided from the hard shoulder of the motorway. Access to the pond at outfall E will be from the roundabout on the realigned local road. Access to the linear wet lands will be provided from the hard shoulder of the motorway.

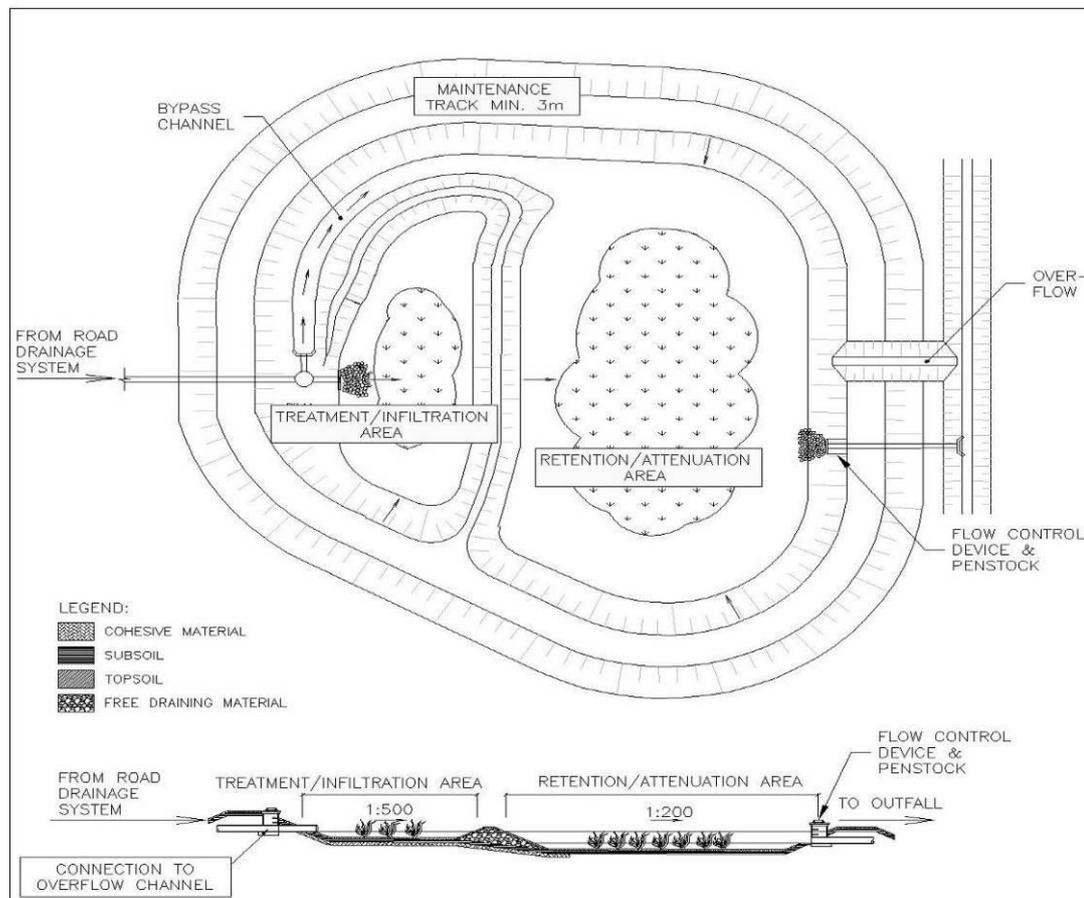


Plate 4.11: Typical Layout of an Attenuation Pond

4.2.6 Culverting of Watercourses

Sixteen streams and drainage ditches are already culverted underneath the existing M7, as listed below in **Table 4.4**. These culverts are continuous beneath the wide grass median and will be unaffected by the proposed work.

Table 4.4: Existing Culverts

Chainage	Culvert Size
Ch 3+300	750mm diameter pipe
Ch 3+350	750mm diameter pipe
Ch 4+040	450mm diameter pipe
Ch 4+720	750mm diameter pipe
Ch 6+750	2350mm corrugated steel culvert
Ch 7+000	600mm diameter pipe
Ch 7+760	900mm diameter pipe
Ch 7+890	750mm diameter pipe
Ch 9+750	750mm diameter pipe
Ch 10+200	750mm diameter pipe
Ch 10+350	900mm diameter pipe
Ch 10+525	900mm diameter pipe
Ch 11+140	2750mm corrugated steel culvert
Ch 11+175	2750mm corrugated steel culvert
Ch 13+040	2 x 1200mm diameter pipes
Ch 13+100	750mm diameter pipe

Those watercourses to which existing outfalls discharge will benefit from the run-off treatment and attenuation described in Section 4.2.5 above.

In addition there is a 74m long corrugated steel culvert (approximate span of 4m) under the R445 at the location of the proposed eastern roundabout of the new J10 interchange. The watercourse passing through this culvert merges with that passing beneath the M7 at Ch 6+750, and the combined flow then enters another existing culvert beneath what used to be the original line of the R445 prior to construction of the motorway, an area that is currently landscaped.

It is proposed that the 74m long culvert beneath the current R445 is extended under the proposed roundabout and M7 eastbound off slip. The culvert extension will be 86m long providing a total culvert length of 160m.

Further to consultations with Inland Fisheries Ireland a fish pass arrangement is also proposed at the new J10 Interchange. A series of interconnected pools will be provided from the upstream side of the proposed culvert to a new 1.5m x 1.5m box culvert to be provided under the existing R445. The pools will provide a permanent water depth of 500mm in order to facilitate fish passage. The proposed fish pass culvert under the R445 will be constructed with a depressed culvert invert in order to ensure that it also remains permanently backwatered in order to facilitate the movement of fish.

The proposed M7 eastbound on slip road follows a similar alignment to the original R445 and will pass over the existing culvert, but would require an extension to the north end while remaining longer than required on the south end. Rather than extending this culvert further it is proposed to take the opportunity to replace it with a culvert of greater conveyance capacity and the minimum required length. The proposed replacement will be a 4.5m x 2.5m concrete box culvert. The removal of the existing culvert will create space for a stilling pond at the confluence of the watercourse culverted under the extended culvert under the existing R445 and the watercourse culverted under the existing motorway

The existing watercourse to the north of the R445 will be diverted along the toe of the roundabout and eastbound on-slip embankment to tie into the downstream outlet of the new 4.5m x 2.5m concrete box culvert. The diverted channel will be regraded by approximately 300mm in order to intercept the diverted fish pass.

The proposed arrangement of the culverts, diverted watercourses and ponds at the new J10 Interchange is illustrated on **Figures 4.5 and 4.13, EIS Volume 3.**

4.2.7 Earthworks

The proposed dual three lane motorway will follow the alignment of the existing dual two lane motorway, with the additional paved width being constructed within the existing wide median. As such no earthworks are anticipated for the widening works with the exception of excavation of approximately 0.5m of soil from within the central median to facilitate construction of the additional pavement. Testing on samples taken from trial pits undertaken in the existing grassed median in 2012 confirmed the existence of a firm foundation for pavement works. Should any local soft spots be identified during construction the soft material will be removed and replaced with granular capping material in accordance with the NRA Specification for Road Works.

Construction of the proposed new J10 interchange (Ch 6+700) will require widening of the existing 8m high R445 embankment either side of the motorway to support the new roundabouts, together with new embankments varying from 1m to 8m in height supporting the four new slip roads between these roundabouts and the M7 below. The construction of these embankments will require the import of approximately 90,000m³ of material.

4.2.8 Pavement

The proposed additional lanes to be constructed within the existing median of the M7 together with the proposed new slip roads at J10 will be constructed in accordance with NRA TD 25-26 to provide a design life of 40 years. As noted in section 4.2.7 above, laboratory testing of samples obtained in trial pit excavations within the existing median demonstrated a firm foundation suited to a sub-base only pavement foundation. This is of particular benefit for this on-line widening as it minimises the depth of excavations required and eliminates the need to import capping materials, both of which will significantly reduce the number of truck movements required within the constrained site. Typically the new pavement construction will involve the following, although the contractor will be permitted to propose alternative materials provided they comply with the above design standard and the NRA Specification for Road Works:

- 35mm Polymer Modified Stone Mastic Asphalt Surface Course;
- 55mm Asphaltic Concrete Binder Course;
- 260mm Asphaltic Concrete Base Course;

- 200mm Granular Sub-Base.

Extensive investigations were undertaken in 2012 to assess the condition and residual life expectancy of the existing road pavements of the section of the M7/N7 under consideration. From this information design proposals have been derived to extend the life of the existing pavements to match the 40 year life of the added lanes.

Most significantly, the hard shoulders between J11 Great Connell and J10 Newhall are of very light construction and would not be capable of being utilised as part of the traffic management plans to carry diverted traffic. Current standards require that hard shoulders are constructed to the same standard as the main carriageway in order to facilitate their use as traffic lanes during maintenance works. It is therefore proposed that these sections of hard shoulder will be fully reconstructed to the same standards as the additional lanes described above.

While the pavements in the traffic lanes have been shown to be structurally sound, only requiring nominal overlays over certain lengths, the surface course is showing some signs of deterioration. Given the proposal for widening in the median and the need to reconstruct significant lengths of the hard shoulders it is anticipated that the surface course will be replaced across the full width.

The overall results of the Falling Weight Deflectometer testing indicate very good existing bearing capacity within the traffic lanes, with very few structural related distresses identified by the Visual Pavement Condition survey. For the 40 year design life a structural overlay will be required along some of the design segments as shown in Table 4.5, below.

Table 4.5: Hot Mix Overlay Requirements by Segment

Lane	Chainage	National Models
		Hot-mix Overlay Requirement for 40 year design traffic
EB Hard Shoulder	2+075 to 7+075	Reconstruction
EB Hard Shoulder	7+225 to 8+425	75 mm
EB Hard Shoulder	8+425 to 8+825	No overlay required
EB Hard Shoulder	8+825 to 13+625	100 mm
EB Hard Shoulder	13+725 to 14+325	No overlay required
EB Traffic Lanes	2+100 to 3+275	100 mm
EB Traffic Lanes	3+275 to 3+900	No overlay required
EB Traffic Lanes	3+900 to 4+175	75 mm
EB Traffic Lanes	4+175 to 14+125	No overlay required
WB Hard Shoulder	2+450 to 6+050	Reconstruction
WB Hard Shoulder	6+050 to 6+350	75 mm
WB Hard Shoulder	6+350 to 7+200	Reconstruction
WB Hard Shoulder	7+200 to 7+600	No overlay required
WB Hard Shoulder	7+750 to 9+850	75 mm
WB Hard Shoulder	9+850 to 11+300	100 mm
WB Hard Shoulder	11+300 to 12+250	75 mm
WB Hard Shoulder	12+250 to 13+250	100 mm
WB Hard Shoulder	13+250 to 14+350	No overlay required

Lane	Chainage	National Models
		Hot-mix Overlay Requirement for 40 year design traffic
WB Traffic Lanes	2+250 to 3+450	75 mm
WB Traffic Lanes	3+450 to 3+850	No overlay required
WB Traffic Lanes	3+850 to 4+875	75 mm
WB Traffic Lanes	4+875 to 14+325	No overlay required

The above overlay requirements represent the structural minimum required. The precise overlay arrangements at each section will be dictated by construction phasing, ensuring that a smooth and adequately drained surface is maintained throughout the works period. Typical cross sections are illustrated in **Figure 4.15, EIS Volume 3**.

4.2.9 Structures

There are 12 road bridges on the scheme including the Johnstown Village Footbridge and the M9 Slip Road Tunnel which is beyond the limits of construction. These bridges will not be altered as a result of the construction of the additional traffic lanes.

There is just one under bridge where the M7 passes over the canal and Canal Bank Road at Ch 11+150. This bridge has been assessed and confirmed to be capable of carrying the additional loading that will result from the additional traffic lanes that will extend over the bridge.

The nine overbridges which carry the remaining side roads and junctions listed in sections 4.1.2 and 4.1.3 above have been assessed and confirmed to be capable of resisting collision impact on the piers in accordance with current design requirements. A minimum headroom of 5.03m will be maintained as required by NRA TD 27.

The Johnstown Village footbridge was constructed in 2006 as part of the Naas Road Widening Scheme and was designed to current standards at that time. The road cross section beneath this structure will remain unchanged in both line and level.

In summary no works to the existing structures will be required as part of the proposed scheme.

4.2.10 Signing and Lighting

Signing

Directional Signs and Regulatory Signs shall be provided in accordance with the 'Traffic Signs Manual' as published by the Department of the Environment in 2010 and the 'Road Traffic (Signs) Regulation, 1997' and any subsequent amendments of these documents. Advanced Directional Signs will be provided at the approaches to each junction to advise drivers on directions to regional and local destinations.

Road Markings, Reflective Markings and Road Studs will be provided in accordance with the 'Traffic Signs Manual' and in accordance with Series 1200 of the 'Specification for Road Works' as published by the NRA.

Temporary traffic signs during construction will comply with Chapter 8 of the Traffic Signs Manual, Guidance for the Control and Management of Traffic at Road Works and the Specification for Road Works as published by the NRA.

White-on-brown tourist signage panels will be provided where appropriate. These will be of a standard form and with the name of the town or village and will contain a short descriptive phrase to highlight features likely to be of interest to tourists.

The design of tourist signage and the confirmation of destinations to be included along the scheme shall be in accordance with "Policy on the Provision of Tourist and Leisure Signage on National Roads (Revision 1, National Roads Authority, March 2011)

Public Lighting

Locations for Road Lighting

Public lighting is not provided on rural motorways with the exception of lighting of the offline elements of junctions. Historically lighting was provided on the motorway mainline on the approach to junctions, but this is no longer considered good practice. It is proposed that the existing lighting between Ch 7+000 and Ch 8+000 associated with the existing J10 Newhall interchange will be removed. Following removal of this high mast lighting new localised lighting will be required on the Newbridge Road overbridge to avoid the creation of a dark patch between the M7 Business Park and Bundle of Sticks roundabouts. New lighting will also be required on the R445 between the existing lighting at the Bundle of Sticks roundabout and the proposed new J10 interchange, through the two interchange roundabouts and on each of the approaches to the roundabouts (refer **Figure 4.13, EIS Volume 3**).

The existing lighting at J8 Johnstown and J9 Maudlins will be unaffected.

Lighting Design

The lighting installation shall be designed in accordance with ISEN 13201-2: 2003 Road Lighting Part 2: Performance Requirements and BS 5489-1: 2003 Code of practice for the Design of Road Lighting, Part 1: Lighting of Roads and Public Amenity Areas. The installation of lighting columns is to comply with the requirements of Series 1300 and 1400 of the 'Specification for Road Works' as published by the NRA.

The design of lighting columns shall include the following

- Lighting columns in the design shall be of slim galvanised steel construction with tubular outreach brackets to support the lanterns.
- Columns will have a mounting height no higher than 12 metres.
- The finished colour of the lighting columns shall be grey.
- Lanterns on lighting columns will be full cut off flat glass type, or similar and will incorporate a high pressure sodium or metal halide light source.
- The proposed lanterns, and the limitation of their mounting angle to 5 degrees or less above the horizontal, will limit spillage of light as far as is practicable.
- As far as practically possible, lighting will be directed away from residential properties.
- All cabling associated with lighting will be located underground.

Where the need is identified in the environmental assessment, fully cut-off high pressure sodium lanterns will be utilised to minimise night-time visual intrusion.

4.2.11 Noise Barriers

Noise barriers varying in height from 2.0m to 2.5m will be provided at various locations along the scheme as detailed in Chapter 15 of this EIS and **Figures 15.1 – 15.9 of EIS Volume 3**. Barriers will be in accordance with series 300 of the NRA Specification for Road Works. Where the road is at grade or on embankment the barriers will be located along the back of the verge, while in cut sections the barriers will be located along the road boundary at the top of the cutting. In both cases their installation will result in minimal disruption to the existing vegetation between the back of verge and the road boundary. Where barriers are located at the road boundary access to construct these barriers will be from the local road network or, by agreement, from adjacent landholdings.



Plate 4.12: Example of Noise Barrier at the back of verge (M50 Dublin)

4.3 Utilities

Enquiries with utility owners indicate the existence of gas, water and sewer mains which cross beneath and along the verges of the existing M7. In addition four high voltage and thirteen medium voltage overhead ESB lines cross the M7. These utilities are shown on **Figures 4.16 – 4.24 in EIS Volume 3**.

Confirmatory Ground Probing Radar surveys and slit trenches have not identified any utilities less than 1.2m below ground level within the existing median and verges. Consequently no utility diversions are expected to be required. Appropriate protective measures will be taken to avoid damage to those utilities crossing beneath the median and carried in the existing verges.

Various other utilities cross the M7 on the existing overbridges, separate from and unaffected by the works on the mainline.

In the vicinity of the proposed new J10 interchange with the R445 a number of existing utilities will require diversion and these are discussed below.

Over the summer of 2013, Kildare National Roads Office held consultation meetings with utility owner companies and a local authority section including Bord Gais Eireann, the Electricity Supply Bord Transmission Section and Local Network Section, Eircom Ltd and Kildare County Council Water Services Section (to be incorporated into Irish Water in 2014) regarding the diversion requirements for their respective utilities networks at the proposed Newhall Interchange during construction stage. The meetings addressed construction stage and operational stage issues in terms of the in-situ maintenance or diversion of utility networks which will be impacted by the proposed works at Newhall interchange. Kildare National Roads Office is continuing to liaise with the utility owners on issues such as diversion options, necessary clearance zones for overhead utilities, diversion cost estimates and construction stage working arrangements.

4.3.1 High and Medium Voltage Electricity Lines

Existing high and medium voltage ESB lines cross the M7, R445 and Due Road at the location of the proposed new J10 interchange.

The High Voltage ESB Overhead Electricity lines are located in close proximity to the proposed 12m light standards at the proposed eastern roundabout. At this location the light standards will be positioned at a set-back of 20m to 40m from the ESB Overhead Electricity lines so as to avoid any requirement for diversion of the High Voltage ESB Pylons. Precise arrangements will be subject to agreement with ESB at the detailed design stage.

The Medium Voltage ESB Overhead Electricity Line connecting to lighting services in the trailer park at Due Road will require local diversion along the realigned Due Road to Rathasker.

4.3.2 Bord Gais Network

Existing gas mains in the verge of the R445 cross beneath the M7 and into the verges of Due Road at the location of the proposed J10 interchange. These will require local diversion along the re-aligned Due Road to Rathasker and into the verge of the proposed western roundabout.

4.3.3 Telecommunications

An Eircom underground optic fibre cable may require diversion into the verges of the proposed western and eastern roundabouts the across the bridge structure. Alternatively a more localised diversion along the Due Road to Rathasker and the verge of the western roundabout may be possible. Final details will be subject to agreement with Eircom at the detailed design stage.

4.3.4 Water Supply

Existing watermains in the verges of both the R445 and Due Road will require local diversion. A large ductile iron main will be locally diverted through the new roundabouts. A smaller PVC main may also require local diversion into the verge of the R445 and the new roundabouts where the widening of the R445 would otherwise result in it being beneath main carriageway. The works will be undertaken by the main construction contractor to the approval of Water Services Section of Kildare County Council.

4.4 Construction Phase

The significant factors that have been taken account of in the phasing of the construction of the M7 Naas to Newbridge By-Pass Upgrade Scheme are outlined in this section.

4.4.1 Potential Construction Procurement Method

Subject to necessary statutory approvals it is likely that the Design and Construction of the scheme would take place as part of a Design and Build Contract (D&B). The successful Contractor would be responsible for designing the scheme in compliance with the Employer's Requirements including compliance with the EIS for the scheme and any other conditions imposed by An Bord Pleanála. In particular the contract will dictate that, with the exception of construction of the proposed new J10 interchange, attenuation ponds, linear wet lands, noise barriers located along the road boundary and local excavations for sign bases, the works must not extend beyond the back of verge of the existing road, such that the existing established vegetation between the back of verge and the road boundary remains unaffected. Wherever possible access to works along the road boundary will be undertaken, subject to agreement, from the adjoining lands.

4.4.2 Duration and Phasing of Works

It is anticipated that the construction of the proposed road development will be progressed as a single construction contract with the construction phase lasting between 28 - 34 months. The works will be constructed in a phased manner in order to maintain two traffic lanes in each direction on the N7 / M7 between 6am and 10pm throughout the construction phase. A potential phasing of the work and approximate timescale for the construction are set out below. However the appointed construction contractor will be permitted to propose alternative phasing subject to working with the above restrictions on traffic lane closures and subject to compliance with this EIS and any conditions imposed by An Bord Pleanála. Any proposals will be subject to approval by Kildare County Council.

Throughout the construction phase it is envisaged that the two running lanes would have their width reduced to allow the installation of temporary safety barriers and safety zones to separate the works from live traffic. The lane widths will be reduced as follows:

- Lane 1: Reduced to 3.25m;
- Lane 2: Reduced to 3.00m;
- Offside hard strip: Reduced to 0.45m.

The phasing below divides the works into six sections, as follows:

Table 4.6: Construction Sections

Westbound		Eastbound	
Section 1	0+870 — 5+870	Section 2	0+870 — 5+870
Section 3	5+870 — 10+870	Section 4	5+870 — 10870
Section 5	10+870 — 15000	Section 6	10+870 — 15000

A potential sequence of work is described:

Table 4.7: Potential Sequence of works

Phase	Sequence of Works	Anticipated Duration
A	Verge drainage works and hard shoulder reconstruction – Sections 1 and 2 and south facing half of new J10 interchange	5
B	Median works – Sections 1 and 2 and north facing half of new J10 interchange.	5
C	Inlay Surface course and lining – Sections 1 and 2 and completion of R445 through the new J10 interchange.	2
D	Median Works – Sections 3 and 4	5
E	Inlay surface course and lining – Sections 3 and 4; tie-in works at new J10 slip roads and replace verge drain	2
F	Median works – Sections 5 and 6 , closure, breaking up and landscaping of existing J10 Newhall slip roads.	5
G	Inlay surface course and lining – Sections 5 and 6 and replace verge drain.	2

Phase A

The first phase of works is anticipated to be the re-construction of the hardshoulder in Sections 1 and 2. This is required to facilitate the running of traffic on the hardshoulder during later phases.

The hard shoulders will be excavated to sub-base level and reconstructed to design level. This phase will also include the replacement of the drainage in the verge. The drainage that is in-situ will be excavated and removed. It may be possible that the drainage stone that is in the drains at present may be re-used, but this would depend on further investigation as to the condition of the existing stone at the time of excavation.

While the hardshoulder is being reconstructed, there will be no provision for an Emergency Lane.

Traffic on the R445 will be reduced to a single lane in each direction travelling in contraflow, on the eastbound carriageway to enable the southern half of the two roundabouts to be built. The south facing slip road ramps will be constructed at the same time, but will stop short of the M7 at this phase. During Pavement Reconstruction Works on the R445 in 2012 single lane closures were used for the duration of the works and Kildare County Council were satisfied with the Traffic Management throughout the works because no major problems arose.

Phase B

Construction of the extra lane in the median, the median barrier and any median drainage that may be required will take place during these phases.

During these works the traffic will be moved away from the works area by temporarily reducing the widths of the hardshoulder and traffic lanes, creating space for the temporary safety barriers and safety zones to be located on the existing carriageway adjacent to the median:

During these phases it will be possible to provide an emergency lane / hardshoulder of 2.5m.

Traffic on the R445 will be reduced to a single lane in each direction travelling in contraflow, on the westbound carriageway to enable the northern half of the two roundabouts to be built. The north facing slip road ramps will be constructed at the same time, but will stop short of the M7 at this phase (*as above*).

Phase C

In lay surface course and lining of the existing Lanes 1 and 2 will take place during this phase.

During these works the traffic will be moved on to the hard shoulder and newly constructed lane 3 respectively, with HCV's restricted to the hard shoulder.

An Emergency Lane will be provided within the work area of Lanes 1 and 2.

The new roundabouts on the R445 will be completed and the R445 will then revert to operating as a dual carriageway.

Phase D

Construction of the extra lane in the median, the median barrier and any median drainage that may be required will take place during this phase. In parallel with these works on the M7, the proposed new J10 interchange will be constructed on the R445.

During these works M7 traffic will be moved away from the works area by temporarily reducing the widths of the hardshoulder and traffic lanes, creating space for the temporary safety barriers and safety zones to be located on the existing carriageway adjacent to the median. An emergency lane/hardshoulder of 2.5m will be provided on the motorway during this phase of construction.

Phase E

In lay surface course and lining of the existing Lanes 1 and 2 will take place during this phase, followed by drainage works in the verges and tie-in of the proposed new J10 interchange slip roads with the M7.

During these works the traffic will initially be moved on to the hard shoulder and newly constructed lane 3 respectively, with HCV's restricted to the hard shoulder. At this stage an emergency lane will be provided within the works area of Lanes 1 and 2. Traffic will then be transferred to Lanes 2 and 3 to facilitate work in the verges and at slip road tie-ins, at which stage an emergency lane/hardshoulder will be provided in Lane 1.

During this phase the final tie-in works between the new J10 slip roads and the M7 will be completed.

Phase F

Construction of the extra lane in the median, the median barrier and any median drainage that may be required will take place during these phases.

During these works the traffic will be moved away from the works area by temporarily reducing the widths of the hardshoulder and traffic lanes, creating space for the temporary safety barriers and safety zones to be located on the existing carriageway adjacent to the median.

During these phases it will be possible to provide an emergency lane / hardshoulder of 2.5m.

Traffic will be transferred from the existing J10 Newhall to the new J10 on the R445 and the existing J10 Newhall slip roads will be broken up and landscaped.

Phase G

This phase is similar to Phase E but at a different section where the requirement for slip road tie-in does not apply.

4.4.3 Material Quantities and Construction Traffic

The following approximate material quantities will be required to be moved through the works:

Table 4.8: Material Quantities and Construction Traffic

	Section 1 + 2	Section 3 + 4	Section 5 + 6
Disposal			
Median excavation and disposal (m3)	37,498	58,219	39,110
Attenuation pond excavation and disposal	11,250	5,625	5,625
Drains (m)	36,456	49,000	38,024
Hard shoulder blacktop (m3)	4,944		
Hard shoulder subbase (m3)	14,832		
Disposal Totals (m3)	104,980	112,844	82,759
At 9m3 per truck (no. of loads)	11,664	12,538	9,195
No. of movements	23,329	25,076	18,391
Import			
Median capping (m3)	4,785	6,431	4,991
Median blacktop (m3)	13,838	18,600	14,434
Median subbase (m3)	13,392	18,000	13,968
Hardshoulder blacktop (m3)	15,326		
Mainline Drains (m)	36,456	49,000	38,024
Interchange Earthworks (m3)		90,000	
Interchange Capping (m3)		124,060	
Interchange Sub-base (m3)		10,570	
Interchange blacktop (m3)		10,922	
Interchange drains (m3)		6,000	
Import Totals	83,798	333,583	71,416
At 9m3 per truck (no. of loads)	9,311	37,065	7,935
No. of movements	18,622	74,130	15,870
Total Truck Movements		175,418	
Works Duration:			
Months		30	
Days		600	
Total truck movements per day		292	

As indicated above the average estimated number of truck movements is 292 per day. However the initial 12 months will see the most intensive period of material movement when the mainline works in Sections 1 & 2 are running concurrently with the construction of the new interchange in Sections 3 & 4. For this most intensive period the average estimated number of truck movements is 443 per day. It should be noted that these truck movements will be spread over both sides of the motorway and over the length of the proposed scheme which represents an increase of 9% in the HCV traffic and 0.1% in the overall traffic levels on the motorway. Access to and from the mainline works will be via the existing interchanges and the proposed interchange only.

Possible sources of materials are from:

- Drennanstown, Rathagan
- Allen Quarry, Kilmeague
- Belgard Quarry, Belgard
- Dorans Pit, Blessington
- Behans Quarry, Rathcoole

Possible sites for disposal of materials are:

<http://www.epa.ie/terminalfour/waste/waste-search.jsp>

- Kerdiffstown, Naas, Co. Kildare
- KTK Landfill Limited, Brownstown and Carnalway, Kilcullen, Co. Kildare
- KTK Sand & Gravel Ltd, Kimmeens, Ballymore Eustace West and Coghlanstown East, County Kildare
- Drehid Waste Management Facility, In the townlands of Parsonstown, Loughnacush, Kilkeaskin, Drumond, Timahoe West, Coolcarrigan, Killinagh Lower and Killinagh Upper, Carbury, County Kildare
- Blackhall Soil Recovery Facility, Blackhall, Punchestown, Naas, County Kildare
- Cemex (ROI) Limited, Walshestown, Blackhall, Tipperkevin and Bawnoge, Naas, Co. Kildare

4.4.4 Construction Management Plan

Prior to any demolition, excavation or construction a Construction Management Plan (CMP) will be produced by the successful contractor. A CMP deals with the Contractor's overall management and administration of a construction project. A CMP is prepared by the Contractor during the pre-construction phase, to ensure that the project is completed on-time and within budget. The CMP will include a detailed programme of works and budget. The CMP is also developed to ensure that all construction activities are undertaken in a satisfactory and safe manner, to a delivery program meeting the Clients requirements. The Contractor will be required to include details under the following headings:

- Details of working hours and days;
- Details of emergency plan - in the event of fire, chemical spillage, cement spillage, collapse of structures or failure of equipment or road traffic incident within an area of traffic management. The plan must include contact names and telephone numbers for: Local Authority (all sections/departments); Ambulance; Gardaí and Fire Services;
- Details of chemical/fuel storage areas (including location and bunding to contain runoff of spillages and leakages);

- Details of construction plant storage, temporary offices and on-site chemical toilet areas;
- Traffic management plan (to be developed in conjunction with the Local Authority – Roads Section) including details of routing of network traffic; temporary road closures; temporary signal strategy; routing of construction traffic; programme of vehicular arrivals; on-site parking for vehicles and workers; road cleaning; other traffic management requirements;
- Truck wheel wash details (including measures to reduce and treat runoff);
- Dust management to prevent nuisance (demolition & construction);
- Site run-off management;
- Noise and vibration management to prevent nuisance (demolition & construction);
- Landscape management;
- Management of demolition of all structures and assessment of risks for same;
- Lighting details (construction & operation);
- Signage;
- Stockpiles;
- Project procedures & method statements;
- Demolition & removal of services, pipelines (including risk assessment and disposal);
 - Diversion and Protection of services;
 - Excavation;
 - Construction of pipelines;
 - Temporary hoarding & lighting;
 - Sourcing and delivery of bulk materials
 - Exporting of surplus excavated material;
 - Protection of watercourses from contamination and silting during construction.

The production of the CMP will also detail areas of concern with regard to Health and Safety and any environmental issues that require attention during the construction phase. Adoption of good management practices on site during the construction and operation phases will also contribute to reducing environmental impacts.

4.4.5 Environmental Operating Plan

During the construction phase of the scheme the works will comply with all relevant legislation and guidelines that aim to reduce and minimise environmental impacts. Construction related impacts are generally of short-term duration and localised in nature, these impacts will be reduced as far as possible by complying with the mitigation measures outlined in this EIS, construction industry guidelines, NRA Environmental Construction Guidelines, Environmental Operating Plan and Waste Management Plan.

NRA Environmental Construction Guidelines

The NRA Environmental Construction Guidelines provide guidance with regard to environmental best practice methods to be employed in construction on National Road Schemes for the following:

- Guidelines for the Treatment of Badgers prior to the Construction of a National Road Schemes;
- Guidelines for the Treatment of Bats during the Construction of National Road Schemes;
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes;
- Guidelines for the Testing and Mitigation of the Wetland Archaeological Heritage for National Road Schemes;
- Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post-Construction of National Road Schemes;
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes;
- Guidelines on the Management of Noxious Weeds on National Roads;
- Guidelines for the Treatment of Noise and Vibration in National Road Schemes;
- Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes;
- Management of Waste from National Road Construction Projects;
- Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan.

This is a non-exhaustive list and relevant guidance current at the time of construction will be followed.

Environmental Operating Plan

The Contractor will be required to complete an Environmental Operating Plan (EOP) in accordance with the NRA *Guidelines for the Creation and Maintenance of an Environmental Operating Plan*. The EOP will set out the Contractors approach to managing environmental issues associated with the construction of the road and provide a documented account to the implementation of the environmental commitments set out in the EIS and measures stipulated in the planning conditions. Details within the plan will include;

- All Environmental commitments and mitigation measures included as part of the planning approval process and any requirements of statutory bodies as well as a method documenting compliance with the measures;
- A list all applicable environmental legislation requirements and a method of documenting compliance with these requirements;
- Outline methods by which construction work will be managed to avoid, reduce or remedy potential adverse impacts on the environment.

To oversee the implementation of the EOP the Contractor will be required to appoint a responsible manager to ensure that the mitigation measures included in the EIS and the EOP are executed in the construction of the works and to monitor that those mitigation measures employed are functioning properly.

Waste Management Plan

Included within the EOP will be the Waste Management Plan which clearly sets out the Contractor's proposals regarding the treatment, storage and recovery or disposal of waste. The waste management plan must reference the following guidelines:

- Best Practice Guidelines on the Preparation of Waste Management Plans for construction and Demolition Projects (Department of Environment, Heritage and Local Government, July 2006);
- CIRIA document 133 Waste Minimisation in Construction;
- NRA guidelines including Guidelines for the Management of Waste from National Road Construction Projects, 2008.

The plan itself will contain (but not be limited to) the following measures:

- Details of waste storage (e.g. skips, bins, containers) to be provided for different waste and collection times;
- Details of where and how materials are to be disposed of - landfill or other appropriately licensed waste management facility;
- Details of storage areas for waste materials and containers;
- Details of how unsuitable excess materials will be disposed of where necessary;
- Details of how and where hazardous wastes such as oils, diesel and other hydrocarbon or other chemical waste are to be stored and disposed of in a suitable manner;
- A construction and demolition waste plan.

4.4.6 Construction Compounds

Provision has been made within the lands made available for the main construction compound to be located adjacent to the proposed Newhall junction. The contractor may require other construction compound sites along and / or in the vicinity of the scheme. The location, size and suitability of any additional sites will be at the discretion of the contractor, while planning permission will be required from the planning authority for sites proposed outside of the development boundary. The operation of all construction compounds will be subject to the conditions and mitigation measures outlined in this EIS and also to any future scheme planning approval documents.

The proposed main compound site is approximately 2 hectares in size and may include, stores, offices, materials storage areas, material processing areas, plant storage and parking for site and staff vehicles. The main compound is proposed to remain in place for the duration of the contract but may be scaled up or down during particular activities on site.

The storage of fuels, other hydrocarbons and other chemicals within the construction compounds will not be permitted within 50m of a watercourse. All fuel storage areas will be bunded to 110% of storage capacity to prevent spills and provide sufficient additional capacity in the event of rainfall occurring simultaneously. The compounds will also have appropriate levels of security to limit potential vandalism, theft and unauthorised access within the compounds.

Following completion of construction these areas will be cleared and re-instated, temporary buildings and containers, parking areas and waste material such as rubble, aggregates and unused construction materials will not be permitted to remain exposed on these sites and will need to be removed and disposed of appropriately.

4.4.7 Construction Material

The main materials that will be hauled to, from and within the site in bulk are:

- Earthworks, including topsoil and general cut and fill material, rock and capping materials;
- Pavement Materials, including granular sub-base material hot bituminous pavement materials and road planning's;
- Concrete, both insitu and precast units such as concrete barriers, culvert sections, pipes and chambers;
- Other materials will be required including fencing material, plants and such.