Chapter 18 Assessment of Potential Cumulative Impacts

18.1 Introduction

Section 50 of the Roads Act, 1993, as amended, 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, architectural heritage and cultural heritage. The significant impacts of the proposed scheme on these aspects of the receiving environment are assessed in the previous chapters of this EIS.

An Environmental Impact Assessment is also required to consider any cumulative impacts which may arise as a result of the construction or operation of a project. The EC '*Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* (May 1999) defines Cumulative Impacts as:

"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. For example:

- *Incremental noise from a number of separate developments;*
- *Combined effect of individual impacts, e.g. noise, dust and visual, from one development on a particular receptor;*
- *Several developments with insignificant impacts individually but which together have a cumulative effect, eg development of a golf course may have an insignificant impact but when considered with several golf courses there could be a significant cumulative impact on both local ecology and landscape."*

Following this definition of cumulative impact this chapter examines the potential for the combined effect of individual impacts on individual sensitive receptors affected by the M7 Naas to Newbridge Bypass Upgrade Scheme (**Section 18.2**) and subsequently addresses the potential cumulative impacts arising from adjacent proposed developments, in this case the proposed M7 Osberstown Interchange and R407 Sallins Bypass Scheme (**Sections 18.3 – 18.16**).

18.2 Potential Cumulative Impacts on Sensitive Receptors

Each of the environmental assessments undertaken for the M7 Naas to Newbridge Bypass EIS (refer Chapters 7 – 17 and the associated Figures, EIS Volume 3) were re-examined to identify if any particular receptor(s) were affected by a number of different impacts and if this could be considered as resulting in a cumulative impact on that receptor.

A receptor is considered to be an element of the environment on which an induced impact can act. As such a receptor can be an element of the natural environment such as a protected species, important habitat or designated site; it can equally be a community, population, individual resident or an asset such as an individual business or community recreational centre, etc.

By systematically reviewing the chapters it was identified that the residential properties located to the south west of the existing Newhall Interchange, between the R445 and the motorway are impacted by a number of different factors (**refer R25 and R26** on **Figure 15.4** or **NI-1** on **Figure 14.2**, **EIS Volume 3**). These properties are located immediately adjacent to the proposed west bound off slip and associated

roundabout of the new Interchange and would be negatively impacted by noise, visual impact, loss of amenity, and by construction nuisance.

The noise assessment confirms that the noise levels specified in the Kildare Noise Action Plan are exceeded at R25 with the scheme in place. However with the recommended mitigation measures (noise barrier and low noise road surface) in place the predicted noise levels are reduced when compared to the Do Minimum scenario (proposed upgrade does not occur). The operational noise impact is therefore slightly positive with regard to noise.

Table 14.5 of Chapter 14 Landscape and Visual impact confirms that the visual impact on these properties is high, as a consequence of the proximity of the road development, from construction stage to the medium term (3 – 10 years when any proposed planting will have matured). However, the assessment also notes that both properties are screened by existing garden boundary vegetation which will be retained and highlights that while the domestic environment will be altered the properties are already located adjacent to and between an existing major motorway junction and the significance of the impact must therefore be tempered in this regard.

Chapter 12 'Human Beings' also highlights that the two properties will experience a reduction in the level of amenity currently experienced. This impact on amenity is considered to be significant during the construction of the new interchange as a result of the proximity of construction activity and the creation of noise and dust.

Based on the above review it is considered that at operation these impacts do not combine to create a cumulative impact.

However it is also recognised that during the construction of the new interchange the impact on these properties with regard visual impact, loss of amenity, noise and nuisance will be significant. The strict application of the proposed construction mitigation measures (traffic management, site hoarding, dust management plan and noise monitoring) will ameliorate this impact to some degree, however it is considered that the impact remains significant.

18.3 M7 Osberstown Interchange and R407 Sallins Bypass Scheme

As outlined in Chapter 1 (refer Section 1.5), Kildare County Council, in conjunction with Osberstown Development Ltd, are currently progressing the planning and design of the proposed M7 Osberstown Interchange and R407 Sallins Bypass scheme.

As the M7 Osberstown Interchange would be located between the Maudlins and Newhall Interchanges there is a clear interface between the two proposed schemes. This interface has been fully considered by both design teams and no amendment to the design of the proposed M7 Naas to Newbridge Bypass Upgrade Scheme is required to accommodate the proposed Osberstown Interchange.

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 design and EIS phase course to ensure that each team was aware of the design work and environmental assessments being completed and the overlap and interactions between the two.

An environmental workshop was held on 17th July 2013 to specifically discuss and review cumulative impacts of the respective schemes and to ensure accurate

coverage of cumulative impacts. The workshop was attended by all the environmental specialists from both schemes.

As the physical connection between the proposed schemes occurs only in the location of the proposed Osberstown Interchange, a location where the M7 Naas to Newbridge Bypass Upgrade scheme constitutes only a widening of the motorway into the existing motorway median, the potential cumulative impacts which could arise are primarily indirect: traffic impacts and by association therefore noise impacts. These are reviewed in detail in the following sections (Traffic – Section 18.5; Noise – Section 18.14).

In order to assess a worst-case scenario, it is assumed that both the M7 Naas to Newbridge Bypass Upgrade Scheme and the M7 Osberstown Interchange and R407 Sallins Bypass Scheme will be constructed concurrently.

The following sections present a review of all of the environmental topics with regards cumulative impact.

18.4 Planning and Policy Context

Relieving congestion that negatively affects performance and economic utility of the subject section of motorway is a standalone project that is required and justified in the context of the national spatial strategy, regional planning guidelines, Government guidance and infrastructure investment programmes. The proposed scheme will be carried out notwithstanding the existence of other contemporary proposals for a new interchange at Osbertown north of Naas and the Sallins western bypass. Therefore, it is appropriate that the proposed scheme be separately described and assessed.

The M7 Osbertown Interchange and the R407 Sallins Bypass Scheme together with the Sallins Link Road are additional proposals that, cumulative with the subject scheme, have potential to have cumulative impacts upon the receiving environment. In the local planning context, the Naas Integrated Framework Plan for Land Use and Transportation (IFPLUT) 2003 was prepared as a non-statutory plan to set out an integrated framework plan for the future development of Naas and Environs up to 2020, as part of the Naas/Newbridge/Kilcullen primary development centre identified in the National Spatial Strategy urban structure.Based on the principles of Sustainable Development, the primary objectives of the IFPLUT were: -

- To promote and encourage the development and growth of Naas;
- To promote an appropriate balance of employment, residential, service facilities and land uses that will increase the self-sufficiency of the town and support its role as a key part of a designated Primary Development Centre in the GDA.

The IFPLUT recognises the importance of Sallins train station in the delivery of a multi-modal development base, facilitating all terrestrial modes of transport. The plan makes provision for a public transport corridor from south-east of Naas town centre to Sallins Station. New employment will be concentrated in the town centre and at Millennium Park, located within the Northwest Quadrant.

Subsequently, a non-statutory plan, the Northwest Quadrant Masterplan 2007 was prepared and adopted by Naas Town Council, to guide future development into the designated location for much of the future residential and employment growth in Naas.

Naas is designated as a Primary Economic Growth Town in the Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022 and part of the Naas/Newbridge Core Economic Area, located on the Multi-modal Corridor including the M7/N7 and the railway system with a commuter railway station at Sallins.

These designations were taken into account and incorporated into the Naas Town Development Plan 2011 – 2017 and into the Kildare County Development Plan, 2011 – 2017, Naas Environs.

The M7 Osberstown Interchange and the R407 Sallins Bypass Scheme together with the Sallins link Road will provide the opportunity to improve connectivity for the areas designated for economic development to Sallins train station and to the motorway network.

In strategic planning terms, the cumulative effect of the schemes has been anticipated and the proposed developments are plan-led. The impacts of the proposed development, singularly or cumulatively will be long-term and positive in the context of the proper planning and sustainable development of the area in the interests of the common good.

18.5 Traffic Analysis

In general the proposed M7 Osberstown Interchange and R407 Sallins Bypass scheme will improve accessibility to Naas and Sallins via the M7 Osberstown Interchange and reduce the dependency on the existing M7 Newhall and Maudlins Interchanges. The cumulative impacts, with regards to traffic, of the delivery of both the proposed scheme and the M7 Osberstown Interchange and R407 Sallins Bypass scheme are addressed below.

Assessment of Cumulative Impacts
In order to assess the cumulative impacts of the proposed scheme and the proposed M7 Osberstown Interchange and R407 Sallins Bypass scheme, additional traffic models were constructed.

The proposed scheme Do-Something traffic models were revised to include the infrastructure of the M7 Osberstown Interchange and R407 Sallins Bypass scheme. These revised Do-Something traffic models were run and compared against the Do-Minimum scenario (i.e. existing road network). The key cumulative impacts of the schemes in terms of traffic in the 2030 Design year medium growth scenario are:

- An increase in AADT on the M7 mainline carriageway of between 13% (west of the Osberstown Interchange) and 15% (east of the Osberstown Interchange) in 2030. This is as a result of the additional capacity of the M7 and vehicles remaining on the M7 to access Naas and Sallins via the proposed Osberstown Interchange;
- Decrease in traffic using the eastbound off ramp (37%) of the Newhall Interchange in 2030, as a result of traffic remaining on the M7 and exiting at the Osberstown Interchange. There is also a reduction in traffic on the westbound on ramp (42%) of the Newhall Interchange in 2030, as traffic now access the M7 westbound carriageway from Naas and Sallins via the Osberstown Interchange; and
- In 2030 at the Maudlins Interchange there is decrease in traffic using the westbound off ramp (24%), as traffic remains on the M7 mainline carriageway and now exits at the Osberstown Interchange. There is also a reduction on the

eastbound on ramp (22%) at the Maudlins Interchange as traffic accessing the M7 eastbound now makes use of the Osberstown Interchange.

Overall the cumulative impact of both schemes is an increase in traffic on the M7 mainline carriageway between the M7/M9 and Maudlins Interchanges as a quantity of traffic which previously used the Newhall and Maudlins Interchanges to access areas of Naas and Sallins remains on the M7 and accesses these areas via the Osberstown Interchange. This leads to a reduction in traffic through both the Newhall and Maudlins Interchanges.

The proposed M7 Osberstown Interchange and R407 Sallins Bypass Scheme raises a number of questions in relation to the proposed scheme which need to be addressed. These are:

- Phasing - Can the M7 Osberstown Interchange and R407 Sallins Bypass scheme be opened prior to the proposed scheme?; and
- Newhall Interchange - Is there a need for an upgrade of the existing Newhall Interchange if the M7 Osberstown Interchange and R407 Sallins Bypass scheme is delivered?

Opening of the M7 Osberstown Interchange and R407 Sallins Bypass Scheme prior to the proposed scheme

The existing M7 mainline carriageway between the M7/M9 and Maudlins Interchanges currently experiences significant congestion and delays during peak periods and operates at a Level of Service E (in a hierarchy of A to F).

The NRA Transport Research & Information Note "A Study of Lane Capacity in the Greater Dublin Area" (Feb 2012), estimates the capacity of an unmanaged lane (no traffic management in place) to be approximately 1750 Passenger Car Units (PCU). This is the practical capacity of a lane before flow breakdown is likely to occur.

Current lane demand (nearside lane) on the M7 is in excess of 2000 PCU in the peak hours (eastbound in the AM and westbound in the PM) which reflects the high level of congestion and subsequent 'shockwaves' currently experienced on the M7.

The introduction of the proposed M7 Osberstown Interchange and R407 Sallins Bypass scheme prior to the proposed widening of the M7 mainline would increase demand on the M7 mainline by between 8 - 10% and would lead to increased congestion and further delays to vehicles on the M7 during peak periods.

As such the opening of the M7 Osberstown Interchange and R407 Sallins Bypass scheme is dependent on the completion of the motorway widening works of the proposed scheme. The M7 Osberstown Interchange and R407 Sallins Bypass scheme may be constructed at the same time as the proposed scheme but not opened until the widening works on the M7 are completed.

The need for an upgrade of the Newhall Interchange with the M7 Osberstown Interchange and R407 Sallins Bypass in place

As illustrated above the proposed M7 Osberstown Interchange and R407 Sallins Bypass scheme will reduce the overall demand of traffic through the Newhall Interchange, particularly on the east bound off ramp and the west bound on ramp. To assess the capacity and operation of the existing Newhall Interchange with the M7 Osberstown Interchange and R407 Sallins Bypass in place, micro-simulation

models of the road network were developed using the micro-simulation software VISSIM (v5.04-02).

The most difficult sections of a motorway to analyse are the diverging and merging sections, where the majority of conflicts and vehicle interactions occur. Micro-simulation models were developed as they allow the assessment of merging and diverging impacts associated with motorway interchanges to be modelled accurately.

A summary of the micro-simulation assessment demonstrated that:

- The existing Newhall Interchange is currently operating at capacity (2012 flows). Significant queuing occurs on both of the M7 off-ramps during peak periods which impacts upon traffic on the M7 mainline carriageway leading to serious safety concerns;
- In the absence of the proposed upgrade of the Newhall interchange, but with the introduction of the proposed M7 Osberstown Interchange and R407 Sallins Bypass queuing on the existing M7 eastbound off-ramp would reduce both in 2015 and 2030, but significant queuing would still occur. This queuing is due to the limited capacity of the M7 Business Park Roundabout and the high right turn demand from the M7 overbridge to the M7 eastbound on-ramp;
- Similarly in the absence of the proposed upgrade of the Newhall Interchange, but with the introduction of the proposed M7 Osberstown Interchange and R407 Sallins Bypass, queuing on the existing M7 westbound off-ramp would initially reduce, but as traffic levels rise, queuing back along the off-ramp onto the M7 mainline reoccurs.

The micro-simulation assessment demonstrated that the overall demand through the Newhall Interchange would reduce if the M7 Osberstown Interchange and R407 Sallins Bypass scheme were to proceed. This would initially lead to a reduction in the queuing experienced on the off-ramps of the Newhall Interchange, but as traffic levels rise, significant queuing during peak hours would reoccur on both of the existing Newhall off-ramps in the absence of the proposed junction upgrade.

18.6 Ecology

As the M7 Naas to Newbridge Bypass Upgrade Scheme is primarily confined to the existing motorway footprint, the scope for cumulative impacts in the ecological environment is limited and will be effectively avoided by the application of the mitigation measures set out in Chapter 7.

Should the construction periods of the two schemes overlap, there is a slight risk of cumulative impact on water quality within the River Liffey catchment. With the absence of appropriate mitigation by either scheme, high suspended solids or loadings of other pollutants could result in siltation of spawning gravels or direct mortality to juvenile salmonids, as well as indirect impacts on Annex listed species such as otter, kingfisher and crayfish.

The potential for this cumulative impact on the water quality within the Liffey catchment to arise is effectively avoided by the application of the appropriate construction and operational mitigation measures which have been applied to both schemes.

18.7 Hydrogeology

The hydrogeological assessment completed for the M7 Naas to Newbridge Bypass Upgrade Scheme concluded that there will be no significant effect on the underlying hydrogeological environment.

As stated in Section 18.1, the cumulative impacts of a development are the combination of many minor impacts creating one, larger, more significant impact. There are no anticipated cumulative impacts on the hydrogeological environment as a result of the proposed M7 Naas to Newbridge Bypass Upgrade Scheme.

The propsoed M7 Osberstown and Sallins Bypass Scheme connects to the proposed M7 Naas to Newbridge Bypass Upgrade Scheme at Osberstown. A review of the hydrogeological assessment for both schemes was undertaken. There are no anticipated cumulative impacts on the local hydrogeological environment as a result of these two schemes being progressed in tandem.

18.8 Hydrology

The assessment of impacts on hydrology completed for the M7 Naas to Newbridge Bypass Upgrade Scheme EIS concluded that there will be no significant effect on the underlying hydrological environment. The inclusion of pollution control measures and attenuation will provide a greater level of treatment to runoff prior to discharge while the provision of the fish pass channel will provide a greater level of protection against flooding than is currently available when compared to the existing scenario. Both of these impacts are considered to be residual, minor beneficial and permanent in nature.

The cumulative impact of the proposed development and the proposed M7 Osberstown Interchange and R407 Sallins Bypass Scheme has been considered as part of this assessment as the interchange/bypass scheme is defined as a reasonably foreseeable future action and both schemes are linked to one another at Osberstown.

No cumulative impacts upon the hydrological regime have been identified as a result of the development of both schemes as there are no outfalls shared by both schemes.

18.9 Soils and Geology

As the M7 Naas to Newbridge Bypass Upgrade Scheme is primarily an online widening and is confined to the existing roadway the overall impacts on the underlying soils and geology were deemed imperceptible. Similarly, the impacts from the M7 Osberstown Interchange and R407 Sallins Bypass Scheme were deemed imperceptible with the implementation of mitigation measures.

A potential cumulative indirect impact is identified for the scenario where the Osberstown/Sallins project would be underway at the same time. The potential impact arises from the volume of earthworks and pavement materials to be provided to both schemes. The impacts on soils and geology for both schemes were identified as imperceptible and it is considered that the cumulative impact remains imperceptible, taking into account the extent of earthwork requirements for both projects.

A reduction in potential impacts could be achieved if the materials excavated from this M7 upgrade scheme were to be used as a source of general fill or processed to provide select fill to the Osberstown/Sallins scheme. The stated impacts of each would not change, however the overall volume required by import from external sources would be reduced.

18.10 Material Assets

There are a number of properties, such as those located to the south west of the existing Newhall Interchange, which have previously been impacted by road developments including the N7 Naas Bypass, N7 Newbridge Bypass and M7 / M9 Motorway. Following a desktop review, the cumulative impact arising from the impact of the previous road developments in-combination with the additional impact of the construction of the proposed M7 Naas to Newbridge By-pass Upgrade Scheme is not considered significant given the passage of time since the completion of the previous listed schemes.

There will be no direct impact on agricultural or non-agricultural property as a consequence of the construction or operation of the proposed widening of the M7. A number of individual plots are required at specific locations along the alignment to provide the proposed attenuation ponds. However there is no foreseeable cumulative impact on such property arising from the development of the M7 Osberstown Interchange and R407 Sallins Bypass.

18.11 Human Beings

The potential cumulative impact on individual sensitive receptors as a result of a combination of impacts arising from the proposed M7 Naas to Newbridge Bypass Upgrade Scheme is addressed in Section 18.2.

Under the title 'Human Beings' the assessment examines journey times and journey characteristics, community severance, amenity and economy. As the proposed schemes are connected at the proposed M7 Osberstown Interchange only, where the M7 is to be widened into the existing motorway median, any potential for direct cumulative impact to arise would occur in this area.

The M7 Naas to Newbridge Bypass Upgrade Scheme has no effect on 'Human Beings' or on the human environment for any receptor in the vicinity of Osberstown. There is therefore no potential for direct cumulative impacts on Human Beings in association with the M7 Osberstown Interchange scheme.

When both schemes are operational there may be indirect cumulative impacts on 'Human Beings' in the Osberstown area with regard to amenity, community severance, etc as a consequence of the combined traffic figures. The M7 Osberstown Interchange and R407 Sallins Bypass Scheme EIS has assumed the baseline environment to be the M7 Widening in place and fully operational. In this way the EIS for that scheme addresses the potential indirect cumulative impact on Human Beings and the human environment in the vicinity of Osberstown.

With reference to the traffic analysis (Section 18.5), at operation the cumulative impact of the combined schemes is considered to be positive with regards economy and journey characteristics.

If both schemes were under construction at the same time there is a possibility that the combined number of HGV movements on the road network could have an impact on amenity, journey characteristics, etc.

This EIS in Chapter 4 confirms that HGV movements during the construction of the M7 Naas to Newbridge Bypass Upgrade scheme will be restricted to the M7 motorway, existing motorway interchanges and the regional road network.

The M7 Osberstown Interchange and R407 Sallins Bypass EIS has identified the access routes for HGVs as being the M7 motorway (construction of Osberstown Interchange), the Naas Western Distributor Road (Western Distributor Road / Motorway Crossing to Grand Canal) and the R407 Clane Road (Grand Canal to Existing R407 Clane Road and Sallins Link Road) (refer **Figures 4.7 and 4.8**, **EIS Volume 3** for relevant road lcoations).

At present there is no motorway interchange present on the R407 and therefore as the M7 Widening HGV traffic will not be utilising the R407 there is no possibility for cumulative impact with regard HGV movements for those residents present on the R407 in Sallins and beyond. In addition, in the Osberstown area the construction of the M7 widening shall utilise the M7 only and there is therefore no situation where the Western Distributor Road would be utilised. Finally, the construction of the M7 Widening scheme results in a 0.1% increase in the Annual Average Daily Traffic (AADT) on the M7 and the construction of the Osberstown Interchange results in an increase in AADT of less than 1% on the M7. It is therefore concluded that there is no possibility of cumulative impact arising with regard to HGV construction traffic.

18.12 Archaeology, Architecture and Cultural Heritage

The cumulative impact of the proposed development and the proposed M7 Osberstown Interchange and R407 Sallins Bypass Scheme has been considered as part of this assessment as the interchange/bypass scheme is defined as a reasonably foreseeable future action and both schemes are linked to one another at Osberstown.

No cumulative impacts upon the archaeological, architectural and cultural heritage resource have been identified as a result of the development of both schemes.

18.13 Landscape and Visual Impact

Cumulative Impacts – M7 Widening and Newhall Interchange

The two elements of the development are proposed to take place in and alongside the defining feature of Co. Kildare's Strategic Development Corridor, i.e. the M7, with the junction located at a key node along that corridor. Road infrastructure (and the related transport function) is the defining feature of the landscape, and it affects all the other elements and characteristics of the landscape by influencing/determining the adjacent land use. In this context, neither of the two elements of the proposed development would individually cause a significant change in the character, quality or value of the landscape. Nor would the two elements combined constitute a significant accumulation of landscape impact.

Regarding visual impacts, the two elements of the proposed development are distinct from each other in nature and scale, with differing visual impacts. The road widening will result in minor changes to the existing road corridor with no significant elements (in terms of scale and appearance/visibility) added to or removed from the landscape.

Road users are the only group that will experience significant visual change. By contrast the new interchange will introduce significant new structures to the landscape. Road users will for the most part experience the resulting visual change (after construction) only fleetingly. Those using the interchange itself will be more exposed to the change, but there will be no significant long term change to the composition, character and quality of views so visual amenity for road users generally would be unaffected.

The occupants of a small number of residential properties in the vicinity of the interchange will may experience the visual effects of both elements of the development. While the effects of the interchange will be significant in certain cases/locations (two houses - R25 and R26 - between the M7 and R445 closest to the R445 overpass), the effects of the road widening will be negligible at worst. Nonetheless for the occupants of these properties any visible development of the road infrastructure (and intensification of the transport function in the landscape) could be perceived negatively and regarded as an accumulation of negative impacts.

Cumulative Impacts – Newhall Interchange and Osberstown Interchange and R407 Sallins Bypass

The proposed Newhall Interchange and the proposed Osberstown Interchange are some 5km apart. There is no location in the landscape at which both developments could be seen. The only visual receptors that will experience the effects of both developments are road users, who are of low sensitivity to the type of change proposed. For them the two interchanges will each have a fleeting effect on the composition of views (but not their character or quality), approximately 2 minutes apart - the Osberstown interchange having greater effect being a new interchange than Newhall which is effectively the relocation of an existing interchange. In the context, i.e. on the M7 bypassing Naas to or from Dublin, there will be no significant accumulation of impact on visual amenity.

18.14 Noise and Vibration

A separate proposal to construct a new interchange along the M7 at Osberstown has been considered as part of a separate EIS study for the proposed M7 Osberstown Interchange and R407 Sallins Bypass Scheme.

The M7 Osberstown Interchange and R407 Sallins Bypass Scheme EIS has considered the impacts of traffic from both the widened M7 Motorway and upgraded Newhall Interchange scheme in addition to the proposed Osberstown Interchange, Sallins Bypass and Sallins Link Road scheme. Noise mitigation measures set out within the M7 Osberstown Interchange and R407 Sallins Bypass Scheme EIS include a low noise road surface along the new Osberstown Interchange and Sallins Bypass in addition to road side barriers along the M7 to the east of the Osberstown Interchange and along the Sallins Bypass Road.

In order to ensure a full cumulative impact assessment has been undertaken, traffic flows associated with the operation of both full Schemes have been assessed along the full length of the M7 Naas to Newbridge Bypass Upgrade Scheme. The results of the assessment taking account of the mitigation measures set out in both schemes (i.e. a low noise road surfaces and road side barriers) confirms that noise levels at the 59 noise sensitive locations assessed show no increase above the calculated levels set out in the body of this report. The assessment has concluded that the mitigation measures assessed within the body of this report are appropriate for the

M7 Naas to Newbridge Bypass Upgrade Scheme in isolation and for the combined operation of both schemes.

18.15 Air Quality and Climate

The potential cumulative air quality and climate impacts associated with the M7 Naas to Newbridge By-pass Upgrade Scheme and the M7 Osberstown Interchange and R407 Sallins By-pass Scheme have been assessed.

Construction Phase

Local Air Quality

The greatest potential impact on air quality during the construction phase of both schemes is from construction dust emissions and the potential for nuisance dust. Dust emissions can come from a variety of sources including construction traffic. As long as the dust minimisation measures specified in Section 16.14 of this EIS are implemented during the construction phase of both schemes, fugitive emissions of dust from the site will be insignificant and pose no nuisance to nearby receptors.

Climate

Based on the assessments carried out for both schemes, it can be concluded that the construction phase of both schemes will have an insignificant impact on climate.

Operational Phase

Local Air Quality

The cumulative impacts of both schemes for the pollutants CO, benzene, PM_{10}, $PM_{2.5}$ and NO_2 have been assessed for the opening and design years. Levels of all pollutants range from 21 – 66% of their respective limit values in either 2015 or 2030. The greatest impact on pollutant concentrations in the region of both schemes in either 2015 or 2030 will be an increase of 3.3% of the annual or maximum 1-hour limit value for NO_2. Furthermore, the greatest improvement in pollutant concentrations in either 2015 or 2030 will be a decrease of 6.5% of the annual or maximum 1-hour limit value for NO_2. The impact of the proposed schemes in terms of the assessed pollutants is negligible at all receptors assessed.

Impacts on Sensitive Ecosystems

The impact of NO_x emissions resulting from the proposed schemes at the Grand Canal pNHA was assessed. The proposed schemes encroach the Grand Canal pNHA at Osberstown (Chainage 11,200) and Herbertstown (Chainage 2,700).

The predicted annual average NO_x level in the Grand Canal pNHA at Osberstown exceeds the limit value for the "do nothing" scenario in 2015 and 2030, reaching 193% in 2015 and 145% in 2030. For the "do something" scenario, levels reach 196% in 2015 and 149% in 2030. The impact of the proposed schemes at this location leads to an increase in NO_x concentrations of at most 1.4 $\mu g/m^3$. The maximum increase in the NO_2 dry deposition rate is 0.04 Kg(N)/ha/yr in 2015 and 0.06 Kg(N)/ha/yr in 2030. This reaches only 1.2% of the critical load for inland and surface water habitats of 5-10 Kg(N)/ha/yr (NRA 2011).

The predicted annual average NO_x level in the Grand Canal pNHA at Herbertstown exceeds the limit value for the "do nothing" scenario in 2015, with NO_x concentrations reaching 117% of the limit value and is below the limit value for the "do nothing" scenario in 2030, reaching 68% of the limit value. For the "do something" scenario, levels reach 117% in 2015 and 69% in 2030. The impact of the proposed schemes

at this location leads to an increase in NO_x concentrations of at most 0.15 µg/m^3. The maximum increase in the NO_2 dry deposition rate is 0.006 Kg(N)/ha/yr in 2015 and 0.008 Kg(N)/ha/yr in 2030. This reaches only 0.16% of the critical load for inland and surface water habitats of 5-10 Kg(N)/ha/yr (NRA 2011).

Regional Air Quality

The regional impact of the proposed schemes on emissions of NO_x and VOCs has been assessed. For 2015, the predicted impact of the proposed schemes is to increase NO_x levels by 0.02% of the NO_x emissions ceiling and increase VOC levels by 0.0002% of the VOC emissions ceiling which was to be complied with in 2010. For 2030, NO_x levels are predicted to increase by 0.005% of the NO_x emissions ceiling and decrease VOC levels by 0.0004% of the VOC emissions ceiling which was to be complied with in 2010.

Climate

The impact of the proposed schemes on emissions of CO_2 was also assessed. The results show that the impact of the proposed schemes will be to increase CO_2 emissions by 0.005% and 0.006% of Ireland's Kyoto target in 2015 and 2030 respectively. Thus, the impact of the Proposed Scheme on national greenhouse gas emissions will be insignificant in terms of Ireland's obligations under the Kyoto Protocol (FCCC 1997, DEHLG 2007b).

18.16 Conclusion

This assessment has reviewed the potential for cumulative impacts to arise on individual sensitive receptors as a consequence of the interaction between individual impacts arising from the M7 Naas to Newbridge Bypass Upgrade Scheme. It has confirmed that two residential properties to the south west of the existing Newhall Interchange will experience a potentially significant temporary cumulative impact during construction. The strict application of the construction mitigation measures laid out throughout this EIS will ameliorate this impact.

The assessment has also examined the potential for cumulative impacts in association with the proposed M7 Osberstown Interchange and R407 Sallins Bypass Scheme. With the application of the construction and operational mitigation measures identified in this EIS there are no anticipated negative cumulative impacts.