

Dunkettle Interchange Improvement Scheme

Environmental Impact Statement Volume 1 of 4: Non-Technical Summary



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1 Non-Technical Summary

1.1 Background to the Proposed Road Development

The National Roads Authority (NRA) has developed proposals for the improvement of the existing Dunkettle Interchange in County Cork. The existing Dunkettle Interchange is located approximately 6km to the east of Cork City, where the M8/N8 road from Dublin to Cork intersects with the N25 road from Waterford to Cork, via the existing interchange, just north of the Jack Lynch Tunnel.

Therefore the existing Dunkettle Interchange is a strategically important intersection of a number of key national routes, with the main links described as follows:

- *The M8/N8 Dublin to Cork Road;*
- *The N25 Cork to Waterford Road; and*
- *The N40 Southern Ring Road (through the Jack Lynch Tunnel).*

The existing interchange comprises a signalised roundabout, which includes a free flow overpass for traffic travelling along the N25 from the east to Cork, in the west, and vice versa. Traffic using the interchange other than for this movement must negotiate the circulatory carriageway (roundabout) which is controlled via traffic signals.

The Dunkettle Interchange Improvement Scheme Environmental Impact Statement (EIS) presents a statement of the likely effects on the environment of the proposed development and includes a description of the measures envisaged in order to avoid, reduce and where possible, remedy any identified significant adverse effects.

(a) Need for the Proposed Development

At present the existing Dunkettle Interchange operates above capacity on a daily basis. This is an impediment to the achievement of development objectives indicated or facilitated by strategic and statutory plans. Improvement of the Dunkettle Interchange will optimise the benefits gained from investment elsewhere on the arterial roads system and will facilitate delivery of an element in the long term development of the Atlantic Corridor.

The proposed development will facilitate:

- *Delivery of higher order strategic planning objectives, integration of the motorway system, delivery of an element in the development of the Atlantic Corridor;*
- *Economic and quality of life improvements in the Cork City gateway in accordance with the National Spatial Strategy, South West Regional Planning Guidelines and statutory development plans; and*
- *Improved dedicated direct access to Little Island, a strategic resource of national importance for manufacturing, jobs and exports.*

The scheme specific need relates to the current operational deficiencies associated with the existing interchange. Although the existing interchange is of major importance in the context of the national road network, it is currently operating above capacity in peak traffic conditions resulting in significant congestion, with queues developing on many of the approaches. These queues result in increased journey times through the interchange resulting in increased cost to businesses which is impacting on the economic competitiveness of the region.

The proposed development is consistent and compatible with the following national, regional and local policy documents:

- *National Spatial Strategy for Ireland, 2002 – 2020;*
- *Infrastructure and Capital Investment 2012-16: Medium Term Exchequer Framework;*
- *Smarter Travel, 2009;*
- *Cork Area Strategic Plan 2001 (and update of 2008);*
- *Cork County Development Plan, 2009;*
- *Blarney Local Area Plan, 2011;*
- *Cork City Development Plan, 2009 – 2015; and*
- *South West Regional Authority Regional Planning Guidelines 2010 – 2022.*

(b) Scheme Objectives

The scheme objectives are driven by the need to improve the current operational deficiencies associated with the existing interchange. This existing problem, if not resolved, will be exacerbated by traffic growth predicted to occur between the present year and the schemes design year, 2031. In addition to the core objectives associated with addressing the existing operational issues, the scheme objectives also includes the minimisation of environmental impacts and consideration of sustainable transport modes including pedestrian and cyclist facilities and railway connectivity within the proposed development.

The proposed development objectives are outlined in Table 1.1 below;

No	Objective
1	Improve capacity through the existing Dunkettle Interchange thereby reducing congestion.
2	Make best use of the existing Dunkettle Infrastructure thus minimising the impact of the scheme as much as possible and minimise disruption to road users through unnecessary demolition and reconstruction.
3	Separate local traffic movements from strategic traffic in so far as practicable.
4	Provide separate clearly designated lanes for each traffic movement with minimal weaving or crossover in so far as practicable.
5	Provide dedicated pedestrian and cycle connectivity through the junction area away from the busy corridors/arteries.
6	Minimise impact on adjacent environmentally sensitive sites.
7	Integrate with national, regional and local policy by improving capacity through the existing Dunkettle Interchange and thus facilitating connectivity between the N8 and N25 strategic routes and linkage to potential Cork/ Middleton local rail station and Park & Ride options.
8	Provide consideration of access to a future railway station in the vicinity and associated Park & Ride facilities. Any such access should also be accessible by pedestrians and cyclists.
9	Provide planning certainty in the area by establishing the design and layout of the improvement works to the existing interchange, thereby enabling better assessment of future planning applications in the area in the context of the proposed improvement works.

Table 1.1 Dunkettle Interchange Improvement Scheme Objectives

As can be noted above, the improvement works not only comprise specific traffic related improvements, but also includes the consideration of additional sustainable transport modes including pedestrian and cyclist facilities and railway connectivity.

1.2 Description of the Proposed Road Development

The proposed development comprises the reconfiguration of the existing Dunkettle Interchange to a free flowing interchange in so far as practicable, i.e. an interchange whereby traffic movements aren't conflicted by opposing traffic movements either by yielding or stopping at traffic signals, as is the case with the existing interchange. The proposed development includes the following elements of infrastructure:

- A series of direct road links between the N8, the N25 and the N40 and links to the R623 Regional Road in Little Island and Burys Bridge in Dunkettle;
- 1 grade separated junction arrangement at the existing N25 to the east of the existing Dunkettle Interchange;
- 4 roundabouts – 2 at the grade separated junction and 2 at tie ins with the existing road network;
- 43 major structures of various forms;
- Several culverts where the scheme crosses watercourses or intertidal areas; and
- Pedestrian and cyclist facilities.

The proposed development also has consideration for an access to a potential Park and Ride site for Irish Rail. A flood risk assessment was conducted in relation to the proposed development which demonstrated that it does not adversely impact on the existing flooding regime in the area and nor is the development itself at risk of flooding. Traffic Analysis has demonstrated that the proposed development significantly reduces congestion thereby reducing journey times through the interchange.

The proposed development is illustrated below in Image 1.1.

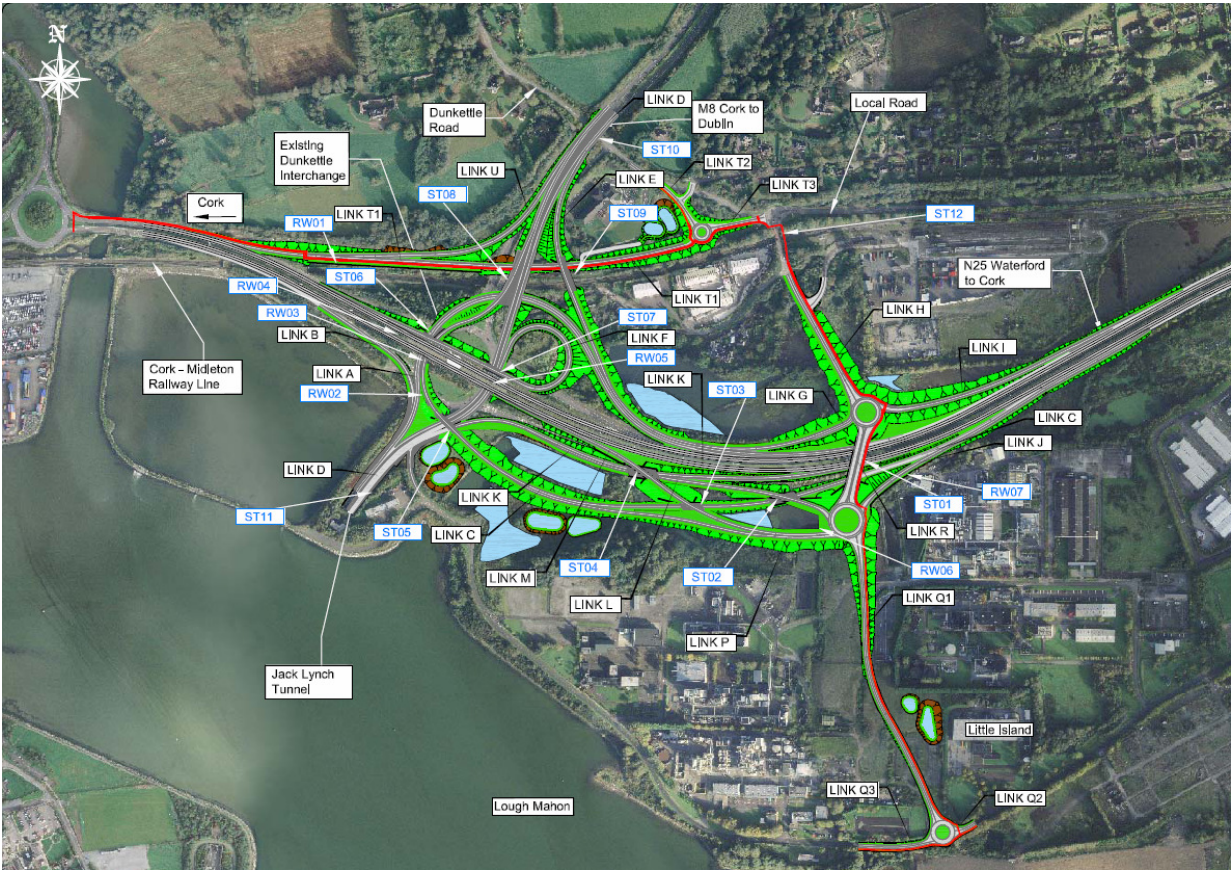


Image 1.1 The Proposed Development

An assessment of the proposed development and its compliance with the projects defined objectives is outlined in Table 1.2 below.

No	Objective	Compatibility
1	Improve capacity through the existing Dunkettle Interchange thereby reducing congestion.	Traffic modelling has been undertaken which demonstrates that the proposed development significantly improves the capacity of the existing interchange which results in reduced congestion.
2	Make best use of the existing Dunkettle Infrastructure thus minimising the impact of the scheme as much as possible and minimise disruption to road users through unnecessary demolition and reconstruction.	The proposed development maintains the existing east-west free flow flyover and also maintains the existing structures associated with the existing interchange.
3	Separate local traffic movements from strategic traffic in so far as practicable.	The proposed development includes a grade separated junction to the east of the main interchange to accommodate local traffic movements.
4	Provide separate clearly designated lanes for each traffic movement with minimal weaving or crossover in so far as practicable.	The proposed development includes designated lanes for the majority of movements and has minimised the amount of weaving necessary for traffic.
5	Provide dedicated pedestrian and cycle connectivity through the junction area away from the busy corridors/arteries.	The proposed development includes a dedicated pedestrian and cyclist facility which is remote from the main busy interchange elements.
6	Minimise impact on adjacent environmentally sensitive sites.	The assessment of the impact the scheme has on the environment is identified in Chapters 4 to 14 of this EIS. In particular the scheme avoids any direct impact on the Cork Harbour SPA, nor does it have a direct impact on Dunkettle House or its Demesne.
7	Integrate with national, regional and local policy by improving capacity through the existing Dunkettle Interchange and thus facilitating connectivity between the N8 and N25 strategic routes and linkage to potential Cork/ Midleton local rail station and Park & Ride options.	The proposed development complies with national, regional and local policy.
8	Provide consideration of access to a future railway station in the vicinity and associated Park & Ride facilities. Any such access should also be accessible by pedestrians and cyclists.	The proposed development facilitates access to a future Park & Ride facility which is also accessible via the dedicated pedestrian and cyclist infrastructure included as part of the proposed development.
9	Provide planning certainty in the area by establishing the design and layout of the improvement works to the existing interchange, thereby enabling better assessment of future planning applications in the area in the context of the proposed improvement works.	The proposed development as depicted provides planning certainty in relation to the proposed layout of the improvement works.

Table 1.2 Objective Compatibility

As is evidenced from the above table, the proposed development complies with all the objectives which were outlined.

1.3 Outline of Alternatives

Various alternative solutions were considered to address the scheme objectives. This comprised 5 different infrastructure type options, i.e. options which included civil engineering works to improve capacity thereby reducing congestion, and 18 different traffic management options, which comprised solutions to control demand and manage traffic within the confines of the existing infrastructure. A 'Do Nothing' and a 'Do Minimum' alternative were also considered.

The Do-Nothing alternative comprised an investigation of the existing road infrastructure and its ability to meet future demands for traffic and safety without any upgrade or junction improvement works, other than routine maintenance. The Do-Minimum alternative included only the addition of the improvement works to the N40 Southern Ring Road Sarsfield Road to Bandon Road Improvement Scheme, the construction of which commenced in July 2011. The Do-Nothing and Do-Minimum alternatives were discounted on the basis that they would not meet the scheme objectives.

The identified traffic management alternative options fell into three categories:

- *Intelligent Transport Systems (ITS) measures involving access control, incident detection and variable mandatory speed limits;*
- *Fiscal measures, i.e. tolling (single and multi-point); and*
- *A combination of both fiscal and ITS measures.*

The traffic management alternatives were assessed in terms of their environmental impact (in particular emissions), costs and their impact on the level of congestion at the existing Dunkettle Interchange.

An analysis of the ITS measures demonstrated no reduction in congestion at the existing Dunkettle Interchange and therefore the ITS measures were not considered further as this is one of the schemes key objectives. The best performing fiscal traffic management measure (in the context of the environment, costs and reduction in congestion at Dunkettle) was an option that comprised a single point barrier free toll of the Jack Lynch Tunnel in both directions throughout the day using fixed tariffs dependent on the vehicle type crossing the toll point. However, when this measure was considered further, particularly in terms of its cost benefit analysis in comparison with the infrastructure options considered below, it was not economically viable (in the absence of any infrastructural improvement works) and this alternative also resulted in additional environmental emissions when compared with the Do-Minimum situation.

Based on the consideration of the Do-Nothing / Do-Minimum & Traffic Management Alternatives and the conclusion that such measures were not viable or would not satisfy the scheme objectives, the only remaining alternatives to be considered were those associated with direct infrastructural improvements.

Infrastructure alternatives or options comprise solutions which involve new infrastructure such as roads, bridges, roundabouts etc. The major constraints to the development of the infrastructure alternatives were:

- *Cork Harbour SPA (Special Protection Area);*
- *Dunkettle House;*
- *Cork - Middleton Railway Line;*
- *N40 Jack Lynch Tunnel;*
- *Dunkettle Shore pNHA (proposed Natural Heritage Area);*
- *Construction Phasing; and*
- *Topography.*

On completion of the development of outline sketches and designs, a number of these were considered to merit inclusion in the formal appraisal process. Those options which were decided to be taken forward were titled as follows:

- *Blue Option;*
- *Brown Option;*
- *Orange Option;*
- *Purple Option; and*
- *Red Option.*

Further to the identification and refinement of the various infrastructure alternatives, an appraisal of the alternatives on the basis of the five Common Appraisal Criteria was undertaken. These criteria are as follows:

- *Economy;*
- *Safety;*
- *Environment;*
- *Accessibility and Social Inclusion; and*
- *Integration.*

The results of the appraisal concluded that the Red Option was assessed as having high preferences in most categories, and was therefore considered to be the best performing of all the options considered. The Red Option did not have a direct impact on the Cork Harbour SPA, nor did it have a direct impact on Dunkettle House or its Demesne. Further, as a result of its layout and configuration, it performed best in terms of reducing traffic congestion and improving journey times, as evidenced in its cost benefit analysis. It was also favoured (along with the Brown Option), in terms of its safety appraisal.

Based on the Project Appraisal Framework Matrix prepared, the Red Option was determined as the Preferred Alternative (or Route Corridor). The Red Option was therefore taken forward and refined and improved to reflect the current proposed development as presented in this EIS.

1.4 Socio-Economics

The Dunkettle Interchange has strategic importance in facilitating the movement of people and freight. The impacts on human beings considered in this assessment relate to direct physical impacts of the construction work and impacts on quality of life and safety arising from changed traffic flows and changes in commuting patterns. The assessment also seeks to identify the land use changes and changes in economic activities directly attributable or attributable in part to the proposed development.

The assessment was undertaken in line with a number of guidance documents including the National Roads Authority (NRA) EIA of National Road Schemes – A Practical Guide (Revision 1, NRA, 2008).

Impacts on the socio-economic environment from the proposed development have been assessed for both the construction and the operational phase of the proposed development for the following socio-economic aspects:

- *Economic activity and employment;*
- *Commuting patterns and health and safety;*
- *Tourism, recreation and access; and*
- *Land use and development.*

The socio-economic impact assessment assumes appropriate traffic and safety management during the construction period to minimise impacts to road users, local residents and local business interests in the vicinity of the interchange. The assessment concluded no significant impacts on the local communities or other socio-economic receptors during construction.

The operation of the proposed development upgrade is expected to deliver significant benefits to road users and specifically commuters, and is also likely to provide significant economic benefits as a result of its strategic importance for business and tourism connections to all parts of the country. The construction of the scheme will also provide in the region of four hundred construction jobs over a 2 year period. The majority of these positions are expected to be filled from within the local area. This is considered to be a positive benefit to the local economy given the current situation with regard to unemployment.

1.5 Flora and Fauna

The EIS considered and assessed the potential direct, indirect and cumulative ecological impacts on terrestrial and aquatic ecology within the ecological study area (zone of influence) of the proposed development.

The assessment was undertaken in line with a number of guidance documents including the NRA Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2, NRA, 2009).

The footprint of the proposed development is predominantly characterised by the existing interchange infrastructure, associated semi-mature plantation woodland, and pockets of inland intertidal wetland habitats. It is apparent that in spite of the existing interchange links providing round-the-clock disturbance from noise, light and surface water discharges, there are diverse habitats and species in close proximity to the existing roadway.

The coastal waters within the vicinity of the proposed development are part of Upper Cork Harbour and include Lough Mahon to the south west of Little Island and to a lesser extent the lower reach of the Glashaboy Estuary. With the exception of the Glashaboy and the western shore of Little Island, the intertidal areas within the study area have weak linkage to Lough Mahon, all being connected to same via culverts. These poorly connected highly modified intertidal areas that are separated from Lough Mahon by culverts comprise the bulk of the study area.

A number of specialist surveys have been carried out to establish terrestrial and aquatic baseline within and adjacent to the proposed development including:

- *Habitat Surveys;*
- *Survey for Otters;*
- *Bird wintering and breeding surveys;*
- *Bats surveys; and*
- *Fisheries surveys.*

There are 23 designated sites within 15km of the proposed development; those sites within 5km of the proposed road development have been identified as follows:

- *Cork Harbour Special Protection Area (SPA);*
- *Dunkettle Shore proposed Natural Heritage Area (pNHA);*
- *Douglas River Estuary pNHA;*
- *Glanmire Wood pNHA;*
- *Rockfarm Quarry pNHA;*
- *Great Island Channel pNHA; and*
- *Great Island Channel candidate Special Area of Conservation (cSAC).*

A Natura Impact Statement (NIS) in line with the requirements of the European Union Habitats Directive has been carried out to assess potential adverse effects to the integrity of the SACs and SPAs (collectively known as Natura 2000 Sites) within 15km of the proposed development.

In addition to the above protected sites there are a number of internationally and nationally protected mammals, bird, fish and amphibian species recorded in the vicinity of the proposed development.

Various invasive species are frequent throughout the study area and are found within areas of woodland, scrub, saltmarsh and hedgerow.

Key sources of potential ecological impact arising from the proposed development have been identified as a result of habitat loss of intertidal and terrestrial habitats, noise and physical disturbance, surface water run-off during construction, carriageway runoff during operation, spread of invasive species, sediment disposal during construction, road crossings of water features creating obstructions to mammal movement during operation, culvert design, proposed road drainage during operation, and proposed lighting during operation.

Before implementation of mitigation, the proposed development will result in a range of significant impacts from Local to County levels due to intertidal habitat loss, and potential disturbance to a breeding Grey Heron/Little Egret Heronry, among lesser impacts to grassland and hedgerow habitats and other breeding birds, invertebrates and fish.

Mitigation measures for construction phase impacts include;

- *Construction phase mitigation for control and treatment of surface water generated during construction works;*
- *Intertidal flood compensatory areas included within the proposed development will serve a dual function of flood alleviation and habitat creation;*
- *Invasive Species Management Plan;*
- *Construction phase timing of works; and*
- *Exclusion zones.*

Mitigation measures for the operational phase impacts include;

- *Design measures for surface water runoff treatment, road lighting and landscaping;*
- *Mammal fencing;*
- *Mammal underpasses; and*
- *Restoration and enhancement of aquatic and riparian habitats.*

Following implementation of mitigation, all impacts will be reduced to either non-significant or significant impacts at a local level only.

1.6 Hydrology, Geomorphology and Hydromorphology

The potential impact on various hydrological aspects such as flooding, water quality geomorphology/ hydromorphology, and amenity value likely to be caused by the proposed development have been identified as a result of:

- *Water quality impact on receiving estuaries, streams and intertidal mudflat habitats from routine carriageway runoff and from accidental spillages;*
- *Removal of flood storage as a result of the proposed development footprint;*
- *Removal, crossing and encroachment of the intertidal mudflat habitats; and*
- *Construction works in or adjacent to watercourses.*

The hydrology assessment was undertaken in line with a number of guidance documents including the NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008).

The hydrological study area extends 250 m beyond the landtake boundary of the proposed development. Where required the study area was extended beyond this to account for potential impacts outside this study area.

A number of field studies including baseline water quality monitoring have been undertaken in order to gain an understanding of the hydrological environment in the vicinity of the proposed development.

(a) Hydrology

The major watercourses within and adjacent to the study area are as follows:

- *Lough Mahon;*
- *The Lower Lee Estuary; and*
- *The Glashaboy River & Estuary.*

There are a number of other water features within the study area consisting of intertidal mudflats areas, minor streams and channels and freshwater wetlands.

The study area is served by the Glashaboy Water Works north of the existing Dunkettle Interchange which is connected to the main County Council water supply.

A range of freshwater and marine fish species are present in the Glashaboy River/Estuary and Harbour including Salmon species. However, the intertidal mudflat areas which make up the majority of the study area are not considered to be a fishery, and have little or no fisheries potential.

(i) Flood Risk

A flood risk assessment (FRA) in line with the Office of Public Works (OPW) Guidelines for Planning Authorities (GPA) 20: The Planning System and Flood Risk Management (OPW, 2009), has been undertaken. The primary objective of the FRA was to assess the flood risk in the existing situation and with the proposed development in operation. The FRA concluded that all across the study area predictions between the existing and the proposed road scheme situation demonstrate that the proposed works with the compensatory flood intertidal areas in place do not increase the risk of flooding.

(ii) Water quality

All water bodies with the exception of the Lee (Cork) Estuary Lower are achieving good status under the European Union (EU) Water Framework Directive (WFD).

During the construction phase there is the potential for pollution of surface water features from sediment loading and associated anthropogenic (caused or influenced by humans) polluting substances entering watercourses as a result of surface water runoff or spills on-site. Potential sources during the construction phase include:

- *Construction within and adjacent to watercourses;*
- *Excavations including those related to flood compensation areas, construction and removal of intertidal mudflat areas;*
- *Stockpiling of materials;*
- *Run-off from exposed bare soil surfaces;*
- *Accidental spillage of anthropogenic polluting substances in or adjacent to watercourses; and*
- *Construction plant and vehicle washing.*

To prevent or reduce the amount of sediment released into watercourses the contractor will be required to implement a number of mitigation measure as outlined in the main EIS and to prepare an erosion and sediment/silt control plan prior to commencing the construction works.

In addition, carriageway runoff during the operational phase may contain pollutants that can have an adverse effect on the quality of the water within the receiving watercourse or waterbody and therefore the drainage system identified provides a form of treatment to ensure that any negative impact is reduced. There are currently no attenuation measures in place to treat the carriageway runoff from the existing Dunkettle Interchange. Under the proposed development a 3 stage system is proposed for the proposed development incorporating an oil/petrol Interceptor, an attenuation pond and a constructed wetland.

The assessment concluded that the proposed development will not cause the deterioration of water quality within the water bodies adjacent to the proposed development either during construction (with implementation of appropriate mitigation measures) or during the subsequent operational phase.

(b) Geomorphology and Hydrogeomorphology

The NRA guidelines recommend that geomorphological impacts are considered within the EIS. The WFD defines 'hydromorphology' as the hydrological and geomorphological condition of surface water bodies.

The intertidal mudflat areas within the study area are highly modified and constrained by embankments and culverts, due to previous land reclamation and development. Historic maps indicate that the area was previously a single more open estuarine environment, with a narrow mouth at the confluence with the River Lee/Lough Mahon (east of the Glashaboy River), with a freshwater stream flowing from the east. As a result, the existing intertidal areas are not overly dynamic natural environments, but some have developed a series of habitats that would be sensitive to changes in water level or water flow. The elements of the proposed development considered to impact on hydromorphology are:

- *Loss of intertidal area mudflats due to the creation of road embankments; and*
- *Replacement, extension or addition of culverts.*

The proposed replacement storage/intertidal areas will allow saltmarsh and mudflat habitats to re-establish by natural adaptation/regeneration of these features over time. Significant impacts on hydromorphology of the intertidal system as a whole have been avoided by the inclusion in the design and creation of flood compensatory intertidal areas.

1.7 Geology, Soils and Hydrogeology

(a) Soils and Geology

The soils and geology assessment considered the impacts on soils and geology associated with the construction and operational phases of the proposed development.

In addition, the assessment of impacts has also considered the potential for contamination sources to be introduced during construction and/or operation of the proposed development that may potentially cause contamination of the sub-surface and impact on identified receptors.

The assessment was undertaken in line with a number of guidance documents including the NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008).

The study area for the soils and geology assessment extended from Dunkettle Roundabout in the west to the Little Island Industrial Area in the southeast. The northern extent of the study area is the Dunkettle Road with the Jack Lynch Tunnel marking the southern extent of the study area.

The assessment included a site walkover and a ground investigation (GI).

The estuary and tributaries of the River Lee have been developed into a number of contained river channels over the centuries. The contained river extends to just west of the existing Dunkettle Interchange, where it is joined by the Glashaboy River from Glanmire which in turn joins the River Lee to the southwest of the study area. A number of smaller streams and water channels also traverse the study area. These features contribute to the general ground conditions in the study area which comprise Alluvium (river deposits) consisting of typically soft organic silts underlain by sands and gravels which are in turn underlain by bedrock at varying depths. The geology varies in the Little Island area where a layer of made ground¹ overlies the alluvial silts and clays underlain by gravel underlain by bedrock at varying depths. It is assumed that the made ground was generally placed as part of upfilling to reclaim an area of the estuary.

There are no geological heritage sites within the study area. The closest site of interest is Rock Farm Quarry a pNHA approximately 0.5km from the south eastern boundary of the study area.

There are no significant construction phase impacts identified for soils and geology which requires mitigation as all will have an imperceptible impact.

Potential operation phase impacts (pre-mitigation) to surface/groundwater, human and infrastructure receptors are generally predicted to be negligible or moderate/slight. However, some impacts – relating to possible accidental contamination are predicted to be Profound / Significant. When the required mitigation measures are implemented, the impacts of the proposed development (construction and operational phases) will be imperceptible.

(b) Hydrogeology

The hydrogeological assessment assesses the potential impacts generated by the construction and operational phases of the proposed development on the groundwater

¹ Solid ground formed by filling in an artificial or natural pit with hard rubble such as broken brick, concrete, etc., or with rubbish.

environment, including groundwater water supplies and surface water bodies potentially supported by shallow groundwater.

The assessment was undertaken in line with a number of guidance documents including the NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008).

The majority of the area is underlain by a Locally Important Aquifer with bedrock which is moderately productive only in local zones. No karst features have been identified in the area

A number of private water supplies were identified within a distance of 500m of the proposed development.

The following construction activities have been identified as potentially causing adverse impacts on groundwater or surface water receptors:

- *Piling;*
- *Dewatering;*
- *Preloading of Earthwork Embankments and Construction of Piled Sections; and*
- *Accidental Spillages and Contaminated Runoff.*

Impacts associated with the operational phase of the proposed development have been identified as a result of the following:

- *Accidental Spillages and Road Runoff.*

A series of measures have been proposed to mitigate the impacts associated with the above including:

- *Contaminated groundwater cannot be discharged on site and will need to be tankered off site to an appropriate facility;*
- *Construction works including piling activities will be conducted in accordance with best practice guidelines;*
- *The contractor will monitor the operational water supply yield in the areas;*
- *Remediation of any free phase hydrocarbon contamination in shallow groundwater will be undertaken in advance of any construction works;*
- *The road drainage will be lined in its entire length. Oil interceptors will be installed before the construction of the attenuation ponds on all four drainage networks;*
- *The attenuation ponds and the constructed wetlands will be lined to contain any accidental spillage; and*
- *A contaminant spill emergency plan will be put in place.*

The residual impacts associated with the proposed development after adherence to the mitigation measures during the construction and operational phase of the proposed development are considered negligible.

1.8 Air Quality and Climate

Air quality monitoring indicates that the existing air quality environment in the area is generally well within the national and European Union (EU) ambient air quality standards. The main pollutants associated with traffic assessed under this study are nitrogen dioxide (NO₂), carbon monoxide (CO) and benzene.

The assessment was undertaken in line with a number of guidance documents including the NRA Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (NRA, 2006).

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. Dust minimisation measures will be put in place to minimise dust emissions during construction.

Traffic flow information has been used to model pollutant levels to assess whether any significant air quality impact on sensitive receptors may occur. Levels of traffic-derived air pollutants will not exceed the ambient air quality standards either with or without the proposed development in place. Thus, the impact of the proposed development in terms of air pollutants (NO₂, PM₁₀², PM_{2.5}, CO and benzene) is negligible at all worst-case receptors assessed.

No significant air quality impact on ecology will occur as a result of the proposed development.

Greenhouse gas emissions as a result of the proposed development, will be insignificant in terms of Ireland's obligations under the Kyoto Protocol.

² Particulate Matter

1.9 Noise and Vibration

(a) Noise

This assessment considers the anticipated types of noise and the impacts of same associated with both the construction and operation of the proposed development.

The assessment was undertaken in line with a number of guidance documents including the NRA Guidelines for the Treatment of Noise and Vibration in National Road Scheme (NRA, 2004).

The existing noise climate has been surveyed at the existing Dunkettle Interchange as part of the noise assessment.

During the construction works a variety of items of plant will be in use, such as excavators, piling equipment, lifting equipment, dumper trucks, compressors and generators. It is also possible that rock breaking may be required on occasions and there will be vehicular movements to and from the site that will make use of existing roads. Due to the nature of the activities undertaken on a large construction site, there is potential for generation of significant levels of noise.

A series of measures have been proposed to mitigate noise levels during construction including adherence to best practice guidelines, timing of works and maintenance of plant machinery. The application of binding noise limits and hours of operation, along with implementation of appropriate noise control measures, will ensure that noise impact is kept to a minimum.

With regard to operational noise level a computer based model has been prepared in order to quantify the traffic noise level associated with the operational phase of the proposed development.

For eight locations, with the proposed development in place, the noise levels results in the requirement for noise mitigation. It is proposed to use a low noise road surface as the noise mitigation measure on those links which dominate the noise environment for the receivers requiring mitigation. With the mitigation measures in place, the noise levels are calculated to be within the NRA design goals for noise at all locations assessed.

(b) Vibration

A survey of vibration along the proposed route corridor was not undertaken, as levels associated with existing roads would not be expected to be of a magnitude sufficient to cause disturbance to people or structural damage to property. Furthermore, vibration was not perceptible at any of the noise survey locations.

The potential for vibration at neighbouring sensitive locations during construction is typically limited to piling, demolition, excavation works, rock-breaking operations and lorry movements on uneven road surfaces. However, the Contractor will be obliged to take specific abatement measures during construction to comply with the limits set in the EIS.

As a vehicle travels along a road, vibration can be generated in the road and subsequently propagate towards nearby buildings. Such vibration is generated by the interaction of a vehicle's wheels and the road surface. However, vibration from road traffic is unlikely to cause a perceptible impact to properties near the road as long as the road surface is subject to normal maintenance requirements. Problems attributable to road traffic vibration can therefore largely be avoided by normal routine maintenance of the road surface.

1.10 Landscape and Visual

The landscape assessment involved reviewing plans and sections of the proposed road development, aerial photography and various publications, together with visits to the environs of the proposed development.

The assessment was undertaken in line with a number of guidance documents including the National Roads Authority (NRA) EIA of National Road Schemes – A Practical Guide (Revision 1, NRA, 2008).

Lying at the edge of the city, close to the River Lee and with steep topography to the north, the landscape and visual environment around the existing Dunkettle Interchange is considered complex. Prominent visual features within the landscape include:

- *Dunkettle House;*
- *The steeply wooded slopes of Lota More, Dunkettle and Kilcoolishal;*
- *The Father Matthew Tower;*
- *The pharmaceutical facilities on Little Island;*
- *The road infrastructure; and*
- *The River Lee and Blackrock Castle on the Mahon peninsula.*

The proposed development does not pass through or is not within close proximity to any listed areas of Outstanding Landscape. There are large areas within the study area which are designated as scenic landscapes and there are a number of scenic routes and views. There are no tree preservation orders in the area.

There are a number of protected structures and recorded monuments within the study area. A number of these structures are visually prominent within the landscape and significantly contribute to the visual character of the area.

The proposed development for the most part is close to the existing interchange and as such the existing road already impacts on many of the affected properties to some degree. The potential visual impact will be an increased level of visual impact on receptors. The following main elements have the potential for landscape and visual impact on the adjoining residential properties, protected structures, areas of woodland and tidal mudflats, areas of commercial and industrial development and road users:

- *Removal of existing vegetation;*
- *General construction disturbance;*
- *Significant, elevated structures such as earthen embankments, earth retaining walls and bridges;*
- *Road Illumination and signage; and*
- *Moving traffic during operation.*

Consideration was given to avoidance of impact wherever possible during the route selection and design process for the proposed development. This attempt at avoidance commenced at an early stage with the preparation of a landscape and visual constraints assessment of a wide study area as part of the overall constraints study for the project.

Mitigation in the form of landscape planting is proposed, and retention of existing vegetation, which will reduce the visual intrusion of the proposed development to slight to moderate in the medium to long term.

1.11 Archaeology, Cultural Heritage and Architectural Heritage

The cultural heritage assessment was undertaken in line with a number of guidance documents including the NRA Guidelines for the Assessment of Archaeological Heritage Impacts on National Road Schemes (NRA, 2005) and Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes, (NRA, 2005).

(a) Archaeological & Cultural Heritage

A total of 27 archaeological and cultural heritage sites were identified within the study area.

Measures to avoid or reduce potential impacts on archaeological sites have been considered throughout the route selection process and incorporated into the design of the proposed road development.

Impacts resulting from the construction of the proposed development have been identified for 14 of the 27 archaeological and cultural heritage sites, therefore mitigation is required. Mitigation will be by preservation in situ and where this is not possible preservation by record is required to mitigate identified impacts.

After mitigation the following impacts are predicted during construction; neutral impacts on 23 sites, a slight negative impact on one site, imperceptible negative impacts on two sites and unknown impact on one area of intertidal archaeological potential.

After mitigation, no additional impacts are predicted during operation.

(b) Architectural

A total of nine architectural heritage sites were identified within the study area. A further ten sites outside this area were included in the assessment due to the potential for impacts on their setting.

Measures to avoid or reduce potential impacts on architectural heritage sites have been considered throughout the route selection process and incorporated into the detailed design of the proposed road development. In addition landscape planting measures will mitigate any impact on specific architectural sites.

During construction, potential impacts were identified on nine of the nineteen sites. After mitigation, there will be a moderate impact on four sites, a slight negative impact on two sites and imperceptible impact on three sites.

During operation, potential impacts were identified on eight sites. After mitigation there will be a slight negative impact on three sites and no impact on five sites.

1.12 Waste

This assessment considers the anticipated types of waste and the impacts of same associated with both the construction and operation of the proposed development.

Waste will be generated during the construction phase as a result of:

- *Excavated Materials / Demolished Structures;*
- *Wetland Excavations / Marine Sediments;*
- *Pile Arisings;*
- *Surplus Materials;*
- *Import of Material; and*
- *General Waste Management.*

It is likely that the majority of excavated material including excavated wetland/marine sediment material will be unacceptable for reuse in road embankments, but is likely to be acceptable for reuse as landscaping material. Where the waste generated is not reusable, it will be sent to an appropriate recovery facility.

The Contractor will ensure that the facility to which waste is brought is licensed/permitted in compliance with Waste Management Legislation.

A Project Construction and Demolition Plan will be prepared for the provision of waste management during the construction phase of the proposed development. The plan will take into account the best practice guidance.

The impacts associated with the proposed development after adherence to the mitigation measures during construction phase are slight to negligible.

The main potential impacts from the operational phase of the proposed development are likely to arise from road maintenance, verge cleaning, green waste from landscape maintenance and wastes generated through littering.

Management of wastes arising during the operational phase of the proposed development will be the responsibility of the council or contractors appointed by the council to provide waste management and landscaping services.

1.13 Material Assets

The material assets considered as part of the material assets assessment include:

- *Agricultural Land Use; and*
- *Major Utilities.*

The existing agricultural land use and major utilities in the area have been compiled in order to undertake this assessment.

No agricultural lands will be impacted upon by the proposed development during the construction and operational phases.

Impact to the Utility Provider's services shall be permanent in nature, and occur during the construction phase. The impact on services in the absence of mitigation would be profound as many of the services would no longer be functioning. There will be no additional impact during the operational phase which has not already been considered as part of the construction phase.

When the mitigation measures are implemented such as protection and diversion of utilities, the magnitude of impact is reduced to imperceptible as the services will continue to operate in their current form.

1.14 Inter-Relationships between Environmental Factors

The significant interactions and inter-dependencies between environmental factors were taken into consideration as part of the individual environmental assessments.