20 Interrelationships, Interactions and Cumulative Impacts

20.1 Introduction

Section 50 of the Roads Act, 1993 as amended by the Environmental Assessment Directive 97/11/EC specifies the scope of the Environmental Impact Assessment. It lists the particular aspects of the environment likely to be significantly impacted by the proposed road development: human beings, fauna and flora, soils and geology, water, noise, air, climate, the landscape, material assets, archaeological and architectural heritage, and cultural heritage. The significant impacts of the proposed scheme on these aspects of the receiving environment are assessed in this EIS.

The NRA Environmental Impact Assessment of National Road Schemes – A Practical Guide, 2008 advises that impact inter-relationships/interactions relate to the reactions between impacts within a project and the inter-relationships between impacts identified under on each topic with impacts identified under another topic.

20.2 Interaction of Effects

The major interactions between the recorded environmental impacts are assessed within the individual chapters of the EIS. All environmental factors are inter-related to some extent, and the relationships can range from tenuous to highly complex.

Table 20.1 provides a tabular summary of interactions between the various parameters outlined in this EIS from Chapters 5 to 19. The following sections outline in summary the main environmental interactions anticipated as a result of the proposed road development. Table 20.2 provides explanatory notes for each of the dominant relationships. Subsidiary, reverse and more tenuous links are not commented on.

The qualitative assessment was based on information contained within this EIS and consultation with the relevant sub-consultants. To facilitate the identification and consideration of interactions, an EIS workshop was held on 23 May 2013 with attendees including relevant sub-consultants and the Arup EIS and Design Team.

The following summarises the main environmental interactions anticipated as a result of this proposed road development.

20.2.1 Transportation, air quality, climate, noise and vibration, hydrology, resource and waste management and human beings

Transportation interacts with a wide range of environmental parameters. Consequently the interactions and impacts associated with traffic are outlined in a number of chapters. The impact of traffic noise is addressed in Chapter 11. The impact of traffic on air quality and climate is addressed in Chapters 12 and 13. The impact of traffic on hydrology is considered in Chapter 17.

The proposed scheme requires material to be excavated and removed from site during the construction phase. This generates traffic from the construction site to the suitable disposal site, refer to Chapter 18. Finally the impact of traffic on human beings is assessed in Chapter 7.

20.2.2 Landscape and visual, human beings, ecology and architectural heritage

The removal of visual screening can have a negative impact on human beings, refer to Chapter 7. The proposed scheme will require the removal of various habitats which impacts on both ecology (Chapter 14) and landscape (Chapter 10). The impacts to architectural heritage that relate to landscape impacts are addressed in Chapter 9.

20.2.3 Noise and vibration and landscape and visual

Noise barriers are proposed to reduce the impact of traffic noise at sensitive receptors, refer to Chapter 11. The visual impact of these barriers is assessed in Chapter 10.

20.2.4 Air quality, noise and vibration and human beings

The impact of changes to air quality and noise on human beings is assessed in Chapters 12, 11 and 7 respectively.

20.2.5 Air quality, noise and vibration, geology, archaeology and cultural heritage and architectural heritage

Excavated soils can be disturbed, eroded and dispersed as dust. The removal of soils also generates noise and vibration. The impact of excavated soils and the impact of transporting excavated materials on air quality and noise and vibration is addressed in Chapters 11 and 12. The impacts of potential vibration on structures are considered in Chapters 8 and 9.

20.2.6 Air quality and ecology

The impact of changes to air quality on flora and fauna is addressed in both Chapters 12 and 14 respectively.

20.2.7 Climate and hydrology

The potential impacts to surface water and flooding attributed to possible climatic effects are included in the drainage strategy and flood risk assessment outlined in Chapter 17.

20.2.8 Ecology and hydrology

The potential impacts to local watercourses and ecology from the construction and operational phases of the proposed scheme are evaluated and mitigation measures proposed in Chapters 14 (ecology) and 17 (hydrology).

20.2.9 Soils and geology, hydrogeology and hydrology

The impact of soils and geology on hydrogeology is addressed in Chapter 16. The interaction between hydrogeology and hydrology is addressed in Chapter 17.

Table 20.1: Potential Interaction of Effects

Typical Inter Relationships Matrix- Environmental Elements	Transportation	Agronomy	Human beings	Archaeology and cultural heritage	Architectural heritage	Landscape and visual	Noise and vibration	Air Quality	Climate	Ecology	Soils and geology	Hydrogeology	Hydrology	Resource and waste management	Non agriculture material assets
Transportation															
Agronomy															
Human beings															
Archaeology and cultural heritage															
Architectural heritage															
Landscape and visual															
Noise and vibration															
Air Quality															
Climate															
Ecology															
Soils and geology															
Hydrogeology															
Hydrology															
Resource and waste management															
Non agriculture material assets															

Table 20.2: Explanatory Notes on the Relationships between the Environmental Topics

Typical Inter Relationships Matrix- Environmental Elements	Transportation	Agronomy	Human beings	Archaeology and cultural heritage	Architectural Heritage	Landscape and visual	Noise and vibration	Air Quality	Climate	Ecology	Soils and geology	Hydrogeology	Hydrology	Resource and waste management	Non Agriculture material assets
Transportation		Changed access may affect agricultural properties	Traffic may affect community severance				Traffic may affect noise levels	Traffic may affect pollution levels	Traffic may affect pollution levels		Traffic may affect soils	Traffic may affect run-off	Traffic may affect run-off		Changed access may affect non-agricultural properties
Agronomy			Impacts on agronomy affects socio-economics								Impacts on soils and geology may impact agronomy	Impacts on soils and geology may impact agronomy			
Human beings							Noise levels affect communities	Pollution affects communities							
Archaeology and cultural heritage						Landscape changes may affect archaeological sites	Noise and vibration may affect built structures								
Architectural heritage						Landscape changes may affect architectural heritage sites	Noise and vibration may affect built structures								
Landscape and visual							Noise barriers may affect		Climate change may affect visual	Nature of landscape affects			Presence or absence of		

Typical Inter Relationships Matrix-Environmental Elements	Transportation	Agronomy	Human beings	Archaeology and cultural heritage	Architectural Heritage	Landscape and visual	Noise and vibration	Air Quality	Climate	Ecology	Soils and geology	Hydrogeology	Hydrology	Resource and waste management	Non Agriculture material assets
							landscape		screening	ecology and vice-versa			surface water and structures to cross surface water may affect landscape and visual		
Noise and Vibration										Noise levels may affect fauna and birds	Excavation generates noise and vibration	Excavation generates noise and vibration			Noise and vibration may affect material assets
Air Quality									Pollution affects climate	Pollution may affect ecology					Pollution may affect material assets
Climate													Climate may affect rainfall and hydrology		
Ecology													Surface water levels and quality affect ecology		
Soils and Geology												Groundwater nature and levels		Disposal of soils affects	

Typical Inter Relationships Matrix- Environmental Elements	Transportation	Agronomy	Human beings	Archaeology and cultural heritage	Architectural Heritage	Landscape and visual	Noise and vibration	Air Quality	Climate	Ecology	Soils and geology	Hydrogeology	Hydrology	Resource and waste management	Non Agriculture material assets
												affects soils and geology		waste generation	
Hydrogeology														Presence of waste may affect hydrogeology	
Hydrology															
Resource and Waste Management															
Non-Agricultural Material Assets															

20.3 Cumulative Impacts

In addition to the interactions between the individual environmental elements of this proposed scheme, there is potential for cumulative effects arising from adjacent road and development schemes which are either proposed or in the vicinity of the M7 Osberstown Interchange and R407 Sallins Bypass Scheme. These include the M7 Naas to Newbridge Bypass Upgrade Scheme and the zoned lands within the northwest quadrant of Naas as a minimum.

20.3.1 M7 Naas to Newbridge Bypass Upgrade Scheme

Kildare County Council, in conjunction with Kildare National Roads Office and Roughan O'Donovan, are currently progressing the M7 Naas to Newbridge By-Pass Upgrade Scheme.

This proposed scheme provides a third lane along the M7 motorway between the M7 Maudlins Interchange to the north of Naas and the M7/M9 Interchange at Great Connell, to the south of Naas, a total distance of 13 km. This proposed scheme also includes an upgrade to the Newhall Interchange. As the M7 Osberstown Interchange is located in between the M7 Maudlins and Newhall Interchanges, there is an immediate interface between the two schemes.

As discussed in Chapter 1, the M7 Osberstown Interchange and R407 Sallins Bypass will only be progressed should the M7 Naas to Newbridge Bypass Upgrade Scheme be developed in advance. As a result, the M7 Naas to Newbridge Scheme forms part of the baseline on which the M7 Osberstown Interchange and R407 Sallins Bypass is assessed.

On this basis, cumulative impacts have been assessed, and included within the relevant chapter of this EIS. For example, the traffic impact assessment assumes that the M7 Naas to Newbridge By-Pass Upgrade Scheme has been developed in advance of the M7 Osberstown Interchange and R407 Sallins Bypass Scheme. The do-minimum scenario includes for the provision of the M7 Naas to Newbridge By-Pass Upgrade Scheme. Therefore the air quality, climate and noise assessments have assessed the cumulative impact of both schemes by adding the impacts associated with the M7 Osberstown Interchange and R407 Sallins Bypass Scheme to the baseline which includes the M7 Naas to Newbridge Scheme.

Similarly, any planting or noise barriers provided for the M7 Naas to Newbridge Bypass Upgrade Scheme forms part of the baseline on which the M7 Osberstown Interchange and R407 Sallins Bypass Scheme is assessed in the Landscape and Visual Chapter.

Potential cumulative construction impacts have also been considered within this EIS. In order to assess a worst-case scenario, it is assumed that both the M7 Widening and M7 Osberstown Interchange and R407 Sallins Bypass Scheme will be constructed concurrently. Construction traffic generated for this scenario has been computed and the associated air quality and noise impacts assessed.

Regular project co-ordination meetings between the Design Teams on the M7 Naas to Newbridge Bypass Upgrade Scheme and the M7 Osberstown Interchange and R407 Sallins Bypass Scheme were conducted throughout the course of the last year to ensure that each team was aware of the work by the other team.

An environmental workshop was held on 17 July 2013 attended by all specialists on the M7 Osberstown Interchange and R407 Sallins Bypass Scheme and the M7 Naas to Newbridge By-Pass Upgrade Scheme to discuss cumulative impacts of the respective schemes and to ensure accurate coverage of cumulative impacts.

20.3.2 Northwest Quadrant of Naas

As discussed in Chapter 2, the Northwest quadrant of Naas is an area comprising some 299 hectares of mostly greenfield lands of which 247 hectares have been identified under the Naas Town Council Development Plan 2005-2011 for development.

The Northwest Quadrant, as the designated location of much of Naas' future residential and employment growth, will therefore see the creation of significant employment opportunities locally with supporting residential and community facilities and transport infrastructure.

As discussed in Chapter 5, a trip generation exercise was conducted to ascertain the potential volume of traffic likely to be generated from the zoned lands located both within the Naas and Sallins environs to validate the growth predictions used within the Local Area Model as derived from the NRA's National Transport Model. The traffic model that was used in the preparation of this EIS includes for the effects on traffic generation caused by the future development of the northwest quadrant.

On this basis, cumulative impacts of any environmental elements which are dependent on traffic numbers have been assessed and included within the relevant chapter of this EIS. For example, the traffic impact assessment includes for the trips generated as a result of the build out of this development. Therefore the air quality and noise assessments have assessed the cumulative impact these developments.

In relation to hydrology, the existing environment includes infrastructure to cater for the future development in this quadrant which includes the Osberstown pond. The M7 Osberstown Interchange and R407 Sallins Bypass Scheme will not cause any overall alteration to the volume of the existing Osberstown pond. Similarly, the existing development discharges from the Osberstown pond to the Osberstown stream but the M7 Osberstown Interchange and R407 Sallins Bypass Scheme does not increase the discharge to this stream as it restricts the outflow to greenfield runoff.

In relation to ecology, the existing environment includes the Osberstown pond and the culverts under the existing M7 as part of the infrastructure for the northwest quadrant. As this is in place in the existing environment, it is already assessed in the baseline situation and therefore in the cumulative impacts.

20.3.3 Summary

A fully co-ordinated approach has been adopted during the EIA to assess the cumulative impacts of the proposed scheme in conjunction with the adjacent schemes and adjacent potential future development. The fact that the major adjacent schemes/developments are already included in the baseline information ensures that the cumulative impacts are considered and included in the assessment.

Nevertheless, all road construction projects give rise to some degree of unavoidable impacts and measures are proposed to mitigate such impacts wherever possible in each chapter of this EIS. Provided that all design, construction methodology ad mitigation measures for the proposed scheme are carried out in accordance with best practice guidelines, it is considered that no additional likely significant residual impacts will arise as a result of the cumulative impacts.

20.4 Interim Scheme

20.4.1 Introduction

This EIS considers that the M7 Osberstown Interchange and R407 Sallins Bypass will be constructed concurrently. However, there is the possibility that the scheme will be progressed as two separate construction contracts, with the interchange constructed first. On this basis, an interim scenario has been developed to assess the potential environmental impacts associated with developing the interchange without the bypass, refer to **Figure 4.3 V3**. This section assesses the impacts predicted as a result of the development of this interim scheme in relation to all environmental aspects.

20.4.2 Transportation

20.4.2.1 Assessment Scenarios

The validated 2012 base year model has been used to forecast traffic impacts for the proposed interim scheme as set out below:

- 2015: Opening Year:
  - Do Minimum (DM).
  - Do Something (DS) - with the M7 Interchange only.
- 2020: Design Year:
  - Do Minimum (DM).
  - Do Something (DS) - with the M7 Interchange only.

The above listed Do-Something scenarios are referenced as DS1 in **Appendix A5.1 V4**.

20.4.2.2 Impacts of the Interim Scenario

Tables 20.1 to 20.3 presents predicted traffic volumes (AADT) for the possible interim scenario with the interchange only constructed initially, compared to do-minimum volumes.

Table 20.1: Modelled Annual Average Daily Traffic (AADT) (in vehicles) – Interim Scenario

Road Links		2012 Base Year	2015_ DM	2015_ DS	2020_ DM	2020_ DS
Western Distributor Link Road						
1	West Of Monread Roundabout	15,550	18,350	13,700	19,650	13,850
2	East Of Airside Business Park	13,250	14,250	12,550	15,600	12,750
3	East Of Sallins Road (R407) Roundabout	16,100	16,550	15,450	17,500	15,800
4	West Of Sallins Road (R407) Roundabout	11,400	12,650	13,050	14,550	14,250
5	East Of Proposed M7 Osberstown Interchange Link	10,900	12,150	13,550	13,750	15,050
6	West Of Proposed M7 Osberstown Interchange Link	10,900	11,900	8,100	13,250	9,700
7	North Of R409 Carragh Road	11,050	11,700	7,800	13,000	9,250
8	North Of R445 Newbridge Road	10,050	9,350	2,900	10,200	3,300
M7/N7						
9	East Of Johnstown Interchange (Jn 8)	69,600	72,000	72,000	76,200	76,200
10	East Of Maudlins Interchange (Jn 9)	68,600	70,900	71,700	74,650	75,950
11	East Of Proposed Osberstown Interchange	56,400	58,100	59,500	61,350	63,600
12	West Of Proposed Osberstown Interchange	56,400	58,100	63,750	61,350	66,900
13	West Of Newhall Interchange (Upgraded) (Jn 10)	54,950	56,500	57,950	59,300	60,850
R445 Newbridge Road						
14	East of the Carragh Road	7,500	7,800	8,000	8,150	8,250
15	East of the South Ring Road	6,300	6,700	7,000	7,350	7,600
16	East Of The Western Distributor Link Road	13,450	13,900	14,400	14,800	15,300
17	West Of The B&Q Roundabout	20,800	20,550	13,400	21,700	14,400
18	West Of The Bundle of Sticks Junction	17,000	21,950	14,250	23,200	15,550
19	West Of Newhall Interchange (Northern Roundabout)	17,000	20,250	19,950	21,000	20,800
R409 Carragh Road						
20	West Of Western Distributor Link Road	6,450	6,950	7,350	7,600	7,950
21	East Of Western Distributor Link Road	7,550	8,400	8,700	9,850	10,250
Southern Ring Road						
22	South Of R445 Newbridge Road	8,850	9,850	10,150	11,050	11,450

Road Links		2012 Base Year	2015_ DM	2015_ DS	2020_ DM	2020_ DS
R445 Dublin Road						
23	East Of Monread Road Roundabout	13,000	14,050	12,800	15,000	13,100
24	South Of Monread Road Roundabout	15,650	14,600	13,500	15,300	14,000
25	North Of R410 Blessington Road	11,000	11,600	11,150	12,250	11,600
Canal Bank						
26	North Of Mill Lane (or South of Osberstown Road)	1,050	2,000	2,000	2,250	2,300
27	South Of Mill Lane	1,050	2,100	2,000	2,300	2,350
Mill Lane						
28	West Of R407 Sallins Road	3,150	3,050	3,200	3,250	3,300
R407 Sallins Road						
29	North Of Proposed Sallins Bypass Junction (Clane Road Roundabout)	18,700	19,250	18,950	20,350	20,000
30	North Of Proposed Sallins Link Road Junction	17,700	18,200	17,950	19,400	19,050
31	North Of Osberstown Road Junction	18,600	19,100	19,400	20,150	20,550
32	North Of Monread Road Roundabout	18,000	17,650	18,300	18,400	18,950
33	South Of Monread Road Roundabout	11,700	11,050	12,200	11,600	12,800
34	North Of Main Street	12,500	12,050	11,350	12,600	11,850
Main Street						
35	North Of Popular Square	9,450	10,650	10,450	11,500	11,200
36	South Of Popular Square	15,500	16,550	15,850	17,200	16,600
Osberstown Road/Cottages						
37	West Of R407 Sallins Road	3,450	3,950	3,500	4,450	4,050
38	West Of Canal Bank Junction	2,600	2,250	1,800	2,550	2,050
Proposed R407 Sallins Bypass						
39	North Of Proposed M7 Interchange	N/A	N/A	N/A	N/A	N/A
40	North Of Proposed Sallins Link Road Junction	N/A	N/A	N/A	N/A	N/A
Proposed Sallins Link Road						
41	East Of Proposed Sallins Bypass	N/A	N/A	N/A	N/A	N/A
42	West Of R407 Sallins Road Junction	N/A	N/A	N/A	N/A	N/A

Road Links		2012 Base Year	2015_ DM	2015_ DS	2020_ DM	2020_ DS
Newhall Cross Road						
43	Newhall Cross Road	6,600	4,750	4,750	4,950	5,150
Kerdiffstown Road						
44	Kerdiffstown Road	2,100	2,300	1,750	2,700	1,950
Osberstown Interchange Link Road						
45	Link Road	N/A	N/A	16,900	N/A	18,950

Table 20.2: AADT M7 Traffic Volumes (in vehicles)

AADT	2015_DM	2015_DS	2020_DM	2020_DS
M7 EB West of Interchange	29,200	31,750	30,800	33,550
M7 WB West of Interchange	28,900	32,000	30,500	33,350
Two-Way Total (West of Interchange)	***58,100***	***63,750***	***61,300***	***66,900***
M7 EB East of Interchange	29,200	30,450	30,800	32,650
M7 WB East of Interchange	28,900	29,050	30,500	30,950
Two-Way Total (East Interchange)	***58,100***	***59,500***	***61,300***	***63,600***

Table 20.3: Peak Hour M7 Traffic Volumes (in vehicles)

Peak hour Flows	2015_DM	2015_DS	2020_DM	2020_DS
AM Peak				
M7 EB West of Interchange	3,600	3,750	3,850	4,000
M7 WB West of Interchange	2,150	2,550	2,250	2,650
Two-Way Total (West of Interchange)	***5,750***	***6,300***	***6,100***	***6,650***
M7 EB East of Interchange	3,600	3,750	3,850	4,050
M7 WB East of Interchange	2,150	2,150	2,250	2,300
Two-Way Total (East Interchange)	***5,750***	***5,900***	***6,100***	***6,350***
PM Peak				
M7 EB West of Interchange	2,150	2,400	2,300	2,550
M7 WB West of Interchange	3,950	4,000	4,200	4,150
Two-Way Total (West of Interchange)	***6,100***	***6,400***	***6,500***	***6,700***

Peak hour Flows	2015_DM	2015_DS	2020_DM	2020_DS
M7 EB East of Interchange	2,150	2,250	2,300	2,400
M7 WB East of Interchange	3,950	3,950	4,200	4,200
Two-Way Total (East Interchange)	***6,100***	***6,200***	***6,500***	***6,600***

For the interim scheme, there will be a higher increase in traffic on the section of the Western Distributor Road between the R407 Sallins Road Roundabout and the Distributor Link Road connecting to the M7 Osberstown Interchange.

Traffic volumes on the M7 on approach to the proposed M7 Osberstown Interchange are lower than with the addition of the R407 Sallins Bypass Connection.

20.4.2.3 M7 Osberstown Interchange Operational Performance

The analysis presented in Chapter 5, Section 5.5.4 was found to be the worst case scenario in terms of operational performance for the proposed M7 Osberstown Interchange. The Interchange operates well within capacity for the interim scheme

20.4.2.4 L3012 Western Distributor Road / Distributor Link Road Roundabout

The capacity assessment of the proposed roundabout at the junction of the Western Distributor Road with the Distributor Link Road for the 2020 interim scheme DS scenario is presented in Tables 20.4.

Table 20.4: 2020 Western Distributor Road/ M7 Osberstown Interchange Link Road Roundabout Performance (Interim Scheme DS)

Scenario	Junction Arm	2020 AM Peak		2020 PM Peak	
		Capacity (RFC)	Queue (vehs)	Capacity (RFC)	Queue (vehs)
DS1	Western Distributor (East)	0.50	1.0	0.50	1.0
	Unnamed Road (Future Link)	0.04	<1	0.06	0.1
	Western Distributor (West)	0.25	<1	0.09	0.1
	M7 Interchange Link	0.15	<1	0.27	0.4

From the above assessment, it can be seen that the roundabout is expected to have sufficient capacity to accommodate the projected traffic levels associated with the possible interim scheme.

20.4.2.5 Impacts on Public Transport

The impacts of the possible interim scheme on public transport remain positive in terms of reducing traffic volumes on the local and regional road network, thereby improving journey time and its reliability for existing and potential additional future public transport services.

20.4.2.6 Impacts on Cyclists and Pedestrians

The introduction of the proposed pedestrian and cycle connection between the Western Distributor Road and Canal Road remains as part of the possible interim scheme, thereby facilitating a connection between Cycle Route N6 and Green Route K13, as identified in the draft GDA Cycle Network Plan.

Reductions in traffic volumes along other sections of the local and regional road network will also support improvements to existing and the development of new planned cycle network infrastructure.

20.4.2.7 Construction Traffic Impacts

There are no anticipated additional construction impacts arising from the possible interim scheme other than those already presented in Section 4.4 of Chapter 4 – *Description of the Proposed Scheme* and as discussed in Section 5.6.

20.4.3 Mitigation Measures

There are no additional mitigation measures required on the local, regional or national road networks to address traffic capacity issues arising from the possible interim scheme.

20.4.4 Agronomy

The interim scheme, as shown in **Figure 4.3, V3,** will affect two farms, reference number 109 and 115. Farm 109 is located at both sides of the M7. The affected land south of the M7 is zoned industrial/residential and is therefore non-agricultural. The landtake will be approximately 5.76 hectares on the northern side of the M7. There would be no land separation impact on this farm due to the interim scheme. The resulting impact on Farm 109 is significant adverse overall. The impact on the stud farm No 115 is slight due to a small land take (0.9 hectares) along existing M7 boundary. The impact of the interim scheme is imperceptible on agriculture in the study area.

20.4.5 Human Beings

20.4.5.1 Journey Characteristics

Under the interim scheme, traffic will have direct access from the M7 to the Western Distributor Road and to lands zoned for commercial development in the Northwest Quadrant of Naas including Millennium Park.

Traffic for these destinations will be able to choose to avoid the Newhall Interchange or the busy Monread Road from Maudlins Interchange. Most traffic for central Naas from the M7 will continue to use either of the two existing interchanges.

On this basis of the criteria given in the methodology section, the impact on journey time and journey time reliability for journeys commencing from outside Naas will be slight positive noting the typical length of journeys to the Millennium Park for drivers on the M7. However, given that this implies a reduction of up to 30% in journey duration this still represents a sizeable absolute saving given the magnitude of the impact, i.e. the number of journeys. Arguably, the more relevant impact is the improved connectivity for the Northwest Quadrant together with the journey time reliability this will provide. Given the zoning of the location for commercial development, the implications of this impact are addressed in the section dealing with economic impacts.

20.4.5.2 Community Severance

Under the interim scheme scenario, the M7 Osberstown Interchange will have a slight positive impact in terms of relief from severance on Monread Road due to the transference of some traffic to the M7. The impact will be of most significance in the vicinity of retail outlets and away from crossing facilities, although the dominant means of access to these retail outlets is by motor vehicle.

At the Sallins Road/Monread Road roundabout there will similarly be slight positive relief from severance due to the interim scheme. However, as there are no community facilities in the immediate vicinity of the roundabout the main impact relates to journey amenity.

On the built-up section of Osberstown Road in Sallins there will be a reduction in traffic due to the interim scheme of up to 12% in the Opening Year under the medium growth scenario as commuting traffic is transferred, rising to 24% with the addition of the bypass. This will provide for slight positive relief from neighbourhood severance between households and for the crèche located here.

20.4.6 Archaeology and Cultural Heritage

There are no anticipated additional impacts arising from the potential interim scheme other than those already presented in Chapter 8 *Archaeology and Cultural Heritage.*

20.4.7 Architectural Heritage

There are no anticipated additional impacts arising from the possible interim scheme other than those already presented in Chapter 9 *Architectural Heritage.*

20.4.8 Landscape and Visual

There are no anticipated additional impacts arising from the possible interim scheme other than those already presented in Chapter 10 *Landscape and Visual.*

20.4.9 Noise and Vibration

20.4.9.1 Traffic Noise Predictions

Traffic noise predictions have also been conducted for the operational phase of the interim scheme for two years, 2015 the proposed year of opening and 2020, the interim year. The following scenarios have been considered for each of the assessment years:

- Year 2015 – Do Minimum (DM, proposed scheme is not built. This scenario incorporates the M7 Naas to Newbridge By-Pass Upgrade Scheme).
- Year 2015 – Do Something (DS, M7 Osberstown Interchange is developed).
- Year 2020 – DM (Incorporates M7 Naas to Newbridge By-Pass Upgrade Scheme).
- Year 2020 – DS (M7 Osberstown Interchange is developed).

20.4.9.2 Predicted Noise Levels for Interim Scheme - 2015

The results of the traffic noise predictions for the year 2015 DS (develop the M7 Osberstown Interchange only) are presented in Table 20.1. Making reference to Section 11.3 in Chapter 11 *Noise and Vibration*, the noise mitigation measures are only required whenever all three of the conditions specified by the NRA are satisfied. Table 20.5 compares the results of the assessment against each of the three requirements in order to determine the requirement for noise mitigation.

Table 20.5: Predicted Noise Levels for Years 2015 for DM and DS Scenarios

Receiver Location Reference	Opening Year 2015		NRA Condition for Noise Mitigation Satisfied?			Mitigation Required?
	Predicted Noise Level					
	DM	DS				
	L_{den} (dB)	L_{den} (dB)	(a)	(b)	(c)	
R1	60	60	No	No	No	No
R2	61	61	Yes	No	No	No
R3	63	62	Yes	No	No	No
R4	59	59	No	No	No	No
R5a	59	58	No	No	No	No
R5b	59	58	No	No	No	No
R6	55	55	No	No	No	No
R7	53	54	No	No	No	No
R8b	57	58	No	Yes	Yes	No
R8a	57	57	No	No	No	No
R9	60	59	No	No	No	No
R10a	60	60	No	Yes	No	No
R10b	59	60	No	No	No	No

Receiver Location Reference	Opening Year 2015 Predicted Noise Level		NRA Condition for Noise Mitigation Satisfied?			Mitigation Required?
	DM	DS				
	L_{den} (dB)	L_{den} (dB)	(a)	(b)	(c)	
R11	55	55	No	No	No	No
R12	62	61	Yes	No	No	No
R13	59	59	No	No	No	No
R14	59	59	No	No	No	No
R15	63	63	Yes	No	No	No
R16	59	58	No	No	No	No
R17	60	60	No	No	No	No
R18	52	52	No	No	No	No
R19	51	51	No	No	No	No
R20	49	49	No	No	No	No
R21	49	49	No	No	No	No
R22	53	53	No	No	No	No
R23	49	49	No	No	No	No
R24	49	49	No	No	No	No
R25	48	48	No	No	No	No
R26	49	49	No	No	No	No
R27	49	49	No	No	No	No
R28	52	52	No	No	No	No
R29	55	54	No	No	No	No
R30	49	49	No	No	No	No
R31	48	48	No	No	No	No
R32	51	51	No	No	No	No
R33	51	51	No	No	No	No
R34	48	48	No	No	No	No
R35	51	50	No	No	No	No
R36	73	73	Yes	No	No	No
R37	65	65	Yes	No	No	No
R38	70	70	Yes	No	No	No
R39	57	57	No	No	No	No
R40	44	44	No	No	No	No
R41	64	64	Yes	No	No	No

2015 DS Scenario

The results of the assessment indicate that during the DS Scenario, predicted noise levels are either below 60dB L_{en} or are lower than or equal to the DM Scenario and hence do not satisfy the requirements for noise mitigation.

20.4.9.3 Predicted Noise Levels for Interim Scheme - 2020

The results of the traffic noise predictions for the year 2020 are presented in Table 20.6. For the year 2020, the DS Scenario has been assessed.

Table 20.6: Predicted Noise Levels for Years 2020 for the DS

Receiver Location Reference	Interim Year 2020		NRA Condition for Noise Mitigation Satisfied?			Mitigation Required?
	Predicted Noise Level					
	DM	DS				
	L_{den} (dB)	L_{den} (dB)	(a)	(b)	(c)	
R1	60	60	No	No	No	No
R2	61	61	Yes	No	No	No
R3	63	63	Yes	No	No	No
R4	60	60	No	No	No	No
R5a	59	58	No	No	No	No
R5b	59	59	No	No	No	No
R6	55	55	No	No	No	No
R7	54	54	No	Yes	No	No
R8a	58	59	No	Yes	Yes	No
R8b	57	57	No	No	No	No
R9	61	60	No	No	No	No
R10a	60	61	Yes	Yes	Yes	Yes
R10b	59	60	No	No	No	No
R11	55	55	No	No	No	No
R12	62	61	Yes	No	No	No
R13	59	59	No	No	No	No
R14	59	59	No	No	No	No
R15	63	63	Yes	No	No	No
R16	59	59	No	No	No	No
R17	60	60	No	No	No	No
R18	52	53	No	Yes	No	No
R19	51	52	No	Yes	No	No
R20	49	50	No	No	No	No
R21	49	49	No	No	No	No
R22	53	53	No	No	No	No

Receiver Location Reference	Interim Year 2020 Predicted Noise Level		NRA Condition for Noise Mitigation Satisfied?			Mitigation Required?
	DM	DS				
	L_{den} (dB)	L_{den} (dB)	(a)	(b)	(c)	
R23	50	50	No	No	No	No
R24	49	49	No	No	No	No
R25	48	48	No	No	No	No
R26	49	49	No	No	No	No
R27	49	50	No	No	No	No
R28	52	53	No	No	No	No
R29	55	55	No	No	No	No
R30	49	50	No	No	No	No
R31	48	49	No	No	No	No
R32	51	51	No	No	No	No
R33	51	51	No	No	No	No
R34	48	49	No	No	No	No
R35	51	51	No	No	No	No
R36	73	73	Yes	No	No	No
R37	66	66	Yes	No	No	No
R38	70	70	Yes	No	No	No
R39	57	57	No	No	No	No
R40	44	44	No	No	No	No
R41	64	64	Yes	No	No	No

2020 DS Scenario

The results of the assessment indicate that during the DS Scenario, one location satisfies the requirement for noise mitigation. This location (R10a) is located at Osberstown House. Mitigation should therefore be considered for this property should this scenario proceed.

At all other properties, predicted noise levels associated with the DS are either below 60dB L_{den} or are lower than or equal to the DM Scenario and hence do not satisfy the requirements for noise mitigation.

20.4.9.4 Mitigation Measures

Construction Phase

Mitigation measures for the construction phase are outlined in detail in Section 11.5.1 of Chapter 11 *Noise and Vibration.*

Operational Phase

Options for the reduction in traffic noise levels can take the form of a low noise road surface (LNRS), the use of barriers and or bunds or a combination of both. A LNRS surface is assumed to achieve a minimum noise reduction of -2dB when compared to Hot Rolled Asphalt (HRA).

The most appropriate noise mitigation measure for this scenario is the use of a LNRS along the link roads of the M7 Osberstown Interchange. This scenario will tie in with the application of this surface along the extent of the M7 Naas to Newbridge By-pass Upgrade Scheme of which the proposed interchange will form a part.

20.4.9.5 Residual Impact

Predicted noise levels at Location R10 with the application of a LNRS to the M7 Osberstown Interchange results in predicted noise levels equal to or below those predicted as part of the DM Scenario for the years under assessment (i.e. 2015 and 2020). In this instance, the three requirements for mitigation are no longer satisfied at this location.

20.4.10 Air Quality

20.4.10.1 Introduction

The scenarios modelled for the purpose of the air quality assessment for the interim scheme are as follows:

- The 'Do-Minimum' (DM) Scenario assumes that the M7 Osberstown Interchange and R407 Sallins Bypass scheme is not constructed with traffic scenarios for 2015 and 2020. This scenario assumes the M7 Naas to Newbridge By-Pass Upgrade Scheme has been developed.
- The 'Do-Something' (DS) Scenario assumes that only the M7 Osberstown Interchange is constructed with traffic scenarios for 2015 and 2020.

The assessment utilises traffic predictions for 2015 and 2020.

20.4.10.2 Predicted Air Quality Impacts

Opening Year (2015)
Predicted concentrations (including background concentrations) for the 'DM', and the 'DS' scenarios for the opening year, 2015 are presented in Table 20.7

The receptor showing the greatest level of pollutants (including the background concentrations), as a result of the 'DS' scenario is Receptor 13 (see **Figure 12.1 V3**).

For this receptor, annual average concentrations of NO_2 are predicted to be 17.91µg/m³, which complies with the AQS of 40µg/m³; annual average concentrations of $PM_{2.5}$ are predicted to be 17.13µg/m³, which complies with the proposed limit value of 25µg/m³ and the annual average concentrations of PM_{10} are predicted to be 19.03µg/m³ which complies with the limit value of 40 µg/m³. The number of annual days which PM_{10} levels is predicated to exceed the limit of 50µg/m³ is <2 days. This complies with the limit of 35 days.

The predicated increase in NO_2, $PM_{2.5}$ and PM_{10} is considered negligible. The increase in magnitude of change in PM_{10} daily values is also considered negligible.

Under the 2015 DS scenario, all predicted pollutant concentrations comply with the relevant limit values at all receptors selected.

Table 20.7: Predicted Pollutant Concentrations Including Background Concentrations - Predicted using the DMRB for 2015

Receptor	Location	Scenario	NO_2 (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (Days > 50 µg/m³)
		Limit Values	*40*	*40*	*25*	*35*
R02	Osberstown Road	DM	15.54	17.85	16.07	<2
		DS	15.54	17.85	16.07	<2
		Increase/Decrease DS- DM	0.00	0.00	0.00	
		Increase/Decrease %				
		DS - DM	0.00	0.00	0.00	
R03	Osberstown Road/Cottages West Of Canal Bank Junction	DM	16.58	18.09	16.28	<2
		DS	16.28	18.06	16.25	<2
		Increase/Decrease DS- DM	-0.30	-0.03	-0.03	
		Increase/Decrease %				
		DS – DM	-1.81	-0.17	-0.18	
R06	Proposed Sallins Link Road	DM	15.45	17.83	16.05	<2
		DS	15.5	17.84	16.06	<2
		Increase/Decrease DS- DM	0.05	0.01	0.01	
		Increase/Decrease %				
		DS - DM	0.32	0.06	0.05	
R07	Proposed M7 Osberstown Interchange (West)	DM	16.18	18.17	16.35	<2
		DS	16.28	18.2	16.38	<2
		Increase/Decrease DS- DM	0.10	0.03	0.03	
		Increase/Decrease %				
		DS - DM	0.62	0.17	0.15	
R08	Proposed M7 Osberstown	DM	15.45	17.83	16.05	<2
		DS	15.59	17.86	16.07	<2

Receptor	Location	Scenario	NO_2 (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (Days > 50 µg/m³)
		Limit Values	*40*	*40*	*25*	*35*
	Interchange (Northwest)	Increase/Decrease DS- DM	0.14	0.03	0.03	
		Increase/Decrease %				
		DS - DM	0.91	0.17	0.15	
R09	Proposed M7 Osberstown Interchange (South)	DM	16.18	19.62	17.66	<2
		DS	16.26	19.65	17.69	<3
		Increase/Decrease DS- DM	0.08	0.03	0.03	
		Increase/Decrease %				
		DS - DM	0.49	0.15	0.14	
R10	R407 Sallins Bypass - North Of Clane Road Roundabout	DM	17.21	18.34	16.51	<2
		DS1	17.2	18.34	16.51	<2
		Increase/Decrease DS1- DM	-0.01	0.00	0.00	
		Increase/Decrease %				
		DS - DM	-0.06	0.00	0.00	
R11	East Of Proposed M7 Osberstown Interchange Link (Distributor Link Road)	DM	15.61	17.87	16.08	<2
		DS	15.62	17.87	16.08	<2
		Increase/Decrease DS- DM	0.01	0.00	0.00	
		Increase/Decrease %				
		DS – DM	0.06	0.00	0.00	
R13	M7/N7 West Of Proposed M7 Osberstown Interchange	DM	17.82	18.98	17.08	<2
		DS	17.91	19.03	17.13	<2
		Increase/Decrease DS- DM	0.09	0.05	0.05	
		Increase/Decrease %				
		DS - DM	0.51	0.26	0.24	
R15	R407 Sallins By-Pass - South Of Monread Road Roundabout	DM	17.29	18.5	16.65	<2
		DS	17.63	18.62	16.76	<2
		Increase/Decrease DS- DM	0.34	0.12	0.11	
		Increase/Decrease %				
		DS - DM	1.97	0.65	0.58	
R16	Mill Lane - West Of R407 Sallins Road	DM	16.14	18.01	16.21	<2
		DS	16.17	18.02	16.22	<2
		Increase/Decrease DS- DM	0.03	0.01	0.01	
		Increase/Decrease %				
		DS - DM	0.19	0.06	0.05	
R17	Carragh Road South Of Western Distributor	DM	16.62	18.21	16.39	
		DS	16.76	18.24	16.42	
		Increase/Decrease DS- DM	0.14	0.03	0.03	

Receptor	Location	Scenario	NO_2 (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (Days > 50 µg/m³)
		Limit Values	*40*	*40*	*25*	*35*
	Link Road	**Increase/Decrease %**				
		DS - DM	0.84	0.16	0.15	
R18	Carragh Road North Of Western Distributor Link Road	DM	16.45	18.12	16.31	<2
		DS	16.64	18.16	16.34	<2
		Increase/Decrease DS- DM	0.19	0.04	0.04	
		Increase/Decrease %				
		DS - DM	1.16	0.22	0.20	
R19	Newbridge Road East of the South Ring Road	DM	17.08	18.32	16.49	<2
		DS	17.15	18.34	16.51	<2
		Increase/Decrease DS- DM	0.07	0.02	0.02	
		Increase/Decrease %				
		DS - DM	0.41	0.11	0.10	

Interim Year 2020

Predicted concentrations (including background concentrations) for the 'DM' and the 'DS' scenarios for the interim year, 2020 are presented in Table 20.8.

The receptor showing the greatest increase in levels of pollutants (including the background concentrations), as a result of the 'DS' scenario is Receptor 13 (**see Figure 12.1 V3**).

For this receptor, annual average concentrations of NO_2 are predicted to be 14.42µg/m³, which complies with the AQS of 40 µg/m³; annual average concentrations of $PM_{2.5}$ are predicted to be 16.99 µg/m³, which complies with the proposed limit value of 25 µg/m³ and the annual average concentrations of PM_{10} are predicted to be 18.88 µg/m³ which complies with the limit value of 40 µg/m³. The number of annual days which PM_{10} levels is predicted to breach the 50µg/m³ limit is <2 days. This complies with the limit of 35 days.

The increase in NO_2, $PM_{2.5}$ and PM_{10} is considered negligible. The subsequent magnitude of change in PM_{10} daily values is also considered negligible.

Under the 2020 DS scenario, all predicted pollutant concentrations comply with the relevant limit values at all receptors selected.

Table 20.8: Predicted Pollutant Concentrations Including Background Concentrations - Predicted using the DMRB for 2020

Receptor	Description	Scenario	NO_2 (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (Days > 50 µg/m³)
		Limit Values	***40***	***40***	***25***	***35***
R02	Osberstown Road	DM	12.21	17.72	15.95	<1
		DS	12.18	17.72	15.95	<1
		Increase/Decrease DS- DM	-0.03	0	0.00	
		Increase/ Decrease %				
		DS – DM	-0.25	0.00	0.00	
R03	Osberstown Road/Cottages West Of Canal Bank Junction	DM	13.19	17.95	16.15	<2
		DS	12.93	17.90	16.11	<2
		Increase/Decrease DS- DM	-0.26	-0.05	-0.04	
		Increase/ Decrease %				
		DS – DM	-1.97	-0.28	-0.25	
R06	Proposed Sallins Link Road	DM	12.2	17.7	15.93	<2
		DS	12.29	17.71	15.94	<2
		Increase/Decrease DS- DM	0.09	0.01	0.01	
		Increase/ Decrease %				
		DS1 – DM	0.74	0.06	0.05	
R07	Proposed M7 Osberstown Interchange (West)	DM	12.79	18.03	16.23	<2
		DS	12.88	18.06	16.25	<2
		Increase/Decrease DS- DM	0.09	0.03	0.03	
		Increase/ Decrease %				
		DS – DM	0.70	0.17	0.15	
R08	Proposed M7 Osberstown Interchange (North)	DM	12.1	17.7	15.93	<2
		DS	12.23	17.73	15.96	<2
		Increase/Decrease DS- DM	0.13	0.03	0.03	
		Increase/Decrease %				
		DS – DM	1.07	0.17	0.15	

Receptor	Description	Scenario	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} (Days > 50 $\mu g/m^3$)
		Limit Values	***40***	***40***	***25***	***35***
R09	Proposed M7 Osberstown Interchange (South)	DM	12.77	18.03	16.23	<2
		DS	12.86	18.06	16.25	<2
		Increase/Decrease DS- DM	0.09	0.03	0.03	
		Increase/ Decrease %	0.16	0.06	0.05	
		DS – DM	0.70	0.17	0.15	
R10	R407 Sallins Bypass- North Of Clane Road Roundabout	DM	13.73	18.18	16.36	<2
		DS	13.72	18.18	16.36	<2
		Increase/Decrease DS- DM	-0.01	0	0.00	
		Increase/ Decrease %				
		DS – DM	-0.07	0.00	0.00	
R11	East Of Proposed M7 Osberstown Interchange Link (Distributor Link Road)	DM	12.28	17.75	15.98	<2
		DS	12.29	17.76	15.98	<2
		Increase/Decrease DS- DM	0.01	0.01	0.01	
		Increase/ Decrease %				
		DS1 – DM	0.08	0.06	0.05	
R13	M7/N7 West Of Proposed M7 Osberstown Interchange	DM	14.34	18.84	16.96	<2
		DS	14.42	18.88	16.99	<2
		Increase/Decrease DS- DM	0.08	0.04	0.04	
		Increase/ Decrease %				
		DS – DM	0.56	0.21	0.19	
R15	R407 Sallins Bypass - South Of Monread Road Roundabout	DM	13.99	18.39	16.55	<2
		DS	14.16	18.46	16.61	<2
		Increase/Decrease DS- DM	0.17	0.07	0.06	
		Increase/ Decrease %				
		DS – DM	1.22	0.38	0.34	
R17	Carragh Road South Of Western Distributor Link Road	DM	13.36	18.12	16.31	<2
		DS	13.5	18.15	16.34	<2
		Increase/Decrease DS- DM	0.14	0.03	0.03	

Receptor	Description	Scenario	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} (Days > 50 $\mu g/m^3$)
		Limit Values	***40***	***40***	***25***	***35***
		Increase/ Decrease %				
		DS – DM	1.05	0.17	0.15	

20.4.10.3 Air Quality Improvements

Table 20.9 outlines locations where air quality will improve, as a result of decreases in AADT due to the interim scheme. Hatched areas represent scenarios where AADT flow values will decrease by 10% or greater. Non-hatched areas represent scenarios where a 10% reduction in AADT flow does not occur.

The reduction in traffic will result in a localised improvement of air quality in these regions, which will be particularly evident where sensitive receptors are adjacent to roadways and traffic reductions are substantial

Table 20.9: Locations of Improved Air Quality as a result of reduced AADT flows

Location	Link Number (see Figure 5.5 V3)	Link	2015	2020
			DS- DM	*DS- DM*
Western Distributor Link Road	1	West of Monread Roundabout		
	2	East of Airside Business Park		
	3	East of Sallins Road (R407) Roundabout		
	6	West of Proposed M7 Osberstown Interchange Link		
	7	North of R409 Carragh Road		
	8	North of R445 Newbridge Road		
M7/N8	17	West of the B&Q Roundabout		
	18	West of the Bundle of Sticks Junction		
R445 Dublin Road	23	East of Monread Road Roundabout		

Location	Link Number (see Figure 5.5 V3)	Link	2015	2020
			DS- DM	*DS- DM*
Osberstown Road/Cottages	37	West of R407 Sallins Road		
	38	West of Canal Bank Junction		
Kerdiffsown Road	44	Kerdiffsown Road		
Maudlins Interchange (Junction 9)		Westbound Off-Slip (West of Dublin Road)		
		Westbound On-Slip		
		Eastbound Off-Slip		
		Eastbound On-Slip		
		Interchange Link Road		
Johnstown Interchange (Junction 8)		Eastbound On-Slip		
		Interchange Link Road		
		Johnstown Road (West)		

20.4.10.4 Regional Assessment

The DMRB regional approach was used to estimate total emissions from the road network for the interim scheme. The assessment focuses on the change in emissions of nitrogen oxides in the current (baseline), opening and design years. The impact on carbon dioxide is considered in Chapter 13- *Climate*. Table 20.10 presents the predicated pollutant emissions at regional level.

Table 20.10: Predicted NOx Emissions at Regional Level - Predicted using the DMRB for 2015 and 2020 (Tonnes per Annum)

	Scenario	NO_x (t/a)
2015	DM	166
	DS	170
	% Increase/Decrease	
	DS – DM	2.5
2020	DM	160
	DS	164
	% Increase/Decrease	
	DS - DM	2.8
% of change (2020) relative to NEC Directive Limits		0.004

Nitrogen oxides are predicted to increase by 0.004% of the NEC Directive limit for NO_x in 2020. This increase is not considered significant.

20.4.11 Climate

Table 20.11 describes the predicted CO_2 produced as a result of the proposed scheme. The results include CO_2 levels based on Do-Minimum (DM) and Do-Something for both 2015 and 2020. Results are based on traffic data for the various scenarios; refer to Section 20.4.2. Predicted changes in level of CO_2 due to the proposed development are compared to Ireland's non-ETS commitments under the EU Climate Change and Renewable Energy Package.

Table 20.11: Total Estimated CO_2 Produced as a result of the Operation of the Interim Scheme

Scenario	Tonnes/year
Ireland's non-ETS CO_2 Commitment for 2020	38,000,000
Total CO_2 as a result of scheme 2015 (DM-DS)[1]	1,547
Change relative to CO_2 commitment	0.004%
Total CO_2 as a result of scheme 2020 (DM-DS)[1]	1,742
Change relative to CO_2 commitment (DS)	0.0046%

[1]Total C converted to total CO_2 using a factor of 44/12

Table 20.11 shows that a maximum of 0.0046% increase of CO_2 relative to Ireland's commitments under the EU Climate Change and Renewable Energy Package is predicted to occur due the interim scheme. This is not deemed to be significant.

20.4.12 Ecology

There are no anticipated additional impacts arising from the proposed interim scheme other than those already presented in Chapter 14 *Ecology*.

20.4.13 Soils and Geology

There are no anticipated additional impacts arising from the proposed interim scheme other than those already presented in Chapter 15 *Soils and Geology.*

20.4.14 Hydrogeology

There are no anticipated additional impacts arising from the proposed interim scheme other than those already presented in Chapter 16 *Hydrogeology.*

20.4.15 Hydrology

There are no anticipated additional impacts arising from the proposed interim scheme other than those already presented in Chapter 17 *Hydrology.*

20.4.16 Resource and Waste Management

There are no anticipated additional impacts arising from the proposed interim scheme other than those already presented in Chapter 18 *Resource and Waste Management.*

20.4.17 Non Agricultural Material Assets

There are no anticipated additional impacts arising from the proposed interim scheme other than those already presented in Chapter 19 *Non-agricultural Material Assets.*

20.5 References

Roads Act 1993 (No. 14 of 1993) Government Publications, Dublin, Ireland.

Roads (Amendment) Act 1998 (No. 23 of 1998) Government Publications, Dublin, Ireland.

Roads Act 2007 (No. 34 of 2007) Government Publications, Dublin, Ireland.