

N52 ARDEE BYPASS

Part VIII Planning Application Report

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Client:
Louth County Council
Town Hall
Crowe Street
Dundalk
Co. Louth
A91 W20C

N52 Ardee Bypass

Part VIII Planning Application Report

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EXECUTIVE SUMMARY

The N52 National Secondary route is approximately 174 km in length, running from the junction of the N2 in Ardee, through the counties of Louth, Meath, Westmeath, Offaly and Tipperary to its termination at Junction 26 on the M7 at Nenagh. The N52 is a major northeast – southwest strategic link, providing a direct route from the north-east of the country and beyond to Belfast, to the south-west of the country.

The traffic volumes currently experienced cause significant congestion in the centre of Ardee. This leads to a reduction in operational capacity of the N2, reduced operating speeds, increased journey times and reduced journey time reliability. The sub-standard nature of the N52, with a cross-section below that of a Type 3 Single Carriageway already impacts on the average journey times and this is expected to deteriorate further as traffic volumes increase.

The sub-standard nature of the N52 is further highlighted in the accident statistics, which shows that the collision rate is approximately 84% higher than the national average and a TII collision rate of twice above average. The N2 through the centre of Ardee also consistently has a collision rate of twice above the average.

The N52 Ardee Bypass, hereafter referred to as the 'proposed development' will comprise the realignment of approximately 4.5km of the existing N52 to the west of Ardee. The proposed development includes the provision of 4 new junctions, a staggered T-Junction of the Silverhill Road, providing access to the Silverhill Road east and west of the proposed development, a staggered junction on Townparks Road, providing access to Townpark Road east and west of the proposed development, a T-Junction on Mullanstown Road to the north, providing access to the proposed development. All T junctions have a ghost island right turn facility on the proposed N52. The proposed development terminates at a multi-lane roundabout on the N2 north of Ardee. A new single lane entry roundabout on the existing N52 at the junction with the realigned Silverhill Road will also be provided. Where the proposed development traverses the River Dee and River Garra, 2 new bridges will be constructed spanning each river, both with a span of approximately 30m.

The proposed development includes the provision of pedestrian and cycle facilities in the eastern verge between the Silverhill and Mullanstown Roads, including connections and crossing points at each of the roads crossed to maintain connectivity for vulnerable road users. Additional pedestrian and cycle facilities will also be provided at the southern tie-in of the proposed development, providing a connection to the stopped-up section of the existing N52 at Burley Bridge and in the northern verge of the realigned Silverhill Road, connecting the proposed development back to the existing N52.

This report summarises the Option Selection Constraints Study, including the natural constraints and artificial constraints identified within the study area, and how these constraints were considered when selecting the preferred route for the proposed development. This report also provides a summary of the submissions received during the public consultation process before providing a detailed description of the proposed development, and the associated construction methodology. Traffic and transport modelling was also undertaken to assess the impact of the proposed development in traffic movements, journey time and congestion.

An Appropriate Assessment (AA) screening and Environmental Impact Assessment (EIA) screening were completed for the proposed development. An Bord Pleanála as the competent authority made a determination on the 19th October 2021 that it considered the proposed development is:

- Not likely to have significant effects on the environment and an Environmental Impact Assessment Report (EIAR) is not required;
- Not likely to have significant effect on Dundalk Bay SAC, Dundalk Bay SPA, Stabannan-Braganstown SPA or any other European site, and a Natura Impact Statement is not required.

This Part VIII Report has been prepared to provide a description of the nature and extent of the proposed development, and to assess and consider any potential environmental effects that may arise as a result of the proposed development. An environmental assessment has been undertaken across a range of environmental topics including

- Population and Human Health;
- Biodiversity;
- Soils, Geology, and Hydrogeology;
- Hydrology;
- Landscape and Visual;
- Noise and Vibration;
- Air Quality and Climate;
- Cultural Heritage; and
- Material Assets and Land.

A summary of the likely environmental effects and recommended mitigation measures are detailed at the end of each environmental topic addressed in Section 4 of this report. An Outline Construction Environmental Management Plan has been prepared and appended to this report, which the successful contractor will have to expand and comply with in agreement with Louth County Council prior to construction works commencing.

The environmental assessment found that there will be no likely significant adverse environmental effects as a result of the proposed development.

1. INTRODUCTION

Roughan & O'Donovan Consulting Engineers (ROD) were commissioned by Louth County Council (LCC) to undertake a detailed review of previous design for the N52 Ardee Bypass and develop an alternative design where necessary. This design review process has resulted in changes to the junction arrangements for the N52 Ardee Bypass. As part of this, ROD has prepared this Part VIII Planning Report to support the Part VIII Planning Application for the whole of the revised N52 Ardee Bypass described in Section 2.1 below.

The planning for the N52 Ardee Bypass (hereafter referred to as the 'proposed development') is undertaken in accordance with the legislative requirement under Section 179 of the Planning & Development Act, 2000, as amended and the Planning and Development Regulations 2001, as amended. A Part VIII procedure is required for specific developments by, on behalf of, or in partnership with local authorities.

The purpose of this Part VIII Planning Application Report is to report on the identified environmental effects from the proposed development that are likely to occur during the construction and operational phases and ensure mitigation measures, as appropriate will be put in place during both construction and operation of the proposed development.

A separate Appropriate Assessment (AA) Screening Report has been prepared for the proposed development, which concluded that the proposed development either individually or in combination with other plans or projects, will not give rise to any likely significant effects on Qualifying Interests of European Sites or their Conservation Objectives, in view of best scientific knowledge. Having considered the AA Screening Report, An Bord Pleanála determined that it is considered reasonable to conclude that on the basis of the information available, which is considered adequate, to issue a screening determination that the proposed development, either individually or in combination with other plans or projects, would not be likely to have a significant effect on the Dundalk Bay Special Area of Conservation (Site Code: 000455), Dundalk Bay Special Protection Area (Site Code: 004026) or Stabannan-Braganstown Special Protection Area (Site Code: 004091), or any other European Sites, in view of the conservation objectives of these Sites and that a Stage 2 appropriate assessment and the submission of a Natura Impact Statement for the proposed development is not, therefore, required.

A separate Environmental Impact Assessment (EIA) Screening Report has also been prepared which concluded that the proposed development does not trigger the threshold for mandatory EIA as set out in the Roads Act, 1993 (as amended) and / or in the Road Regulations of 1994. Having been considered and assessed using the appropriate criteria, An Bord Pleanála concluded that the proposed development would not be likely to have significant effects on the environment and that the submission of an Environmental Impact Assessment Report is not therefore required.

1.1 Project Background

The N52 National Secondary route is approximately 174 km in length, running from the junction of the N2 in Ardee, through the counties of Louth, Meath, Westmeath, Offaly and Tipperary to its termination at Junction 26 on the M7 at Nenagh. The N52 is a major northeast – southwest strategic link, providing a direct route from the north east of the country and beyond to Belfast, to the south west of the country. The N52 also provides a direct connection between the European TEN-T road network, namely the M1, N2, N3, N4 (and N5 via the N4), M6 and M7. The N52 directly links the regional

centres of Dundalk (via the N33 and M1) and Athlone (via the M6), whilst providing improved accessibility to Limerick City (via the M7).

The N52 commences in the centre of Ardee, resulting in high volumes of traffic in the town centre. The need for an N52 bypass of the town is outlined in national, regional and local policy and has been progressed by LCC over a number of years. In 1999, LCC and the National Roads Authority (NRA; now TII) first identified the need for the project. In 2001, approval for the project was received under the Part X process. In 2005, an amendment to the alignment of the then proposed bypass resulted in submission of a revised planning application under the Part 8 process. The Part 8 application was approved by LCC in July 2005, with the associated Compulsory Purchase Order (CPO) confirmed by An Bord Pleanála in September 2006.

Due to funding constraints associated with the economic recession, the project was not able to progress to construction. Following the reactivation of the scheme in 2018, technical advisors carried out the detailed design of the project and fencing was erected in advance of the main construction contract. At this point, a number of concerns regarding the project design were raised by members of the local community, primarily in relation to the creation of two cul-de-sacs and potential impacts arising in terms of access.

Accordingly, LCC decided to undertake a detailed review of the project, and establish whether any design changes were required. ROD were appointed to undertake a detailed review of the scheme and develop an alternative design where necessary. This process has resulted in changes to the proposed junction arrangements. This revised proposal for the N52 Ardee Bypass is the subject of this Part VIII Planning Report.

1.2 Development Overview

The proposed development comprises a bypass of Ardee town in Co. Louth. This bypass will be achieved through the realignment of approximately 4.5km of the existing N52 to the west of Ardee as shown in drawing N52A-ROD-EAC-SW_AE-DR-EN-300001 in Appendix A. The proposal also includes the provision of new pedestrian and cycle infrastructure along sections of the realigned road, four new junctions where the new road intersects existing side roads, two new bridges crossing of the Rivers Dee and Garra, and all ancillary works, as detailed further in Section 3, below.

1.3 Need for the Proposed Development

The traffic volumes currently experienced cause significant congestion in the centre of Ardee. This leads to a reduction in operational capacity of the N2, reduced operating speeds, increased journey times and reduced journey time reliability.

The sub-standard nature of the N52 within the study area is highlighted as being deficient, with the cross-section below that of a Type 3 Single Carriageway. This reduced cross-section, with the current traffic volumes already impacts on the average journey times and this is expected to deteriorate further as traffic volumes increase.

The sub-standard nature of the N52 is further highlighted in the accident statistics, which show that the collision rate for this section of the N52 is 0.392 collisions per million vehicle kilometres, which is approximately 84% higher than the national average of 0.213 per million kilometres of travel. This is also reflected in the TII collision rates, which highlights that most sections of the N52 have had a collision rate of twice above average and that the N2 through the centre of Ardee is consistently ranked as twice above the average collision rate.

During the 8-year period between 2008 to 2016, there have been 37 collisions, which has resulted in 1 fatality, 5 serious injuries and 44 minor injuries. 37.8% of these collisions have involved vulnerable road users, with the fatality also the result of a collision with a pedestrian.

The need for the proposed development is consistent with the objectives of a number of European, national, regional and local planning and development policies. The review of European, national, regional and local planning policy documents presented in the following sections will highlight the need to improve this section of the N52, in order to improve accessibility and connectivity to the north-west, improve road safety and to promote sustainable economic development in the region.

European Policy Context

- Trans-European Transport Network (TEN-T)
- EU Cycling Strategy (2017)

National Policy Context

- Project Ireland 2040
- National Planning Framework to 2040
- National Development Plan 2021-2030
- Smarter Travel – A Sustainable Transport Future
- National Cycle Policy Framework 2009 - 2020
- Investing in Our Transport Future – Strategic Investment Framework for Land Transport (2015)
- Road Safety Authority Road Safety Strategy 2013 – 2020
- National Secondary Roads Needs Study – East (2011)
- Climate Action Plan 2021

Regional Policy Context

- Eastern & Midland Regional Spatial and Economic Strategy 2019 – 2031

Local Policy Context

- Louth County Development Plan 2021-2027
- Ardee Local Area Plan 2010 – 2016

1.3.1 European Policy

Trans-European Transport Network (TEN-T)

On the 11th of December 2013 Regulation (EU) No. 1315/2013 came into effect. This defines and provides legal guidance for the provision of the Trans-European Transport Network (TEN-T). The TEN-T policy is the infrastructure policy in Europe in relation to transport.

The TEN-T consists of two planning layers, namely the Core and Comprehensive transport networks. The Core network will form the backbone for transportation in Europe's Single Market. Its implementation will be progressed by the setting up of 9 major transport corridors that will bring together Member States and stakeholders. By 2030 it will remove bottlenecks, upgrade infrastructure and streamline cross border transport operations for passengers and businesses throughout the EU.

The new TEN-T Core network will be supported by a Comprehensive network of routes, feeding into the Core network at regional and national level. The target for completion of the Comprehensive network is 2050. The aim is to ensure that progressively, throughout the entire EU, the TEN-T will contribute to enhancing internal markets, strengthening territorial, economic and social cohesion and reducing greenhouse gas emissions.

The N52 national secondary route connects directly to the N2 which forms part of the TEN-T comprehensive road network and indirectly, via the N2 to the N33 which connects to the Core Network of the M1. Figure 1-1, overleaf, shows the extent of both the Core and Comprehensive transport networks in relation to roads, ports and airports within Ireland.



Figure 1-1 TEN-T Network

EU Cycling Strategy (2017)

The EU Cycling Strategy *Recommendations for Delivering Green Growth and an Effective Mobility System in 2030* consolidates a systematic review of all policies related to cycling, reviewing the current state of cycling in the European Union and providing a cycling implementation plan including recommendations addressed to the European level, complemented by recommendations to the national and regional/local level.



These regional and local recommendations include:

- Develop and maintain regional and local cycle route networks;
- Develop safe cycle routes to schools, city centres and business areas;
- Segregate cyclists from other traffic where there is high speed/high volume motorised traffic, or otherwise create safe conditions on roads where cyclists mix with motorised vehicles;
- Develop and maintain national cycle route networks;
- Develop and maintain regional and local cycle route networks.

In achieving a shift in mobility culture, the strategy requires EU cities to convince policymakers to support cycling; encourage people to cycle more; and to facilitate the cooperation amongst road users for safer cycling.

The strategy includes four core objectives for the timeframe of the document:

- Grow cycle use by 50% at an average across the EU;
- Halve rates for killed and seriously injured cyclists (in km cycled);
- Invest €3 billion in cycling in the period 2021 – 2027, and €6 billion from 2028 – 2034; and
- At a qualitative level, it is strongly advised that cycling is treated as an equal partner in the mobility system.

The proposed development will develop a local cycle route network by providing segregated cyclist facilities along the proposed bypass with connections to the existing Silverhill Road, Townparks Road and Mullanstown Road. This will maintain access across the stopped up roads for pedestrians and cyclists and create local route networks which may encourage locals to cycle more.

1.3.2 National Policy

Project Ireland 2040

Project Ireland 2040 was launched by the Government in February 2018 as the overarching policy for spatial planning and development in Ireland during the period 2018 – 2040. It is comprised of two major policy documents, the National Planning Framework to 2040 (NPF) and the National Development Plan 2021 – 2030 (NDP). The NPF presents a broad national-level policy to guide strategic planning and development across Ireland, while the NDP sets out the 10-year public capital investment strategy required to support its implementation.

National Planning Framework to 2040

The overarching purpose of the NPF is “to enable all parts of Ireland, whether rural or urban, to successfully accommodate growth and change, by facilitating a shift towards Ireland’s regions and cities other than Dublin, while also recognising Dublin’s ongoing key role” (p. 20). It is the Government’s high-level strategic plan for shaping the future growth and development of Ireland out to the year 2040. The ambition of the NPF is to “to create a single vision, a shared set of goals for every community across the country” by achieving a number of goals. These goals are expressed in this Framework as ten National Strategic Outcomes (NSOs), as illustrated in Figure 1-2.

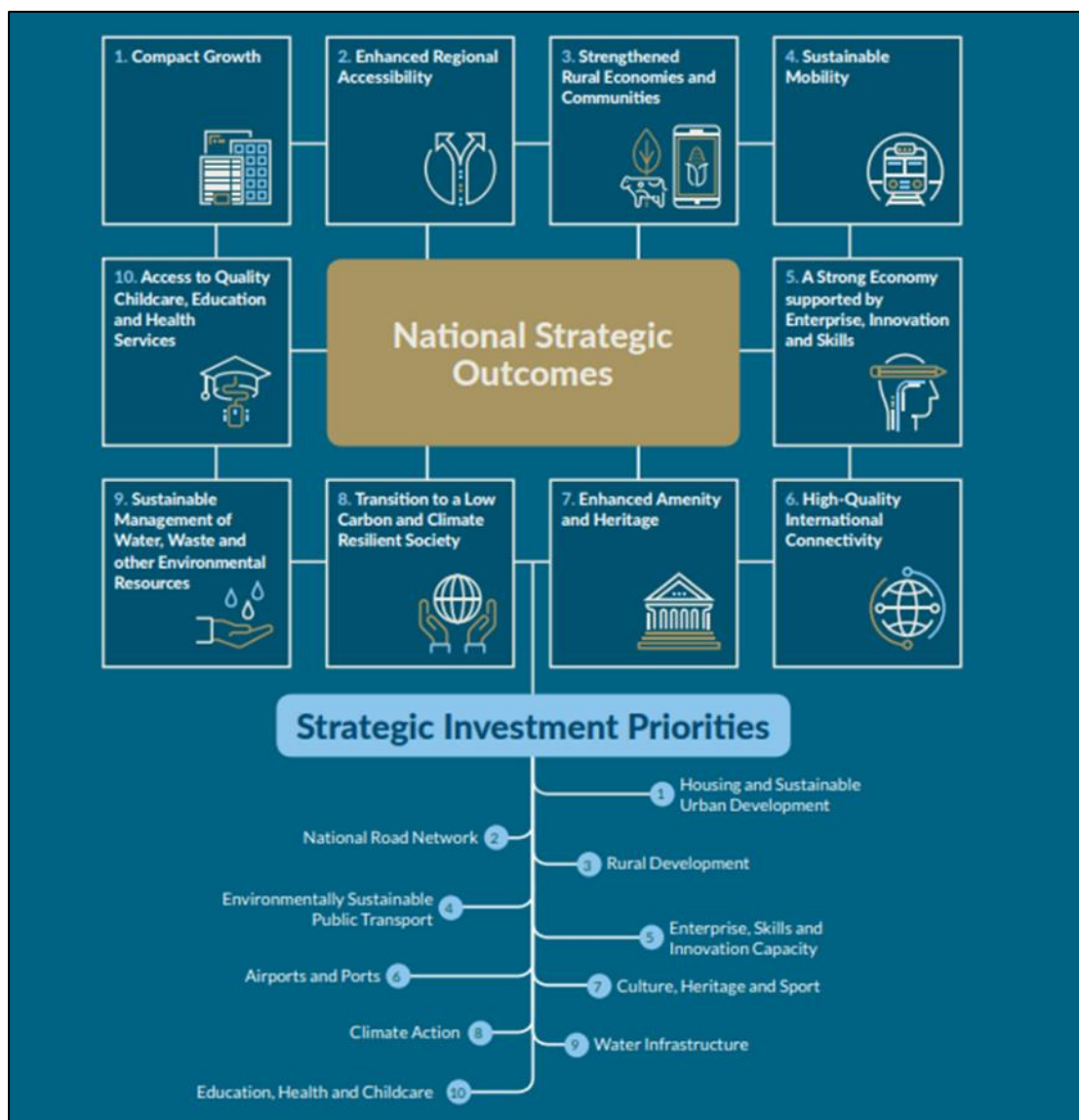
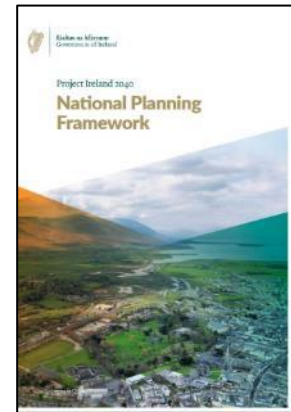


Figure 1-2 NSOs and Strategic Investment Priorities of Project Ireland 2040 (NPF).
Source: National Planning Framework (2018)

With a view to realising these NSOs, a suite of National Policy Objectives (NPOs) are set out. The proposed development is discussed in relation to the relevant NSOs and NPOs in the following paragraphs.

NSO 1: Compact Growth

The NPF Compact Growth NSO 1 aims to promote residential development within existing built-up areas of cities, towns and villages, ensuring that these urban centres are viable attractive alternatives for people to discourage urban sprawl. Along with infill development, integrated transport and promoting regeneration and revitalisation of urban areas, pursuing a compact growth policy at national, regional and local level will secure a more sustainable future for our settlements and for our communities.

The N52 is a major north-east – south-west strategic link, providing a direct route from the north-east of the country and beyond to Belfast, to the south west of the country as far as Junction 26 on the M7 at Nenagh. It joins the N2 in Ardee Town providing a link to the regional centre of Dundalk via the N33 and M1. Ardee is subject to high numbers of traffic on a daily basis due to these main connector routes travelling through the town centre. The provision of the proposed road development will remove this through traffic from the town centre, which causes congestion on a daily basis, regenerating the town centre and making it a more attractive place to live.

NSO 2: Enhanced Regional Accessibility

In terms of Enhanced Regional Accessibility, the aim of the NPF is to enhance connectivity between centres of population of scale to support the objectives of the NPF. Better accessibility between the four cities and to the Northern and Western regions will enable unrealised potential and to prepare for the potential impacts of Brexit.

With regard to inter-urban roads, the following NPF objectives apply to the proposed road development:

- Maintaining the strategic capacity and safety of the national roads network including planning for future capacity enhancements;
- Improving average journey times targeting an average inter-urban speed of 90kph; and
- Advancing orbital traffic management solutions.

While Co. Louth is located in the Eastern and Midland Regional Assembly area, the North-East is a functional area that comprises part of two Regional Assembly areas that also includes most of Co. Cavan and Co. Monaghan in the Northern and Western Region. The key driver for this regional area is the Dublin-Belfast cross-border network, focused on Drogheda, Dundalk and Newry. The significant influence of Dublin and the cross-border network extends to the county towns and other settlements within the north-eastern regional area as well as to parts of Co. Meath. Development must be supported by enhanced connectivity, quality of life, strengthened urban cores and more compact housing in urban settlements. This is to protect and manage the strategic capacity of transport infrastructure and to ensure that the distinctiveness of settlements and rural areas is maintained. NPO 2c states that *“Accessibility from the north-west of Ireland and between centres of scale separate from Dublin will be significantly improved, focused on cities and larger regionally distributed centres and on key east-west and north-south routes”*.

The proposed development will improve access to the Dublin – Belfast Economic Corridor from Limerick City and the Athlone Regional Centre, and to the north west, via the N2 and A5. It also links with the EU TEN-T Core and Comprehensive Networks serving other cities and regional centres. By improving connectivity across these key routes, the N52 Ardee Bypass project will contribute to enhanced regional accessibility

and will promote high-quality international connectivity, in accordance with the NSOs of the NPF.

NSO 3: Strengthened Rural Economies and Communities

Ireland's rural areas have faced many challenges in recent decades, including poor connectivity, emigration and loss of traditional industries and employment. Building on Government policy and the 2017 Action Plan for Rural Development, the NPF will place a major focus on rural areas in relation to, and not limited to the following:

- Planning for the future growth and development of rural areas, including addressing decline, with a special focus on activating the potential for the renewal and development of smaller towns and villages;
- Better co-ordination of existing investment programmes dealing with social inclusion, rural development and town and village renewal; and
- Addressing connectivity gaps.

The NPF emphasises that rural communities have a strong interrelationship between neighbouring towns and villages, often beyond county or regional boundaries. For instance, rural settlements of Silverhill, Townparks and Mullanstown served by the existing N61 interact with towns of Ardee, Dundalk, Dublin and Belfast in the Eastern and Northern Regions respectively through connectivity for work and goods.

The NPF's NPOs 15 and 17 set out the Government's policy in relation to future growth and development of rural areas:

- **NPO 15:** *"Support the sustainable development of rural areas by encouraging growth and arresting decline in areas that have experienced low population growth or decline in recent decades and by managing the growth of areas that are under strong urban influence to avoid over-development, while sustaining vibrant rural communities".*
- **NPO 17:** *"Enhance, integrate and protect the special physical, social, economic and cultural value of built heritage assets through appropriate and sensitive use now and for future generations."*

The proposed development is located in rural area of County Louth and will bypass the town of Ardee. By removing heavy traffic from the centre of Ardee, the proposed development will provide an opportunity to revitalise the distinct character and built heritage of the town and promote its 'sense of place'.

The proposed development has integrated walking and cycling infrastructure within the design to preserve walking and cycling connections between the urban centre of Ardee town and the more rural communities of Silverhill, Townparks and Mullanstown and to provide new connections and circular routes between these communities. It will create an opportunity for the locals to travel to school and work within Ardee Town on foot or bicycle and will provide a new link between these townlands to enable families visit relatives and to access amenities and sportsgrounds within the community.

NSO 4: Sustainable Mobility

In relation to NSO 4, Sustainable Mobility, it is an objective of the NPF to *"Develop a comprehensive network of safe cycling routes in metropolitan areas to address travel needs and to provide similar facilities in towns and villages where appropriate"*. The need for investment in pedestrian and cycling infrastructure is reflected in the following NPOs:

- **NPO 27:** *“Ensure the integration of safe and convenient alternatives to the car into the design of our communities, by prioritising walking and cycling accessibility to both existing and proposed developments, and integrating physical activity facilities for all ages.”*
- **NPO 64:** *“Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy-efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions”.*

By providing new dedicated pedestrian and cyclist infrastructure along its route, the proposed development facilitates the use of sustainable, zero-carbon personal mobility options (i.e. walking and cycling) among local residents. It will allow those travelling between Ardee town and the rural hinterland to the west and north-west to utilise safe, sustainable and active modes of personal mobility. Furthermore, by reducing traffic congestion in Ardee town, the proposed development is likely to make the town centre and immediate environs a safer, healthier and more attractive environment for walkers and cyclists.

NSO 5: A Strong Economy supported by Enterprise, Innovation and Skills

The NPF states that the achievement of this NSO *“will depend on creating places that can foster enterprise and innovation and attract investment and talent... Delivering this outcome will require the coordination of growth and place making with investment in world class infrastructure...”*. The need for positive ‘place making’ in the rural environment is reflected in NPO 14, which aims to *“Protect and promote the sense of place and culture and the quality, character and distinctiveness of the Irish rural landscape that make Ireland’s rural areas authentic and attractive places to live, work and visit”*. The proposed development may be expected to contribute to positive place making in Ardee town. By reducing congestion, improving air quality and reducing traffic-related noise, the bypass will make Ardee town a healthier and more attractive town environment in which to live and do business.

NSO 6: High-Quality International Connectivity

The NPF states that the provision of high-quality international connectivity *“is crucial for overall international competitiveness and addressing opportunities and challenges from Brexit”*. This NSO and its associated NPOs focus on improving international connectivity via improvement of airport and port infrastructure, rather than national road transport infrastructure *per se*. However, the proposed development improves connectivity to the M1 Drogheda-Dundalk-Newry corridor from the south-west, in particular the regional centre of Athlone and Limerick City, whilst also alleviating congestion on the N2 through Ardee, also providing greater and more reliable connectivity from the North-West to Dublin Airport and Dublin Port.

NSO 7: Enhanced Amenity and Heritage

This NSO aims to *“ensure that our cities, towns and villages are attractive and can offer a good quality of life”*. It aims to encourage *“greater city and town centre living, enhanced recreational spaces and attractiveness from a cultural, tourism and promotional perspective”*. It intends to do so largely through setting out objectives in relation to investment in well-designed public realm and recreational infrastructure. NPO 18a, for instance, aims to *“Support the proportionate growth of and appropriately designed development in rural towns that will contribute to their regeneration and renewal, including interventions in the public realm, the provision of amenities, the*

acquisition of sites and the provision of services". The need for improved walking and cycling routes is also explicitly stated in relation to this NSO. During the operational phase, the proposed development will reduce congestion and air pollution in historic Ardee town, creating a healthier and more attractive town environment, and thereby improving the quality of life of residents and workers in the town. By doing so it will also promote a greater appreciation of the town's significant, historic built heritage.

NSO 8: Transition to a Low Carbon and Climate Resilient Society

The NPF aims to contribute to a transition to a low-carbon and climate resilient society, largely through investment in renewable energy and the necessary new energy systems to support it at scale. While the proposed development does not relate to renewable energy, it can contribute to a certain degree of decarbonisation in a number of ways. By reducing congestion in Ardee town, the proposed development will reduce the need for variable speeds, braking and idling of vehicles with internal combustion engines in the town centre, which is expected to reduce net vehicular emissions of those travelling along the route. It will also provide new pedestrian and cyclist infrastructure along the route, facilitating and promoting the use of zero-carbon modes of personal mobility among local residents.

NSO 9: Sustainable Management of Water, Waste and other Environmental Resources

The NPF highlights that *"environmental resources such as our water sources [...] are critical to our environmental and economic well-being into the future"*. NPO 60 states the aim to *"Conserve and enhance the rich qualities of natural and cultural heritage of Ireland in a manner appropriate to their significance"*. Water resources management is a central topic under this NSO. The need for sustainable water resources management is reflected in a number of NPOs:

- **NPO 57:** *"Enhance water quality and resource management by:*
 - *Ensuring flood risk management informs place-making by avoiding inappropriate development in areas at risk of flooding in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities.*
 - *Ensuring that River Basin Management Plan objectives are fully considered throughout the physical planning process.*
 - *Integrating sustainable water management solutions, such as Sustainable Urban Drainage (SUDS), non-porous surfacing and green roofs, to create safe places."*
- **NPO 63:** *"Ensure the efficient and sustainable use and development of water resources and water services infrastructure in order to manage and conserve water resources in manner that supports a healthy society, economic development requirements and a cleaner environment."*

In relation to flood risk management, the NPF emphasises the *"particular importance"* of planning and development. A number of core objectives are set out in this respect, as follows:

- *"Avoiding inappropriate development in areas at risk of flooding;*
- *Avoiding new developments increasing flood risk elsewhere, including that which may arise from surface run off;*
- *Ensuring effective management of residual risks for development permitted in floodplains;*

- *Avoiding unnecessary restriction of national regional or local economic and social growth; and*
- *Improving the understanding of flood-risk and ensure flood risk management in accordance with best practice.”*

The proposed development passes through an area which experiences frequent flooding. As stated above, it is a core objective of the NPF that, where development is permitted in floodplains, it needs to be ensured that associated residual risks are managed effectively. In order to ensure sustainable management of the water resources and wetland habitats in the area, the proposed development will incorporate sustainable drainage systems (SuDS), including use of attenuation ponds, culverting of existing watercourses and use of impermeable geotextile barriers to prevent dewatering of adjacent lands. A Site Specific Flood Risk Assessment has been undertaken in respect of the proposed development, the results of which are discussed herein.

Under this NSO, the NPF also sets out the need to improve air quality and reduce noise in urban areas and towns:

- **NPO 64:** *“Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions.”*
- **NPO 65:** *“Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions.”*

By reducing congestion (and, thereby, vehicular emissions and noise) in Ardee town, the proposed development will contribute to the achievement of these NPOs, increasing amenity and providing a healthier environment for local resident, workers and visitors.

N50 10: Access to Quality Childcare, Education and Health Services

It is stated that *“Good access to a range of quality education and health services, relative to the scale of region, city, town, neighbourhood or community is a defining characteristic of attractive, successful and competitive places”*. The design of the proposed development maintains access across the wider area, for the rural communities to access Ardee, ensuring access is maintained to workplaces, childcare and healthcare facilities, and centres of education. By eliminating the bottleneck at Ardee town, the proposed bypass will also reduce journey times and accessibility for those travelling along the N52 and the N2 to educational, health and workplace facilities in Ardee and the surrounding towns, such as Dundalk.

National Development Plan 2021-2030

The National Development Plan (NDP) 2021 – 2030, is a ten-year strategy identifying priorities for public capital investment across all sectors, including Transport. The total investment is estimated at €165 billion over the next decade. The NDP has been designed to support the 10 NSOs in the NPF through its ten Strategic Investment Priorities (Figure 1-2, above).

Investment in national roads is identified as a strategic investment priority in relation to NSO 2, Enhanced Regional Accessibility. The NDP states that the roads network is “A key backbone for both sustainable mobility and private transport provision across the country”. It also states that “ensure a high degree of accessibility for all regions and urban areas, to other regional centres and to our cities, developing and supporting regional connectivity is also a focus with respect to many [National] roads’ projects”. The N52 Ardee Bypass was identified as part of the previous NDP 2018-2027 and is subsequently identified in the most recent NDP as a key project.

Under the revised NDP, the National Roads programme will continue to provide for improved connectivity across the years 2021-2030. The Department and Transport Infrastructure Ireland are working to continue to provide continued protection and renewal of the existing National Roads network as well as progressing new National Road projects which will improve compact growth and regional connectivity across the country.

Smarter Travel – A Sustainable Transport Future

Smarter Travel – A sustainable Transport Future is a sustainable transport policy for Ireland for the period 2009 – 2020. Delivering this policy is a key objective of Government because transport and travel trends are currently unsustainable.

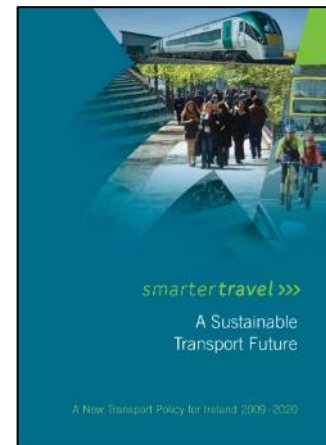
Despite investment in road infrastructure, congestion will get worse, transport emissions will continue to grow, economic competitiveness will suffer, and quality of life will decline unless more sustainable transport policies are adopted. This document outlines the Government’s vision for sustainability in transport by setting down key goals, which are to:

- Improve quality of life and accessibility to transport for all and, in particular, for people with reduced mobility and those who may experience isolation due to lack of transport;
- Improve economic competitiveness through maximising the efficiency of the transport system and alleviating congestion and infrastructural bottlenecks;
- Minimising the negative impacts of transport on the local and global environment through reducing localised air pollutants and greenhouse gas emissions;
- Reduce overall travel demand and commuting distances travelled by the private car; and
- Improve security of energy supply by reducing dependency on imported fossil fuels.

The policy recognises the importance of continued investment in transport to ensure an efficient economy and continued social development, but it also sets out the necessary steps to ensure that people choose more sustainable transport modes such as walking, cycling and public transport.

The policy contains 49 actions, which are grouped into essentially four overarching actions:

- *Actions to reduce distance travelled by private car and encourage smarter travel, including focusing population growth in areas of employment and to encourage*



people to live in close proximity to places of employment and the use of pricing mechanisms or fiscal measures to encourage behavioural change;

- *Actions aimed at ensuring that alternatives to the car are more widely available, mainly through a radically improved public transport service and through investment in cycling and walking;*
- *Actions aimed at improving the fuel efficiency of motorised transport through improved fleet structure, energy efficient driving and alternative technologies, and;*
- *Actions aimed at strengthening institutional arrangements to deliver the targets.*

In relation to roads, the policy proposed is to invest in roads that “*will remove bottlenecks, ease congestion and pressure in towns and villages, and provide the necessary infrastructure links to support the National Spatial Strategy*” (p. 51) (now superseded by the NPF). This is consistent with prioritised network improvements along the National Primary and Secondary Road Networks.

For bus transport providers, including the CIE Group and private operators, quality uncongested roads are an essential requirement. Investment in the road network is therefore a key ingredient in improved public transport in Ireland.

The project is in line with the goals of *Smarter Travel* in a number of ways:

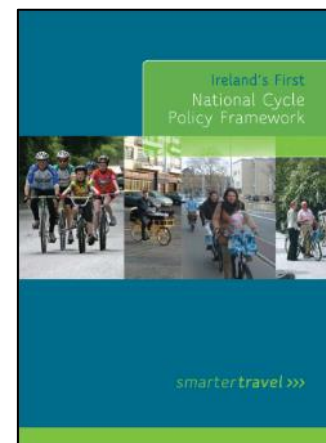
- The N52 Ardee Bypass will reduce traffic volumes in the centre of Ardee, thereby encouraging the use of non-motorised forms of transport and low carbon public transport options in the town.
- The project will include pedestrian and cycleways linking the local road network to the bypass and will provide for future linkages on these local roads into the centre of Ardee. The linkages being provided will also improve access to sporting facilities located on the western periphery of Ardee, such as Ardee Celtic Soccer club and Ardee Rugby club.
- By reducing congestion and associated environmental impacts (e.g. air pollution) in Ardee, the project is expected to improve the quality of life of inhabitants and workers in the town.

The project will remove an infrastructural bottleneck on the National Road Network, thereby enhancing connectivity and improving the efficiency of the road network.

National Cycle Policy Framework 2009 – 2020

This framework sets out the National Cycle policy under the Smarter Travel policy. The stated vision of the National Cycle Policy is to “create a strong cycling culture in Ireland”. The vision is not confined to urban areas, and it is stated that all cities, towns, villages, and rural areas will be bicycle friendly. It is an aspiration of this framework that, by 2020, 10% of all trips will be by bicycle. The development of a national network of both rural and urban cycle routes is a specific objective of the National Cycling Policy Framework.

The National Cycleway Policy Framework 2009-2020 has nineteen stated objectives to improve cycling provision within Ireland. The proposed development supports these objectives in its design. The incorporation of the cycle route as part of the proposed development will provide better connectivity between the rural



settlements of Silverhill, Townparks Road and Mullanstown Road to the town of Ardee and other local amenities and sports grounds, while promoting cycling as a recreational activity for locals.

Investing in Our Transport Future – Strategic Investment Framework for Land Transport (2015)

The Strategic Investment Framework for Land Transport (SIFLT) published by the Department of Transport, Tourism and Sport (DTTAS) outlines the key principles against which national and regional, comprehensive and single mode-based plans and programmes will be drawn up and assessed. While the framework does not set out a list of projects to be prioritised, the following three priorities are listed:

- Priority 1 – Achieve steady state maintenance;
- Priority 2 – Address urban congestion; and
- Priority 3 – Maximise the value of the road network.



In terms of Priority 2, the report states that “*priority is to address urban congestion and improve the efficiency and sustainability of the urban transport systems*”, while the provision of “*Improved and expanded walking and cycling infrastructure*” is outlined as a measure to be included.

The key principles for land transport investment are to:

- *Improve the quality of life of citizens and be consistent with environmental, climate and biodiversity objectives, imperatives and obligations, including those arising from the EU Habitats Directive;*
- *measures to address current and future urban congestion and to improve the efficiency and sustainability of urban transport, including walking and cycling infrastructure;*
- *investment should be targeted to maximise the contribution of the land transport networks by enhancing the efficiency of the existing network.*

It is also pointed out that “*In the case of roads, investment should provide access to poorly served regions, access for large-scale employment proposals, complete missing links or address critical safety issues*” (p. 28). It is stated that transport projects “*should maintain and improve the quality of life of citizens and be consistent with environmental, climate and biodiversity objectives, imperatives and obligations, including those arising from the EU Habitats Directive*” (p. 28).

The project is considered to be in accordance with the priorities and principles of the SIFLT in a number of respects, including that:

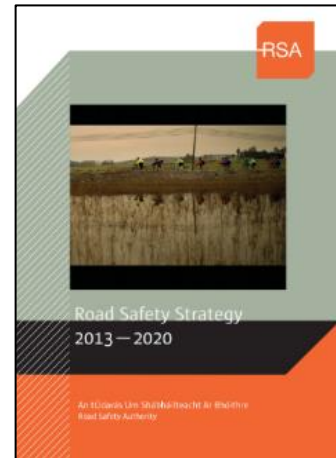
- It will reduce the existing environmental impacts associated with traffic congestion in the historic centre of Ardee, thereby improving the quality of life of inhabitants and workers.
- It has incorporated walking and cycling infrastructure into the design of the development with the aim of enhancing local connectivity and provide efficient modes of transport.
- As discussed above, it will improve accessibility to the Regional Centres of Dundalk and Athlone from both within the Midlands and Eastern Region and from the North-West Region in accordance with the NSOs of the NPF.

Allied with the fundamental elements of the proposed development to ensure safe use by pedestrians and cyclists, by alleviating congestion and reducing through-traffic in Ardee, it is expected that the project will also improve safety for road-users and pedestrians in the town.

Road Safety Authority Road Safety Strategy 2013 – 2020

The Road Safety Authority (RSA) Road Safety Strategy 2013 – 2020, sets out targets to be achieved in terms of road safety in Ireland as well as policy to achieve these targets. The primary target of this strategy is: *“A reduction of road collision fatalities on Irish roads to 25 per million population or less by 2020 is required to close the gap between Ireland and the safest countries. This means reducing deaths from 162 in 2012 to 124 or fewer by 2020”*.

The plan sets out strategies for engineering and infrastructure in terms of the benefits that they can have in terms of reducing collisions. The provision of the upgraded section of national road proposed by this project will support this RSA strategy. The strategy also targets a focus on serious injuries. *“In addition to continuing to reduce fatalities, a number of actions will be taken within the Strategy to refine the definition of a serious injury with a target for doing so. With a target of 124 fatalities by 2020, a realistic target for serious injuries should be in the region of 330 by 2020 or 61 per million population. Reduced fatalities and serious injuries will realise benefits for public health policy objectives, as well as reduced demands on the emergency services. A safer road environment will encourage more road users to walk and cycle, thus improving their wellbeing, reducing congestion and improving the environment. Better driving will reduce fuel costs and transport related emissions which will benefit everyone, especially those involved in business and industry”*.



The N52 Ardee Bypass will support this strategy by removing traffic from a legacy route, with its inherent safety issues that have resulted in an accident rate some 84% above the national average onto a new route designed to modern standards. In conjunction, the N52 Ardee Bypass will alleviate the congestion currently experienced on Ardee Main Street, diverting the traffic onto the proposed bypass. The provision of safe walking and cycling facilities along the proposed development and the incorporation of pedestrian and cyclist access from the bypass to the existing N52 and local roads will promote safe alternative routes to the private car.

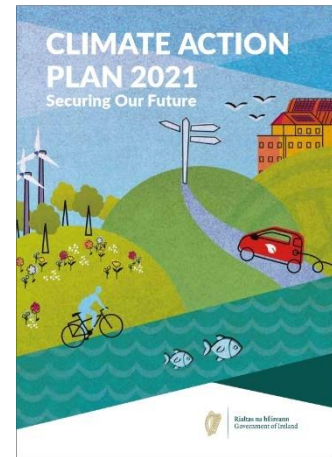
National Secondary Roads Needs Study – East (2011)

The National Roads Authority (now TII) commissioned the National Secondary Road Needs Study (NSRNS) in order to determine necessary upgrades to the National Secondary Road (NSR) network and identify a prioritised list of improvement schemes based on a multi criteria analysis. The National Secondary Road Needs Study (NSRNS) was published by the National Roads Authority in March 2011. The Study divides each NSR into a number of sections and uses a multi-criteria analysis to determine a comparative score for each route under consideration. This score is suggested as the basis for prioritisation of the projects.

The National Secondary Road Needs Study considers the N52 Ardee Bypass to be in place, as such the benefits of this project have already been considered in the context of the positive impact on Ardee. It should be noted that the adjacent Ardee to Kells section of the N52 is listed as a Priority 1 scheme, in need of upgrading.

Climate Action Plan 2021

The 'Climate Action Plan' (CAP), published in November 2021, outlines the most recent status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlines the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The CAP also details the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas.



Transport currently accounts for 20% of Ireland's GHG emissions and the CAP has set a transport sector reduction target of 42-50% in emissions by 2030. In order to achieve this, the CAP has set out *Measures to Deliver Targets* in relation to the targets set out in Section 15.2 for Transport, such as achieving 'an additional 500,000 daily public transport and active travel journeys'. One of the measures outlined to achieve transport targets is Sustainable Mobility, whereby people opt for walking, cycling or public transport instead of the private car. The CAP states that '*continued and enhanced investment in our walking, cycling and public transport infrastructure and services across the country is required on a scale not previously seen*' to achieve transport targets.

The plan outlines the aim to provide good public transport, cycling and walking infrastructure, so people are less reliant on their cars, and congestion can be reduced. The integration of pedestrian and cycle facilities as a key element of the proposed development will provide safe infrastructure for non-vehicular road users. The incorporation of accesses from stopped up roads will allow connectivity to be maintained for pedestrians and cyclists and may encourage a modal shift as it will be the most efficient method of travel. The removal of future congestion within Ardee town will also allow public transport to function reliably, with improved journey times and improved journey amenity. Public transport will operate more efficiently and will be more attractive to commuters, contributing to placemaking where communities can prosper. In this way, the proposed development supports the Climate Action Plan.

As part of the Climate Action and Low Carbon Development (Amendment) Act 2021, a carbon budget shall be proposed by the Advisory Council and approved by the Government for a period of five years, and for each subsequent period of five years. The Minister shall also prepare, within the limits of the carbon budget, the maximum amount of greenhouse gas emissions that are permitted in different sectors of the economy during a budget period. There will also be an annual update to the Climate Action Plan which will be consistent with the carbon budget programme and which will set out a roadmap of actions to include sector specific actions required to comply with the sectoral emission ceilings for the period of the plan.

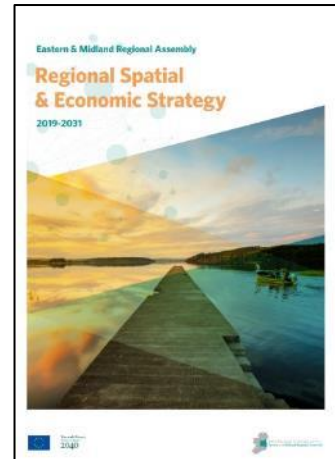
1.3.3 Regional Policy

Eastern & Midland Regional Spatial and Economic Strategy 2019 – 2031

There are three Regional Assemblies in Ireland – the Northern and Western Regional Assembly, Southern Regional Assembly, and Eastern and Midland Regional Assembly. These Regional Authorities are responsible for the development of the respective Regional Spatial and Economic Strategies (RSEs), and the Metropolitan Area Strategic Plans (MASPs) for Ireland's five cities – namely Dublin, Cork, Galway,

Limerick and Waterford. These policy documents effectively implement the vision of the NPF at the regional level.

The Eastern and Midland Region takes in Counties Dublin, Louth, Meath, Kildare, Wicklow, Longford, Westmeath, Offaly and Laois, covering almost 14,500km² and over 2.3 million inhabitants – the smallest region by area but the largest in terms of population. The Regional Assembly, established in January 2015 following the dissolution of the Border, Dublin, Midland and Mid-East Regional Authorities, comprises of elected members from the twelve constituent Local Authorities, namely Dún Laoghaire–Rathdown, Fingal, Kildare, Laois, Longford, Louth, Meath, Offaly, South Dublin, Westmeath, Wicklow and Dublin City. The RSES was published in June 2019, presenting the following vision for the region:



“To create a sustainable and competitive [Eastern and Midland] Region that supports the health and wellbeing of our people and places, from urban to rural, with access to quality housing, travel and employment opportunities for all.” (p. 6)

Ardee is categorised as a town within County Louth and is strategically located adjacent to the M1 and at the intersection of the N2, N33 and N52, close to the Regional Centre of Dundalk.

Regional Policy Objective (RPO) 8.10 states *“The RSES supports appraisal and or delivery of the road projects set out in Table 8.4 subject to the outcome of appropriate environmental assessment and the planning process.”* Table 8.4 highlights the N52 Ardee Bypass as one of the road projects for the region.

With regards to cyclist provision, the RSES promotes the development of green infrastructure including greenways, blueways and peatways noting that they can provide a number of important functions including ecological corridors, local amenity, climate change adaptation and mitigation, and mentally restorative environment. The incorporation of cycle and pedestrian facilities will enable access from the proposed development onto local roads and will provide connectivity between rural and urban locations.

The N52 Ardee Bypass is therefore in accordance with the policies and objectives of the RSES.

1.3.4 Local Policy

Louth County Development Plan 2021 – 2027

The Louth County Development Plan 2021-2027 outlines a number of objectives regarding transport infrastructure. As set out under Policy Objective MOV1, it is LCC’s aim to:

“To work with national transport agencies in supporting the delivery of a high quality, climate resilient and sustainable transport network in the County.”

The Plan outlines that *“there is a well-developed network of roads in Louth that are a fundamental part of the economic competitiveness of the County facilitating the efficient movement of goods and people. The strategic location of the County along the Dublin-Belfast Economic Corridor means the County benefits from access to the motorway network in addition to national primary and secondary routes, which provide connectivity with Dublin, Belfast and key service centres in the region and the border*

area". The N52 Dundalk-Nenagh (via Ardee and Kells) along with other national routes, is noted to provide an important level of connectivity between the Regional Growth centres of Drogheda and Dundalk and key service centres in the wider region and beyond.

Whilst this Plan promotes and supports a modal shift to more sustainable modes of transport it is also recognised that improvements to the existing road infrastructure in the County are required in order to improve connectivity and support more balanced economic development. This will allow settlements to fulfil their economic potential. The N52 Ardee Bypass is listed as a National Road Project in Table 7.7 of the CDP, the progression of which is supported by the plan. Section 7.9.2 N52 Ardee Bypass of the CDP states the following:

"The need for a bypass of Ardee has been identified and included in national, regional and local policy for a number of years. However, due to funding constraints the project was not progressed. The scheme was reactivated in 2018 with a detailed review ongoing at the time of the writing. The scheme has been included in the NDP. The RSES also recognises the benefits of the project and includes support for its progression and delivery in Regional Policy Objective 8.10.

Policy Objective MOV 51: To support the progression of the N52 Ardee Bypass and to continue to work closely with Transport Infrastructure Ireland and Meath County Council and other stakeholders in the delivery of this project." (p7-29)

The plan has set out several strategic settlement policy objectives for Ardee, including the following objective related to transport:

"Policy Objective SS 41: To secure the construction, pending approval by Transport Infrastructure Ireland, of the N2 bypass and the N52 bypass and preserve free of development their proposed routes."

The proposed development supports the CDP Policy Objectives by delivering the N52 bypass.

Section 7.6.11 Cycling and Walking outlines the support for the development of walking and cycling infrastructure throughout the County to encourage a modal shift away from a dependence on the private car. The following Policy Objectives support the development of pedestrian and cycleways as providing connectivity and a modal shift:

"Policy Objective MOV 25: To support the retrospective provision of walking and cycling infrastructure in existing settlements, where feasible, to achieve growth in sustainable mobility and strengthen and improve the walking and cycling network"

"Policy Objective MOV 26 "To improve pedestrian and cycle connectivity to schools, third level colleges, major employment areas, bus and rail stations, and other public transport hubs."

"Policy Objective MOV 28: "To promote walking and cycling as a safe, convenient, healthy, efficient, and environmentally friendly mode of transport for all age groups."

The proposed development will support the above listed Policy Objectives in providing new, safe infrastructure for pedestrians and cyclists along the proposed bypass to ensure connectivity east and west of the proposed development.

Ardee Local Area Plan 2010 – 2016

The Ardee Local Area Plan presented a strategy for spatial planning and development in the town of Ardee, Co. Louth between 2010 and 2016. A new LAP for the town will be prepared during the lifetime of the Louth County Development Plan 2021-2027, however in the absence of a new plan to date, the 2010 plan has been reviewed herein. The town of Ardee is described in the Plan as follows:

“Ardee is the principal town and population centre for mid-Louth. It is a well established and a successful local service, shopping and employment centre for both the town’s population and an extensive hinterland, serving much of mid-Louth and neighbouring areas of County Meath... Ardee has expanded significantly over recent years, from a population of 3,568 in 2002 to an estimated population of 4,500 in 2010. This has been largely driven by car-borne residential commuter development, given the easy accessibility of Ardee to Dublin, Drogheda and Dundalk by road... The deteriorating economic climate that has emerged from 2008 onwards has had serious implications for employment in Ardee... Vacant units, together with traffic congestion have combined to undermine the appeal of the town centre. If Ardee is to remain a successful centre for residents, shoppers, businesses and visitors alike it is important that these issues are addressed.” (p. 1)

The Plan also describes Ardee’s strategic location in terms of the wider National Roads Network and the resultant implications for traffic volumes in the town centre:

“Ardee town is strategically located on the intersection of the N2 national primary Dublin – Derry Route and the N52 national secondary Ardee-Nenagh route. The N33 provides direct access from Ardee to the M1 motorway and national motorway network. The N2 Dublin to Derry national route passes through the town centre and given the volumes of traffic, this causes serious traffic congestion.” (p. 21)

Chapter 4 of the Ardee Local Area Plan (LAP) outlines objectives in relation to transport infrastructure. Policy INF 12 states the need “To secure the construction, pending approval by the [NRA], of the N2 bypass and the N52 bypass and preserve free of development their proposed routes” (p. 21). Regarding the bypasses, the LAP states that:

“The council is proposing to construct by-passes on the N52 and N2 to the east and west of the town. When completed, the traffic congestion in Ardee town centre will be significantly improved. Lands have been purchased to facilitate the construction of the N52 section and this section is likely to proceed during the period of this Plan.” (p. 21).

“Traffic congestion in Ardee town centre is a major problem caused by the volumes of traffic passing through the town along the N2 Derry to Dublin National Primary route and the N52 Dundalk to Nenagh national secondary route. Traffic management plans, including pay parking, have improved the situation. When by-passes on the N2 and N52 are constructed, pending approval by the National Roads Authority, congestion will be greatly alleviated.” (p. 23)

1.3.5 Conclusion

The review of European, national, regional and local planning policy documents has outlined in this section, the need to improve this section of the N52 National Secondary Road in order improve accessibility and connectivity to the north-west, improve road safety and to promote sustainable economic development in the region.

2. ALTERNATIVES CONSIDERED

2.1 Introduction

2.1.1 Project Appraisal Guidelines

In accordance with the TII Project Appraisal Guidelines which implement the Department of Transport, Tourism and Sports' *Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*, the following alternatives were considered in the development of the proposed Ardee Bypass:

- Base Case:
 - Do-Nothing or Do-Minimum
- Do-Something including:
 - Alternative Modes
 - Management Options
 - Investment Options

2.2 Do Minimum Consideration

The 'Do-Minimum' consideration provides the baseline for establishing the economic, integration, safety, environmental and accessibility impacts of all options. The Do-Minimum in this scenario is the same as the Do-Nothing, which investigates the existing road infrastructure and its ability to meet future demands for traffic and safety without any upgrade works, other than routine maintenance.

The Do-Minimum alternative shall comprise an investigation of the existing road infrastructure and its ability to meet future demands for traffic and safety without any upgrade works, other than routine maintenance. Investigation of the Do-Minimum alternative should include an examination of existing policy on improvements to certain National Routes, safety and levels of service.

The 'Base Case' represents the minimum intervention which acts as the basis against which alternative options are appraised. The 'Do-Minimum' option involves consideration of any planned improvements to the surrounding transport network that will impact on the corridor under consideration.

2.2.1 Do-Minimum Consideration for Ardee Town Centre

The Do-Minimum scenario for Ardee town assumes that the town centre is not to be bypassed, and the current level of traffic passing through the town centre from either the N2 or N52 links remain.

The existing N2 through the centre of Ardee provides a wide street approximately 18m in width. There is both parallel and angled parking on the road, reducing the width of the carriageway to 11m where this is present on both sides of the road. The existing footpaths are relatively narrow at 2.0m to 3.0m in width, with shop fronts opening directly onto the footpaths.

There are a high number of direct accesses on the high street, accessing parking facilities of the shops and businesses fronting onto the main street.

The high degree of pedestrian activity, combined with the high traffic volumes, the narrow nature of the existing pedestrian facilities and the on-street parking leads to a high degree of conflict between pedestrians and vehicular traffic, as reflected in the accident statistics where a high proportion of the accidents involve pedestrians.



Figure 2-1 Ardee Main Street, zebra crossing and on-street parking

The junction between the N52 and N2 in the centre of Ardee, is particularly constrained in cross-section (on the N52) resulting in heavy goods vehicles having to utilise the opposite side of the road on the N2 to be able to negotiate the corner. This combined with the high traffic volumes contributes to the considerable congestion experienced on the main street.

The existing N52 west of Ardee town, is largely rural in nature and subject to an 80km/h speed limit up to a point 1.3km from the junction with the N2, where this reduces to 60km/h before further reducing to 50km/h, 850m from the junction.

The rural section of the N52 is sub-standard geometrically, with a narrow cross-section and a high proportion of direct accesses, with over 100 direct accesses between Mandistown crossroads and the commencement of the 50km/h speed limit. Visibility from these accesses is limited by the minimal verge widths and sub-standard geometry.

As you enter the urban fringe of Ardee, there is a footpath provision on the north side of the road from Hickeys Farm Shop, however there are no facilities for cyclists on the N52 and no pedestrian facilities beyond this point.

By the 2038 design year (Central Growth scenario), the increase in traffic to 16,211 AADT has the potential to lead to a corresponding increase in accidents, which due to the nature of Ardee Town Centre are likely to involve a high proportion of vulnerable road users.

The existing N52 is also expected to see an increase in traffic to 7237 AADT, which will further exacerbate the sub-standard nature of the existing road and has the potential to lead to an increase in accidents.

The increase in traffic volumes will result in increased congestion through Ardee town centre. This increase leads to a reduction in the average speed of traffic from the current 60.1km/h (across the extent of the traffic model) to 56.8km/h and which has a corresponding increase in the total travel time from 434 hours to 649 hours across all roads contained within the traffic model.

2.3 Alternative Modes

Alternative Modes can include road, rail, bus, air, water and non-motorised alternatives which can be delivered and meet the objectives of the proposed development. The need for the proposed development identified that the existing issues along the N2 – N52 Ardee corridor are as a result of the sub-standard road cross-section and junction configuration within the highly constrained historic town centre. The reliance on the existing road network results in congestion due to high traffic volumes.

Many of the project objectives relate to relieving congestion on the main street in the town centre, which is due to a combination of through traffic on the national roads, passing through the town and local journeys accessing the facilities within Ardee. While the provision of non-motorised alternatives such as improved pedestrian and cycling facilities on alternative routes could make a contribution to meeting these objectives, it is not possible to improve facilities for these users along the highly constrained main street. Non-motorised user alternatives therefore cannot meet the project objectives without the provision of alternative facilities for motorised traffic. Air transport is not relevant to the problem of local congestion within the town centre. Increasing bus services within the town and surrounding area may potentially reduce traffic levels on the N2 and N52 corridor but would be unlikely to have a sufficient impact when sharing the same congestion corridor to meet the objectives of reduced journey times and improved journey time reliability, or to reduce the HGV demand through the historic towns centre.

2.4 Management Option

A traffic management option has been considered for the existing N52 to determine whether an online improvement to the existing N52 would meet the project objectives.

The online improvement seeks to improve the horizontal and vertical geometry where not constrained by properties, whilst also improving the cross-section to a compliant width. The management option also seeks to minimise the number of direct accesses onto the realigned N52.

Due to the number of properties that front directly onto the N52, the legacy alignment of the N52 is retained at a number of locations, limiting the improvement to the geometry possible. The introduction of parallel collector roads to reduce the number of direct accesses goes some way to alleviating the issues associated with the high degree of direct accesses, however 36 direct accesses would be required to be retained to avoid extensive property impacts.

The junction between the N52 and N2 in the centre of Ardee would remain unchanged as part of the management option due to the property constraints at the junction. With the congestion currently experienced expected to increase over time, this will further exacerbate the issues currently experienced at this junction.

There are a range of improvements that could be made to Ardee main street to improve pedestrian safety, such as the widening of the footpaths, removal of on-street parking and inclusion of a greater number of controlled crossings of the main street. These however would have the effect of further increasing the congestion experienced by vehicular traffic.

As such, a development that reduces the traffic volumes within Ardee, will afford the opportunity to improve the environment of the main street for pedestrians and other vulnerable road users.

Overall the management option for Ardee would not alleviate the long term pressures of increased traffic volumes within Ardee and would still lead to increased journey times. The management option would fail to meet the project objectives, specifically, it would:

- Not reduce traffic volumes in Ardee Town Centre;
- Not improve journey time reliability, or provide any significant change in journey times;
- Not reduce the collision rate on the N2 through Ardee;
- Not facilitate the improvement of Ardee Town Centre for pedestrians and cyclists;
- Not deliver environmental benefits in terms of noise, visual intrusion, CO₂ and particulate emissions within Ardee town centre.

2.5 N2 Eastern Bypass

A bypass to the east of Ardee has been under consideration and received Part X planning permission from Louth County Council 2001 and subsequent amendments received Part 8 planning permission in March 2006. An extract from the Part X Report showing the route alignment has been reproduced in Figure 2-2, overleaf. An assessment of the provision of an N2 bypass to the east of Ardee has been undertaken to confirm what impact the progression of a route to the east would have on an N52 Ardee Bypass to the west of Ardee.



Figure 2-2 N2 Eastern Bypass

Traffic modelling of the N2 eastern bypass has been undertaken to determine the impact of an N2 eastern bypass on the traffic in the centre of Ardee Town and on the N52 Ardee Bypass. The traffic reduction in the centre of Ardee on the N2 main street indicates a considerable reduction in traffic in all scenarios compared to the do-minimum, as shown in Table 2-1, below.

Table 2-1 Reduction in traffic on N2 Ardee Main Street

Scenario	AM Peak		Inter Peak		PM Peak	
	N/B	S/B	N/B	S/B	N/B	S/B
Do-Min vs N52 Bypass	-245	-201	-151	-127	-158	-266
Do-Min vs N2 Bypass	-118	-93	-146	-75	-50	-42
Reduction due to N2 bypass with N52 bypass operational	-113	-89	-153	-83	-141	-80
Do-Min vs N2 bypass and N52 bypass	-356	-274	-300	-200	-300	-335

From Table 2-1, it can be seen that the N52 bypass when compared to the Do-Minimum scenario provides almost double the relief in traffic to Ardee town centre than the N2 eastern bypass would. However as can be seen, when both schemes are constructed, this results in a greater decrease in traffic on the main street.

An N2 bypass to the east of Ardee should therefore be considered as a scheme within its own right and that the N52 bypass to the west of Ardee does not undermine a future N2 bypass. The traffic data also indicates that the N52 bypass provides the greatest relief to Ardee town centre and should therefore be progressed in preference to an N2 eastern bypass.

2.6 Options Selection Constraints Study

A Constraints study was undertaken as part of the Options Selection stage of the proposed development. The purpose of the Constraints Study was to undertake a series of desk studies, preliminary site inspections/field studies and preliminary consultations with statutory and non-government bodies as required, to identify the nature and extent of significant constraints relating to the development of the N52 Ardee Bypass. The aim was to gather background information in advance of the route options being developed. This data collection was focussed on determining the existing receiving environment and the existing constraints which could influence the design and progress of the proposed development.

This constraint study was developed as part of a comprehensive review of the previous N52 Ardee bypass scheme to ensure that all changes in the local built and natural environment are fully considered during the evaluation of route options and subsequent planning requirements.

The study area is shown in Figure 2-3 overleaf, and in Drawing No. N52A-ROD-EAC-SW_AE-DR-EN-300002 in Appendix A, and comprises an existing section of N52 and N2 which is approximately 6km in length, commencing in the townland of Mandistown (Co. Meath) to the south west of Ardee to the townland of Glebe north of Ardee.

Where potential environmental constraints were identified that are located outside of this Study Area, these were also reported.

It is important to consider that depending on design and construction details, the potential zone of influence (ZOI) on the development of options on the environment would extend to far greater than this Study Area and this would be included as part of future environmental assessments.

A summary of the primary constraints identified during the constraints study are provided in the following sections.

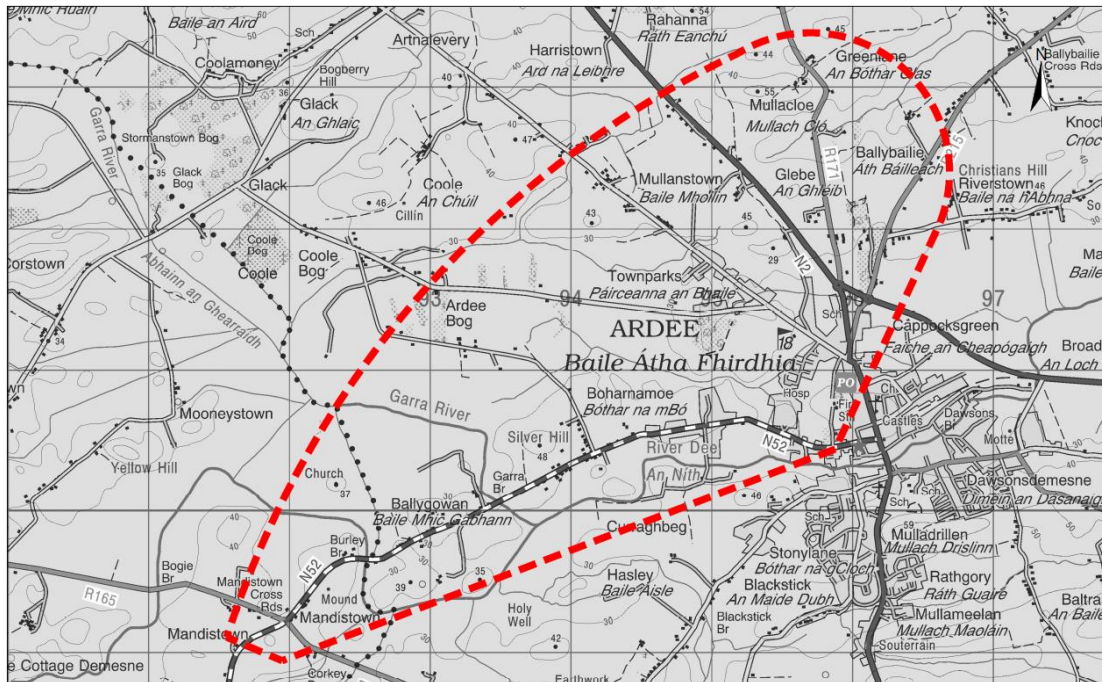


Figure 2-3 Constraints Study Area of Proposed Road Scheme

2.6.1 Natural Constraints

Biodiversity

The Zone of Influence (ZOI) for the biodiversity constraints assessment considered the European and nationally designated sites that could be connected to and subsequently impacted by the project. To this end, the ZOI extends 15km outside of the study area. Downstream of watercourses that flow through the study area are also considered as they are located and enter the sea within 15km of the study area.

The biodiversity constraints that have been considered have been summarised below:

- Watercourses within the Constraints Study Area which provide habitat for protected species;
- The presence of watercourses which drain into European and Nationally designated sites;
- The presence of bats and bat habitat along the route;
- The presence of protected species such as badgers, otters and large white moss in the Constraints Study Area;
- The presence of breeding farmland and wetland birds in the Constraints Study Area;
- The presence of protected habitats within the Constraints Study Area;
- The potential for invasive species in the Constraints Study Area;
- The impacts of hydrological changes on the Ardee Bog pNHA.

Land and Geology

The geomorphology of the landscape of the study area is flat to gently undulating, with more pronounced relief generally found around the study area perimeter, away from Ardee Bog. In wider context, the terrain generally falls very slightly from south to north (study area being positioned at the foothill of White Mountains just to the south of the area) and from west to east (from Monaghan and Cavan drumlin uplands towards sea). A series of low ridges connected to drumlin and moraine ridge landforms can be found stretching in a southwest-northeast direction across the study area and surrounding lands. The existing N52 alignment generally follows the line of one such low ridge.

Recent deposits include alluvium, lake (lacustrine) deposits and peat. Construction in soft ground may be difficult due to the presence of groundwater and the limited bearing capacity of these soils to accommodate embankment and pavement loading.

Hydrology and Hydrogeology

The study area is within the Water Framework Directive Catchment number 06: Newry, Fane, Glyde and Dee. This is a cross border catchment with a surface area of 2,125km², 1390km² of which is located within the Republic of Ireland (RoI).

Flooding

Ardee Bog area acts as the natural floodplain for the Rivers Dee, Garra and their tributaries, attenuating flood waters in extreme events, thus lessening flood volumes downstream (i.e. within Ardee). An extract from floodinfo.ie shows flood in the vicinity of Ardee Bog in Figure 2-4 below. The Dee River and Garra appear to respond quickly to intense rainfall events. There are multiple records of flooding in the bog area with relatively frequent return periods (~1 in 10 year). Additionally, there appears to be overland flow paths between the two catchments in extreme events. There is an overland flow path upstream of Burley Bridge on the River Dee with flood waters directed east to join the River Garra.

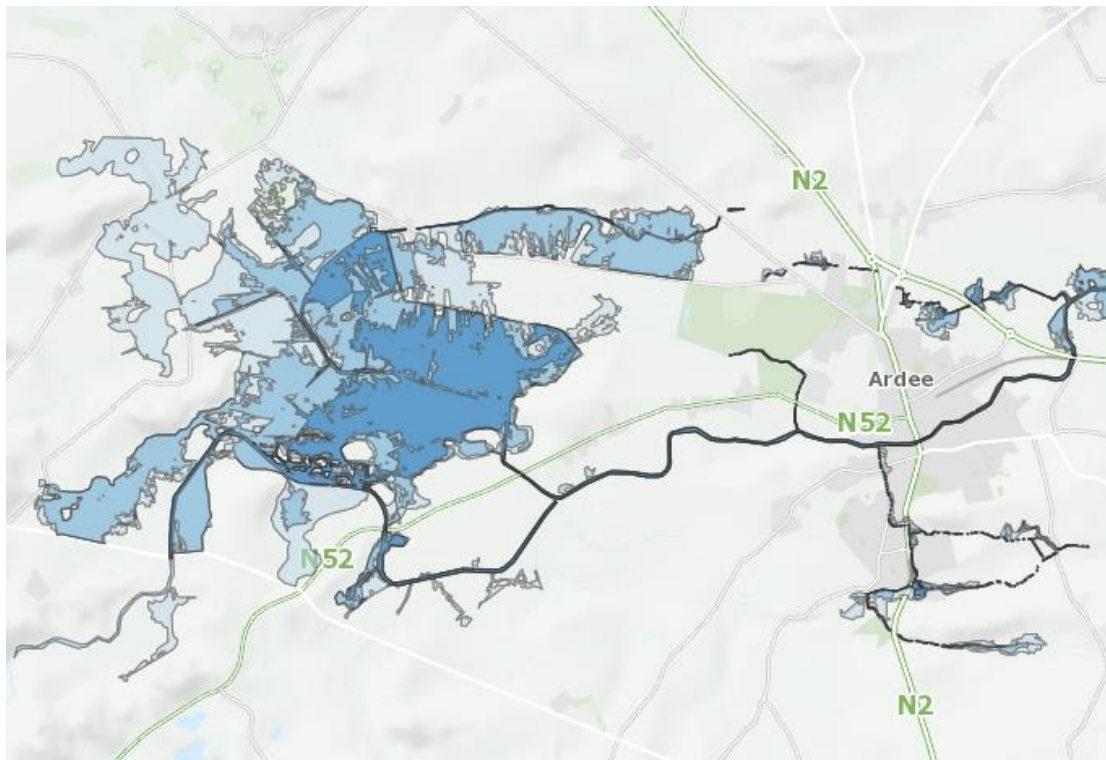


Figure 2-4 Ardee Bog Flooding (OPW, floodinfo.ie)

Aquifers

There are two main aquifers within the study area. The one to the north within townlands Glebe and Mullinstown and which extends down into Townparks, Bohernamoe and Ballygowan, is a Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones. The second aquifer which is present within the southern half of the study area and which is the prominent aquifer within the townlands of Townparks, Bohernamoe, Ballygowan and Curraghbeg, is a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones.

Groundwater Vulnerability

The groundwater vulnerability rating within the study area ranges from Low (L) to Extreme (E). The area around Ardee bog and to the west, is ranked as Low groundwater vulnerability. There are small areas of 'Extreme' vulnerability or 'rock at or near the surface or karst' within and around the study area. Those within the study area are visible at Mandistown to the south along the R165 and at the Hospital (St Brigids) on the N52 on approach to Ardee town. In general, across the study area, the groundwater vulnerability ranges from 'moderate' to 'high'.

Drinking Water Supply

The Curraghbeg Borehole, which contributes water to the Ardee Water Supply Scheme, is located southwest of Ardee. Water is also abstracted from the River Dee for the Supply Scheme. The source protection zone is to the south of the borehole and on the extremity of the study area.

Land and Visual Amenity

Landscape Character

A Louth Landscape Character Assessment (LLCA) was completed for the entire County outside the major towns in 2002, in accordance with the Government's Draft Guidelines for Landscape and Landscape Assessment (2000). This assessment outlined the different areas of the county under nine headings which were divided into four different importance ratings. Ardee is located within the Muirhevna Plain which is rated as being of Local Importance.

The Louth County Development Plan identifies Areas of Outstanding Natural Beauty (AONB) and Areas of High Scenic Quality (AHSQ). The AHSQs, while not having the natural beauty and landscape quality of the AONB, nevertheless add significantly to the stock of natural scenic landscapes within the country. Ardee Bog is identified as an AHSQ within the County Development Plan (2009-2015).

The Louth County Development Plan (2015-2021) details three tree preservation orders within the study area of the N52 Ardee Bypass. Twenty one 'Champion Trees' are also identified in the area of Louth on the Tree Register of Ireland (TROI).

2.6.2 Artificial Constraints

Engineering

Pedestrian and Cyclists

At present there are no dedicated cycle facilities on the N52, with cyclists utilising the existing hard strips where present.

Within Ardee there are currently no cycle facilities in the town centre or on the road links into the town. Pedestrians' safety is compromised by high traffic volumes, particularly when crossing streets and at junctions in the town. The development of

new residential and employment areas gives an opportunity to promote cycling and walking as a viable alternative transport mode for many everyday journeys. It is an aim of the Ardee Local Area Plan (2010-2016) to enhance and extend pedestrian and cycling provision where possible.

There are a number of amenity areas alongside the River Dee within Ardee town. The disused railway corridor between Ardee and the Dublin to Belfast Railway corridor was repurposed as a 5.7km long public footpath created on the south side of the N33 following the former rail line. The south side of the track was refenced and all level crossings removed.

Railway

Ardee is not located along any existing railways. Historically, there was a terminus located in Ardee of a short branch which diverged from the main Dublin to Belfast line at Dromin Junction. The disused railway line has now been repurposed as a public footpath following the N33.

Bus

The N52 provides a key bus corridor from Ardee to Dundalk, with the Bus Éireann route No. 167 departing from Ardee seven times per day and arriving into Ardee seven times per day. This route stops at three different locations within Ardee.

In addition, the Bus Éireann route No. 182 stops in Ardee on its route from Drogheda to Monaghan. This route travels along the N2 and offers seven services in each direction per day. Along the same route, Bus Éireann also provide a route No. 182A which travels from Drogheda to Ardee. This service provides six northbound and six southbound services per day.

Utilities

ESB have a 38kV high voltage overhead powerline that traverses the eastern extent of the study area in a north south direction, in conjunction with predominantly overhead low and medium voltage supplies.

There is a 250mm high pressure transmission gas main crossing the study area to the west of Ardee in a north west to south east direction. It is likely that all route options will impact this gas main.

Archaeological, Architectural and Culture Heritage

Ardee is an example of a medieval walled town with a distinctive central main street and long, narrow plots extending away on each side. There are numerous Record of Monuments and Places (RMP) sites and National Inventory of Architectural Heritage (NIAH) sites within the study area boundary, with a large concentration of RMP and NIAH sites within the historic core of Ardee.

The centre of Ardee is designated an Architectural Conservation Area (ACA) designed to protect and enhance the special character of the area. The Ardee Local Area Plan has a number of policy objectives to preserve and enhance the character of the ACA and which require that any development is not detrimental to the character of structures or to the general setting or character of the ACA, and that regard is given to architectural heritage when considering proposed infrastructure developments located in close proximity to Protected Structures or the ACA.

Materials Assets and Land

Agricultural Environment

Agriculture in Louth supports thousands of jobs in the rural economy, both directly in food & drink processing and also in the wider agri-industry, including input suppliers, agricultural contractors, jobs in auctioneering, transport and engineering and in accountancy, legal, veterinary and other advisory services.

A report carried out by the Irish Farmers Association in 2016¹ found that there were 1,668 farms within County Louth. The average farm size of these farms is 35.8 ha with the total land area being farmed amounting to 59,696 ha. Within county Louth, in 2010 there were fewer dairy farmers (which are generally considered to have high sensitivity) and more Mixed crops and Livestock farmers (generally considered to have medium sensitivity) and Specialist Tillage (generally considered to have medium sensitivity) when compared to national statistics².

Air Quality and Climate

Identified Air Quality and Climate Constraints

While there are no results available for the air quality of the study area, the prevailing air quality at the Dundalk monitoring station, which is representative of the study area, is well in compliance with the national air quality standards, is classified as 'good' on the EPA Air Quality Index for Health map³.

The most sensitive receptors in terms of air quality and climate within the constraints study area are residential receptors, a school, two hospitals, sports grounds, and protected areas considered to be important on a European or Irish level. Other than existing road traffic emissions, no significant existing air pollutant emission sources need to be considered in the route selection process.

Noise and Vibration

Identified Noise and Vibration Constraints

The prevailing noise climate in the Constraints Study area varies from relatively rural areas with low background noise levels to areas with more elevated noise levels due to proximity to the existing traffic flows on the existing national and regional roads.

The most sensitive receptors in terms of noise and vibration within the constraints study area include residential receivers, two hospitals, a national school, the Ardee Golf Course and a playground. Other than existing road traffic noise, no significant existing noise sources need to be considered in the route selection process.

Population and Human Health

The study area is located to the north west of Ardee town. Ardee is located at the junction of the N2, N52 and N33 roads. The town is located along the route between Kells and Dundalk and Slane and Monaghan. Three Electoral Divisions (ED) encompass the Study Area and are Ardee Urban ED, Ardee Rural ED and Drumcondra. According to the CSO 2016 census⁴, the combined population of the three EDs is 9,173 persons.

¹ The Value of Agriculture at County Level. IFA Estimate, 2016.

² Census of Agriculture 2010 – Final Results, CSO, December 2012.

³ EPA Air Quality Index for Health Map <http://www.epa.ie/air/quality/>

⁴ Central Statistics Office – Census 2016 Small Area Population Statistics. Available at: <http://census.cso.ie/sapmap/> <http://census.cso.ie/sapmap/>

2.7 Stage 1 – Preliminary Options Assessment

In the instance of the N52 Ardee Bypass, five investment options were developed following the identification of the constraints within the study area. As the purpose of the Stage 1 assessment is to refine the number of options to between 3 and 5 for the more detailed assessment, all route options were progressed to the Stage 2 appraisal.

The do-minimum and management options did not progress through to the Stage 2 appraisal as they would not meet the project objectives.

2.8 Route Options - Public Consultation (PC1)

A Public Consultation event was held in the Ardee Parish Centre, Hale Street, Ardee on the 5th of March 2020 between 4pm and 8pm. This public consultation displayed the previous route design, showing the previous junction arrangements to receive feedback from members of the public so that their views could be taken on board during the detailed review of the scheme.

Following the Public Consultation, 75 submissions were received before the extended return date of the 21st April. Of the submissions, 60% highlighted concerns regarding the traffic movements and the impact of stopping up of existing roads would have on the surrounding communities.

The main points raised in relation to the junction proposals were:

- Removal of the cul-de-sacs to facilitate local traffic movements;
- Inclusion of a roundabout or bridge crossing of the Mullanstown Road;
- Greater consideration for cyclists and pedestrians, in particular crossing the proposed bypass, in particular in relation to:
- Access to Ardee Celtic Football Club;
- Accessing school bus services;
- Providing continuity of walking routes on the existing local road network;
- Inadequacy of the Silverhill Road and that this would require upgrading if the current configuration were retained;
- Creation of a staggered junction to facilitate access to Ardee Celtic Football club;
- That the connection to the N2 would increase collisions.

The feedback highlights the inadequacy of the current Silverhill Road to act as a diversion route for the Townparks Road and that a connection for Ardee Celtic football club was not sufficiently catered for in the previous design.

A number of submissions raised concerns regarding the junction type and the provision of cul-de-sacs on the Mullanstown Road and Townparks Road. Junction options have therefore been developed to consider all movements at these roads and what impact the provision of a roundabout would have on traffic within the area.

2.9 Stage 2 – Project Appraisal of Route Options

The options developed all have a common tie-in point to the south of the study area at Mandistown crossroads and connect to the N2 north of Ardee, at a distance of 4.5km to the northeast.

At the southern end of the study area the tie-in point was chosen to ensure that the deficient section of the N52 which is north of this point, in particular at Burley bridge would be improved or bypassed. At the northern end there are some slight variations between the tie-in points on the N2 at Glebe, but all options are compatible with the future N2 upgrade of which commences at the tie-in point of the N2.

2.9.1 Proposed Route Options

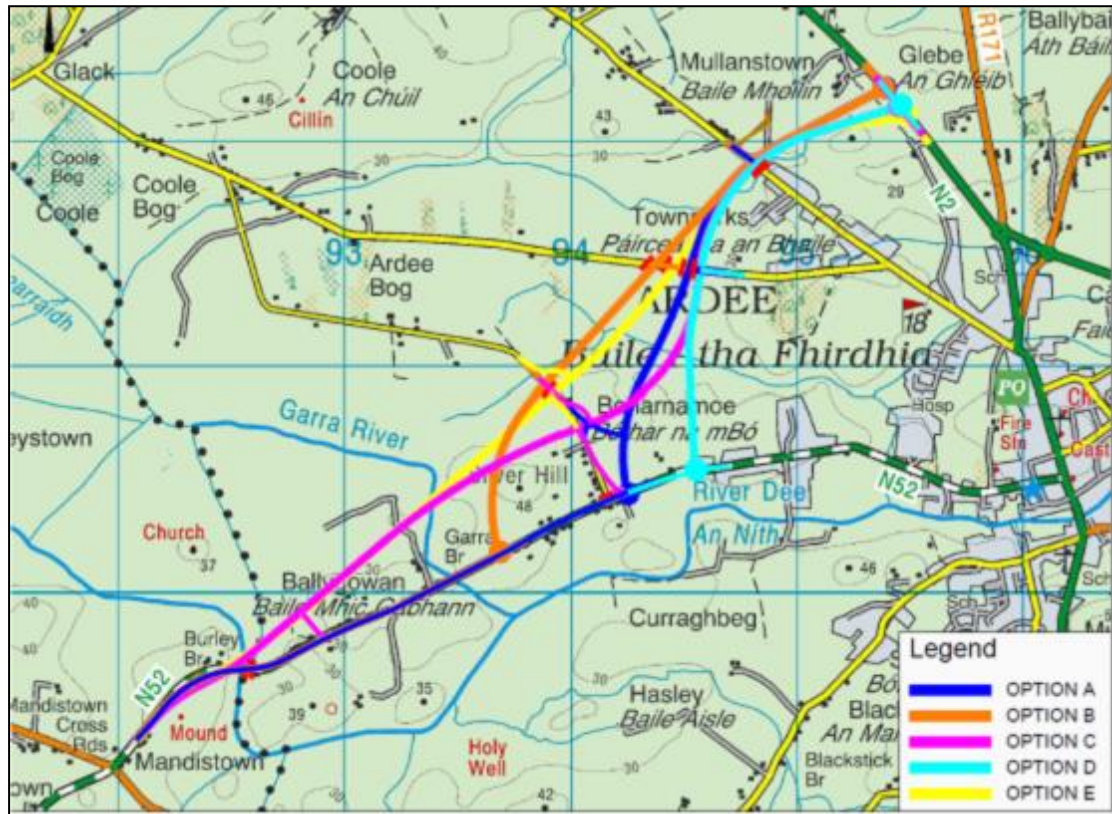


Figure 2-5 Stage 2 – All Route Options

All five Route Options, as shown in Figure 2-5, run in a north-easterly direction. Routes A, B and D comprise a combination of online and offline sections, taking varying lengths of the existing N52 (where improvements to the existing road are proposed). Routes C and E are both fully offline. See Table 2-2 for the associated lengths of offline and online sections for each route option, in addition to the depths of the cut and fill sections required.

All alignments curve eastwards at their northern ends to meet the existing N2, c. 600m north of the roundabout with R171 and R215. All five Route Options entail the creation of cul-de-sacs on the Townparks Road and the Mullanstown Road. The Townparks Road will be closed on the northern (i.e. rural) side of the alignment, while the Mullanstown Road will be closed on the southern (i.e. Ardee) side of the alignment. All five Route Options entail the construction of a new bridge at the crossing of the River Garra. The online options would require a replacement bridge at the current River Garra crossing, while the offline options would require a new bridge upstream of the existing River Garra bridge, while the existing bridge would be retained for local access. Additionally, the offline Options (C and E) entail the construction of a new bridge at the crossing of the River Dee, a short distance north of the existing River Dee Bridge, which will be retained to provide local access.

Table 2-2 Overview of Lengths and Profiles of Route Options A – E

Route Option	Offline Length (km)	Online Length (km)	Max. Cut Section (m)	Max. Fill Section (m)
A	2.3	2.5	7	4
B	2.8	1.8	7	5
C	4.5	-	3.5	4.5
D	2.1	2.8	6.5	3.5
E	4.5	-	6.5	3.5

Prior to the commencement of the Stage 2 Route Corridor Selection, further ecological assessments were carried out along each of the four Route Options. The purpose of these assessments was to identify specific issues and to refine the Route Options where possible to reduce any potential impacts. This process identified and defined the Key Ecological Receptors (KERs) along each Route Option. Where possible, Route Options were amended locally and in consultation with the other disciplines to minimise the impacts on these ecological receptors, while respecting other constraints.

The horizontal and vertical alignments and outline junction configurations were developed for all five options to provide an indicative earthworks footprint and inform the more refined assessment of construction costs.

“Multi-Criteria Analysis (MCA) is an appraisal tool used to evaluate alternatives based on identified criteria and ranked on the basis of an aggregation procedure. The criteria would normally reflect policy, programme or project objectives and other considerations as appropriate, such as value for money, environment, social inclusion, etc. Scores achieved do not necessarily need to be conveyed in quantitative monetary terms, but can simply be expressed in physical units or in qualitative terms...”

MCA can be used as an alternative or complementarily to appraisal techniques which primarily use monetary valuations (Financial Analysis, Cost-Effectiveness Analysis and Cost-Benefit Analysis) when there are different impacts that may be quantified but not monetarily valued, such as social impacts or environmental impacts (for example, impacts on landscape). In this way, it can provide a useful framework to evaluate different transport options with several criteria.”

TII's Project Appraisal Guidelines (PAGs) (2016) provide a method for using MCA to select a Preferred Option for transport projects. This is a five-step process:

(1) Establish the decision-making context

The policy context is described and the project objectives are identified under the headings of the Common Appraisal Framework (CAF) criteria, as follows:

- (i) Economy;
- (ii) Safety;
- (iii) Environmental;
- (iv) Accessibility and social inclusion;
- (v) Integration; and
- (vi) Physical activity.

(2) Identify the Options for assessment

On the basis of comprehensive consideration of the natural and artificial constraints, and a preliminary assessment of Options, a number of feasible Options are identified for appraisal.

(3) Define criteria and sub-criteria

The CAF criteria for appraisal of Options are the same as those listed under Step 1, above, in respect of project objectives. Under the headings of these criteria, a series of sub-criteria are developed, as appropriate to the context in question and in accordance with the guidance provided in the PAGs (TII, 2016a).

(4) Establish a scoring procedure

The performance of each Option is assessed against the above-stated criteria and corresponding sub-criteria and the results are presented in a matrix. Scores from 1 – 7 are assigned as follows:

- 7 – Major or highly positive
- 6 – Moderately positive
- 5 – Minor or slightly positive
- 4 – Not significant / neutral
- 3 – Minor or slightly negative
- 2 – Moderately negative
- 1 – Major or highly negative

A high-level / consolidated ranking is then developed for each Option by adding together the respective criteria scores.

(5) Examine the results and make recommendations

As stated in the PAGs (TII, 2016a, p. 3):

*“The ranking of the proposed options gives an indication of how one option performs against the objectives showing their strengths and weaknesses... It is **not** intended that the sum of each of the individual scores will be used in selecting a preferred option. The overall impact will obviously depend on the strength of individual impacts and it is up to the assessor to weigh up the individual impacts and form a view as to the likely overall impact of the options.”*

A summary of the project appraisal matrix from the route selection report is included in Table 2-3 below.

Table 2-3 Summary of Project Appraisal Matrix

	Option A	Option B	Option C	Option D	Option E
Economy	6	6	6.5	6	7
Safety	5.42	5.42	6.25	5.42	6.25
Environment	2.6	2.6	3	2.7	2.8
Accessibility & Social Inclusion	4	4	4	4	4
Integration	5.08	5.08	5.15	5.08	5.15
Physical Activity	5	5	5.5	5	5.5
Overall Scores	4.68	4.68	5.06	4.70	5.11
Overall Ranking	4	4	2	3	1

As can be seen from Table 2-3, there is a clear preference for the fully offline route options of C and E, with Option E ranked slightly higher than Option C.

Based on this assessment, it is therefore recommended that Route Option E is taken forward as the Preferred Route for the N52 Ardee Bypass.

2.10 Junction Strategy

A detailed junction strategy was subsequently undertaken on the preferred route corridor to ensure that the optimal arrangement of junctions on the N52 Ardee Bypass.

Five junction options were developed as detailed below:

Option 1

This option recreates the current design proposal that received Part 8 planning permission in 2005 and provides for 5 junctions on the Ardee bypass as detailed below:

- A new link to the N52 at Ch. 0+930
- A staggered T Junction between Ch.2+400 and Ch.2+500 for the Silverhill Road;
- A T Junction to the east at Ch. 3+200 on the Townparks Road. Western arm of Townparks Road is stopped up;
- A T Junction to the north at Ch.3+760 on the Mullanstown Road. Southern arm of Mullanstown Road is stopped up;
- Roundabout on the N2 at Ch.4+490.

Option 2

This option provides for 4 junctions on the Ardee bypass as detailed below:

- A T Junction at Ch.2+400 for the Silverhill Road East, providing a link to the existing N52. Silverhill Road West is stopped up;
- A 4 armed roundabout at Ch.3+200 on the Townparks Road providing access east and west on the Townparks Road;
- A T Junction to the north at Ch.3+760 on the Mullanstown Road. Southern arm of Mullanstown Road is stopped up;
- Roundabout on the N2 at Ch4+490.

Option 3

This option provides for 4 junctions on the Ardee bypass as detailed below:

- A T Junction at Ch.2+400 for the Silverhill Road East, providing a link to the existing N52. Silverhill Road West is stopped up;
- A T Junction to the west at Ch.3+200 on the Townparks Road. Eastern arm of Townparks Road is stopped up;
- A 4 armed roundabout at Ch.3+760 on the Mullanstown Road, providing movement in all directions;
- Roundabout on the N2 at Ch.4+490.

Option 4

This option provides for 4 junctions on the Ardee bypass as detailed below:

- A T Junction at Ch.2+400 for the Silverhill Road East, providing a link to the existing N52. Silverhill Road West is stopped up;

- A staggered T Junction at Ch.3+200 on the Townparks Road, provided access to the Townparks Road east and west;
- A T Junction to the north at Ch.3+760 on the Mullanstown Road. Southern arm of Mullanstown Road is stopped up;
- Roundabout on the N2 at Ch.4+490.

Option 5

This option provides for 4 junctions on the Ardee bypass as detailed below:

- A T Junction at Ch.2+400 for the Silverhill Road East, providing a link to the existing N52. Silverhill Road West is stopped up;
- A T Junction to the west at Ch.3+200 on the Townparks Road. Eastern arm of Townparks Road is stopped up;
- A staggered junction at Ch.3+760 on the Mullanstown Road, providing access to the Mullanstown Road north and south;
- Roundabout on the N2 at Ch.4+490.

The junction options were assessed under the following headings:

- Diversion Lengths
- Route Suitability;
- Junction Capacity & Impact;
- Economy;
- Safety; and
- Environment.

Table 2-4 below highlights the preference of each option under each of these headings.

Table 2-4 Junction Preference

	Option 1	Option 2	Option 3	Option 4	Option 5
Diversion Length	Least Preferred	Preferred	Preferred	Preferred	Preferred
Route Suitability	Least Preferred	Preferred	Preferred	Preferred	Preferred
Junction Capacity & Impact	Intermediate	Least Preferred	Least Preferred	Preferred	Preferred
Economy	Least Preferred	Intermediate	Preferred	Intermediate	Least Preferred
Safety	Intermediate	Preferred	Preferred	Preferred	Preferred
Environment	Least Preferred	Preferred	Intermediate	Intermediate	Least Preferred
Overall Ranking	Least Preferred	Intermediate	Intermediate	Preferred	Intermediate

It is therefore proposed that Option 4 (shown in Figure 2-6 overleaf) be taken forward as the preferred junction strategy for the N52 Ardee Bypass as this is ranked as preferred under four headings and intermediate under two headings, where the scoring for environment ranking is close to that of the preferred option.



2.11 Emerging Preferred Route Public Consultation (PC2)

2.11.1 Introduction

Following the selection of the emerging preferred junction strategy option, a second non-statutory public consultation was held in relation to the N52 Ardee Bypass. Due to the COVID-19 pandemic restrictions, this public consultation event was held online, with the option for members of the public to hold telephone or video consultations with members of the design team. Feedback was welcomed over a four-week period from the 16th of October to the 13th of November 2020.

2.11.2 Public Consultation Event

The following information was made available for download on the LCC website (www.louthcoco.ie):

- N52 Ardee Bypass Junction Strategy Report;
- Six technical drawings showing Junction Options 1 – 5 and detailing the emerging preferred junction option;
- An informative brochure; and
- A feedback form.

To ensure that all members of the public were facilitated, including those for whom the web-based format of the public consultation presented a challenge, 250 no. hard copies of the brochures and feedback forms were also made available to landowners on the roads affected by the proposed development, to ensure they were informed of the public consultation event.

Following the public consultation event 221 submissions were received from members of the public making submissions regarding the proposals presented at the consultation event.

These submissions were assessed by the design team and can be categorised into the following common themes/categories, namely:

- Junction options preferences;
- Impacts related to severance and access;
- Road safety impacts;
- Impacts on farmland and agri-business;
- Flooding;
- Impacts on Ardee Bog; and
- Concerns in relation to statutory environmental assessments.

2.11.3 Junction Option Preference

Junction Option 4 was outlined in the Junction Strategy Report and Public Consultation as the Emerging Preferred Option. Preferences for Junction Options 1 – 5 as expressed in the submissions received are summarised in Table 2-5 below.

The results indicate that Junction Option 3 is preferred among local residents, with 89% of respondents in favour of this junction arrangement. Junction Options 1, 2 and 4 (Option 4 being the emerging preferred option) each have approximately 1% of the preference among submissions, while Junction Option 5 received no explicit preference in any of the submissions received.

Table 2-5 Preferences for Junction Options 1 – 5 as expressed in submissions

Junction Option	No. submissions	% of total to nearest whole number
Junction Option 1	2	1%
Junction Option 2	2	1%
Junction Option 3	195	89%
Junction Option 4	3	1%
Junction Option 5	0	-
Any	1	<1%
Other	12	6%
Not stated	4	2%

2.11.4 Issues Raised in Submissions

Severance & Access

Concerns were raised in submissions predominantly related to impairments to access, severance and the potential for associated negative impacts in the areas affected. In terms of access, Option 3 is the preferred option among respondents because of the presence of a single-lane roundabout on the Mullanstown Road, which the submissions consider would provide a safer and more convenient crossing of the N52 for road users travelling between Ardee and lands to the north-west, particularly cyclists, pedestrians and drivers of buses and HGVs. A number of submissions also queried why all junction options entail the creation of new cul-de-sacs on the other local roads. Submissions have called for the removal of the proposed cul-de-sacs on the Townparks and / or Silverhill Road. Submissions highlighted that the cul-de-sac on Silverhill Road west would cut off connectivity between families located on Silverhill Road and create severance between farmers' houses and their land. Submissions also outlined potential impacts on businesses, whose suppliers currently access their premises via Silverhill Road. The submissions claim that access to the businesses located on Silverhill Road via the Townparks Road would not be possible and that the businesses would therefore, no longer be able to operate.

Access to Community Facilities

A number of submissions state concerns that the addition of cul-de-sacs and road terminations will make it harder for local residents to access community facilities, including schools, childcare facilities, shops, pharmacies and healthcare facilities in Ardee, as well as the Ardee Celtic GAA club. There are concerns that a cul-de-sac on the Mullanstown Road would prevent a local school bus service from operating in the areas in question.

Journey Amenity and Duration

A number of submissions state concerns that the addition of cul-de-sacs and road terminations will result in reduced journey amenity, forcing certain road-users to make diversions onto less suitable roads / junctions (namely, the Silverhill Road, Cookstown Cross and Glebe Roundabout) and resulting in longer journey times.

Access to Ardee for Pedestrians and Cyclists

Concerns were expressed in a number of submissions that the addition of cul-de-sacs and road terminations will prevent local residents in affected areas from accessing Ardee town on foot or bicycle, particularly where road terminations are proposed. It

was pointed out that a substantial proportion of residents in the areas affected are elderly and may rely on these forms of personal mobility to access local facilities, amenities and services, and, with lengthy diversions, may not be able to access Ardee town, local amenities or friends / family by foot or bicycle any longer.

Access to Businesses

Concerns were raised regarding the potential for adverse impacts on a number of businesses in the area (including Ardee Coach Trim, Ardee Precast Concrete, Seamie Walsh Interiors, PJK Structural Steel, Churchtown Pub, Douglas Nurseries & Horticultural Services, Deeside Supplies), as result of impairments to access for suppliers and / or customers.

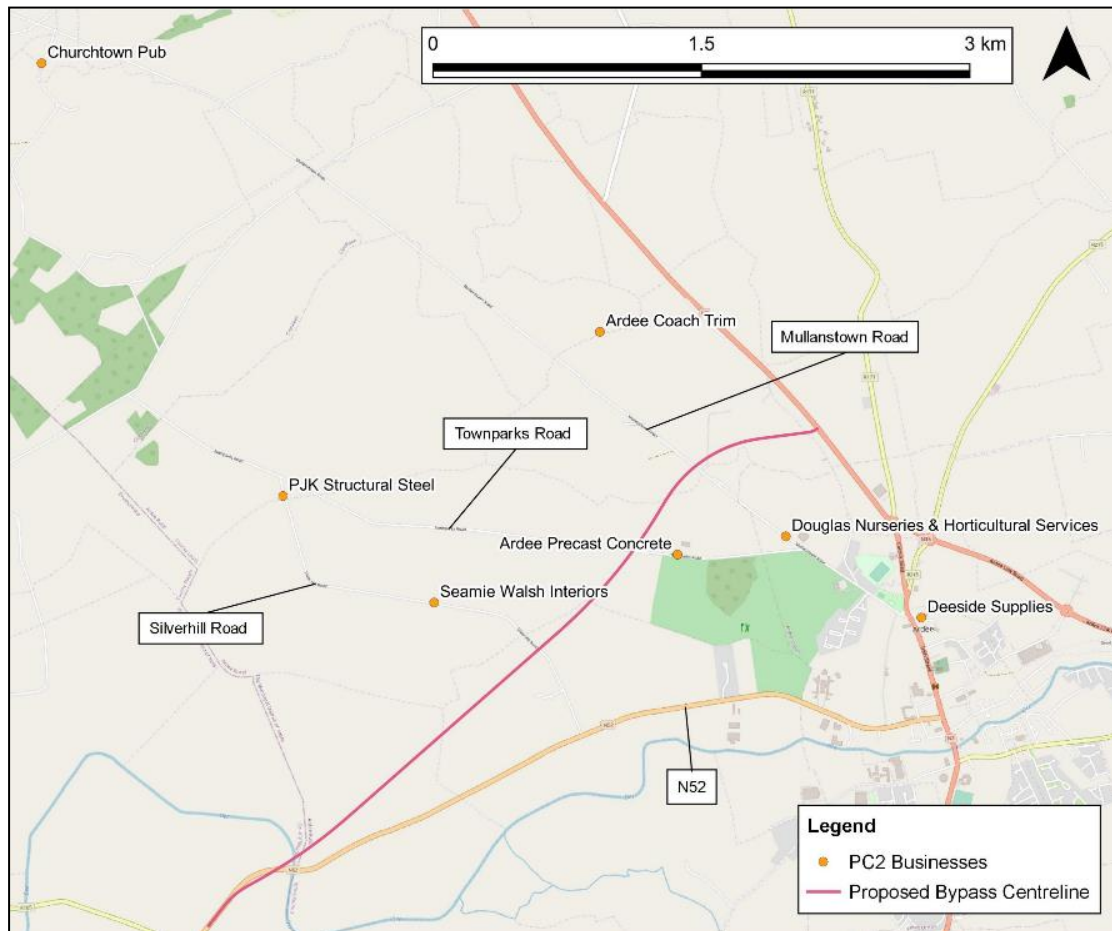


Figure 2-7 Local businesses referred to in PC2 submissions

In particular access for deliveries to Seamie Walsh interiors was highlighted as an issue in submissions due the deficiencies of the Silverhill Road / Townparks Road junction and the sub-standard nature of the existing Silverhill Road. One submission stated that the proposed development would have a 'serious affect' on the business and it 'may have to close permanently'.

In addition, access to Ardee Coach Trim for employees and HGVs arriving on the N52 was raised in a number of submissions. The submissions stated that the roundabout on the Mullanstown Road would provide the easiest and safest option for access to the business for employees, deliveries and the arrival of buses.

Farmland and Agri-business

A number of submissions expressed concern that the addition of cul-de-sacs and road terminations would result in the need for lengthy diversions for landowners attempting to access their land and that this could pose a particular problem in terms of transporting farm machinery, bales / silage or otherwise, on a daily basis over longer distances and / or on less suitable roads, including the unsuitability of the junction between the Silverhill Road and Townparks road to accommodate these large vehicles.

A submission expressed concern that the closure of the Silverhill Road would result in the loss of 'reasonable road access' to farms along the road, and requested that the junction between the N52 and Silverhill Road be kept open in future. Another submission states that provision for farmers on the Silverhill Road was made in previous iterations of the proposal in the form of gates on either side of the proposed N52 to allow the passage of animals and agricultural machinery between severed lands, but that this is no longer proposed, forcing farmers to undertake lengthy diversions via the Townparks Road, which is regarded as being unsuitable.

A submission was received from a farmholding with lands on both sides of the proposed bypass, which would be affected by major access issues and lengthy diversions if the current proposal proceeded and requested that the previous Silverhill Road link be reinstated.

A smaller number of submissions expressed concern regarding the loss of land (e.g. as a result of Compulsory Purchase Order) or loss of land value as a result of the proposed development.

Vulnerable Road Users

A number of submissions called for greater provision of infrastructure for cyclists and pedestrians as part of the proposed development. Even for the preferred option among respondents it is queried why no footpaths, cycle lanes or wide margins will be incorporated along the N52 mainline section of the proposed development. Concerns are expressed that, by increasing the speed of traffic on the N52 and adding cul-de-sacs and or staggered junctions, the proposal will reduce road safety across the area for vulnerable road users, i.e. pedestrians, cyclists, elderly persons and children. Concern regarding the lack of cyclist / pedestrian infrastructure is common to all five junction options.

Ghost Island

A number of submissions raised safety concerns over the proposed ghost island at the N52 – Mullanstown Road T-junction, providing for a right turn onto the Mullanstown Road for N52 southbound traffic. A number of local residents have indicated that they would not feel safe attempting a right turn at the ghost island in heavy traffic. It was also stated in one submission that ghost islands have caused problems elsewhere in the locality. Another concern expressed in relation to the ghost island was that drivers could face lengthy waits for breaks in traffic at this turning.

Road Safety Issues on Existing Silverhill Road, L1209 and Cookstown Cross

Several submissions highlighted that conditions are already unsafe on the Silverhill Road, L1209 and Cookstown Cross (L1209 – N2 junction), and that these conditions will be exacerbated if road users are forced to divert onto these parts of the road network, rather than accessing the N52 directly.

Lack of Margin / Hard Shoulder

Concerns have been expressed in a number of submissions regarding the lack of a wide margin / hard shoulder on the N52 mainline section of the proposed development. A small number have pointed out that a wider margin could allow for the school bus to stop along the route, collecting and dropping off local school children. Others have pointed out that a margin should be provided for use by cyclists, pedestrians and motorcyclists, increasing safety for these road users. Others have expressed concern that there is insufficient space for vehicles to pull over in case of emergencies, e.g. breakdown.

Flooding

Concerns were expressed regarding the possibility that the proposed development may adversely affect or worsen flooding, which is an existing issue in the area. A number of submissions asserted that the proposed bypass will have the effect of a dam or dyke, causing a greater volume of water to accumulate to the north-west, and to dissipate eastwards more slowly than at present. It was queried whether mitigation (e.g. creation of an artificial lake / pond) could be incorporated to address flooding. It was also queried whether compensation would be arranged for landowners adversely affected by flooding caused or exacerbated by the proposed development. One submission also voiced concern that the construction of the proposed development on peatland could result in contamination of the local water supply.

Ardee Bog

A number of submissions raised concerns in relation to potential impacts on Ardee Bog, which were not specific to a single option presented. The issues raised were:

- Ecological impacts on the habitats and species present, including Curlew and Common Frog;
- Carbon impacts (i.e. greenhouse gas emissions and loss of carbon sink potential); and
- Cultural / historical / heritage impacts from the potential deterioration or loss of peatland used over generations.

Environmental Assessments and Planning Process

A number of submissions express concern that the potential environmental impacts of the scheme are not being sufficiently addressed under the scope of an Environmental Impact Assessment, particularly in terms of potential hydrological and ecological impacts in relation to Ardee Bog and, to a lesser degree, in terms of recorded and undiscovered archaeological heritage.

A submission was made by an environmental organisation, who are of the view that the original Part 8 approval for the project is invalid on the basis of the EU EIA Directive and associated case law, and that a new planning application should be submitted for the entirety of the scheme, including, at a minimum, EIA and AA screening reports. Another submission cites a 2008 ECJ ruling against Ireland for failing to adequately assess the potential impacts of a Galway wind farm on peatland (Case C-215/06, Commission v Ireland) and a subsequent ruling regarding the State's failure to comply with same (Case C-261/18, European Commission v Ireland) as indication that failure to adequately consider impacts on Ardee Bog, in this case, through EIA would result in the Commission levying fines against the State.

2.11.5 Consideration of Issues Raised in Submissions

Each of the issues highlighted in Section 2.11.4 have been considered and the concerns raised responded to in this Section 2.11.5.

Severance & Access

A large number of the submissions indicated a preference to Option 3, namely the provision of a single lane roundabout on the Mullanstown Road, citing improved access, particularly for HGV and Bus traffic over the proposed T junction with ghost island facility proposed.

When considering the T junction with ghost island, it has to be considered that the T junction will be designed in accordance with TII Publication Standard DN-GEO-03060, which specifically caters for HGV's, buses and similar long vehicles. AutoTrack manoeuvres of the junction have been undertaken to confirm the suitability for these larger vehicle types and these can be accommodated within the design provided. The junction will operate at 7% of capacity for traffic on the N52 turning right into Mullanstown Road. This is considerably below the 75% threshold that is required within the design standards.

All options would be designed in accordance with design standards and appropriate facilities for vulnerable road users incorporated into the design to facilitate safe crossings of the road, as such the perceived safety benefit of a roundabout option on Mullanstown Road is incorrect, as all options would provide a similar level of safety for all users.

Severance of the Silverhill Road has been raised in a number of submissions, in particular access for HGV's, via the Townparks Road junction with the Silverhill Road. Following an assessment of the existing junction, it is acknowledged that the cul-de-sac on Silverhill could have the potential to restrict access to businesses and farmers whose lands are located on Silverhill west of the crossing, for HGV's and large agricultural vehicles. Therefore, this junction would need to be upgraded to ensure access for these vehicles is maintained following the implementation of the scheme.

Access to Community Facilities

The stopping up of the Mullanstown road on the south/east side of the N52 Ardee Bypass will result in an alternative journey for motorised users, via either the Townparks Road or N2. These diversions result in a delay of between 36 and 15 seconds depending on the route chosen.

When considering the impact on non-motorised users (NMUs), a crossing point will be incorporated into the junction, with pedestrian and cycle connectivity provided to the severed section of Mullanstown Road, resulting in only minor changes to journey length. The provision of a new segregated pedestrian and cycle facility on the east side of the N52 Ardee bypass will also provide more direct access to the Soccer Club (Townparks Road) and beyond to Silverhill Road and the existing N52 to the west of Ardee town centre.

Journey Amenity and Duration

It is recognised that the diversion lengths and journey times as a result of the closure of the Silverhill Road west will result in a maximum diversion length of 4km to get back to the existing Silverhill Road. This diversion will apply to the properties on the stopped up section of the Silverhill Road and the patrons and suppliers to the businesses on this section of the Silverhill Road. Upgrading of the Silverhill Road to prevent flooding

of the road in a 1:1,000 year event is also assumed in all 5 of the junction strategy options to facilitate access to properties on diversion routes during flood events. Townparks Road is of a higher standard than the Silverhill Road and there are less properties / landowners impacted by the closure of the Silverhill Road, therefore minimising the disturbance to the wider population.

As stated above, the creation of the cul-de-sac on the Mullanstown Road will marginally increase journey length by between 400m and 700m dependent on the diversion route undertaken, which will not increase journey times significantly.

Access to Ardee for Pedestrians and Cyclists

Connections are proposed to be provided to the cul-de-sac section of roads from the mainline for pedestrians and cyclists, in addition to the proposed pedestrian and cycle facility provided on the new N52 Ardee bypass from the Silverhill Road to the Mullanstown Road. This will improve the connectivity to Ardee and the facilities on the periphery of Ardee for cyclists and pedestrians, via the new bypass.

Access to the existing stopped up section of the N52 will also be provided from the southern tie-in of the N52 Ardee Bypass. This will facilitate longer distance cycle trips to Ardee on the existing N52, which will be subject to considerably less traffic than is currently the situation.

Access to Businesses

When considering the junction options, access to the businesses was considered, however following submissions from the public, highlighting the un-suitability of the Townparks/Silverhill Road junction to accommodate HGV turning manoeuvres, the junction has undergone a detailed assessment which has determined that it would be necessary to upgrade this junction to accommodate these vehicles.

Access to businesses such as Ardee Coach Trim, Ardee Precast, Churchtown Pub and Deeside Supplies are considered to be improved over the existing access arrangements, with more direct access to the National Secondary Road, without having to traverse the town centre of Ardee, and that a ghost island T junction would adequately serve these businesses.

Douglas Nurseries & Horticultural Services, whilst located on the cul-de-sac section of the Mullanstown Road, would have improved access to the N52 without having to negotiate Ardee town centre via the Townparks Road.

Farmland and Agri-business

Following submissions from the public, highlighting the un-suitability of the Townparks/Silverhill Road junction to accommodate large agricultural machinery, such as harvesters and trailers, and their turning manoeuvres, the junction has undergone a detailed assessment which has determined that it would be necessary to upgrade this junction to accommodate these vehicles.

As noted above, it is acknowledged that the closure of the Silverhill Road west will result in a maximum detour of 4km to get back to the existing Silverhill Road. It is also acknowledged that the substandard nature of this road will result in an additional inconvenience to farm owners and agri-businesses in travelling between their lands with farm machinery and livestock. In relation to provisions for access across the new Ardee Bypass at Silverhill for agricultural machinery access, a gated private access is proposed to be included to facilitate access, however it would have to remain a private access and therefore will not be available for all landowners to use.

Vulnerable Road Users

Pedestrian and cycle infrastructure is to be incorporated into the mainline alignment between the Silverhill Road and the Mullanstown Road to provide connectivity for these vulnerable road users. In addition to this, a connection at the southern tie-in to the existing severed section of the N52 is also included to provide an alternative route on quiet roads to Ardee from the south.

Pedestrian and cycle links to the existing roads intersected by the scheme have been considered to maximise the extent of pedestrian and cycle facilities to the surrounding community facilities.

Ghost Island

The traffic modelling indicates that all of these junctions will be operating considerably below capacity, with capacities of <10% on most turning movements at the junctions. The queue lengths indicate minimal queuing at these junctions for traffic waiting in the right turn lanes.

The Right turn lanes will be designed fully in accordance with TII publication standard DN-GEO-03060, with approach visibility appropriate for the 100km/h design speed, allowing approaching drivers to fully appreciate the junction form and layout as they approach.

Road Safety Issues on Existing Silverhill Road, L1209 and Cookstown Cross

The traffic modelling indicates that whilst the Townparks Road experiences an increase in traffic between the proposed N52 and the junction with the Silverhill Road, the Mullanstown Road will experience a slight decrease in traffic. The Silverhill Road west will experience removal of all but local traffic movements.

The increase on Townparks Road is from 406 AADT to 693 AADT, which whilst this represents a 70% increase in volumes, the traffic flow is still low. Design standards recommend the inclusion of a ghost island junction on the N52 Ardee bypass for traffic flows of between 450 and 3,000 AADT on the local road.

Lack of Margin / Hard Shoulder

An assessment of the appropriate road cross-section has been carried out for the N52 Ardee Bypass. The road has been designed to accommodate the predicted design year traffic volumes (15 years after opening) and ensure that the junctions and road can operate safely with this volume of traffic. The traffic modelling indicates that the road will be below capacity, with average speeds of >90km/h, which indicating a Level of Service (LOS) B. This is above the TII capacity goal of Level of Service D and is in compliance with the National Planning Framework target for inter-urban roads of 90km/h.

Flooding

A flood model has been developed for the region to assess the pre-development flooding and the implications for flooding post-development. The majority of the existing watercourses will be culverted to permit the through flow of flood waters, thereby minimising any constriction to the flood flows that would otherwise arise from the construction of an embankment through the flood plain.

The flood risk assessment indicates at one culvert a maximum change in water level of 14mm, and an average change over the flood extent of 2mm between the pre and post development scenarios.

Ardee Bog

The environmental impacts of the individual junction options have been considered as part of the development of the junction strategy. An Environmental Impact Assessment (EIA) Screening Report and Appropriate Assessment (AA) Screening Report have been prepared for the full scheme and submitted to An Bord Pleanála for determination.

A constraints study and option selection study have been undertaken which confirmed that the previous route is the most appropriate to take forward to the planning stage. These studies and surveys have also fed into the environmental appraisal of the junction options being considered as part of this junction strategy.

In advance of the planning submission, environmental assessments of the final design proposals will be undertaken across all environmental factors and mitigation measures will be proposed and incorporated into the design where necessary to ameliorate those impacts.

Environmental Assessments and Planning Process

The environmental impacts of the whole development are being fully considered, with numerous ecological surveys undertaken in the vicinity of the full extent of the proposed development to allow ecologists to be able to determine what impact the road development as a whole would have on Ardee Bog pNHA and the receiving environment within proximity of the proposed development.

A flood model for the area has been developed to determine the pre-development and post-development flooding, so that this can determine what impact the road development as a whole will have on flooding in the area and whether flood mitigation measures are required to be incorporated into the design.

2.11.6 An Environmental Impact Assessment (EIA) Screening Report and Appropriate Assessment (AA) Screening Report have been prepared for the full scheme and submitted to An Bord Pleanála for determination. Proposed Changes to the design following Public Consultation 2

Following an assessment of the submissions received and the issues highlighted therein, one change has been made to the emerging preferred route option to remove the impact that the junction strategy will have on the community and businesses located on Silverhill Road. The cul-de-sac on Silverhill Road west has been identified in the submissions received as causing access issues and severance to families, businesses and agri-businesses currently located on Silverhill Road. It is therefore proposed to re-instate the Silverhill Road west connection to form part of the preferred option and ultimately, the scheme design.

This change will negate the need for works to the junction between the Silverhill Road and Townparks Road closer to the heart of Ardee Bog, which was identified as being required to facilitate access for HGVs and large vehicles onto Silverhill Road to maintain access to existing businesses and landholdings.

In the case of the preferred route option (option 4), a gated private access would have been provided at the location of Silverhill Road west cul-de-sac to maintain landowner access to lands severed by the proposed N52 Ardee Bypass. The inclusion of the additional junction onto the N52 will now replace this direct access, and as such will not lead to an additional access point, whilst providing unfettered access to the businesses and farms for HGV and agricultural machinery. The inclusion of the Silverhill Road west connection has increased the length of the right turn facility on the

N52 Ardee Bypass, slightly increasing the footprint of the mainline through this section, which can be accommodated with the lands previously acquired for the scheme.

In addition, all options included for an upgrade to the Silverhill Road to prevent flooding of the road in a 1:1,000 year event and to ensure access to properties was maintained along the identified diversion routes during flood events. These works were deemed necessary for all five of the original junction options as either the Silverhill Road or Townparks Road were stopped up, and therefore access for residents would have been restricted. With the inclusion of the Silverhill Road west, this upgrade of the Silverhill Road is no longer required, given that access will be available from the Ardee Bypass via the Silverhill junction for those properties south of the area liable to flooding or via Townparks Road for those properties north of the area liable to flooding.

The inclusion of the Silverhill west connection will mitigate the issues raised in submissions in relation to severance and access issues for businesses, families and agri-businesses on Silverhill Road. An assessment of the differences between the original preferred route option (option 4) and the Amended Preferred Option has been undertaken and is summarised in Table 2-6 below.

Table 2-6 Overall Option Preference

	Preferred Option (Option 4)	Amended Option 4
Diversion Length	Least Preferred	Preferred
Route Suitability	Intermediate	Preferred
Junction Capacity & Impact	Intermediate	Preferred
Economy	Intermediate	Intermediate
Safety	Intermediate	Preferred
Environment	Intermediate	Preferred
Overall Ranking	Intermediate	Preferred

2.12 Conclusion

Following the consideration of the feedback from the Public Consultation No 2 as outlined in this section, the Amended Preferred Option is presented as the Final Scheme Design as shown in Figure 2-8 overleaf.

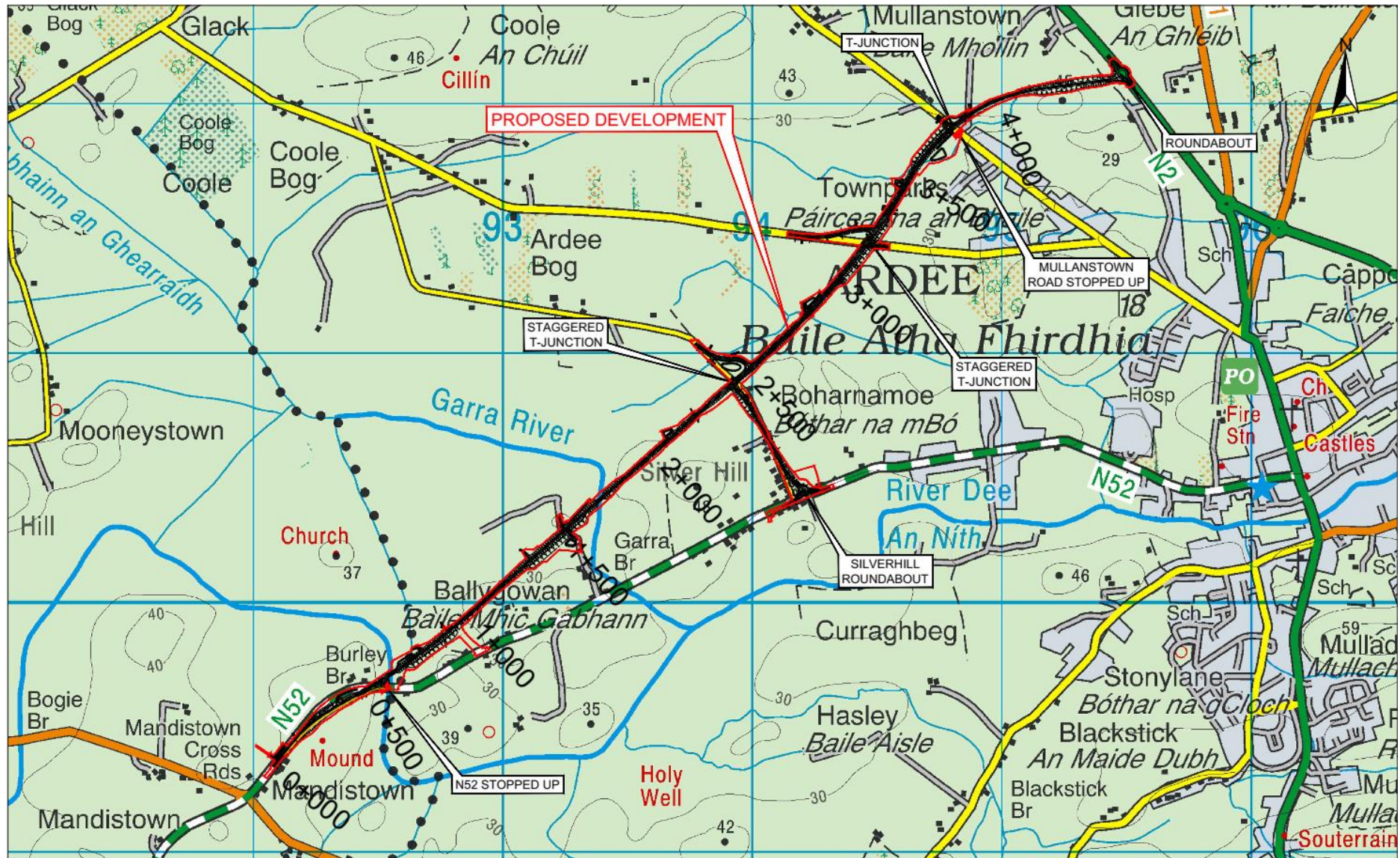


Figure 2-8 Final Scheme Design

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

This section should be read in conjunction with the development drawings in Appendix A.

3.1 Outline Project Description

The proposed N52 Ardee Bypass development involves the following elements:

- Construction of approximately 4.5 km of Type 2 Single Carriageway;
- The provision of 4 no. junctions on the Ardee Bypass:
 - A staggered T-Junction on the Silverhill Road, providing access to the Silverhill Road east and west of the proposed development;
 - A Staggered junction on the Townparks Road, providing access to the Townparks Road east and west of the proposed development.
 - A T-Junction on the Mullanstown Road to the north, providing access to the proposed development. The proposed development will create a cul-de-sac on Mullanstown Road by closing access on the southern (i.e. Ardee) side of the alignment for vehicular traffic;
 - A multi-lane roundabout on the N2;
- The provision of a new single lane entry roundabout on the existing N52 at the junction with the realigned Silverhill Road;
- Construction of 2 no. bridge structures spanning over the River Dee and the River Garra, both with a span of approximately 30m;
- Provision of pedestrian and cyclist facilities in the eastern verge of the N52 Ardee Bypass between the Silverhill Road and Mullanstown Road, including connections to the existing Silverhill Road, Townparks Road and Mullanstown Road;
- Provision of pedestrian and cycle facilities at the southern tie-in of the N52 Ardee Bypass, providing a connection to the stopped-up section of the existing N52 at Burley Bridge;
- Provision of pedestrian and cycle facilities in the northern verge of the realigned Silverhill Road, providing connectivity between the existing N52 and the N52 Ardee Bypass;
- Utilities and services diversion works and the connection of road / land drainage outfalls to the new sustainable drainage system (SuDS) network;
- Associated earthworks including excavation of peat and unacceptable material, excavation and processing of rock and other material, provision of material deposition areas, and deposition and recovery of unacceptable material for use in the works;
- Erection of a temporary site compound;
- Completion of landscaping works;
- Erection of safety barriers, public lighting and fencing;
- Completion of all accommodation works; and
- Implementation of environmental measures and all other ancillary works.

3.2 Location of the Proposed Development

The proposed development is located on the western side of Ardee, commencing in on the existing N52 in County Meath, north of the Mandistown Crossroads. It traverses

six townlands, namely Mandistown, Ballygowan, Boharnamoe, Townparks, Mullanstown and Glebe as it crosses the Silverhill Road, Townparks Road and Mullanstown Road before connecting to the existing N2 approximately 650m north of the existing N2/N33/R171 Carrickmacross Road Roundabout north of Ardee Town Centre. The proposed development is located in an area that is characterised as rural, with numerous one-off housing and farming enterprises within close proximity. The extents of the development are as shown in Figure 3-1 below.

The proposed development from its southern tie-in diverges from the existing N52, removing a substandard bend in the existing road at Burley Bridge, before crossing the River Dee on a new bridge structure located to the north of the existing bridge. The existing N52 will be stopped up at this location. The route continues on its north-easterly direction, crossing the River Garra on a new bridge structure, passing to the north of Silver Hill, before crossing the Silverhill Road. The western section of the Silverhill Road is realigned to form a staggered junction with the eastern section of the Silverhill Road. The eastern section of the Silverhill road is realigned to provide a connection back to the exiting N52, where a new single lane roundabout is provided. The route continues in a north-easterly direction, passing to the west of Ardee Golf Course, traversing the low-lands before crossing the Townparks Road, where a staggered junction with ghost islands is provided to maintain connectivity east and west. The route then begins to curve on a desirable minimum radius in a more easterly direction, crossing the Mullanstown Road. The Mullanstown Road is connected to the north, with a ghost island T junction, with the southern section of the Mullanstown Road stopped up and no access provided. The route then continues in an easterly direction, connecting to the N2 approximately 650m north of the Carrickmacross Road Roundabout with a new multi-lane entry roundabout.

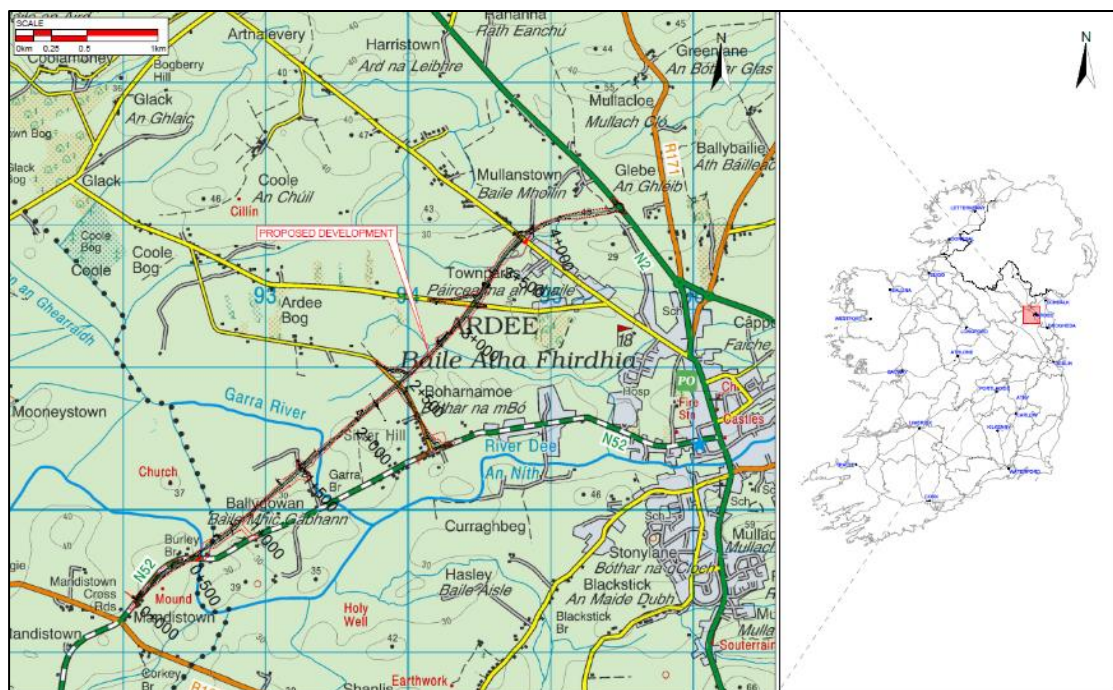


Figure 3-1 Site Layout – Location & Extent of N52 Ardee Bypass

3.3 Detailed Development Description

3.3.1 Main Alignment

The N52 Ardee Bypass is proposed to be a single carriageway comprising of two 3.5m wide lanes, with two 0.5m wide hard strips and a minimum of 2.5m wide verges. At the T junctions, the road will be widened to accommodate a 3.5m ghost island right turn facility. It will have a posted speed limit of 100km/h commensurate with a rural section of National Secondary Road that has been designed in accordance with current TII Publication Standards.

The proposed road development will extend north-eastwards from a tie-in north of Mandistown Cross Roads. From Ch. 0+000 to Ch. 0+600, the N52 Ardee Bypass utilises a 510m radius before transitioning onto a right hand over overtaking radius of 2880m. This combination of horizontal curves removes the sub-standard bend south of Burley Bridge on the existing N52 before moving offline to the north where a new bridge crossing is provided of the River Dee at Ch. 0+600. The bridge crossing of the River Dee has a clear span of approximately 30m and has been designed to provide a setback of 2m from the top of bank to the bridge abutment. The bridge consists of a piled foundation, with reinforced concrete abutment and wing walls, with precast concrete bridge beams and insitu concrete deck. The bridge size has been designed to accommodate the predicted flood flows and has received Section 50 approval from the OPW.

From Ch. 0+600, the route continues in a north-easterly direction, transitioning from the 2880m horizontal radius onto a straight. The road reaches a high point at Ch. 1+158 where it has a level of 29.451m AOD, before falling through the 400K overtaking crest curve at a gradient of 0.21% to the low point at Ch. 2+992 at a level of 25.776m AOD. The road through this section is generally on an embankment of between 1.5m and 4m in height, with short sections where the exiting landform rises and the road is in a shallow cutting of up to 1.5m in depth. At Ch. 1+700, the road crosses the River Garra, where a new bridge structure has been provided with a clear span of approximately 30m, designed to provide a setback of 2m from the top of bank to the bridge abutment. The bridge consists of a piled foundation, with reinforced concrete abutment and wing walls, with precast concrete bridge beams and in situ concrete deck. The bridge size has been designed to accommodate the predicted flood flows and has received Section 50 approval from the OPW.

From the River Garra, the route continues in a north-easterly direction on a straight, crossing a cattle underpass at Ch. 2+200, before increasing in cross-section width to accommodate the ghost island right turn facility for Silverhill Road staggered Junction between Ch. 2+400 and Ch. 2+500. A pedestrian / cycle crossing is provided at that ghost island to facilitate connection east and west along Silverhill Road for pedestrians and cyclists utilising the NMU facilities provided in the eastern verge of the mainline and the northern verge of the Silverhill Road.

From the Silverhill Road east connection at Ch. 2+400, the cross-section increases in width to accommodate a 5.5m verge (including hardstrip) on the east side, which provides a 2.0m separation from the running lane, a 3.0m shared two way footway/cycleway and 0.5m separation from the back of verge to the earthworks.

From Ch. 2+400, the route continues in a north-easterly direction on a left hand 2880m radius and continues to fall to the low point in the road at Ch. 2+992 at a level of 25.776m AOD, resulting in the route being on an embankment of approximately 2m in height. This height ensures that the road is above the predicted 1:1000 year flood levels.

The route widens from Ch. 3+050 to accommodate a ghost island right turn lane facility for the staggered junction on Townparks Road. The staggered junction provides for a 50m separation between the two arms of the staggered junction in a right-left configuration in accordance with the TII Publication Standard ND-GEO-03060. The connection to the eastern arm of the Townparks Road is at Ch. 3+190, with the western connection at Ch. 3+240. A crossing point for pedestrians and cyclists is incorporated into the ghost island facility at the staggered junction, with the western section of the exiting Townparks Road utilised to provide dedicated facilities from the mainline onto the Townparks Road.

From the junction at Ch. 3+240, the route continues of a 2880m horizontal radius before transitioning onto a desirable minimum 720m right hand curve from Ch. 3+550. From the low point at Ch. 2+992, the route rises on a 0.25% gradient resulting in an embankment of approximately 2m in height through this area. Once on the 720m radius horizontal curve, the road widens from Ch.3+700 to accommodate the ghost island right turn lane for the Mullanstown Road north connection to the mainline. Verge widening has been incorporated in addition to the provision for pedestrians and cyclists to accommodate desirable minimum stopping sight distance for southbound traffic on the N52 Ardee Bypass.

From the junction with the Mullanstown Road at Ch.3+760, the route continues on the 720m desirable minimum radius, before straightening on the immediate approach to the roundabout on the existing N2. The route continues to climb on a 0.4% gradient, with the route entering a cutting with a maximum depth of 6m before approaching the roundabout on the N2.

3.3.2 Side Road Alignments

Silverhill Road East

Silverhill Road East has been realigned to improve the horizontal and vertical alignment of the Silverhill Road, in accordance TII Design Standards for a design speed of 60km/h.

From the junction with the N52 Ardee Bypass, the alignment curves southwards on a 510m radius to pull the alignment away from existing properties and businesses, before straightening to a 1440m horizontal radius, utilising the existing road space to pass between properties north and south of the alignment. The route then curves on a 510m radius towards the north to pull the alignment away from properties on the south side of the Silverhill Road and to provide compliant geometry to the approach to the roundabout on the existing N52.

From the N52 Ardee Bypass, the route provides a 15m dwell area adjacent to the junction in accordance with the TII Design Standard DN-GEO-03060, before increasing in gradient to 4.581% to allow the levels to closely match the existing levels where the alignment is close to properties. The alignment crests at a high point at Ch. 0+309 matching existing ground levels, before reducing in level on the approach to the new roundabout on the existing N52.

Access to the individual properties is maintained through either the provision of a direct access onto the realigned Silverhill Road, or through utilisation of the existing severed section of the Silverhill Road, combining the accesses into a single entrance onto the realigned Silverhill Road.

Silverhill Road West

Silverhill Road West has been realigned to provide a connection to the existing Silverhill Road, whilst providing a stagger to the Silverhill Road east. The realignment of the Silverhill Road west link has been designed to a design speed of 50km/h in accordance with TII Publication Standard DN-GEO-03031, which is in line with the standard of the existing Silverhill Road.

From the junction with the N52 Ardee Bypass, the alignment curves southwards on a 60m radius to provide a T junction perpendicular to the mainline and provide the stagger distances required in TII Publication Standard DN-GEO-03060. The alignment then curves on a 160m radius to connect to re-join the existing Silverhill Road. No transitions are provided between the opposing curves in accordance with Chapter 11 of TII Publication Standard DN-GEO-03031 for a local road realignment.

From the N52 Ardee Bypass, the vertical alignment falls on a constant 0.578% longitudinal gradient to tie-in to the existing road levels. This 0.578% gradient provides the required dwell area adjacent to the N52 Ardee Bypass.

Access to farm holdings is maintained through the provision of a direct access onto the realigned Silverhill Road, and utilisation of the existing severed section of the Silverhill Road.

Townparks Road East

The Townparks Road East is connected to the mainline alignment with a ghost island right turn lane T junction. The realignment of the Townparks Road occurs over a length of 88m, consisting of a 360m radius to curve the road, before tightening to a 90m radius to provide a connection perpendicular to the mainline alignment.

The vertical climbs on a 0.5% longitudinal gradient from the existing road level to match the level of the proposed bypass.

Townparks Road West

The alignment has been designed for a design speed of 85km/h, which is commensurate with the speed restriction of 80km/h on this section of the Townparks Road. The horizontal alignment has back to back 360m radii, with transitions of 60.88m in length to provide a smooth transition between each curve. The alignment then on the immediate approach to the junction turns on a 50m horizontal radius to for a junction perpendicular to the mainline alignment.

The vertical alignment matches the gradient of the existing road before increasing to 0.5% longitudinal gradient to tie-in to the proposed mainline levels.

The existing redundant section of the Townparks Road is to be repurposed to be used as part of the pedestrian / cycle facility.

Mullanstown Road North

The northern re-connection of the Mullanstown Road is 68m in length, largely improving the existing road to provide the appropriate widths to accommodate turning HGV and bus traffic. The vertical alignment re-creates the existing sag curve, before increasing to 2.5% in level to tie-in to the proposed mainline alignment.

A pedestrian crossing is incorporated into the right turn lane facility to assist pedestrians and cyclists accessing Mullanstown Road north to cross the mainline

alignment for connection to the proposed pedestrian/cycle facilities on the bypass, or on to Mullanstown Road south to connect to the centre of Ardee.

Mullanstown Road South

The southern section of the existing road is stopped up, with a turning head provided adjacent to the mainline alignment. A pedestrian/cycle connection to the pedestrian/cycle facilities on the mainline is provided from this turning head.

3.3.3 River Dee and River Garra Bridges

Two bridge structures will be provided across the River Dee and River Garra. The River Dee bridge will be provided just north of the existing N52 River Dee crossing, at a greenfield location. The crossing of the River Garra will be approximately 350m north of the existing Garra Bridge in a greenfield location. It is proposed to cross both rivers by means of clear span bridges with approximate spans of 30m. The bridge abutments will be designed and set back a minimum of 2.0m from the top of the natural riverbank to reduce the impacts of excavations directly adjacent to watercourses, see Drawing N52A-ROD-EAC-SW_AE-DR-EN-300040 and Drawing N52A-ROD-EAC-SW_AE-DR-EN-300041 in Appendix A. The remainder of the watercourses will be crossed via culverts or diverted to an adjacent watercourse.

3.3.4 Pedestrian and Cycling Provisions

Pedestrian and cycle facilities are a key element of the N52 Ardee Bypass development. This will include a shared cycle and pedestrian link from the southern tie-in to the existing N52 where this is stopped up at Burley Bridge which will facilitate pedestrian and cycle access to, and along the existing N52.

The cycle way provisions will be in accordance with TII Publication Standard DN-GEO-03036. Figure 3-2, below, illustrates a cross section of the proposed cycleway alongside the road carriageway (see Drawing N52A-ROD-EAC-SW_AE-DR-EN-300038 in Appendix A for full drawing). The cycleway will comprise a 3.0m wide shared surface which will be parallel to the proposed road, segregated from the carriageway by a kerb and 2.0m separation zone.

Pedestrian and cycle crossings of the N52 Ardee Bypass and the side roads that are crossed by the proposed development will be designed in accordance with TII Publication Standards DN-GEO-03060, as shown below in Figure 3-3.

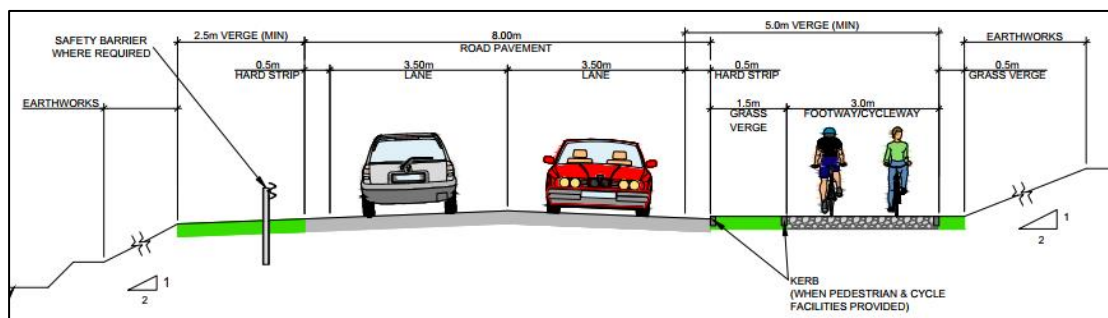


Figure 3-2 Typical shared pedestrian and cyclist provision



3.3.5 Junctions

Silverhill Road

A refuge island has been incorporated into the ghost island between the two opposing arms of the staggered junction to provide a safe refuge for pedestrians and cyclists crossing the N52 Ardee Bypass to access the stopped-up section of the Silverhill Road.

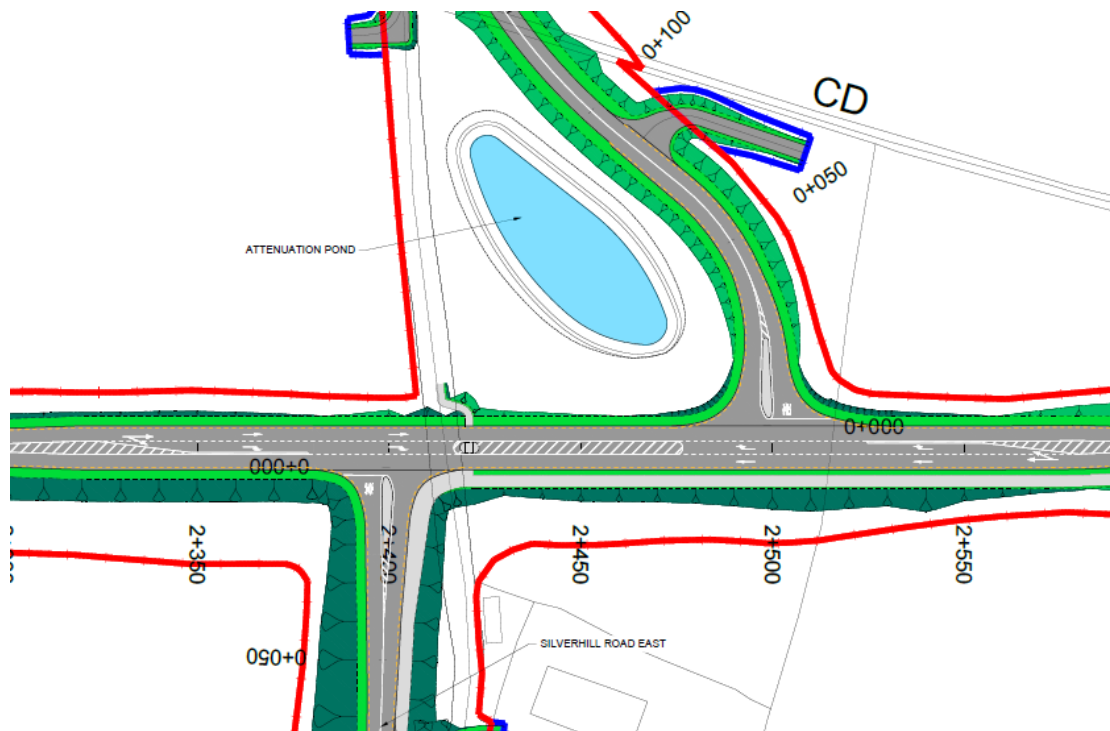


Figure 3-4 Silverhill Road Junction

Townparks Road

The Townparks Road junction is a staggered at-grade T junction with ghost island right turn facility on the mainline alignment and channelising island on both arms of the Townparks Road. The opposing arms of the staggered junction are separated by 50m in accordance with TII Standard DN-GEO-03031 and have desirable minimum visibility splays of 215m from the junction to the north and south.

A refuge island has been incorporated into the ghost island to provide a safe refuge for pedestrians and cyclists crossing the N52 Ardee Bypass to access the redundant section of the Townparks Road.

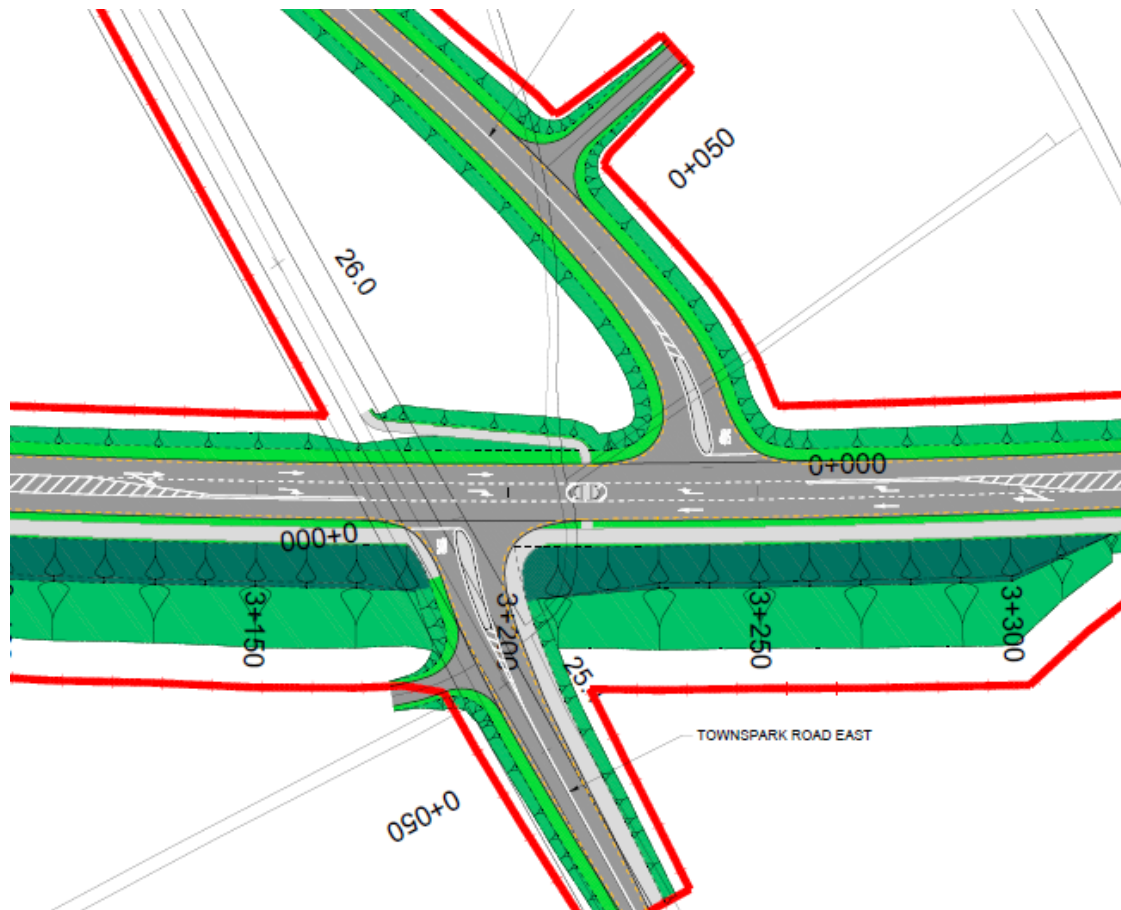


Figure 3-5 Townsparks Road Junction

Mullanstown Road

The Mullanstown Road junction is an at-grade T junction with ghost island right turn facility on the mainline alignment and channelising island on the Mullanstown Road. The junction has been designed in accordance with TII Standard DN-GEO-03031, with visibility splays of 215m from the junction to the north and south.

A refuge island has been incorporated into the ghost island to provide a safe refuge for pedestrians and cyclists crossing the N52 Ardee Bypass to access the stopped up section of the Mullanstown Road.



Figure 3-6 Mullanstown Road Junction

N2

The junction with the N2 is a multi-lane three armed roundabout with an inscribed circle diameter (ICD) of 50m. Each approach will widen to provide a two lane entry onto the roundabout and two lanes on the circulatory carriageway. There is a splitter island provided on each arm of the roundabout to facilitate pedestrians crossing the roundabout. The roundabout has been designed in accordance with TII Standard DN-GEO-03060.



Figure 3-7 N2 Roundabout Junction

3.3.6 Drainage

The proposed road drainage design is in accordance with TII Publication Standards, in particular standards DN-DNG-03022 and 03063, which require a Sustainable Drainage Systems (SuDS) including attenuation for a 100-year flood event and 20% climate change and hydrocarbon interceptors prior to reaching the existing surface water drainage network and eventually the River Dee and River Garra. The drainage system developed for the proposed development will provide a suitable drainage system to service the road and to ensure that the drainage system within adjacent lands is not adversely impacted.

3.3.7 Ancillary Works

In order to complete the proposed development, it will be necessary to carry out ancillary works to provide the foundation for the road construction. These additional works include:

- 1 Erection and dismantling of construction site compound;
- 2 Site Clearance;
- 3 Boundary treatment, such as fencing, hedgerows and walls at adjoining land and residences;
- 4 Drainage, including the construction of attenuation and treatment ponds, outfalls and carriageway drainage;
- 5 Earthworks, including the stripping of topsoil, excavation of suitable and unsuitable material, deposition of suitable material and selected material to form the road embankments and bunds and disposal of the unsuitable material on site. The verges, earthwork slopes and bunds will be topsoiled;
- 6 Provision of road pavement works, including tie-in to existing roads;
- 7 Provision of signs and road markings;
- 8 Provision of street lighting and other necessary electrical works;
- 9 Construction of the River Dee and River Garra bridges as described in Section 3.3.3 above;
- 10 Construction of a cattle underpass at Ch. 2+200;
- 11 Construction of culverts maintaining connectivity of existing watercourses;

- 12 Diversion of utilities, in particular the high pressure gas main that traverses the mainline at Ch. 1+150;
- 13 Individual accommodation works as considered necessary, and agreed during land negotiations;
- 14 Landscaping of road verges and areas for screening;
- 15 Maintenance of access and utility services, where possible, during the construction of the proposed development such that minimum disruption is caused.

3.3.8 Land Acquisition

The majority of the land is within Louth County Council's ownership, having been the subject of an earlier Part 8 and CPO process. As such, only the additional lands necessary to accommodate the alterations to the design are required to be acquired through the Compulsory Purchase Order (CPO) process, either temporarily (such as in the case of the proposed construction compound location), or permanently. The total area of additional land required for the proposed development is 3.239 Hectares.

Accommodation works are likely to temporarily affect public lands outside of this CPO and will be subject to landowner agreements.

3.4 Construction Methodology

The construction methodology as outlined in the following section outlines the general construction methodology for the proposed development.

Preliminary Construction Sequence for the roadworks and bridgeworks will take place over approximately 18-24 months. The works are likely to take place in the following sequence:

- **Site Clearance and Boundary Fencing**
Site clearance will be undertaken during the permitted months, with the majority of the site already fenced off.
- **Gas Networks Diversion**
The GNI diversion of the high pressure transmission main will be required to commence early in the construction period, or undertaken as an advance works contract to ensure that adequate protection over the gas main is provided to facilitate construction traffic traversing the gas main and thereby provide access to the River Dee and River Garra bridges.
- **The installation of pre-earthworks drainage and temporary settlement ponds to intercept silt laden run-off in advance of the main earthworks operations commencing construction.**
- **The construction of the roadworks will commence simultaneously with the bridge works construction.**
 - Road construction is expected to commence from the Silverhill Road and the southern and northern tie-ins to facilitate provision of haul routes and access routes to the River Dee and River Garra bridge crossings to permit the construction of the two river bridges to commence.
 - The construction of this main section of the route will entail improvements to the existing ground through a combination of surcharging the sub-soils or excavation and replacement of soft materials.
 - The installation of the cattle underpass and watercourse culverts will also be necessary in this section to facilitate the haul route. It may be that some

temporary watercourse crossings are installed to facilitate construction traffic.

- Road construction of the remaining earthworks on the project, including the installation of the remaining watercourse culverts, pre-earthworks drainage and settlement ponds.
- Installation of permanent drainage system, including hydrocarbon interceptors and attenuation/treatment facilities and their outfalls to the receiving watercourses.
- Construction of pavement, including sub-base, base, binder and surface courses, kerbing, including combined kerb drainage systems and footways/cycleways. During these works, in particular, temporary diversion of existing roads in particular at tie-in areas are likely to be necessary.
- Installation of street lighting, signage and road markings.
- Completion of the River Dee and River Garra bridges, including the installation of parapets, approach and departure lengths of safety barriers.
- Landscaping, accommodation works and other ancillary works.

Access to residential properties will be maintained throughout the construction phase. Where short term restrictions may be required to some properties, and/or disruption to utilities during certain periods, these will be minimised, and residents will be notified in advance.

Construction traffic volumes will be in the order of 47,700 two-way heavy goods vehicle movements, during the first year, when the first earthwork season will be undertaken. The bulk of these vehicle movements will be within the land acquired for the site, moving excavated material from one area of the site for reuse in another area. This is an average of 200 each way per day.

The construction of the project will require the importation of materials from sources external to the site, such as quarries, pavement plants, precast concrete manufacturers and the like. It is envisaged that approximately 20% of the vehicle traffic accessing the site will need to use the public road network to do so. This equates to an increase of approximately 56 AADT on the existing road network, which is a 1% increase in the overall traffic volumes on the existing road network.

Site access points will be limited to ensure that construction traffic is not accessing through roads unsuitable for such vehicles. It is proposed that access points to the site for the mainline works will be restricted to the following roads:

- N2;
- Silverhill Road;
- Existing N52.

Construction traffic will only be permitted to use the local road network for the purpose of the construction of the realigned sections of the local roads. The condition and width of these roads is not suitable for use by heavy construction traffic.

3.4.1 In-stream Works

There are two bridges to be built as part of the proposed development, over the River Garra and the River Dee. These bridges will be clear span to avoid instream works as shown on drawings N52A-ROD-EAC-SW_AE-DR-EN-300040 and N52A-ROD-EAC-SW_AE-DR-EN-300041 in Appendix A.

There are a number of minor watercourses and field drains that are intercepted by the proposed development and these are typically piped under the road, or diverted to an adjacent stream that is piped under the road in pipe culverts. These pipe culverts will require in-stream works.

3.4.2 Materials

The majority of the proposed development lies over soils that are competent for building embankments on and with high reusability where excavated in cuttings. The proposed development also traverses lands which are subject to flooding, resulting in the deposition of soft silt strata. These soft silt layers do not possess the adequate strength and compressibility characteristics on which to construct a road and typically require to be excavated to firm strata and filled back to ground level to provide a firm foundation for the road construction. To minimise the volume of unacceptable material to be excavated, where possible the sub-strata will be improved by surcharging the existing ground to compress the sub-soils, eliminating the requirement to excavate these materials, thus minimising the volume of unsuitable material requiring disposal and the volume of materials requiring importation.

Earthworks materials that are being excavated are to be processed, where possible, to render them suitable for re-use in the road embankment or bunds to minimise the importation requirement, with a material deposition area identified that will be landscaped within the land take to accommodate materials that cannot be re-used within the road construction or environmental bunds. A material deposition area is envisaged at RHS at approximate chainage 3+725. It will receive all of the 4,500 m³ approx. of peat to be excavated throughout the scheme, in addition to other non-processed excavated soft soils. Depending on the final volume of the deposition area, a minor quantity of surplus soil may be deposited off-site in a suitably licensed facility or potentially reused on nearby projects. The overall earthworks balance is indicated in Table 3-1 below.

Table 3-1 Estimated earthworks quantities

Cumulative Cut	Cumulative Fill	Balance
146,545m ³	245,760m ³	88,840m ³ Import requirement

The total area of land take associated with the proposed development is 276,500 m².

3.4.3 Site Compounds

Site Compounds will be required during construction to ensure enough room is afforded for construction. The compounds may include offices, material storage areas, material processing areas, plant storage and parking for site and staff vehicles. These sites are proposed to remain in place for the duration of the contract but may be scaled up or down during particular activities on site. The main site compound location has been identified at the Silverhill Road as illustrated on Drawing N52A-ROD-EAC-SW_AE-DR-EN-300032 in Appendix A. This provides access from the existing National Road network for the early stages of construction, whilst also facilitating access to the proposed development via the Silverhill Road.

3.4.4 Demolition

There will be no major demolition works included as part of the proposed development, with demolition of boundary walls to properties envisaged as a number of locations, where new walls will be constructed to replace these boundaries.

3.4.5 Construction Environmental Management Plan

Prior to any demolition, excavation or construction a Construction Environmental Management Plan (CEMP) will be produced by the successful contractor, using the plan set out in Appendix B. The CEMP will set out the Contractor's overall management and administration of the construction project and will be developed by the Contractors during the pre-construction phase, to ensure commitments included in the statutory approvals are adhered to.

The CEMP will also be required to integrate with the requirements of the Environmental Operating Plan (EOP). The Contractors will be required to include details under the following headings, as per the plan in Appendix B:

- Details of working hours and days;
- Details of emergency plan - in the event of fire, chemical spillage, cement spillage, collapse of structures or failure of equipment or road traffic incident within an area of traffic management. The plan must include contact names and telephone numbers for: Local Authority (all sections/departments); Ambulance; Gardaí and Fire Services;
- Details of chemical/fuel storage areas (including location and bunding to contain runoff of spillages and leakages);
- Details of construction plant storage, temporary offices;
- Traffic management plan (to be developed in conjunction with the Local Authority – Roads Section) including details of routing of network traffic; temporary road closures; temporary signal strategy; routing of construction traffic; programme of vehicular arrivals; on-site parking for vehicles and workers; road cleaning; other traffic management requirements;
- Truck wheel wash details (including measures to reduce and treat runoff);
- Dust management to prevent nuisance (demolition & construction);
- Site run-off management;
- Noise and vibration management to prevent nuisance (demolition & construction);
- Landscape management;
- Stockpiles;
- Project procedures & method statements for:
 - Diversion of services;
 - Excavation and blasting (through peat, soils & bedrock);
 - Piling;
 - Construction of pipelines;
 - Temporary hoarding & lighting;
 - Borrow Pits & location of crushing plant;
 - Storage and Treatment of peat and soft soils;
 - Disposal of surplus geological material (peat, soils, rock etc.);
 - Earthworks material improvement;
 - Protection of watercourses from contamination and silting during construction;
- Site Compounds.

The production of the CEMP will also detail areas of concern with regard to Health and Safety and any environmental issues that require attention during the construction phase. Adoption of good management practices on site during the construction and operation phases will also contribute to reducing environmental impacts. The mitigation measures outlined in this Part VIII will be outlined in the CEMP and will be the responsibility of the contractor to ensure they are carried out effectively, who will be monitored to ensure compliance with these requirements.

3.4.6 Environmental Operating Plan

The Environmental Operating Plan (EOP) is defined as a document that outlines procedures for the delivery of environmental mitigation measures and for addressing general day-to-day environmental issues that can arise during the construction phase of a construction project.

Before any works commence on site, the Contractor will be required to prepare an Environmental Operating Plan (EOP) in accordance with the TII *Guidelines for the Creation and Maintenance of an Environmental Operating Plan*. The EOP will set out the Contractors approach to managing environmental issues associated with the construction of the road and provide a documented account to the implementation of the environmental commitments set out in the Part VIII and the CEMP.

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

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

This is a non-exhaustive list and relevant guidance current at the time of construction will be followed as a minimum. Updates of guideline documents are available at <https://www.tii.ie/technical-services/environment/construction/>. It is proposed to employ these guidelines, as and where relevant, on the proposed development.

4. ENVIRONMENTAL ASSESSMENT

4.1 Environmental Assessment Methodology

A key document that has informed this environmental assessment methodology for the N52 Ardee Bypass includes the *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (August 2017)* produced by the Environmental Protection Agency (EPA). Section 3.7 of these Guidelines and specifically Table 4-1 (below) forms the basis for describing the impacts as part of this assessment. The consideration of potential impacts includes direct, indirect, secondary and cumulative impacts as appropriate, with reference to the appropriate guidance.

Where specialists' topics have recognised different guidance / standards relating to the description of effects and significance these are set out in the respective sections as part of that environmental topic as appropriate.

Table 4-1 Description of Effects

Quality of Effects:	
Positive	A change which improves the quality of the environment.
Neutral	No effects, or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative	A change which reduces the quality of the environment.
Describing Significance of effect:	
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Slight effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Very significant Effects	An effect which, by its character, magnitude, duration or intensity significant alters most of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.
Describing the Extent and Context of Effects:	
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Probability of the Effects:	
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.

Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measure are properly implemented.
Describing the Duration and Frequency of Effects:	
Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects last less than a day
Temporary Effects	Effects lasting less than a year
Short-term Effects	Effects lasting one to seven years
Medium-term Effects	Effects lasting seven to fifteen years
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years
Describing the Duration and Frequency of Effects:	
Reversible effects	Effects that can be undone, for example through remediation or restoration.
Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hour, daily, weekly, monthly, annually).

4.2 Environmental Factors

The following environmental factors have been assessed in this Part VIII document in the following sections:

- Section 5 – Traffic and Transportation
- Section 6 – Population and Human Health
- Section 7 – Biodiversity
- Section 8 – Soils, Geology and Hydrogeology
- Section 9 – Hydrology
- Section 10 – Landscape and Visual
- Section 11 – Air Quality and Climate
- Section 12 – Noise and Vibration
- Section 13 – Cultural Heritage
- Section 14 – Material Assets and Land
- Section 15 – Major Accidents and Disasters
- Section 16 – Cumulative Effects

5. TRAFFIC AND TRANSPORT

5.1 Introduction

The traffic modelling for the N52 Ardee Bypass Project has been undertaken in accordance with the Transport Infrastructure Ireland (TII) Project Management Guidelines (PMG) 2019 and TII Project Appraisal Guidelines (PAG) 2016.

The TII PAG are in compliance with the Department of Transport (DoT) Common Appraisal Framework (CAF) for Transport Projects and Programmes 2020 and Department of Public Expenditure and Reform (DPER) Public Spending Code (PSC) 2019.

5.2 Traffic Modelling Overview

As part of the Phase 2 (Option Selection) process, an N52 Local Area Model (LAM) was developed in accordance with TII's PAG. Future Year forecasts were developed for an Opening Year (2023), Design Year (2038) and Horizon Year (2053).

Five bypass options of Ardee were modelled and assessed using the N52 LAM. The assessment considered each option in terms of their overall benefit to Ardee and the surrounding road network in terms of the overall reduction in delay and change in distance travelled. In addition, the end to end improvements in journey times and reduction in the level of traffic in Ardee town centre were also assessed. Following the Phase 2 process the Preferred Option was identified and brought forward to Phase 3 for further consideration.

5.3 Data Collection

5.3.1 Traffic Survey Data

A summary of the traffic survey data that was collected as part of the development of the 2018 N52 LAM is outlined in Table 5-1. The location of the traffic surveys are illustrated in Figure 5-1 to Figure 5-3.

Table 5-1 Traffic Survey Data

Survey Type	Description
Traffic Count	Traffic data from 2 permanent TII Traffic Monitoring Units (TMU) (2018)
	A total of 6 Automatic Traffic Counts (ATC) surveys were carried out between 9 th July 2018 to 22 nd July 2018 (two weeks)
	Junction Turning Count (JTC) surveys at 4 locations were carried out on Tuesday 10 th July 2018 between 07:00-19:00
Journey Time	Journey time survey data was assessed using the Google Distance Based API tool. The survey was conducted on 28 th January 2020
Origin-Destination Survey	An Automatic Number Plate Recognition (ANPR) survey was conducted at 9 locations on 12 th March 2020



Figure 5-1 Overview of TII Traffic Monitoring Units

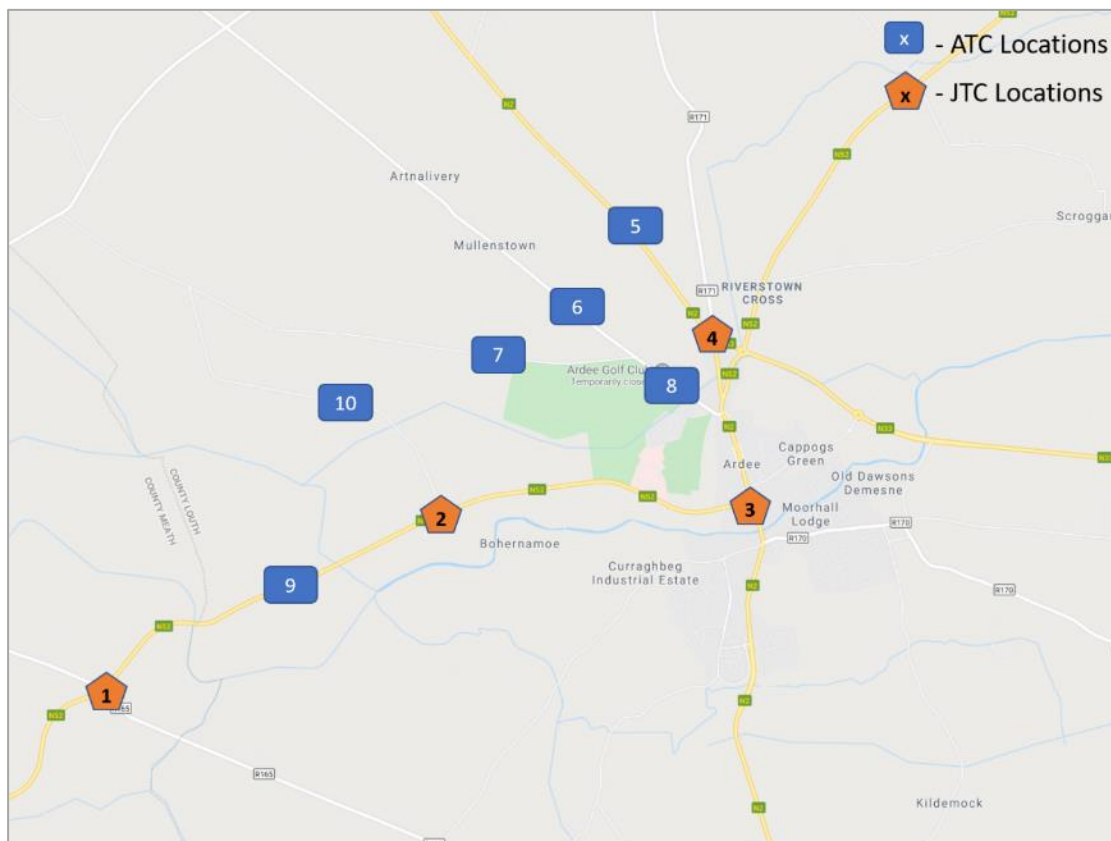


Figure 5-2 Overview of ATC and JTC Locations (2018)

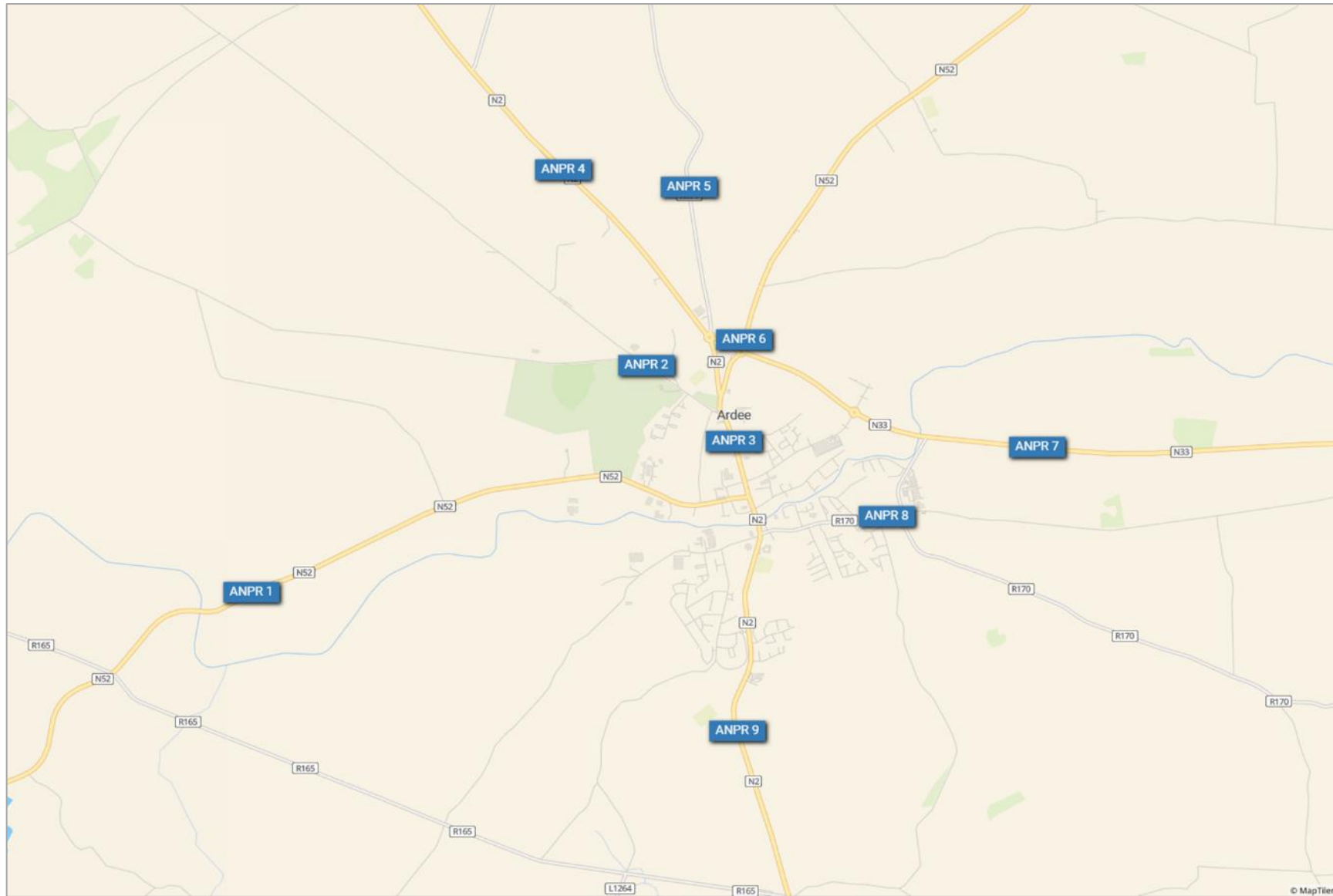


Figure 5-3 Automatic Number Plate Recognition Camera Locations

TII Traffic Monitoring Units

Transport Infrastructure Ireland collect real-time traffic data at over 360 locations on the National Road and Regional Road network via their network of Traffic Monitoring Units (TMUs). A TMU is a permanent Automatic Traffic Counter (ATC) that captures the number for vehicles passing a given point on a road and classifies the vehicles into different vehicle classifications, for example cars, Light Goods Vehicles (LGV) and Heavy Goods Vehicles (HGV).

There are 2 TMUs located within the N52 LAM network extents which provided observed data for 2018. The observed 2018 Annual Average Daily Traffic (AADT) and percentage (%) HGV at each of the 2 TMU sites is provided in Table 5-2.

Table 5-2 TII TMU Sites (2018 AADT & %HGV)

TMU No.	TMU Location	2018	
		AADT	% HGV
1331	N33 Between Ardee and M01, Richardstown, Co. Louth	12,489	7.8%
20023	N02 Between Collon and Ardee, Hunterstown, Co. Louth	7,257	7.2%

Automatic Traffic Counts

An ATC captures the number of vehicles passing a given point on a road and classifies the vehicles into different vehicle classifications, for example cars, Light Goods Vehicles (LGV) and Heavy Goods Vehicles (HGV). 6 ATC surveys were undertaken over a 14-day period in July 2018 throughout the study area. The AM Peak (08:00 – 9:00), average Inter Peak (12:00 – 14:00) and PM Peak (17:00 – 18:00) hour flows at each ATC site is presented in Table 5-3.

Table 5-3 Automatic Traffic Counter Data 2 Way Flow (2018)

Dataset	ATC	ATC Location	Average Weekday 2-Way Flow (Vehs/hr)		
			AM Peak (08:00 – 9:00)	Avg. Inter Peak (12:00 – 14:00)	PM Peak (17:00 – 18:00)
ATC	5	N2	880	823	1,169
	6	Snipe Hill / Mullanstown Road	58	67	101
	7	Townparks Road	25	38	48
	8	Golf Links Road	94	109	160
	9	N52	321	310	426
	10	Silver Hill	17	20	22

Junction Turning Counts

A Junction Turning Count (JTC) captures the total number of vehicles turning at a junction and observes which turn they take. As with the ATCs they classify the traffic into different vehicle categories. JTC surveys were undertaken at 4 junctions on Tuesday 10th July 2018 between 07:00- 20:00. Traffic flow was classified by vehicle type and recorded in 15min time intervals. The following junctions were surveyed (refer to Figure 5-2):

- Junction 1: R165/N52;
- Junction 2: N52/ Silver Hill;
- Junction 3: N2/N52; and
- Junction 4: N33/N2/R171.

Figure 5-4 provides an overview of the 2018 modelled AADT for the N52 corridor and connecting road network.



Figure 5-4 2018 Modelled AADT

Journey Time Data

Journey time data was extracted for the routes illustrated in Figure 5-5 using the Google Distance Matrix Application Programme Interface (API) for the AM, Inter and PM peak hours. The survey has been carried out on 28th January 2020. The average journey time for 8 observations for each of the selected routes for the three model peak hours (AM, Inter and PM) is presented in Table 5-4.

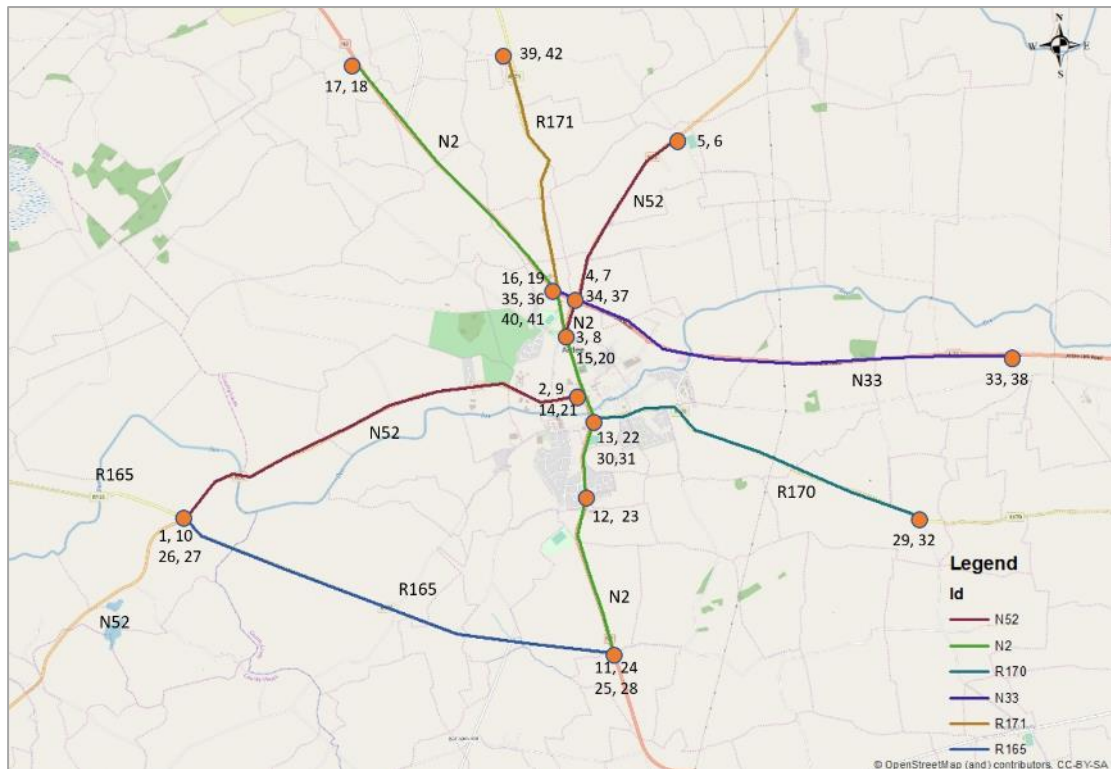


Figure 5-5 Journey Time Data

Table 5-4 Average Journey Times

Route	Section	Distance (km)	Average Journey Time (min:sec)		
			AM Peak	Inter Peak	PM Peak
N52_EB	1-2	4.7	04:40	04:59	05:48
N52_NB	3-4	0.4	00:35	00:36	00:35
N52_NB	4-5	2.1	01:43	01:45	01:44
N52_SB	6-7	2.1	01:47	01:45	01:53
N52_SB	7-8	0.4	00:44	00:39	00:40
N52_WB	9-10	4.7	04:11	04:34	04:23
N2_NB	11-12	1.9	01:38	01:42	01:44
N2_NB	12-13	0.7	01:11	01:07	02:07
N2_NB	13-14	0.3	00:47	01:08	01:48
N2_NB	14-15	0.7	01:43	02:20	02:21
N2_NB	15-16	0.4	00:44	00:46	00:49
N2_NB	16-17	3.2	02:20	02:20	02:20
N2_SB	18-19	3.2	02:25	02:24	02:29
N2_SB	19-20	0.4	00:43	00:44	00:45
N2_SB	20-21	0.8	01:54	02:30	02:41
N2_SB	21-22	0.3	00:43	00:45	00:53
N2_SB	22-23	0.4	01:01	01:15	01:03
N2_SB	23-24	1.9	01:38	01:50	01:46

Route	Section	Distance (km)	Average Journey Time (min:sec)		
			AM Peak	Inter Peak	PM Peak
R165_EB	25-26	4.8	04:15	04:15	04:21
R165_WB	27-28	4.8	04:22	04:35	04:37
R170_EB	29-30	3.8	04:08	04:09	04:04
R170_WB	31-32	3.8	03:58	03:53	03:58
N33_EB	33-34	4.7	04:22	04:20	04:35
N33_EB	34-35	0.2	00:18	00:17	00:17
N33_WB	36-37	0.2	00:17	00:17	00:18
N33_WB	37-38	4.8	03:42	03:46	03:53
R171_SB	39-40	2.7	02:20	02:29	02:22
R171_NB	41-42	2.7	02:22	02:19	02:18

Table 5-5 shows the end to end journey times for the National and Regional roads in the N52 LAM.

Table 5-5 End to End Average Journey Times

Route	Distance (km)	Average Journey Time (min:sec)		
		AM Peak	Inter Peak	PM Peak
N52_Eastbound	4.7	4:40	4:59	5:48
N52_Westbound	4.7	4:11	4:34	4:23
N52_Northbound	2.5	2:18	2:21	2:19
N52_southbound	2.5	2:31	2:24	2:33
N2_Northbound	7.1	8:23	9:23	11:09
N2_southbound	7.1	8:24	9:28	9:37
R165_Eastbound	4.8	4:15	4:15	4:21
R165_westbound	4.8	4:22	4:35	4:37
R170_Eastbound	3.8	4:08	4:09	4:04
R170_Westbound	3.8	3:58	3:53	3:58
N33_Eastbound	5.0	4:40	4:37	4:52
N33_Westbound	5.0	3:59	4:03	4:11
R171_Northbound	2.7	2:20	2:29	2:22
R171_Southbound	2.7	2:22	2:19	2:18

5.4 Model Development

5.4.1 Definition of Model Area

In order to identify the extent of the study area for the LAM a high-level assessment was undertaken using the TII National Traffic Model (NTM) model.

An indicative N52 Ardee bypass scheme was coded into the model in order to determine the extent of the traffic model study area. The test was undertaken in order

to identify the maximum potential impact of the scheme. The screenshot presented in Figure 5-6 highlights the impact of the Ardee bypass scheme during the AM peak in the NTM.

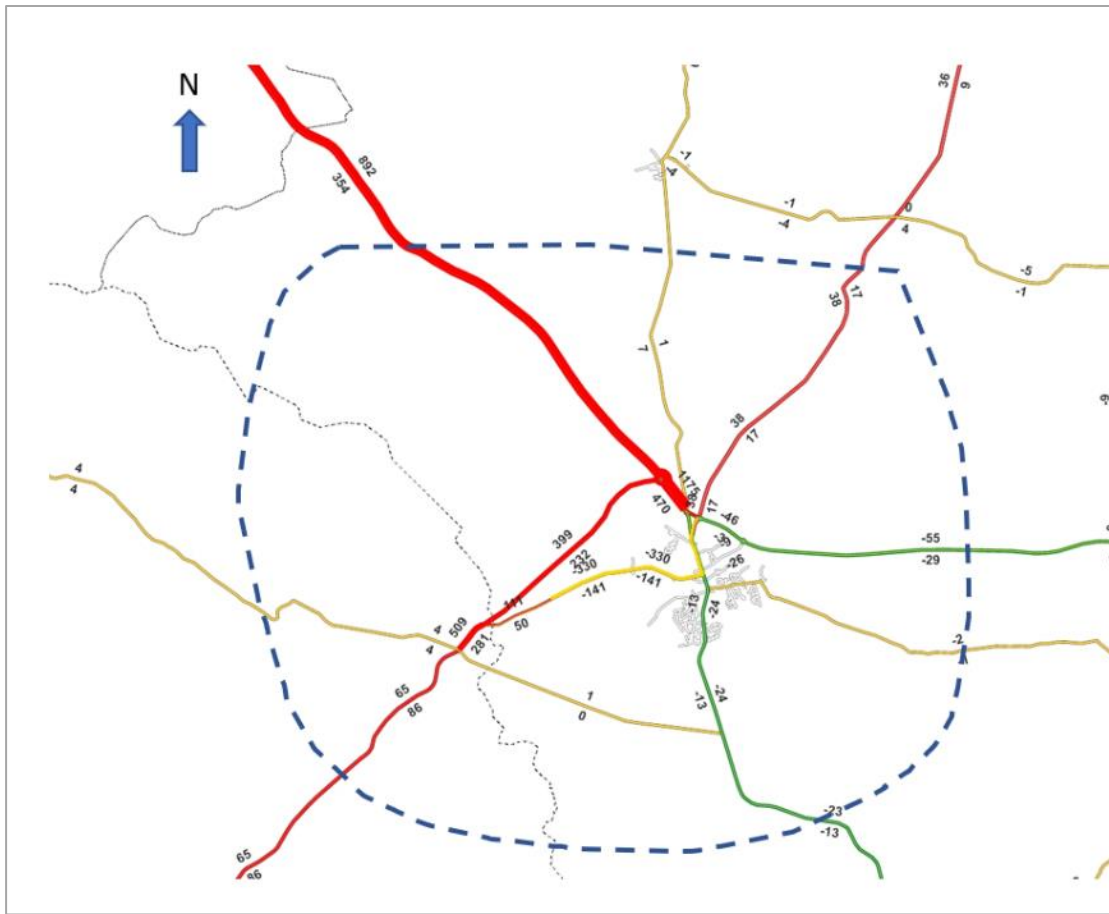


Figure 5-6 Defining the N52 Ardee Bypass Study Area

The impact of the proposed scheme is illustrated using bandwidths, whereby a red bandwidth indicates an increase in traffic and green indicates a decrease. The Figure 5-6 shows that the proposed scheme has an impact upon a number of National roads, including a slight reduction in traffic on the N2 and N33 and subsequent increase on the N52 as traffic re-routes to the proposed scheme.

The study area for the N52 LAM covers Ardee town including the suburban area and National/regional/local roads i.e. N52, N2, N33, R170 and R171. This study area was subsequently cordoned from the NTM Model to form the initial starting point for N52 LAM.

5.4.2 Network Development

The initial road network and zone structure for the 2018 N52 LAM was based on the TII NTM. An amalgamation of site investigation and aerial photography was then used to enhance the N52 LAM model to accurately represent the road network in 2018. Figure 5-7 shows the refined LAM with additional local roads added into the N52.

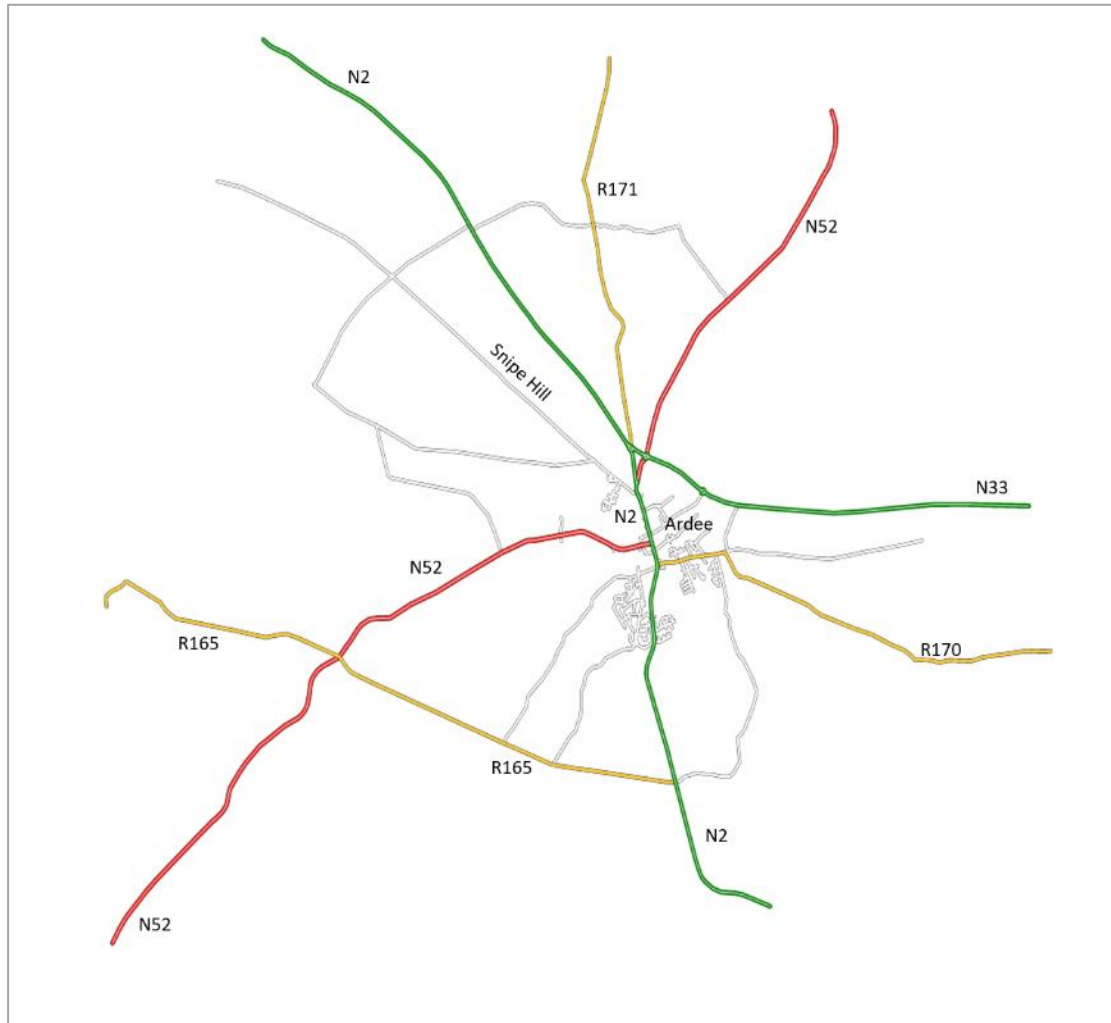


Figure 5-7 Refined N52 Ardee Bypass LAM Road Network

5.4.3 Trip Matrix Development

The following time periods were developed in the N52 LAM:

- Morning peak from 08:00 – 9:00 (AM Peak Period);
- Average hour in the inter peak period from 12:00 - 14:00 (Inter Peak Period); and
- Evening Peak from 17:00 – 18:00 (PM Peak Hour).

'Prior' AM Peak and Inter Peak hour, Light and Heavy vehicle matrices were cordoned from the 2016 TII NTM. The matrices were disaggregated or split to provide a more refined N52 LAM zoning system. The resultant 'Prior' matrices were then adjusted during the calibration process using matrix estimation methods to reflect 2018 demand.

5.4.4 Model Calibration

The purpose of model calibration is to ensure that the model assignments reflect the existing travel situation. Calibration is an iterative process whereby the model is continually revised to ensure that the most accurate replication of the base year conditions is represented. The models were calibrated, and subsequently validated in line with PAG guidance

Matrix Estimation

Matrix Estimation (ME) is the process in which the number of trips assigned along a modelled link is adjusted to match an observed total. Using transportation modelling software (VISUM in this case) it is possible to perform this operation at numerous locations in a single matrix estimation run, adjusting large sections of the trip matrix to match observed demand.

“TFlow Fuzzy” is the matrix estimation tool provided in VISUM, designed to automatically adjust trip matrices to match modelled volumes to observed volumes along multiple links or turns. Prior to the TFlow Fuzzy process, numerical parameters are set to form tolerance values, calculated as a percentage of the observed volumes, in order to ensure accuracy within the matrix estimation process.

The subject models were generally calibrated utilising flow bundle analysis, whereby flow bundle matrices were extracted, examined and subsequently adjusted to match observed flows up and downstream of the point at which the flow bundle was taken.

5.4.5 Future Year Model Development

This section details the development of the future year LAM for the scheme Opening Year (2023), Design Year (2038) and Horizon Year (2053). The development of traffic growth forecasts for the Opening Year and Design Year N52 LAMs is based on the methodology set out in TII PAG Unit 5.3 Travel Demand Forecasting (May 2019). This PAG unit sets out the criteria for using the Zonal growth rates forecasting methodology which is used for forecasting traffic growth when using an Assignment Models.

NTM Growth

The future year forecasted growth in the N52 LAM is based on growth rates developed from the NTpM. The growth for light and heavy vehicles in the NTpM is based on a range of different economic and demographic projections. The growth in light vehicles is forecast based on demographic data such as employment, population, jobs and car ownership. Full details can be found in the NTpM Travel Demand Forecasting Report (NTpM Volume 3).

Internal Zone Trip End Growth

The relationship between the N52 LAM zones and the NTM zones was established, then annualised origin and destination Trip End Growth (TEG) factors for the zones in the N52 LAM were extracted from Unit 5.3 of the PAG for both the AM, Inter and PM Peak Period.

The TEG factors were then applied to the base year origin and destination trip ends for all internal zones in the LAM for 2023, 2038 and 2052 to calculate the total growth. The total growth in demand was distributed between the internal trip ends Ardee based on the proportions set out in Figure 5-8.

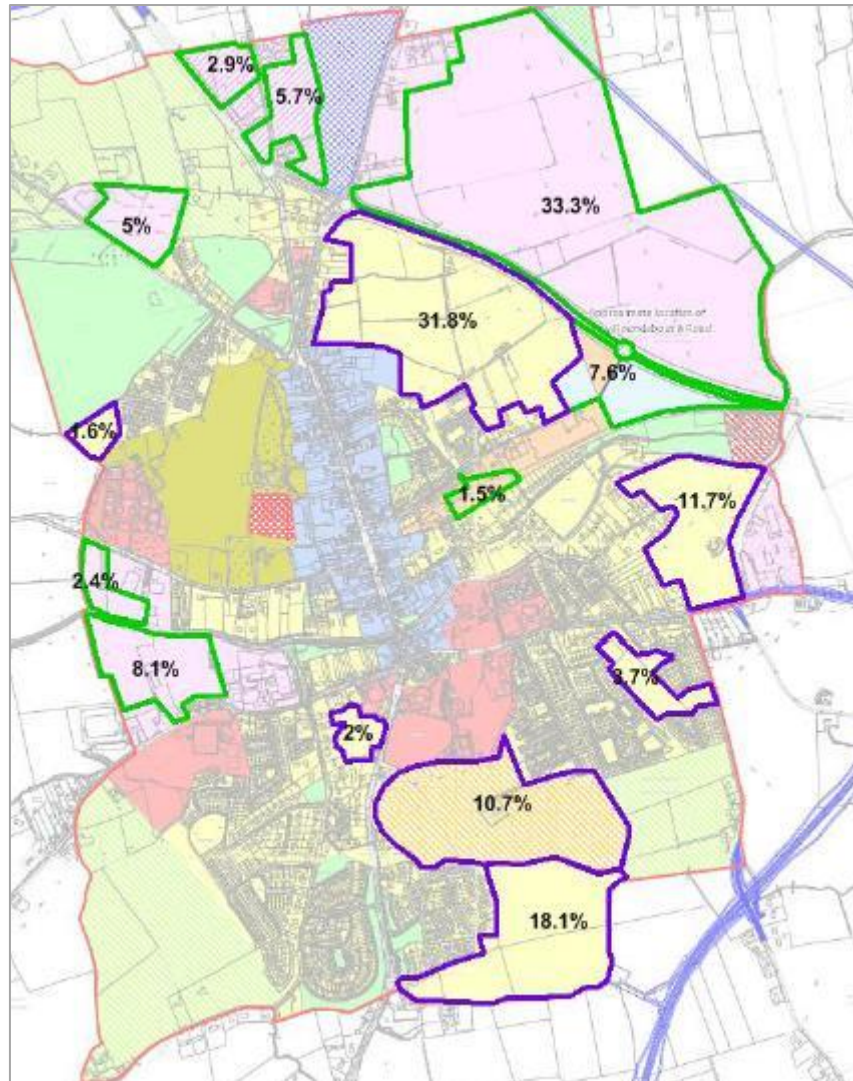


Figure 5-8 Proposed Proportion Growth Rates for the Development Sites

External Zone Trip End Growth

The N52 LAM boundary was cordoned from the Future Year (2030, 2040 and 2050) NTM's and compared against the Base Year (2016) NTM. The resultant growth factor for each external zone trip end was identified and annualised.

The resulting TEG factors were then applied to the base external origin and destinations trip ends in the N52 LAM for the scheme Opening, Design Year and the horizon year.

Future Year Trip Distribution

Future year trip distribution was undertaken utilising the furnishing distribution method. In order to carry out the trip distribution process it was first necessary to 'seed' the cells with no trips in the base year matrices with very small numbers (0.01 vehicles) to allow for future year trips between those specific cells. Otherwise any cell with a zero will remain zero irrespective of the factor applied. As part of the trip distribution process the matrix totals were doubly constrained to the mean of the forecast trip ends totals.

Future Demand Forecast Totals

Traffic growth rates were estimated for the TII Central Traffic Growth scenario based on the PAG. The Central Traffic Growth scenario is the scenario used to inform the appraisal and design of the proposed road development. The total growth in traffic between the 2018 base year and the forecast years is presented in Table 5-6.

Table 5-6 Future Year Total Traffic Growth - Central Growth Scenario

Demand	TII Central Growth		
	2018 - 2023	2018 - 2038	2018 - 2053
AM Peak Car	7%	31%	48%
AM Peak HGV	17%	69%	112%
Inter Peak Car	8%	24%	31%
Inter Peak HGV	16%	65%	106%
PM Peak Car	11%	38%	58%
PM Peak HGV	16%	66%	108%

The resultant 2023, 2038 and 2053 matrix totals based on the TII growth rates as outlined above are provided in Table 5-7.

Table 5-7 Trip Matrix Total Comparison - Central Growth Scenario

Demand	Base Year 2018	TII Central Growth		
		2023	2038	2053
AM Peak Car	2,781	2970	3649	4125
AM Peak HGV	179	209	302	379
Inter Peak Car	2,351	2531	2919	3084
Inter Peak HGV	186	217	308	384
PM Peak Car	3,606	3990	4987	5704
PM Peak HGV	201	234	335	418

5.4.6 Future Year Network Development

Do-Minimum Road Network

There are no other committed schemes planned within the study area so the future year 'Do-Minimum' network reflects the existing road network properly maintained over time. Figure 5-9 illustrates the Do-Minimum network.

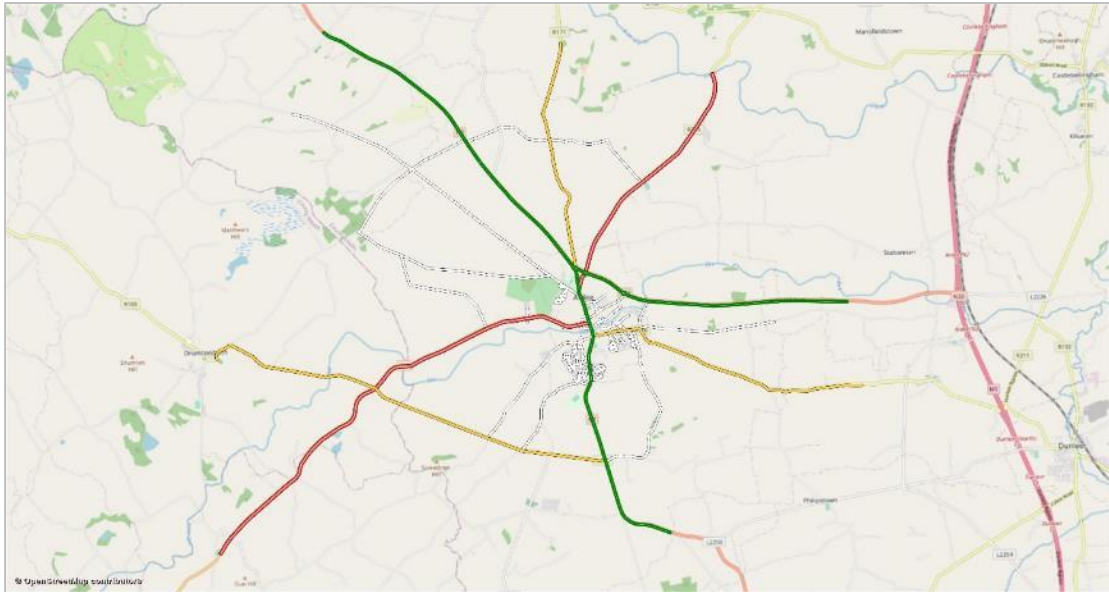


Figure 5-9 Do-Minimum Road Network

Do-Something Road Network

The Phase 3 (Design & Environmental Evaluation) Do-Something road network is illustrated in Figure 5-10. The Do-Something network consists of preferred route and associated junction strategy.

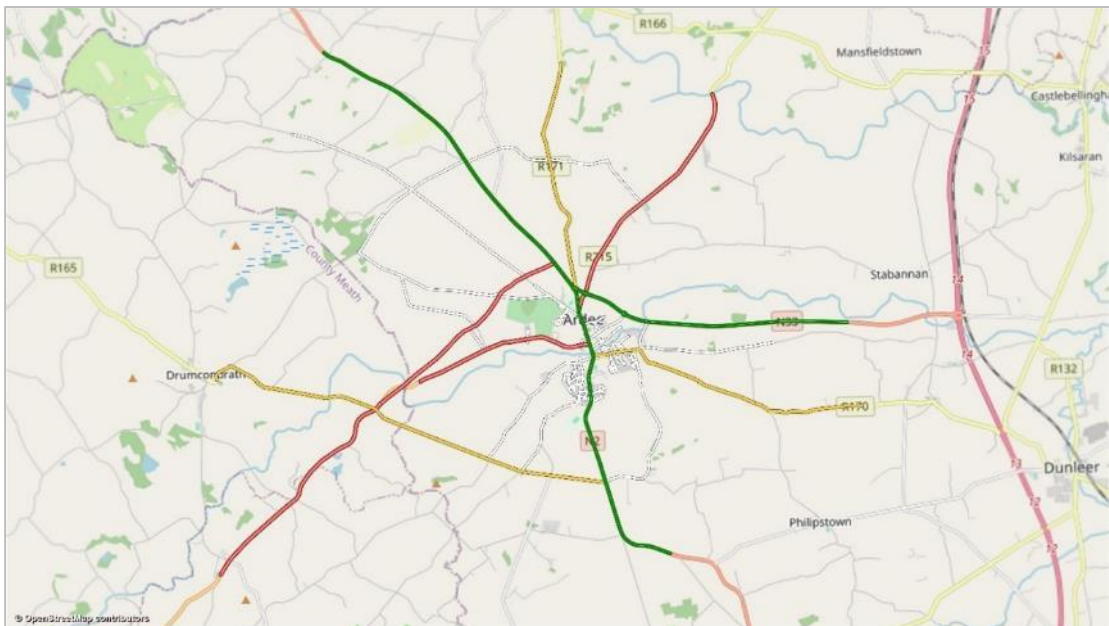


Figure 5-10 Do-Something Road Network

5.5 Predicted Impacts

The forecast AADT and percentage HGV for the 2038 Do-Minimum and Do-Something scenarios respectively is presented in Figure 5-11 to Figure 5-14.

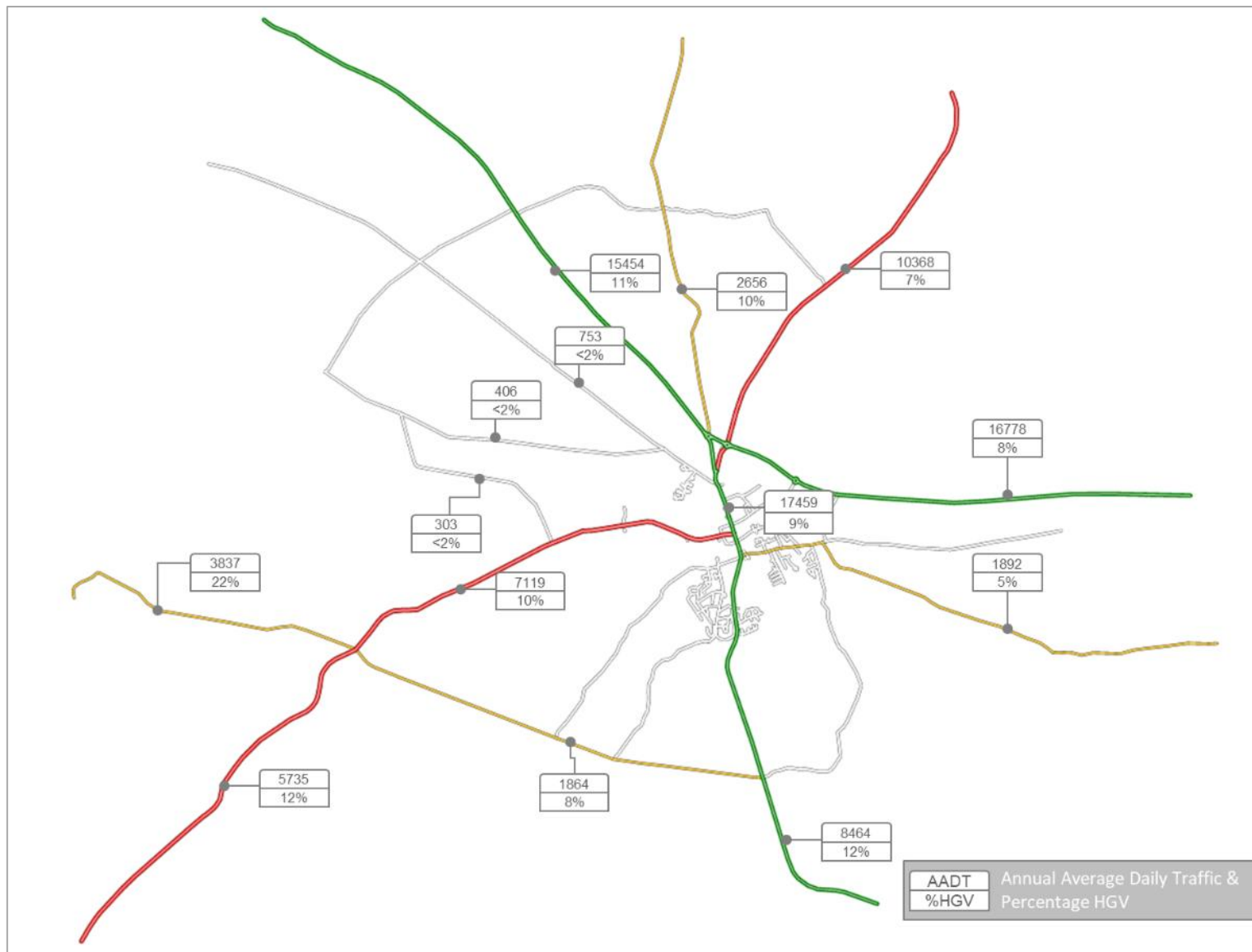


Figure 5-11 N52 Ardee Bypass Forecast 2038 Central Growth AADT – Do-Minimum Network

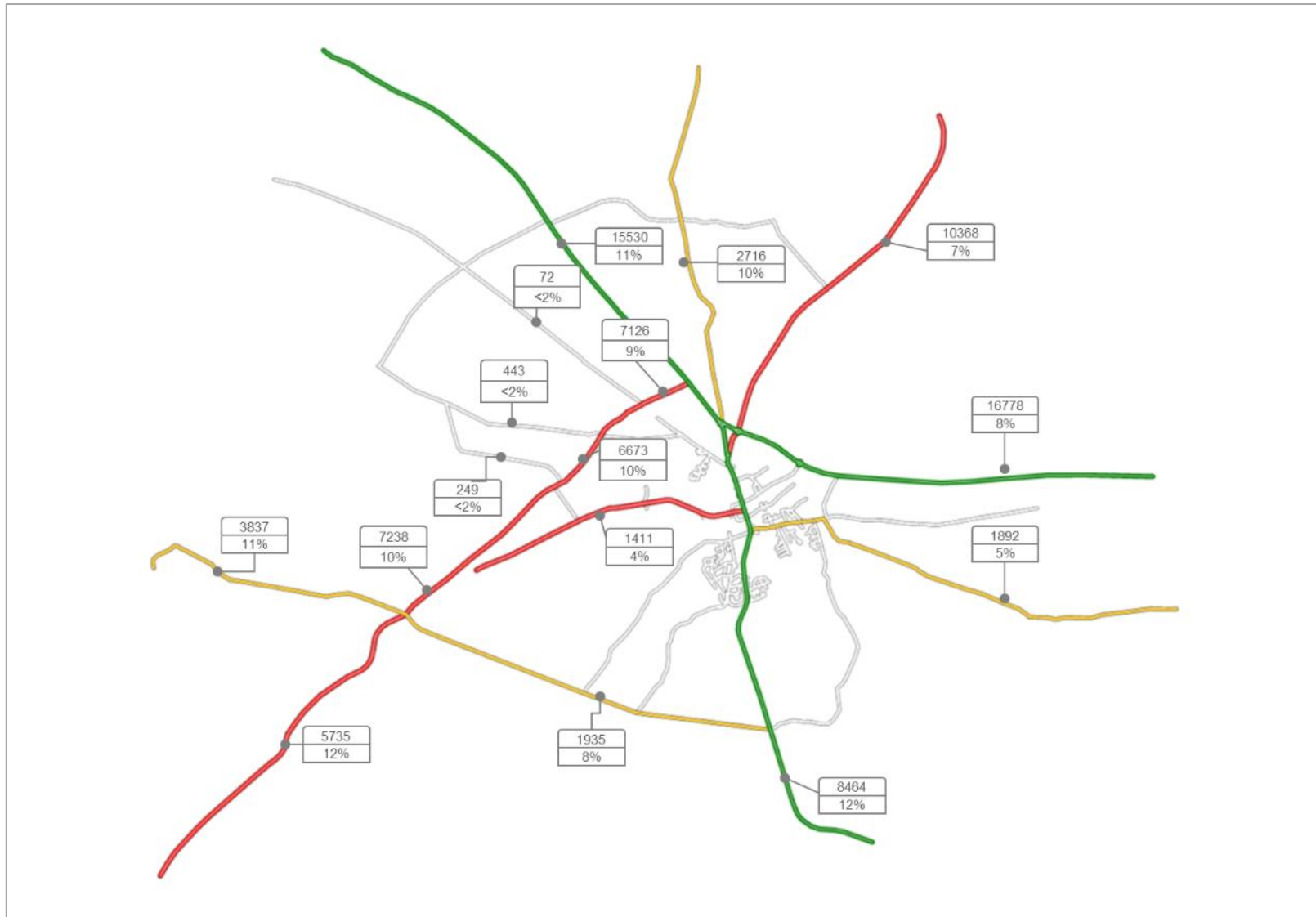


Figure 5-12 - N52 Ardee Bypass Forecast 2038 Central Growth AADT – Do-Something Network

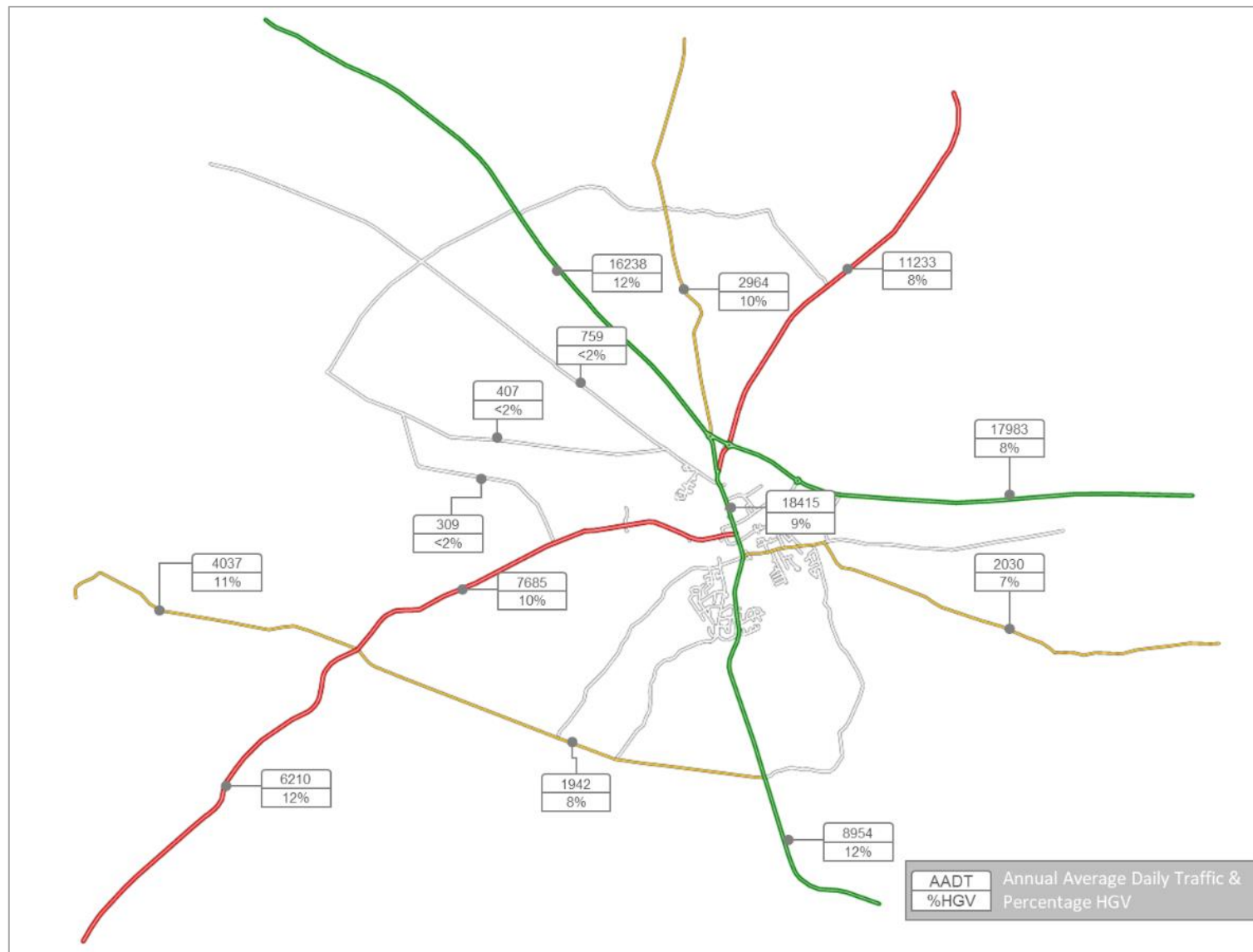


Figure 5-13 N52 Ardee Bypass Forecast 2038 High Growth AADT – Do-Minimum Network

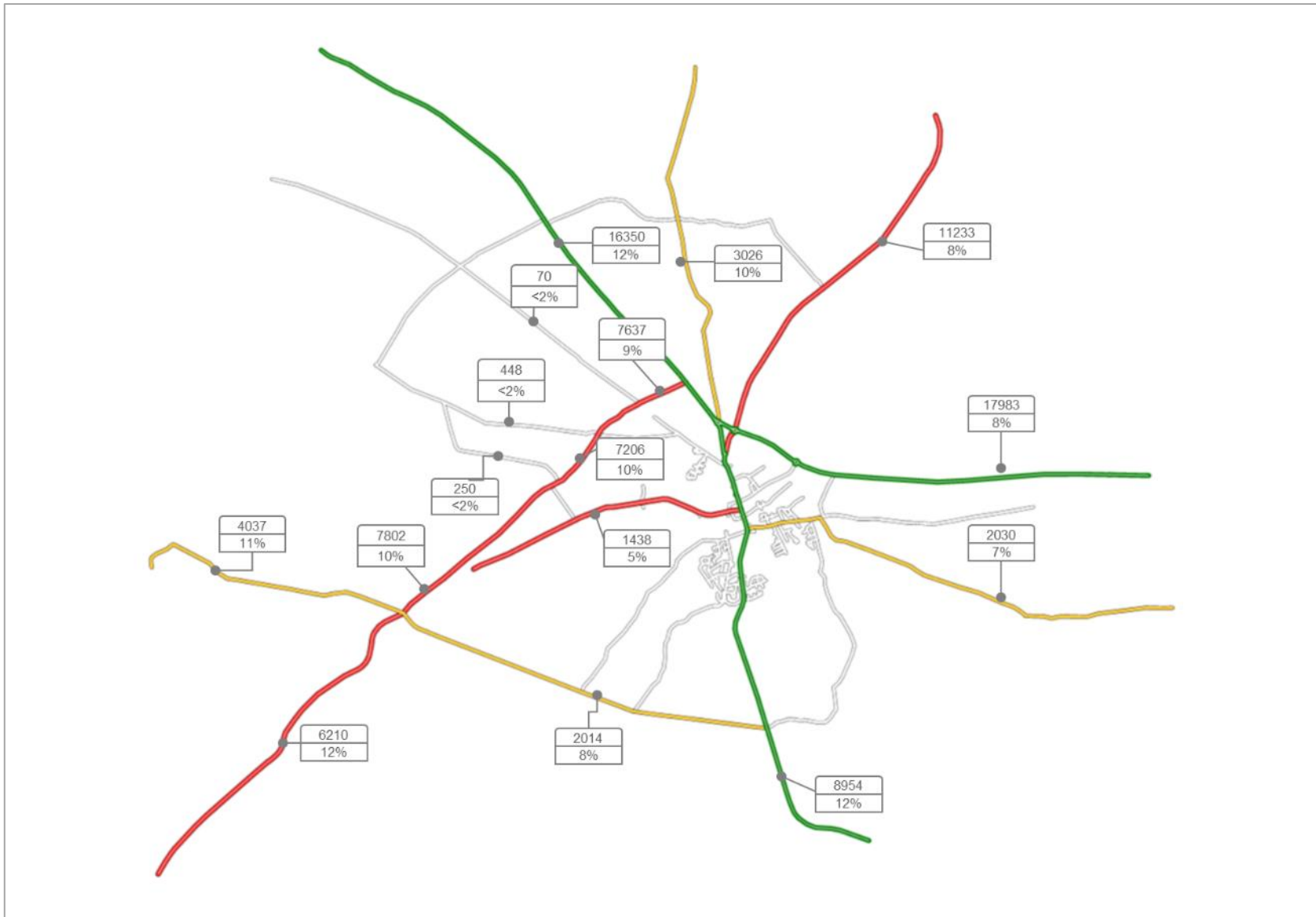


Figure 5-14 N52 Ardee Bypass Forecast 2038 High Growth AADT – Do-Something Network

The proposed road development will reduce journey times by approximately 3 minutes on average between N52 North and N52 West (2038 Do-Something scenario compared to the Do-Minimum scenario).

Table 5-8 represents journey time reduction of proposed options compared against the Do-Minimum model for section from N52 North of section to N52 West for design year 2038.

Table 5-8 Comparison of Journey Time for all options against Do Minimum

Model Comparison	Reduction in Journey Time		
	AM Peak	IP Peak	PM Peak
North-Eastbound	26%	27%	28%
South-Westbound	25%	23%	25%

The comparison of the journey times for all options against Do-Minimum model shows improvement of 23-38% reduction in journey time across all the time periods.

The proposed road development will also significantly reduce traffic levels in town centre, with traffic levels on the core town reducing by approximately 30%, which will lead to reduced air emissions, noise, severance and improved safety for all road users.

6. POPULATION AND HUMAN HEALTH

6.1 Introduction

This chapter addresses the potential population and human health impacts relating to the construction and operation of the N52 Ardee Bypass, hereafter referred to as 'the proposed development'.

6.2 Methodology

A study of population and human health impacts generally addresses impacts at the community level rather than for individuals or identifiable properties. The assessment of impacts at a local level has focused on the communities adjacent to, or in the general environs of, the proposed development works. Particular emphasis has been given to the impacts on local vehicle journeys, pedestrians, cyclists and local residents in terms of the following four headings:

- *Journey characteristics*: an assessment of the impact of the proposed route on journey time, journey time reliability and travel patterns.
- *Community severance*: an assessment of the impact of the proposed route with regard to community severance, including impacts on the use of community facilities, particularly those used by older people, children or other vulnerable groups. The category includes both new severance and relief from existing severance.
- *Amenity*: An assessment of the impact on journey amenity arising from traffic conditions and people's exposure to traffic (i.e. safety, noise, dirt, air quality). The category also includes impacts on sites used for amenity purposes and general impacts on local quality of life.
- *Economic impacts*: an evaluation of the proposed interchange in the context of economic prospects and employment.
- *Human Health*: considered with reference to and interactions with other environmental receptors contained in corresponding sections such as air, noise, traffic, as appropriate.

6.2.1 Study Area

There is no national guidance available on an appropriate study area to focus the assessment of population and human health. The study area has been defined with reference to the potential for impact from the proposed development based on the availability of relevant information. There are 3 EDs partially contained within 500m of the proposed development, see Table 6-1 and Figure 6-1. The area contained in these three Electoral Divisions is therefore assessed as the study area for the population and human health assessment.

Table 6-1 Electoral Divisions within 500m of the Proposed Development

Electoral Division (ED)	County
Ardee Rural	Co. Louth
Ardee Urban	Co. Louth
Drumcondra	Co. Meath

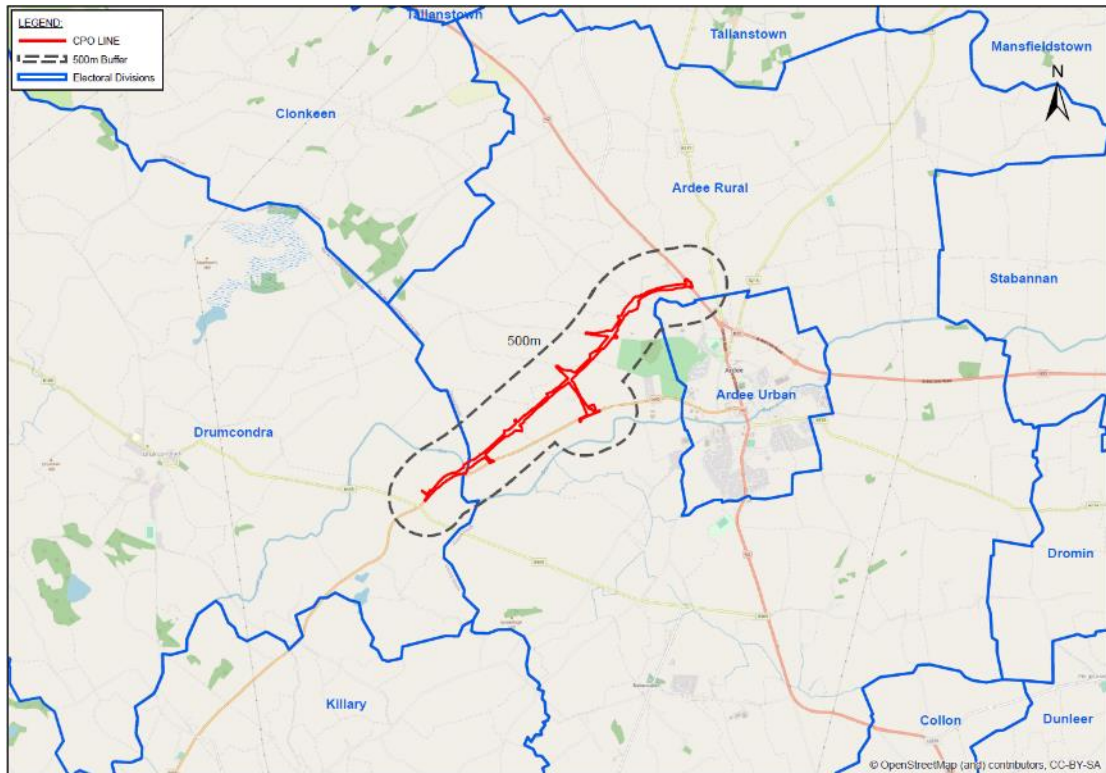


Figure 6-1 Electoral Divisions within 500m of the proposed development

6.2.2 Data Collection Methods

Both primary and secondary data collection methods were used to inform this chapter. A desk-based assessment was carried out to determine the various elements of the existing receiving environment, including population, economic activity, employment, modes of transport and general amenities. Topographical maps and Google maps were also used to inform this chapter.

6.2.3 Data Sources

Data sources consulted to inform this chapter include:

- Central Statistics Office; Census 2016 and Census 2011
- Health Service Executive
- Google Maps
- Myplan.ie
- Ordnance Survey Ireland GeoHive Map
- Issues raised during public consultation

6.3 Description of Receiving Environment

6.3.1 Population

The proposed development is predominantly located in County Louth, with the western extents located in County Meath. Census 2016 reported that the population of County Louth increased by 4.9% from 112,897 in 2011 to 128,884 in 2016. The population of County Meath also increased from 2011 to 2016 from 184,135 to 195,044, representing a 5.9% increase (See Table 6-2). According to Census 2016, the total population for the study area was 9,157 in 2016, demonstrating a 5% increase in population since 2011 (See Table 6-2).

Table 6-2 Population Change from 2011 to 2016

Region	2011 Population	2016 Population	Population Change	% Population Change
State	4,588,252	4,761,865	173,613	3.8%
County Louth	112,897	128,884	5,987	4.9%
County Meath	184,135	195,044	10,909	5.9%
Study Area	8,719	9,157	438	5.0%
Ardee Urban	4,554	4,919	365	8.0%
Ardee Rural	2,875	2,935	60	2.1%
Drumcondra	1,290	1,303	13	1.0%

Age Profile

The age profile for the study area has been determined by reviewing Census 2016 data. The percentage of the population within each age band is broadly comparable to that of County Louth, County Meath, and the State. Those aged 0-14, 25-44 and 45-64 account for a significant proportion of the population of the study area, as shown in Table 6-3.

Table 6-3 Age Groups as % of the Population

Region	Age Groups as % of the Population				
	0-14	15-24	25-44	45-64	65 +
State	21%	12%	30%	24%	13%
County Louth	23%	12%	29%	24%	12%
County Meath	25%	11%	29%	23%	11%
Study Area Average	22%	12%	26%	26%	15%
Ardee Urban	22.1%	10.7%	30.9%	22.6%	13.7%
Ardee Rural	21.7%	13.8%	22.0%	28.0%	14.5%
Drumcondra	21.7%	12.1%	23.6%	27.2%	15.3%

Housing

Census 2016 reports that there are 3,589 dwelling units located within the 3 EDs of the study area. Of those, 90.3% are occupied, while 6.8% are vacant. Additionally, the study area contains a low proportion of vacant holiday homes at 0.5%, compared to the State average of 3.1%.

Table 6-4 Occupancy Status of Permanent Dwellings on Census Night

Region	Occupied	Temporarily Absent	Unoccupied holiday home	Other vacant dwellings
State	85.2%	2.5%	3.1%	9.1%
County Louth	88.6%	2.3%	1.5%	1.7%
County Meath	90.6%	2.5%	0.3%	6.6%
Study Area	90.3%	2.4%	0.5%	6.8%

Region	Occupied	Temporarily Absent	Unoccupied holiday home	Other vacant dwellings
Ardee Urban	90.7%	2.4%	0.2%	6.7%
Ardee Rural	91.5%	2.4%	0.2%	6.0%
Drumcondra	86.5%	2.4%	2.4%	8.6%

Principal Economic Status

Census 2016 was utilised to determine and compare the economic status of the population within the 3 EDs (study area). The principal economic status of County Louth, County Meath and the State has been included for comparison purposes. This data indicates that 50.6% of people in the study area are 'at work'.

Table 6-5 Principal Economic Status

Region	Economic Status							
	At Work	Looking for first job	Unemployed having lost or given up previous job	Student	Looking after home/family	Retired	Unable to work due to sickness or disability	Other
State	53.3%	0.8%	7.1%	11.4%	8.3%	14.5%	4.2%	0.4%
Co. Louth	50.7%	1.2%	9.0%	11.2%	8.6%	14.1%	4.9%	0.3%
Co. Meath	57.0%	0.7%	6.5%	11.0%	9.1%	12.0%	3.5%	0.3%
Study Area Average	50.6%	0.9%	7.9%	11.0%	10.2%	15.0%	4.2%	0.4%

Within the study area, 21% of those who are at work are employed in a skilled trade occupation, with 13.7% employed within professional occupations.

Table 6-6 Occupation

Occupation	Study Area Average
Managers, Directors and Senior Officials	7.0%
Professional Occupations	13.7%
Associate Professional and Technical Occupations	8.1%
Administrative and Secretarial Occupations	9.8%
Skilled Trades Occupations	21.0%
Caring, Leisure and Other Service Occupations	9.0%
Sales and Customer Service Occupations	5.9%
Process, Plant and Machine Operatives	8.4%
Elementary Occupations	7.4%
Not stated	8.2%

Travel to Work, School or College

The modes of transport used within in the 3 EDs (study area) for commuting to work, school, or college were compared to modes of transport for the State, County Louth, and County Meath.

0.8% of the population of the 3 EDs (study area) use a bicycle as a means of commuting to work, school, or college, compared to the State average of 2.9%. The percentage of the population who commute to work on foot (9.8%) is lower than the county average, but slightly higher than the state average of 8.9%. As the proposed development includes pedestrian and cycling facilities there is potential for an increase in the number of people who walk or cycle.

Table 6-7 Modes of Commuting

Region	Modes of Commuting					
	On Foot	Bicycle	Public Transport (incl. Bus and Rail)	Private Vehicle	Do not Commute (work mainly at or from home)	Not Stated
State	8.9%	2.9%	8.9%	69.8%	4.8%	4.8%
Co. Louth	15.6%	1.8%	11.8%	64.3%	2.0%	4.4%
Co. Meath	12.5%	0.9%	12.9%	67.6%	2.9%	3.3%
Study Area Average	9.8%	0.8%	10.8%	71.7%	3.6%	3.3%

6.3.2 General Amenity

The local amenities situated within the study area of the proposed development are identified in Table 6-8 below. The approximate distance from the proposed development to the general amenities are outlined.

Table 6-8 Distance from Proposed Development to General Amenities

Type	Name	Townland	Approximate distance from Proposed Development (KM)
School	Ardee Educate Together N.S.	Townparks	0.85
	Scoil Mhuire Na Trocaire	Townparks	2.0
	Monastery National School	Townparks	2.0
	Ardee Community School	Stonylane	1.5
	S N Pheadair agus Phoil	Rathtrasna	3.9
Church	Ardee Church	Townparks	2.0
	St. Peter and Pauls Church	Rathtrasna	3.7
	St. Marys Abbey	Townparks	1.4
Post Office	Ardee Post Office	Townparks	1.5
	Drumconrath Post Office	Drumcondra	3.5
	Ardee Golf Club	Townparks	0.1

Type	Name	Townland	Approximate distance from Proposed Development (KM)
Sports Ground	Ardee Celtic FC	Townparks	0.5
	Ardee Rugby Club	Townparks	0.7
	Ardee St. Marys GFC	Blakestown	2.1

6.3.3 Human Health Profile

Human health is defined by the World Health Organisation (WHO) as “a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity”.

According to Census 2016, 87.6% of the population within the study area reported that their health was very good/good which is slightly higher than the State average (See Table 6-9). 1.7% of the population within the study area reported their health to be bad/very bad.

Table 6-9 General Health of Population

Region	General Health			
	Very Good / Good	Fair	Bad or Very Bad	Not Stated
State	87%	8%	1.6%	3.4%
Co. Louth	86.4%	8.7%	1.8%	3.1%
Co. Meath	89.6%	6.7%	1.2%	2.4%
Study Area Average	87.6%	8.9%	1.7%	1.7%

In 2015, the Irish Health Repository, Lenus, carried out a countrywide health profile for the Health Service Executive (HSE) (Lenus (2015a and b). The key findings for County Louth and County Meath are as follows:

County Louth

- Has above average lone parent households of 12.4% (national rate 10.9%)
- Deaths rates for all ages, respiratory and injury and poisoning are higher than the national rates, whilst heart disease in those aged under 65 years is lower than the national rate

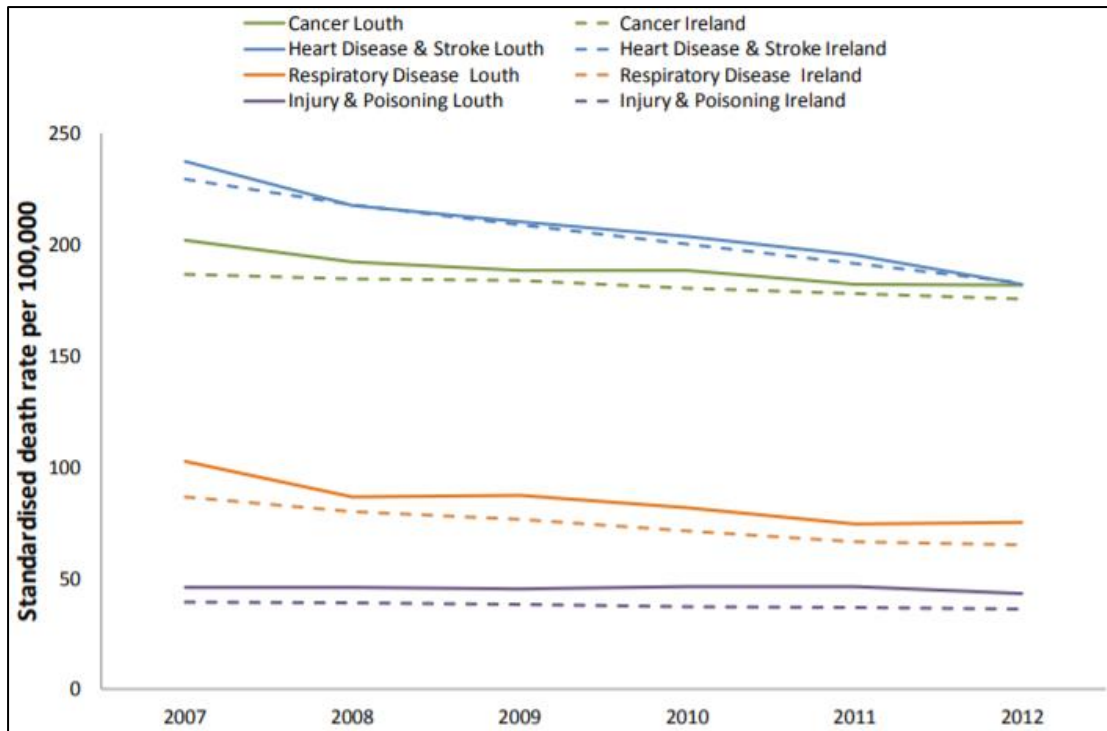


Figure 6-2 Death rate per 100,000 in Co. Louth for the four principal causes of deaths of all ages over the 2007-2012 period. Source: Lenus, (2015)

County Meath

- Has the second highest rate nationally of children aged 0-4 at 9.5%, and the highest for those aged 5-14 of 15.7% (national 7.8% and 13.6% respectively)
- Has the lowest percentage of those who report their health as being bad or very bad at 1.1% (national rate 1.5%), and a low percentage of those with disability of 10.7% (national 13.0%)
- Birth rate for all ages at 17.2 is higher than the national rate of 15.8, births to those aged under 20 at 9.1 is lower than the national rate of 12.3
- Cancer incidence rates for the main causes of cancer are average except for female malignant colorectal cancer which is the second highest nationally
- Has below average death rate for all causes and all ages

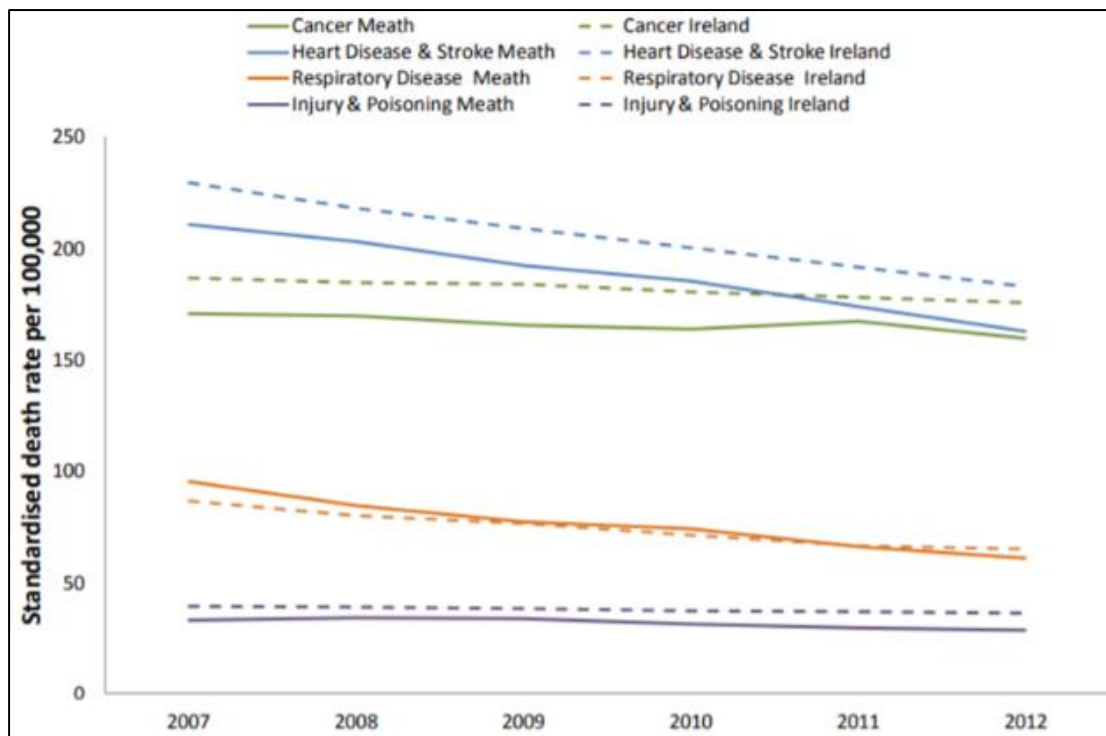


Figure 6-3 Death rate per 100,000 in Co. Meath for the four principal causes of deaths of all ages over the 2007-2012 period. Source: Lenus, (2015)

6.4 Description of Predicted Impacts

This section provides an assessment of predicted impacts as a result of the proposed road development on population and human health.

6.4.1 Construction Phase

The following headings assess the predicted impacts on population and human health as a result of the construction stage of the proposed road development, prior to mitigation measures.

Journey Characteristics

The construction stage will see the construction of tie-ins to the existing roads in the locality which will result in short-term road closures and diversions. This will result in some local journey times being increased due to diversions. Construction traffic may also cause nuisance to locals while material is being delivered to site. The construction stage is predicted to have a moderate, short-term, negative effect on journey characteristics.

Community Severance

The construction of the proposed development may require short-term road closures and traffic diversions along affected roads. Access to properties and community facilities will be maintained at all times, however local diversions may increase travel times. The impact on communities due to the construction stage is predicted to be slight, negative and short-term.

Amenity

The construction stage will result in site traffic travelling to and from the proposed development for the delivery of materials and services. Construction traffic and the construction compound may cause nuisance to local residents and road users due to

noise and dust pollutants. Access to local amenity areas such as the Ardee Celtic will be maintained, however local diversions may be put in place. Impacts on the local amenity as a result of construction is predicted to be moderate, short-term, negative effects.

Human Health

Road construction activities have the potential to cause congestion or risk of collision and hazards. There is potential for nuisance and disruption caused by noise and dust generated from construction in the absence of mitigation measures, causing slight, short-term, negative impacts.

Economic and Employment

The local economy will benefit from local expenditure by construction workers during the construction phase, which will have a slight, short-term, positive effect. The purchase of construction materials will also have a moderate, short-term positive effects on the local economy. Additional indirect employment and economic activity is likely to occur due to the provision of goods and services during construction stages. Access to local businesses will be maintained at all times during construction, however local diversions will be put in place which will result in additional journey times for customers and suppliers. It is predicted that this will have a moderate, short-term, negative impact on local businesses.

6.4.2 Operational Phase

The following headings assess the predicted impacts on population and human health as a result of the operational phase of the proposed road development, prior to mitigation measures.

Journey Characteristics

It is anticipated that the journey characteristics will improve for all modes of travel during operation phase along the N52 and through Ardee town as the new Ardee Bypass will eliminate the need to travel through Ardee town, improving journey time by creating an alternative route and reducing congestion. The proposed development will reduce the volume of traffic passing through Ardee town, thus reduce congestion and resulting in reduced journey time and improved journey time reliability, which is likely to have a significant, positive, long-term effect on journeys within Ardee town and along the N52 National Road which runs from the N2 north of Ardee, through the counties of Louth, Meath, Westmeath, Offaly and Tipperary to its termination at Junction 26 on the M7 at Nenagh. This will result in improved regional and inter-urban connectivity and journey reliability along this south-west to north-east route.

The proposed development includes the implementation of a cul-de-sac on the Mullanstown Road which will marginally increase journey distance for local road users by 400-700m depending on the chosen diversion route, however this will not increase journey time significantly, with journeys increasing by 15-36 seconds depending on the chosen diversion route. This will have an imperceptible, negative, long-term effect. Access across the proposed road development will be maintained along the Silverhill Road and Townparks Road by way of staggered junctions and right-hand turn ghost islands. This will also have an insignificant impact on journey characteristics. For properties located along the old N52, they will now be located on a cul-de-sac, therefore journey times if travelling south-west will also be increased, due to the added diversion onto the proposed development. This is predicted to have a slight, long-term, negative, effect on a small number of properties.

Community Severance

Access within the community will be maintained north and south of the proposed development throughout the operational phase. The proposed development will provide walking and cycling facilities between the rural communities of Silverhill, Townparks and Mullanstown, improving connectivity, resulting in a moderate, long-term, positive effect.

As discussed above, the proposed development will create a cul-de-sac on the Mullanstown road, however pedestrian and cyclist access will be maintained.

A number of agricultural properties will be affected by land take and severance. It is considered that through the provision of mitigation measures for the agricultural properties affected, to ensure the lands can continue to be used, and the provision of replacement boundaries for the properties affected, the overall residual impacts are likely to be long-term, not significant, and negative.

Amenity

Access to community facilities including Ardee Celtic FC, Ardee Rugby Club and Ardee Golf Club will be maintained with additional links for pedestrians and cyclists between the Silverhill, Townparks and Mullanstown Roads along the proposed development.

Vehicular access to community facilities will not be impeded with connectivity remaining across the proposed road development at Townparks Road via a staggered junction, to allow access the Ardee Celtic FC grounds. Those travelling south along Mullanstown Road will be able to access the Ardee Golf and Rugby clubs via the proposed development and the Townparks road. A southbound link from the proposed bypass onto the existing N52 at Silverhill will provide access to facilities on the N52 including Hickey's Home Farm Shop and St. Brigid's Hospital.

Human Health

The proposed development will reduce congestion in Ardee town, improving air quality and reducing noise, and promote sustainable modes of transport like cycling and walking which is likely to have moderate, positive, long-term effects.

Economic and Employment

The Louth Local Area Plan noted that vacant shop units and traffic congestion combined have undermined the appeal of the town centre. The proposed development will minimise traffic and this could potentially make Ardee town a more attractive location for businesses and consumers, which would have a positive effect on economic activity and employment within the town centre. In addition, businesses located on Townparks and Mullanstown Roads will have improved access to the National Road Network.

6.5 Mitigation Measures

6.5.1 Construction Phase

The mitigation measures to be implemented for population and human health are as follows:

- A Construction Environmental Management Plan (CEMP) will be implemented as part of the construction stages to account for all works associated with the construction of the proposed development, including pre-construction site clearance works. This plan will ensure construction practices and measures are put in place to minimise any effects on road users.
- The appointed contractor will be required to finalise the CEMP, in agreement with Louth County Council prior to the commencement of construction. The contractor will identify an Environmental Manager/Site Representative who will be responsible for implementing the Plan and who will act as a liaison between the contractor, Louth County Council and the public with regard to the environmental management of the development works. The Environmental Manager will prepare the CEMP and their duties will include maintaining an environmental record, providing guidance to the site team in relation to environmental matters as well as reviewing environmental management content of method statement.
- A Traffic Management Plan will be submitted for approval to Louth County Council Road and Traffic Division by the appointed contractor prior to the commencement of any construction works as part of the Environmental Management Plan. This plan will put diversions in place during temporary road closures and ensure that temporary traffic works and road safety measures will be in place during the duration of the construction phase to minimise the impact on local road users.
- An Environmental Operating Plan will be implemented prior to construction works. This plan will outline procedures for the delivery of environmental mitigation measures and for addressing day-to-day environmental issues that can arise from construction.
- To minimise air quality impacts, dust minimisation measures will be implemented, see Section 11.5.
- Noise and vibration mitigation measures are outlined in section 12.5 and will be implemented during construction and operation stage.

6.5.2 Operational Phase

- Noise barriers will be placed at noise sensitive locations.
- Landscape planting will be implemented to reduce visual effects for local residents.

6.6 Residual Impacts

There is likely to be short-term, slight, negative effects to the community due to disruption during construction stage. Overall, it is considered that there will be significant, long-term positive effects associated with the proposed development. There are no predicted adverse residual impacts with respect to human health.

6.7 Conclusion

This development will be a valuable asset to motorists who wish to bypass Ardee town on their journeys. Additionally, the proposed development will facilitate sustainable modes of transport, like walking and cycling, and provide a connection between rural communities.

6.8 References

Census, (2016). Small Area Population Maps (SAPS). [Online] Accessed 02-06-2021
<http://census.cso.ie/sapmap/>

Lenus, (2015a) *Health Profile 2015 Louth*. [Online] Accessed 02-06-2021
<https://www.lenus.ie/bitstream/handle/10147/584038/Louth.pdf?sequence=5>

Lenus (2015b) *Health Profile 2015 Meath*. [Online] Accessed 02-06-2021
<https://www.lenus.ie/bitstream/handle/10147/584018/Meath.pdf;jsessionid=0F311FD2EC8FDA444E8EE52C617CD298?sequence=1>

7. BIODIVERSITY

7.1 Introduction

7.1.1 Background

This section contains the Ecological Impact Assessment (EclA) which has been prepared by Roughan & O'Donovan (ROD) in respect of the proposed N52 Ardee Bypass as part of the Part VIII Planning Report and provides an assessment of the baseline ecological conditions in the area likely to be impacted by the proposed development and of the nature, magnitude and significance of those impacts. This EclA also proposes appropriate mitigation measures to eliminate those impacts or, where this has not been possible, to minimise their effects as to no longer be considered significant. Ecological surveys were carried out for the proposed development between February 2020 and February 2021. The purpose of the surveys was to identify, quantify and evaluate the potential impacts that the proposed development might have on the biodiversity and ecology in the local area.

The surveys and assessments were led by Patrick O'Shea MCIEEM. Patrick is a Senior Ecologist in ROD and holds a BA in Natural Sciences (Botany) from Trinity College Dublin and an MSc in Ecological Management and Conservation Biology from Queen's University Belfast. He has nine years' experience in ecological survey and assessment for infrastructure projects.

7.1.2 Legislation and Policy

The European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended) ("the Habitats Regulations") transpose into Irish law Directive 2009/147/EC (the Birds Directive) and Council Directive 92/43/EEC (the Habitats Directive), which list priority habitats and species of Community importance and that require protection. This protection is afforded in part through the designation of areas that represent significant populations of listed species within a European context, i.e. Natura 2000 sites. An area designated for bird species is classed as a Special Protection Area (SPA), and an area designated for other protected species and habitats is classed as a Special Area of Conservation (SAC). Birds in SPAs for which they are designated features and habitats and species listed on Annexes I and II, respectively, of the Habitats Directive in SACs for which they are designated features have full European protection. Species listed on Annex IV of the Habitats Directive are strictly protected wherever they occur, whether inside or outside the Natura 2000 network. Annex I habitats outside of SACs are still considered of national and international importance and, under Article 27(4)(b) of the Habitats Regulations, public authorities have a duty to strive to avoid the pollution or deterioration of Annex I habitats and habitats integral to the functioning of SPAs.

The Wildlife Act, 1976 (as amended) ("the Wildlife Act") is the principal mechanism for the legislative protection of wildlife in Ireland and outlines strict protection for species that have significant conservation value. In summary, the Wildlife Act protects species from injury, disturbance, and damage to breeding and resting sites. All species listed in the Wildlife Act must, therefore, be a material consideration in the planning process.

The Flora (Protection) Order, 2015 ("the FPO") is an important piece of national legislation for the protection wild flora, i.e. vascular plants, mosses, liverworts, lichens and stoneworts, and makes it illegal to cut, uproot or damage a listed species in any way or to alter, damage or interfere in any way with their habitats. This protection applies wherever the species listed in the Schedules to the Order are found.

Sites of national importance for nature conservation are afforded protection under planning policy and the Wildlife Act. Natural Heritage Areas (NHAs) are sites that are designated under statute for the protection of flora, fauna, habitats and geological interest.

Proposed Natural Heritage Areas (pNHAs) are published sites identified as of similar conservation interest but have not been statutorily proposed or designated – pNHAs are nonetheless afforded some protection under planning policies and objectives.

The Ramsar Convention entered into force in Ireland on 15 March 1985. Since then, Ireland has designated 45 sites as Wetlands of International Importance (Ramsar Sites), with a surface area of 66,994 hectares. This intergovernmental treaty embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the “wise use”, or sustainable use, of all of the wetlands in their territories.

Ireland’s *National Biodiversity Action Plan 2017-2021* (DAHG, 2017), in accordance with the Convention on Biological Diversity, is a framework for the conservation and protection of Ireland’s biodiversity, with an overall objective to secure the conservation, including, where possible, the enhancement and sustainable use of biological diversity in Ireland and to contribute to collective efforts for conservation of biodiversity globally. Action 1.1.3 of the National Biodiversity Strategy aspires that “*all Public Authorities and private sector bodies move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure*”. This is particularly relevant to developments. The plan is implemented through legislation and statutory instruments concerned with nature conservation. The Planning and Development Act and the European Communities (Environmental Impact Assessment) Regulations, 1989 (as amended) are particularly important in that regard and includes a number of provisions directly concerned with the protection of natural heritage and biodiversity.

The *All-Ireland Pollinator Plan 2015-2021* (NBDC, 2015) seeks to halt the decline in pollinators through a range of objectives. This plan is supplemented by the guidance document *Councils: Actions to Help Pollinators* (NBDC, 2016).

The Local Biodiversity Action Plan for County Louth 2021- 2026 was endorsed by Louth County Council in 2021 to protect, enhance and restore biodiversity within the County Louth, and to contribute to national and international efforts to halt the sixth mass extinction of life on Earth. The Plan does not reference Ardee or the Ardee Bog pNHA specifically, however the following objectives relate to the protection of biodiversity in the County and infrastructure development:

- LBAP Action 1: Louth County Council will continue to apply best practice in SEA, AA and other assessment tools to ensure proper consideration of biodiversity in policies and plans, for both those projects it is promoting itself and in its role as regulating authority e.g. in planning, waste management etc.
- LBAP Action 2: Louth County Council will require no net loss of biodiversity in relation to grants of planning permission or in any other activity in which it may have a regulatory role and will, if possible, require nett gain for biodiversity.
- LBAP Action 23: Louth County Council will continue to protect, enhance and monitor the ecological status of water during the second cycle of the Water Framework Directive (2015- 2021) including reducing risks to water quality and utilising ecological expertise in decision-making, and in analysis of cumulative effects.

- LBAP Action 27: Louth County Council will endeavour to plant native species, where appropriate, in order to reduce importation of non-native species and varieties.

7.1.3 Approach and Objectives

A habitat is the environment in which an animal or plant lives, generally defined in terms of vegetation and physical structures. Features of ecological significance occurring or likely to occur within the Zone of Influence of the proposed development are classified as Key Ecological Receptors (Key Ecological Receptors) and may include:

- Designated sites;
- Habitats and species protected under the Habitats Directive, the Birds Directive, the Wildlife Act or the Flora (Protection) Order;
- Species subject to restrictions under the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended), i.e. invasive alien species; or,
- Any other features of ecological importance based on recent declines or rarity.

A Key Ecological Receptor can therefore be defined as any site, habitat, ecological feature, vegetative assemblage, community, species or individual:

- occurring in close proximity to the proposed development; and,
- considered likely to be impacted upon by the proposed development;

This EcIA assesses the potential impacts on Key Ecological Receptors and identifies the mitigation measures required to avoid and reduce any likely significant impacts. Identification of impacts and specific mitigation measures have been devised following a collaborative approach by a multidisciplinary team at ROD comprising ecologists, hydrologists, environmental scientists, and engineers.

On completion of scoping, a desk study was undertaken to review all available published data on European and nationally designated sites for nature conservation, other ecologically sensitive sites and habitats and species of interest within the Zone of Influence. Published data describing ecological conditions was then cross-referenced with publicly available maps and aerial orthophotography from Ordnance Survey Ireland (OSi), the National Biodiversity Data Centre (NBDC), the National Parks & Wildlife Service (NPWS) and the Environmental Protection Agency (EPA) to identify important ecological features. During preparation of this Ecology Report, the statutory consultee, the NPWS, provided data on designations of habitats and species of conservation interest. The baseline information obtained from the desk study was the first stage in defining the Zone of Influence of the proposed development.

Following the scoping and desk study, an ecological walkover survey was conducted of the entire site adhering to *Ecological Survey Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (TII/NRA, 2009a) and *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al.*, 2011). The survey classified habitats according to *A Guide to Habitats in Ireland* (Fossitt, 2000) and identified corresponding habitats listed on Annex I of the Habitats Directive. The ecology survey also included a bat roost suitability assessment; and protected mammal survey (e.g. for otters and badgers). The survey provided baseline information regarding ecological conditions of the site, identifying Key Ecological Receptors and the need for any specialist surveys, licensing and mitigation.

Using the comprehensive assessment of the existing environment (baseline conditions), it has been possible to accurately predict the likely impacts of the proposed development on the Key Ecological Receptors and correctly assign an ecological significance to each.

Where impacts have been identified, they have been examined and specific mitigation measures developed in accordance with the hierarchy of options suggested by the European Commission in *Managing Natura 2000 sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC* (EC, 2000). The adopted approach was:

- Avoid at source;
- Reduce at source;
- Abate on site; and, finally,
- Abate at receptor.

The information provided in this EclA accurately and comprehensively describes the baseline ecological environment, provides an accurate prediction of the likely ecological impacts of the proposed development, prescribes mitigation as necessary and describes the residual ecological impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate best practice guidelines for EclA, as described in Section 7.2.

7.2 Methodology

7.2.1 Scope of the Assessment

This section describes the methodologies followed in the compilation of this EclA. Recognised guidelines were followed in relation to every aspect of the survey and assessment.

The assessment methodology is based primarily upon the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1*. (CIEEM, 2019). The survey methodology is based on the *TII/NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes* (TII/NRA, 2009).

In addition, other recognised guidance in Environmental and Ecological Impact Assessment regard provided direction in the preparation of the scope, structure and content of the assessment:

- *Guidelines for Assessment of Ecological Impacts of National Road Schemes Rev 2* (TII/NRA, 2009b) (referred to hereafter as the “TII/NRA Ecological Impact Assessment Guidelines”).
- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft August 2017* (EPA, 2017)
- *Transport Infrastructure Ireland Design Manual for Roads and Bridges* (TII/NRA, 2013).
- *Transport Infrastructure Ireland 2010 Project Management Guidelines* (TII/NRA, 2010).
- *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes* (TII/NRA, 2014)
- *Guidelines on the Implementation of Landscape Treatment on National Road Schemes in Ireland* (TII/NRA, 2012)

- *Environmental Impact Assessment of National Road Schemes – A Practical Guide* (TII/NRA, 2008b).
- *Environmental Assessment and Construction Guidelines* (TII/NRA, 2006).
- *Advice Notes on Current Practice (in preparation of Environmental Impact Statements)* (EPA, 2003).

7.2.1.1 Establishing the Zone of Influence

The key variables determining whether Key Ecological Receptors will be subject to effects through development are:

- the physical distance of the proposed development to the Key Ecological Receptors;
- the sensitivities of the Key Ecological Receptors within the receiving natural environment; and,
- the potential for effects in combination with other plans and projects.

The Zone of Influence, as presented in Drawing N52A-ROD-EAC-SW_AE-DR-EN-300042 of Appendix A, was defined as a 15km buffer from the footprint of the proposed development. A 15 km buffer was selected as this includes all designated areas that could potentially be impacted by the proposed development and beyond this distance potential ecological effects arising from the proposed development could not occur. This includes all designated sites hydrologically connected to the proposed development.

7.2.1.2 Establishing the Study Area

This Study Area was defined by the findings of the desk study (presence/absence of protected habitats, flora or fauna within the Zone of Influence) and best practice methodology referenced above for assessing effects on those ecological features. In general, the study area included the site of the proposed development and a 50m buffer. The surveys extended beyond this area are as follows:

- The Otter survey included watercourses within 150m of the proposed development.
- A breeding Curlew survey was carried out on the Ardee Bog and surrounding fields.
- A March Fritillary survey was undertaken on the Ardee Bog.
- The habitat survey included the Ardee Bog.
- Wintering bird surveys were carried out in the Constraints Study Area. Following the selection of the preferred route corridor, three further wintering bird surveys were carried out within the project boundary and adjacent lands, in the Ardee bog and in the fields surrounding it, and at several fields 1.5km north-west of the Project where Whooper Swans and Greylag Geese were recorded on the first two surveys.
- Two surveys for nesting Curlew were carried out on the Ardee Bog and the surrounding fields on the 21st May and the 10th June 2020. Three further breeding bird surveys were undertaken along the preferred route on the 10th, 23rd and 25th June 2020. No Curlew were recorded.

7.2.2 Desk Study

A desktop study was carried out to collate information on the ecology in the Zone of Influence that will potentially be impacted by the proposed development. Information on species listed on Annex II and IV to the Habitats Directive; the Wildlife Acts; the

Flora (Protection) Order; Annex I to the Birds Directive; and, the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations were sourced from the statutory consultee, the NPWS, and the National Biodiversity Data Centre (NBDC). The NPWS online interactive map-viewer provided information relating to designated sites of conservation importance within the Zone of Influence of the proposed development. Rare and protected species records from within hectad N98 were obtained from the NBDC. The desk study undertaken for this EclA included a review of available ecological data including from the following sources:

- Allott O'Connor (2001) N52/N2 Ardee Bypass Part X Report. Report by Allott O'Connor on behalf of Louth County Council.
- Allott O'Connor (2005) Changes in Alignment to the N52/ N2 Ardee Bypass Part VIII Report. Report by Allott O'Connor on behalf of Louth County Council.
- Bat Conservation Ireland. Data request for recorded within 10km of proposed development centre point. Received 26th April 2021.
- BirdWatch Ireland. iWEBs Data for the Stabannan- Braganstown SPA. Received 12th September 2020.
- Brian Keeley (2018) A walkover assessment of the Ardee Bypass, Co. Louth. Unpublished Report.
- Daly, O.H. & Barron, S. (2014) *Surveys of possible Marsh Fritillary sites and habitat in Cos Louth, Meath & Monaghan, Final report*. Unpublished Report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- EPA publicly available data relating to the Water Framework Directive status of waterbodies within the Zone of Influence.
- Foss, Crushell, O'Loughlin & Wilson (2011) *Louth Wetland Identification Survey*.
- Gilbert G, Stanbury A and Lewis L. (2021) *Birds of Conservation Concern in Ireland 2020-2026*. Irish Birds 9: 523-544.
- IPCC (1990) *Ardee Bog Site Evaluation*. Irish Peatland Conservation Council.
- IPCC (1998) *Ardee Bog, Co. Louth. Survey and Evaluation Report*. Irish Peatland Conservation Council.
- Keeley, Brian (2018) A Walkover Assessment of the Ardee Bypass, Co. Louth.
- Mitchell, F., & Tuite, B. (1995). The great bog of Ardee. Dundalk, County Louth Archaeological and Historical Society.
- NPWS *Designations Viewer*.
- NPWS *Flora Protection Order Map Viewer - Bryophytes*.
- NPWS documents related to national and European protected sites within the Zone of Influence.
- National Biodiversity Data Centre (NBDC) *Biodiversity Maps*.
- TOBIN (2019) *N52 Ardee Bypass Ecology Walkover for Advance Fencing Contract. Report*. TOBIN Consulting Engineers.
- TOBIN (2009) *N52 Ardee Bypass Badger Sett Reopening Report*. December 2009. TOBIN Consulting Engineers.

As with all desk studies, the data considered was only as good as the data supplied by the recorders and recording schemes. The recording schemes provide disclaimers in relation to the quality and quantity of the data they provide, and these were considered when examining outputs of the desk study.

7.2.3 Consultations

The statutory and non-statutory consultees listed in Table 7-1 were contacted during the desk study and invited to submit any observations in relation to the proposed development. All issues raised by the consultees have been addressed as far possible in this chapter.

Table 7-1 Consultation Responses

Consultee	Date	Summary of Response
Statutory Consultees		
National Parks & Wildlife Service	24 th March 2021	The NPWS noted the following: - The route of the proposed development goes across the eastern edge of the Ardee Cutaway Bog pNHA. The NPWS received a number of unconfirmed reports of Curlew activity in this area during the 2019 and 2020 breeding seasons. - It is aware of the presence of at least one Badger sett in close proximity to the proposed development site. It is noted that the proposed route includes a number of crossings on rivers which are known to be occupied by Eurasian Otter. - The area to the southwest of the Silverhill road is frequently flooded during the winter months. This area is used as a feeding area by a considerable number of waders and wildfowl including Curlew, Lapwing, and Whooper Swans. - The proposed development has the potential to disturb breeding birds (specifically Curlew) otter, and their resting places and badger setts. - The proposed development has the potential to increase mortality of waders and wildfowl using the area. The NPWS recommend the following measures be taken to mitigate impacts; - Prior to any development an otter survey and a badger survey should be carried out across the entire development site by a suitably qualified ecologist. Suitable mitigation measures should be put in place, guided by the surveys, to ensure minimal disturbance to protected mammals during road construction and operation. - A specific breeding Curlew survey should be undertaken to determine the extent of usage of the area immediately surrounding the proposed site and what measures are necessary to be put in place to ensure minimal impact to breeding birds. - Landscaping or removal of vegetation should be undertaken outside the dates of the bird nesting season (1st March to 31st August) to avoid disturbance of nesting birds. The NPWS stated that surveys should be carried out to determine the movements of wildfowl and waders in this area in order to put in places mitigation measures to avoid collisions and increased mortality.

Consultee	Date	Summary of Response
Inland Fisheries Ireland	26 th August 2021	IFI noted the following: The proposed road will cross several watercourses in the River Dee catchment namely: • River Dee main channel • Garra River • Un-named tributary north of Bohernamoe • Un-named tributary at Townparks From a fisheries perspective these watercourses contain valuable fisheries habitat and support stocks of salmon, trout, European Eel, lamprey, pike and coarse fish species among other species. Salmon and lamprey species are Annex II listed species in the European Habitats Directive. Both the River Dee and the Garra River are popular angling amenities, as a result angler access should be borne in mind at design stage. IFI's concerns regarding works of this nature include: • Damage to the aquatic and associated riparian habitat • Pollution of water • Interference with upstream and downstream movement of aquatic fauna • Introduction of non-native species In the case of watercourse crossings IFI's preference would be for clear span bridges or bottomless culverts as they have the least impact on fisheries habitat. Design of any structure should ensure the existing gradient is maintained, where necessary, and the passage of fish and other aquatic fauna should be maintained. IFI's general requirements for works of this nature include: • IFI should be consulted regarding the design of all watercourse crossings • Instream works should be carried out in the period July to September • There must be not discharge of suspended solids or any other deleterious matter to watercourses • IFI should be kept informed of progress with the proposed project.
Non-statutory Consultees		
Irish Peatland Conservation Council	27 th February 2020	The main concerns of the Irish Peatland Conservation Council (IPCC) were: • Construction on peat soils which may have implications for the hydrological management of proposed development, and which may impact on the raised bog habitat, local community and town. • Destabilisation of peat sediments which can make their way into the river network impact aquatic flora and fauna.

Consultee	Date	Summary of Response
		• IPCC stated there needs to be a hydrological and peat depth assessment to ensure that no adverse effects are imposed on the rare, raised bog habitat, species that utilise it or the river network before the proposed development goes ahead. Impact to the river network and Ireland's reporting of the status of our rivers to the European Union under the Water Framework Directive. • Impact to European designated sites • Impact to Curlew and their breeding habitat • Impact of the proposed development on wetland habitat which supports frogs. • The risk of spread of invasive species arising from the construction phase. The IPCC acknowledged the existing issues around road safety and congestion but stated that the development of infrastructural projects should not be an impediment to the protection of an important peatland habitat. IPCC would like to see more sensitivity in regard to the environment and the protection of rare, raised bog habitat which has local, national and international ecological value.

7.2.4 Field Surveys

Table 7-2 Ecological Survey Details

Survey	Date	Surveyor
Habitats	21 st May 2020; 1 st September 2020	Patrick O'Shea and Kate Moore
Bats	23 July, 25 th August & 9 th September 2020	Patrick O'Shea assisted by ROD Ecology Team
Breeding Curlew	21 st May & 10 th June 2020	Patrick O'Shea
Breeding Birds	10 th , 23 rd & 25 th June 2020	Patrick O'Shea and Kate Moore
Wintering Birds	4 th February, 5 th March, 1 st December 2020 and 2 nd February, 17 th February 2021	Patrick O'Shea
Marsh Fritillary	23 rd September 2020	Patrick O'Shea
Invasive Species	1 st September 2020	Patrick O'Shea
Otter	1 st February 2021	Patrick O'Shea
Badger	1 st February 2021	Patrick O'Shea

7.2.4.1 Habitat Surveys

The habitat survey was carried within the footprint of the proposed development and a 50m buffer and also within the Ardee Bog pNHA. Habitats were recorded in accordance with Fossitt (2000). Habitat mapping was undertaken with regard to guidance set out in Smith et al. (2011). Plant nomenclature for vascular plants followed *Webb's An Irish Flora* (Parnell & Curtis, 2012). Habitats considered to be of ecological significance, including those with the potential to correspond to those listed in Annex I of the Habitats Directive, were identified during the walkover survey.

7.2.4.2 Protected Mammal Surveys

The methodologies followed in undertaking the various detailed protected mammal surveys undertaken are presented below.

Otter (*Lutra lutra*)

The purpose of the otter survey was to identify any sensitive features within the study area potentially of use to breeding, resting, foraging or commuting otters and to establish presence or absence of otter activity.

The otter survey was based on best practice guidance (TII, 2008b; 2008c) and involved a search of the River Dee, River Garra and ditches for physical evidence of otters, e.g. spraints, prints, slides, trails, couches and holts. TII (2008b; 2008c) does not specify an extent or scope for an otter survey other than an expectation that the derogation limit⁵ of 150m is sufficiently covered. The survey methodology was also cognisant of the recommendations in the Otter Threat Response Plan 2009-2011 (NPWS, 2009), which recognises the importance of the riparian buffer (10m on both banks) for otters and these areas were included in the survey corridor.

Badger (*Meles meles*)

The badger survey was conducted in order to determine the presence or absence of badgers within the study area. The proposed development may directly or indirectly impact on badgers. Construction may result in death or injury to badgers within setts, as well as the destruction of the setts themselves, loss of foraging habitat or dissection of their foraging areas. Construction works close to breeding setts can cause serious disturbance to badgers and mortality of cubs.

The badger survey was based on best practice guidance (TII, 2006b; 2008c) and involved a systematic search of all fence lines, woodland and scrub habitats within 30 m of the centreline of the proposed development (where accessible) for evidence of badgers, e.g. setts, latrines, badger paths. The optimal period for badger surveys is during seasonal peaks in territorial activity and when vegetation cover is at a minimum (February to April, inclusive, and a less pronounced peak in October). Badger setts were classified as main, annex, subsidiary and outlier, as per the convention set out in TII (2006b) and levels of current usage were noted.

Bats

The bat suitability assessment was conducted adhering to best practice guidance (TII, 2006a; Collins (ed.), 2016) and involved a visual assessment and categorisation of structures and trees capable of supporting roosting bats. The site of the proposed development was cleared in 2019, there therefore there was limited vegetation and no structures within the land take. Suitable entry and exit were examined on the Dee Bridge (Burley Bridge) for physical evidence of use by bats, e.g. droppings and

⁵ The "derogation limit" is the distance from an otter holt within which a licence is required for derogation from the strict protection for the breeding and resting places of otters (and other Annex IV species).

indicative staining and scratching at holes or cracks. An external visual assessment was undertaken using binoculars and torches. Trees were assessed using the recognised criteria set out in Collins (ed.) (2016). Trees with any natural holes, cracks/splints in major limbs, loose bark, hollows/cavities or dense epicormic growth that could provide moderate to high potential were recorded.

The bat activity surveys were conducted adhering to best practice guidance (TII/NRA, 2006a; Collins (ed.), 2016) and included one driven and two walked activity surveys. The surveys were undertaken using two ecologists and the surveyors used either an Anabat Walkabout or Song Meter EM3+ bat detector. Both detectors allow visual validation of echolocation recordings (species identification) in real time and all audio files are linked to a GPS and digitally geospatially referenced. The walked transect involved walking the preferred route at a slow pace to observe and record bat activity along the route. The bat activity transects were undertaken between 15 minutes before sunset and two hours after sunset.

The driven transect survey involved one person holding a bat detector out the passenger window and recording bat calls, and the second person driving at <25kmph. Driven transects cover greater distance, however the time a surveyor is in one spot is less than on walked transect surveys. The driven transect survey began at dusk and lasted 2.5 hours.

Following each survey, recordings (detections) were processed using Kaleidoscope Pro Analysis software to extract information including sound recordings, sonograms, GPS coordinates, time, date and species identification confidence values. Recordings with low confidence values or of rare species were validated manually. All validated detections were geospatially referenced using the ESRI geographic information systems (GIS) program, ArcGIS.

7.2.4.3 Birds

Breeding Birds

The breeding bird survey followed an adapted methodology of Breeding Bird Survey (BBS) as described in Gilbert et al. (1998). The preferred route was walked early in the morning at a slow pace, and birds within the surveyor's field of vision and hearing were recorded. The surveyor carried a pair of 10× binoculars to aid the identification of birds at distance. All bird species were recorded using standard species codes from the British Trust of Ornithology (BTO). Breeding evidence for each species was also collected, noting 'possible', 'probable' and 'confirmed' breeding outlined in Bird Atlas 2007-11 (BTO, 2011).

In addition to the standard breeding bird surveys, two surveys for breeding Curlew were carried out on the Ardee Bog and the surrounding fields on the 21st May and the 10th June 2020. The survey involved walking to within 50m of all points on the Ardee Bog and scanning the surrounding fields with binoculars.

The habitat 150m upstream and downstream of the proposed River Dee and River Garra crossing points were surveyed for potential Kingfisher nesting sites. This survey was carried out at the same time as the Otter Survey.

Wintering Birds

The wintering bird survey followed the 'look-see' methodology described in Gilbert et al. (1998). Wintering birds are defined as those species whose entire winter population over-winters in Ireland and resident bird species whose numbers are augmented by

winter arrivals from other countries. All wintering bird species were recorded using standard species codes from the British Trust of Ornithology (BTO).

Wintering bird surveys were carried out in the Constraints Study Area on the 4th February and the 5th March 2020. Following the selection of the preferred route corridor, three additional wintering bird surveys were carried out within the Project boundary and on adjacent lands, on Ardee Bod and in the fields surrounding it, and at several fields 1.5 km north-west of the Project where Whooper Swan and Greylag Geese were recorded during the first two surveys. These surveys were carried out on the 1st December 2020 and the 2nd and 17th February 2021.

7.2.4.4 Additional Protected Species

During the walkover survey the potential for the study area to support additional protected mammals listed in the Wildlife Act, such as Irish Hare, Pine Marten, Red Squirrel, Pygmy Shrew, Irish Stoat, Hedgehog etc. was assessed and any physical evidence of presence recorded.

All waterbodies within the footprint of the proposed development and a 50m buffer were assessed for potential to support frogs and newts during the habitat survey.

Ardee Bog contains Devil's-bit Scabious (*Succisa pratensis*), the favoured food plant of the Marsh Fritillary (*Euphydryas aurinia*). A survey was undertaken to check for Marsh Fritillary larval (caterpillar) webs on 23rd September 2020. The area was walked at a slow pace and the plants were inspected for larval webs of Marsh Fritillary.

7.2.4.5 Invasive Species

The focus of the invasive species survey was to identify species subject to restrictions under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). Target notes were taken on any invasive species identified. Information recorded included the location, total area of infestation, plant condition and height. Site features that could affect control measures such as adjacent land use, structures and services were also recorded.

7.2.5 Ecological Evaluation and Impact Assessment Methodology

7.2.5.1 Evaluation of Ecological Resources

The criteria used for assessment of the value of the ecological resources follows those set out in Section 3.3 of the TII/NRA Ecological Impact Guidelines (2009). These guidelines set out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor. The guidelines provide a basis for determination of whether any particular site is of importance on the following scale:

- International
- National
- County
- Local Importance (Higher Value)
- Local Importance (Lower Value)

This guidance clearly sets out the criteria by which each geographic level of importance can be assigned. For example, Locally Important (Lower Value) receptors contain habitats and species that are widespread and of low ecological significance and only of any importance in the local area. Conversely, Internationally Important sites are either designated for conservation as part of the Natura 2000 Network (SAC or SPA)

or provide the best examples of habitats or internationally important populations of protected fauna.

All habitats and species within the Zone of Influence and study area were assigned a level of significance on the above basis and Key Ecological Receptors were established and classified on this basis. Features of Local importance (Lower Value) and features of no ecological value are not considered to be Key Ecological Receptors.

7.2.5.2 Assessment of Impact Type and Magnitude

Reference is made to the following parameters wherever appropriate when characterising impacts (Section 5):

- Magnitude – relates to the quantum of impact, for example the number of individuals affected by an activity;
- Extent – relates to the area over which the impact occurs;
- Duration – intended to refer to the length of time for which the impact is predicted to continue, until recovery or re-instatement;
- Reversibility – whether an impact is ecologically reversible, either spontaneously or through specific action; and,
- Timing – timing and/or frequency of impacts in relation to important seasonal and/or life-cycle constraints should be evaluated. Similarly, the frequency with which activities (and associated impacts) would take place can be an important determinant of the impact on receptors.

The assessment of impact takes account of construction and operational phases; direct, indirect and synergistic impacts; and, those that are temporary, reversible and irreversible. The criteria for assessment of impact magnitude, type and significance are given in Table 7-3 and Table 7-4. The following terms are defined when quantifying duration (EPA, 2017):

- Temporary – up to 1 year;
- Short-term – 1 to 7 years;
- Medium term – 7 to 15 years;
- Long term – 15 to 60 years; and,
- Permanent – over 60 years.

Table 7-3 Criteria for assessing impact significance based on (EPA, 2017)

Impact Magnitude	Definition
No change	No discernible change in the ecology of the affected feature.
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect that causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

Impact Magnitude	Definition
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An impact that obliterates sensitive characteristics.

Table 7-4 Criteria for assessing impact quality based on (EPA, 2017)

Impact Type	Criteria
Positive	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

Once the potential impacts are characterised, the significance of any such impacts on the identified Key Ecological Receptors will be determined. An impact is considered to be ecologically significant if it results in a change in the conservation status of a Key Ecological Receptor.

7.2.5.3 Process of Assessing Significance

The significance of any identified impacts is determined whereby impacts are assigned significance on the basis of an analysis of the factors which characterise them, irrespective of the value of the receptor. Significance is determined by effects on conservation status or integrity, regardless of geographical level at which these would be relevant.

If impacts are not found to be significant at the highest geographical level at which the resource has been valued, they may be significant at a lower level and this is determined sequentially. Similarly, impacts that do not affect the integrity of a site may, nevertheless, affect the conservation status of a valuable constituent habitat or species, at a lower geographic scale. An equivalent approach has been applied to mitigation measures prescribed, which may have a significant beneficial impact, but at a higher or lower geographic scale than the receptor to which they have been applied.

7.2.6 Mitigation

The proposed development has been designed to specifically avoid, reduce and minimise negative effects on all Key Ecological Receptors. The potential impacts of the proposed development have been considered and assessed to ensure that all impacts on Key Ecological Receptors are adequately addressed. Where potential significant negative effects on Key Ecological Receptors are predicted, mitigation has been prescribed to ameliorate such impacts.

Specific best practice design and mitigation measures are set out in this EcIA and are feasible in terms of cost and practicality. Provided measures follow the prescribed methodologies and best practice guidelines where available. They have a high probability of success in terms of addressing the impacts on the identified Key Ecological Receptors.

The need for compensation and/or enhancement measures has also been considered. Compensatory measures are those which 'offset' significant residual (i.e. post-mitigation) impacts. Enhancement measures are those which "seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation" (CIEEM, 2018, p. 12).

7.2.7 Survey Limitations

Standard survey methods were followed, and no particular difficulties were encountered during the completion of the surveys described above. However, any biases or limitations associated with these methods could potentially affect the results collected. While every effort was made to provide a full assessment and comprehensive description of the study area, ecological trends (e.g. population trends) may not be fully reflected due to the instantaneous/short-term nature of the field surveys. However, the data obtained from field surveys coupled with the background knowledge provided by the desk study provides a robust representation of the baseline for the habitats and species within the Zone of Influence.

7.3 Desk Study Results

This section of the EclA presents the results of the desk study.

7.3.1 General Description of the Receiving Environment

The landscape in the area of the proposed development is low-lying agricultural land. The dominant land use is grazing for cattle and sheep with some fields used for crops such as potato and cereals. The fields are divided by a network of hedgerows and occasionally treelines. The Ardee Bog lies to the west of the proposed development and is a degraded raised bog which has suffered from anthropogenic pressures over recent years but still exhibits some characteristics and species composition of raised bog and heath habitat. The bog is surrounded by encroaching birch woodland and agricultural land consisting of long and narrow fields which are indicative of the extensive and ongoing drainage.

The Ardee Cutaway Bog proposed Natural Heritage Areas (pNHA) includes the Bog, the surrounding woodlands and fields. The proposed road development crosses the pNHA near Townparks at which point the pNHA is has been drained and fertilised and is now improved agricultural grassland of limited ecological value.

The proposed road development crosses two significant watercourses, the River Dee and the River Garra, which is a tributary of the River Dee. These watercourses have been subject to channelisation and ongoing arterial drainage works. Nevertheless, these watercourses are of ecological significance owing to the aquatic and riparian habitats they provide for species including Otter, Kingfisher and Daubenton's Bat, and also in their function as ecological corridors.

There are three designated sites downstream of the proposed development, the Dundalk Bay SAC, the Dundalk Bay SPA and the Dundalk Bay pNHA. The conservation importance of these site lies in the presence of vast areas of intertidal habitats, marine habitats and the occurrence of birds listed on Annex 1 of the E.U. Habitats Directive.

The route of the proposed road development was cleared and fenced off in 2019 and most of the land within the fence-line has been uncultivated since.

7.3.2 Designated Sites

The NPWS online map viewer was consulted in order to identify designated sites within the Zone of Influence. Table 7-5 lists those sites. Where potential pathways for impacts on a site were identified, these sites are described in further detail, according to the NPWS Site Synopses, Conservation Objectives and Natura 2000 Standard Data Forms for the respective sites, where available. The description of the Dundalk Bay Ramsar site is based on the description available from www.ramsar.org [accessed 29/10/2020].

Table 7-5 Designated Sites within 15km of the Proposed Development. The Numbers in Square Brackets are the Site Identifier Codes.

Site Code	Site Name	Distance from Study Area (km) ⁶	Are there potential pathways for impacts from the Works to this site?
004091	Stabannan – Braganstown SPA	5.3km east	Yes
000455	Dundalk Bay SAC	12.4km east	Yes
004026	Dundalk Bay SPA	12.4 km east	Yes
001454	Ardee Cutaway Bog pNHA	within study area	Yes
001616	Louth Hall and Ardee Woods pNHA	400m east	No
001587	Mentrim Lough pNHA	0.8km south west	No
000552	Corstown Loughs pNHA	2.2km west	No
001806	Kildemock Marsh pNHA	2.6km south	No
000456	Stabannan – Braganstown pNHA	3.0km east	No
001828	Reaghstown Marsh pNHA	5.3km north west	No
001461	Darver Castle Woods pNHA	6.6km north east	No
001464	Mellifont Abbey Woods pNHA	7.5km south	No
001594	Ballyhoe Lough pNHA	8.4km north west	No
001803	Stephenstown Pond pNHA	10.5km north	No
000455	Dundalk Bay pNHA	11.1km east	Yes
001608	Monalty Lough pNHA	12.1km north west	No
001462	Drumcah, Toprass & Cortial Loughs pNHA	12.2km north	No
001801	Barmeath Woods pNHA	12.4km south east	No
000561	Lough Naglack pNHA	12.8km north	No
001671	Spring and Corcrin Loughs pNHA	13.5km north west	No
000560	Lough Fea Demesne pNHA	13.6km north	No
001592	Boyne Woods pNHA	14.8km south	No

⁶ Nearest straight-line distance “as the crow flies” measured via distance calculator tools in GIS.

Site Code	Site Name	Distance from Study Area (km) ⁶	Are there potential pathways for impacts from the Works to this site?
Ramsar site no. 834.	Dundalk Bay Ramsar Site	12.4km	Yes

7.3.2.1 European Designated Sites

It was determined that three European sites, namely the Stabannan-Braganstown SPA, the Dundalk Bay SAC and the Dundalk Bay SPA, occur within the Zone of Influence.

Stabannan- Braganstown SPA

The description of the Stabannan-Braganstown SPA provided here is based on the Site Synopsis (NPWS, 2010), Conservation Objectives (2020b), and Natura 2000 Standard Data Form (NPWS, 2018d) for the site.

Site Overview

Stabannan-Braganstown SPA is situated approximately 4km inland from Dundalk Bay in Co. Louth. It is a small, flat alluvial plain adjacent to the River Glyde and is bounded to the north and south by low, rolling hills. The site is an SPA, of special conservation interest for Greylag Goose. In winter this site is utilised by an internationally important wintering population of Greylag Goose (1,391 birds, five-year mean peak for the period 1995/96 to 1999/2000).

The population of Greylag Goose utilising the site has declined in recent years but is still of national importance. The site also supports smaller populations of Greenland White-fronted Goose (24) and Whooper Swan (60). Small numbers of Bewick's Swan (2) have also been recorded at the site. At night, most of the geese and swans roost in Dundalk Bay. Other species typical of agricultural land also occur, notably Golden Plover (876) and Lapwing (300) – all figures five-year mean peaks for the period 1995/96 to 1999/2000.

The site is of ornithological importance as it supports an important population of Greylag Goose, which on occasion occurs in numbers of international importance. It is of note that three species that regularly occur at the site are listed on Annex I to the EU Birds Directive, i.e. Greenland White-fronted Goose, Whooper Swan and Golden Plover.

Qualifying Interests of the Site

[A043] Greylag Goose (*Anser anser*)

Dundalk Bay SAC

The description of the Dundalk Bay SAC provided here is based on the Site Synopsis (NPWS, 2014a), Conservation Objectives (NPWS, 2011), and Natura 2000 Standard Data Form (NPWS, 2018a) for the site.

Site Overview

This SAC is a very large open, shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending some 16km from Castletown River on the Cooley Peninsula in the north, to Annagassan / Salterstown in the south. The bay

encompasses the mouths and estuaries of the Rivers Dee, Glyde, Fane, Castletown and Flurry.

The extensive sandflats and mudflats occur and are comprised of ecological communities such as muddy fine sand communities and fine sand community complexes. In the centre of Dundalk Bay there is a gravel community dominated by polychaetes. These habitats host a rich collection of bivalve molluscs, marine worms and crustaceans and are the main food resource of the tens of thousands of waterfowl which feed in the intertidal area of Dundalk Bay. The saltmarshes are used as high-tide roosts by all of these species, while the grazing birds feed on the saltmarsh grasses and other grassland vegetation. The site is internationally important for waterfowl because it regularly holds over 20,000 birds (up to 57,000 have been recorded) and supports over 1% of the North-West European/East Atlantic Flyway populations of Brent Goose (*Branta bernicla*), Bar-tailed Godwit (*Limosa lapponica*) and Knot (*Calidris canutus*).

Shingle beaches are particularly well represented in Dundalk Bay, occurring more or less continuously from Salterstown to Lurgan White House in the south bay, and from Jenkinstown to east of Giles Quay in the north bay.

Dundalk Bay is a site of significant conservation value because it supports good examples of a range of coastal habitats listed on Annex I of the E.U. Habitats Directive, as well as large numbers and a high diversity of bird species, some of which are listed in the Birds Directive.

Qualifying Interests of the Site

[1130]	Estuaries
[1140]	Tidal Mudflats and Sandflats
[1220]	Perennial Vegetation of Stony Banks
[1310]	Salicornia Mud
[1330]	Atlantic Salt Meadows
[1410]	Mediterranean Salt Meadows

Dundalk Bay SPA

The description of the Dundalk Bay SPA provided here is based on the Site Synopsis (NPWS, 2014b), Conservation Objectives (NPWS, 2011), and Natura 2000 Standard Data Form (NPWS, 2018b) for the site.

Site Overview

Dundalk Bay is a large open shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending some 16km from Castletown River on the Cooley Peninsula, in the north, to Annagassan / Salterstown in the south. The extensive sandflats and mudflats are rich in bivalves, molluscs, marine worms and crustaceans which provides the food resource for most of the wintering waterfowl. The outer part of the bay provides excellent shallow-water habitat for divers, grebes and sea ducks. In summer, it is thought to be a major feeding area for auks (*Alcidae*) from the Dublin breeding colonies. The bay is used at night for roosting by wintering flocks of Greylag Goose, Greenland White-fronted Goose and Whooper Swan from Stabannan / Braganstown and other inland sites.

The site is of international importance because it regularly supports an assemblage of over 20,000 wintering waterbirds. It also qualifies as a site of international importance

for supporting populations of Light-bellied Brent Goose (370), Knot (9,710), Black-tailed Godwit (*Limosa limosa*) (1,100) and Bar-tailed Godwit (1,950). The site also supports nationally important populations of three wintering gull species; Black-headed Gull (*Chroicocephalus ridibundus*) (6,643), Common Gull (*Larus canus*) (551) and Herring Gull (*Larus argentatus*) (754). In spring and autumn the site attracts a range of passage migrants, including Little Stint (*Calidris minuta*), Curlew Sandpiper (*Calidris ferruginea*) and Ruff (*Philomachus pugnax*).

Dundalk Bay SPA is one of the most important wintering waterfowl sites in the country and one of the few that regularly supports more than 20,000 waterbirds. Four species occur in numbers of international importance and a further 19 species in numbers of national importance. The regular occurrence of Golden Plover, Bar-tailed Godwit, Red-throated Diver (*Gavia stellate*), Great Northern Diver (*Gavia immer*) and Little Egret (*Egretta garzetta*) is of particular note as these species are listed on Annex I of the Birds Directive. Dundalk Bay is a Ramsar Convention site and parts of Dundalk Bay SPA are designated as Wildfowl Sanctuaries.

Qualifying Interests of the Site

[A005]	Great Crested Grebe (<i>Podiceps cristatus</i>)
[A043]	Greylag Goose (<i>Anser anser</i>)
[A048]	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>)
[A048]	Shelduck (<i>Tadorna tadorna</i>)
[A052]	Teal (<i>Anas crecca</i>)
[A053]	Mallard (<i>Anas platyrhynchos</i>)
[A054]	Pintail (<i>Anas acuta</i>)
[A065]	Common Scoter (<i>Melanitta nigra</i>)
[A069]	Redbreasted Merganser (<i>Mergus serrator</i>)
[A130]	Oystercatcher (<i>Haematopus ostralegus</i>)
[A137]	Ringed Plover (<i>Charadrius hiaticula</i>)
[A140]	Golden Plover (<i>Pluvialis apricaria</i>)
[A141]	Grey Plover (<i>Pluvialis squatarola</i>)
[A142]	Lapwing (<i>Vanellus vanellus</i>)
[A143]	Knot (<i>Calidris canutus</i>)
[A149]	Dunlin (<i>Calidris alpina</i>)
[A156]	Black-tailed Godwit (<i>Limosa limosa</i>)
[A157]	Bar-tailed Godwit (<i>Limosa lapponica</i>)
[A160]	Curlew (<i>Numenius arquata</i>)
[A162]	Redshank (<i>Tringa totanus</i>)
[A179]	Black-headed Gull (<i>Chroicocephalus ridibundus</i>)
[A182]	Common Gull (<i>Larus canus</i>)
[A184]	Herring Gull (<i>Larus argentatus</i>)
[A999]	Wetlands and Waterbirds

7.3.2.2 Appropriate Assessment

An Appropriate Assessment (AA) Screening Report was prepared by ROD on behalf of Louth County Council (the Competent Authority in this case) for the proposed development in compliance with Part XAB of the Planning and Development Act, 2000

(as amended). As part of that assessment, the potential for the Project to significantly affect any European sites in the likely Zone of Impact was considered. The AA Screening Report concluded as follows:

“it is the considered opinion of ROD, as the author of this AA Screening Report, that the Competent Authority, Louth County Council, may find in completing its AA Screening in respect of the N52 Ardee Bypass, that the Project, either individually or in combination with other plans and projects, is not likely to have a significant effect on any other European site, in view of best scientific knowledge and the Conservation Objectives of the sites concerned. Therefore, it is the recommendation of the author of this AA Screening Report that the Competent Authority may determine that AA is not required in respect of the Project.”

Louth County Council requested An Board Pleanála to exercise its powers under article 250(3)(a) of the Planning and Development Regulations, 2001, as amended, whether Louth County Council should be directed to prepare a Natura Impact Statement in Respect of the proposed development. In its determination An Board Pleanála decided to:

“Direct the local authority not to prepare a Natura Impact Statement in respect of the proposed development, based on the reasons and considerations set out below

Reasons and Considerations

Having regard to:

- a) The nature and scale of the proposed development,*
- b) The substantial separation distance between the proposed development site and the Dundalk Bay SAC and SPA, and the Strabannan-Braganstown SPA,*
- c) The length of the hydrological between the site and the European sites at Dundalk Bay SAC and SPA,*
- d) The absence of a hydrological connection between the site and European site Strabannan-Braganstown SPA,*
- e) The surface water management arrangements which form part of the overall project, and the separation distance to European Sites,*
- f) The submission made by the local authority, including the Appropriate Assessment Screening report dated April 2021,*
- g) The report and recommendation of the person appointed by the Board to make a report and recommendation on the matter,*

it is considered reasonable to conclude that on basis of the information available, which is considered adequate to issue a screening determination, the proposed development, either individually or in combination with other plans or projects, would not be likely to have a significant effect on the Dundalk Bay Special Area of Conservation (Site Code: 0004550, Dundalk Bay Special Protection Area (Site Code: 004026), or Strabannan-Braganstown SPA (Site Code: 004091), or any other European Sites, in view of the conservation objectives of these Sites and that a Stage 2 appropriate assessment and the submission of a Natura Impact Statement for the proposed development is not, therefore, required.

Based on this conclusion, no European Sites have been included as Key Ecological Receptors in relation to the proposed development.

7.3.2.3 Nationally Designated Sites

It was determined that pathways for impacts exist between the proposed development and two nationally designated sites occur within the Zone of Influence, namely the Dundalk Bay pNHA and the Ardee Bog pNHA.

Dundalk Bay pNHA

There is no published site synopsis for the Dundalk Bay pNHA. The description of the Dundalk Bay pNHA is considered to be similar to the descriptions of the Dundalk Bay SAC and SPA in Sections 7.3.2.1 above. Potential impacts relating to water quality are envisaged to be highly localised in nature and would have an imperceptible impact within the immediate vicinity of the development and be imperceptible in the wider catchment including Dundalk Bay pNHA. Dilution and diffusion processes over the ~25km reach of the River Dee between Ardee and Dundalk Bay would likely render any potential pollutants imperceptible in the water column long before reaching Dundalk Bay. For context, the Q50 flow volume of the River Dee between Ardee and the Dundalk Bay is conservatively estimated to be >420,000m³. Undertaking the works in accordance with TII Standards and Publications will ensure that the potential for pollutants to discharge to surface waterbodies in the quantities required to impact sensitive receptors downstream is very limited and effectively inconceivable.

In relation to wintering birds in the pNHA that may also use the area around the Ardee Bog, considering the distance between the proposed development and the pNHA, the small area which will be disturbed during the construction and operational phases of the proposed development relative to the widespread similar habitat available in the surrounding area, the temporary nature of the construction phase, and that most of the usage of the area by wintering birds concentrated following heavy rainfall events when the fields are flooded, it can be concluded, without any reliance on the assimilative capacity of the River Dee, that the temporary and permanent loss of foraging habitat for wintering birds during the construction and operational phases will not impact the pNHA. Therefore, the Dundalk Bay pNHA has not been included as a Key Ecological Receptor.

Ardee Bog pNHA

The description of the Ardee Bog pNHA is based on the site synopsis (NPWS, 2009). The site is a cutaway raised bog, situated 3km west of Ardee in Co. Louth. The site supports a mosaic of bog and heath vegetation, with such species as Heath (*Calluna vulgaris*), Round-leaved Sundew (*Drosera rotundifolia*), Tormenitil (*Potentilla erecta*), Bottle Sedge (*Carex rostrata*), Purple Moor-grass (*Molinia caerulea*), Bracken (*Pteridium aquilinum*), Devil's-bit Scabious (*Succisa pratensis*), Royal Fern (*Osmunda regalis*), milkwort (*Polygala* sp.), Heath Wood-rush (*Luzula multiflora*) and Rosebay Willowherb (*Chamerion angustifolium*) occurring. Channels and wet pools on the site support Bogbean (*Menyanthes trifoliata*).

A notable feature of the site is the presence of areas where bog mosses (*Sphagnum* spp.) and cottongrasses (*Eriophorum* spp.) occur abundantly. An area of birch (*Betula* spp.) scrub occurs on the eastern side of the site.

Although the bog itself is outside the area of the scheme, there is potential for earthworks and the construction of the road to lead to alternations to the hydrology and hydrogeology in the area which could lead to the bog drying out further and therefore, the Ardee Cutaway Bog pNHA has been included as a Key Ecological Receptor.

7.3.2.4 Other Designated Sites

Dundalk Bay RAMSAR Site

The Dundalk Bay RAMSAR Site is an open sea bay with extensive saltmarshes, intertidal sand and mudflats encompassing the estuaries of the four rivers. The intertidal flats support a rich fauna of bivalve molluscs, marine worms and crustaceans that provide the main food source for tens of thousands of waterbirds. The site is internationally important for waterbirds regularly holding over 20,000 birds and

supporting over 1% of the Northwest European/East Atlantic Flyway populations of numerous species of waterbirds. The saltmarshes are partially fenced and grazed by sheep and are used as high-tide roosts. This site overlaps with the Dundalk Bay SAC and SPA, and the Dundalk Bay pNHA and it has not been included as a Key Ecological Receptor for the same reasons as these sites.

7.3.2.5 National Parks and Wildlife Service & National Biodiversity Data Centre

The Department of Culture, Heritage and Gaeltacht (the NPWS) and the National Biodiversity Data Centre (NBDC) provided records of rare and protected species. Upon a more detailed review of these species records, the species that were recorded in the past 10 years were included in the list below. The most recent NPWS record is from 2003, and therefore no NPWS records are included in this EclA. Table 7-6 lists the rare and protected species found on the NBDC database, within hectad N98. There were many protected bird species recorded within the hectad. Therefore, only bird species that are listed under Annex I of the Birds Directive and/or are red or amber listed on the list of Birds of Conservation Concern Ireland (2020-2026) are included in Table 7-6 below.

Table 7-6 Rare and Protected Species. Source: NBDC (2020). Key: VU/NT/EN = Irish Red List status; WA = the Wildlife Act; HD = Habitats Directive, II/IV/V = Annex II/IV/V.

Common Name	Scientific Name	Status
Mammals		
Badger	<i>Meles meles</i>	WA
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	HD-IV; WA
Daubenton's Bat	<i>Myotis daubentonii</i>	HD-II,V; WA
Leisler's Bat	<i>Nyctalus leisleri</i>	HD-IV; WA
Hare	<i>Lepus timidus hibernicus</i>	HD-V; WA
Hedgehog	<i>Erinaceus europaeus</i>	WA
Otter	<i>Lutra lutra</i>	HD-II,IV; WA
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	HD-IV; WA
Pine Marten	<i>Martes martes</i>	HD-V; WA
Pygmy Shrew	<i>Sorex minutus</i>	WA
Amphibians		
Common Frog	<i>Rana temporaria</i>	HD-V; WA
Birds *all birds are protected under the Wildlife Acts		
Barn Owl	<i>Tyto alba</i>	BoCCI-Red
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	BoCCI-Amber
Coot	<i>Fulica atra</i>	BoCCI-Amber
Cormorant	<i>Phalacrocorax carbo</i>	BoCCI-Amber
Curlew	<i>Numenius arquata</i>	BoCCI-Red
Golden Plover	<i>Pluvialis apricaria</i>	BD-I; BoCCI-Red
Great-crested Grebe	<i>Podiceps cristatus</i>	BoCCI-Amber
Herring Gull	<i>Larus argentatus</i>	BoCCI-Amber

Common Name	Scientific Name	Status
House Martin	<i>Delichon urbicum</i>	BoCCI-Amber
House Sparrow	<i>Passer domesticus</i>	BoCCI-Amber
Kestrel	<i>Falco tinnunculus</i>	BoCCI-Red
Kingfisher	<i>Alcedo atthis</i>	BD-I; BoCCI-Amber
Lapwing	<i>Vanellus vanellus</i>	BoCCI-Red
Merlin	<i>Falco columbarius</i>	BD-I; BoCCI-Amber
Mute Swan	<i>Cygnus olor</i>	BoCCI-Amber
Peregrine Falcon	<i>Falco peregrinus</i>	BD-I
Skylark	<i>Alauda arvensis</i>	BoCCI-Amber
Snipe	<i>Gallinago gallinago</i>	BoCCI-Red
Starling	<i>Sturnus vulgaris</i>	BoCCI-Amber
Spotted Flycatcher	<i>Muscicapa striata</i>	BoCCI-Amber
Swallow	<i>Hirundo rustica</i>	BoCCI-Amber
Swift	<i>Apus apus</i>	BoCCI-Red
Teal	<i>Anas crecca</i>	BoCCI-Amber
Tree Sparrow	<i>Passer montanus</i>	BoCCI-Amber
Whooper Swan	<i>Cygnus cygnus</i>	BD-I; BoCCI-Amber
Woodcock	<i>Scolopax rusticola</i>	BoCCI-Red
Yellowhammer	<i>Emberiza citrinella</i>	BoCCI-Red
Invasive Species		
Grey Squirrel	<i>Sciurus carolinensis</i>	N/A
American Mink	<i>Neovison vison</i>	N/A
Canadian Waterweed	<i>Elodea canadensis</i>	N/A

7.3.3 Species and Habitats

This section gives an overview of the results of the desk study from the sources listed in Section 7.3.2.

7.3.3.1 Ardee Bog

The following IPCC reports were reviewed:

- IPCC (1990) *Ardee Bog Site Evaluation*. Irish Peatland Conservation Council.
- IPCC (1998) *Ardee Bog, Co. Louth. Survey and Evaluation Report*. Irish Peatland Conservation Council.

Ardee bog is an example of a raised bog. This bog forms the Ardee Bog pNHA and has been listed as having a scientific importance since 1981. The site represents an asset of considerable importance for County Louth's Natural Heritage. The bog is geographically important as it is one of the most easterly raised bogs in the country. Ardee bog contains good wetland habitat. The bog has been subject to turf cutting, drainage and afforestation.

A consultation response was received from the IPCC in relation to the proposed development as outlined in Table 7-1 **Error! Reference source not found..**

7.3.3.2 Badger

There were two badger setts recorded during a site walkover completed in 2018 by Brian Keely. One of these setts was recorded during an ecology survey conducted by TOBIN Consulting Engineers on the 4th of July 2019 which was undertaken in advance of the fencing contract. The badger sett which was located within 30m of the proposed works had four entrances and was inactive. The sett was classified as a subsidiary or outlier sett, based on the number of sett entrances, lack of pathways to other setts and lack of recent activity. Although there was no activity in or around this sett, the adjoining northern field had evidence of badger activity in the form of snuffle holes. This evidence indicated that the sett was located within an active badger territory. The most northern sett entrance was identified as the closest to the development. This sett was located at 16m from the advance fencing works and 23m from the proposed earth works for the road.

A licence was issued by the NPWS on 16th August 2019 under Section 23(5)(D) of the Wildlife Acts to allow for the temporary closure of this sett. The sett was temporarily closed on 30th September 2019. The aim of closing the sett was to allow construction works (including fencing) to be carried out without negatively impacting badgers which could potentially use this sett. After the badger sett closure was undertaken, the fencing works for the proposed development were carried out and completed during the period of September to December 2019. It was intended to leave this temporary closure in place until all construction works for the proposed development had been completed; however, the construction of the N52 Ardee Bypass was postponed. As a result of this, it was agreed with Louth County Council and the NPWS that the sett should be reopened, and the existing licence closed out. The sett was reopened under licence on the 10th December 2019.

7.3.3.3 Otter

There are records of Otter on the River Dee (NBDC, 2020). The remains of an otter were recorded close to the River Dee in 2018 (Brian Keely, 2018).

7.3.3.4 Bats

Daubenton's Bat has been recorded within the study area on the River Dee as part of the All Ireland Daubenton's Bat Waterways Survey (NBDC, 2020; BATLAS, 2020).

7.3.3.5 Other Mammals

There are records of other protected mammals including Pine Marten, Pygmy Shrew, Hare and Hedgehog within the hectad (NBDC, 2020).

7.3.3.6 Birds

Several species on the list of Birds of Conservation Concern Ireland (2020-2026) including red-listed species Barn Owl, Kestrel and Snipe have been recorded within the hectad pertaining to the proposed development (NBDC, 2020). Species listed on Annex I of the Birds Directive which have been recorded within the hectad include Golden Plover, Kingfisher, Whooper Swan, Merlin, Peregrine Falcon (NBDC, 2020). Brian Keeley (2018) contains records of bird species of conservation concern including Yellowhammer, Tree Sparrow, Lapwing and Skylark within the study area.

The IPCC reports that Curlew and other wetland waders such as Snipe use the Ardee Bog. There are records of sightings that show that the Ardee Bog is good Curlew habitat dating from the IPCC's survey in 1990. A Curlew survey undertaken in June

2019 with the aid of the local NPWS Ranger, recorded Curlew on the Ardee Bog, in a field to the south of the bog and other fragmented peatlands to the west.

7.3.3.7 Amphibians and Reptiles

There are records of Common Frog in the hectad pertaining to the proposed development (NBDC, 2020). Brian Keeley (2018) recorded frogs along the route.

7.3.3.8 Invertebrates

The distribution map prepared by the NPWS as part of the Article 17 Report (NPWS, 2019) does not contain any records of Marsh Fritillary in Co. Louth. A report commissioned by the NPWS (BEC, 2014) listed the potential sites for this species in Co. Louth and rejected the Ardee Bog as being suitable for Marsh Fritillary.

7.3.3.9 Protected Flora

No records of species listed on the Flora Protection Order (FPO 2015) were obtained during the desk study.

7.3.3.10 Invasive Species

One species, namely American Mink, subject to restrictions as listed on the Third Schedule of the Birds and Natural Habitats Regulations was recorded by Brian Keely (2018) along the River Dee. Canadian Pondweed (*Elodea canadensis*) was recorded on the River Dee (Grid Reference: N925896) close to chainage 0+600 in 2006 by the EPA. Grey Squirrel was recorded over 4km from the proposed development at Loughbracken (Grid Reference: N879886) during the Irish Squirrel Survey in 2012.

7.3.3.11 Environmental Protection Agency

'Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy' (the 'Water Framework Directive' or 'WFD') requires that each Member State protect and improve water quality in all waters so that good ecological status is achieved. Additionally, proposed actions (within discrete River Basin Management Plans) are also required, to secure national natural water resources for the future. The EPA is the competent authority responsible for monitoring, protecting and improving the water environment in Ireland.

In accordance with WFD guidelines, water quality 'Status' is assigned using a variety of available data on aquatic flora and fauna (including fish), the availability of nutrients, and aspects like salinity, temperature and pollution by chemical pollutants. Morphological features, such as quantity, water flow, water depths and structures of the riverbeds, are also taken into account.

The original EPA water quality classification system (the 'Quality Rating System' or 'Q-values') is also used to assess water quality in Irish rivers, taking into account aquatic macrophytes, phytobenthos and hydromorphology. The Quality Rating System has been shown to be a robust and sensitive measure of riverine water quality and has been linked with both chemical status and land-use pressures in catchments. Individual macroinvertebrate species are ranked for their sensitivity to organic pollution and the Q-value is assessed based, primarily, on their relative abundance within a biological sample. A review of both the internal EPA Q-value status and WFD surface water status for the relevant watercourses was undertaken.

The EPA's online map viewer provides access to information at individual waterbody level in Ireland. Waterbodies can relate to surface waters (these include rivers, lakes, estuaries [transitional waters], and coastal waters) or to groundwater.

The River Dee was tested at Burley Bridge in 2018 and was given a Q-value score of 4-5 (High). The River Garra was test in 2018 at a location 2.5km downstream of the proposed road development and below its confluence with the River Dee and was given a Q-value score of 2-3 (Poor).

7.4 Field Survey Results

This section of the EcIA presents the results of the field surveys and provides a detailed description of the ecology of the existing environment within the site.

7.4.1 Habitats

The following section describes the habitats recorded during field surveys in September 2020. A total of 15 habitats were recorded within and adjacent to the study area. Table 7-7 lists the habitats within the site of the proposed development. The habitat map is presented on Drawings N52A-ROD-EAC-SW_AE-DR-EN-300043-300046.

Table 7-7 Habitats Recorded Within the Study Area and their Respective Codes. Habitat Classification follows Fossitt (2000).

Habitat Name	Habitat Code
Freshwater	
Depositing/Lowland River	FW2
Drainage Ditch	FW4
Grassland and Marsh	
Arable Crops	BC1
Dry Meadows and Grassy Verges	GS2
Improved Agricultural Grassland	GA1
Wet Grassland	GS4
Woodland and Scrub	
Hedgerow	WL1
Mixed Broadleaved Woodland	WD1
Scrub	WS1
Treeline	WL2
Built Land	
Buildings and Artificial Surfaces	BL3
Buildings and Artificial Surfaces/Amenity Grassland	BL3/GA2
Peatland	
Raised Bog	PB1
Wet Heath	HH3
Non Fossitt (2000) Habitat	
Fenced Mosaic	FM

7.4.2 Habitat Description

The lands within the route corridor were cleared and fenced off in 2019. This area is now a mosaic of habitats (referred to as 'Fenced Mosaic' in this report) varying from

meadow to recolonising bare ground with native herbaceous species (Figure 7-1). Remnants of old crops including potatoes and barley are also found growing in this area. Cattle have access to the most northern section of the route.



Figure 7-1 Fenced Mosaic habitat

Outside the route corridor, the land use is agricultural and is dominated by pasture. Fields vary from improved grassland (GA1) to wet grassland (GS4) dominated by rushes. The fields are separated by a network of treelines (WL1), hedgerows (WL2) and ditches (FW4). These habitats support a variety of species, including bats and birds therefore 'Hedgerows and Treelines' have been included as a Key Ecological Receptor. Whooper Swans, Greylag Geese, Lapwing and Curlew have been recorded in the Zone of Influence. The route crosses the River Dee, River Garra and a number of drainage ditches. Both the River Dee and River Garra have been subject to channelisation and correspond to Depositing/ Lowland Rivers (FW2). The River Garra flows into the River Dee which enters the sea in Dundalk Bay, which is designated as an SAC, SPA and pNHA. The River Dee and River Garra correspond to the Annex 1 habitat 'Watercourses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation' (3260) and contains valuable habitats that support protected species, therefore, 'Watercourses' has been included as a Key Ecological Receptor.

The Ardee Bog lies to the north-west of the proposed development and is the most easterly raised bog (PB1) in Ireland. The fence line of the route is approximately 270 m from the edge of the bog. Extensive and ongoing drainage, development and historical turf-cutting have degraded the Ardee Bog. Dense heather growth and the presence of Scot's Pine and Birch indicate that the bog is drying out in places. The site supports a mosaic of bog and wet heath vegetation (HH3), with such species as

Round-leaved Sundew (*Drosera rotundifolia*) and Devil's-bit Scabious (*Succisa pratensis*). Channels and wet pools on the site support Bogbean (*Menyanthes trifoliata*). A notable feature of the site is the presence of areas where bog mosses (*Sphagnum spp.*) and cottongrasses (*Eriophorum spp.*) occur abundantly. The Ardee Cutaway Bog pNHA includes the bog as well the surrounding birch woodland (WN7) and agricultural land around the bog. The route will travel across the eastern part of the pNHA which is agricultural grassland and of little ecological value itself.

Parts of the Ardee Cutaway Bog pNHA corresponds to the Annex 1 habitat 'Degraded Raised Bogs Capable of Natural Regeneration' (7120) and 'Northern Atlantic wet heaths with *Erica tetralix*' (4010) (Figure 7-2).



Figure 7-2 **Ardee Bog**

7.4.3 Ecological Corridors

Article 10 of the Habitats Directive recognises the importance of ecological networks as corridors and steppingstones for wildlife, including for migration, dispersal and genetic exchange of species of flora and fauna. The Directive requires that ecological connectivity and areas of ecological value outside the Natura 2000 network of designated ecological sites are maintained and it recognises the need for the management of these areas through land use planning and development policies.

Ecological corridors are important in connecting areas of local biodiversity with each other and with nearby designated sites to prevent islands of habitat from becoming isolated. Ecological corridors include linear features such as treelines, hedgerows, railway lines, rivers, streams, canals, and ditches steppingstones for wildlife moving within their range. They are particularly important for mammals, especially bats and small birds. Ecological corridors has been included within the Key Ecological Receptor 'Watercourses'.

7.4.4 Protected Flora

There were no species listed on the Flora Protection Order (FPO) recorded in the study area during the surveys.

7.4.5 Protected Fauna

7.4.5.1 Badger (*Meles meles*)

One badger sett was recorded within 30m of the proposed development at chainage 2+800. This sett had four entrances, one of which had signs of recent activity (Figure 7-3). Strong paths linked the sett with the surrounding area. A live badger was seen on the Silverhill Road during one of the bat surveys. Badger prints were recorded on the concrete slab bridge over the River Dee, c. 150m upstream of the proposed River Dee crossing, in the fields west of the Garra crossing and in the fields south of the existing N52 along the River Dee. Badger may be impacted upon and has been included as a Key Ecological Receptor.



Figure 7-3 Badger Sett

7.4.5.2 Otter (*Lutra lutra*)

Otter prints were recorded on the bank of the River Dee close to the crossing point. No holts or other lying-up sites were recorded. Otter is considered to be present in the River Dee system. Development projects, by their nature, can negatively impact on otters by creating barriers to connectivity and by disturbance. For this reason, Otter has been included as a Key Ecological Receptor.

7.4.5.3 Bats

As the route of the proposed road was cleared in 2019, there are no trees or built structures which could be used by bats that could be directly impacted by the proposed development. A bat suitability assessment of Burley Bridge was carried out. The arch barrel of this bridge is well sealed. Some gaps in the stonework are present on the

spandrel walls that could be used by small numbers of bats, but no evidence of bats was recorded.

The bat activity surveys were undertaken in suitable weather conditions and lasted approximately two hours each. Table 7-8 presents the survey details of the activity transects and Table 7-9 presents the results of the bat activity transects.

Table 7-8 Bat Survey Details

Survey Type	Date	Sunset	Start Time	End Time	Weather Conditions
Driven	23/07/2020	21:38	21:40	00:00	15°C, 100% cloud, still, dry.
Walked	26/08/2020	20:30	20:33	23:40	15°C, 50% cloud, still, dry.
Walked	09/09/2020	19:56	20:20	23:11	13°C, 100% cloud, still, dry.

Table 7-9 Bat Passes Recorded During Bat Activity Surveys

Date	Spip	Cpip	Leis	Daub	BLE
23/07/2020	20	29	24	2	0
26/08/2020	30	12	6	0	1
09/09/2020	9	14	4	0	0

(Spip=Soprano Pipistrelle; Cpip= Common Pipistrelle; Leis=Leisler's Bat; Daub= Daubenton's Bat; BLE=Brown Long-eared Bat)

Five species were recorded during the activity transects, namely Soprano Pipistrelle, Common Pipistrelle, Leisler's Bat, Daubenton's Bat and Brown Long-eared Bat. Soprano Pipistrelle, Common Pipistrelle and Leisler's Bat are the three more common species in Ireland. Daubenton's Bat is a species of bat that is associated with water where it feeds on insects close to the surface. This species is sensitive to artificial light and was recorded on the River Dee. Brown Long-eared Bats call much quieter than the other species, making this species more difficult to detect on bat detectors. One pass was recorded along a mature treeline between the Silverhill Road and Townparks Road.

Bats could be impacted during the construction and operation of the proposed development and have been included as a Key Ecological Receptor.

7.4.5.4 Birds

Breeding Birds

A breeding bird survey was carried out in June and July 2020. Details of the surveys are presented in Table 7-10 below. Table 7-11 below provides a list of bird species recorded during the breeding bird surveys and also includes incidental records of other species recorded during the breeding season. Birds recorded on the Ardee Bog during the breeding curlew survey, but not on the route corridor, are denoted with an asterisk (*).

A breeding Curlew survey was carried out on the Ardee Bog and surrounding fields on the 21st May and the 10th June 2020. This survey was carried out during a dry spell

and the entire bog was accessible. No Curlew were recorded, and this species did not nest on the Ardee Bog or in the surrounding fields in 2020.

Kingfisher was recorded flying along the River Garra, 3km upstream of the crossing point. No suitable burrowing habitat was recorded within 150m of the River Dee and River Garra crossing points.

Nesting birds could be impacted by the proposed development and have been included as a Key Ecological Receptor.

Table 7-10 Breeding Bird Survey Details

Date	Start Time	End Time	Weather Conditions
Breeding Bird			
10 th June 2020	06:30	10:00	50% cloud, 10°C, dry, still.
23 rd June 2020	07:00	12:15	100% cloud, showers, 14°C, still.
25 th June 2020	07:00	11:15	No cloud, 16°C, still.
Breeding Curlew Survey			
31 st May 2020	09:00	10:00	No cloud, 15°C, still.
10 th June 2020	10:30	11:30	50% cloud, 10°C, dry, still.

Table 7-11 Bird Species Recorded During the Breeding Bird Surveys

Common Name	Scientific Name	BoCCI Listing
Blackbird	<i>Turdus merula</i>	Green
Blue Tit	<i>Cyanistes caeruleus</i>	Green
Bullfinch	<i>Pyrrhula pyrrhula</i>	Green
Buzzard	<i>Buteo buteo</i>	Green
Chaffinch	<i>Fringilla coelebs</i>	Green
Chiffchaff	<i>Phylloscopus collybita</i>	Green
Coal Tit	<i>Parus ater</i>	Green
Dunnock	<i>Prunella modularis</i>	Green
Goldfinch	<i>Carduelis carduelis</i>	Green
Grasshopper Warbler*	<i>Locustella naevia</i>	Green
Great Tit	<i>Parus major</i>	Green
Greylag Geese	<i>Anser anser</i>	Amber
Hooded Crow	<i>Corvus cornix</i>	Green
House Martin	<i>Delichon urbicum</i>	Amber
House Sparrow	<i>Passer domesticus</i>	Amber
Jackdaw	<i>Corvus monedula</i>	Green
Jay*	<i>Garrulus glandarius</i>	Green
Kingfisher	<i>Alcedo atthis</i>	Amber
Lapwing	<i>Vanellus vanellus</i>	Red

Common Name	Scientific Name	BoCCI Listing
Linnet	<i>Linaria cannabina</i>	Amber
Mallard	<i>Anas platyrhynchos</i>	Green
Meadow Pipit	<i>Anthus pratensis</i>	Red
Moorhen	<i>Gallinula chloropus</i>	Green
Pheasant	<i>Phasianus colchicus</i>	Green
Pied Wagtail	<i>Motacilla alba</i>	Green
Robin	<i>Erithacus rubecula</i>	Green
Rook	<i>Corvus frugilegus</i>	Green
Snipe*	<i>Gallinago gallinago</i>	Amber
Starling	<i>Sturnus vulgaris</i>	Amber
Swallow	<i>Hirundo rustica</i>	Amber
Teal	<i>Anas crecca</i>	Amber
Woodcock*	<i>Scolopax rusticola</i>	Red
Wood Pigeon	<i>Columba palumbus</i>	Green
Wren	<i>Troglodytes troglodytes</i>	Green
Yellowhammer	<i>Emberiza citrinella</i>	Red

Wintering Birds

Details of the surveys are presented in Table 7-12 below. A summary of the results of each survey are presented in Table 7-13

A flock of Whooper Swan (*Cygnus cygnus*) were recorded in a field 1.5 km north-west of the proposed development. Whooper Swan are faithful to feeding sites and were recorded on all five surveys in the same field. Six Greylag Geese (*Anser anser*) were present on with the flock on two occasions. Small flocks of Whooper Swan were recorded in other fields 800m west of the proposed development.

The area surrounding the Ardee Bog area acts as the natural floodplain for the Rivers Dee, Garra and their tributaries, attenuating flood waters following extreme rainfall events. Curlew (*Numenius arquata*), Lapwing (*Vanellus vanellus*), Teal (*Anas crecca*) and Black-headed Gull (*Chroicocephalus ridibundus*), Little Egret (*Egretta garzetta*) and other species are attracted to the flooded areas to feed. Flocks of Redwing (*Turdus iliacus*), a migratory thrush, were recorded on all of the wintering bird surveys.

Wintering birds could be impacted by the proposed development and have been included as a Key Ecological Receptor.

Table 7-12 Wintering Bird Survey Details

Date	Start Time	End Time	Weather Conditions
4 th February 2020	10:00	14:30	No cloud, light breeze.
5 th March 2020	10:15	15:00	No cloud, still. Flooding in week prior to survey.
1 st December 2020	09:30	12:00	No cloud, 10°C, still.

Date	Start Time	End Time	Weather Conditions
2 nd February 2021	10:00	12:00	100% cloud, showers, recent heavy rain with standing water in fields.
17 th February 2021	10:00	11:45	9°C, 50% cloud, dry, cold breeze.

Table 7-13 Summary of Wintering Bird Survey Results

Date	Summary
4 th February 2020	A flock of 19 Whooper Swan and 6 Greylag Geese were recorded west of the Ardee Bog on the Meath/ Louth border. Six Snipe and one Woodcock were risen in an area of Ardee Bog to the west of Ardee Celtic FC.
5 th March 2020	A flock of 41 Whooper Swans, 6 Greylag Geese and 1 Little Egret were recorded in the same field as on the first survey. A second flock of 7 Whooper Swans was recorded further west at the very edge of the Constraints Study Area. Two Whooper Swans were recorded in a field immediately to the south of the Ardee Bog. Two Snipe were flushed from the area to the west of Ardee Celtic FC. In a field west of the Dee crossing, close to the ruined church, a flock of 59 Black-headed Gulls and one Little Egret were recorded around a flooded area.
1 st December 2020	A flock of 10 Whooper Swans were recorded in the same field as the big flock on the first and second survey. 60 Lapwing were recorded in a flooded field east of the Garra Crossing and south of the preferred route corridor.
2 nd February 2021	A flock of 45 Whooper Swans were recorded feeding same field as the big flocks in the first three surveys. Along the edge of the flood waters south of the Ardee Bog and the Silverhill Road, 500m northwest of the Garra crossing, 97 Curlew, 22 Teal and 192 Lapwing were recorded. Black-headed Gull and Mallard were also recorded in small numbers.
17 th February 2021	A flock of 11 Whooper Swans were recorded west of the Ardee Bog on the Meath/ Louth border.

7.4.5.5 Reptiles and Amphibians

Suitable habitat for Common Frog and Smooth Newt is widespread in the study area. No ponds will be physically damaged, drained or in-filled during the construction of the proposed development. The construction footprint of the proposed development has limited suitable habitat for amphibians in the form of wet areas within fields and ditches. However, the loss of a small number of individuals would not be significant.

There will be no loss of lizard habitat and this species is not considered further.

7.4.5.6 Other Species

Irish Hare (*Lepus timidus hibernicus*) was recorded on the Ardee Bog and the fields west of the proposed development. The habitat within the vicinity of the proposed road is not important for the local hare population given the amount of similar habitat in the wider area. Therefore, Irish Hare is not included as a Key Ecological Receptor and no further surveys are required.

Devil's-bit Scabious occurs in parts of the Ardee Bog, outside the proposed development boundary. No larval webs of Marsh Fritillary were found on the survey in September 2020. Therefore, this species is considered absent from the area and has not been included as a Key Ecological Receptor.

Irish Stoat (*Mustela erminea hibernica*), Hedgehog (*Erinaceus europaeus*), Pine Marten (*Martes martes*) and Pygmy Shrew (*Sorex minutus*) are likely to occur within the study area. Significant impacts on these species are not anticipated at the population level and these species have not been included as Key Ecological Receptors.

7.4.6 Invasive Species

No species listed on the Third Schedule to the Habitats Regulations were recorded during the field surveys. Canadian Pondweed which is subject to restrictions as listed on the Third Schedule has previously been recorded on the River Dee. Invasive species pose a threat to biodiversity and could inadvertently be introduced to the site of the proposed development through construction activities. Invasive species have therefore been included as a Key Ecological Receptor.

7.5 Key Ecological Receptors

This section of the report provides details of the Key Ecological Receptors that were identified during the desk study and the subsequent field surveys. The Key Ecological Receptors identified are described in detail in Table 7-14 and an ecological valuation for each Key Ecological Receptor is also provided.

7.5.1 Evaluation of Key Ecological Receptors Identified

Table 7-14 Evaluation of Key Ecological Receptors

Key Ecological Receptor	Description	Importance/Ecological Valuation (TII/NRA, 2009a)
KER 1 Ardee Cutover Bog pNHA	This pNHA include the Ardee cutover bog and surrounding woodlands and fields. The proposed road travels through the eastern portion of the pNHA which is improved agricultural fields of little ecological value. Bog and woodland habitats within the pNHA are 250m northwest of the proposed road at their closest point. Road developments can indirectly impact wetlands through changes in hydrology and hydrogeology in the area which can lead to a lowering of the water table and a drying out of the bog.	National Importance on the basis that the Ardee Cutover Bog is designated as a proposed Natural Heritage Area (pNHA).
KER 2 Watercourses	The River Dee and its tributaries provide an important wildlife corridor which supports species such as otters, eels and salmonids. The proposed road development will drain into the River Dee catchment.	Local Importance (Higher Value) as the river corridor supports species listed on Annex IV to the Habitats Directive and protected under the Wildlife Act. It also drains into European Sites in Dundalk Bog and acts as a wildlife corridor.

Key Ecological Receptor	Description	Importance/Ecological Valuation (TII/NRA, 2009a)
KER 3 Hedgerows and Treelines	Hedgerows and treelines were recorded along field boundaries within the study area. Small areas of hedgerows and treelines will be cleared.	Local Importance (Higher Value) on the basis that these habitats support species of conservation of importance and provide local corridors for wildlife between areas of higher ecological value.
KER 4 Badger	One active sett, prints, snuffle holes and a live sighting of a Badger were recorded in the study area. Badger are vulnerable to habitat fragmentation, road traffic accidents and disturbance.	Local Importance (Higher Value) as this species is protected under the Wildlife Act and is present within the study area.
KER 5 Otter	Otters occur on the watercourses crossed by the proposed development. Otters are vulnerable to habitat loss, habitat degradation, road traffic accidents and disturbance.	Local Importance (Higher Value) as this species is listed on Annexes II and IV to the Habitats Directive and protected under the Wildlife Act and is present in the study area
KER 6 Bats	Five species of bat were recorded in the study area. Bats are vulnerable to habitat loss and degradation, particularly the light sensitive Daubenton's Bat which was recorded on the River Dee.	Local Importance (Higher Value) as these species are listed on Annex IV to the Habitats Directive and protected under the Wildlife Act and are present within the study area.
KER 7 Nesting Birds	31 bird species, including two Red-listed species, were recorded during the breeding bird surveys. Nesting birds are vulnerable to disturbance.	Local Importance (Higher Value) on the basis that birds including Red-listed species, which are protected under the Wildlife Acts, nest in the study area.
KER 8 Wintering Birds	Whooper Swan, Greylag Goose, Curlew Lapwing, Teal and Little Egret were recorded during the wintering bird surveys. Wintering birds are vulnerable to disturbance and habitat loss.	County Importance on the basis that species listed on Annex I to the Birds Directive, regularly occur within the study area.
KER 9 Invasive Species	Invasive species occur along watercourses in the vicinity and could potentially be introduced to the site of the proposed development. Construction could lead to the introduction of invasive aquatic species via in-stream works and the movement of soil and equipment.	Invasive plants have the potential to impact negatively on biodiversity locally.

7.5.2 Impacts on Key Ecological Receptors

7.5.2.1 General Impacts on Key Ecological Receptors

Habitat Loss

The road construction will result in the complete loss of habitats within the land take of the preferred route option. In this case, the road is approximately 4.5km long with

junction layouts, cut and fill areas, bridge, culverts, a material deposition area, attenuation ponds and other ancillary land-take requirements. The permanent loss of grassland and former arable land within the proposed development footprint is not considered to be of ecological significance as these habitats are relatively species poor, support limited biodiversity and are widespread locally and throughout Ireland. Although the site was cleared of hedgerows and trees in 2019, small sections of hedgerow are still intact at the junctions.

Habitat Fragmentation

The proposed development could lead to habitat fragmentation due to the use of fencing, artificial lighting, new bridges and culverts and the addition of noise and visual disturbance. Habitat Fragmentation could affect the following Key Ecological Receptors: 'Watercourses', 'Hedgerows and Treelines', 'Bats', 'Otter' and 'Badger'.

Displacement/Disturbance of Fauna

The proposed development will result in the disturbance and displacement to the fauna that reside along the proposed route. Where fauna of ecological significance or potential habitat for such species was recorded, these were included as Key Ecological Receptors and are described in the following paragraphs. The construction of the proposed development will lead to disturbance from noise, vibration, visual cues and lighting, which will lead to the displacement of certain species from the general area. The operation of the proposed development will result in noise and visual disturbance.

One badger sett was recorded 20m outside the fence line and badger signs were recorded along the route. There will be a temporary disruption associated with the construction phase which may lead to temporary displacement of badger. Following construction, badgers are expected to adjust to the re-ordered landscape and there will be no long-term impact on the badger population within the vicinity of the road.

No potential holts or couches were recorded in the vicinity of the proposed development. Construction works on the watercourse crossings may lead to disturbance and habitat fragmentation for otters, but this is a short-term impact which will not alter the overall population or distribution of this species. Continued movement of otters will be accommodated along all watercourses during the construction phase.

Mammal species such as Hedgehog and Irish Hare are, similarly, likely to be affected, however impacts on these species are not considered likely to be of significance given the widespread availability of alternative similar habitat for these species.

Birds along the route will be displaced due to increased disturbance during construction and operation. The sensitivity of birds to disturbance varies by species and whether the source of the disturbance is visual, or noise based. Additionally, the current level of habituation will also determine a bird's response to disturbance.

The presence of humans in an area is unlikely to illicit a response by waterbirds beyond 300 m (Cutts et al, 2009). The noise levels from typical construction activity, as set out in BS 5228: Part 1, are generally less than 100 dBA. Put into practice, this will mean that if the noise generated was 100 dBA at 1.0 m from the source, this sound will be 70 dBA at 32m away. The threshold for noise to have an impact on waterbirds is 70 dBA at receptor (Cutts et al., 2013). Regular noise above this level is likely to illicit a response. This calculation does not take screening from hedgerows into account and therefore, in practice, the impacts from noise and visual disturbance will be less than in an open environment. The graph for 4m embankment, 1.5m AGL receiver and 100km/h traffic speed in Appendix A (Page 51) of Good Practice

Guidance for the Treatment of Noise during the Planning of National Road Scheme (TII, 2014) has been used to calculate the noise levels from the road during the operational phase. The 24 hours traffic flow is expected to be 7238 in the year 2038. Based on the worst-case scenario including a higher proportion of heavy goods vehicles on asphalt, the expected distance for the 60dB_Lden threshold (the design goal for national road schemes) is approximately 100m. The maximum distance at which wintering birds could be disturbed during the construction and operational phases is 300m. In reality, the area in which wintering birds will be disturbed will be much smaller due to the screening provided by the existing hedgerows and buildings.

The risk of disturbance for breeding birds associated with the road construction is considered negligible given the intervening hedgerows between the proposed road development and surrounding lands. All species would be expected to maintain local populations, and none would be deterred from utilising habitats alongside the proposed development during the operational phase. There are no known or potential Barn Owl or Kingfisher nest sites on or in the immediate vicinity of the proposed development which could be disturbed during construction or operation.

Direct Mortality

Direct mortality is possible as a result of site clearance and vegetation removal. Birds are particularly vulnerable during the nesting season (March - August inclusive) when works could lead to the loss of nests. Otter and badger are present along the route and could build shelters within the footprint between the time of the surveys to inform the EclA and the construction phase. The introduction of road traffic into the study area as a result of the proposed development will present the likelihood of collisions with wildlife including birds, badger, otter and bats.

Water Quality Impacts

Construction activities within and adjacent to surface waters, e.g. rivers, can negatively impact water quality. The construction of the proposed development, if not properly managed, has the potential to impact on water quality as follows.

Surface water run-off from construction activities can contain high levels of suspended sediments and other pollutants. Such run-off, if not attenuated and treated prior to discharge, has the potential to cause significant ecological impacts. Large amounts of fine sediment deposition can smother benthic habitats, leading to changes in biological composition.

During construction, concrete, grout or other pollutants may spill directly into the local environment or be washed into the water in construction site run-off. These materials are highly alkaline and, consequently, can drastically alter the pH of the receiving water body. This can lead to profound ecological impacts and can affect the condition of habitats by causing damage to pH-sensitive species.

Vehicles, plant and equipment which will be used during construction rely on hydrocarbons such as diesel, petrol and lubricating oils. Leaks from poorly maintained vehicles, plant, equipment, or storage tanks risk the input of hydrocarbons into the environment. In the absence of appropriate mitigation, hydrocarbons from the construction site may be washed into surface waters in construction site run-off. This has the potential to cause negative ecological impacts on freshwater habitats. Hydrocarbons can have direct toxic effects, including reducing the ability of organisms to absorb water and nutrients. Hydrocarbons can also alter the nutrient balance and microbiota in soil and water, which can benefit some species while detrimentally

affecting others. Such changes have the potential to alter the ecological community structures and ecological integrity of habitats.

Inadequate treatment of wastewater from on-site toilets and washing facilities also provides for potential water quality impacts which could lead to ecological effects. Faecal contamination can alter the nutrient balance in soils and water, causing significant changes in microbial communities and reductions in oxygen levels. This can have significant effects on the biological composition of receiving habitats.

The operation of the proposed development has the potential to cause run-off from the road surface, which is likely to contain small concentrations of hydrocarbons and other pollutants, to be discharged to watercourses in the study area. Attenuation ponds, which form part of the proposed development could flood mobilising fine sediment and contaminants into receiving waterbodies.

Hydrological Impacts to Habitats

The proposed road construction could potentially result in hydrological changes to the area surrounding the proposed development due to drainage or waterlogging. The proposed development could indirectly impact the Ardee bog through changes in hydrology and hydrogeology in the area resulting in a lowering of the water table and a drying out of the bog.

Dispersal of Invasive Species

Construction activities could aid the spread of invasive species within the site. In the absence of control measures, there is a possibility that these species may be inadvertently spread during construction, through the movement of equipment and contaminated soil to, from, or within the site.

7.5.2.2 Impacts on Key Ecological Receptors

Table 7-15 below describes the impacts on each of the Key Ecological Receptors.

Table 7-15 Impacts on Key Ecological Receptors

KER	Construction-phase Impacts	Operational-phase Impacts	Ecological Significance if Unmitigated
KER 1 Ardee Cutover Bog pNHA	Habitat loss	Habitat degradation	<u>Construction Phase</u> The proposed development will result in a permanent imperceptible neutral/negative impact at the local level in respect of habitat loss. <u>Operational Phase</u> The proposed development will result in an indirect permanent significant negative impact at the local level in respect of habitat degradation.

KER	Construction-phase Impacts	Operational-phase Impacts	Ecological Significance if Unmitigated
KER 2 Watercourses	- Water quality impacts leading to habitat degradation - Habitat fragmentation	Water quality impacts leading to habitat degradation	<u>Construction Phase</u> The proposed development will result in a short-term significant negative impact at the local level in respect of both habitat degradation and fragmentation. <u>Operational Phase</u> The proposed development will result in a permanent significant negative impact at the local level in respect of habitat degradation.
KER 3 Hedgerows and Treelines	- Habitat loss - Habitat degradation - Habitat fragmentation	None	<u>Construction Phase</u> The proposed development will result in a Short-term Moderate Negative Impact at the local level in respect of habitat loss, degradation and fragmentation.
KER 4 Badger	- Direct mortality - Disturbance including sett abandonment - Habitat loss - Habitat degradation - Habitat fragmentation	- Direct mortality due to vehicular collision - Disturbance arising from lighting, noise and visual impacts	<u>Construction Phase</u> The proposed development will result in a short-term imperceptible negative impact at the local level in respect of direct mortality, a short-term significant negative impact at the local level in respect to disturbance including sett abandonment, a permanent significant negative Impact at the local level in respect to habitat loss and a short-term slight negative impact at the local level in respect to habitat fragmentation. <u>Operational Phase</u> The proposed development will result in a permanent moderate negative impact at the local level in respect of both direct mortality and to disturbance.
KER 5 Otter	- Direct Mortality - Disturbance - Water quality impacts leading to habitat degradation	- Direct mortality due to vehicular collision - Disturbance arising from lighting, noise and visual impacts	<u>Construction Phase</u> The proposed development will result in a short-term imperceptible negative impact at the local level in respect of direct mortality, a short-term significant negative impact at the local level in respect to disturbance and a short-term significant negative impact at the local level in respect of habitat degradation. <u>Operational Phase</u> The proposed development will result in a permanent moderate negative impact at the local level in respect of both direct mortality and to disturbance.

KER	Construction-phase Impacts	Operational-phase Impacts	Ecological Significance if Unmitigated
KER 6 Bats	- Habitat loss - Habitat degradation - Habitat fragmentation	- Direct mortality due to vehicular collision - Disturbance arising from lighting	<u>Construction Phase</u> The proposed development will result in a short-term and permanent imperceptible negative impact at the local level in respect of habitat loss, short-term imperceptible negative impact at the local level in respect of habitat degradation and a short-term imperceptible negative impact at the local level in respect to habitat fragmentation. <u>Operational Phase</u> The proposed development will result in a permanent imperceptible negative impact at the local level in respect of both direct mortality and to disturbance.
KER 7 Nesting Birds	- Loss of nests - Habitat loss - Displacement	- Direct mortality due to vehicular collision - Disturbance arising from noise and visual impacts	<u>Construction Phase</u> The proposed development will result in a short-term moderate negative impact at the local level in respect of loss of nests, habitat loss and displacement. <u>Operational Phase</u> The proposed development will result in a permanent moderate negative impact at the local level in respect of both direct mortality and to disturbance.
KER 8 Wintering Birds	- Disturbance - Displacement	- Direct mortality due to vehicular collision - Disturbance arising from noise and visual impacts	<u>Construction Phase</u> The proposed development will result in a short-term moderate negative impact at the local level in respect of disturbance and displacement. <u>Operational Phase</u> The proposed development will result in a permanent imperceptible negative impact at the local level in respect of both direct mortality and to disturbance.
KER 9 Invasive Species	Spread of invasive species	None	Construction of the proposed development may lead to the introduction and spread of invasive species.

7.6 Mitigation

This section describes the measures that are in place to mitigate and offset likely negative impacts on the environment associated with the proposed development and the Key Ecological Receptors identified in the preceding sections. Construction phase mitigation measures are described first, followed by general mitigation measures which will apply during the construction and operational phases. Lastly, mitigation measures which related specifically to the Key Ecological Receptors is described.

The proposed development has been designed having regard to EU and Irish legislation and all relevant guidelines in relation to ecology and engineering best practice for the planning and construction of road projects. These guidelines provide practical measures that can be incorporated into the design to minimise impacts and protect the receiving environment. The design has followed the basic principles outlined above to eliminate the potential for ecological impacts, where possible, and to minimise such impacts where total elimination is not possible. The design has followed the TII Publications (Standards) and the TII Environmental Assessment and Construction Guidelines.

There will be no direct impacts on Annex I habitats resulting from this development. The construction of the proposed development will maintain a drainage neutral situation thus there will be no indirect impacts on sensitive habitats.

The proposed development has been designed to include measures and enhancements that will benefit wildlife. The creation of numerous attenuation ponds along the proposed development will provide additional breeding habitat for amphibians and invertebrates. A new peat deposition area will be landscaped to include native vegetation and ponds. The landscaping plan (CSR, 2021) includes the creation of new hedgerows and treelines with native Irish species along the CPO line. The biodiversity value of the new hedgerows, trees will be low at first but will improve with time as the plants grow become established.

7.6.1 Construction Phase Mitigation Measures

- Prior to any demolition, excavation, or construction a Construction Environmental Management Plan (CEMP) will be produced by the Contractor, using the outline plan set out in Appendix B. The CEMP will set out the Contractor's overall management and administration of the construction project and will be developed by the Contractors during the pre-construction phase, to ensure commitments included in the statutory approvals are adhered to. The CEMP will also be required to integrate with the requirements of the Environmental Operating Plan (EOP).
- Before any works commence on site, the Contractor will be required to prepare an Environmental Operating Plan (EOP) in accordance with the TII Guidelines for the Creation and Maintenance of an Environmental Operating Plan. The EOP will set out the Contractors approach to managing environmental issues associated with the construction of the road and provide a documented account to the implementation of the environmental commitments set out in the the Part VIII Planning Application Report.
- An Ecological Clerk of Works (ECoW) shall be appointed prior to the commencement of works. It shall be their responsibility to supervise and provide recommendations on the execution of any and all works which have the potential to give rise to negative or positive effects on biodiversity. The ECoW will have at least five years' experience as an Ecological Clerk of Works on road infrastructure projects.
- The Contractor will appoint a Site Environmental Manager (SEM) prior to the commencement of works. This person shall be responsible for carrying out environmental monitoring of the works and ensuring that the mitigation measures proposed in this EclA are adhered to.
- Site Compounds will be required during construction to ensure enough room is afforded for construction. The construction envelopes for the compounds, bridges and other ancillary infrastructure will be temporarily fenced off at the

outset of the construction and will avoid the potential for un-necessary loss of habitat outside of the construction footprint.

- The fencing for the compound at Silverhill Road will be set inside existing hedgerow and treeline boundaries to avoid habitat loss. The set-back distance will be directed by the ECoW.
- The mitigation measures presented in other sections of the Part VIII Planning Application Report, including, but not limited to 'Hydrology' and 'Landscape and Visual' sections will be implemented in full.
- The use of artificial lighting on site will be minimised in terms of the area required to be illuminated and the length of time for which any lighting is switched on. Light spillage will be prevented as far as reasonably practicable. Artificial lighting will be shut off at night when not in use or when works cease at the end of the day in order to minimise the effects of light pollution and disturbance to crepuscular and nocturnal species. Security lighting, if required, will be cowed, to prevent light spill outside the works areas. Direct or indirect lighting onto the watercourses will be avoided. The ECoW will ensure that light spill is reduced as much as possible.
- A pre-construction survey will be undertaken 2-3 weeks prior to construction to ensure that protected species such as Otter and Badger have not taken up residence within the construction envelope and to record invasive species extent and distribution. The survey will cover the footprint of the proposed development and a 50m buffer. Should any protected species shelters (e.g. holts, setts) be found, the ECoW will seek direction from the NPWS.
- Any excavations deeper than 1m will be either covered or have ramps fitted outside of working hours, which will allow badgers and other wildlife to escape. Similarly, any temporarily exposed open pipe system will be capped to prevent species such as Otter from gaining access when contractors are off site.
- Two new watercourse crossings are proposed as part of the proposed development. The first bridge will cross the River Dee at Ch. 0+600 while the second will cross the River Garra Ch. 1+700. Both bridges are clear span and the bridge abutments of each will be designed to provide a minimum setback of 2m from the top of the natural riverbank.
- The natural riverbank will be retained to allow mammals to pass under the bridges. Should this not be possible, mammal ledges will be provided in these structures in accordance with TII (2008). The ledges will be at least 500mm wide and at least 150mm above the 1 in 5-year flood event and have at least 600mm of headroom.
- Noise mitigation measures will be employed to ensure the construction noise limits are not exceeded along the entire length of the proposed development. The contract documents will clearly specify the construction noise criteria which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of BS 5228- 1:2009+A1:2014.

The risk of accidental transfer of non-native invasive species and diseases will be minimised by the implementation of Invasive Species and Biosecurity Management measures to avoid the spread or transfer of all invasive plants, animals and diseases in accordance with current best practice protocol, the TII Guidelines on the Management of Noxious Weeds and Non-native plant species on National Road Schemes (2010).

7.6.2 Non-Specific Mitigation Measures

The following is an overview of the non-specific mitigation measures that will be employed to avoid or minimise significant impacts on the ecological receptors within the Zone of Influence:

7.6.2.1 Water Quality – Construction Phase

Best practice pollution control measures shall be implemented during the construction phase, including:

- All material including oils, solvents and paints will be stored within temporary bunded areas or dedicated bunded containers;
- The Contractor will not be permitted to use lands liable to flooding for the storage of materials and will be required to monitor weather forecasts to ensure works within flood prone areas are not undertaken in during times of flood.
- Refuelling will take place in a designated bunded area away from surface water gullies, drains and water bodies, in the event of refuelling outside of this area, fuel will be transported in a mobile double skinned tank;
- All machinery and plant used will be regularly maintained and serviced and will comply with appropriate standards to ensure that leakage of diesel, oil and lubricants is prevented;
- Spill kits and hydrocarbon absorbent packs will be available and drip trays will be used during refuelling;
- Elements of the bridge will be prefabricated to reduce the need for pouring wet concrete on site.
- The use of machinery carries the potential for accidental hydrocarbon contamination of works areas by fuel spillages or oil leaks for example. The works will be carried out in accordance with the following measures to avoid such impacts:
 - Mobile storage such as fuel bowzers will be bunded to 110% capacity to prevent spills. Tanks for bowzers and generators will be double-skinned.
 - When not in use, all valves and fuel trigger guns from fuel storage containers will be locked.
 - All plant refuelling will take place using mobile fuel bowzers. Plant refuelling will take place as far as practicable from watercourses. A spill kit and drip tray shall be on site at all times and available for all refuelling operations. Equipment will not be left unattended during refuelling. All pipework from containers to pump nozzles will have anti-siphon valves fitted.
 - Strict procedures for plant inspection, maintenance and repairs will be detailed in the contractor's method statements and machinery shall be checked for leaks before arrival on-site.
 - All site plant will be inspected at the beginning of each day prior to use. Defective plant will not be used until the defect is satisfactorily fixed.
 - All major repair and maintenance operations will take place off-site.

7.6.2.2 Water Quality – Operation Phase

- The road drainage for the proposed development has been designed based on Sustainable Drainage Systems (SuDS) which will provide attenuation for a 1 in 100-year flood event including a 20% increase due to climate change. These systems will also include hydrocarbon interceptors which will treat all run-off prior to discharge into the existing surface water drainage network and the River Dee

and River Garra. This will prevent impacts on water quality, both in terms of sedimentation, pollutants and the sudden increase in flows following a rainfall event, as a result of the proposed development. The drainage system developed for the proposed development will provide a suitable drainage system to service the road and to ensure that the existing drainage systems adjacent to the proposed development are not adversely impacted.

- A number of the attenuation ponds are situated in flood-prone areas. The crest of the bunds that form the attenuation ponds are above the 1:100-year flood levels, such that they are not envisaged to be inundated in a flood event through overtopping. However, the outfalls of the ponds to the receiving watercourses are below the 1:100-year flood level in most instances. To ensure that flood waters can't back-up through the outlet into the pond, non-return valves will be provided on all attenuation pond outlets below the 1:100 year flood level. In the case of more severe than 1:100-year flood events, in which one or more attenuation pond is flooded, there will be mobilisation of fine sediment and contaminants. Assuming regular maintenance of ponds, the associated impact would be minor.
- Excavated material will be processed and reused on site where possible. A material deposition area has been selected at Ch. 3+725 which will receive approximately 4500m³ of peat and soil which will be excavated during the construction phase. Depending on the final volume of excavated material, surplus material may be deposited off-site to a suitably licensed facility or potentially reused on nearby projects. The deposition area will be positioned at least 10m from the adjacent watercourse as per *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*. (TII, 2006). Best practice drainage and pollution prevention measures will be implemented to prevent / minimise potential run-off from the proposed material deposition area at Ch. 3+725 this will include the use of silt traps which will intercept run-off.

The proposed route traverses' areas indicated as liable to flood in extreme events. Conveyance within the floodplain will be maintained by the provision of adequately sized watercourse crossings and flood conveyance culverts to ensure that the road embankment does not act as a barrier to the flood waters. The road embankment from ground level to the 1:100year flood level will be constructed of coarse graded granular fill (Class 6) that has a void ratio of 30%, to allow storage of flood waters within the embankment. The design of the scheme will ensure that it will have no residual significant impact on flooding as can be seen in the flood extent drawings. There is no discernible difference in the flood extent between the pre- and post-development scenarios.

7.6.2.3 Lighting

- The lighting design has been designed in accordance with TII guidance document *Design of Road Lighting for the National Road Network* (TII, 2018) and *Bats and Artificial Lighting in the UK* (BCT, 2018).
- The lighting design will ensure that all luminaries will be LED which lack UV elements and will have peak wavelengths greater than 550nm (~3000°K). This will produce a warm white colour, and, in tandem with maintaining the minimum allowable lux levels, will reduce the impacts of lighting on wildlife.
- Lights will be designed to minimise light spill outside the intended area. This will include the use to light shields or cowls to prevent light spill onto habitats adjacent to the proposed development.

7.6.2.4 Fencing

- Mammal-resistant fencing as shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050 will be provided along the route to guide Badgers and Otter to mammal underpasses and other safe crossing points. The specification for mammal-resistant fencing is given in the *Guidelines on the Treatment of Badgers prior to the Construction of National Road Schemes* (TII, 2006a) and *Guidelines on the Treatment of Otters Prior to the Construction of National Road Schemes* (TII, 2008b).
- Fencing will be recessed and tied into mammal crossings points to guide Badgers and Otter safely under the road and prevent them accessing the road carriageway.
- Mammal-resistant fencing will be incorporated at the earliest possible stage during road construction, preferably during erection of the permanent fence line with gaps left at locations recommended for mammal crossing points.
- Where there is an overlap of stock-proof fencing and mammal-resistant fencing at mammal crossing points, stock-proof fencing must be adjusted to allow for unimpeded access to the mammal crossing points. This involves modification of the lower section of the stock-proof fence. The fence will be adjusted so that the bottom rail and wire mesh are removed and chain-link is not fixed to the ground at the location of the underpass. This allows the animals to see a break in the fence line and thus clear access to the mammal crossing points nearby.

7.6.3 Landscaping

A landscape plan (CSR,2021 – refer to Drawings N52A-ROD-EAC-SW_AE-DR-EN-300052 - N52A-ROD-EAC-SW_AE-DR-EN-300055) has been prepared for the proposed development. It includes the following measures:

- In order to compensate for the loss hedgerow and treeline habitat, hedgerows and trees will be planted along the CPO line.
- Dedicated mammal crossings points (as shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050) will have appropriate landscape planting to provide cover.
- Green areas which would ordinarily be seeded with grass will be planted with a locally sourced wildflower mix containing native species. This area will be mown twice per year, once in early spring and once in late summer.
- In order to provide resources for pollinators and birds, a heathland mix containing Ling Heather (*Calluna vulgaris*) and Bell Heather (*Erica cinerea*) together with a mix of other flowering species, will be planted in areas of peaty soil.
- Planting will consist of locally sourced native species of national provenance only, insofar as possible.
- Planting will be undertaken in accordance with guidelines set out in the following documents:
 - All Ireland Pollinator Plan 2021-2025 (NBDC, 2021)
 - Pollinator-friendly management of: Transport Corridors (NBDC, 2019)
- If soil/substrate needs to be imported to the site for the purposes of the proposed development, the Contractor shall ensure that the imported soil/substrate is free from invasive species.

7.6.4 Specific Mitigation Measures

In addition to the general mitigation measures described above, specific measures are described in relation to individual Key Ecological Receptors in the following sections.

Biodiversity mitigation measures are presented in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050.

7.6.4.1 Ardee Bog pNHA (KER1)

The proposed development will result in the loss of habitat within the pNHA. The habitats are improved agricultural grassland and the loss of this habitat is not considered significant in the context of the ecological integrity of the pNHA.

The road drainage has been designed to achieve a drainage neutral effect on the surrounding area. This has been achieved by preserving existing drainage paths and using adequately sized culverts, flood conveyance culverts and watercourse crossings. To prevent dewatering effects of peat excavation, impervious subsurface liners will be used in these areas. Transverse impermeable geotextile barriers will be installed to prevent the road formation from draining the peat

7.6.4.2 Watercourses (KER2)

In addition to the construction phase and non-specific mitigation measures described above, the following measures will be implemented to ensure the protection of Key Ecological Receptor 2 Watercourses:

- Works within and adjacent to watercourses will comply with *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (IFI, 2016) and *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes* (TII, 2008). Measures contained in these documents include the following:
 - Prior to any excavations, the works area will be assessed and clearly *delineated* with temporary fencing. The minimum area necessary will be identified as part of the works area and there will be no access to works vehicles outside the fenced off areas.
 - All storage of plant, excavated material/topsoil and other materials required for construction, will be held within the fenced area.
 - No washing of plant, vehicles or equipment will be completed within 50m of a watercourse. The site foreman will ensure that all deliveries are required to complete wash-out at their own company base, i.e. not on site.
 - In all circumstances, excavation depths and volumes will be minimised, and excavated material will be re-used where possible.
 - During the operational phase, TII will be responsible for carrying out regular, best practice maintenance of attenuation ponds.
 - The measures prescribed in the CEMP will be strictly adhered to during both the construction and the operational phase.
- In-stream works will only take place between the 1st July and 30th September, subject to agreement with Inland Fisheries Ireland.
- Where pipe culverts are required for minor watercourses or field drains pipes they will be up to 2m wide, designed to match existing channel widths, whilst accommodating flood flows in line with the OPW requirements. These culverts will have inverts set 500mm below bed level for box culverts and 200mm below bed level for pipe culverts to ensure they are always backwatered and therefore accommodate unimpeded fish movement under all flow conditions.

7.6.4.3 Hedgerows and Treelines (KER3)

The existing hedgerows and treelines along the route are to be retained and protected except at specific locations where vegetation removal is necessary to facilitate the

proposed development. Adequate protective fencing will be erected around trees and hedgerows which are to be retained and will include a Root Protection Area.

7.6.4.4 Badger (KER4)

In addition to the construction phase and non-specific mitigation measures described above, the following measures which comply with *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes* (TII, 2006b). will be implemented to ensure the protection of Key Ecological Receptor 4 Badger:

One badger sett was recorded 30m from at Ch. 2+800. The location of the sett is illustrated in Drawing N52A-ROD-EAC-SW_AE-DR-EN-300049. Works within 50m of a badger sett have the potential to lead to sett abandonment including the abandonment of dependent young. Due to it's location within 30m of the proposed development and risk that the sett may be used in the future by badgers, it is recommended that a licence for disturbance and exclusion be sought from the NPWS prior to the commencements of any works within 30m of the badger sett.

- Prior to construction, the sett at Ch. 2+800 will be surveyed to assess if it is active or inactive. Monitoring using camera traps may be required to ascertain whether the sett is active or inactive and whether it is being used for breeding.
- The sett will be temporarily closed, in accordance with TII (2006b). Exclusion/closing of active setts will be carried out under licence from the NPWS and under the supervision of an appropriately qualified ecologist. An artificial sett will not be provided as the sett is not a main sett. The sett will be closed as follows:
 - The sett should be closed outside the breeding season (December to June inclusive). No construction machinery will be used within 30m of the badger sett (extended to 50m for active setts during the breeding season).
 - Prior to any closure works it is recommended that the sett is soft blocked for five days to determine if the sett is inactive. This should be carried out using small twigs and placing them over the entrance of the sett, the site will then be revisited after 5 days to see if the twigs have been moved and therefore confirming if the sett is active or not. Camera traps will be used to ascertain if the sett is in use or not.
 - If soft blocking proves the sett is inactive, the sett should be closed immediately.
 - If required, a one-way Badger gate will be fitted over each sett entrance. The badger gate will be tied open for approximately three days to allow mammals (if present) to move freely from the sett.
 - Gates will be closed after three days and will be monitored every three days for 21 days in total before the sett is then deemed inactive.
 - The gates and fencing can be left in place for the duration of the construction period within that vicinity and will be removed after works are complete. This will allow the badgers to move back into the sett once works have been completed.
 - While the sett is closed it should be monitored on a monthly basis to ensure there has been no interference with the closure and no mammals have attempted to dig back into the sett.
- 9 No. mammal crossing points will be provided at suitable locations along the proposed development to accommodate unimpeded movement of badger across the proposed development and avoid road traffic collision (listed in Table 7-16 below and shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 -

N52A-ROD-EAC-SW_AE-DR-EN-300050). The locations of mammal crossing points have been selected based on existing mammal trails, locations close to the badger setts and where foraging activity has been recorded and which tie-in with existing features on either side of the carriageway (hedgerows, treelines, etc.).

- Mammal crossing points in the form of underpasses will be constructed in accordance with adherence to the following general guidelines:
 - The exit and entrance to tunnels will be flush with mammal-resistant fencing and the invert set at ground level.
 - A concrete surround will provide a solid connection to the uprights of the fence and inhibit any efforts by Badgers to dig under the pipe.
 - Drainage will be adequate to prevent water-logging at the entrances during wet weather. Specific design of underpasses will be tailored to individual locations and will be carried out at the detailed design stage.
- One box culvert measuring 2.7m (W) x 1.8m (H) in vicinity of the badger sett, will be designed for mammal passage. The culvert be fitted with a raised mammal ledge along one or both sides as *per Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes* (TII, 2005). Ledges shall be at least 500mm wide, constructed at least 150mm above the 1 in 5 year flood event, and allow at least 600mm headroom.
- Four separate mammal pipes measuring >600mm will be constructed above flood level adjacent to the stream culverts.
- The natural riverbank at bridges crossing the River Dee and Garra will be retained to allow Badgers pass under the bridges. Should this not be possible, each structure will be fitted with a raised mammal ledge along one or both sides as *per Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes* (TII, 2005). Ledges shall be at least 500mm wide, constructed at least 150mm above the 1 in 5 year flood event, and allow at least 600mm headroom.
- Badger-resistant fencing will be provided along the entire route of the proposed development as shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050. The fencing will adhere to the relevant specifications set out in *Figure 2 Specifications for the Development of Badger-Resistant Fencing* in TII (2006b).
- The success of the mitigation measures for badgers will be monitored for a period after construction, and measures taken to enhance use of mammal crossings where required. Monitoring will be carried out to determine the success of the measures employed within one year after construction ceases, in accordance with TII (2006b).
- In order to ensure that the long-term effectiveness of badger-resistant fencing and mammal crossings, these will require periodic maintenance in accordance with TII (2006b).

Table 7-16 Mammal Crossing Points

Mammal Crossing Points	Location	Type of Crossing Point
MU0.1	CH 0+600	Riverbank at bridge over the River Dee
MU0.2	CH 0+900	600mm mammal underpass
MU1.1	CH 1+700	Riverbank at bridge over the River Garra

Mammal Crossing Points	Location	Type of Crossing Point
MU2.1	CH 2+200	Farm underpass
MU2.2	CH 2+700	600mm mammal underpass
MU2.3	CH 2+800	Culvert with ledge near badger sett
MU3.1	CH 3+050	600mm mammal underpass
MU3.2	CH 3+350	600mm mammal underpass
MU3.3	CH 3+850	600mm mammal underpass

7.6.4.5 Otter (KER5)

In addition to the construction phase and non-specific mitigation measures described above, the following measures which will comply with *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (TII, 2008b). will be implemented to ensure the protection of Key Ecological Receptor 5 Otter:

- A pre-construction survey will be undertaken 2-3 weeks prior to construction to ensure that Otter have not taken up residence within the construction envelope. The survey will cover the footprint of the proposed development and a 150 m buffer. Should any holts be found, the SEM will seek direction from the NPWS. Watercourse crossings will be designed to ensure that otter passage is not impeded.
- As outlined in Section 7.3.4 9 No. mammal crossing points will be provided at suitable locations along the proposed development to accommodate unimpeded movement of otter across the proposed development and avoid road traffic collision (listed in Table 7-16 above and shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050).
- Otter-resistant fencing will be provided with 50m either side at watercourse crossings as shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050. Otter-resistant fencing will be incorporated on either side of watercourses and will stretch to at least 50m or more either side of the crossing. The fencing will adhere to the relevant specifications set out in *Figure 1 Mammal Fencing* in TII (2008b)

7.6.4.6 Bats (KER6)

The mitigation measures described in Section 7.6.1 and 7.6.2 will ensure that there are no impacts on Key Ecological Receptor 6 Bats.

Two bat boxes will be installed on the proposed bridges. The bat boxes should be a mix of cavity and crevice type bat boxes such as the Schwegler 2F and 1FF, or equivalent. Bat boxes should be at least 2m off the ground with a clear flight path in and out of box. They should be south facing. Bat boxes are available from www.nhbs.co.uk. The position of the bat boxes will be determined by the ECoW.

7.6.4.7 Nesting Birds (KER7)

In addition to the construction phase and non-specific mitigation measures described above, the following measures will be implemented ensure the protection of Key Ecological Receptor 7 Nesting Birds:

The protection of habitats during the nesting season (1st March to 31st August, inclusive) are set out in the Wildlife Act. Late-nesting species, such as the Red-listed Yellowhammer, nest into September and, therefore, no removal of vegetation will be undertaken between 1st March and 30th September, inclusive. If site clearance is

required during the nesting bird season, the area will be checked by the ECoW. If nesting birds are found to be present, the site clearance works will be postponed until the chicks have fledged.

A pre-construction survey will be undertaken 2-3 weeks prior to construction to ensure that Kingfisher have not taken up residence within the construction envelope. The survey will cover the crossings of the River Dee and River Garra and a 50 m buffer. Should any Kingfisher nests be found, the ECoW will seek direction from the NPWS.

Four 17A Schwegler Swift Nest Boxes (triple cavity) or similar will be incorporated into the existing bridges/viaducts and into new bridges crossing the River Dee and River Garra. These will be positioned on the northern faces of the bridges out of the prevailing wind and at least 2m high. The position of the swift boxes will be determined by the ECoW and will follow best practice guidance *Notes on the Common Swift and Setting up Nest Boxes* (Huxley, 2014) provides guidance on setting up swift boxes.

Landscaping along the proposed development will provide nesting and feeding habitat for a range of small bird species and will help to off-set the loss of habitat and the effects of habitat fragmentation as a result of the proposed development.

7.6.4.8 Wintering Birds (KER8)

The proposed development has been designed to reduce impacts to wintering birds. TA Site-Specific Flood Risk Assessment (SSFRA) has been prepared for the Project. The SSFRA indicates that the proposed development will have minimal impact on the existing flood regime. The low-lying nature of Ardee Bog and the surrounding lands ensure that any displacement of flood waters by the Project is dispersed across a very wide area and the effect on water level is barely perceptible. The hydraulic model estimates the increase in flood levels in the 0.1%AEP (1 in 1000 year) + mid-range future climate change scenario to be a median change of 2 mm across all modelled reaches. As can be seen in the flood extent drawings (Appendix B), there is no discernible difference in the flood extents between the pre- and post-development scenarios. Therefore, there is no discernible difference to flooding in fields used by wintering birds. The landscape plan includes planting of hedgerows and treelines which will screen the road from adjacent lands.

7.6.4.9 Invasive Species (KER9)

In addition to the construction phase and non-specific mitigation measures described above, the following measures will be implemented to prevent the further spread of Key Ecological Receptor 9 Invasive Species:

- The Contractor will prepare an invasive species management plan, detailing how the introduction and spread of invasive species will be prevented. The invasive species management plan will be approved by Louth County Council.
- Aquatic invasive species such as Canadian Pondweed spread by fragmentation and are occur in watercourse along the route. The invasive species management plan will include measures to prevent their spread to other waterbodies by thoroughly cleaning all equipment involved in working the watercourses.
- Herbicides will be used in accordance with the European Communities (Plant Protection Products) Regulations, 2012 (S.I. No. 159 of 2012) and the (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012) (as amended).
- Landscaping of the proposed development shall use native species of plants of national provenance only and, insofar as possible, soil reused from on-site

excavations. If soil/substrate needs to be imported to the site for the purposes of the proposed development, the Contractor shall ensure that the imported soil/substrate is free from invasive species.

7.7 Residual Impacts

Table 7-17 Residual Impacts on Key Ecological Receptors

Key Ecological Receptor	Pre-mitigation Impacts	Ecological Significance Following Mitigation
KER 1 Ardee Cutover Bog pNHA	- Habitat loss - Habitat degradation	Mitigation measures have been put in place to minimise habitat loss, however some habitat loss within the pNHA boundary is unavoidable. The loss of habitat within the pNHA is considered to constitute a permanent imperceptible neutral/negative impact at the local level . There are no significant residual negative effects on the Ardee Cutover Bog pNHA at any scale.
KER 2 Watercourses	- Water quality impacts leading to habitat degradation - Habitat fragmentation	There will be slight to imperceptible impact to watercourses arising from the proposed development. There are no significant residual negative effects on watercourses at any scale.
KER 3 Hedgerows and Treelines	- Habitat loss - Habitat degradation - Habitat fragmentation	With the implementation of the prescribed mitigation measures and landscape plan are no significant residual negative effects on hedgerows and treelines at any scale.
KER 4 Badger	- Direct Mortality - Disturbance including sett abandonment - Habitat loss - Habitat degradation - Habitat fragmentation	The provision of mammal crossing points across the proposed development will provide habitat continuity for Badger. With the implementation of the prescribed mitigation measures, the impact of the proposed development is likely to be slight negative for Badger. There are no significant residual negative effects on Badger at any scale.
KER 5 Otter	- Direct mortality - Disturbance - Water quality impacts leading to habitat degradation	The retention of mammal passage on watercourses and provision of mammal crossing points across the proposed development will provide habitat continuity for Otter. With the implementation of the prescribed mitigation measures, the impact of the proposed development is likely to be imperceptible negative for Otter. There are no significant residual negative effects on Otter at any scale.

Key Ecological Receptor	Pre-mitigation Impacts	Ecological Significance Following Mitigation
KER 6 Bats	- Habitat loss - Habitat degradation - Habitat fragmentation - Direct mortality	With the implementation of the prescribed mitigation measures, the impact of the proposed development is likely to be imperceptible negative on Bats. There are no significant residual negative effects on Bats at any scale.
KER 7 Nesting Birds	- Loss of nests - Habitat loss - Displacement - Direct Mortality - Disturbance	With the implementation of the prescribed mitigation measures, the impact of the proposed development is likely to be imperceptible negative on Nesting Birds. There are no significant residual negative effects on Nesting Birds at any scale.
KER 8 Wintering Birds	- Disturbance - Displacement - Direct Mortality	There are no significant residual negative effects on Wintering Birds at any scale.
KER 9 Invasive Species	Spread of invasive species	With the implementation of best practice biosecurity protocols during the construction phase, there will be no significant residual negative effects on Invasive Species at any scale.

7.8 Conclusion

Following consideration of the residual impacts (post mitigation) it is concluded that the proposed development will not result in any significant impacts on any of the identified Key Ecological Receptors.

It is considered that, with the implementation of the mitigation measures set out in this EclA, the construction and operation of the proposed development will not have a significant negative impact on biodiversity in the Zone of Influence.

7.9 References

Bat Conservation Trust (2018). Bats and Artificial Lighting in the UK. Bat Conservation Trust, UK.

CIEEM (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

Gilbert G, Stanbury A and Lewis L. (2021) *Birds of Conservation Concern in Ireland 2020-2026*. Irish Birds 9: 523-544.

Collins, J. (Ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition). The Bat Conservation Trust, London.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). Official Journal of the European Communities, L206/7.

CSR (2021) N52 Ardee Bypass Landscape Mitigation Plan. Cunnane Stratton Reynolds, 3 Molesworth Place, Dublin 2.

DCHG (2017) National Biodiversity Action Plan 2017-2021 Department of Culture, Heritage and the Gaeltacht.

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (the Birds Directive). Official Journal of the European Union, L20/7.

EPA (2003) Advice Notes on Current Practice. Environmental Protection Agency, Wexford.

EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Draft. Environmental Protection Agency, Wexford.

EPA (2020) ENVision Map Viewer. [Accessed 29/10/2020] <https://gis.epa.ie/EPAMaps>. Environmental Protection Agency, Wexford.

EPA Catchments (2020) Maps – Catchments.ie [Accessed 29/10/2020] <https://www.catchments.ie/maps/>. Environmental Protection Agency, Dublin.

European Communities (Birds and Natural Habitats) Regulations, 2011. SI No. 477/2011.

European Communities (Birds and Natural Habitats) (Amendment) Regulations, 2013. SI No. 499/2013.

European Communities (Birds and Natural Habitats) (Amendment) Regulations, 2015. SI No. 355/2015.

European Communities (Environmental Impact Assessment) Regulations, 1989. SI No. 349/1989.

European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC

EC (2008) Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. European Commission, Brussels.

Flora (Protection) Order, 2015. SI No. 356/2015.

Fossitt, J.A. (2000) A Guide to Habitats in Ireland. The Heritage Council, Kilkenny.

Louth County Council (2020) Draft Biodiversity Action Plan 2020- 2025. Cuntý Council Louth

NPWS (2020a) *Online Map Viewer* <<http://webgis.npws.ie/npwsviewer/>> [Accessed 29/10/2020]. Department of Culture, Heritage and the Gaeltacht, Dublin.

NPWS (2020b) Conservation objectives for Stabannan-Braganstown SPA [004091]. Generic Version 7.0. Department of Culture, Heritage and the Gaeltacht.

NPWS (2019a). *The Status of EU Protected Habitats and Species in Ireland*. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

NPWS (2019b). *The Status of EU Protected Habitats and Species in Ireland*. Volume 3: Species Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.

NPWS (2018a) *Natura 2000 Standard Data Form for the Stabannan-Braganstown SPA [004091]*. Updated September 2018. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2018b) *Natura 2000 Standard Data Form for the Dundalk Bay SAC [000455]*. Updated September 2018. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2018c) *Natura 2000 Standard Data Form for the Dundalk Bay SPA [004026]*. Updated September 2018. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2018d) *Natura 2000 Standard Data Form for the Stabannan-Braganstown SPA [004091]*. Updated September 2018. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2014a) *Site Synopsis for the Dundalk Bay SAC [000455]*. Published 31/01/2014. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2014b) *Site Synopsis for the Dundalk Bay SPA [004026]* Published 7/07/2014. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2011) *Conservation Objectives: Dundalk Bay SAC 000455 and Dundalk Bay SPA 004026*. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2010) *Site Synopsis for the Stabannan-Braganstown SPA [004091]*. Published 6/09/2010. National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2010) *Circular NPW 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities*. Department of the Environment, Heritage and Local Government, Dublin.

NBDC (2021) All Ireland Pollinator Plan 2021-2025. National Biodiversity Data Centre, Waterford.

NBDC (2016) Councils: actions to help pollinators. *All-Ireland Pollinator Plan 2015-2020*. National Biodiversity Data Centre, Waterford.

NBDC (2019) *Pollinator-friendly management of: Transport Corridors*. All-Ireland Pollinator Plan, Guidelines 9. National Biodiversity Data Centre Series No. 20, Waterford.

NBDC (2020) *Biodiversity Maps* <<https://maps.biodiversityireland.ie/>> [Accessed 29/10/2020]. National Biodiversity Data Centre, Waterford.

Planning and Development Act, 2000. *No. 30 of 2000*.

Planning and Development (Amendment) Act, 2002. *No. 32 of 2002*.

Planning and Development (Strategic Infrastructure) Act, 2006. *No. 27 of 2006*.

Planning and Development (Amendment) Act, 2010. *No. 30 of 2010*.

Regulation (EU) No. 1143/2014 of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species (the IAS Regulation). Official Journal of the European Union, L317/35.

Smith, G.F., O'Donoghue, P., O'Hara, A. and Delaney, E. (2011) *Best Practice Guidance for Habitat Survey and Mapping*. The Heritage Council, Kilkenny.

TII (2006a) *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*. National Roads Authority, Dublin.

TII (2006b) *Guidelines on the Treatment of Badgers Prior to the Construction of National Road Schemes*. National Roads Authority, Dublin.

TII (2008a) *Guidelines on the Treatment of Otters Prior to the Construction of National Road Schemes*. National Roads Authority, Dublin.

TII (2008b) *Environmental Impact Assessment of National Road Schemes – A Practical Guide*. National Roads Authority, Dublin.

TII (2009a) *Ecological Survey Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*. National Roads Authority, Dublin.

TII (2009b) *Guidelines for Assessment of Ecological Impacts on National Roads*. National Roads Authority, Dublin

TII (2010). *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads, Ireland*. Transport Infrastructure Ireland, Dublin.

TII (2012) *Guidelines on the Implementation of Landscape Treatment on National Road Schemes in Ireland*. Transport Infrastructure Ireland, Dublin.

TII (2014) *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes*. Transport Infrastructure Ireland, Dublin.

Wildlife Act, 1976. *No. 39 of 1976*.

Wildlife Act, 1976 (Protection of Wild Animals) Regulations, 1990. SI No. 112/1990.

Wildlife (Amendment) Act, 2000. *No. 38 of 2000*.

Wildlife (Amendment) Act, 2012. *No 29 of 2012*.

8. SOILS, GEOLOGY AND HYDROGEOLOGY

8.1 Introduction

This section describes the natural characteristics of the site of the proposed development and its immediate surroundings, in terms of soils, geology, geomorphology and hydrogeology. The likely significant impacts of the proposed development on these resources are assessed and where required, mitigating measures are put in place to avoid, reduce or minimise the impact of the proposed development.

This section outlines the governing ground conditions, with the likely impacts assessed on the basis of the relevant construction methodology and particular soil characteristics.

The mitigation measures and the residual impacts are provided in separate subsections.

8.2 Methodology

Desk Study

The preliminary assessment comprised a desk study of publicly available information from a number of sources outlined below:

- Geological Survey of Ireland, Bedrock Geology Mapping;
- Geological Survey of Ireland, Soils and Subsoils Mapping;
- Geological Survey of Ireland, Karst Features Database;
- Geological Survey of Ireland, Geological Heritage Sites Database;
- Geological Survey of Ireland, Landslide Database;
- Geological Survey of Ireland, Quaternary Geology Maps;
- Geological Survey of Ireland, Geotechnical Borehole Records;
- EPA, Local Authority landfill sites in Ireland;
- Geological Survey of Ireland, Directory of active quarries, pits and mines in Ireland, 2001;
- Geohive, historical mapping series;
- GSI Louth - County Geological Site Report;
- Ardee Bog information from Irish Peatland Conservation Council.
- Geological mapping from the Geological Survey of Ireland (GSI),

Ground Investigations

The ground investigation surveys available for this area include:

- Final Geotechnical Factual Report, N52 Ardee By-pass Ground Investigation (IGSL, 2013); and
- Final Geophysical Survey Report, N52 Ardee By-pass Ground Investigation (Minerex Geophysics Ltd, 2012).

The geophysical survey consisted of 8 seismic refraction (p-wave) and MASW (s-wave) surveying profiles, predominantly completed along the chainages Ch.173-473 and Ch.4+280-4+480 at proposed cut locations.

The intrusive ground investigation consisted of 15 cable percussion boreholes, 5 rotary core holes, 22 mechanically excavated trial pits and 30 Cone Penetration Tests (CPT). In addition to this, in-situ SPT tests were carried out in each exploratory hole, and relevant samples were recovered for laboratory ground tests.

The amount of GI available is considered sufficient for the development of this proportion and complexity.

8.3 Receiving Environment

The assessment of the existing ground conditions is based on both the desk study and ground investigation conducted on the proposed development area.

Geomorphology

The geomorphology of the landscape of the study area through which the proposed development passes is flat to gently undulating. The existing ground levels range from approximately +24mOD to +38mOD (Ordnance Survey). A series of low ridges connected to drumlin and moraine ridge landforms stretching in a southwest-northeast direction can be found in the area over which the proposed development will pass. The existing N52 alignment generally follows the line of one such low ridge.

The defining geomorphological feature of the study area is Ardee Bog, a flat area of cut raised bog positioned centrally in the study area. The proposed development will skirt the bog's south-eastern fringes. The proposed development will cross two rivers, the Garra River and the River Dee, as well as several smaller streams and drainage features related to Ardee Bog.

Almost the entire land encompassing the development area is used agricultural land, with localised built areas such as local roads that will be traversed by the proposed development.

Solid Geology

The solid geology largely consists of three distinct units, including the Cruicetown Group (argillaceous bioclastic limestone) and Navan Beds (dark limestone, mudstone and sandstone) in the western half of the development and the Clontail Formation (calcareous red mica greywacke of Silurian age) in the eastern half, according to GSI's 1:100,000 Bedrock Geology map. The bedrock under the footprint of the proposed development is typically at depths exceeding 10m below ground level and will not be exposed in any cutting.

A single karst landform interpreted as well (ref. 2929SWK001) is indicated in the vicinity of St Brigid's Hospital, according to the GSI database.

Quaternary geology

Based on the GSI maps and the existing ground investigation, quaternary geology across the development area predominantly consists of glacial till, comprising both fine-grained and coarse-grained soils, as well as cutover peat mainly covering areas of the north-eastern part of the development at the outskirts of Ardee Bog. Localised areas of lacustrine and alluvial deposits are also indicated as present on either side of the existing N52.

The ground survey data suggest a typical ground sequence of either made ground (where tests were done at local roads) or peat and organic clay overlying alluvial or lacustrine deposits overlying glacial till. Made ground, peat and alluvial/lacustrine

deposits are not present everywhere, and competent glacial till is found at surface over a considerable length of the proposed development. The thickness of surficial layer of peat is less than 1.0m, even at areas closest to Ardee Bog, and the layer is not present continuously but rather in localised patches. Glacial till, which covers the vast majority of the site, can be divided into fine-grained and coarse-grained units, which are interpreted to comprise sandy gravelly clay, and sands and gravels respectively. Made ground is largely miscellaneous, while both alluvial and lacustrine sediments are typically interpreted as very soft to soft organic silt or clay. Alluvium is mainly associated with river Dee floodplains and lacustrine sediments are indicated underneath peat at Ardee Bog. Some of the soft ground is also associated with softened glacial till. The thickness of soft soils (alluvium, lacustrine and soft glacial till) varies considerably and reaches up to 9m at one point but is typically less than 4m.

Ground contamination

The proposed development will be situated almost entirely in the agricultural land, where no ground contamination is expected. Elevated levels of contaminants may be locally present where handling of made ground will be required, such as where the proposed development traverses the local roads. The risk is addressed in the mitigation measures.

Hydrogeology

Aquifers

There are two main aquifers within the footprint of the proposed development as can be seen in Figure 8-1. One is situated to the north within townlands Glebe and Mullanstown and extends south into Townparks, Bohernamoe and Ballygowan. This is classified as a 'Poor Aquifer – Bedrock' which is Generally Unproductive except for Local Zones. The second aquifer which underlies the western and eastern extents of the proposed development and which is the prominent aquifer within the townlands of Townparks, Bohernamoe, Ballygowan and Curraghbeg, is a 'Locally Important Aquifer – Bedrock', which is Moderately Productive only in Local Zones.

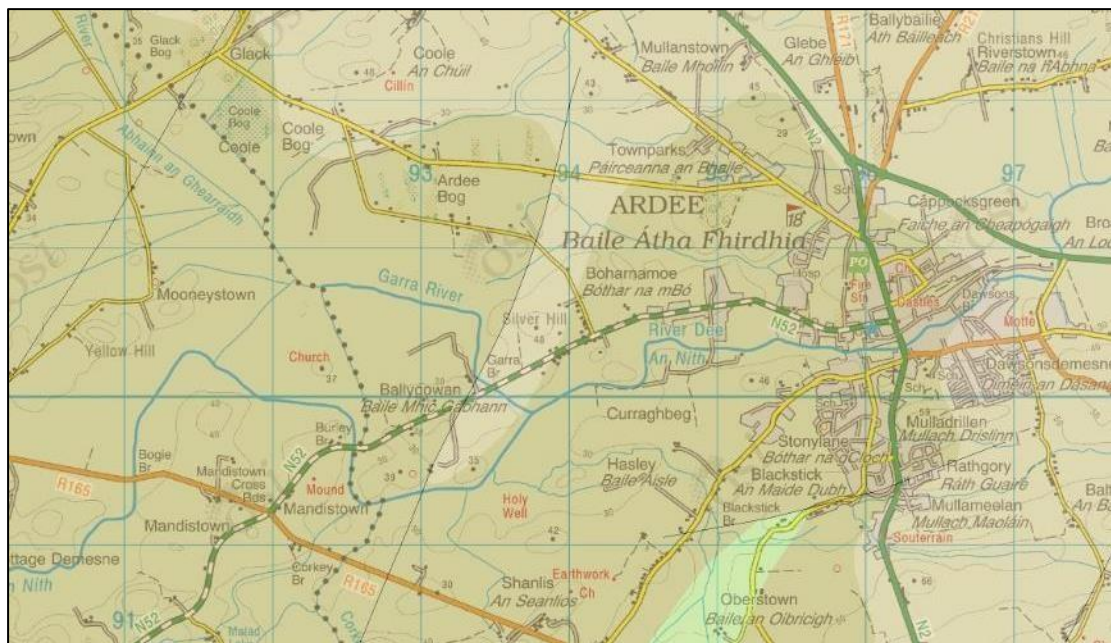


Figure 8-1 Groundwater resources (aquifers) within the study area (source: <https://dcenr.maps.arcgis.com/>)

Drinking Water Supply

The Curraghbeg Boreholes, which contributes water to the Ardee Water Supply Project, is located southwest of Ardee. Water is also abstracted from the River Dee for the Supply Project. LCC requested Source Protection Zone delineation for the Curraghbeg Borehole from the GSI, in order to develop Source Protection Zones for the entire zone of contribution to the groundwater component of the Ardee Water Supply⁷. The Zone of Contribution is shown in Figure 8-2.

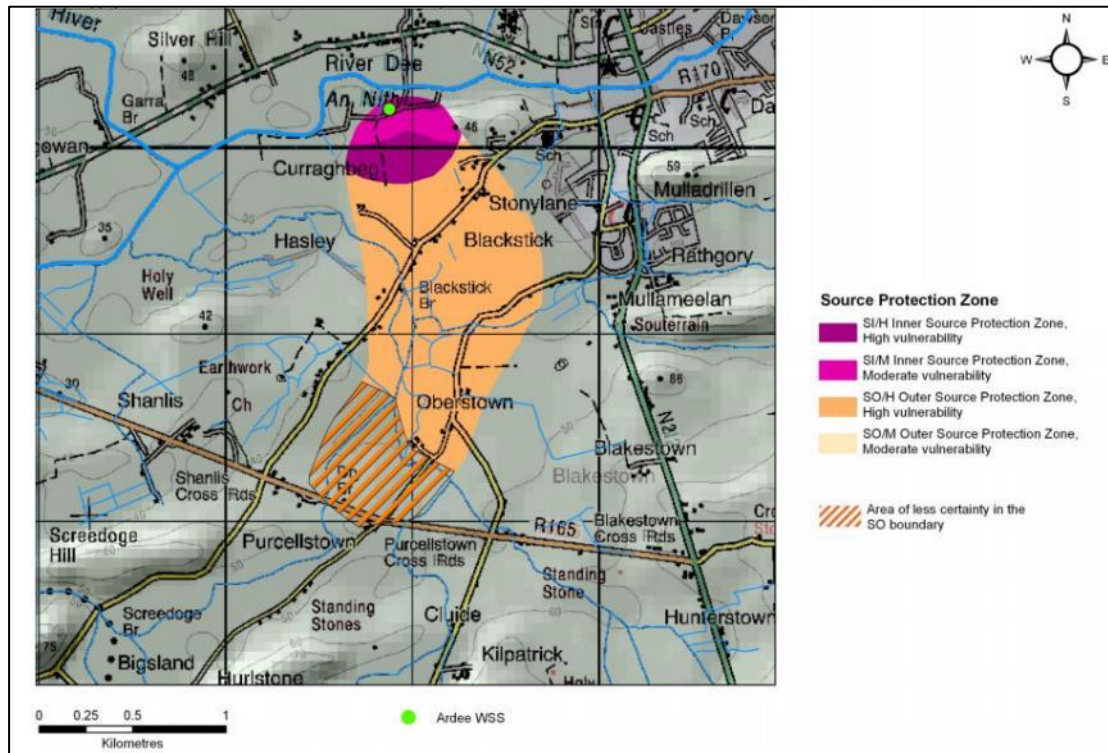


Figure 8-2 Source Protection Zone for the Curraghbeg Borehole

Groundwater Vulnerability

The groundwater vulnerability rating within the footprint of the proposed development ranges from Moderate (M) to High (H). As shown in Figure 8-3, below, the area around Ardee bog and to the west, is ranked as Low groundwater vulnerability. There are small areas of 'Extreme' vulnerability or 'rock at or near the surface or karst' within a 2km radius of the proposed development, such as the location just north of the proposed development adjacent to the River Garra, at the convergence of Townparks Road and Mullanstown Road north of the development, at Mandistown to the south along the R165 and at the Hospital (St Brigids) on the N52 on approach to Ardee town. In general, across the proposed development, the groundwater vulnerability ranges from 'moderate' to 'high'.

⁷ Establishment of Groundwater Source Protection Zones Ardee Water Supply Project Curraghbeg Borehole. Geological Survey of Ireland.

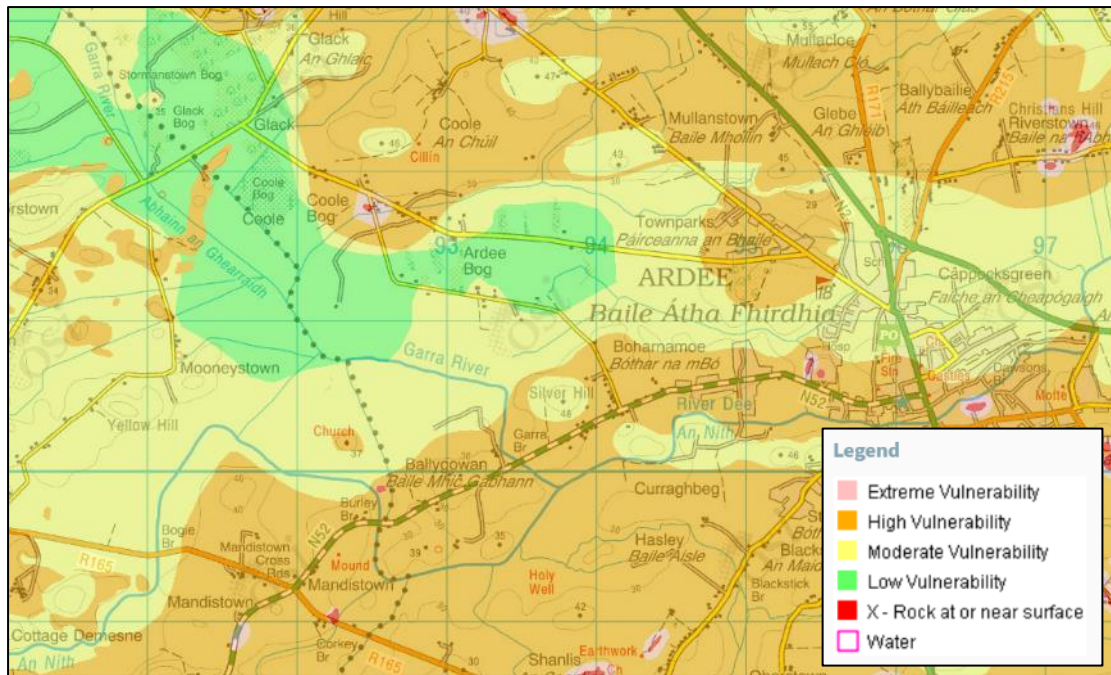


Figure 8-3 Groundwater vulnerability in the study area

8.4 Predicted Impacts

Construction Phase

Soils and Geology

The proposed alignment is to be situated on ground of mainly agricultural interest and will transform the land for transportation infrastructure usage.

The majority of the proposed development will comprise low to moderately high embankments, of up to approximately 6m above the existing ground level and low to moderately deep cuttings up to approximately 8m.

It is anticipated that all the material won from the cuttings on the proposed development will be reused as fill in the proposed development. The competent glacial till will be reused as a general fill for the embankments. Wetter and softer surficial ground layer will be improved, typically by spreading and drying, and reused as Class 4 landscape fill for bunds, noise barriers, shoulders to slack embankments and similar. Topsoil will be carefully removed and reused throughout the scheme.

In the areas where the embankment footprint traverses the soft ground, the surficial layer of peat and organic clay will be excavated and replaced with the competent fill. The total volume of excavated peat (approximately 4,500m³) will be transferred to the material deposition area identified as a part of the development, with the remaining material deposition areas capacity also receiving the organic clay. The rest of the excavated organic clay (approximately 20,000m³) will be disposed of within a landscaped material deposition area within the works, or off-site to a suitably licenced facility if necessary. This includes the minor quantities of soft soil excavated during piling works for the bridge substructure. The excavation and disposal of unacceptable soils will constitute the permanent negative not-significant impacts.

To minimise the volume of the excavated soft soil below embankment footprint, all non-organic soft soil that is unable to support embankment weight will be improved in-situ by surcharging and vertical band drains. This will improve the ground by increasing its

strength, stiffness and bearing capacity, reducing the risk of geotechnical failures. This will constitute a permanent not-significant positive impact.

The bridge substructure will be founded on piles (deep foundations). Piles will be either rotary bored concrete-filled piles. Given the localised nature of these works, there will be no impact to soil and geology from these rigid inclusions.

The proposed development will require approximately 88,840m³ of imported fill on top of all the reused excavated material from the scheme. The imported fill will predominantly be good quality clean granular fill Class 6, mainly for the purposes of embankment fill, drainage and capping layers. The fill will be sourced from the nearest possible quarry, a large number of which exist in Co. Louth and Co. Meath within 25km radius. The importation of fill will constitute a slight permanent negative impact to local soil and geology.

The proposed development alignment cuts through the northern section of the Geological Heritage site known as Ardee-Newtown Bedform Field. The proposed earthwork impacts will be negligible due to relative difference in scale between the Geological Heritage site (approx. 50km²) and size of its glacial features compared to the earthworks size.

No karst landforms or such features are anticipated to be affected by the proposed development.

No impacts from the contaminated land are expected for the proposed development, as the proposed development will be primarily built on greenfield land. Mitigation measures are devised for the minor quantities of contaminated ground potentially encountered locally.

Hydrogeology

Construction runoff from the site could pose a risk to the groundwater or adjacent watercourses due to infiltration of contaminated water from the settlement ponds during construction. The proposed road development crosses the Ardee Bog pNHA near Townparks at which point the pNHA has been drained through a series of field drains and ditches. The limited removal of peat material to provide a suitable base for the construction of the roadway will likely have slight impacts on the hydrogeology of the bog itself.

The GI conducted in 2013 throughout the proposed project area included trial pits, soakaway trial pits, boreholes and laboratory testing to determine the hydraulic conductivity of soils. The boreholes completed during the GI provided the local lithology to determine the connectivity between Ardee Bog and the proposed work area which could impact drainage of the bog. Given that the permeability of the soils are low, the excavation and replacement of peats with a mixture of the removed overburden and imported soils will have a slight impact on the hydraulic conductivity and connectivity of Ardee Bog and the project area.

Aquifers

The proposed development intersects two main aquifers in the area as illustrated in Figure 8-1. The less prominent, Poor Aquifer – Bedrock is adjacent to Ardee Bog is described as generally unproductive bedrock. The proposed development would likely have negative, imperceptible impacts during the construction phase of the proposed road on this aquifer.

Drinking Water Supply

A review of the GSI database revealed the presence of several springs and wells located within the project area. The majority of the wells mapped using the GSI database are located in the area of Boharnamoe and are of either poor yield (25.9 cubic meters per day, m^3d^{-1}) or moderate yield at $51.8 \text{ m}^3\text{d}^{-1}$. The wells in this area are listed as active and used for either agricultural or domestic use. Several of the wells in the Boharnamoe area are located over 200m south of the existing N52 road and therefore would not be impacted by the proposed construction.

Two additional wells are mapped in the Townparks area southeast of Mullanstown along the northwest end of the proposed development area and are listed as being active for either agricultural or domestic use. As with the wells found in the Boharnamoe area the wells were of poor to moderate yield. In addition, Borehole Well No.8 located approximately 640m west of the N52 and N2 junction was found to contain a karst formation. This borehole was completed as part of a study of the Ardee Mental Hospital Farm and was found to be dominated by muddy limestone. No other information in relation to this borehole was readily available for review at the time of this report, however, given the distance of proposed construction efforts there is not likely to be any impact on this karst formation.

According to the Louth County Council's report on Ardee Water Supply Scheme at Curraghbeg Borehole produced in January 2012⁸, the borehole supplies between 380 and $1,700 \text{ m}^3\text{d}^{-1}$ of water through abstraction for the surrounding community. The abstraction points for the Curraghbeg Borehole and the Ardee Public Water Supply (PWS) are located south of the existing N52 motorway with general groundwater flow direction moving from the south to north following the general topography according to the above referenced report. Given that the distance from the proposed construction of the N52 bypass is located well over 1.5 m to the north, the impact to the PWS will be imperceptible, temporary and neutral.

Hydromorphology

There is potential for negative hydro-morphological impacts during the construction phase of the development due to changes in groundwater flow patterns along sections of the proposed roadway. In the absence of mitigation measures, the potential impact is negative, temporary slight to moderate.

Given that the ground improvement works will increase the strength and compressibility of the underlying soils, the permeability of the soils will be decreased locally. This has the potential to result in slower groundwater seepage velocity under the road footprint, which would have a not-significant, negative, impact.

Groundwater Vulnerability

Groundwater vulnerability in the area immediately to the west of the proposed new River Dee crossing is listed primarily as "High" with a much smaller area listed as "Extremely Vulnerable" with rock at/or near the surface and possible karst formations as well. As described above in the section for Drinking Water Supply the only known karst formation is located along the existing N52 roadway west of the junction of the N52 and N2 roadways. This area is located over 1km south of the proposed roadway and there is not likely to be any impacts to the karst system.

⁸ Louth County Council, Establishment of Groundwater Source Protection Zones Ardee Water Supply Scheme Curraghbeg Borehole, January 2012, Revision 4.

As the majority of the project area is listed as either low to moderate groundwater vulnerability and construction will occur in these areas the impacts to groundwater will be slight, negative and temporary.

Operational Phase

Soils and Geology

No further operational phase impacts are expected in relation to soils and geology. The permanent impacts of ground excavation, importation and changing the characteristics of surcharged soil are addressed in Construction Phase section.

Drinking Water Supply

Hydrogeology

Potential impacts to groundwater will likely be limited to localized areas within the extent of the proposed road from potential hydrocarbon runoff from stormwater events. While the likelihood of large releases to the surrounding groundwater is low, the potential exists due to the forecasted increased traffic along the road which could negatively impact groundwater in those areas demarcated as having high groundwater vulnerability. These impacts will be avoided by an attenuation pond with a treatment facility which will aid in the removal of any sediment and hydrocarbon runoff.

The proposed drainage system will eliminate the likelihood of negative impacts to the subsoils as it will divert any impacted run-off to an attenuation pond system prior to discharging into the receiving watercourse. Without the implementation of a SuDS drainage system, a negative impact could have resulted to the subsoils as the removal of overlying peat which had acted as a natural filtration. The use of the drainage system will result in positive impacts on run-off draining from the road surface. The proposed drainage system will eliminate the likelihood of negative impacts to the subsoils areas.

8.5 Mitigation Measures

Construction Phase

- The proposed construction operations will be implemented with the least soil disturbance possible. The extent of the excavated material will be limited to the cuttings and soft spots beneath embankment footprint that include peat and organic soils across the embankment footprint.
- All excavated peat will be safely removed to the material deposition area designated as a part of the scheme. A small volume of organic clay will also be removed there where the volume of deposition area allows. The rest of the surplus excavated soft ground will be improved in-situ to be used as Class 4 landscaping fill or disposed of in a suitably licensed landfill. No more than 20,000 m³ of material for disposal off-site is expected. The contractor will be required to submit a C&D Waste Management Plan to the local authority for approval which should address all types of material to be disposed of.
- All other areas of soft ground without organic content (i.e., alluvial or lacustrine deposits) are to be subject to preloading with surcharge with the help of band drains, thus improving them in-situ. This will mitigate the requirement for large scale excavation and replacement of all soft soils, which is the typical construction process.
- Excavated soils from cutting, such as glacial till, will be reused for embankment construction and landscaping fill purposes wherever these comply to the fill

reusability criteria dictated by the Specification for Road Works. This will minimise the volume of imported fill.

- Imported fill material will be acquired from quarries from as near as possible to the proposed development area. There are a number of active quarries in the vicinity of the proposed development. General fill is ubiquitous in the in-situ ground surrounding the proposed development area.
- Standard construction practices necessitate silt-laden surface water run-off and spillages to be collected and treated prior to discharge, where necessary, settlement ponds will be lined to prevent infiltration to the groundwater.
- The contractor shall prepare a project-specific Construction Environmental Operating Plan (CEMP) for approval by LCC. It will be maintained by the Contractor for the duration of the construction phase. The CEMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures. As a minimum, the CEMP for the proposed development will be formulated in consideration of the standard best practice. The CEMP will include a range of site-specific measures such as management of temporary storage of any contaminated material, measures to limit transport of erodible soils around the perimeter of temporary storage and earthworks, dust suppression, appropriate PPE and similar.
- The installation of transverse barriers along sections of the proposed route as shown in drawings N52A-ROD-EAC-SW_AE-DR-EN-300051 in Appendix A are designed to allow the flow of groundwater to maintain its current state. The transverse barriers are to be constructed in areas in which cutover peat has been excavated and to be replaced with a more stable road base for the proposed road.

The construction of the transverse barriers will provide a pathway for groundwater to continue to flow naturally without either increasing the flow rate out of the Ardee Bog and acting as an additional means to dewater the bog or transversely negating or slowing the natural groundwater flow and causing the bog to become permanently flooded, preserving the current groundwater flows into and out of the bog.

Operational Phase

There are no mitigation measures proposed for the operational phase which apply in relation to soils, geology or hydrogeology.

8.6 Residual Impacts

Soils and Geology

No residual impacts on the soils and geology are applicable. The aforementioned ground improvement techniques will improve the strength and compressibility of the underlying soils where applicable.

Hydrogeology

The overall residual impacts of the proposed development will result in slight, temporary and negative effects on hydrogeology.

Aquifers

Aquifers will be impacted only during the construction phase of the proposed project with impacts assessed as imperceptible, temporary and negative.

Drinking Water Supply

The residual impact on local wells will be imperceptible due to their distance from the development. Similarly, the impact on the public water supply will be imperceptible

Hydromorphology

Following the implementation of the mitigation measures proposed and the installation of the transverse barriers, the residual impact on hydromorphology will be not-significant, negative and long term.

Groundwater Quality

Due to the generally low to moderate vulnerability of groundwater throughout the project area with few small areas of extreme vulnerability, the residual impacts on groundwater quality will be slight, temporary and negative.

8.7 Conclusion

The impacts from the proposed development to the soils and geology are mainly related to the required earthworks operation, including the excavation and disposal of the in-situ material, and importation of the good quality fill. Overall the impacts are assessed to be permanent, not-significant, negative. Larger significance of the event is mitigated using design measures that enable in-situ ground improvement of the majority of soft soils.

The overall impacts on the hydrogeology are assessed to be temporary, slight and negative. The impacts will be limited to those areas in which native soils will be excavated and replaced with semi-permeable materials and the transverse barriers.

8.8 References

Final Geotechnical Factual Report, N52 Ardee By-pass Ground Investigation (IGSL, 2013)

Final Geophysical Survey Report, N52 Ardee By-pass Ground Investigation (Minerex Geophysics Ltd, 2012)

Geological Survey of Ireland Data Maps (<https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx>)

Geohive Historical Mapping Tool (<https://webapps.geohive.ie/mapviewer/index.html>)

Louth County Council, Establishment of Groundwater Source Protection Zones Ardee Water Supply Scheme Curraghbeg Borehole, January 2012, Revision 4.

9. HYDROLOGY

9.1 Introduction

This section describes the natural characteristics of the site of the proposed development and its immediate surroundings, in terms of hydrology. The likely significant impacts of the proposed development on hydrology are assessed and where required, mitigating measures are put in place to avoid, reduce or minimise the impact of the proposed development.

9.2 Methodology

The hydrological impact assessment methodology is in general agreement with the guidance outlined in the NRA (now Transport Infrastructure Ireland (TII)) 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' (2009). The impact category, duration and nature of impact have been taken into account in this assessment, as per the guidelines. The range criteria for assessing the importance of hydrological features within the study area and the criteria for quantifying the magnitude of impacts follow these guidelines.

The hydrological assessment includes a desktop review of published literature available from various sources, including a web-based search for relevant material. Site specific topographical information and aerial photography has been reviewed to locate any potential features of hydrological interest, and these have been investigated on the ground by a walkover survey.

Available topographical and hydrometric information (field and desk-based) has been used to perform a hydrological impact assessment of the proposed watercourse crossings. All watercourses and water bodies which could be affected directly (i.e. crossed or realigned / diverted) or indirectly (i.e. within 250m of the proposed development) were assessed through an initial walkover visit followed up by a detailed desk study and hydrological assessment.

The subject lands have a known history of flooding. A Site Specific Flood Risk Assessment has been completed which included undertaking a detailed hydraulic modelling exercise of the existing and post development scenarios.

Impact Characterisation

Types of hydrological impact fall into two broad categories of quantitative and qualitative impacts.

Quantitative Impacts

Hydraulic structures such as bridges, culverts, channel diversions and outfalls can, if not appropriately designed, impact negatively on upstream water levels and downstream flows. If a bridge opening is too narrow it may impede flow during times of floods, thus causing water levels upstream of the structure to be raised above what would occur in the absence of the structure.

Surface water drainage from the bridge deck and landings can also lead to localised increased flows and flooding in the receiving watercourses.

Qualitative Impacts

The drainage network may convey contaminants to receiving waterbodies. Depending on the hydrological and ecological sensitivities of the proposed outfall receiving waters, treatment of storm water via silt traps and hydrocarbon interceptors may be required upstream to protect water quality, particularly from spillage and first flush events.

Bridge crossings may cause permanent disturbance of rivers and floodplains at bridge abutments and where they connect to the bank. These structures can, if not appropriately designed, create an obstacle to flow, particularly under flood conditions resulting in increased flood risk and damage as a result of afflux by such structures. Such structures can locally alter bed levels and channel dimension resulting in changes in flow velocity and water depth which can, during low flow periods, represent a barrier to fish passage. These structures can result in localised bed and bank erosion, resulting in long-term changes to the morphology of the stream channel.

9.2.1 Field Surveys

A detailed topographical survey of the watercourses, floodplains and existing structures has been carried out in preparation of the hydraulic assessment. Survey locations were informed by previous walk over surveys where hydrological impacts were considered likely to occur.

9.2.2 Desk Study

A desk study was completed using the following information sources:

- Geological Survey of Ireland (GSI) – bedrock geology;
- Teagasc – subsoil map;
- Aerial photography;
- EPA Maps – surface water quality;
- EPA Maps – Water Framework Directive Status;
- Office of Public Works (OPW) Preliminary Flood Risk Assessment (PFRA) mapping;
- OPW Catchment Flood Risk Assessment and Management (CFRAMs) mapping;
- OPW Flood Hazard Mapping; and
- GSI web-based mapping.

This chapter has been prepared having due regard to relevant legislation listed below:

- The EU Water Framework Directive (2000/60/EC) requires all Member States to protect and improve water quality in all waterbodies so that they achieve good ecological status by 2015 or, at the latest, by 2027. It was given legal effect in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003). It applies to rivers, lakes, groundwater, transitional and coastal waters. The Directive requires that management plans be prepared on a river basin basis and specifies a structured method for developing these plans.
- The EU Floods Directive (2007/60/EC) which came into force in 2007, aims to reduce the adverse consequences of flooding on human health, the environment, cultural heritage and economic activity. The EU Floods Directive was transposed into Irish law by the European Communities (Assessment and Management of Flood Risks) Regulations 2010, S.I. No. 122 of 2010 and amended by the European Communities (Assessment and Management of Flood Risks) (Amendment) Regulations 2015, S.I. No. 495 of 2015.

9.2.3 Guidance documents

This chapter has been prepared having due regard to relevant guidance and specific policy documents listed below:

- Transport Infrastructure Ireland (TII 2009) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Transport Infrastructure Ireland (TII 2008) Guidelines for the crossing of watercourses during the construction of National Road Schemes; and
- DoEHLG (Nov 2009) The Planning System and Flood Risk Management – Guidelines for Planning Authorities.

9.3 Receiving Environment

9.3.1 Hydrological Regime and Water Quality

The proposed road development crosses multiple watercourses, as identified on EPA mapping (Figure 9-1). The River Dee is the largest of these. The proposed development will traverse the River Garra approx. 1km upstream of the point where it confluences with the River Dee. These watercourses and their catchment are discussed below.

The study area is within the Water Framework Directive (WFD) Catchment number 06: Newry, Fane, Glyde and Dee. This is a cross border catchment with a surface area of 2,125km², 1390km² of which is located within the Republic of Ireland (RoI). The Newry-Fane-Glyde-Dee catchment comprises 15 sub-catchments with 68 river water bodies, ten lakes, nine transitional and four coastal water bodies, and 19 groundwater bodies. There are no heavily modified water bodies or artificial water bodies in the catchment.

The study area comprises a number of sub-catchments within the Newry-Fane-Glyde-Dee catchment (sub-catchments 06_01, 06_04, 06_10 and 06_15). The southern section of the study area drains to the River Dee through sub-catchments 06_01, 06_04 and 06_15. The River Dee is the main waterbody located within the study area. The River Dee rises near Bailieboro in Co. Cavan and flows in a north easterly direction for over 30 miles, passing through Ardee before entering the sea at Annagassan. It is joined by a number of smaller streams such as the White and Corkey Rivers from the south and Garra River from the north. This river can cater for all game anglers, as it possesses stocks of native wild brown trout as well as salmon and sea trout. The River Dee traverses the southern part of Ardee town.

The EPA water quality status for the years 2013 – 2018 (as accessed on catchments.ie on 28/06/21) range from poor to moderate for the River Dee. In general, sections of the river in the west of the study area have a status of 'poor' while those to the east of the town are given a status of 'moderate'. All watercourses within the study area have been given a WFD risk score of being 'at risk'. This means that it is at risk of deteriorating or being at less than 'good' status in the future. Game angling is also popular in Ardee (OPW, Flood Risk Management Plan, Neagh Bann 2018). To the north of the study area, the River Bawn, which is part of the Glyde catchment, has not been assigned a WFD risk score, as it is under review.

Hydromorphology is a key consideration in defining waterbody status as per the WFD. The Dee and Garra river catchments show indications of historic alterations including channelisation and land drainage.



Figure 9-1 Watercourses at the location of the proposed development

Flooding

A Site Specific Flood Risk Assessment (SSFRA) has been prepared for the proposed scheme. A part of this several historical and predictive flood indicator datasets have been reviewed including floodinfo.ie, Benefitting Land maps, Ordnance Survey of Ireland (OSi) flood indicators, and Catchment Flood Risk Assessment and Management (CFRAM) mapping. All datasets indicate elevated levels of flood risk within the townlands of Townparks, Mandistown and Ballygowan. In addition, as part of the Stage Detailed flood risk assessment a hydraulic model was prepared for the scheme to assess existing and post development flooding within the subject lands.

The findings from the hydraulic analysis indicate that the area surrounding the Ardee bog is very low lying with a highly complex drainage network. Extreme fluvial events result in considerable flooding in lands north of the existing N52. Flood waters are attenuated for multiple days within the natural floodplain of the River Garra/Ardee bog before receding to the river Garra. Existing bridges on the River Dee and River Garra appear to be sufficiently sized for extreme flows. The model indicates that a large portion of the subject area including lands within the footprint of the proposed road are within Flood Zone A. The 1 in 100 year flood extent mapping prepared as part of the SSFRA is reproduced below in Figure 9-2 below. For the full suite of flood mapping please refer to *N52 Ardee Bypass Site Specific Flood Risk Assessment*.

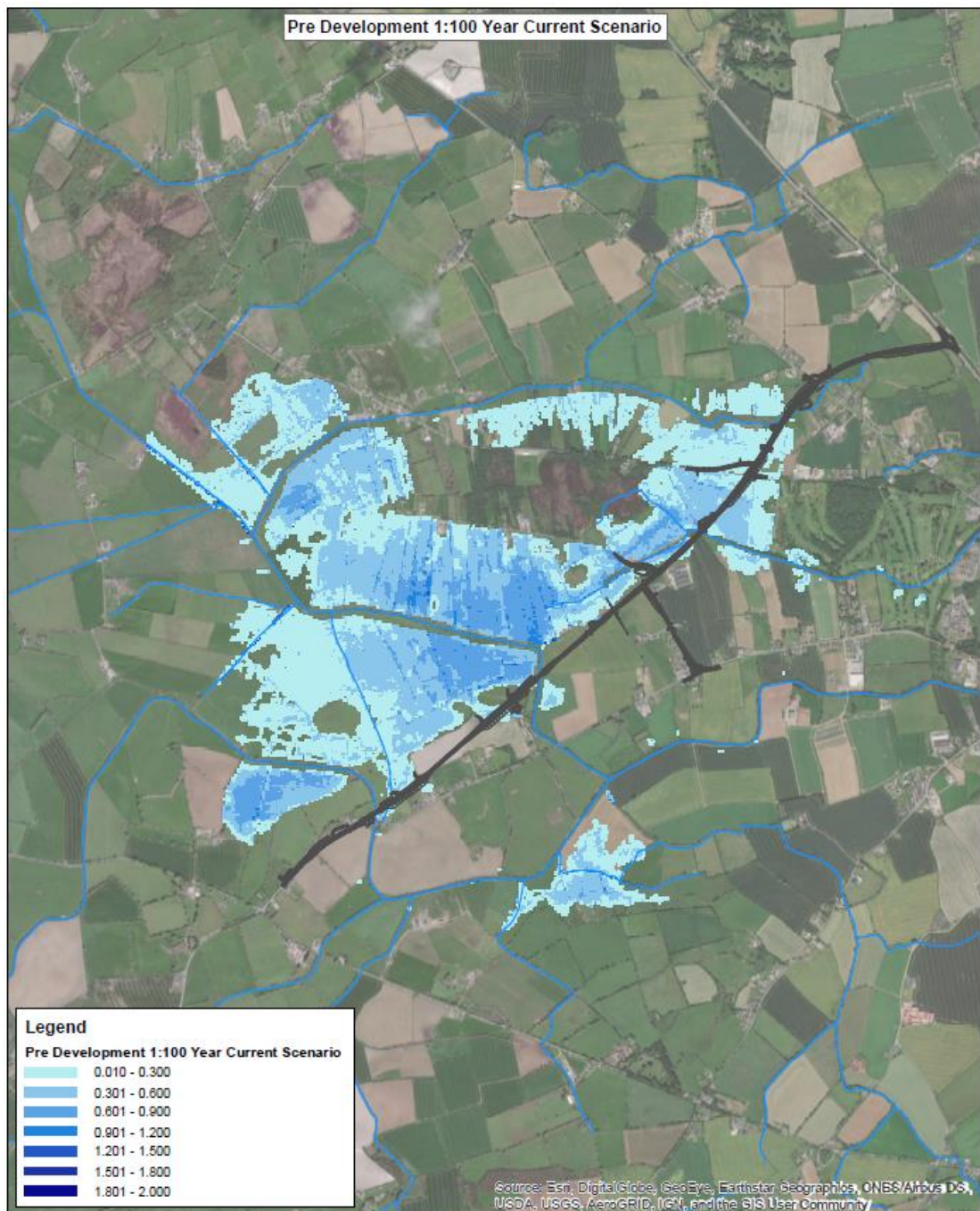
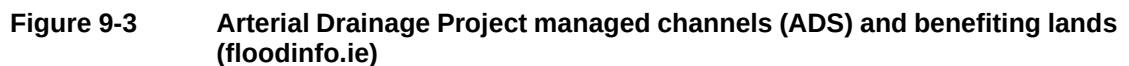


Figure 9-2 Ardee Bog flooding (floodinfo.ie)

There are two OPW managed Arterial Drainage Projects and existing flood relief projects within the Neagh Bann River Basin, namely the Monaghan Blackwater and the Glyde & Dee Arterial Drainage Projects, and the existing flood relief projects (OPW Neagh Bann Flood Risk Management Plan, 2018). Figure 9-3 below shows the highly complex connectivity between the OPW Managed channels in the vicinity of Ardee Bog. Ardee Bog has been greatly reduced in size due to historic peat harvesting and agricultural drainage works, which have left the area crossed by multiple minor watercourses that drain to the Dee and Garra rivers.



The Curraghbeg Boreholes, which contributes water to the Ardee Water Supply Project, is located southwest of Ardee. Water is also abstracted from the River Dee for the Supply Project. LCC requested Source Protection Zone delineation for the Curraghbeg Borehole from the GSI, in order to develop Source Protection Zones for the entire zone of contribution to the groundwater component of the Ardee Water Supply. The Zone of Contribution is shown in Figure 9-4**Figure 9-4** below.

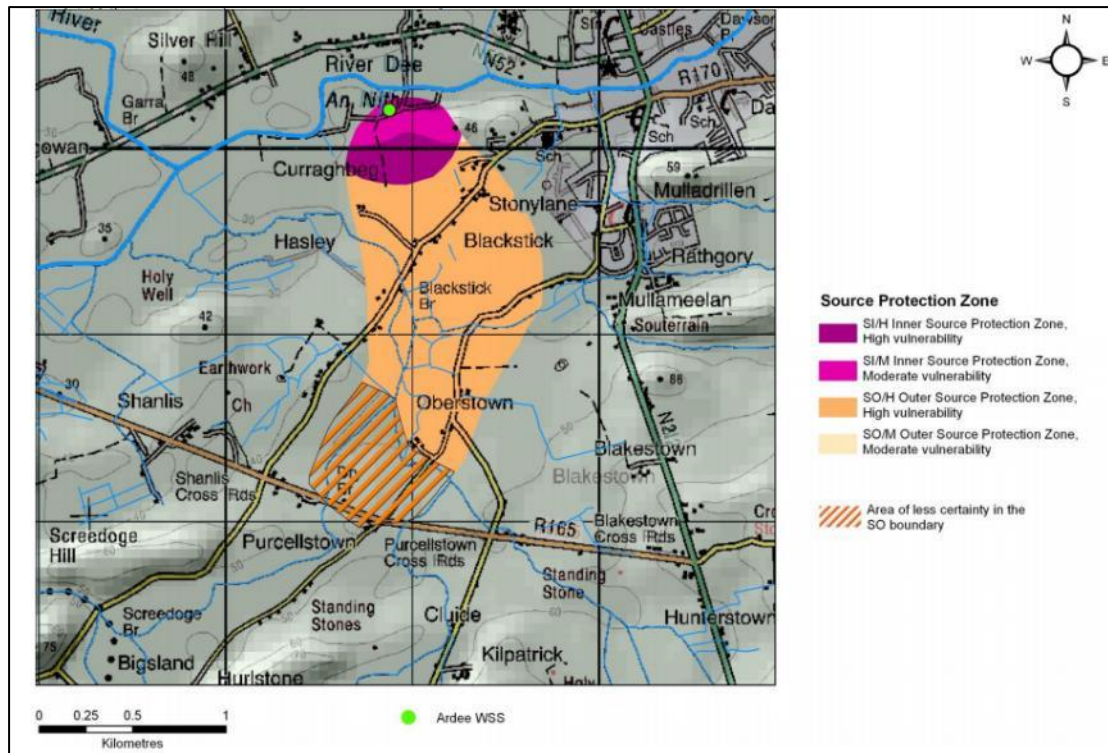


Figure 9-4 Source Protection Zone for the Curraghbeg Borehole

Existing Road Drainage

The road drainage on the existing N52 is mostly 'over the edge', wherein unattenuated and untreated run-off makes its way to watercourses via drainage ditches.

9.4 Predicted Impacts

9.4.1 Construction Phase

Water Quality

Construction activities associated with road scheme construction, crossing and alongside watercourses, can contribute to the deterioration of water quality and can physically alter the river bed and bank morphology with the potential to alter erosion and deposition rates locally and downstream. Activities within or close to the watercourse channels can lead to increased turbidity through re-suspension of bed sediments and release of new sediments from earthworks. The main contaminants likely to arise from construction include:

- Elevated silt/sediment loading within watercourses from construction site runoff and culvert/bridge construction. Multiple major and minor crossings of watercourses are proposed for the scheme. Culvert construction will require instream works and temporary diversion of watercourses. Effects on erosion and deposition processes during construction are likely to be *negative, temporary, imperceptible to slight* and highly localised. The existing riparian land cover and drainage network have the potential for significant runoff generation and subsequent conveyance of pollutants to receiving waterbodies. Elevated silt loading can lead to long-term damage to aquatic ecosystems by smothering spawning grounds and gravel beds and clogging the gills of fish. Increased silt load in receiving watercourses stunts aquatic plant growth, limits dissolved oxygen capacity and overall reduces the ecological quality with the most critical period associated with low flow conditions. Other pollutants in the watercourse can bind to silt which can lead to increased bioavailability of these pollutants.

- Spillage of concrete, grout and other cement-based products. These cement-based products are highly alkaline (releasing fine highly alkaline silt) and extremely corrosive and can result in significant impact to watercourses altering their pH, smothering the stream bed and physically damaging fish through burning and clogging of gills due to the fine silt.
- Accidental Spillage of hydrocarbons from construction plant and refuelling operations at storage depots / construction compounds, which can reach watercourses.
- Faecal contamination arising from inadequate treatment of on-site toilets and washing facilities.
- There is also potential for pollutants derived from construction materials to be mobilised by flood waters. A proposed material deposition area at Ch. 3+725 is immediately adjacent to the headwaters of a River Garra tributary.

In the absence of mitigation measures, the potential impact is *negative, temporary moderate to significant*.

Flood Risk

Flood mapping produced as part of the SSFRA indicates that the proposed route is within the 1 in 1000-year (plus climate change) flood extents emanating from the aforementioned watercourses and bog. There is potential for flood events to occur during the construction phase. The construction works will increase the number of people near a known source of flooding, thus increasing the potential for flood risk related impacts on human health. This has the potential to have a negative, temporary, slight to moderate impact.

Hydromorphology

There is potential for negative hydro morphological impacts during the construction phase due to increased sediment run-off when constructing the carriageway, watercourse crossings and new surface water drainage infrastructure. In the absence of mitigation measures, the potential impact is negative, temporary slight to moderate.

Public Water Supply

The main water supply for Ardee town comes from the River Dee and Curraghbeg Boreholes, located south of the N52, 1km east of Silver Hill. The Rivers Dee and Garra have been designated as drinking water rivers in accordance with European Communities (Drinking Water) (No. 2) Regulations 2007 (SI no. 278/2007). Pollution of the watercourses during construction of the proposed development could directly impact the provision of potable water for Ardee. Potential impacts during the construction phase may be exacerbated by the site flooding, potentially mobilising pollutants in the water column. In the absence of mitigation measures, the potential impact is negative, temporary moderate to significant.

9.4.2 Operational Impacts

Road schemes have the potential to cause permanent disturbance to river channels, floodplains and the flood regime. Watercourse crossings and embankments, if not appropriately designed, create an obstacle to flow, particularly under flood conditions resulting in increased flood risk and damage in the vicinity of the proposed development. Such structures can locally alter channel morphology resulting in changes in flow velocity and water depth. These structures can also result in localised riverbed and riverbank erosion, resulting in long-term changes to the morphology of the river channel.

Water Quality and Drainage Pathways

The existing drainage pathways for the subject lands will be maintained as part of the development during operation. The proposed development includes a drainage design featuring pollutant prevention technologies, including sustainable drainage systems (SuDS) measures and hydrocarbon interceptors. This constitutes an improvement on the existing scenario, wherein unattenuated and untreated run-off from the road surface, which is likely to contain small concentrations of hydrocarbons and other pollutants, is being discharged to watercourses in the study area. The inclusion of SuDS measures in the proposed drainage design will result in a reduction in the concentration of pollutants being discharged to watercourses, including the Rivers Dee and Garra.

A number of the proposed attenuation ponds are situated in flood-prone areas. The crest of the bunds that form the attenuation ponds are above the 1:100-year flood levels, such that they are not envisaged to be inundated in a flood event through overtopping. However, the outfalls of the ponds to the receiving watercourses are below the 1:100-year flood level in most instances. To ensure that flood waters can't back-up through the outlet into the pond, non-return valves will be provided on all attenuation pond outlets below the 1:100 year flood level. In the case of more severe than 1:100-year flood events, in which one or more attenuation pond is flooded, there will be mobilisation of fine sediment and contaminants. Assuming regular maintenance of ponds, the associated impact would be minor.

Overall, the impact of the development on water quality of receiving waterbodies has the potential to have a positive, long term, imperceptible to slight impact.

Flooding

A 1D-2D hydraulic model of the subject lands was developed using the Flood Modeller software v4.5. A digital terrain model (DTM) of the subject lands was created using LiDAR data with points at 10m centres. Variations of this hydraulic model were constructed to simulate the existing and post-development characteristics for 1%AEP and 0.1%AEP events in the current and MRFS climate scenarios.

The proposed development within the subject lands includes flood mitigation measures. Flood mitigation elements are outlined below:

- The proposed route traverses' areas indicated as liable to flood in extreme events. Conveyance within the floodplain will be maintained by the provision of adequately sized watercourse crossings and flood conveyance culverts to ensure that the road embankment does not act as a barrier to the flood waters.
- The road embankment from ground level to the 1%AEP flood level will be constructed of coarse graded granular fill (Class 6A) that has a voids ratio of 30%, to allow storage of flood waters within the embankment. As per the precautionary the proposed road embankment has been modelled impermeable.
- To account for residual flood risk, at its lowest point the minimum carriageway level will be 25.776mOD. This is 0.586m above the predicted 0.1%AEP flood level at this point.

Water Level Results

Table 9-1 and Table 9-2 detail the calculated extreme water levels and the difference between pre-and post-development scenarios at key locations exported from the hydraulic model.

Table 9-1 Water levels Summary

	Climate	Current Scenario (CS)				Mid-Range Future Scenario (MRFS)			
	Development	Pre		Post		Pre		Post	
	AEP	1%	0.1%	1%	0.1%	1%	0.1%	1%	0.1%
Node Label	Description	mOD							
0607M00 185D	Burley Bridge – N52 (River Dee)	25.118	25.181	25.128	25.191	25.166	25.24	25.176	25.25
MCA1-15	Proposed River Dee Bridge	25.149	25.204	25.15	25.208	25.193	25.258	25.195	25.262
0602M02 265DS	Existing River Garra Bridge (N52)	24.694	24.888	24.694	24.883	24.854	25.049	24.85	25.039
MO1J-1	Proposed Garra Bridge	24.757	24.983	24.757	24.983	24.943	25.182	24.944	25.184
0602M02 579	Existing SilverHill Rd Garra Culvert	24.752	24.98	24.757	24.989	24.921	25.183	24.929	25.194

Table 9-2 Difference between Pre and Post Development Scenario

Climate Scenario	CS		MRFS	
AEP	1%	0.1%	1%	0.1%
	mOD			
Greatest Increase	0.011	0.011	0.012	0.014
Greatest Decrease	-0.012	-0.013	-0.011	-0.022
Median Change	0.001	-0.001	-0.001	0.002

The flood levels shown in the Tables 9-1 and 9-2 above indicate that the proposed development will have minimal impact on the existing flood regime. The low-lying nature of Ardee Bog and the surrounding lands ensure that any displacement of flood waters by the proposed development is dispersed across a very wide area and the effect on water level is barely perceptible. The hydraulic model estimates the greatest increase in flood levels in the 0.1%AEP +MRFS climate change scenario to be 14mm with the median change across all modelled reaches being 2mm. As can be seen in the post development flood extent drawings (refer to SSFRA), flood conveyance culverts at appropriate locations maintain flow paths through the proposed road embankment. The incorporation of standard mitigation measures results in negligible effect on the existing flood regime overall. The predicted impact is therefore *negative, long-term imperceptible to slight*.

Hydromorphology

During the operational phase there is the potential for permanent significant negative impacts to the Ardee Bog's hydrological integrity by altering surface and subsurface drainage pathways in the vicinity of the site. As the dependencies are primarily

hydrogeological the potential impacts have been discussed and assessed in Section 8.

Public Water Supply

The nature of the proposed development combined with the implementation of SuDS mean it is seen as highly unlikely that the scheme would have any significant impacts on potable water supply derived from surface waters during the operational phase. Likely impacts are negative, permanent imperceptible.

9.5 Mitigation Measures

9.5.1 Construction Phase

As is normal practice with infrastructure projects, an Environmental Operating Plan (EOP) and Construction Environmental Management Plan (CEMP) will be prepared for the scheme. A CEMP is included in Appendix B. These will be developed by the selected contractor to suit the detailed construction methodology and allocate responsibilities to individuals in the construction team. In doing so, the measures detailed in the appended reports will be considered minimum requirements to be considered and improved upon. The level of detail provided within the current drafts of the Plans is sufficient to allow an assessment of the anticipated impacts including residual impacts.

The following will be implemented as part of this plan:

- An Incident Response Plan (see requirements outlined in the CEMP) will be finalised by the contractor detailing the procedures to be undertaken in the event of spillage of chemical, fuel or other hazardous wastes, non-compliance with any permit or license, or other such risks that could lead to a pollution incident, including flood risks.
- All necessary permits and licenses for in stream construction work for provision of the flood defences will be obtained prior to the commencement of construction.
- During construction, cognisance will have to be taken of the following guidance documents for construction work on, over or near water.
- *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites* (Eastern Regional Fisheries Board)
- *Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers*.
- *CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors*.
- *CIRIA C648 Control of Water Pollution from Constructional Sites*.
- *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII, 2006)*.

Based on the above guidance documents concerning the control of construction impacts on the water environment, the following outlines the standard mitigation measures that will be adhered to for the construction phase, in order to protect all catchments and watercourses from direct and indirect impacts.

Standard Mitigation Measures

- Site works will be limited to the minimum required to undertake the necessary elements of the project.

- Surface water flowing onto the construction area will be minimised through the provision of berms, diversion channels or cut-off ditches.
- Management of excess material stockpiles to prevent siltation of watercourse systems through runoff during rainstorms will be undertaken. This may involve allowing the establishment of vegetation on the exposed soil and bunding.
- Protection of waterbodies from silt load will be carried out through the use of gully silt/sediment filters and shallow berms in hardstanding areas to provide adequate treatment of runoff to watercourses.
- Settlement tanks/ponds, silt traps/bags and bunds will be used. Where pumping of water is to be carried out, filters will be used at intake points and discharge will be through a sediment trap.
- The anticipated site compound/storage facility will be fenced off at a minimum distance of 5m from the top of the edge of the watercourse bank. Any works within the 10m buffer zone will require measures to be implemented to ensure that silt laden or contaminated surface water runoff from the compound does not discharge directly to the watercourse. CEMP has been drafted and will need to be finalised by the appointed Contactor. See the CEMP in Appendix B for further detail.
- Protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with the TII document "*Guidelines for the crossing of watercourses during the construction of National Road Schemes*". All chemical and fuel filling locations will be contained within bunded areas and set back a minimum of 50m from watercourses.
- Foul drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner, off site, to prevent pollution.
- The construction discharge will be treated such that it will not reduce the environmental quality standard of the receiving watercourses.
- Water quality monitoring will be undertaken in the River Dee and Garra, with monthly samples being taken from at least 6 months prior to commencement of construction until at least 24 months post-completion. Water samples will be taken from at least two locations. The final number and location of sampling points will be determined by the Site Environmental Manager. The results of the water quality monitoring programme will be reviewed by the Site Environmental Manager and Ecological Clerk of Works on an ongoing basis during construction. In the event of any non-compliance with regulatory limits for any of the water quality parameters monitored, an investigation will be undertaken to identify the source of this non-compliance and corrective action will be taken where this is deemed to be associated with the proposed development.

Specific Mitigation Measures - Concrete Works

The use and management of concrete in or close to watercourses must be carefully controlled to avoid spillage which has a deleterious effect on water chemistry and aquatic habitats and species. As the use of concrete cannot be avoided, the following control measures will be employed:

- Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water;
- When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used;

- Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters;
- Placing of concrete in or near watercourses will be carried out only under the supervision of the Ecological Clerk of Works (ECoW);
- The weather forecast will be consulted prior to commencing concrete pours. No such works will be undertaken if inclement weather is forecast such that precipitation may make it difficult to maintain a dry working area.
- There will be no spills of concrete, cement, grout or similar materials hosed into surface water drains. Such spills shall be contained immediately and runoff prevented from entering the watercourse;
- Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface watercourses;
- On-site concrete batching and mixing activities will only be allowed at the identified construction compound areas;
- Washout from concrete lorries, with the exception of the chute, will not be permitted on site and will only take place at the construction compound (or other appropriate facility designated by the manufacturer);
- Chute washout will be carried out at designated locations only. These locations will be signposted. The Concrete Plant and all Delivery Drivers will be informed of their location with the order information and on arrival to site; and
- Chute washout locations will be provided with an appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the Contractor's Waste Management Plan.

9.5.2 Flooding

The Contractor will provide method statements for weather forecasting and continuous monitoring of water levels in the River Dee and Garra. The Contractor will also provide method statements for the removal of site materials, fuels, tools, vehicles and persons from flood zones in order to minimise the risk to persons working on the site as well as potential input of sediment or construction materials into the river during flood events.

9.5.3 Hydromorphology

Impacts to hydromorphology will be managed through the implementation of measures outlined above and detailed in the Environmental Operating Plan (EOP) and Construction Environmental Management Plan.

9.5.4 Public Water Supply

Impacts to public water supplies will be managed through the implementation of measures outlined above and detailed in the Environmental Operating Plan (EOP) and Construction Environmental Management Plan.

9.6 Residual Impacts

9.6.1 Water Quality

Following the implementation of the measures outlined in the CEMP in Appendix B, there will be a *negative, slight, temporary* residual impact on water quality during the construction of the proposed scheme.

9.6.2 Flooding

Mitigation in place during the construction phase will limit flood risk and reduce the potential for pollution events. With the inclusion of mitigation during the construction phase, the proposed flood defences scheme will have a temporary negative imperceptible to slight impact.

9.6.3 Hydromorphology

Impacts to hydromorphology will be managed through the implementation of measures outlined above and detailed in the Environmental Operating Plan (EOP) and Construction Environmental Management Plan. The potential impact is negative, temporary imperceptible to slight.

9.6.4 Public Water Supply

Impacts to public water supplies will be managed through the implementation of measures outlined above and detailed in the Environmental Operating Plan (EOP) and Construction Environmental Management Plan. The potential impact is negative, temporary imperceptible.

9.7 Conclusion

The impacts from the proposed development on hydrology have been assessed with regard to Water Quality, Flood Risk, Hydromorphology and Water Supply. Standard mitigation measures proposed with regard to hydrological impacts can all be considered as inline with TII standards and guidance. Overall, with the inclusion of these standard measures it is envisaged that there will be no likely significant impacts as a result of the proposed development.

9.8 References

Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers.

CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.

CIRIA C648 Control of Water Pollution from Constructional Sites.

Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII, 2006).

Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board)

N52 Ardee Bypass Site Specific Flood Risk Assessment, ROD 2021.

10. LANDSCAPE AND VISUAL

10.1 Introduction

The Landscape and Visual Appraisal prepared by CSR was informed by a desktop study and a survey of the site and receiving environment in July 2020 and April 2021. The appraisal is in accordance with the methodology prescribed in the Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013 (GLVIA) published by the UK Landscape Institute and the Institute for Environmental Management and Assessment and the relevant updates and Clarifications as issued by the Landscape Institute.

This methodology also reflects the methodology and guidance set out in TII Publications:

- Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Specified Infrastructure Projects - Overarching Technical Document. PE -ENV-01101 December 2020
- Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Proposed National Roads – Standard. PE-ENV-01102 December 2020

The assessment identifies and discusses the landscape and visual constraints as well as landscape and visual effects in relation to the N52 Ardee Bypass, here known as the proposed development, as described in Section 3 above.

10.2 Methodology

Ireland is a signatory to the European Landscape Convention (ELC). The ELC defines landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'. This definition is important in that it expands beyond the idea that landscape is only a matter of aesthetics and visual amenity. It encourages a focus on landscape as a resource in its own right - a shared resource providing a complex range of cultural, environmental and economic benefits to individuals and society.

As a cultural resource, the landscape functions as the setting for our day-to-day lives, also providing opportunities for recreation and aesthetic enjoyment and inspiration. It contributes to the sense of place experienced by individuals and communities and provides a link to the past as a record of historic socio-economic and environmental conditions. As an environmental resource, the landscape provides habitat for fauna and flora. It receives, stores, conveys and cleans water, and vegetation in the landscape stores carbon and produces oxygen. As an economic resource, the landscape provides the raw materials and space for the production of food, materials (e.g. timber, aggregates) and energy (e.g. carbon-based fuels, wind, solar), living space and for recreation and tourism activities.

10.2.1 Forces for Landscape Change

The GLVIA notes that the landscape change is ongoing. Many different pressures have progressively altered familiar landscapes over time and will continue to do so in the future, creating new landscapes. For example, within the receiving environment, the environs of the proposed development have altered over the last thousand years, from wilderness to agriculture and settlement.

Many of the drivers for change arise from the requirement for development to meet the needs of a growing population and economy. The concept of sustainable development

recognises that change must and will occur to meet the needs of the present, but that it should not compromise the ability of future generations to meet their needs. This involves finding an appropriate balance between economic, social and environmental forces and values.

The reversibility of change is an important consideration. If change must occur to meet a current need, can it be reversed to return the resource (in this case, the landscape) to its previous state to allow for development or management for future needs. Climate change is one of the major factors likely to bring about future change in the landscape, and it is accepted to be the most serious long-term threat to the natural environment, as well as economic activity (particularly primary production) and society. The need for climate change mitigation and adaptation, which includes the management of water and more extreme weather and rainfall patterns, is part of this.

10.2.2 Guidance

Landscape and Visual Appraisal is a tool used to identify the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity. As this Landscape and Visual Appraisal is part of a Part VIII Report, it does not include a statement of the significance of effects, however the process by which the landscape and visual effects are identified is similar to that of a Landscape and Visual Assessment carried out as part of an EIAR.

The methodology is informed by the following key guidance documents, namely:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA).
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (Draft August 2017, EPA).

References are also made to the '*Landscape and Landscape Assessment – Consultation Draft of Guidelines for Planning Authorities*' document, published in 2000 by the Department of Environment, Heritage and Local Government.

Use of the Term 'Effect' vs 'Impact'

The GLVIA advises that the terms 'impact' and 'effect' should be clearly distinguished and consistently used in the preparation of an LVIA.

'*Impact*' is defined as the action being taken. In the case of the proposed works, the impact would include the construction of the proposed development.

'*Effect*' is defined as the change or changes resulting from those actions, e.g. a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focusses on these effects.

10.2.3 Assessment of Both 'Landscape' and 'Visual' Effects

Another key distinction to make in a LVIA is that between landscape effects and the visual effects of development.

'*Landscape*' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations of these elements and their spatial distribution create distinctive character of landscape in different places. 'Landscape character assessment' is the method used in LVIA to describe landscape, and by which to understand the potential effects of a development on the landscape as 'a resource'. Character is not just about the physical elements and features that

make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of landscape that make a place distinctive.

Views and ‘*visual amenity*’ refer to the interrelationship between people and the landscape. The GLVIA prescribes that effects on views and visual amenity should be assessed separately from landscape, although the two topics are inherently linked. Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area’s visual amenity.

The appraisal of landscape and visual effects included a desktop study, review of the proposed development drawings and visualisations, and site visits carried out in July 2020 and April 2021.

10.2.4 Methodology for Landscape Appraisal

Landscape appraisal considers the sensitivity of the receptor, and the likely nature and magnitude of the changes to the main landscape elements and characteristics. Existing trends of change in the landscape are taken into account.

Sensitivity of the Landscape Resource

Landscape Sensitivity: Landscape sensitivity is a function of its land use, landscape patterns and scale, visual enclosure and distribution of visual receptors, scope for mitigation, and the value placed on the landscape. It also relates to the nature and scale of development proposed. It includes consideration of landscape values as well as the susceptibility of the landscape to change.

Landscape values can be identified by the presence of landscape designations or policies which indicate particular values, either on a national or local level. In addition, a number of criteria are used to assess the value of a landscape. These are described further below.

Landscape susceptibility is defined in the GLVIA as *the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline scenario and/or the achievement of landscape planning policies and strategies*. Susceptibility also relates to the type of development – a landscape may be highly susceptible to certain types of development but have a low susceptibility to other types of development.

For the purpose of assessment, three categories are used to classify the landscape sensitivity of the receiving environment.

Sensitivity is therefore a combination of Landscape value and Susceptibility.

Table 10-1 Categories of Landscape Sensitivity

Sensitivity	Description
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principal management objective for the area is conservation of the existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The

Sensitivity	Description
	character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principal management objective may be to consolidate landscape character or facilitate appropriate, necessary change.
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would result in a minor change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principal management objective is to facilitate change through development, repair, restoration or enhancement.

Magnitude of Landscape Change: The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Four categories are used to classify magnitude of landscape change.

Table 10-2 Categories of Landscape Change

Magnitude of Change	Description
High	Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape.
Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.
Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.
Negligible	Change that is limited in scale, resulting in no alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character.

Landscape Effects

A conclusion on the relative importance of landscape effects (either on physical landscape elements or on the landscape character) can be arrived at by combining the landscape sensitivity and the magnitude of change. This is illustrated in Figure 10-1 below.

As this report is part of a Part VIII report it does not include a statement of the significance of effects in line with the GLVIA3 Statement of Clarification 1/13 10-06-13.

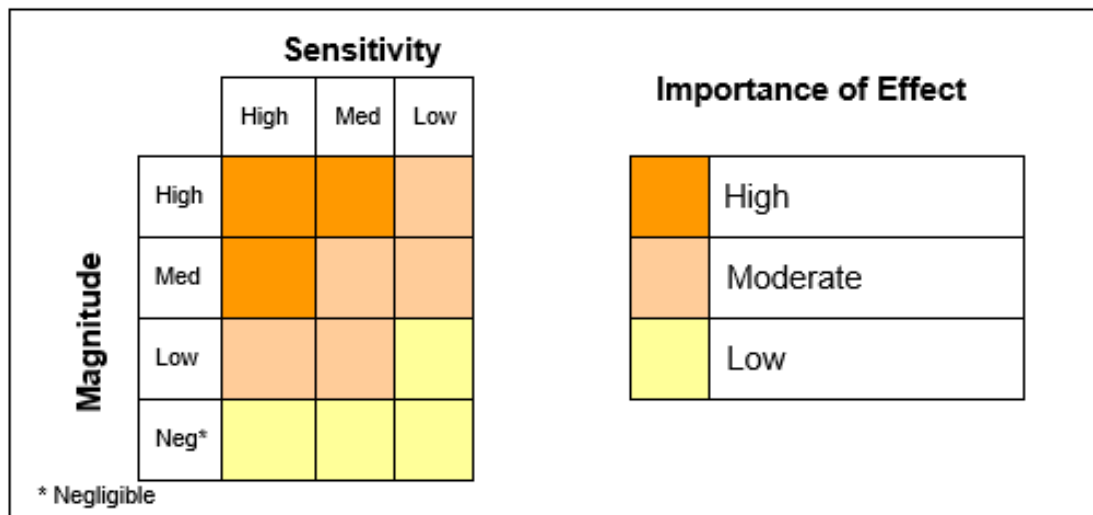


Figure 10-1 Guide to the classification of the level of effects

Landscape effects are also classified as positive, neutral or negative/adverse. Development has the potential to improve the environment as well as damage it. In certain situations, there might be policy encouraging a type of change in the landscape, and if a development achieves the objective of the policy the resulting effect might be positive, even if the landscape character is profoundly changed.

Methodology for Visual Appraisal

Visual appraisal considers the changes to the composition of views, the character of the views, and the visual amenity experienced by visual receptors. Visual receptor sensitivity is a function of two main considerations:

- *Susceptibility of the visual receptor to change.* This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention or interest is focussed on the views or visual amenity they experience at that location.

Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience.

Visual receptors less susceptible to change include travellers on road, rail and other transport routes (unless on recognised scenic routes which would be more susceptible), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.

- *Value attached to the view.* This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).

Three categories are used to classify a viewpoint's sensitivity:

Table 10-3 Categories of Visual Receptor Sensitivity

Sensitivity	Description
High	Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are valued by the local community. This would include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes.
Medium	Viewers at viewpoints representing people travelling at slow or moderate speed through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.
Low	Viewers at viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, etc. The view may present an attractive backdrop to these activities but there is no evidence of that the view is valued, and not regarded as an important element of these activities. Viewers travelling at high speeds (e.g. motorways) may also be considered of low susceptibility.

Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral, or glimpses). It also considers the geographical extent of the change, the duration and the reversibility of the visual effects.

Four categories are used to classify magnitude of change to a view.

Table 10-4 Magnitude of Visual Change

Magnitude of Change	Description
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Visual Effects

A conclusion on the relative importance of visual effects can be arrived at by combining the visual receptor sensitivity and the magnitude of change. This is included in Figure 10-1 above as for Landscape Effects.

As this report is not part of an Environmental Impact Assessment Report, and is instead a Landscape and Visual Appraisal as part of a Part VIII Report, it does not include a statement of the significance of effects in line with the GLVIA3 Statement of Clarification 1/13 10-06-13.

Quality and Timescale of Effects

The predicted effects are also classified as beneficial, neutral or adverse. This is not an absolute exercise; in particular, visual receptors' attitudes to development, and thus their response to the impact of a development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative impacts/effects are defined as:

- Adverse – Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished;
- Neutral - Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality;
- Beneficial – improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Effects are also categorised according to their longevity or timescale:

- Temporary – Lasting for one year or less;
- Short Term – Lasting one to seven years;
- Medium Term – Lasting seven to fifteen years;
- Long Term – Lasting fifteen years to sixty years;
- Permanent – Lasting over sixty years.

10.3 Receiving Environment

This section is divided into a review of landscape related Planning Policy as set out in the Louth County Development Plan 2021-2027 and associated documents, and a description of the study area informed by desktop assessment and site visit.

Development Plan Context

The following statutory plans are referenced in this section, owing to their relevance to the site location and its proposed development:

- Louth County Development Plan 2021-2027
- Meath County Development Plan 2021-2027

10.3.1 Louth County Development Plan 2021-2027

The Louth County Development Plan 2021-27 contains an overall strategy for the proper planning and sustainable development of County Louth. The Louth County Development Plan 2021-27 (hereafter referred to as LCDP) contains a range of policies relevant to establishing the landscape and visual values and sensitivities for

the site and site environs and guiding the design and impacts for developments. The LCDP is reviewed in this section, in terms of relevance to the site location and the development.

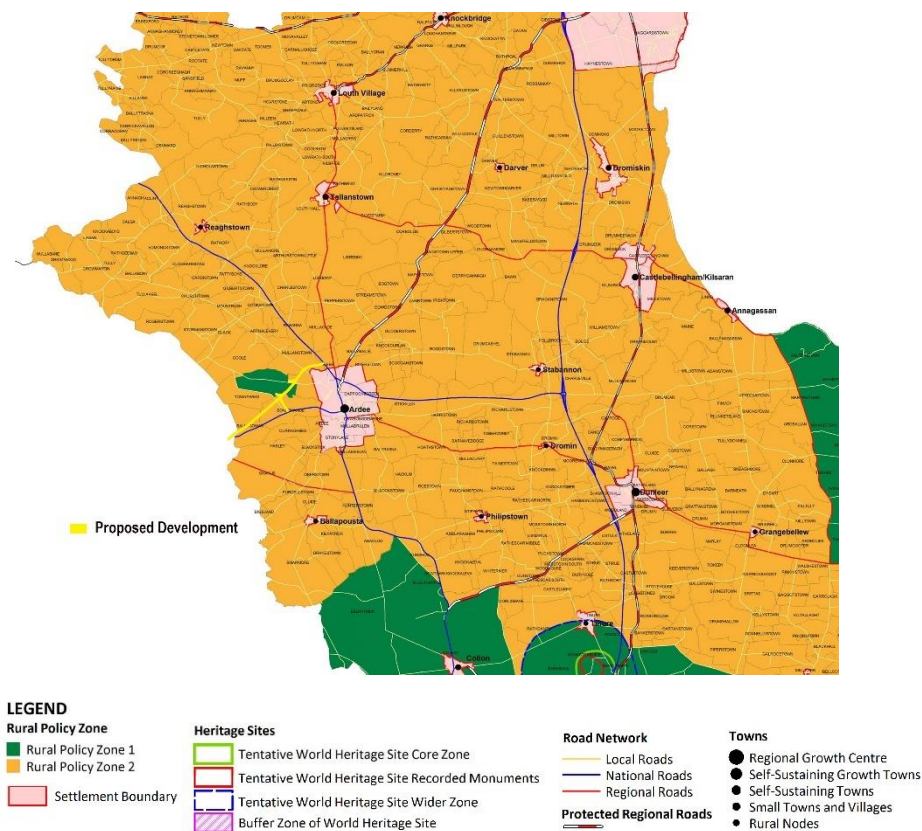


Figure 10-2 Rural Policy Zone Map - Louth County Development Plan 2021-27

Chapter 2 - Core Strategy and Settlement Strategy

The Core Strategy and Settlement Strategy seeks to achieve sustainable growth and compacted urban settlements across the county. Several objectives relating to proposed growth of Ardee town include:

- SS 35** *To support the role of Ardee as a Self-Sustaining Growth Town, which shall be complementary to the Regional Growth Centres, and to facilitate balanced population and economic growth that will meet the needs of the residents of Ardee and its hinterland.*
- SS 37** *To support the creation of a sustainable compact settlement in Ardee that provides opportunities for walking and cycling and to encourage a minimum density of 25 units/ha for new residential developments.*
- SS 41** *To secure the construction, pending approval by Transport Infrastructure Ireland, of the N2 bypass and N52 bypass and preserve free of development their proposed routes.*

Land Use Zoning

The proposed development is located across the rural landscape of County Louth and falls outside of the settlement limits of the town of Ardee. Most of the farmland overlaid by the proposed development are zoned as Rural Policy Zone 2 with a small portion zoned as Rural Policy Zone 1, where the route passes through Ardee Cutaway Bog proposed Natural Heritage Area (see Figure 10.2).

Table 3.3 of the LCDP describes both zones as: Rural Policy Zone 1 – ‘Area under strong urban influence and of significant landscape value’ and Rural Policy Zone 2 as an – ‘Area under strong under influence’.

Archaeology

The County is rich with archaeological remains and the protection of these archaeological heritage is important in the context of landscape and visual amenity. The archaeological heritage consists of known (‘recorded’) and as yet unidentified sites, monuments, objects and environmental evidence. These include round towers, high crosses, burial sites, ringforts, tower houses and souterrains. All known recorded monuments (and any new archaeological sites, artefacts or other evidence subsequently discovered) are protected under Section 12 of the National Monuments (Amendment) Act, 1994. Relevant Policies of the LCDP in relation to archaeological heritage are as follows:

- **BHC 1** *To protect archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places (RMP), and to seek their preservation in situ (or at a minimum, preservation by record) through the planning process.*
- **BHC 6** *To ensure that any development, both above and below ground, adjacent to or in the immediate vicinity of a recorded monument or an area of special archaeological interest (including formerly walled towns) shall not be detrimental to the character of the archaeological site or its setting and be sited and designed with care to protect the monument and its setting. Where upstanding remains exist, a visual impact assessment may be required.*
- **BHC 10** *To require, as part of the development management process, archaeological impact assessments, geophysical surveys, test excavations and monitoring, as appropriate, where development proposals involve ground clearance of more than half a hectare or for linear developments over one kilometre in length or for developments in proximity to areas with a density of known archaeological monuments and history of discovery, as identified by a licensed archaeologist.*

Architectural Conservation Areas (ACA)

The town of Ardee is a medieval, walled market town. The Ardee Town ACA lies within the study area. It is the policy of the Council to ensure the protection of these architectural areas of value, history and interest and that any development in the vicinity of the ACA should ensure preserving or enhancing the character and appearance of an ACA and shall not detract from the existing character of the ACA. Relevant Policies of the LCDP in relation to the ACA are as follows:

- **BHC 31** *To require that all development proposals within or affecting an Architectural Conservation Area preserve or enhance the character and appearance of that area, protect architectural features of special interest and ensure that the design respects the character of the historic architecture in terms of height, scale, layout, and materials. All development proposals shall have regard to the Architectural Conservation Area objectives in Appendix 11, Volume 3 and objectives contained in applicable Character Appraisals where available.*
- **BHC 33** *To ensure that any new infrastructure (installed either by the Local Authority or by Public or Private Sector Utility Companies) shall not be located / positioned where it will be detrimental to the character of the ACA.*
- **BHC 35** *To require that any new development on the periphery of an ACA does not detract from the existing character of the designated ACA.*

- **BHC 36** To ensure that any new trading bays and their associated signage shall not be located where it will be detrimental to the character of the ACA or any important building or vista in the ACA.
- **BHC 37** To retain surviving medieval plots and street patterns in the ACAs, and other towns and villages where in evidence and in the course of development, to record and mark evidence of ancient boundaries and layouts etc.

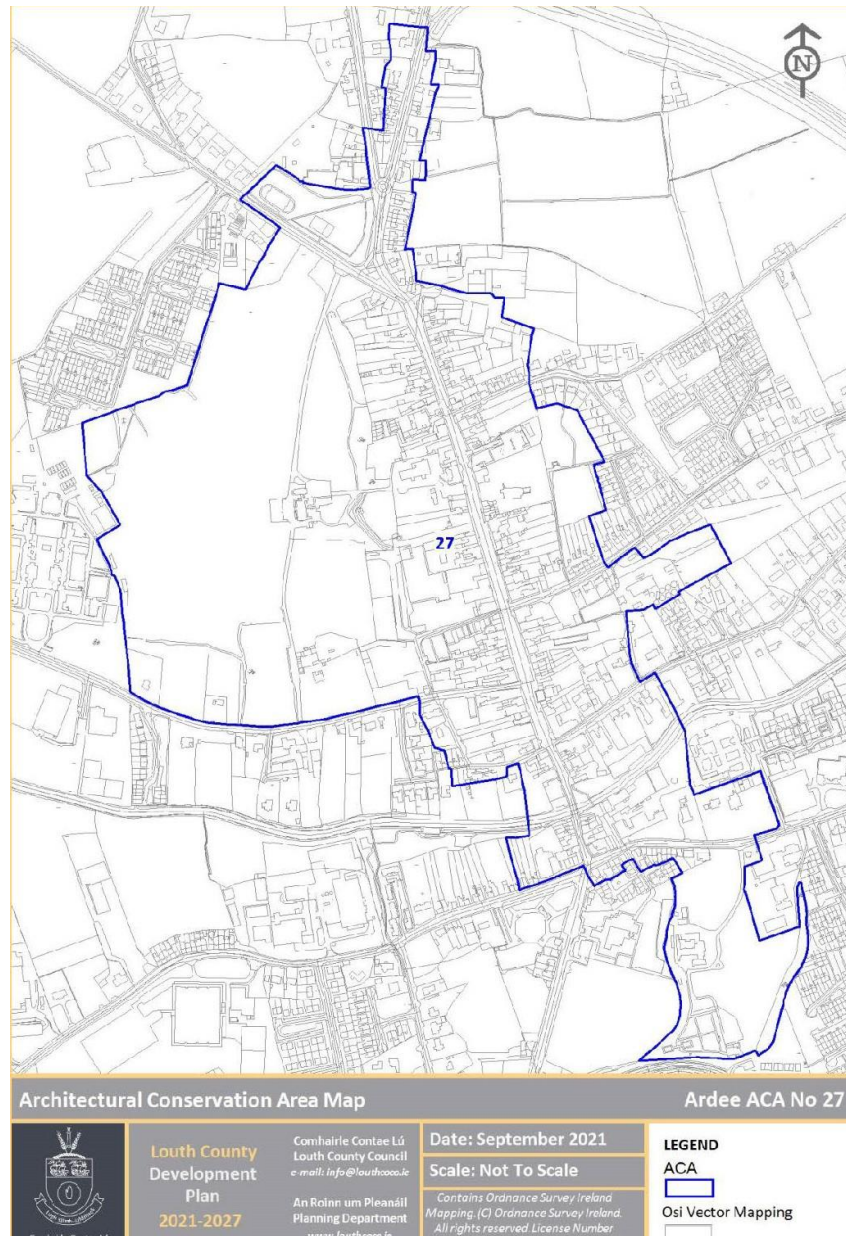


Figure 10-3 Ardee Town Architectural Conservation Area (LCDP 20251-2027)

Historic Gardens and Designated Landscapes

Louth has a rich heritage of gardens and designated landscaped gardens, as identified in the LCDP. The Ardee District Hospital (Ardee House) and the Red House are designated historic landscapes within the study area (see BHC 38 *To ensure that new development will not adversely affect the site, setting or views to and from historic gardens and designed landscapes.*

- **BHC 39** To require that any proposals for new development in designed landscapes and demesnes include an appraisal of the landscape, designed

views and vistas, and an assessment of significant trees or groups of trees, as appropriate.

- **BHC 40** *To require applicants for proposed large scale developments within the Designed Landscapes and Demesnes utilise 3D Digital Survey Modelling tools to demonstrate that the proposed development does not adversely affect the site or its setting.*

Table 10-5). Relevant Policies of the LCDP are as follows:

- **BHC 38** *To ensure that new development will not adversely affect the site, setting or views to and from historic gardens and designed landscapes.*
- **BHC 39** *To require that any proposals for new development in designed landscapes and demesnes include an appraisal of the landscape, designed views and vistas, and an assessment of significant trees or groups of trees, as appropriate.*
- **BHC 40** *To require applicants for proposed large scale developments within the Designed Landscapes and Demesnes utilise 3D Digital Survey Modelling tools to demonstrate that the proposed development does not adversely affect the site or its setting.*

Table 10-5 Historic Gardens within the study area

Historic Gardens & Designated Landscapes	Garden ID	NIAH Buildings	RPS
Ardee District Hospital (Ardee House) iosS St Joseph's & St Brigid's & Tower House	LH0002	13823032,13823033, 13823035, 13823036	Lhs017-035, Lhs017-037, Lhs017-038
Red House (Ardee)	LH0064	13901401	Lhs014-006

Natural Heritage

The proposed development does not fall within or in the immediate vicinity of a Special Areas of Conservation (SAC) or a Special Protection Area (SPA). However, the proposed development transects the Ardee Cutaway Bog (NH1454) Proposed Natural Heritage Area (pNHA) eastern end across the townland of Townparks.). Relevant Policies of the LCDP are as follows:

- **NBG 14** *To protect from inappropriate development and maintain the character, integrity and conservation value of those features or areas of ecological interest listed as pNHA or that may be designated as NHA, during the lifetime of this Plan.*
- **NBG 15** *To ensure that any development within or adjacent to a NHA or pNHA is designed and sited to minimise its impact on the ecological value of the site and to resist development that would result in a significant deterioration of habitats or a disturbance of species.*

Sites of Geological Interest

The Ardee-Newtown Bedform Field (LH01) is designated as County Geological Sites (CGS) that overlaps the extent of the proposed development as far north as the townlands of Boharnamoe and Townparks. The CGS are sites of lesser importance than the Natural Heritage Areas (NHA), however, it is recommended that the CGS should still be protected. Relevant Policies of the LCDP are as follows:

- **NBG 16:** Support the designation of qualifying sites of geological interest listed in Table 8.4 as Natural Heritage Areas
- **NBG 17:** *In consultation with the Geological Survey of Ireland, protect from inappropriate development and maintain the character, integrity and conservation value of those features or areas of geological interest listed in Table 8.4 of the Plan.*
- **NBG 18:** *To promote awareness, where appropriate, of areas of geological interest, including the provision of access and interpretation where desirable and feasible.*

Visual Amenity

Chapter 5 of the LCDP ('Heritage') outlines the protection of natural heritage in the County and addresses the 'Views and Prospects of Special Amenity Value'. There are no 'Areas of Outstanding Natural Beauty' (AONB) in the study area. Adding to the stock of natural scenic landscape within the County is Ardee Bog 'Area of High Scenic Amenity' (AHSQ 6), which is situated within the study area. The proposed development runs through the far eastern end of this AHSQ, which includes approximately 380m of the mainline directly southwest of Townpark Road and a 140m section of slip road off of Silverhill Road.

Views and Prospects of Special Amenity Value

The LCDP lists the 'Views and Prospects' that are reflective of Louth's unique scenic quality. As per the list; one protected view (VP-33) and one Scenic Route (SR-17) fall within the study area. VP-33 (Townparks) is located at western-most end of SR-17, and is described as follows:

"View to North flat open field, infill site between two bungalows. New two storey house in middle background. View to South. Flat open field with backdrop of mature deciduous trees. View of Ardee Bog".

SR-17 (Townparks, Ardee) is a designated route with scenic values. It runs from the edge of Ardee town to Townparks, Ardee. Relevant Policies of the LCDP are as follows:

- **NBG 37** *To protect the unspoiled rural landscapes of the AHSQ from inappropriate development for the benefit and enjoyment of current and future generations.*
- **NBG 38** *Protect and sustain the established appearance and character of views and prospects listed in Tables 8.14 – 8.18 of this Plan that contribute to the distinctive quality of the landscape, from inappropriate development.*
- **NBG 39** *To improve, where necessary, public access to viewing points, subject to availability of resources.*
- **NBG 40** *To prohibit inappropriate development which would interfere with or adversely affect the Scenic Routes as identified in Table 8.19 and illustrated on Map 8.20.*

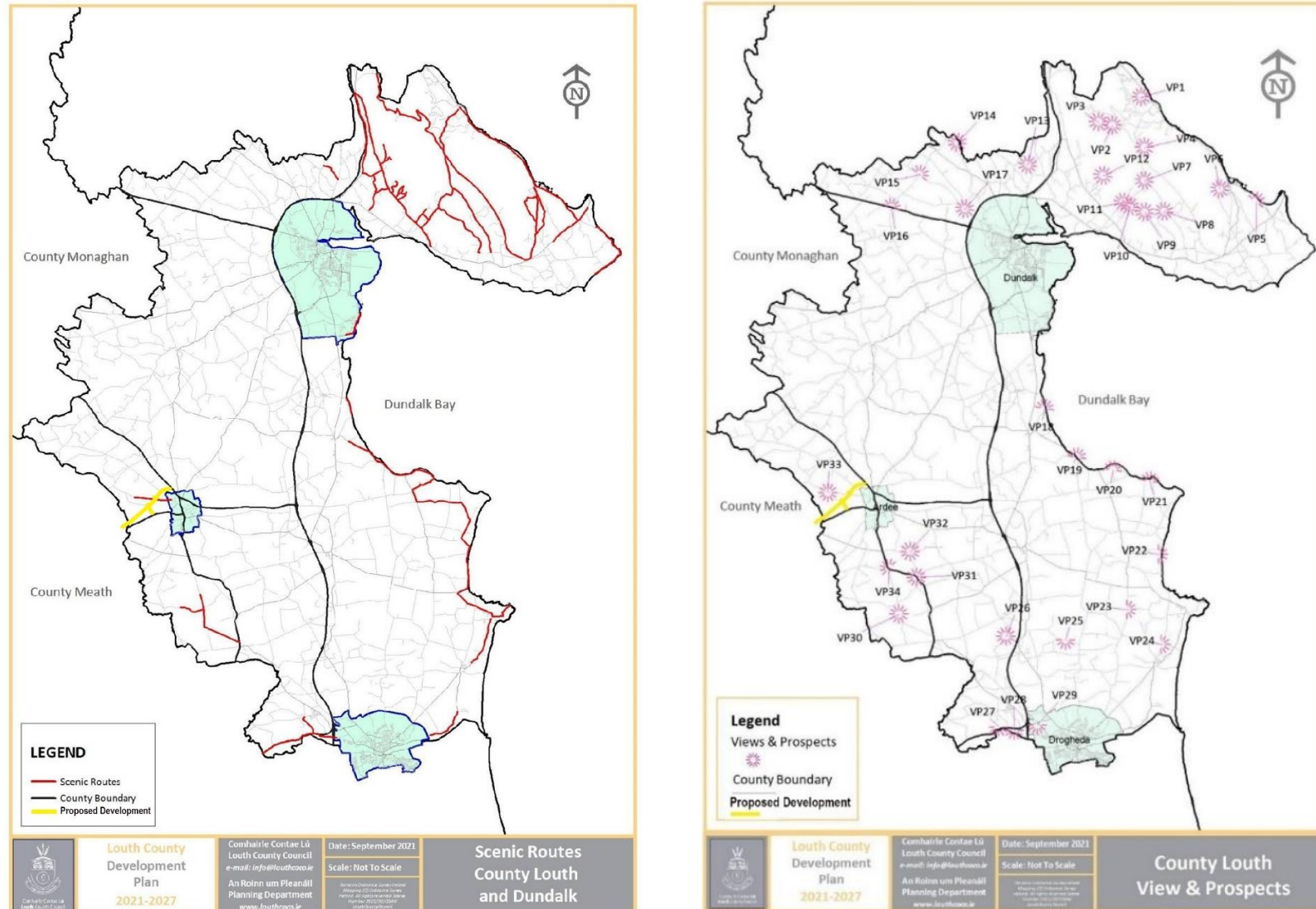


Figure 10-4 Maps of Scenic Views, Prospects and Scenic Routes (LCDP 2021-27)

Landscape Character Assessment



Figure 10-5 Map of Landscape Character Areas (LCDP 2021-27)

The LCDP highlights a matrix of factors contributing to a 'Landscape Character Area', as follows; Landscape Quality, Scenic Quality, Rarity, Conservation Interests, Wilderness, Recreational Opportunity, Cultural Association, Tranquillity and Stakeholder Representative. This classification is based on the Louth Landscape

Character Assessment (LCC, 2002), which details the landscape assessment of the Landscape Character Area the study area falls within. Relevant Policies of the LCDP are as follows:

- **NBG 23** *To ensure the preservation of the uniqueness of a landscape character type by having regard to its character, value and objectives in accordance with national policy and guidelines and the Louth Landscape Character Assessment and by ensuring that new development meets high standards of siting and design and does not unduly damage or detract from the character of a landscape or natural environment.*
- **NBG 24** *To ensure development reflects and, where possible, reinforces the distinctiveness and sense of place of the landscape character types including the retention of important features or characteristics, taking into account the various elements, which contribute to their distinctiveness such as scenic quality, habitats, settlement pattern, historic heritage and land use.*
- **NBG 26** *To explore the designation of Landscape Conservation Areas as appropriate, in conjunction with the relevant Government Department and stakeholders to protect specific important landscapes and particularly in respect of Carlingford Mountain SAC.*
- **NBG 28** *To co-operate with adjoining local authorities, both north and south of the border, to ensure that the environment is maintained in a sustainable manner and to support the coordinated designation of sensitive landscapes and policy approaches with adjoining areas and on all aspects of environmental protection, particularly where transboundary environmental vulnerabilities are identified.*

Tree Preservation Order

The planning authority can retain and protect trees that achieve public amenity benefits and that have special amenity value. The Council has made four Tree Preservation Orders (TPOs) in the County, three of which fall within the study area:

1. TPO1 – Fox Covert, Ardee;
2. TPO2 – Ardee Golf Club (the TPO1 area falls entirely within this area); and
3. TPO3 – Red House

These are illustrated in Figure 10-6.

Trees and Woodlands of Special Amenity Value (TWSAV)

The council has listed trees and groups of trees of special amenity value in the development plan. Four such designated areas fall within the study area:

1. TWSAV108 – The Rectory
2. TWSAV109 – St. Joseph's
3. TWSAV110 – Red House
4. TWSAV111 – St Bridget's

Relevant Policies of the LCDP are as follows:

- **NBG 30:** *To protect trees and woodlands of special amenity value and to review and where appropriate make a Tree Preservation Order(s), in relation to trees of special amenity value*
- **NBG 31:** *Where in exceptional circumstances, trees and or hedgerows are required to be removed in order to facilitate development, this shall be done outside nesting season and there shall be a requirement that each tree felled is replaced at a ratio of 10:1 with native species and each hedgerow removed is to*

be replaced with a native species. In Drogheda and Dundalk, replacement trees will be required at a ratio of 5:1 where the removal of trees is required in order to facilitate development.

- **NBG 33:** *To assess the implications of proposed development on significant trees and hedgerows located on lands that are being considered for development, seeking their incorporation into design proposals where appropriate and in compliance with procedures detailed in Appendix 6.*
- **NBG 34:** *To increase native tree coverage in the County to also act as carbon sinks by promoting the planting of suitable native trees and hedgerows along public roads, residential streets, parks and other areas of open space.*



Figure 10-6 TPO2 and TPO3 (Source: LCDP, 2021-27) and TPO4 (Source: LCDP, 20121-27)

10.3.2 Meath County Development Plan

A portion of the western part of the study area lies within County Meath. For this reason, a review of the Meath County Development Plan 2021-2027 has been carried out. On the basis of this review, it has been determined that the proposed development would not contravene with any of the corresponding policies.

10.3.3 Landscape Character Assessments

Louth Landscape Character Assessment, December 2002

The LCDP identifies the importance of the Louth Landscape Character Assessment (hereafter referred to as LLCA) as a guide to landscape sensitivities and integrating development in the countryside. The study area is located within 'Muirhevna Plain' Landscape Character Areas (LCA). This LCA falls under the classification of 'Local Importance' in the Landscape Area of Classification for Louth. The following descriptive text is provided for this character area in the LLCA.

Extent

This area is by far the largest landscape area in the county. It extends from the top of the Boyne Valley up to the and including Dundalk. It is identified for its flat undulating features drained by the meandering lazy rivers of the Fane, Glyde, White and Dee rivers. It contains the most fertile agricultural land in the county, which gives an overall impression of good farming husbandry. In the western half the landscape horizon is limited due to the smaller field patterns with their mature hedgerows and trees. The new motorway, when travelling north, offers uninterrupted views of the Cooley mountains for miles.

Landscape Characteristics

The LLCA describes the distinctive Landscape Characteristics of this LCA. The key characteristics of 'Muirhevna Plain' are;

- *Serves as a major traffic corridor between North and South.*
- *Extensive plain located between the Carlingford/Slieve Gullion mountain complex and the uplands of Collon and Monasterboice.*
- *Rich soils are conducive to extensive agricultural practices both in crop and animal production*
- *Robust hedgerows give a sense of enclosure.*
- *The nature of the topography has had the effect that a number of small meandering rivers drain the flat landscape.*
- *The nature of the topography has had the effect that a number of small meandering rivers drain the flat landscape.*
- *Contains a number of fine broadleaf wooded areas around country houses.*
- *Area is rich in archaeological features.*
- *Renowned for its mythological past leading to the definition of the Táin Trail.*
- *Isolated housing is very evident especially in the eastern half.*

Landform and Landcover

"Around Ardee there are undifferentiated groups of limestone, mudstone and sandstone from the Carboniferous/Dinantian Period.

Whilst there are little are no commercial forests in the area, it abounds in small woodlands which are primarily broadleaf in character, particularly beech, with some

oak and chestnut occasionally. Many of these trees are entwined with the ubiquitous climbing ivy. Ardee is particularly rich in tree cover. Other areas include Barmeath (N.H.A), Blackhall (N.H.A), Corderry, Darver (N.H.A.), Drumcar, Drumcashel, Lisrenny House, Rathbrist and Stephenstown. “

Human intervention

- *Evidence of hedgerow removal to facilitate more intensive farming*
- *The Dublin - Derry N2 and Dundalk –Limerick N52, passes through Ardee at present, and a bypass is being proposed to relieve the traffic congestion in the town.*
- *Isolated rural housing is much more obvious in the eastern half of the area, due to the influence of the two large county towns and the more open landscape.*
- *E.S.B. power lines (220 kv) are quite obvious in the landscape.*

Landscape Sensitivity

Ardee bog (pNHA) is currently under threat from land drainage. The proposed N52 bypass of the town touches on the area also. Table 10-6 outlines the landscape values and objectives for the 'Muirhevna Plain' as outlined in the LLCA.

Table 10-6 Landscape Values and Objectives – from LLCA

Key Values	Objective
Extensive area of good quality agricultural land with fine traditional hedgerows.	Conserve/ enhance / restore
Small but very fine broadleaf woodlands throughout the area and within the town of Ardee.	Conserve/ enhance
High density of archaeological features, particularly souterrains.	Conserve
Contains four proposed N.H.A.s	Conserve / create
Rathescar Lake worthy of N.H.A. status.	Conserve / create
Overall Classification	Regional

Meath Landscape Character Assessment

The Meath Landscape Character Assessment (MCLA) is part of the MCDP 2013 - 2019. A part of the study area falls within the County Meath boundary and this area is classified as 'Landscape Character Area (LCA) 5 – North Navan Lowlands'. The landscape is characterised as being of 'Moderate' Landscape Value, 'Medium' Landscape Sensitivity and of 'Regional' Landscape Importance. The proposed development would not degrade or detract from the existing character of the area. Hence, it would have minor landscape change within the Meath County, and this is not considered further herein.

10.3.4 Summary of Planning Policy and Objectives

There are a number of consistent policies in the various current and draft development plans which have implications for identifying landscape constraints on the proposed N52 Ardee bypass. These include:

- *A balanced approach to landscape protection and socio-economic development.*
- *Protection of residential amenity*
- *Protection of archaeological heritage.*
- *Protection of proposed Natural Heritage Areas (Ardee Bog and Red House).*

- *Protection of TPO areas (TPO 2,3 and 4) and enhancement of trees and woodlands of special amenity value (TWSAV108-1119).*
- *Protection of the integrity of Ardee Town ACA.*
- *Protection and enhancement of visual amenity in Ardee Bog Area of High Scenic Quality' (ASHQ-6).*
- *Protection of Designated Scenic Route 17 (Townparks, Ardee) and 'Views and Prospects' (VP-33 Townparks).*
- *Landscape Character of 'Muirheva Plain' and North Navan Lowlands LCA which is of regional importance and of medium sensitivity.*
- *Retain and protect hedgerows and other distinctive boundary treatments.*
- *Increase general woodland cover, particularly native species.*
- *The development of access and public rights of way.*
- *Facilitate appropriate development that respects the scale, character and sensitivity of the landscape.*

10.3.5 Landscape Characteristics

The LCA described in the above section provides an excellent overview of the characteristics and sensitivities of the landscape in this part of County Louth. A site visit and further desktop review provides a more fine-grained understanding of these characteristics. These are described in more detail below.

Topography, Drainage and Landform

The receiving environment is characterised by gently undulating topography with higher contours and levels of 30-50m OD on gently mounded hills, forming a bowl around the Townparks area, where the Ardee bog is located. The highest point in the study area is Silver Hill at 48m OD, just to the north of the N52. The bog formerly extended well beyond the current protected landscape and due to the topography the wider area is still prone to flooding.

The proposed development is crossed by two rivers, the River Garra, flowing south east along the southern fringes of Ardee bog before being diverted south by Silver Hill, under the N52 connecting to the River Dee. The River Dee flows eastwards through Ardee to the sea, running south of and approximately parallel to the N52. Within the Townparks and Ardee Bog area, a number of streams or drains can be found linked to field boundary ditches, which have evolved over the centuries as the bog has been drained for agricultural purposes. The relationship between topography, drainage, the Ardee Bog and its historic extents, and current field patterns are illustrated in Figure 10-7 to Figure 10-9 below.

Field patterns, boundaries and vegetation.

The landscape field pattern reflects the topography and land use over the centuries. The more elevated and better drained lands consist of medium sized approximately orthogonal shaped fields in pasture or cultivated. The lower lying fields are long linear patterns probably reflecting traditional turbary rights and drainage patterns that have evolved into landholdings and agricultural fields. See Figure 10-7 to Figure 10-9 below.

Vegetation is formed predominantly by field boundaries of mature hedgerows with individual and rows of trees with more substantial woodlands or copses of trees in places. The Ardee Golf Club lands contain a substantial and protected woodland known as the Fox Cover, however the wider Golf Club contains significant tree cover – lines of trees and other copses. This creates a more open landscape in the wider

landscape but a more intimate pattern through Ardee bog where the closer field boundaries often merge across more overgrown fields.

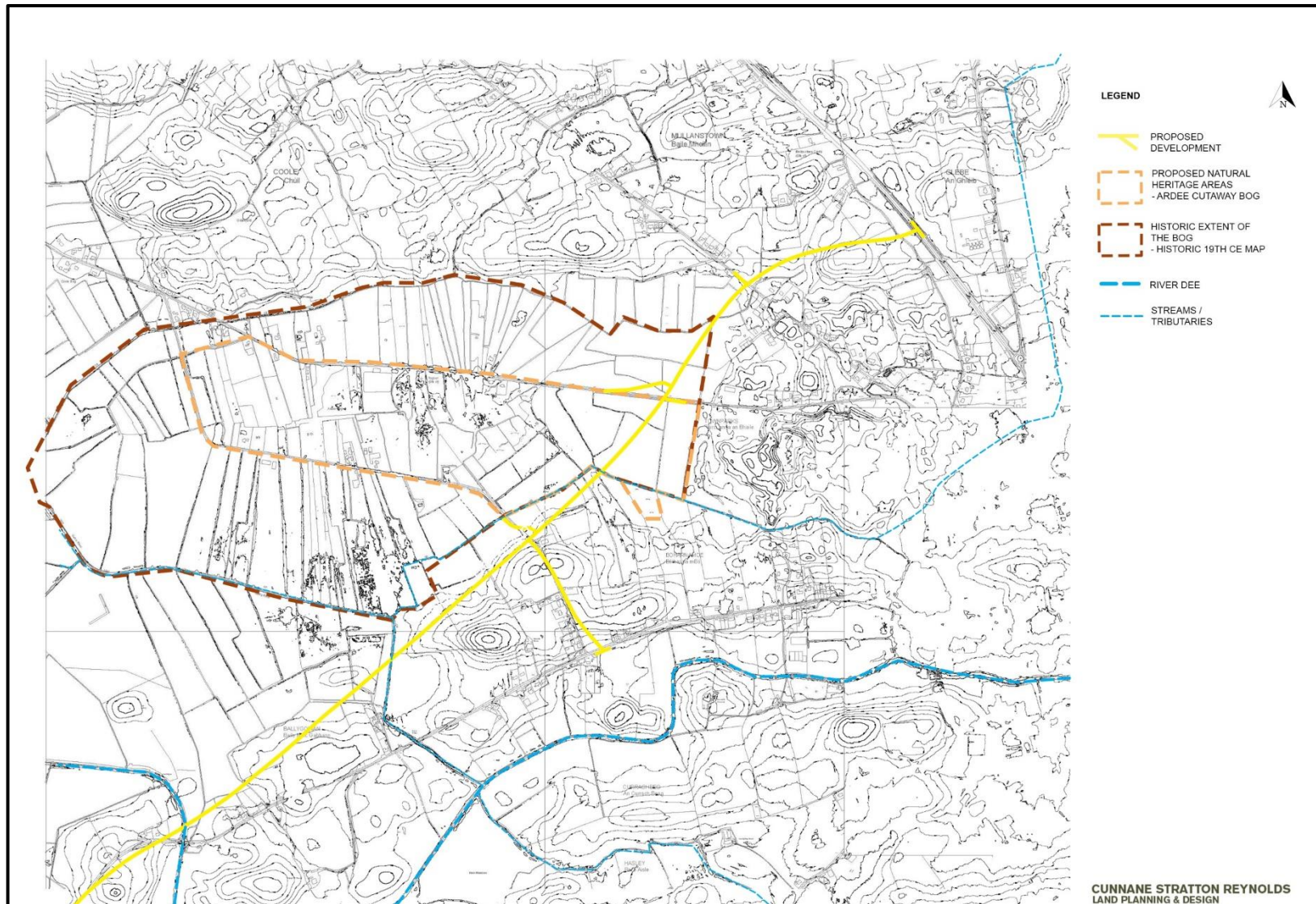


Figure 10-7 Topography and Drainage bog area being the lowlands.



Figure 10-8 Field Patterns and vegetation in the vicinity of the development

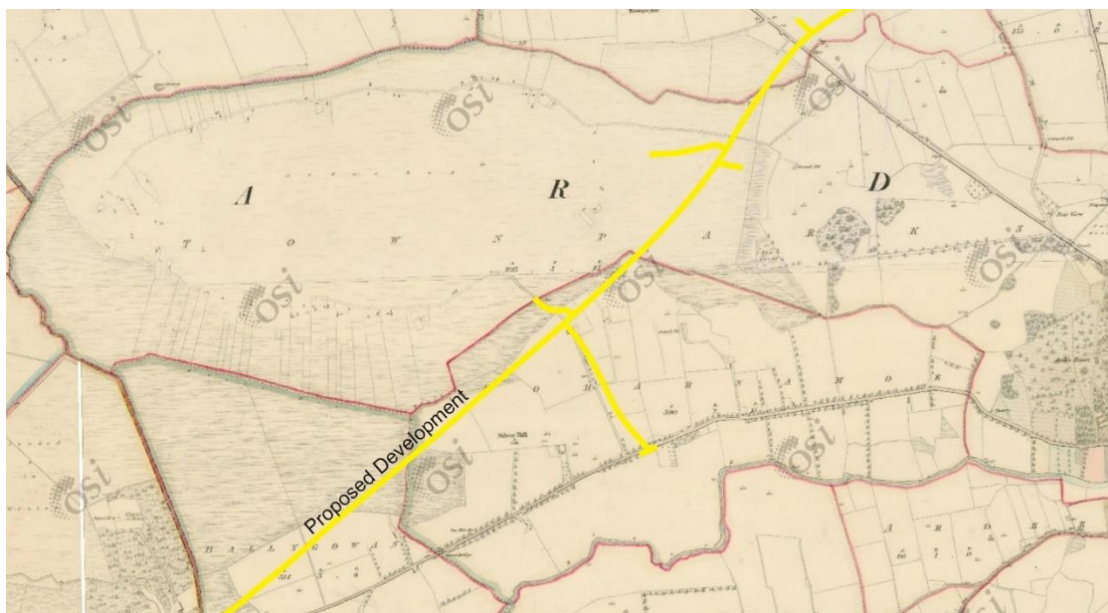


Figure 10-9 19th Century map of Ardee Bog and townland boundary

Land use, settlements and transport patterns.

Due to the landform, settlements, roads and housing are located on the more elevated lands. The N52 itself runs along a ridge from Mandistown to Ardee. Ardee itself is located on these slightly elevated lands as are the N2 and Mullanstown roads to the north. The town itself is currently traffic dominated – parking and through traffic. A number of smaller roads criss-cross the Ardee Bog area including Silver Hill from the N52 running north west and linking to another local road running east west from Golf

Links Road to Rogerstown. Other than the N2 all roads have scattered one-off or, more commonly, clusters of houses, local farmsteads and/or commercial/industrial buildings scattered along them. See Figure 10-10. Land use is primarily Agriculture reflected in the field patterns with significant natural heritage value ascribed to Ardee Bog (pNHA) and protected woodlands such as Fox Cover in the Golf Club and Red House to the north east of Ardee town.

Built and cultural heritage

The town and environs of Ardee are rich in built and cultural heritage reflecting its role as a key fortification on the outskirts of the Pale - the town can be traced back to 13th CE. The town is a prime example of a medieval 'walled town' in Ireland, with a distinctive, central Main Street and long narrow plots extending from the main street. The town itself is situated in the southern part of the ancient territory known as the Plain of Muirheimhne. The town lies along the 15th century Pale frontier between Dundalk and Kells. It was originally called Atherdee, originated from Irish name – Ath Fhirdia (the Ford of Ferdia) which is derived from the fabled four-day battle between Cuchulainn and Ferdia, for the defence of Ulster from Queen Maeve of Connacht.

Most built heritage with an upstanding presence are within the built-up area of the town and to the east of potential route alignments. This historic core of Ardee Town is designated as Ardee ACA. A number of old institutional buildings lie within the study area west of the town. The visibility of the new road from these heritage sites would be constrained due to the thick vegetation and by other buildings in the vicinity.

Visual amenity

Topography results in occasional panoramic views from elevated roads and locations. In particular, the N52 enjoys views to the south and north in places. These views are not very long distance, as within a few kilometres the view is closed by other elevated areas. In general the experience of the landscape is highly varied from open views out and over the landscape to intimate enclosed routes by hedgerows or trees close to and overtopping the road corridor.

The landscape has an intimate character with contrasting openness and views in places. The overriding character is that of a working rural landscape with a strong sense of nature and history. It is very representative or typical of the LCA descriptions in the County Landscape Character Assessments with locally distinctive features such as Ardee Bog and environs, woodlands and tree cover, and the historic town of Ardee.

This character is recognised in the Area of High Scenic Amenity designation of Ardee Bog, the designated scenic route through Ardee bog and the protected viewpoint further west along this route.

Figure 10-11 illustrates the protected and designated areas within the study area, as discussed in the previous paragraphs.



Figure 10-10 Residential receptors in the vicinity of the proposed development

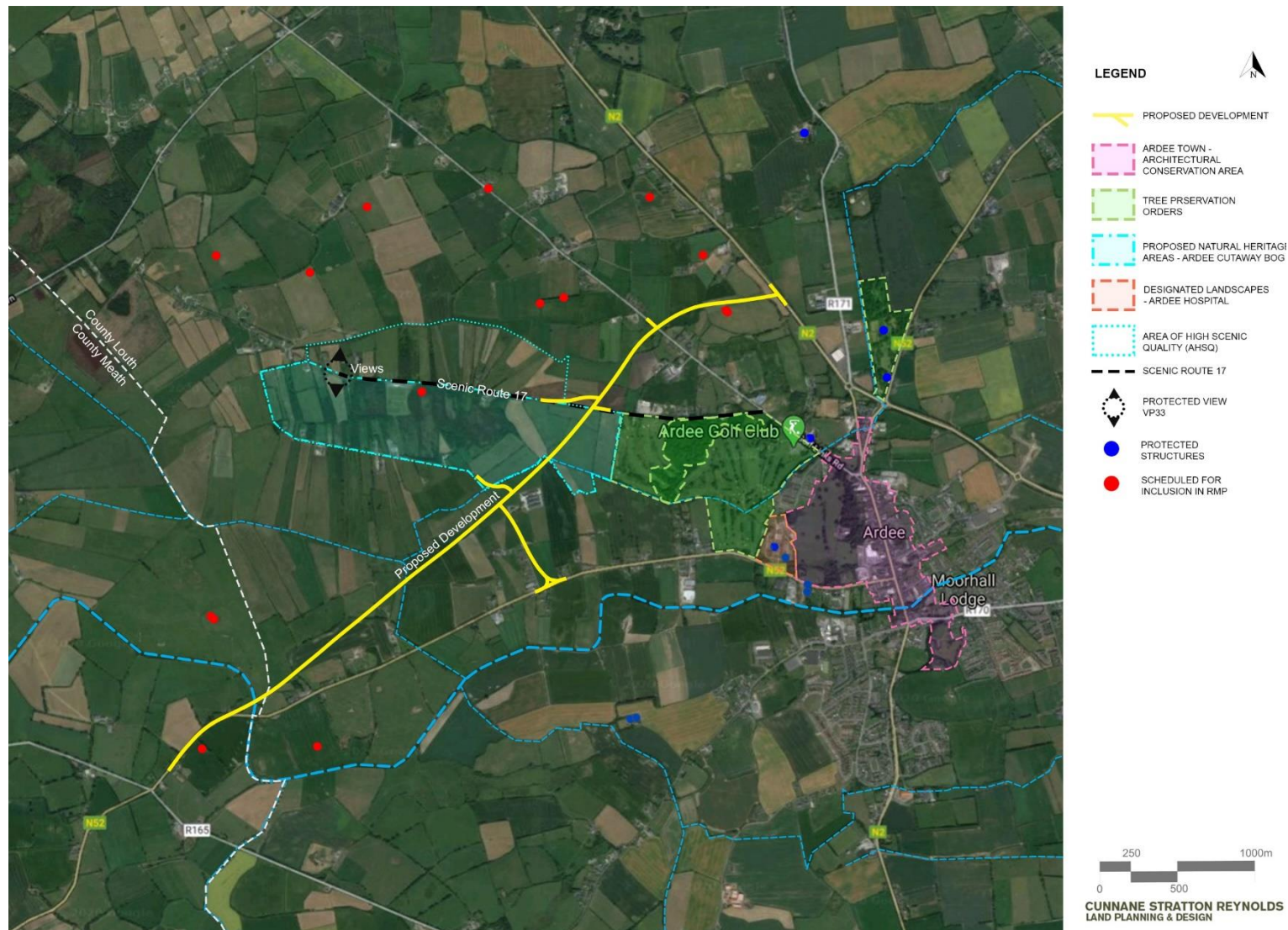


Figure 10-11 Protected and designated areas



Figure 10-12 From the N52 road at Mandistown looking northeast towards the southern end of the N52 Ardee Bypass in the background



Figure 10-13 From the N52 road at Mandistown near River Dee looking northeast onto the farmland containing a section of the N52 Ardee Bypass



Figure 10-14 From the junction of the N52 road and the Silverhill Road at Boharnamoe which will contain a new roundabout linking the N52 Ardee Bypass with the existing N52 road, looking north onto the area of farmland.



Figure 10-15 From local road at Townparks looking northeast onto the farmland which will contain a proposed access road and a section of the N52 Ardee Bypass



Figure 10-16 From Scenic Route at Townparks looking south directly onto the farmland which will contain a section of the N52 Ardee Bypass



Figure 10-17 From local road at Mullanstown looking southwest onto the farmland which will contain a section of the N52 Ardee Bypass



Figure 10-18 From the southern embankment of the N2 at Glebe looking south directly onto the farmland that will contain the northernmost section of N52 Ardee Bypass

Landscape Values

The above description of the receiving environment describes a number of characteristics of the study area that are experienced or viewed. These contribute an experience of a gently varying rural but working landscape close to an historic town.

One of the key characteristics is the topographic variation that creates a slightly more elevated and more cultivated agricultural landscape with the supporting road system and the main urban area. This elevated area forms a bowl type enclosure of low lying land which has been partly reclaimed from bog but is still legible in its distinctive field pattern and vegetation and regular flooding. The landscape features a good deal of mature vegetation, with hedgerows and small to medium sized broadleaved woodlands, with small rivers and streams slowly meandering through the topography.

These features, characteristics or values are summarised below in terms of Enhancement Values – those aspects or characteristics of the landscape that are supportive of change and development - and Conservation Values – those values or aspects of the receiving environment that should be protected and conserved and the constraint or opportunity they provide for the proposed development.

Table 10-7 Landscape Characteristics and Values

No.	Landscape Characteristic, Element or Feature	Landscape Value	Constraints / Opportunities to Road Design
<i>Enhancement Values</i>			
1	Heavily trafficked character of Ardee town, a protected ACA	The historic town of Ardee has much to offer visitors, residents and local businesses, as a place of interest and character.	Supportive of a proposed replacement to the N52, which will remove through traffic from the town, freeing up the public realm for further enhancement and improving the quality of the protected ACA
		Policy (of the LAP) to develop a town by-pass to enhance the town and traffic movement	As above
2	Development plan policy of a balanced approach to landscape protection and socioeconomic development	Landscape is a working place for use as well as enjoyment	Supportive of landscape change in a balanced way
3	Landscape character of 'Muirhevna Plain' LCA / North Navan Lowlands, which is of regional importance and medium sensitivity		This implies a neutral constraint for a development that reflects the local landscape sensitivities whilst addressing local needs / delivering local benefits
<i>Conservation Values</i>			
1	Working agricultural landscape	A sense of a mixed agricultural landscape as expressed in the pasturelands, field patterns and farm buildings	The viability and spatial extent of agricultural activity and farming i.e. the road alignment needs to be sensitive to the land uses, field patterns and ownership patterns through which it is passing
2	An existing transport corridor associated with the main settlements	The current location of the N52 has a logical and historic rationale running along a natural ridgeline and is well integrated into the wider valley landscape	Maximising where possible this logic in new alignment
3	Local Roads and Residential Receptors	The local roads provide transport and communications routes for the population residing in the dispersed rural dwellings across the study area, and for agricultural and other commercial operations. The rural character of the	The road should seek to avoid causing disturbance to residential dwellings and the existing road network.

No.	Landscape Characteristic, Element or Feature	Landscape Value	Constraints / Opportunities to Road Design
		landscape and unspoilt views generate residential amenity value enjoyed by the residents of the study area	
4	Ardee Bog: pNHA and Area of High Scenic Quality with designated scenic route and protected viewpoint	A sense of quality and nature in the rural landscape	The Ardee Bog is a pNHA coupled with associated scenic route and viewpoint. The historic bog extended beyond the designated area and continues to be legible in the field pattern today. The new road should seek to minimise the impact on the bog and its setting
5	Trees, tree lines and woodlands – protected and other	Trees are high quality visual elements in the landscape, providing enclosure and structure, and are a primary contributor to visual amenity value in the landscape as well as ecological value. In places, they have historic significance and therefore significant cultural historic value.	The new road should minimise traversing areas of woodland or tree lines and, thereby, avoid reducing the landscape's ecological, cultural heritage and visual amenity value
6	Field boundaries and hedgerows	As linear, connected habitat corridors, hedgerows have significant ecological value. As indicators of historic land boundaries, they have significant cultural historic value. With woodlands, they provide enclosure and structure in the landscape. The hedgerows are a primary contributor to visual amenity value in the landscape.	The new road should retain the landscape pattern of fields, or as many lengths of hedgerow as possible.
7	Topography and landform	The attractive, gently rolling landscape creates variation and interest, offering views of / from elevated locations, and enclosure screening from lower areas.	Land use and development to date, including transport corridors, has traditionally been in the more elevated, well-drained areas, allowing residents and road users to overlook the low-lying areas.
8	Unspoilt rural but working agricultural character	Visual and landscape amenity	Potential visual intrusion and landscape severance, affecting the experience of rural dwellers or visitors to local landscape amenity – Ardee Bog and rural landscape. The new road should seek to avoid visual intrusion and where possible maintain the character of the area.
9	River Corridors	Adding visual and ecological interest and value	The new road should ensure the protection of biodiversity and avoid disturbance to ecological connectivity, where possible. Therefore, crossing

No.	Landscape Characteristic, Element or Feature	Landscape Value	Constraints / Opportunities to Road Design
			locations should minimise impact on key river features and seek to enhance character by appropriate design of structures.
10	Archaeological features	A sense of quality, timelessness and continuity in the rural landscape	The new road should seek to protect the historic townland boundaries, archaeological remains and, where possible, avoid damage / removal of stone walls and historic hedgerows
11	Built heritage, structures and stone walls	A sense of quality, timelessness and continuity in the rural landscape	Proposed new road design should minimise destruction of stone walls, old bridges and related built heritage features. Consider architecture/materials of new components of road and its local context to promote harmony with existing built heritage.

Zone of Visual Influence and Potential Visual Receptors

A thorough assessment of potential views of the proposed development was carried out during the site visit. The surrounding vicinity was walked and driven, and the areas with likely views were identified.

The linear nature of the proposed development and the receiving environment will likely result in the potential views of receptors being limited to a section of the overall route, as views are likely to be restricted by the surrounding local topography and vegetation.

Consideration of the design is also important in determining the potential visual receptors across the study area. As certain sections of the route will be either elevated along an embankment or set within a cutting, and so sit respectively above or below the existing topography. Potential views are also likely to be affected by any mitigation measures proposed to reduce the proposed development's visibility. The potential visual effects of the proposed development on the identified receptors are considered in Section 10.4.

Potential visual receptors within the study area include a mix of local rural residents and road users along the local road network including: the N52, Silverhill Road, Townparks Road, Mullanstown Road and the N2 road. All of these routes are intersected by the Proposed Development. The 2.5km long section of Townparks Road within the study area has been designated as a scenic route and a protected view no.33 is also located along this route, from which road users experience varied views across the local landscape.

The northern part of Ardee town, including its historic core, is located on the eastern end of the study area. However potential views of receptors within this town are fully screened by the intervening buildings and vegetation.

Details of the 11 selected viewpoints and their locations are provided in Table 10-8 and Figure 10-19 as part of the visual assessment within Section 10.4.4 Predicted Visual Impacts.

10.4 Predicted Impacts

10.4.1 Characteristics of the Proposed Development

The proposed development is described in detail in Section 3, those components of the development that are particularly relevant to landscape and visual effects include:

- 4.5km of Type 2 Single Carriageway across farmland west of Ardee town connecting the existing N52 to the N2 road.
- The proposed development will be accessed from local roads by new junctions off the Silverhill, Townparks and Mullanstown Roads. A cul-de-sac will be created on the eastern end of Mullanstown Road. A roundabout will be located where the new road converges onto the N2 and a smaller one replacing the existing Silverhill Road and N52 road junction.
- The road profile will vary across its route from being level with the surrounding lands to slightly extending above or below the existing ground level. The deepest cut along the mainline is 5.5m at Ch 4+300. The highest embankment along the mainline is 4.5m at Ch 1+450. The deepest cut on sideroads is 6.1m lower along Silverhill, at Ch 0+100.
- The road will also include new SUDS drainage measures and new bridges over the existing River Dee and River Garra.

10.4.2 Potential Impact of the Proposed Development

Key elements of the development relevant to its landscape and visual impacts include:

- Temporary construction works across the site including large earthworks
- The change in land use from farmland to infrastructure and how this will potentially alter the characteristics of the LCA and Ardee Bog designation.
- Views of the new road and its supporting elements together with the traffic flow along it from the surrounding local area including protected views and routes.
- Replacement of a section of the existing N52 road by the new road as a main thoroughfare.

10.4.3 Predicted Landscape Impacts and Effects

Construction Phase

The construction phase will result in construction of the key infrastructure and ancillary works over a temporary period of approximately 18-24 months. An outline of the proposed works required to be undertaken at this phase is provided in Section 3.4 above.

Overall, the impacts described are generally short-term and visually adverse in nature.

10.4.3.1 Construction Effects on The Site, Immediate setting

Landscape Sensitivity

Landscape sensitivity is considered to be Medium as described in Table 10-1 and reflecting the Louth and Meath LCAs.

Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principal management objective may be to consolidate landscape character or facilitate appropriate, necessary change.

Landscape sensitivity of the site within the Ardee Bog pNHA AHSQ is considered to be High as described in Table 10-1.

Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principal management objective for the area is conservation of the existing character.

Magnitude of Change

The proposed development will mostly be limited to the area of land take already fenced in and cleared of previous boundary vegetation, with small areas of additional lands required to accommodate changes in the design such as Townparks Road west, additional attenuation ponds and the pedestrian / cycle facilities.

The construction works will result in large scale earthworks movement alternating the existing site levels, with some sections of embankments, bunds and cuttings to achieve the required grade and screening.

The site works will require the installation of new bridge crossings over the River Dee and River Garra and culverting of existing field drainage, to maintain connectivity of these watercourses.

The improved grassland cover across the site's farmland will be removed and replaced by the proposed road corridor. The established field patterns have already been alternated by the new fencing added along the site boundary, resulting in fields being divided into two. Connectivity between some of these split fields will be maintained by cattle underpasses below the road and/or new field accesses.

The proposed development will create a new road across the existing farmland within the site limits. The magnitude of change will be **Medium**:

Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape

The magnitude of change will be **High** across the extent of the Ardee Bog pNHA and AHSQ designation which contains the proposed development.

Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape.

Level of Landscape Effect

The landscape importance of effects will be **Moderate to High**.

Qualitatively the landscape effect will be **Adverse**, as the effects will affect the integrity and completeness of the rural landscape character and the protected landscape, habitat and scenic qualities of Ardee Bog.

10.4.3.2 Construction Effects on The Wider Landscape

Landscape Sensitivity

Landscape sensitivity of the wider landscape is considered to be Medium as described in Table 10-1 (Although the Ardee Bog would be regarded as of a higher sensitivity it is addressed within the immediate setting).

Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principal management objective may be to consolidate landscape character or facilitate appropriate, necessary change.

Magnitude of Change

Changes to the landscape of the Muirhevna Plain LCA during the construction phase will be limited to the site and to the immediate environs, as the site works are well contained by the surrounding topography. Some indirect effects will occur from the sourcing and movement of materials and personnel to/from the site from the wider area during the construction works.

Disturbance to the Ardee Bog pNHA AHSQ lands by the site works will be limited to the section of the proposed development which crosses the two fields within the eastern end of the designation. Resulting in ground disturbance and permanent alternations to the designation's lands within the site boundary. There will be varying visibility of the wider proposed development's site works from within the Ardee Bog pNHA, with views greatest from the more open areas of farmland.

The proposed development will create a new road across the existing farmland of the Muirhevna Plain LCA and the more sensitive Ardee Bog within that. The magnitude of change to this wider context would be **Medium**:

Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.

Level of Landscape Effect

The landscape importance of effects will be **Moderate**.

Qualitatively the landscape effect will be **Adverse**, as the effects will affect the integrity and completeness of the rural landscape character / Muirhevna Plain LCA and the protected landscape, habitat and scenic qualities of Ardee Bog pNHA AHSQ.

10.4.3.3 Operational Phase

Site and Immediate Environs

Landscape Sensitivity

Landscape sensitivity is considered to be Medium for the site and immediate lands with the exception of the Ardee Bog pNHA AHSQ which is considered to be High.

Magnitude of Change

The proposed development will result in a permanent loss of farmland across the extent of the site. The route crosses over approximately 35 fields, whose field patterns and boundary elements have already been altered by the installation of a new wooden fence along the extent of the site boundary. This has resulted in some field being divided in two or a small portion of the field corner being lost to the proposed development. The design provides for connectivity points along the route to ensure the neighbouring fields are still able to be farmed and not left as inaccessible lands by the proposed development. Mitigating native hedgerow planting will be provided along the site boundaries to compensate the severed field boundaries.

The proposed development will alter the site's existing topography as sections of the route will be raised up from its surroundings on embankments or lowered through cuttings into the land. These topographical variations are relatively low not exceeding more than +4.5m in height for embankments and – 6.1m in height for cuttings.

The proposed development will create a new road across the existing farmland within the limits of the site. The magnitude of change will be **Medium**:

Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape

The proposed development will introduce a new infrastructure feature into part of two fields of improved grassland within the Ardee Bog pHA AHSQ. This section of route will consist of the new road on an embankment along with an attenuation pond, culverted stream and new farm access points. It will cut off the remaining eastern part of the designation from the wider designated lands.

Mitigation planting will include a mix of wildflower meadows, heathland, scrub hedgerows and woodland species, which are reflective of the local landscape, to help soften the proposed development's appearance and integrate it into its surrounding.

The magnitude of change will be **High** across the extent of the Ardee Bog pNHA and AHSQ designation which contains the proposed development.

Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape.

Level of Landscape Effect

The landscape importance of effects will be **Moderate to High**.

Qualitatively the landscape effect will be **Adverse**, as the effects will affect the integrity and completeness of the rural landscape character and the protected landscape, habitat and scenic qualities of Ardee Bog.

In the Long Term as the mitigation hedgerow planting along the site boundary becomes established it will help re-establish the previously severed field boundaries and field patterns reducing the effects upon the immediate non designated areas of affected farmland to **Neutral**.

10.4.3.4 The Wider Landscape

Landscape Sensitivity

Landscape sensitivity is considered to be Medium for the wider landscape and Muirhevna Plain LCA (Although the Ardee Bog would be regarded as of a higher sensitivity it is addressed within the immediate setting).

Magnitude of Change

The proposed development will introduce a new transport infrastructure across an area of the Muirhevna Plain lowlands currently under improved pasture. The proposed development will consist of a 4.5km long single-track carriageway not dissimilar to the existing section of the N52 it is replacing. The road is located near the rural/urban fringe of Ardee town which is served by a number of other national graded roads. The route has been designed to minimize disturbance within the immediate landscape through limiting the required land take while also being contained by the surrounding higher local topography. The surrounding farmland bordering the route will still be farmed as new access points have been provided off/or under the route where required.

The proposed development will create a new road across the existing farmland of the wider landscape / Muirhevna Plain LCA. The magnitude of change will be **Medium**:

Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic

in the context. Such development results in change to the character of the landscape

The magnitude of change will be higher across the extent of the Ardee Bog pNHA and AHSQ designation which contains the proposed development.

The proposed development intended purpose is to divert traffic away from the centre of Ardee town, particularly around Barret's Lane and Castle Street, where the existing N52 and N2 diverge. The reduced traffic volumes and congestion will have positive changes to this part of the town and character of the historic townscape contained within Ardee ACA. Allowing future opportunities to enhance the quality of the public realm within the centre of Ardee town and Ardee ACA.

Level of Landscape Effect

The landscape importance of effects will be **Moderate**.

Qualitatively the landscape effect will be mostly **Adverse**, as the effects will affect the integrity and completeness of the rural landscape character / Muirhevna Plain LCA and the protected landscape, habitat and scenic qualities of Ardee Bog pNHA and AHSQ.

In the Long Term as the landscape mitigation planting matures it will help to integrate the linear transport feature into the broader landscape of the Muirhevna Plain LCA and reduce the quality of effects upon the LCA to **Neutral**.

Some wider landscape effects will be **Beneficial**, as a result of diverting traffic along the new N52 route away from the centre of Ardee town and providing future opportunities to enhance the quality of the public realm within the centre of Ardee town and Ardee ACA.

10.4.4 Predicted Visual Impacts

Based on the assessment of the landscape characteristics, values, and sensitivities, 11 representative viewpoints were selected to assess visual impact and effects. These are scheduled and mapped below.

The views are listed below and described / assessed in the following section.

Table 10-8 Viewpoints

No.	Receptor and views	Rationale for selection	Approx. distance from site boundary (CPO Line)
1	Along the N52 road at Mandistown	Part of the immediate environs	55m southwest
2	Next to house at Mandistown.	Part of the immediate environs and residential receptor	0m within site
3	Along the N52 road at Ballygowan adjacent to single house and east of existing River Dee crossing.	Part of the immediate environs and residential area	0m immediately adjacent
4	Group of Houses by the junction of the N52 and Silverhill Road.	Part of the immediate environs and residential area	0m within site

No.	Receptor and views	Rationale for selection	Approx. distance from site boundary (CPO Line)
5	Along the N52 at Bohernamoe near to Ardee.	Part of the wider environs and residential area	670m southeast/320m east (Silverhill junction)
6	Along Silverhill Road, Townparks	Part of the wider environs and residential area	4707m northwest Silverhill Road West/ 575m northwest of mainline CPO
7	Protected View No. 33, Townparks road scenic route.	Protected View within LCC Development Plan	1.2km northwest
8	Along scenic route on Townparks road	Designated route within LCC Development Plan	234m northwest
9	Along Mullanstown Road	Part of the immediate environs and residential area	0m within site
10	Snipe Hill	Part of the immediate environs and residential area	180m north
11	Along the N2 road at Glebe	Part of the immediate environs	0m within site

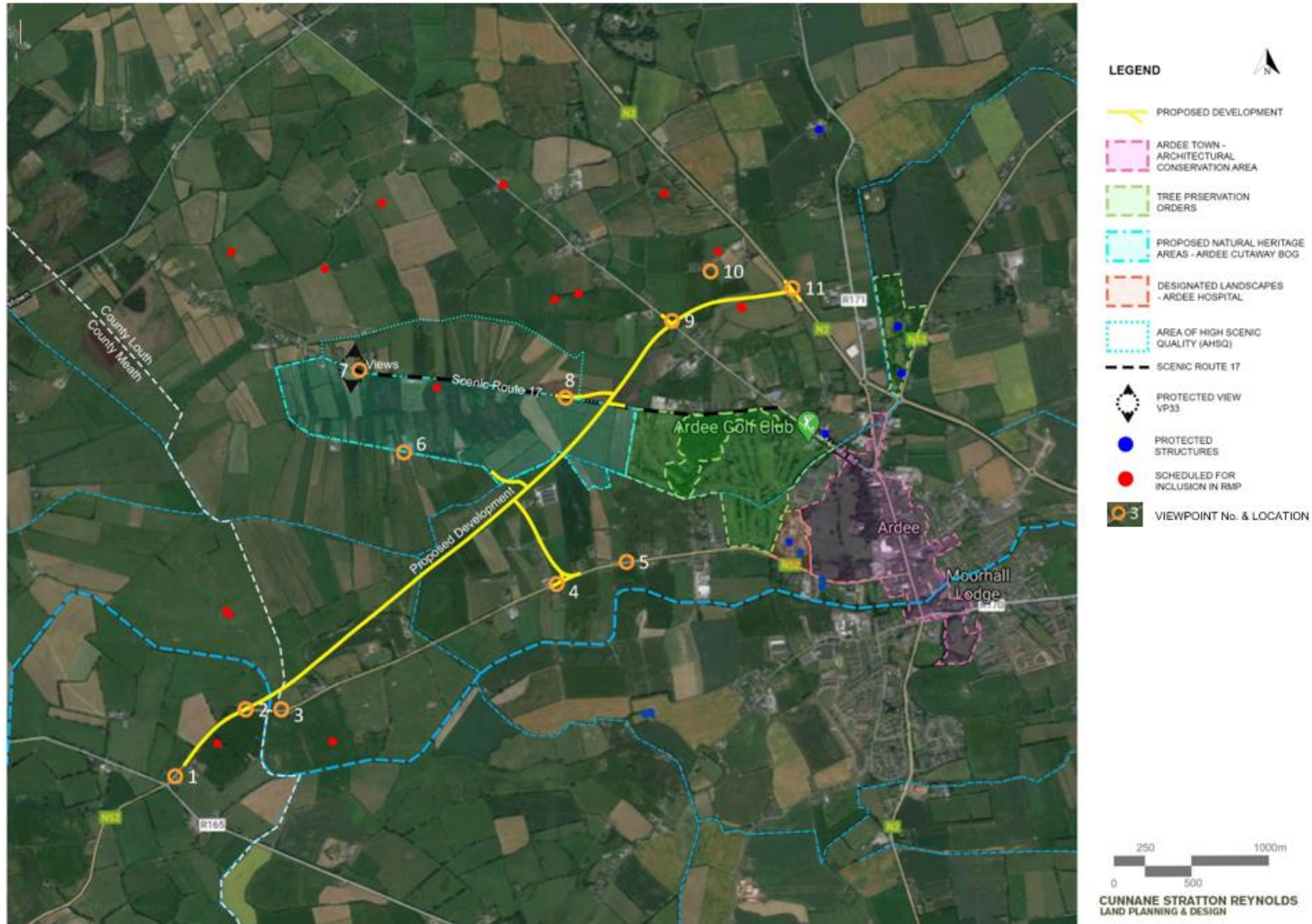


Figure 10-19 Viewpoint Location Map

Viewpoint 1 – Along the N52 road at Mandistown



Figure 10-20 View along the existing N52 road looking northeast towards the southern end of the proposed development lands in the background

Existing View

The view is located along the N52 next to an agricultural engineering workshop and just west of the proposed development. The foreground view contains some signage and hedgerow lining the existing N52 road with partial views into neighbouring fields.

In the middle ground on the right (east) is the boundary walls of a group of houses and on the opposite side of the road is a crash barrier which indicates the approximate start of the new route.

Visual Receptor Sensitivity

The visual receptors here consist of road users and adjacent residents creating a **Medium** sensitivity.

Proposed View

The view will contain the improved road and new cycle track following the same section of the existing N52 road at this point. Views from residence will also look directly onto a new attenuation pond and field access track west of the new road, with views greatest from upper floors. Roadside views of these additional elements from this point will be partially obscured by the existing roadside vegetation and topography. As the mitigation planting becomes established views of these elements will be reduced.

Magnitude of Change

The magnitude of change is considered **Low** - *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.*

Visual Effect

The importance of the visual effect would be **Low** and would remain so in the Short, Medium and Long Term.

The quality of the effect would be **Neutral**.

During the Construction Phase the effects would be short-term, localised, **Low and Adverse**.

Viewpoint 2 – Next to house at Mandistown.



Figure 10-21 View from the N52 road at Mandistown near Burley Bridge looking northeast onto the proposed development lands and surrounding farmland

Existing View

The view is next to a house along the N52 looking northeast out onto the surrounding farmland. The extent of the Proposed Development land is clearly defined across the immediate agricultural lands and roadside by a new low fence line (timber posts with black banding) which marks out the site boundary line. The lands within this area contain remnants of cleared trees and hedgerows along the former field boundaries.

Visual Receptor Sensitivity

The visual receptors consist of road uses and include this single dwelling with outward views dominated by the existing N52 road. The viewpoint is therefore of **Medium** sensitivity.

Proposed View- Magnitude of Change

The view from this point will contain the new road on an embankment as it crosses north east to the farmland and severs the link with the existing N52 route.

The Proposed Development will be clearly visible from the adjacent residence as the new route has been reorientated, so facing approximately northeast-southwest direction, and raised up from the existing ground level. While part of the new road will

be located slightly further away from the western end of the house it will encroach the southeast corner of the gardens/drive. This will result in a partial loss of the front garden hedge and boundary wall/gates to the earthworks and new road. Views to the east will also be possible of the new road crossing the adjoining farmland. Further alternations to the property's south/western corner garden boundary hedge/wall will be required to provide access from the residence via the new private access off the N52.

The difference in height from the existing and new route of approx. 2m will mean that views will be looking up to the new road rather than directly out onto it as experienced with the existing N52 road.

The mitigation planting will include hedgerow and tree planting along the top of the embankment which will further enclose views of the new section of road and passing traffic as the planting becomes established.

The magnitude of change is considered **Medium** - *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

Visual Effect

The importance of effect would be **Moderate** and would remain so in the Short and Medium Term and reducing to **Low** in the Long Term as the mitigation planting becomes established.

The quality of the effect is considered **Adverse** but reducing to **Neutral** in the Long Term as the mitigation matures.

During the Construction Phase the effects would be short-term, localised, **High and Adverse** - some of the works will be within the resident's garden.

Viewpoint 3 – N52 road at Ballygowan



Figure 10-22 View from the N52 road at Ballygowan looking north towards the boundary edge.

Existing View

The view is from the N52 on the county border between County Louth and County Meath, adjacent to a single house lying just south of the road and just east of the existing River Dee crossing. The roadside view shows the N52 in the foreground and the fields north of the existing road leading in the middle of the view to the fenced corridor of the proposed new road. To the right (east) of centre various buildings, garden hedges and fences associated with residences further east along the N52 can be seen. Most of these residences are enclosed by hedgerows and trees along the boundaries of their gardens or neighbouring fields. There is a notable drop in topography between these properties and the proposed road corridor, as illustrated in the view above from the N52 looking northern east towards the westernmost property within the group.

Visual Receptor Sensitivity

The visual receptors consist of road users and include this single dwelling with outward views dominated by the existing N52 road. The viewpoint is therefore of **Medium** sensitivity.

Proposed View- Magnitude of Change

The new road visible within this view will be set within the fenced area along an embankment of approximately 3.5m higher than the existing topography. Mitigation planting in the form of hedgerow and woodland planting along this embankment will help reduce the prominence of the new elevated N52 route. Potential views from the single property opposite are hindered by its lower setting and garden boundary planting. While the new woodland planting on the embankment and existing boundary planting around the group of properties in the middle distance help constrain their potential views towards the new road.

Once the proposed development is operational this section of the N52 will notice a reduction in traffic flow resulting in improvements to local landscape and visual amenity within the existing N52 corridor.

The magnitude of change is considered **Medium** - *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

Visual Effect

The importance of effect would be **Moderate** and would remain so in the Short, Medium and Long Term.

The quality of the effect is considered Neutral.

During the Construction Phase the effects would be short-term, localised, **Moderate** and **Adverse**.

Viewpoint 4 – Group of Houses by the junction of the N52 and Silverhill road.



Figure 10-23 View from the junction of the N52 and Silverhill Road looking north towards the proposed development lands.

Existing View

The view is from the junction of Silver Hill and the N52 and is representative of the properties clustered along the southern end of the Silverhill Road. These are slightly elevated above the road providing frontal roadside views eastwards directly onto the immediate farmland.

The extent of the Silverhill and N52 road junction proposed as part of the proposed development is clearly defined within this view by the fenced boundary line (timber posts with black banding) present across the adjacent field. Three properties on the northern end of this cluster have extended elevated northwards views of the rural

landscape and part of the fence line along the northern end of the same proposed junction.

The view shows the land rising northwards from the N52 along Silverhill Road to a gentle ridge approximately 150m north.

Visual Receptor Sensitivity

The visual receptors are primarily residential, comprising this group of residences. Although adjacent to the busy N52, their outlook is rural in character and therefore has a **High** sensitivity.

Proposed View- Magnitude of Change

The view from these properties will be an alteration of the existing road layout.

The new layout will push the road slightly further away from some of the properties nearest to the existing N52 junction. Changes to the views will also include the replacement of the existing T junction with a small roundabout with lighting and two attenuation ponds west of the new side road. As the realigned road will directly connect the existing and new N52 roads, residents will experience increased views of traffic movement in comparison with those already experienced along the existing narrow Silverhill Road, however the new road will be aligned further east from the houses creating a safer residential setting and the ponds and mitigation planting will create attractive natural features.

Potential views of the main route from these properties are hidden by the local topography and crest of Silverhill road.

The magnitude of change is considered **Medium** - *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity. To Low* - *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.*

Visual Effect

The importance of the effect, would vary between **High-Moderate** within this group dependent on the receptor's closeness to road and overall visibility to the road/traffic, and would remain so in the Short and Medium Term reducing to **Moderate to Low** in the Long Term, as mitigation measures and the proposed new landscape features (ponds and planting) develop and establish.

The quality of the effect is considered **Adverse**. This will reduce to **Neutral** for receptors nearest the existing N52 whose views are screened by the mitigation planting as it becomes established and which benefit from the movement of the new road away from the houses

During the Construction Phase the effects would be short-term, localised, **High** and **Adverse**. As the proposed temporary construction compound area is located within the field opposite these properties, resulting in a high level of activity around the compound and Silverhill road throughout the construction phase.

Viewpoint 5 – Along the N52 at Bohernamoe near to Ardee.



Figure 10-24 View from the N52 at Bohernamoe looking north across farmland

Existing View

The view is from along the existing N52 road, approximately 20m west of a group of houses and immediately west of the 60kmph zone on the western rural/urban fringes of Ardee town. The view looks north from the existing N52. The boundary hedge to the adjoining field to the north can be seen. Beyond the hedge an attractive rural and agricultural view opens up, which is bounded by mature trees and hedgerows along the field boundaries which contain this view to the immediate area.

Visual Receptor Sensitivity

The viewpoint is representative of the existing road and the nearby residences in this section of the road. The viewpoint is therefore of **Medium** sensitivity.

Proposed View- Magnitude of Change

There will be no change to existing view as the proposed development will be fully screened by the intervening topography and vegetation.

Visual Effect

There will be no visual effect.

Viewpoint 6 Along Silverhill Road, Townparks



Figure 10-25 View from Silverhill Road, Townparks looking southeast towards the proposed development lands and Silver Hill.

Existing View

The view is from a small group of rural properties on this section of the local road. The view looks southeast across the surrounding flat farmland in the foreground and the distinct slopes of Silverhill in the middle ground and higher hills and the turbines of Collon Windfarm in the distance. The fenced extent of the proposed development is partially visible within the view along the lower slopes of Silverhill and the lowland in the middle ground. The long narrow fields are a distinctive local feature. The field boundaries are low and undeveloped with limited tree cover resulting in relatively open views over an unspoilt and attractive rural scene.

Visual Receptor Sensitivity

The local rural road, landscape setting and the residential visual receptors create a **High** sensitivity.

Proposed View- Magnitude of Change

The new road will be visible running along the lower slopes of Silverhill and surrounding lowlands, with some sections of the route slightly raised on an embankment. A new bridge crossing the River Garra will also be visible to the right (southwest) of the Silverhill.

The proposed development will introduce a new road and the movement of traffic within this rural and unspoilt view. Its setting within the lowlands will help contain it within the wider rural landscape. The extent of the proposed development's visibility will vary from these residential receptors, as some views will be reduced by the screening provided by the presence of hedgerows and trees along the boundaries of their gardens, the roadside and intervening fields, however the character of the view would change. Mitigation planting in the form of hedgerows and strips of woodland will be added along the edges of the new road which as it becomes established will help

reduce the prominence of the new road and movement of traffic across the rural landscape.

The magnitude of change is considered **High** - *partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.*

Visual Effect

The importance of effect would be **High** and would remain so in the Short and Medium term and reducing to **Moderate** in the Long Term as the planting becomes established.

The quality of the effect is considered **Adverse**.

During the Construction Phase the effects would be short-term, **High** and **Adverse**.

Viewpoint 7 – Protected View No. 33, Townparks scenic route.



Figure 10-26 View from the protected view and scenic route on Townparks looking southeast across the surrounding landscape.

Existing View

This is representative of Protected View 33 and Townparks scenic route. The protected view covers views to the north and south of the road, with the illustrated view above showing the southern roadside view from the end point of the scenic route. The view includes a mix of rural dwellings, local hills and wooded areas within Ardee Bog designated pNHA. The more scenic quality of this view is towards the southeast as illustrated where views are looking towards the dense woodlands with distance hills visible through minor breaks in the tree coverage.

It is an attractive and unspoilt rural view over the pNHA with a high residential amenity value for local houses.

Visual Receptor Sensitivity

The viewpoint is of **High** sensitivity reflecting the protected view, scenic route designations and local residences.

Proposed View- Magnitude of Change

The new road would lie further east, beyond and screened by the intervening woodland described above and local topography. There will be no change to the existing view.

Visual Effect

There would be no visual effect

Viewpoint 8 – Along scenic route on Townparks road



Figure 10-27 View from Townparks scenic route looking southeast towards the proposed development land and surrounding landscape.

Existing View

The view is located along the scenic route section of the Townparks road, looking southeast onto the surrounding farmland within Ardee Bog designated pNHA. In the foreground can be seen the Townparks road travelling east into the centre left of the view. The low field boundaries along this point of the scenic route, as shown above, allow views to adjacent low-lying fields to the south (right). The proposed development's boundary fence line is partially visible crossing the field in the middle ground. Beyond this, tree lines along field boundaries and the background of dense mature woodland within Ardee golf course close the view.

Visual Receptor Sensitivity

As a designated scenic route the road user are of **High** sensitivity.

Proposed View- Magnitude of Change

The existing scenic road and view will be altered at this immediate setting, as the proposed development will require the diversion of the road across the farmland to the northeast (left) of the existing road to connect to the new N52. The new view from this point will contain both this link road and the new N52 road on a slight embankment crossing the central view. Road users along the short diverted section of the Townparks Road scenic route will have views of the new N52 road and traffic as it passes through the eastern part of the Ardee designated pNHA and adjacent farmland to the north. The new road will be partially integrated into the landscape by the backdrop of woodland and trees within the golf club and the surrounding field hedgerows and trees as well as new landscape mitigation planting associated with the road corridor. Views of the proposed development from along the Townparks Road Scenic Route will be limited to the immediate area where the new main road intersects the scenic route.

The magnitude of change is considered **High** – *Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.*

Visual Effect

The importance of effect would be **High** and would remain so in the Short and Medium Term reducing to **Moderate** in the Long Term as the mitigation planting becomes established.

During the Construction Phase the effects would be short-term, localised, **High** and **Adverse**.

Viewpoint 9 - Along Mullanstown Road



Figure 10-28 View from Mullanstown Road looking northwest across the road corridor towards local houses.

Existing View

The point is located between two groups of houses along the Mullanstown Road. The view illustrated is from this local road looking northwest towards the nearest residential properties either side of the road. The local road is visible running centrally in the view and open views to adjacent fields either side. Further west the local road rises gently with the local topography with associated cottages and gardens creating a pleasant view. The proposed road corridor fence line is visible within the immediate lands on either side of the road.

Visual Receptor Sensitivity

The view is from a local road servicing local residences and is therefore of **Medium** sensitivity.

Proposed View- Magnitude of Change

The new road would cross the view in the immediate foreground creating a prominent and intrusive feature. The new road would be slightly raised above the existing farmland allowing open views of traffic along it from road and the side and/or rears of the nearest houses. There would be partial views of the revised Mullanstown road junction and new access track leading to the farmstead on Snipe Hill, Viewpoint 10. Houses on either side of the location would see a substantial change to the view and the existing rural lane character would be severed.

Over time, associated landscape planting would mitigate the visual effect and change.

Magnitude of Change

The magnitude of change is considered **High** - *Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.*

Visual Effect

The importance of effect would be **High** and would remain so in the Short and Medium and reducing to **Moderate** in the Long Term as the mitigation planting becomes established.

The quality of the effect is considered **Adverse**. This would reduce to Neutral for the majority of receptors as the mitigation planting establishes.

During the Construction Phase the effects would be short-term, localised, **High** and **Adverse**.

Viewpoint 10 – Snipe Hill



Figure 10-29 View from Snipe Hill looking south towards the surrounding farmland with partial views of the proposed development lands.

Existing View

The view is next to two dwellings on a farmstead looking southeast across the surrounding rural landscape. The foreground view includes large fields sloping down towards the houses along Mullanstown Road, which are partially visible in the middle ground. The proposed development's boundary fence line is partially visible within the middle ground to the left of the view (north). Against the background are a series of hills including Mount Oriel together with transmission masts and Collon Windfarm.

Visual Receptor Sensitivity

The view is from a local farmhouse and is therefore of **Medium** sensitivity.

Proposed View- Magnitude of Change

Views of the proposed development from this point will be mostly screened by the topography and existing hill. Some slight views of the proposed development and traffic along the section of the new N52 route will be possible where it starts to enter the large area of cut on the route's northern end and of a short section of the cut itself. Mitigation hedgerow planting will be added to the roadside edges helping to contain the road and establish field boundaries.

The receptors will also experience views of the route as they travel along their lane way, which has been partially altered as part of the proposed development. Mitigation planting will be provided along their short section of altered laneway next to the revised Mullanstown and N52 roads, helping to screen the immediate views of these roads. The receptors elevated location will allow for some extended views of the proposed development within the surrounding landscape providing capacity and context. New mitigation planting across the road corridor will over time reduce its visibility.

The magnitude of change is considered **Medium** - *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

Visual Effect

The importance of effect would be **Moderate** and would remain so in the Short and Medium reducing to **Low** in the Long Term as the mitigation planting becomes established.

The quality of the effect is considered **Adverse**.

During the Construction Phase the effects would be short-term, localised, **Moderate** and **Adverse**.

Viewpoint 11 – Along the N2 road at Glebe



Figure 10-30 View from the N2 road at Glebe looking southeast towards Ardee.

Existing View

View from hard shoulder along the N2 road looking east towards Ardee town. The view is enclosed either side by the embankments and roadside vegetation. The N2 dominates the view as it travels into the distance where there are some distant views to the hills. Roadside vegetation has been cleared at two locations where the proposed new road would meet the N2. Although well landscape the view is of a utilitarian piece of infrastructure with high speed and limited complexity.

Visual Receptor Sensitivity

The view is from a national road with a high speed and is therefore of **Low** sensitivity.

Proposed View - Magnitude of Change

The proposed development will introduce a new roundabout at this point in the N2 road linking the existing and proposed road. Visibility will be limited to only road users as the proposed development will be contained within the immediate landscape by the proposed area of cutting and existing surrounding vegetation and topography. The roundabout will include lighting columns around the road edge, although these will be designed to limit any potential spillage within the local receiving environment. The mitigation planting will merge with the existing landscape along the N2 roadside to help integrate both road corridors.

The magnitude of change is considered **Medium** - *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily*

uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.

Visual Effect

The importance of the effect is **Low - Moderate** and would remain so in the Short, Medium and Long Term.

The quality of the effect is considered **Neutral** as the proposed development is mainly of a similar scale and size to the existing road and the type of development is characteristic of the area.

During the Construction Phase the effects would be short-term, localised, **Moderate** and **Adverse**

Summary of Visual Effects

The Table 10-9 summarises the results of the assessment of the effects of the proposed development on the visual resource.

The proposed development is expected to have a temporary adverse effect on the visual resource during construction. Upon operation and into the future, the development is expected to have a neutral or adverse long term / permanent effect on the visual resource.

Table 10-9 Summary of Visual Effects

VP No.	Location	Sensitivity	Degree of Change	Importance and Qualitatively			
				Construction	Short	Medium	Long
1	Along the N52 road at Mandistown	Medium	Low	Low and Adverse	Low and Neutral		
2	Next to house at Mandistown.	Medium	Medium	High and Adverse	Mod* and Adverse		Low and Adv
3	N52 road at Ballygowan	Medium	Medium	Moderate and Adverse	Moderate and Neutral		
4	Group of Houses by the junction of the N52 and Silver Hill road.	High	Medium to Low	High and Adverse	Mod to High and Adverse		Low to Mod and Adv to Neutral
5	Along the N52 at Bohernamoe near to Ardee.	Medium	There would be no change				
6	Along Silver Hill Road, Townparks	High	High	High and Adverse	High and Adverse		Mod and Adv

VP No.	Location	Sensitivity	Degree of Change	Importance and Qualitatively			
				Construction	Short	Medium	Long
7	Protected View No. 33, Townparks road scenic route.	High	There would be no change				
8	Along scenic route on Townparks road	High	High	High and Adverse	High	Mod and Adverse	
9	Along Mullanstown Road	High	Medium	Moderate and Adverse	High and Adverse	Mod and Adv to Neutral	
10	Snipe Hill	Medium	Medium	Moderate and Adverse	Mod and Adverse	Low and Adv	
11	Along the N2 road at Glebe	Low	Medium	Moderate and Adverse	Low - Moderate and Neutral		

*Mod and Adv = Moderate and Adverse

10.5 Mitigation Measures

Construction Phase

- Construction activity will be carried out in accordance with the Construction Environmental Management Plan (CEMP) to ensure minimal disruption to landscape elements and local residential receptors.
- The extent of the Proposed Development has been confined to the area already fenced off insofar as possible to minimise land take. Small areas of further land take have been identified which are required for construction of the development.
- Any site works occurring near to trees located on lands bordering the site to be carried out in accordance with *BS 5837: 2012 Trees in relation to design, demolition and construction– Recommendations* to ensure these trees are protected from any damage.
- Design and placement of supporting elements e.g. lighting, signage, noise barriers, walls to be considered so to minimise impact on the landscape character and views of receptors.

Operational Phase

- Areas where landscape works are implemented will require monitoring until they become established, with any new planting which dies replaced within the first five years. This is to ensure that the intended screening and softening in appearance of the proposed development is achieved over time.
- Occasional landscape maintenance will be required for the general upkeep of the proposed development's landscaping during its operational phase.

Landscape Design Consideration

A landscape mitigation plan has been developed to help integrate the proposed development into the receiving landscape, see Drawings N52A-ROD-EAC-SW_AE-

DR-EN-300052-300055 in Appendix A for details. The plan's proposed landscape planting measures include:

- Planting of native hedgerows and trees which are reflective of the surrounding landscape to help soften the appearance of the proposed development's roads, embankments and bridges.
- Attenuation pond edges will be softened with the planting of suitable marginal planting
- Planting of heathland and grassland across open ground and roadside verges. Grassland will consist of suitable species rich mixes including wildflowers which are reflective of the surrounding landscape
- All planting to be supportive of the All-Ireland pollinator plan.

Overtime as the planting establishes and grows to create a new landscape context to the road, of hedgerows, trees and new habitats, the visibility of the road pavement and its traffic will reduce. The shrubs and trees will reinstate the landscape structure and patterns typical of the wider environment, enclosing the new road corridor. The mature road corridor landscape will then appear as the existing roads in the landscape, bordered by linear vegetation and becoming integrated over time.

10.6 Residual Impacts

The proposed development will introduce a new permanent linear transport feature (approximately 4.5km long with supporting link roads) into the rural landscape of the Muirhevna Plain LCA and including part of the eastern area of the Ardee Bog pNHA. The route would have some permanent changes to the landscape pattern, but this is kept to a minimum through the required land take and over time as the mitigation planting reinstates and repairs the landscape structure, the road will become integrated in the wider landscape.

A section of the existing N52 running between Silverhill road junction to just beyond Burley Bridge, Mandistown, approximately 1.9km in length, will no longer have through access as it will be severed by the new road. Allowing only access for cyclists, pedestrians and local residents on this section of road and permanently changing the character of this section of former busy national route to that of a minor country road.

The nature of the development will mean the road and traffic along it will remain visible from some of the local receptors identified within the visual assessment. A landscape mitigation plan implemented at construction stage will, over time, help reduce some of the initial predicted effects on the above identified landscape and visual receptors. Screening native and hedgerow vegetation along the route will help in the long term by enclosing the road within the landscape and reducing its visibility and associated traffic along it over time as the planting matures from Year 7 to Year 15 and beyond.

Cumulative Impacts

Cumulative landscape effects can be defined as those which:

'...result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it) or actions that occurred in the past, present or are likely to occur in the foreseeable future' (Landscape Institute and IEMA, 200 quoted in GLVIA 2013).

The potential for cumulative landscape and visual effects to have occurred, e.g. other road schemes or large scale housing/industry across the study area were considered.

Following a review of Louth and Meath County Council's online planning applications search facility there are no known developments which may contribute to cumulative effects. Therefore, no cumulative landscape or visual effects are expected with the proposed development.

10.7 Conclusion

Landscape Effects

The proposed development will introduce a new transport infrastructure feature on the rural/urban fringes of Ardee town and lowlands of the Muirhevna Plain LCA. The new road has been designed to minimize the required landtake. It will travel for a length of approximately 4.5km including short, realigned sections, crossing over 35 no. fields of improved grassland. The majority of the site has already been fenced off as part of a previous development, which has altered the existing pattern of the fields forming part of the proposed development. However, the design supports connectivity points along the route to ensure the neighbouring fields to the road are still accessible to the farmers.

The proposed development will be located along lowlands, between approximately 25m to 36m AOD, which are contained within the immediate area by the surrounding higher lands. The proposed development will alter the site's existing topography with some sections of embankments or cuttings. These topographical variations are relatively low not exceeding more than +4m in height for embankments and - 6m in height for cuttings.

The proposed development will introduce a new infrastructure feature and associated traffic, crossing part of two fields of improved grassland within the Ardee Bog pNHA and AHSQ. This feature would erode the landscape quality of the eastern part of the is designation. The proposed development's layout would result in isolating the fields to the east of the route which fall within the same designation. Nonetheless the road corridor passes through open unspoilt landscape and would have a negative effect on the core conservation values described, specifically:

- The integrity and completeness of the rural landscape character north of the existing N52 is slightly to moderately and negatively affected.
- The integrity and completeness of the protected landscape, habitat and scenic qualities of Ardee Bog is moderately to highly and negatively affected.

The importance of the landscape effects will be **Moderate to High and Adverse**. In the Long Term as the landscape mitigation planting matures it will help to integrate the linear transport feature into the broader landscape of the Muirhevna Plain LCA and reduce the quality of effects upon the LCA to **Neutral**.

Beneficial effects of the proposed development will include reduced traffic flow and congestion around Ardee town's Barret's Lane and Castle Street, where the existing N52 and N2 diverge, allowing potential opportunities to enhance the quality of the public realm within the centre of Ardee town and townscape characteristics of the ACA.

Visual Effects

Visibility of the proposed development is limited to the immediate area by the surrounding topography. Those affected visual receptors will be limited to a small number of individual and clusters of rural residents along with road users. These receptors are all located close to the proposed development either on the existing N52 or local roads which are intersected by the proposed development.

Most of these affected residents will have increased views of traffic travelling along the new road and/or along the realigned connecting roads through the rural landscape of the study area. The extent of these views will typically consist of only a small portion of the overall development and will be further influenced by the presence of vegetation screening, orientation of the affected residence and whether the dwelling is a single or two storey property.

Views of the proposed development from along the Townparks Road Scenic Route will be limited to the immediate area where the new main road intersects the scenic route. However, there will be no views of the proposed development from the protected view located at the end of this scenic route.

Of the four views experiencing High and Adverse effects in their local environment, all four of these will reduce to Moderate and Adverse or Neutral in the Long Term. Similarly, most of the other assessed receptors will likewise experience reduced visual effects over the Long Term down to Low adverse or neutral, as summarised in Table 10.9 above. As the potential visibility of the road structure and moving traffic from these affected receptors by the Long Term becomes notably reduced or fully screened by the proposed hedgerow and woodland mitigation planting. As by Year 15 the planting will have become established and thickened out to provide a strong visual buffer along the edges of the proposed development. The new planting will also help to visually integrate the Proposed Development into the landscape through re-establishing field hedgerows and use of native planting species, similar to those found in the locality, to soften the appearance of the road's engineered form.

Beneficial visual effects of the proposed development will occur where affected receptors experience reduced views of traffic flow levels because of diverting traffic off the existing N52 onto the new bypass route, in particular HGV vehicles. These positive changes will include the views of residential receptors whose properties front onto the downgraded section of the N52 and improvements to the visual amenity within the Ardee ACA.

Summary

Overall, the proposed development will have localised effects on the landscape and visual receptors within the immediate environment. The type of development will result in most of these effects being neutral or adverse in nature. Many of these predicted effects are prevalent within the Short to Medium Term but then reduce in severity by the Long Term as the proposed mitigation planting becomes established. As by this stage the planting is mature helping to alleviate the initial adverse landscape and visual effects of the proposed development by assimilating the new road into its surroundings.

However, beneficial effects will also occur along the existing N52 road (from Burley Bridge towards Ardee town) and around the historic core of Ardee town ACA. As the proposed development will reduce traffic flows and congestion, around these locations and allow for enhancement opportunities to the public realm and townscape character of the Ardee ACA.

10.8 References

The LVIA study has been informed by the following documents:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA). Along with supporting GLVIA3 Statements of Clarification.

- Guidelines on the Information to be Contained in Environmental Impact Statements, 2002, published by the Environmental Protection Agency (and the Revised Guidelines on the Information to be Contained in Environmental Impact Statements, Draft 2017)
- Louth County Development Plan 2015-2021
- Draft Louth County Development Plan 2021-2027
- Meath County Development Plan 2012-2019
- Draft Meath County Development Plan 2020-2026
- Ardee Local Area Plan 2010-2016
- Louth Landscape Character Assessment Dec-2012
- Meath Landscape Character Assessment 2012-2019
- The National Roads Authority Environmental Impact Assessment of National Road Schemes – A Practical Guide.
- The National Roads Authority Guide to Landscape Treatments for National Road Schemes.
- Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Specified Infrastructure Projects - Overarching Technical Document. PE -ENV-01101 December 20
- Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Proposed National Roads – Standard. PE-ENV-01102 December 2020

11. AIR QUALITY AND CLIMATE

11.1 Introduction

This section assesses the likely air quality and climate impacts associated with the proposed N52 Ardee Bypass. The scheme is approximately 4.5 km in length and is located to the west of Ardee town, Co. Louth. A full description of the development is provided in Section 3.

11.2 Methodology

11.2.1 Criteria for Rating of Impacts

Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or “*Air Quality Standards*” are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC, which has set limit values for various pollutants. In terms of this assessment, the limit values for NO₂, PM₁₀ and PM_{2.5} are applicable as these are traffic related pollutants (see Table 11-1).

Dust Deposition Guidelines

The concern from a health perspective is focussed on particles of dust which are less than 10 microns (PM₁₀) and less than 2.5 microns (PM_{2.5}) and the EU ambient air quality standards outlined in Table 11-1 have set ambient air quality limit values for PM₁₀ and PM_{2.5}.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this development.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m²*day) averaged over a one year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Heritage & Local Government (DEHLG, 2004) apply the Bergerhoff limit value of 350 mg/(m²*day) to the site boundary of quarries. This limit value can also be implemented with regard to potential dust impacts from construction of the proposed development.

Table 11-1 Air Quality Standards Regulations

Pollutant	Regulation Note 1	Limit Type	Value
Nitrogen Dioxide (NO ₂)	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m ³
		Annual limit for protection of human health	40 µg/m ³
NO _x	2008/50/EC	Critical level for protection of vegetation	30 µg/m ³ NO + NO ₂
Particulate Matter (as PM ₁₀)	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m ³
		Annual limit for protection of human health	40 µg/m ³
Particulate Matter (as PM _{2.5})	2008/50/EC	Annual limit for protection of human health	25 µg/m ³

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Climate Agreements

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global Greenhouse Gas (GHG) emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013* (the Regulation). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS greenhouse gas emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) was enacted (the Act). The purpose of the Act was to enable Ireland 'to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050' (3.(1) of No. 46 of 2015). This is referred to in the Act as the 'national transition objective'. The Act makes provision for a national mitigation plan, and a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the

function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019a). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second Climate Action Plan in November 2021 (Government of Ireland, 2021a). The plan contains similar elements as the 2019 CAP and aims to set out how Ireland can reduce our greenhouse gas emissions by 51% by 2030 (compared to 2018 levels) which is in line with the EU ambitions, and a longer-term goal of achieving net-zero emissions no later than 2050. The 2021 CAP outlines a 42 – 50% (6 - 7 MtCO₂e) reduction in transport sector emissions by 2030 relative to 2018 levels. This will primarily be achieved through the electrification of the fleet, increased use of biofuels and a modal shift to transport modes with a lower energy consumption (i.e. public and active transport).

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme for the Climate Action (Amendment) Bill 2019 in December 2019 (Government of Ireland 2019b) followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) (hereafter referred to as the 2021 Climate Act) in July 2021 (Government of Ireland, 2021b). The 2021 Climate Act was prepared for the purposes of giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act is to provide for the approval of plans ‘*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050*’. The 2021 Climate Act will also ‘*provide for carbon budgets and a decarbonisation target range for certain sectors of the economy*’. The 2021 Climate Act defines the carbon budget as ‘*the total amount of greenhouse gas emissions that are permitted during the budget period*’. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a ‘*local authority climate action plan*’ lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

Louth County Council's *Climate Change Adaptation Strategy 2019 – 2024* was published by Louth County Council in 2019 and includes the following goals and associated objectives which relate to Infrastructure and Built Environment:

- “Goal 2 Infrastructure and Built Environment - Objective: To work towards the objective for a low carbon society”;
- “Goal 2 Infrastructure and Built Environment – Objective: Integrate climate considerations into the design, planning and construction of all roads, footpaths, bridges, public realm and other construction projects. Make provision to incorporate green infrastructure as a mechanism for carbon offset”;

- “Goal 3 Land-use and development - Objective: To integrate climate action considerations into land-use planning policy and influence positive behaviour.”

11.2.2 Construction Phase Methodology

Air Quality

The current assessment focused on identifying the existing baseline levels of PM₁₀ and PM_{2.5} in the region of the proposed development by an assessment of EPA monitoring data. Thereafter, the impact of the construction phase of the development on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the proposed development in line with Appendix 8 of the TII document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (TII, 2011).

Construction phase traffic also has the potential to impact air quality. The UK Design Manual for Roads and Bridges (DMRB) guidance (UK Highways Agency, 2019a), states that road links meeting one or more of the following criteria can be defined as being ‘affected’ by a proposed development and should be included in the local air quality assessment. The use of the UK guidance is recommended by the TII (2011) in the absence of specific Irish guidance, this approach is considered best practice.

- Annual Average Daily Traffic (AADT) changes by 1,000 or more.
- Heavy duty vehicle (HDV) AADT changes by 200 or more.
- A change in speed band.
- A change in carriageway alignment by 5m or greater.

The construction stage traffic does not meet the above scoping criteria and therefore, has been scoped out from any further assessment as there is no potential for significant effects.

Climate

The impact of the construction phase of the proposed road development on climate has been estimated using the Transport Infrastructure Ireland (TII) Carbon Assessment Tool Version 2.0 (2020). This tool is specifically designed to account for the embodied emissions associated with road developments in Ireland. The assessment commences with the high-level design, through the pre-construction (site clearance) stage, followed by the assessment of the embodied carbon associated with all materials used in the construction of the road, the emissions during the construction phase and additionally emissions related to waste generated during the construction phase. The tool also assesses on-going maintenance associated with the default 60 year lifetime of the road development. For roads, it is generally assumed that end-of-life demolition is not relevant and thus there are no emissions associated with this stage.

The TII Carbon Tool (TII, 2020) uses emission factors from recognized sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013). The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction / maintenance phase. The outputs are expressed in terms of kgCO₂e (kilograms of carbon dioxide equivalent).

Information on the material quantities, site activities, land clearance, waste product and construction traffic were obtained for this assessment. This information was inputted into the carbon calculator to determine an estimate of the GHG emissions

associated with the development. Detailed information regarding the proposed construction materials was not available at the time of this assessment and will be specified at the detailed design stage. Best estimates have been used in this assessment to provide an estimate of the GHGs associated with construction materials.

11.2.3 Operational Phase Methodology

Air Quality

The air quality assessment has been carried out following procedures described in the publications by the EPA (2015; 2017) and using the methodology outlined in the guidance documents published by the UK Highways Agency (2019a) and UK Department of Environment Food and Rural Affairs (DEFRA) (2016; 2018). Transport Infrastructure Ireland (TII) reference the use of the UK Highways Agency and DEFRA guidance and methodology in their document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011). This approach is considered best practice in the absence of Irish guidance.

In 2019 the UK Highways Agency DMRB air quality guidance was revised with *LA 105 Air Quality* replacing a number of key pieces of guidance (HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, part of IAN 185/15). This revised document outlines a number of changes for air quality assessments in relation to road schemes but can be applied to any development that causes a change in traffic. Previously the DMRB air quality spreadsheet was used for the majority of assessments in Ireland with detailed modelling only required if this screening tool indicated compliance issues with the EU air quality standards. Guidance from Transport Infrastructure Ireland (TII, 2011) recommends the use of the UK Highways Agency DMRB spreadsheet tool for assessing the air quality impacts from road schemes. However, the DMRB spreadsheet tool was last revised in 2007 and accounts for modelled years up to 2025. Vehicle emission standards up to Euro V are included but since 2017, Euro 6d standards are applicable for the new fleet. In addition, the model does not account for electric or hybrid vehicle use. Therefore, this is a somewhat outdated assessment tool. The LA 105 guidance document states that the DMRB spreadsheet tool may still be used for simple air quality assessments where there is unlikely to be a breach of the air quality standards. Due to its use of a “dirtier” fleet, vehicle emissions would be considered to be higher than more modern models and therefore any results will be conservative in nature and will provide a worst-case assessment.

The 2019 UK Highways Agency DMRB air quality revised guidance *LA 105 Air Quality* states that modelling should be conducted for NO₂ for the base, opening and design years for both the do minimum (do nothing) and do something scenarios. Modelling of PM₁₀ is only required for the base year to demonstrate that the air quality limit values in relation to PM₁₀ are not breached. Where the air quality modelling indicates exceedances of the PM₁₀ air quality limits in the base year then PM₁₀ should be included in the air quality model in the do minimum and do something scenarios. Modelling of PM_{2.5} is not required as there are currently no issues with compliance with regard to this pollutant. The modelling of PM₁₀ can be used to show that the project does not impact on the PM_{2.5} limit value as if compliance with the PM₁₀ limit is achieved then compliance with the PM_{2.5} limit will also be achieved. Historically modelling of carbon monoxide (CO) and benzene was required however, this is no longer needed as concentrations of these pollutants have been monitored to be significantly below their air quality limit values in recent years, even in urban centres (EPA, 2020b). The key pollutant reviewed in this assessment is NO₂. Concentrations of PM₁₀ have been modelled for the base year to indicate that there are no potential compliance issues.

Modelling of operational NO₂ concentrations has been conducted for the do nothing and do something scenarios for the opening year (2023) and design year (2038).

The UK Highways Agency guidance *LA 150* (2019) scoping criteria outlined above under the construction phase methodology was used to determine the road links required for inclusion in the modelling assessment. The TII guidance (2011) states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc).

Sensitive receptors within 200m of impacted road links are included within the modelling assessment. Pollutant concentrations are calculated at these sensitive receptor locations to determine the effect of the proposed development in terms of air quality. The guidance states a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling (UK Highways Agency, 2019a). The TII guidance (2011) defines sensitive receptor locations as: residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present. A total of ten high sensitivity residential receptors (R1 – R10) were included in the modelling assessment and are detailed in Figure 11-1.

The following model inputs are required to complete the assessment using the DMRB spreadsheet tool: road layouts, receptor locations, annual average daily traffic movements (AADT), percentage heavy goods vehicles (%HGV), annual average traffic speeds and background concentrations. Using this input data, the model predicts the road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB Volume 11 Section 3 Part 1 – HA 207/07 Annexes B3 and B4. These worst-case road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed development with these ambient air quality standards.

The TII document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011) details a methodology for determining air quality impact significance criteria for road schemes. The degree of impact is determined based on both the absolute and relative impact of the proposed development. The TII significance criteria have been used for the proposed development and are detailed in Table 11-2 and Table 11-3. The significance criteria are based on NO₂ and PM₁₀ as these pollutants are most likely to exceed the annual mean limit values (40 µg/m³).

Table 11-2 Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

Magnitude of Change	Annual Mean NO ₂ / PM ₁₀	No. days with PM ₁₀ concentration > 50 µg/m ³	Annual Mean PM _{2.5}
Large	Increase / decrease ≥4 µg/m ³	Increase / decrease >4 days	Increase / decrease ≥2.5 µg/m ³

Magnitude of Change	Annual Mean NO ₂ / PM ₁₀	No. days with PM ₁₀ concentration > 50 µg/m ³	Annual Mean PM _{2.5}
Medium	Increase / decrease 2 - <4 µg/m ³	Increase / decrease 3 or 4 days	Increase / decrease 1.25 - <2.5 µg/m ³
Small	Increase / decrease 0.4 - <2 µg/m ³	Increase / decrease 1 or 2 days	Increase / decrease 0.25 - <1.25 µg/m ³
Imperceptible	Increase / decrease <0.4 µg/m ³	Increase / decrease <1 day	Increase / decrease <0.25 µg/m ³

Table 11-3 Air Quality Impact Significance Criteria For Annual Mean NO₂ and PM₁₀ and PM_{2.5} Concentrations at a Receptor

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration ^{Note 1}		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value With Scheme (≥40 µg/m ³ of NO ₂ or PM ₁₀) (≥25 µg/m ³ of PM _{2.5})	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (36 - <40 µg/m ³ of NO ₂ or PM ₁₀) (22.5 - <25 µg/m ³ of PM _{2.5})	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (30 - <36 µg/m ³ of NO ₂ or PM ₁₀) (18.75 - <22.5 µg/m ³ of PM _{2.5})	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<30 µg/m ³ of NO ₂ or PM ₁₀) (<18.75 µg/m ³ of PM _{2.5})	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value With Scheme (≥40 µg/m ³ of NO ₂ or PM ₁₀) (≥25 µg/m ³ of PM _{2.5})	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value With Scheme (36 - <40 µg/m ³ of NO ₂ or PM ₁₀) (22.5 - <25 µg/m ³ of PM _{2.5})	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value With Scheme (30 - <36 µg/m ³ of NO ₂ or PM ₁₀) (18.75 - <22.5 µg/m ³ of PM _{2.5})	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value With Scheme (<30 µg/m ³ of NO ₂ or PM ₁₀) (<18.75 µg/m ³ of PM _{2.5})	Negligible	Negligible	Slight Beneficial

Note 1 Well Below Standard = <75% of limit value.



Figure 11-1 Location of Sensitive Receptors used in Local Air Quality Modelling Assessment

Conversion of NO_x to NO₂

NO_x (NO + NO₂) is emitted by vehicles exhausts. The majority of emissions are in the form of NO, however, with greater diesel vehicles and some regenerative particle traps on HGVs the proportion of NO_x emitted as NO₂, rather than NO is increasing. With the correct conditions (presence of sunlight and O₃) emissions in the form of NO, have the potential to be converted to NO₂.

Transport Infrastructure Ireland states the recommended method for the conversion of NO_x to NO₂ in “*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*” (2011). The TII guidelines recommend the use of DEFRA’s NO_x to NO₂ calculator (2020) which was originally published in 2009 and is currently on version 8.1. This calculator (which can be downloaded in the form of an excel spreadsheet) accounts for the predicted availability of O₃ and proportion of NO_x emitted as NO for each local authority across the UK. O₃ is a regional pollutant and therefore concentrations do not vary in the same way as concentrations of NO₂ or PM₁₀.

The calculator includes Local Authorities in Northern Ireland and the TII guidance recommends the use of ‘Armagh, Banbridge and Craigavon’ as the choice for local authority when using the calculator. The choice of Craigavon provides the most suitable relationship between NO₂ and NO_x for Ireland. The “All Non-Urban UK Traffic” traffic mix option was used.

Update to NO₂ Projections using DMRB

In 2011 the UK DEFRA published research (Highways England, 2013) on the long term trends in NO₂ and NO_x for roadside monitoring sites in the UK. This study marked a decrease in NO₂ concentrations between 1996 and 2002, after which the

concentrations stabilised with little reduction between 2004 and 2010. The result of this is that there now exists a gap between projected NO₂ concentrations which UK DEFRA previously published and monitored concentrations. The effect of this 'gap' is that the DMRB screening model can under-predict NO₂ concentrations for predicted future years. Subsequently, the UK Highways Agency published an Interim advice note (IAN 170/12) in order to correct the DMRB results for future years. This methodology has been used in the current assessment to predict future concentrations of NO₂ as a result of the proposed scheme.

Traffic Data used in Modelling Assessment

Traffic flow information was obtained from Roughan & O'Donovan on 15 March 2021 for the purposes of this assessment. Data for the base year 2018 and Do Nothing and Do Something scenarios for the opening year 2023 and design year 2038 were provided (see Section 5 – Traffic and Transport for further details). The traffic data used in the assessment is detailed in Appendix C. Only road links that met the DMRB scoping criteria and that were within 200m of chosen receptors were included in the air quality modelling assessment. Background concentrations have been included as per Section 4.9.3 of this chapter based on available EPA background monitoring data (EPA, 2020a). This traffic data has also been used in the operational stage climate impact assessment and ecological assessment.

Air Quality Impact on Sensitive Ecosystems

For routes that pass within 2km of a designated area of conservation (either Irish or European designation) the TII requires consultation with an ecologist (TII, 2011). However, in practice the potential for impact to an ecological site is highest within 200m of the proposed scheme and when significant changes in AADT (more than 5%) occur. Only sites that are sensitive to nitrogen deposition should be included in the assessment. In addition, the UK Highways Agency (2019a) states that a detailed assessment does not need to be conducted for areas that have been designated for geological features or watercourses.

Transport Infrastructure Ireland's *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009) and *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas. If both of the following assessment criteria are met, an assessment of the potential for impact due to nitrogen deposition should be conducted: -

- A designated area of conservation is located within 200m of the proposed development.
- A significant change in AADT flows (more than 5%) will occur.

The proposed alignment will pass directly through a section of the Ardee Cutaway Bog Proposed Natural Heritage Area (pNHA) (site code 001454). Therefore, an assessment of the impact with regards to nitrogen deposition was conducted for the pNHA. Dispersion modelling and prediction was carried out at typical traffic speeds at this location. Ambient NO_x concentrations were predicted for the opening year of 2023 along a transect of up to 200m within the pNHA in line with the UK Highways Agency (2019a) and TII (2011) guidance. The road contribution to dry deposition along the transect was also calculated using the methodology outlined in Appendix 9 of the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011).

Climate

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments *LA 114 Climate* (UK Highways Agency 2019b). The following scoping criteria are used to determine whether a detailed climate assessment is required for a proposed project during the operational stage. If any of the road links impacted by the proposed development meet or exceed the below criteria, then further assessment is required.

- A change of more than 10% in AADT.
- A change of more than 10% to the number of heavy-duty vehicles.
- A change in daily average speed of more than 20km/hr.

There are a number of road links that will experience a change of 10% or more in AADT. These road links have been included in the detailed climate assessment (see Appendix C).

The impact of the proposed development at a national and international level has been determined using the procedures given by Transport Infrastructure Ireland (2011) and the methodology provided in Annex D in the UK Design Manual for Roads and Bridges (UK Highways Agency, 2007). The assessment focused on determining the resulting change in emissions of carbon dioxide (CO₂). The Annex provides a method for the prediction of the regional impact of emissions of these pollutants from road schemes. The inputs to the air dispersion model consist of information on road link lengths, AADT movements and annual average traffic speeds (see Appendix C).

11.3 Receiving Environment

11.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM₁₀, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than PM_{2.5}) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles (PM_{2.5} - PM₁₀) will actually increase at higher wind speeds. Thus, measured levels of PM₁₀ will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport, which is located approximately 52km south of the site. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 11-2). For data collated during five representative years (2016 - 2020), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.5m/s over the period 1981 - 2010 (Met Eireann, 2021). In addition, a review of historical 30 year average data for Dublin Airport indicates that on average 191 days per year have rainfall over 0.2 mm (Met Eireann, 2021).

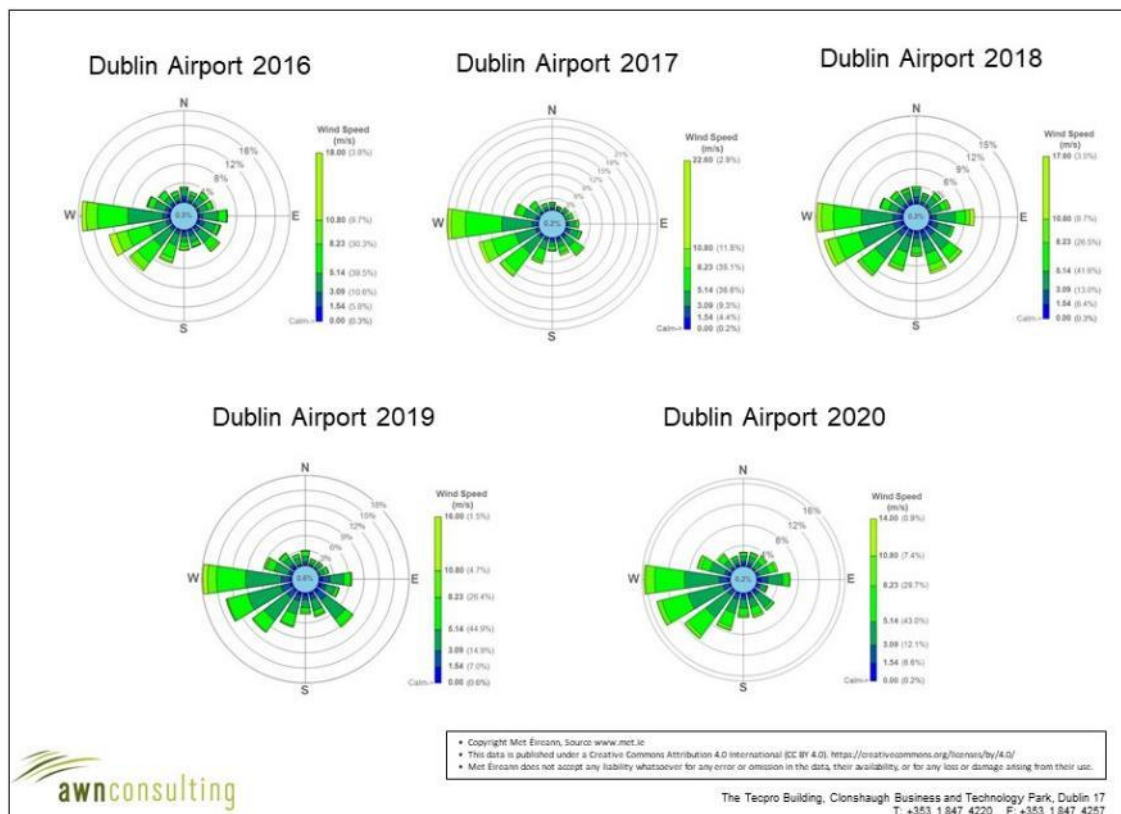


Figure 11-2 Dublin Airport Windrose 2016 – 2020

11.3.2 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is “*Air Quality in Ireland 2019*” (EPA, 2020a). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2021a). The TII guidance (2011) suggests the use of publicly available monitoring data where possible in the absence of on-site monitoring data. The data from the EPA provides long-term background data for the region of the site and is considered an appropriate source of background data for the purposes of this assessment.

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2020a). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the proposed scheme is within Zone D (EPA, 2020a). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed scheme. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

NO₂ monitoring was carried out at two rural Zone D locations in Emo and Kilkitt in recent years, and at an urban location, Castlebar (EPA, 2020a). The NO₂ annual average in 2019 was 4µg/m³ and 5µg/m³ for Emo and Kilkitt respectively while Castlebar had an annual average of 8µg/m³ (see Table 11-4). Long-term average

concentrations measured at all locations were significantly lower than the annual average limit value of $40\mu\text{g}/\text{m}^3$. The maximum 1-hour limit value of $200\mu\text{g}/\text{m}^3$ (measured as a 99.8th percentile; i.e. 18 exceedances allowed per year) was not exceeded in any year for any of the Zone D locations. The average results at the Zone D locations over the last five years suggests an average of $8\mu\text{g}/\text{m}^3$ as a background concentration. Based on the above information, a conservative estimate of the current background NO_2 concentration for the location of the proposed scheme is $9\mu\text{g}/\text{m}^3$.

Long term NO_x monitoring has been carried out at a number of Zone D locations in recent years: Castlebar, Kilkitt and Emo. Annual mean concentrations of NO_x at the monitoring sites over the period 2015 – 2019 ranged from $2\mu\text{g}/\text{m}^3$ for a purely rural area to $13\mu\text{g}/\text{m}^3$ for an urbanised area. These results suggest an upper average over the five year period of no more than $11\mu\text{g}/\text{m}^3$ as a background concentration. An estimate of the current background NO_x concentration in the region of the proposed scheme is $11\mu\text{g}/\text{m}^3$.

Table 11-4 Trends in Zone D Air Quality – Nitrogen Dioxide (NO_2)

Station	Averaging Period	Year				
		2015	2016	2017	2018	2019
Castlebar	Annual Mean NO_2 ($\mu\text{g}/\text{m}^3$)	8	9	7	8	8
	99.8 th %ile 1-hr NO_2 ($\mu\text{g}/\text{m}^3$)	-	66	60	60	59
Kilkitt	Annual Mean NO_2 ($\mu\text{g}/\text{m}^3$)	2	3	2	3	5
	99.8 th %ile 1-hr NO_2 ($\mu\text{g}/\text{m}^3$)	-	26	17	22	42
Emo	Annual Mean NO_2 ($\mu\text{g}/\text{m}^3$)	3	4	3	3	4
	99.8 th %ile 1-hr NO_2 ($\mu\text{g}/\text{m}^3$)	-	36	28	42	28

Long-term PM_{10} measurements carried out at the rural Zone D location in Kilkitt in 2019 gave an average level of $7\mu\text{g}/\text{m}^3$ (EPA, 2020a). Results are also available for Kilkitt to observe the trend in concentrations over the last five years. The average result at Kilkitt over the last five years is $8\mu\text{g}/\text{m}^3$. Concentrations at the urban locations of Castlebar and Claremorris ranged from $10 - 16\mu\text{g}/\text{m}^3$ over the period 2015 – 2019 (see Table 11-5). Long term average concentrations at the Zone D locations were significantly below the annual limit value of $40\mu\text{g}/\text{m}^3$ and the 24-hour limit value of $50\mu\text{g}/\text{m}^3$ (measured as a 90.4th percentile, i.e. 35 exceedances are allowed per year). Based on the above information, a conservative estimate of the current background PM_{10} concentration for the location of the proposed scheme is $10\mu\text{g}/\text{m}^3$.

Table 11-5 Trends in Zone D Air Quality – PM_{10}

Station	Averaging Period	Year				
		2015	2016	2017	2018	2019
Castlebar	Annual Mean PM_{10} ($\mu\text{g}/\text{m}^3$)	13	12	11	11	16
	90 th %ile 24-hr PM_{10} ($\mu\text{g}/\text{m}^3$)	22	20	19	20	24
Kilkitt	Annual Mean PM_{10} ($\mu\text{g}/\text{m}^3$)	9	8	8	9	7
	90 th %ile 24-hr PM_{10} ($\mu\text{g}/\text{m}^3$)	18	15	14	15	13
Claremorris	Annual Mean PM_{10} ($\mu\text{g}/\text{m}^3$)	10	10	11	12	11
	90 th %ile 24-hr PM_{10} ($\mu\text{g}/\text{m}^3$)	17	17	17	20	20

Average PM_{2.5} levels in Claremorris over the period 2015 to 2019 ranged from 4 – 6µg/m³, with a PM_{2.5}/PM₁₀ ratio ranging from 0.36 to 0.60 (EPA, 2020a). Based on this information, a conservative ratio of 0.65 was used to generate an existing PM_{2.5} concentration in the region of the scheme of 6.5µg/m³.

Background concentrations for the Opening Year 2023 and Design Year of 2038 have been calculated for the local air quality assessment. These have used current estimated background concentrations and the year on year reduction factors provided by Transport Infrastructure Ireland in the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011) and the UK Department for Environment, Food and Rural Affairs LAQM.TG(16) (2018).

11.3.3 Climate Baseline

Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details final emissions up to 2019 (EPA, 2021b). The data published in 2021 states that Ireland has exceeded its 2019 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by an estimated 6.85 Mt. For 2019, total national greenhouse gas emissions are 59.78 million tonnes carbon dioxide equivalent (Mt CO₂eq) with 45.58 MtCO₂eq of emissions associated with the ESD sectors for which compliance with the EU targets must be met. Agriculture is the largest contributor in 2019 at 35.3% of the total, with the transport sector accounting for 20.3% of emissions of CO₂.

GHG emissions for 2019 are 4.4% lower than those recorded in 2018. Emission reductions have been recorded in 6 of the last 10 years. However, compliance with the annual EU targets has not been met for four years in a row. Emissions from 2016 – 2019 exceeded the annual EU targets by 0.29 MtCO₂eq, 2.94 MtCO₂eq, 5.57 MtCO₂eq and 6.85 MtCO₂eq respectively. Agriculture is consistently the largest contributor to emissions with emissions from the transport and energy sectors being the second and third largest contributors respectively in recent years.

The EPA 2020 GHG Emissions Projections Report for 2020 – 2040 (EPA, 2021c) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018 and the Climate Action Plan published in 2019. Implementation of these are classed as a “*With Additional Measures scenario*” for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2013 to 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 12.2MtCO₂eq under the “*With Existing Measures*” scenario and under the “*With Additional Measures*” scenario (EPA, 2021c). The projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 – 2030 assuming full implementation of the 2019 Climate Action Plan and the use of the flexibilities available.

11.4 Predicted Impacts

11.4.1 Construction Phase

Air Quality

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 and PM₁₀/PM_{2.5} emissions. Due to the size and nature of the scheme it can be categorised as moderate, indicating that there are potential dust soiling effects within 50m of the works areas (Table 11-6). While construction dust tends to be deposited within 350m of a construction site, the majority of the deposition occurs within the first 50m. There are a number of sensitive receptors, predominantly residential properties within 50m of sections of the proposed scheme. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared (see Section 11.5. In the absence of mitigation, there is the potential for short-term, localised, negative, slight impacts to air quality as a result of dust emissions.

Table 11-6 Assessment Criteria for the Impact of Dust from Construction, with Standard Mitigation in Place

Source		Potential Distance for Significant Effects (Distance From Source)		
Scale	Description	Soiling	PM ₁₀	Vegetation Effects
Major	Large construction sites, with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

Source: TII Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (2011)

Climate

The construction phase of the proposed scheme will result in a number of GHG emissions from various sources. Embodied carbon is carbon dioxide emitted during the manufacture, transport and construction of building materials, together with site activities. As part of the proposed road development, construction stage embodied GHG emissions have been calculated under the following headings within the TII Carbon Calculator v2 (2020):

- Pre-Construction
- Embodied Carbon of Materials
- Construction Activities
- Construction Waste

Transport GHG emissions associated with delivery of materials to site and removal of waste materials off site were also included in the calculator. It was assumed that facilities within a 25km radius of the site would be used for the majority of materials as exact suppliers are not known at this stage in the project. Waste materials were assumed to be transported to licenced facilities within a 50km radius of the site for the purposes of this assessment. These distances were used in the calculator to account for material travel related emissions.

It is estimated there will be a total of 146,545m³ of excavated material as part of the proposed development. Site-won materials will be used as much as possible to reduce the requirement for import of fill materials. Approximately 245,760m³ of fill material will

be required for the proposed scheme. 88,840m³ of aggregates will be required and 1,316m³ of concrete.

Land clearance works will also be required for the new alignment. As part of this work approximately 4,500m³ of peat will be excavated within the Ardee Cutaway Bog pNHA which the proposed alignment directly passes through. Peat has the ability to sequester carbon and therefore its removal will result in carbon emissions and a reduced carbon sequestration capacity. This carbon is included within the 'Construction Activities' category below.

Table 11-7 details the embodied carbon emissions associated with each category. The embodied carbon associated with construction materials is the largest contributor to GHG emissions during the construction phase at 76% of the total.

Emissions have been compared against the total national GHG emissions in Ireland for 2019 (59,777,640 tonnes CO₂eq) (more recent finalised figures are not yet available) and against Ireland's EU 2030 target of 33.3 Mtonnes CO₂eq (set out under *Commission Implementing Decision (EU) 2020/2126 of 16 December 2020 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030 pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council*).

The proposed road development will result in total construction phase emissions of 4,264 tonnes CO₂e over the full construction period, this amounts to 0.0071% of Ireland's national GHG emissions in 2019 or 0.0128% of Ireland's 2030 target. If the total emissions are averaged over the full construction phase (21 months) then annually emissions are 0.0036% of Ireland's 2019 GHG emissions or 0.0064% of Ireland's 2030 target. A number of carbon saving opportunities have been incorporated into the development where possible. These include using site-won material where possible to reduce embodied emissions associated with additional imported material and using GGBS in concrete.

The predicted effect on climate during the construction phase is short-term, negative but overall, not significant.

Table 11-7 Construction Stage Greenhouse Gas Emissions

Activity	Tonnes CO ₂ e / Total
Pre-Construction	12
Embodied Carbon	3,238
Construction Activities	438
Construction Waste	576
Total Construction Phase Emissions	4,264
Total Construction Phase Emissions (per year, assuming 21 month construction phase)	2,132
Total Emissions as % of Irelands Total GHG emissions (2019 actual)	0.0071%
Total Emissions as % of Irelands 2030 GHG emission target	0.0128%

11.4.2 Operational Phase

Air Quality

The impact of the proposed road development has been assessed by modelling emissions from the traffic generated as a result of the development. The impact of NO₂ emissions for the opening and design years was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined.

Transport Infrastructure Ireland's document '*Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes*' (2011) detail a methodology for determining air quality impact significance criteria for road schemes, the degree of impact is determined based on both the absolute and relative impact of the proposed scheme. Results are compared against the 'Do-Nothing' scenario, which assumes that the proposed development is not in place in future years, in order to determine the degree of impact. Impacts were assessed at 10 no. worst-case sensitive receptors, residential properties (R1 – R10), within 200m of the proposed scheme and road links impacted by the proposed scheme as well as within Ardee town to illustrate the beneficial impact of the scheme (see Figure 11-1).

The results of the assessment of the impact of the proposed development on NO₂ in the opening year 2023 are shown in Table 11-8 and for design year 2038 are shown in Table 11-9. The annual average concentration is in compliance with the limit value at all worst-case receptors in 2023 and 2038. Concentrations of NO₂ are at most 30% of the annual limit value in 2023 and 33% of the annual limit in 2038. In addition, the hourly limit value for NO₂ is 200µg/m³ and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO₂ concentration is not predicted to be exceeded in any modelled year (Table 11-10).

The impact of the proposed development on annual mean NO₂ concentrations can be assessed relative to "Do Nothing (DN)" levels. Relative to baseline levels, there are predicted to be some imperceptible to small increases and imperceptible to large decreases in NO₂ concentrations at the worst-case receptors assessed. Concentrations will increase by at most 4.6% of the annual NO₂ limit value in 2038 at receptor R1. While at receptor R6 concentrations will decrease by at most 12.8% in 2038. Using the assessment criteria outlined in Table 11-2 and Table 11-3 the impact of the proposed development in terms of NO₂ is considered negligible at the majority of receptors assessed. However, there is a slight beneficial impact at receptors R5, R6 and R10. Therefore, the overall impact of NO₂ concentrations as a result of the proposed scheme is long-term, negative and imperceptible at some receptors with other receptors experiencing long-term, positive impacts ranging from imperceptible to slight.

Concentrations of PM₁₀ were modelled for the baseline year of 2018. The modelling showed that concentrations were in compliance with the annual limit value of 40 µg/m³ at all receptors assessed, therefore, further modelling for the opening and design years was not required. Concentrations reached at most 1.35 µg/m³. When a background concentration of 10 µg/m³ is included the overall impact is 29% of the annual limit value at the worst case receptor.

The effect of the proposed development on ambient air quality in the operational stage is considered long-term, localised, slight and positive.

Table 11-8 Predicted Annual Mean NO₂ Concentrations – Opening Year 2023 (µg/m³)

Receptor	Opening Year 2023				
	DN	DS	DS-DN	Magnitude	Description
R1	10.0	11.6	1.64	Small Increase	Negligible
R2	11.6	12.0	0.39	Imperceptible Increase	Negligible
R3	10.0	10.5	0.48	Small Increase	Negligible
R4	11.1	10.7	-0.36	Imperceptible Decrease	Negligible
R5	12.7	10.1	-2.55	Medium Decrease	Negligible
R6	12.9	10.3	-2.64	Medium Decrease	Negligible
R7	15.1	13.2	-1.89	Small Decrease	Negligible
R8	17.5	15.0	-2.51	Medium Decrease	Negligible
R9	12.9	11.4	-1.49	Small Decrease	Negligible
R10	12.0	9.6	-2.42	Medium Decrease	Negligible

Table 11-9 Predicted Annual Mean NO₂ Concentrations – Design Year 2038 (µg/m³)

Receptor	Design Year 2038				
	DN	DS	DS-DN	Magnitude	Description
R1	9.4	11.3	1.86	Small Increase	Negligible
R2	12.4	13.1	0.72	Small Increase	Negligible
R3	9.4	10.2	0.74	Small Increase	Negligible
R4	11.1	10.6	-0.49	Small Decrease	Negligible
R5	14.3	9.3	-4.97	Large Decrease	Slight Beneficial
R6	14.5	9.4	-5.12	Large Decrease	Slight Beneficial
R7	16.6	13.8	-2.74	Medium Decrease	Negligible
R8	19.5	16.1	-3.42	Medium Decrease	Negligible
R9	14.3	11.5	-2.74	Medium Decrease	Negligible
R10	13.2	8.6	-4.59	Large Decrease	Slight Beneficial

Table 11-10 Predicted 99.8th percentile of Daily Maximum 1-hour NO₂ Concentrations (µg/m³)

Receptor	Opening Year 2023		Design Year 2038	
	DN	DS	DN	DS
R1	35	41	33	40
R2	41	42	44	46
R3	35	37	33	36
R4	39	38	39	37
R5	44	35	50	33

Receptor	Opening Year 2023		Design Year 2038	
	DN	DS	DN	DS
R6	45	36	51	33
R7	53	46	58	49
R8	61	53	68	56
R9	45	40	50	40
R10	42	34	46	30

Air Quality Impact on Sensitive Ecosystems

The proposed scheme passes through a section of the Ardee Cutaway Bog pNHA (site code 001454). The pNHA is currently adjacent to Silverhill Road and Townparks Road. Modelling has been conducted at the worst-case location in closest proximity to the proposed scheme.

The NO_x emissions resulting from traffic associated with the current road network and proposed scheme have been calculated and are detailed in Table 11-11. Ambient NO_x concentrations have been predicted for the opening year of 2023 as per the UK Highways Agency (2019a) and TII (2011) guidance. Concentrations are predicted along a transect of up to 200m within the pNHA.

The road contribution to NO₂ dry deposition along the transect is also given and was calculated using the methodology of TII (2011).

The predicted annual average NO_x concentration within the pNHA is in compliance with the limit value of 30µg/m³ for the “Do Something” scenario with the proposed scheme in place. Concentrations are at most 55% of the annual limit value, including a background concentration of 11µg/m³, for the protection of vegetation with the proposed development in place. The proposed development is predicted to increase NO_x concentrations by at most 5.05µg/m³.

Appendix 9 of the TII guidelines (2011) state that where the scheme is expected to cause an increase of more than 2µg/m³ and the predicted concentrations (including background) are close to, or exceed the standard, then the sensitivity of the habitat to NO_x should be assessed by the project ecologist. While the NO_x concentration will increase by 5.05µg/m³, which is greater than the 2µg/m³ threshold, concentrations are not predicted to be in exceedance of the limit value reaching only 55% of the limit. Therefore, the change in NO_x concentration is not predicted to be significant and does not need to be assessed by an ecologist.

The contribution to the NO₂ dry deposition rate along the 200m transect within the pNHA is also detailed in Table 11-11. The change in the maximum NO₂ dry deposition rate is 0.28 Kg(N)/ha/yr. This is well below the critical load for raised and blanket bog habitats of 5 - 10 Kg(N)/ha/yr (TII, 2011).

Overall, the air quality effect on the Ardee Cutaway Bog pNHA is considered negative, long-term and imperceptible.

Table 11-11 Assessment of NO_x Concentrations and NO₂ Dry Deposition Impact on the Ardee Cutaway Bog pNHA

Distance to Road (m)	NO _x Concentration (µg/m ³) ^{Note 1}			NO ₂ Dry Deposition Rate Impact
	Do Nothing	Do Something	Change in NO _x Concentration	Kg N ha ⁻¹ yr ⁻¹
0	11.34	16.39	5.05	0.280
10	11.27	15.83	4.56	0.253
20	11.20	14.65	3.45	0.192
30	11.16	13.81	2.65	0.147
40	11.12	13.19	2.06	0.115
50	11.10	12.72	1.62	0.091
60	11.08	12.35	1.28	0.072
70	11.06	12.07	1.01	0.057
80	11.05	11.84	0.79	0.044
90	11.04	11.66	0.62	0.035
100	11.03	11.51	0.48	0.027
110	11.02	11.40	0.38	0.021
120	11.02	11.31	0.29	0.016
130	11.01	11.25	0.23	0.013
140	11.01	11.20	0.19	0.010
150	11.01	11.17	0.16	0.008
160	11.01	11.15	0.14	0.008
170	11.01	11.14	0.14	0.008
180	11.01	11.12	0.11	0.007
190	11.01	11.10	0.09	0.005
200	11.00	11.07	0.07	0.004

Note 1 Based on a background NO_x concentration of 11 µg/m³ in 2023

Climate

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. A detailed Flood Risk Assessment has been undertaken as part of this planning application and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. Therefore, the effect will be imperceptible, localised, neutral and long-term.

There is the potential for a number of greenhouse gas emissions to the atmosphere during the operational phase of the development. The predicted concentrations of CO₂ for the future years of 2023 and 2038 are detailed in Table 11-12. This includes traffic associated with the proposed development and the residual traffic on the surrounding road network. The CO₂ emissions are significantly less than the 2030 target set out under EU legislation. It is predicted that in 2023 the proposed development will

increase CO₂ emissions by 0.00094% of the EU 2030 target. In 2038 CO₂ emissions will increase by 0.00013% of the 2030 target. Therefore, the climate effect of the proposed development is considered negative, long-term and imperceptible.

Table 11-12 Climate Impact Assessment

Year	Scenario	CO ₂
		(tonnes/annum)
2023	Do Nothing	3,781
	Do Something	4,090
2038	Do Nothing	5,657
	Do Something	5,701
Increment in 2023		309.2 Tonnes
Increment in 2038		44.3 Tonnes
Emission Ceiling (kilo Tonnes) 2030		33,381 ^{Note 1}
Impact in 2023 (%)		0.00093 %
Impact in 2038 (%)		0.00013 %

^{Note 1} Target under *Commission Implementing Decision (EU) 2020/2126* of 16 December 2020 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030 pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council

11.5 Mitigation Measures

11.5.1 Construction Phase

Air Quality

The greatest potential impact on air quality during the construction phase is from construction dust emissions and the potential for nuisance dust.

In order to minimise dust emissions during construction, a series of mitigation measures have been prepared. These follow recommendations and guidance contained in the Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction*' (IAQM, 2014). Provided the dust minimisation measures outlined below are adhered to, the air quality impacts during the construction phase will not be significant. The measures which will be implemented will include:

- Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust shall be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using site roads shall have their speed restricted, and this speed restriction shall be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Vehicles delivering material with dust potential (soil, aggregates) shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust.

- Before entrance onto public roads, trucks shall be adequately inspected to ensure no potential for dust emissions.
- Public roads outside the site shall be regularly inspected for cleanliness and cleaned, as necessary.
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.
- Access gates to site shall be located at least 10m from sensitive receptors where possible.
- Vehicles shall have engines switched off when stationary – no idling. Similarly, the use of diesel or petrol powered generators shall be avoided, and electricity or battery powered equipment shall be used when practical.

At all times, these procedures will be strictly monitored and assessed by the site contractor. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust shall be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations. The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board shall also include head/regional office contact details. Community engagement before works commence on site shall be put in place, including a communications plan. All dust and air quality complaints shall be recorded and causes identified, along with the measures taken to reduce emissions.

Climate

The embodied energy of construction materials is predicted to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Good practice to ensure emissions are reduced where possible is the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

11.5.2 Operational Phase

Air Quality

The operational phase air quality impact is considered imperceptible to slight positive and therefore no site specific mitigation measures are required. In general mitigation measures in relation to traffic-derived pollutants have focused generally on improvements in both engine technology and fuel quality. EU legislation, based on the EU sponsored Auto-Oil programmes, has imposed stringent emission standards for key pollutants (Regulation (EC) No 715/2007) for passenger cars which was complied with in 2009 (Euro V) and 2014 (Euro VI). Current emission standards which took effect in 2017 are Euro 6c and Euro 6d_{temp}.

Emissions of pollutants from road traffic can be controlled most effectively by either diverting traffic away from heavily congested areas or ensuring free flowing traffic through good traffic management plans and the use of automatic traffic control systems (UK DEFRA, 2016; 2018).

The Climate Action Plan 2019 (Government of Ireland, 2019) has outlined a number of actions to reduce the use of petrol/diesel vehicles and promote the uptake of electric vehicles in order to achieve the target of 840,000 electric vehicles on the road by 2030. The measures proposed include changes to Vehicle Registration Tax (VRT) and motor

tax to allow for this to be calculated based on CO₂eq, therefore higher emitting vehicles will pay increased tax rates, thus incentivising the purchase of lower emitting vehicles. VRT relief and Benefit in Kind exemptions as well as a vehicle scrappage scheme are among other measures proposed. In addition, as part of Budget 2020, a NO_x emissions levy to all passenger cars was introduced from January 2020. The levy will be charged on a NO_x mg per kilometre basis. Overall, these measures will reduce pollutant levels in future years thus improving air quality.

Climate

The operational phase climate impacts are considered imperceptible and therefore no site specific mitigation measures are required. In general, improvements in climate are likely over the next few years as a result of the on-going comprehensive vehicle inspection and maintenance program, fiscal measures to encourage the use of alternatively fuelled vehicles and the introduction of cleaner fuels.

Ireland has developed strategies for implementing the Paris Agreement which aims to limit global temperature rise to below 2°C above pre-industrial levels. The first 'Climate Action Plan' (CAP) was published by the Irish Government in June 2019 and outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second Climate Action Plan in November 2021 (Government of Ireland, 2021a). The plan contains similar elements as the 2019 CAP and aims to set out how Ireland can reduce our greenhouse gas emissions by 51% by 2030 (compared to 2018 levels) which is in line with the EU ambitions, and a longer-term goal of achieving net-zero emissions no later than 2050. The 2021 CAP outlines a 42 – 50% reduction in transport sector emissions by 2030 relative to 2018 levels, stating emissions need to reach no more than 6 - 7 MtCO₂e by 2030.

The 2021 CAP outlines a range of targets for achieving the required reduction in transport sector emissions including:

- Increasing the number of passenger electric vehicles (EVs) on the road to 845,000 by 2030;
- Achieving a target of 95,000 electric vans and 3,500 low emitting trucks by 2030;
- Procuring 1,500 low-emission buses for public transport in cities; and
- Increasing the biofuel blend rate from the current E5 and B5 blends to E10 and B12 in petrol and diesel, respectively.

In addition, the 2021 CAP aims to achieve 500,000 (14%) additional public transport and active travel journeys per day and to reduce internal combustion engine (ICE) car kilometres by c. 10% in order to achieve the 2030 target. The measures outlined within the 2021 CAP are in addition to or enhance the measures previously proposed within the 2019 CAP. The 2019 CAP proposed the introduction of new legislation to ban the sale of fossil fuel cars from 2030 and to stop granting National Car Test (NCT) certificates from 2045 to fossil fuel cars. In addition, at the EU level, carbon emissions from vehicles are continuing to reduce with a target of 130g of CO₂/km applied to new passenger cars since 2015, reducing to 95g of CO₂/km by 2021.

In July 2021, the Climate Action and Low Carbon Development (Amendment) Act 2021 (referred hereafter as the "Climate Act") was published in which amends and enhances

the 2015 Climate Act. The 2021 Climate Act will *'provide for carbon budgets and a decarbonisation target range for certain sectors of the economy'*.

11.6 Residual Impacts

11.6.1 Construction Stage

Air Quality

Once the dust minimisation measures outlined in Section 11.5 are implemented, the effect of the proposed development in terms of dust soiling will be short-term, localised, negative and imperceptible at nearby receptors.

Climate

The embodied CO₂ emissions associated with the construction materials and their transport to site are considered insignificant in terms of Ireland's total annual GHG emissions. Construction stage climate impacts have been assessed to be short-term, negative and not significant.

11.6.2 Operational Stage

The effect of the proposed scheme on air quality is considered long-term, localised and slight positive. The impact to climate is predicted to be long-term, negative and imperceptible.

11.7 Cumulative Impacts

According to the Institute of Air Quality Management (IAQM) guidance (2014), should the construction phase of the proposed development coincide with the construction phase of any other developments within 350m then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors. However, best practice mitigation measures will be put in place during the construction phase of the proposed development which will avoid significant dust emissions. Provided these mitigation measures are in place for the duration of the construction phase cumulative dust related impacts to nearby sensitive receptors are not predicted to be significant. Cumulative impacts to air quality will be short-term, localised, negative and imperceptible.

Due to the short-term duration of the construction phase and the low potential for significant CO₂ and other GHG emissions, cumulative impacts to climate are considered neutral.

The traffic data used to assess the operational stage impacts to air quality and climate included the cumulative traffic associated with other existing and permitted developments in the local area where such information was available. Therefore, the cumulative effect is included within the operational stage impact for the proposed development. The effect is predicted to be long-term and slight positive in terms of air quality and long-term, negative and imperceptible with regards to climate.

There are no significant cumulative effects on air quality or climate predicted for the construction or operational phases.

11.8 Conclusion

There is the potential for some dust emissions to occur during the construction phase of the scheme. With the implementation of the mitigation measures outlined in Section 11.5 dust impacts will be short-term, localised, negative and imperceptible and will pose no nuisance issue at nearby sensitive receptors.

The embodied CO₂ emissions associated with the construction materials and their transport to site are considered insignificant in terms of Ireland's total annual GHG emissions. Construction stage climate impacts have been assessed to be short-term, negative and not significant.

Overall, during operation, the proposed scheme will have an imperceptible to slight impact on air quality at all worst-case receptors assessed. There is a predicted improvement in air quality at the majority of receptors assessed, this is due to diverting traffic away from the existing N52 and Ardee town. There will be some increases in pollutant concentrations at newly impacted receptors along the new proposed alignment however, these are imperceptible. Overall, the impact of the proposed scheme is long-term, localised, slight and positive.

The operational phase climate impact is considered long-term, negative and imperceptible due to the proposed scheme. The operational phase traffic emissions will be significantly below Ireland's national EU 2030 target.

11.9 References

Department of the Environment, Heritage and Local Government (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities

Department of the Environment, Heritage and Local Government (2010) Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities

Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements – Draft

Environmental Protection Agency (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft

Environmental Protection Agency (2020a) Air Quality Monitoring Report 2019 (& previous annual reports)

Environmental Protection Agency (2021a) EPA website Available at: <http://www.epa.ie/whatwedo/monitoring/air/>

Environmental Protection Agency (2021b) Ireland's Final Greenhouse Gas Emissions 1990 – 2019

Environmental Protection Agency (2021c) GHG Emissions Projections Report - Ireland's Greenhouse Gas Emissions Projections 2020 – 2040

German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft

Government of Ireland (2015) Climate Action and Low Carbon Development Act

Government of Ireland (2019) Climate Action Plan 2019

Government of Ireland (2020) Draft General Scheme of the Climate Action (Amendment) Bill 2019

Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction

Met Éireann (2021) Met Éireann website: <https://www.met.ie/>

Transport Infrastructure Ireland (TII) (2009) Guidelines for Assessment of Ecological Impacts of National Roads Schemes (Rev. 2, Transport Infrastructure Ireland, 2009)

Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes

Transport Infrastructure Ireland (2020) Carbon Assessment Tool Version 2.0 (calculation spreadsheet & guidance document)

UK DEFRA (2016) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. PG(16)

UK DEFRA (2018) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. TG(16)

UK DEFRA (2020) NO_x to NO₂ Conversion Spreadsheet (Version 8.1)

UK Highways Agency (2007) Design Manual for Roads and Bridges Vol 11 Chapter 3, HA 207/07 (Document & Calculation Spreadsheet)

UK Highways Agency (2019a) Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1 LA 105 Air quality

UK Highways Agency (2019b) UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate

World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)

12. NOISE AND VIBRATION

12.1 Introduction

This Noise and Vibration Impact Assessment evaluates the potential noise and vibration impacts for the proposed N52 Ardee Bypass Road development.

The Noise and Vibration Impact Assessment initially sets out the methodology to be used for the assessment (Section 12.2), then describes the existing environment (Section 12.3), sets out the predicted impacts of the proposed road development (Section 12.4), describes the mitigation measures to be incorporated in the proposed road development (Section 12.5) and details conclusions and residual impacts (Section 12.6).

During the construction phase for the proposed road development, noise and vibration will potentially be generated by site preparation works, excavation, infilling works and construction of structures. During the operation phase of the proposed road development, noise and vibration will potentially be generated by vehicular engine and tyre noise on the new road alignment. Therefore, the potential noise and vibration impacts on noise sensitive receiver properties have been considered for both the construction and the operational phases of the project.

12.2 Methodology

12.2.1 Relevant Guidance

This Noise and Vibration Impact Assessment is prepared in accordance with the requirements of Section (50) of the Roads Act 1993 (as amended), and having regard to the following guidance documents:

- *TII Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (2014)*
- *TII Guidelines for the Treatment of Noise and Vibration in National Road Schemes. National Roads Authority (2004)*
- *TII Environmental Impact Assessment of National Road Schemes – A Practical Guide (2008)*
- *EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports Draft (August 2017)*
- *ISO 1996-1: 2016 Description and Measurement of Environmental Noise*
- *World Health Organisation Noise Guidelines for the European Region (2019)*
- *BS 5228-1:2009+A1:2014 Noise and Vibration Control on Construction and Open Sites. Noise*
- *BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration*
- *BS 6472 -1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings*
- *BS 7385-2: 1993 Evaluation and measurement of vibration in buildings - Guide to damage levels from ground-borne vibrations*
- *The Guidelines for Noise Impact Assessment (October 2014) produced by the Institute of Environmental Management and Assessment (IEMA) HMSO (1988) Department of Transport Welsh Office, Calculation of Road Traffic Noise (CRTN)*

- *Design Manual for Roads and Bridges (DMRB), Sustainability & Environment Appraisal LA 111 Noise and vibration (formerly HD 213/11, IAN 185/15) Revision 2 (May 2020).*
- *Environmental Noise Regulations (2006) (S.I. No. 140 of 2006)*
- *European Union (Environmental Noise) Directive 2002/49/EC of the European Parliament and of the Council of 25th June 2002 relating to the Assessment and Management of Environmental Noise.*

12.2.2 Baseline Noise Surveys

A baseline environmental noise survey was undertaken at 6 No. representative noise sensitive locations (N1-N7) in proximity to the proposed road development in accordance with the methodology outlined in Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (2014) and ISO 1996 *Description and Measurement of Environmental Noise*.

This baseline environmental noise survey provides a description of the environmental noise character of the area. The baseline noise surveys were undertaken at sites representative of noise sensitive locations and to establish the maximum and minimum noise levels and the “worst-case” situations along the existing and the proposed road development alignment. Baseline noise monitoring surveys were carried out at 6 No. attended short period (15 minute) and 2 No. unattended 24-hour (daytime and night-time) in proximity to the alignment of the proposed road development. The baseline noise measurements were carried out on the 15th and 16th October 2020 at a sufficient number of properties to establish a representation of the existing noise climate in the vicinity of the proposed road development.

All noise measurements were taken in appropriate weather conditions, i.e. in the absence of wind and precipitation and in conditions of standard temperature and pressure. These ideal conditions rarely apply throughout a full 24-hour monitoring period. Therefore, it was ensured during the survey period that potential variations in noise level measurements due to changes in weather conditions were small as care was taken to select a suitable period for the 24-hour monitoring period. The sound level meters were fitted with a windshield under all circumstances. Care was taken to ensure average wind speeds of less than 5m/sec occurred when all noise measurements were taken. Wind speeds were monitored using a *Logic Energy* telemetry system and rainfall was measured using a tipping bucket rain gauge. Wind speed and rainfall was averaged over synchronised 1-hour intervals. No 1-hour average wind speeds of more than 3m/sec or any rainfall was recorded during the survey period.

The measurement parameters recorded during the baseline survey are defined as follows:

- L_{Aeq} is the equivalent continuous A-weighted sound level – the sound pressure level of a steady sound having the same energy as a fluctuating sound over a specified measuring period. It can be considered similar to an average level.
- L_{A10} is the A-weighted sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
- L_{A90} is the A-weighted sound level that is exceeded for 90% of the sample period and is used to quantify background noise in the absence of the main noise source.

Using the methodology presented in the Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004) the relevant L_{den} noise level at the 24-

hour monitoring location has been calculated directly from the measured LAeq 1hr values and the relevant Lden noise level at each short-term monitoring location has been calculated from the LA10 noise level (See Appendix D). This methodology allows for a determination of the nature of the existing noise environment at noise sensitive properties adjacent to the proposed road development.

12.2.3 Construction Phase Noise & Vibration Impact Assessment

The ground works associated with the construction of the proposed road development will include excavations, embankments and fill sections, structure construction, road paving and installation of signage and services etc. along the proposed development alignment. Equipment and noise sources, such as rock breakers, excavators, generators, dump trucks and road rollers, etc. will be the main noise sources associated with the construction phase of the proposed road development.

The assessment of construction noise impact was undertaken in accordance with the methodologies outlined in the TII Guidelines and *BS 5228-1:2009+A1:2014 Noise and Vibration Control on Construction and Open Sites. Noise*. The assessment of construction related vibration impacts was undertaken in accordance with the TII Guidelines and *BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration*.

12.2.4 Operation Phase Noise & Vibration Assessment

Vehicles travelling on the proposed road development have the potential to generate a negative impact due to traffic noise at nearby receiver locations. This traffic noise impact assessment applies to the component of traffic which is associated with traffic travelling along the existing and proposed alignment and associated link roads.

In accordance with the TII Guidelines all receivers within 300m of the proposed alignment were identified and assessed for operational phase noise related impacts. A receiver height of 1.5m is representative of a bungalow property and a receiver height of 4m is representative of a two-storey property. As the requirement for mitigation measures is influenced by the height at which the receiver is located in relation to the road traffic noise source, a worst-case assessment for each receiver was undertaken where each property was assessed at a receiver height of 4m to represent a two-storey property, irrespective of whether the property was a bungalow property. On the basis of this worst-case assessment, any properties determined to potentially require noise mitigation measure design were specifically assessed as either a bungalow or two-storey property.

Road traffic noise impact predictions were conducted using the CadnaA noise modelling software (Version 2020), which generated predicted noise levels for the noise sensitive receivers located within 300m of the proposed road development. This noise prediction model incorporates the calculation methodologies outlined in the Calculation of Road Traffic Noise (CRTN) produced by the UK Department of Transport (Welsh Office) and the methodology outlined within Method A of the TII Guidelines. The CadnaA computational model develops a visual and mathematical representation of the existing and predicted noise environment in the vicinity of the proposed road development. Existing and future predicted traffic data, horizontal and vertical alignments of the project and existing and proposed local topography were used to predict the traffic noise impact at the nearby sensitive locations due to the proposed road development.

The existing N52 alignment and the proposed N52 Ardee Bypass alignment were digitised within the CadnaA noise model. The projected traffic flows associated with the proposed road development for the base year (2018), the year of opening (2023)

and the design year (2038) were input into separate models. The CadnaA noise prediction software allows for a prediction of noise levels at a number of receiver points which may be affected by the proposed road development. Noise levels resulting from the introduction of the proposed N52 Ardee Bypass alignment have been predicted to assess the change in the noise climate in the vicinity of these receivers. The predicted noise levels have been compared to the design goal criteria as stipulated in the TII Guidelines to determine if mitigation is required. Predicted noise levels are quoted as free-field Lden noise levels.

Traffic flow data used in the noise prediction modelling was based on the traffic flows on the existing N52 and proposed N52 Ardee Bypass alignment. All traffic flows were supplied as 24-hour AADT (Annual Average Daily Traffic) flows and these flows were converted to hourly flows according to specific diurnal profiles for Non-Heavy Commercial Vehicles (HCV) and HCV traffic for each road segment outlined in the TII Guidelines. Specific Heavy Goods Vehicle (HGV) percentages on each road segment were provided. The relevant traffic volumes on each road segment were provided by Roughan & O'Donovan. Traffic speeds on the existing and proposed N52 Ardee Bypass alignment were modelled at the speeds in km/hour as provided by Roughan & O'Donovan.

The screening effects of topographical undulations, embankments, bunds and cuttings which have the potential to provide natural noise attenuation have been incorporated into the noise prediction model using 0.1m interval ground contour data and elevation details for the existing and proposed N52 Ardee Bypass alignment as provided by Roughan & O'Donovan.

The CadnaA noise model has been used to predict noise levels at noise sensitive receivers for the base year (2018), the year of opening (2023) and the design year (2038), the “Do-Nothing” and “Do-Something” scenarios have been modelled (Refer to Section 5).

The likely future perceived impact of change in traffic noise levels at the noise sensitive properties adjacent to the proposed road development has also been determined. In addition to the assessment of noise impact in accordance with the TII Guidelines, the perceived impact of change in traffic noise level has also been reported for the noise sensitive receivers in the Year of Opening (2023) and the Design Year (2038).

The perceived impact rating and the subjective response to changes in noise levels as outlined in this study have been determined based on the subjective assessment of changes in noise levels, in terms of perceived change and loudness. The Guidelines for Noise Impact Assessment (October 2014) produced by the Institute of Environmental Management and Assessment (IEMA) address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. The guidelines state that the noise level threshold and significance should be determined, based upon the specific evidence and likely subjective response to noise. The criteria reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear under most normal conditions. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level. An impact scale offered by the IEMA guidelines is shown in Table 12-1.

Table 12-1 IEMA Impact from the Change in Sound Levels

Long-term impact classification	Short-term impact classification	Sound Level Change L_{pAeqT} (positive or negative) T = either 16hr day or 8hr night
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3 dB and < 5 dB
Moderate	Major	≥ 5 dB and < 10 dB
Major		≥ 10 dB

To determine the overall noise impact, the magnitude and sensitivity to changes in noise levels, the Noise Effects Descriptors presented in Table 12-2 are offered by the IEMA guidelines.

Table 12-2 Noise Effects Descriptors (IEMA)

Very Substantial	Greater than 10 dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise
Substantial	Greater than 5 dB L_{Aeq} change in sound level at a noise sensitive receptor, or a 5 to 9.9 dB L_{Aeq} change in sound level at a receptor of great sensitivity to noise
Moderate	A 3 to 4.9 dB L_{Aeq} change in a sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Slight	A 3 to 4.9 dB L_{Aeq} change in a sound level at a receptor of some sensitivity
None/not significant	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors of negligible sensitivity to noise or marginal to the zone of the influence of the proposed development

Table 12-3 Relationship between Noise Impact, Effect and Significance (IEMA)

Magnitude (Nature of Impact)		Description of Effect (on a specific sensitive receptor)	Significance
Beneficial	Substantial	Receptor Perception = Marked Change Causes a material change in behaviour and/ or attitude, e.g. individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	More Likely to be Significant. (Greater justification needed-based on impact magnitude and receptor sensitivities- to justify a non-significant effect)
	Moderate	Receptor Perception = Noticeable Improved noise climate resulting in small change in behaviour and/or attitude, e.g. turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
	Slight	Receptor Perception = Just Noticeable Noise impact can be heard, but does not result in any change in behaviour or attitude. Can slightly affect character of the area but not such that there is a perceived change in quality of life.	(Greater justification needed-based on impact magnitude and receptor sensitivities- to justify a significant effect)

Magnitude (Nature of Impact)		Description of Effect (on a specific sensitive receptor)	Significance
			Less Likely to be Significant
-	Negligible	N/A = no discernible effect on receptor	Not Significant
Adverse	Slight	Receptor Perception = Non-intrusive Noise impact can be heard, but does not cause change in behaviour or attitude, e.g. turning up volume of television, speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less Likely to be Significant. Greater justification needed-based on impact magnitude and receptor sensitivities- to justify a significant effect)
	Moderate	Receptor Perception = Intrusive Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awaking sleep disturbance. Affects the character of area such that there is a perceived change in the quality of life.	
	Substantial	Receptor perception = Disruptive Causes material change in behaviour and /or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in character of area.	Greater justification needed-based on impact magnitude and receptor sensitivities- to justify a non-significant effect) More Likely to be Significant
	Severe	Receptor Perception = Physically Harmful Significant Changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or psychological effects, e.g. regular sleep deprivation / awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Significant

World Health Organisation (WHO) guidelines

In 1999 and 2009, the World Health Organisation (WHO) published guidelines to protect human health, specifically from community noise and night noise exposure. In recent years, there has been a substantial increase in the number and quality of studies on environmental noise exposure and health impacts. Also, newer studies included noise from sources such as railways and wind turbines. In light of this new evidence, the WHO Environmental Noise Guidelines for the European Region have been developed and published in October 2018.

The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. Leisure noise in this context refers to all noise sources that people are exposed to due to leisure activities, such as attending nightclubs, pubs, fitness classes, live sporting events, concerts or live music venues and listening to loud music through personal listening devices. The WHO has conducted surveys on noise annoyance. According to these large-scale surveys, road traffic noise is the most important source of annoyance, generally followed closely by neighbour noise. Aircraft noise can also be a substantial source of annoyance. Railway noise and industrial noise are enumerated less frequently. The WHO has published the following 'strong' recommendations in relation to noise levels produced by road traffic. For average

noise exposure, the Guideline Development Group (GDG) *strongly recommends reducing noise levels produced by road traffic below 53 dB Lden, as road traffic noise above this level is associated with adverse health effects. For night noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic during night-time below 45 dB Lnight, as night-time road traffic noise above this level is associated with adverse effects on sleep.* To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure.

The recommended levels for road traffic noise are based on two factors; increased risk of incidence of Ischaemic Heart Disease (IHD) and the percentage of people being Highly Annoyed (HA) by road traffic noise. For risks relating to incidence of IHD, a benchmark of 5% increase of relevant risk (RR) was set. On the basis of this benchmark, the corresponding road traffic noise level is 59dB Lden, based on a strong body of evidence to support the relationship. For risks relating to perceived annoyance, a benchmark of 10% of the population being 'Highly Annoyed' by road traffic noise was set. On the basis of this benchmark (10% 'Highly Annoyed'), the corresponding road traffic noise level is 53dB Lden. This was set based on a compilation of varying community response studies relating to road traffic noise from European and International sources. The WHO 2018 Noise Guidelines note the body of evidence supporting this benchmark is of moderate quality due to large variability in the quality of the data sets available. The recommended traffic noise level of 53dB Lden within the WHO 2018 Noise Guidelines is therefore based on a level which 10% of the population are estimated to be 'Highly Annoyed' by road traffic noise. This level is 6dB below the noise level determined for increase of relevant risk (RR) relating to incidence of IHD, i.e. 59dB Lden.

12.2.5 Operation Phase Vibration Impact Assessment

As stated in the TII Guidelines *"it has been found that ground vibrations produced by road traffic are unlikely to cause perceptible structural vibration in properties located near to well-maintained and smooth road surfaces. This aspect does not require further consideration unless there are unusual circumstances under which higher than normal traffic vibration levels may be expected"*.

12.2.6 Operation Phase Noise Mitigation Measures Design Criteria

The TII Guidelines outline that road traffic noise impact criteria in Ireland is based on the Lden noise parameter. The results of the noise prediction modelling are presented as the Lden noise level, which is a composite of long term LAeq values for day, evening and night (termed Lday, Levening and Lnight). TII has stipulated that all national road schemes should be designed, where feasible, to meet the 60dB Lden design goal as specified in the TII Guidelines. Mitigation measures are deemed necessary when the following three conditions are satisfied at sensitive receptors:

- (a) the combined expected maximum traffic noise level, i.e. the relevant noise level from the proposed road development together with other traffic in the vicinity is greater than the 60dB Lden design goal.
- (b) the relevant noise level is at least 1dB more than the expected traffic noise level without the proposed road development in place.
- (c) the contribution to the increase in the relevant noise level from the proposed road development is at least 1dB.

These conditions ensure that mitigation measures arising out of this process are based upon the impact of the proposed road development under consideration only.

Mitigation measures are considered when the proposed road development has a net negative impact, i.e. if the predicted traffic noise level is greater than 60dB Lden, the predicted noise level due to proposed road development traffic and induced traffic is at least 1 dB more than the 'Do- nothing' noise level and therefore, the contribution from the proposed road development is at least 1dB more than the 'Do-nothing' noise level.

This design goal noise level of 60dB Lden has been selected to protect people from being annoyed from a relatively steady and continuous noise source such as the proposed road development. However, it is noted that the TII Guidelines state that *“the Authority accepts that it may not always be sustainable to provide adequate mitigation in order to achieve the design goal. Therefore, a structured approach should be taken in order to ameliorate as far as practicable road traffic noise through the consideration of measures such as alignment changes, barrier type (e.g. earth mounds), low noise road surfaces etc.”* and the design goal of 60dB Lden is not a statutory requirement. Accordingly, if major works are required to bring a noise level from a predicted noise level of approximately 61dB Lden to 60dB Lden for example, these works would not necessarily be carried out. When determining the requirement for mitigation measures, it is important to consider any potential design difficulties and cost, based on the relative impact of the proposed road development on a receiver property in comparison to the currently experienced noise level at such properties.

12.3 Receiving Environment

12.3.1 Baseline Noise Monitoring

The existing noise environment in the vicinity of the noise sensitive receivers nearest to the existing N52 and the proposed N52 Ardee Bypass Road development was established through a baseline noise monitoring survey undertaken at 6 No. attended short period (3 x 15 minute) and 2 No. unattended continuous 24-hour (daytime and night-time) baseline noise monitoring locations (NML1 – NML7). The noise monitoring surveys were undertaken on the 15th and 16th October 2021. The baseline noise monitoring locations are shown in Figure 12-1, Figure 12-2 and Figure 12-3 and the baseline noise monitoring results are provided in Table 12-4. No noise mitigation measures are currently in place along the alignment of the existing N52.

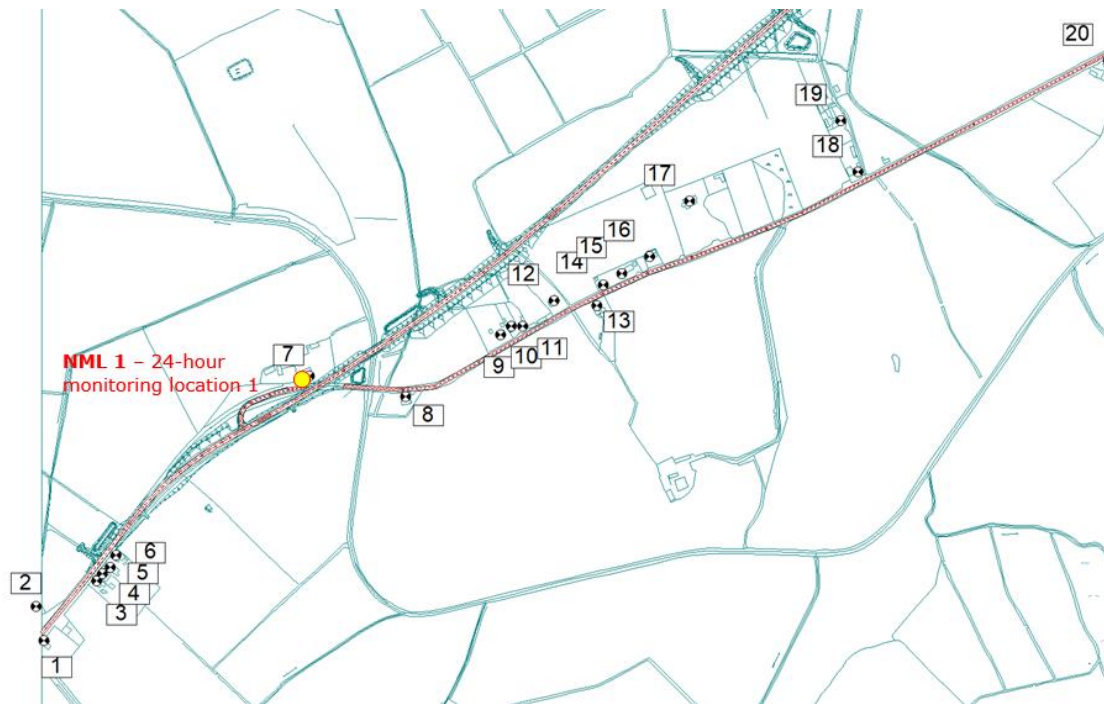


Figure 12-1 Baseline noise monitoring survey locations and noise sensitive receiver locations as inputs into the noise prediction model.

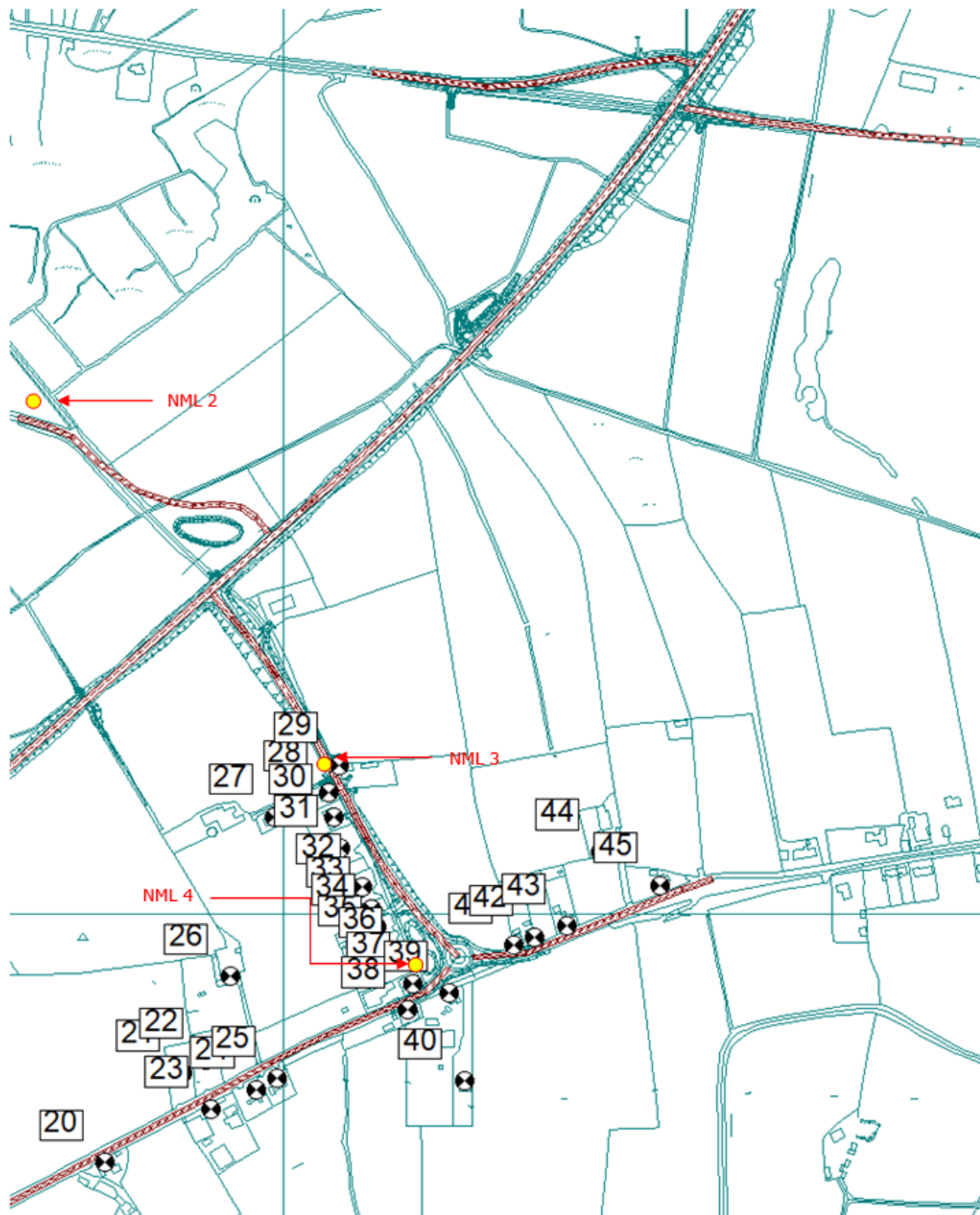


Figure 12-2 Baseline noise monitoring survey locations and noise sensitive receiver locations as input to the noise prediction model.

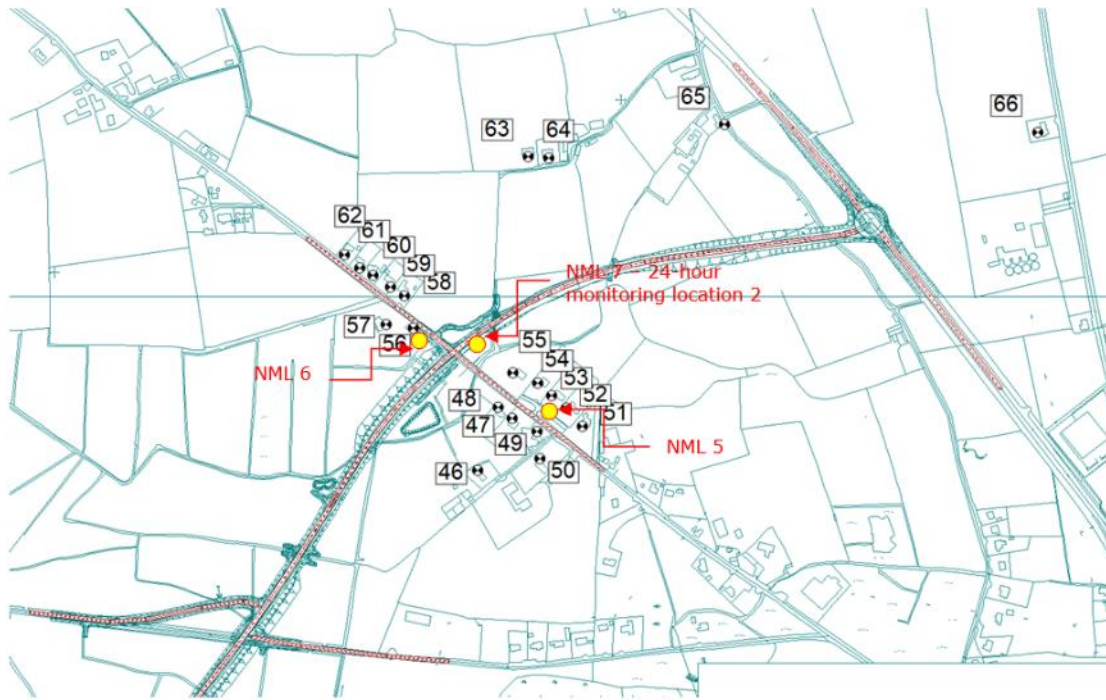


Figure 12-3 Baseline noise monitoring survey locations and noise sensitive receiver locations as input to the noise prediction model.

Table 12-4 Results of the Baseline Noise Monitoring

Noise Monitoring Location	24 Hour Monitoring – 1-Hour L_{Aeq} noise levels converted to L_{den} (dB)	Short term CRTN monitoring – 15-minute L_{A10} noise levels converted to L_{den} (dB)	Notes
NML 1 (24 Hour)	65	-	Close to existing N52
NML 2	-	50	Quiet area
NML 3	-	52	Quiet area
NML 4	-	69	In close proximity to road & junction
NML 5	-	52	In cul de sac area
NML 6	-	54	In close proximity to roadside
NML 7 (24 Hour)	58	-	Quiet area, close to existing local road

The existing ambient noise environment in the study area is dominated by the existing traffic noise from the N52 and local roads in the area as well as the N2 at the east of the proposed N52 Ardee Bypass Road development. Noise levels were also influenced by a combination of other noise sources such as birdsong, dogs barking and agricultural practices.

The L_{Aeq} sound levels recorded during the baseline noise survey indicate that at the residential properties in close proximity to the existing N52 there is an exceedance of the WHO published guidelines to protect human health. The WHO Environmental Noise Guidelines for the European Region published in October 2019 and the 60dB

Lden design goal as specified in the TII Guidelines are exceeded at the residential properties that are in close proximity to the existing N52. At the monitoring locations at residential properties that are located further from the existing N52, there are lower traffic noise levels and hence no exceedance of the WHO published guidelines. The calculated Lden sound level at the 24-hour monitoring location at NML 1 is above the 60dB Lden design goal as specified in the TII Guidelines. This monitoring location was in close proximity to the existing heavily trafficked N52 road. The calculated Lden sound level at the 24-hour monitoring location at NML 7 is below the 60dB Lden design goal as specified in the TII Guidelines. This is in a quiet area adjacent to low trafficked road.

The measured noise levels are consistent with the subjective commentary during the baseline noise survey. Traffic noise from the existing N52 dominates the noise climate in the area. Figure 12-4 indicates a typical comparison level of common sound levels on the dB(A) Scale for reference against the measured sound levels at the residential properties in proximity to the existing N52.

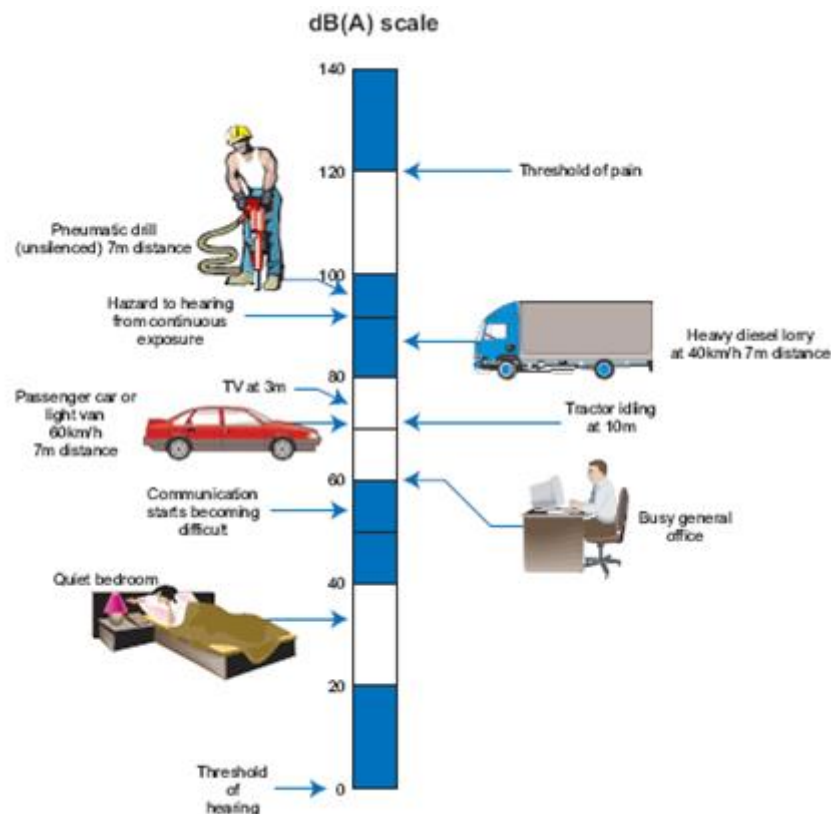


Figure 12-4 The Typical Level of Common Sounds on the dB(A) Scale [Source: UK Design Manual for Roads and Bridges, Volume 11 Consolidated Edition 1993].

Baseline Vibration Monitoring

Ground vibration levels in areas such as along the existing N52 alignment are likely to be extremely low at any potentially sensitive locations as there were no significant sources of vibration noted in the study area other than road traffic. As stated above, ground vibrations produced by road traffic are unlikely to cause perceptible structural vibration in properties located near to well-maintained and smooth road surfaces. Therefore, no baseline vibration monitoring was carried out in the vicinity of the proposed alignment.

12.4 Predicted Impacts

There are two phases of the proposed road development that may impact on the existing noise and vibration environment in the area. These are:

- Construction phase, and
- Operational phase - Noise modelling has been used to predict noise impacts at noise sensitive receivers for the Year of Opening (2023) and Design Year (2038), and in each case, the 'Do-Nothing' and 'Do-Something' scenarios have been modelled and compared.

12.4.1 Construction Noise & Vibration Impact Assessment

It is anticipated that the associated earthworks and construction operations will extend over a period of approximately 18 - 24 months. The majority of the works associated with the construction of the proposed road development will be ground works that are required in order to create the cut and fill sections, to form the cuttings, embankments and structures along the alignment of the proposed road development. It is anticipated that varying degrees of overburden and bedrock removal and infilling will be required along the proposed road development.

Construction works will also include bridge construction, road paving and installation of services, etc. along the proposed road development. Equipment and noise sources, such as rock breakers, excavators, dump trucks, rollers, generators, cranes, etc. will be the main noise sources associated with the construction phase of the project. Due to the linear nature of road construction projects the noise sources will move along the proposed alignment throughout the construction phase.

Construction Noise Guidelines

The TII Guidelines outlines construction noise limits as detailed in Table 12-5.

Table 12-5 Maximum Permissible Noise Levels at the Façade of Dwellings During Construction (Source: TII Guidelines).

Days & Times	L _{Aeq} (1hr) dB	L _{AMax} dB
Monday to Friday - 07.00 to 19.00	70	80
Monday to Friday - 19.00 to 22.00	60*	65*
Saturday - 08.00 to 16.30	65	75
Sundays and Bank Holidays - 08.00 to 16.30	60*	65*

* Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority.

12.4.2 Construction Vibration Guidelines

The relevant vibration standards can be divided into two categories, those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In the case of continuous sources of vibration, such as traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, blasting (an instantaneous activity) or piling (a repetitive/continuous activity), two of the primary sources of vibration during road construction projects, are typically tolerated at vibration levels up to 12mm/s and 2.5mm/s, respectively.

The TII Guidelines identify 2.5mm/s as the vibration level that may be considered tolerable during piling works. This limit provides for protection against the vibration nuisance and is comfortably within the limit for potential cosmetic damage. The potential vibration levels that could be generated by rock breaking works, as required, would be expected to be comparable to the level of vibration that may be generated by piling works. The TII limits for protection against cosmetic damage are given as a function of vibration frequency, and are:

- 8 mm/s (vibration frequency <10Hz)
- 12.5 mm/s (vibration frequency 10 to 50Hz)
- 20 mm/s (vibration frequency >50 Hz).

12.4.3 Construction Vibration Impact

The earthworks will mainly involve the installation of embankments to allow for the bridge construction. The only significant cutting on the proposed road development will occur at the eastern end of the road development in proximity to the existing N2. The nearest residential property to this location is approximately 190m to the north.

To avoid the risk of cosmetic damage to sensitive older buildings, the TII Guidelines suggest that vibration levels should be limited to 8mm/s at frequencies of less than 10Hz, to 12.5mm/s for frequencies of 10 to 50Hz, and to 20mm/s at frequencies of 50Hz and above. Appropriate mitigation measures are outlined in Section 12.5.

The majority of properties in the vicinity of the proposed road development will comply with modern building regulation standards and in this regard the vibration limit levels outlined above are representative of levels that would be expected to be tolerable by these properties, without undue concern. In addition, it should be noted that there is a significant safety margin accounted for within the TII limits, and properties with slight deviations from modern building regulation standards should not be at significantly increased risk of cosmetic damage. Property condition surveys will be offered for all buildings within 50m of the development boundary. Such property condition surveys shall be carried out by a Chartered Surveyor or Chartered Structural Engineer. Such property condition surveys, subject to the written agreement of relevant property owners, shall be carried out in two stages as follows:

- the first stage shall consist of pre-construction condition surveys including photographic records which shall be carried out prior to project commencement,
- the second stage shall consist of post-construction condition surveys which shall include photographic records.

12.4.4 Construction Noise Impact

Table 12-6 outlines the noise levels from typical road construction noise sources during different phases of the construction process as referenced from *BS 5228-1:2009+A1:2014*.

Table 12-6 Typical noise levels during different construction processes as referenced from BS 5228-1:2009+A1:2014.

Ref No.	Equipment	A-weighted sound pressure level, L_{Aeq} , dB @ 10m
Table C.2 Sound level data on site preparation		
Clearing Site & Ground excavation/earthworks		
1	Dozer ж (142 kW, 20T)	75 ж

Ref No.	Equipment	A-weighted sound pressure level, L_{Aeq} , dB @ 10m
3	Tracked excavator (102 kW, 22T)	78
12	Dozer (142 kW, 20T)	80
14	Tracked excavator (226 kW, 40T)	79
Loading lorries		
27	Wheeled loader (493 kW)	80
Distribution of material		
30	Dump truck (tipping fill) (306 kW, 29T)	79
31	Dump truck (empty) (306 kW, 29T)	87
Rolling and compaction		
37	Roller (rolling fill) ж	79 ж
Table C.4 Sound level data on general site activities		
Distribution of materials		
1	Articulated dump truck ж	81 ж
Mixing & Pumping concrete		
20	Concrete mixer truck	80
Trenching		
63	Tracked excavator	77
Power for site cabins		
84	Diesel generator	74
Pumping water		
88	Water pump (diesel) (10 kW, 100Kg)	68
Sweeping and dust suppression		
90	Road sweeper (70 kW)	76
91	Dust suppression unit trailer	78
Table C.5 Sound level data on road construction works		
Breaking road surface & concrete		
1	Backhoe mounted hydraulic breaker	88
6	Hand-held pneumatic breaker	95
Road planing		
7	Road planer (185 kW, 17T)	82
Earthworks		
14	Bulldozer ж (250 kW, 35T)	86 ж
16	Articulated dump truck ж (194 kW, 24T)	81

Ref No.	Equipment	A-weighted sound pressure level, L_{Aeq} , dB @ 10m
Rolling and compaction		
19	Road Roller ж (95 kW, 22T)	80 ж
21	Vibratory Roller ж (95 kW, 12T)	80 ж
29	Vibratory compacter (asphalt)	82
Paving		
33	Asphalt paver (+ tipper lorry) ж	84 ж
Table C.9 Sound level data on hard rock quarries		
Breaking boulders/oversized material		
11	Excavator mounted rock breaker	93
15	Tracked semi-mobile crusher	96

ж Drive-by maximum sound pressure level in L_{Amax} (overall level)

Typical noise levels during different construction processes as referenced from BS 5228-1:2009+A1:2014 are outlined in Table 12-6 above, rock breaking (not expected to be required) will result in a noise level of approximately 93 - 96 dB L_{Aeq} , 1hour at 10m. Noise from rock breaking will occur over short term intervals and will be during daytime periods only. The nearest residential properties will be informed of the timing and duration of the rock breaking. It is anticipated that rock will not be encountered on the project and that existing materials will be re-used on site or imported for embankment construction.

Construction noise levels have been predicted at the nearest residential properties to three selected specific areas of future construction works, due to the following construction activities;

- simultaneous tracked excavator and dozer activities at distinct area of construction,
- with 10 dump truck movements per hour on a haul route on the site. The dump trucks will travel in the direction of where the fill material is required as part of the construction project. For the purposes of the noise impact assessment it has been assumed that there will be 10 dump truck movements to the east and 10 dump truck movements to the west during a worst-case 1 hour period.

This worst-case construction noise impact assessment has been undertaken for indicative construction areas at approximate Chainages 800m, 2,400m and 4,200m. This involved a systematic selection of future construction locations relative to existing receivers along the proposed route as it is not feasible to assess all potential construction noise levels at every location. This allowed for the prediction of worst-case levels assuming concurrent construction activities at a selection of future construction locations.

Table 12-7 outlines the Sound Power Levels for various plant and equipment associated with the construction noise impact assessment. The predicted construction noise levels are based on the likely operations that will occur on site during each phase of activity. The construction noise models are based on importing AutoCad drawings into the CadnaA noise prediction software. The location of the relevant noise sources within the construction excavation areas and the haul roads have been represented accordingly. Table 12-8 outlines the predicted worst-case noise levels due to typical

expected operations involving tracked excavator, dozers and dump truck movements during the construction phase. Construction activities will result in short-term negative noise impacts but will not have a significant residual noise impact.

Table 12-7 Sound Power Levels for plant and equipment, e.g. tracked excavator and dump truck movements in proximity to the proposed cuttings during the construction phase.

Likely Plant & Equipment for use at proposed cuttings	Sound Power Level (L _w) used in Noise Model (dB) (derived from Table 6)
Overburden Removal, e.g. Dozer and Excavator loading HGV	110 dB (Point Source) = 82 dB(A) @10m from source
Excavation, e.g. Excavator loading HGV	108 dB (Point Source) = 80 dB(A) @10m from source
Haul Road HGV movements (assuming 10 per hour @ 20 Kph on haul route)	105 dB (Line Source) with associated number of movements per hour along the line source.

Table 12-8 Predicted worst-case noise levels due to dozer, tracked excavator and dump truck movements at the receiver locations in proximity to the alternative construction areas.

Receiver Location	Predicted Construction Noise Level at nearest Receiver Locations L _{Aeq,1hour} dB		
	Construction Loc. 1	Construction Loc. 2	Construction Loc. 3
1	51.8	<10	<10
2	53	<10	<10
3	63.4	<10	<10
4	65.5	<10	<10
5	64.7	<10	<10
6	66.8	<10	<10
7	64.8	34.7	<10
8	58.5	35.3	<10
9	59.1	36.3	<10
10	59.1	36.4	<10
11	58.4	36.5	<10
12	58	36.9	<10
13	56	37.2	<10
14	56.6	37.4	<10
15	56.3	37.7	<10
16	56	38	<10
17	56.8	38.8	<10
18	53	40.9	<10
19	54.8	41.2	<10
20	50.5	46.1	24.5

Receiver Location	Predicted Construction Noise Level at nearest Receiver Locations L _{Aeq,1hour} dB		
	Construction Loc. 1	Construction Loc. 2	Construction Loc. 3
21	50.5	48.7	30.2
22	50.3	49.4	31.1
23	49.7	48.4	29.6
24	49.3	49.4	31.1
25	49.1	50.1	31.6
26	50.9	51.9	33.1
27	52.1	58.3	36.4
28	51.1	66.4	36.9
29	51.2	68.8	37
30	50.7	64.4	36.8
31	50.3	62.3	36.6
32	49.6	62.2	36.5
33	49.2	61.2	36.4
34	49	60.3	36.3
35	48.7	59.1	36
36	48.4	59.6	36.2
37	48.1	57.5	35.9
38	48	55.4	35.8
39	47.6	57.3	36
40	46.9	51.2	33.8
41	46.9	55.5	36.5
42	46.7	54.2	36.7
43	46.3	52.5	36.9
44	46	51.1	37.4
45	45.2	49.3	37.4
46	37.8	38.1	51
47	36.8	37.4	54
48	36.9	37.4	54.9
49	36.7	37.3	53.1
50	36.9	37.5	51.8
51	36	36.9	53
52	36.1	36.9	54.1
53	36.1	37	55
54	36.1	36.9	56
55	36.3	37	57.5

Receiver Location	Predicted Construction Noise Level at nearest Receiver Locations L _{Aeq,1hour} dB		
	Construction Loc. 1	Construction Loc. 2	Construction Loc. 3
56	36.9	37.2	56
57	37.1	37.3	53.4
58	36.6	37	54.1
59	36.6	36.9	53
60	36.6	36.7	51.8
61	36.6	36.7	51.1
62	36.6	36.6	50.2
63	32.8	35	52.9
64	32.5	34.9	53.4
65	26	31.3	53.8
66	<10	<10	47.2
TII Construction Noise Limit = 70 dB(A)			

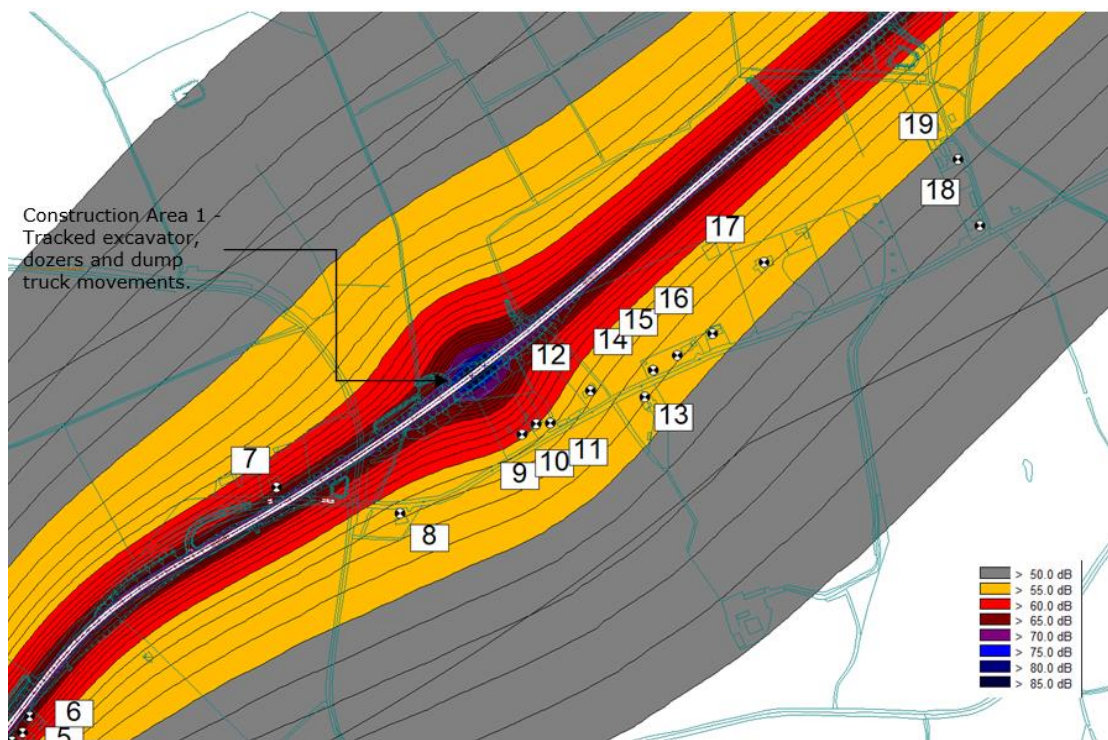


Figure 12-5 Predicted Construction Noise Levels – Construction Location 1

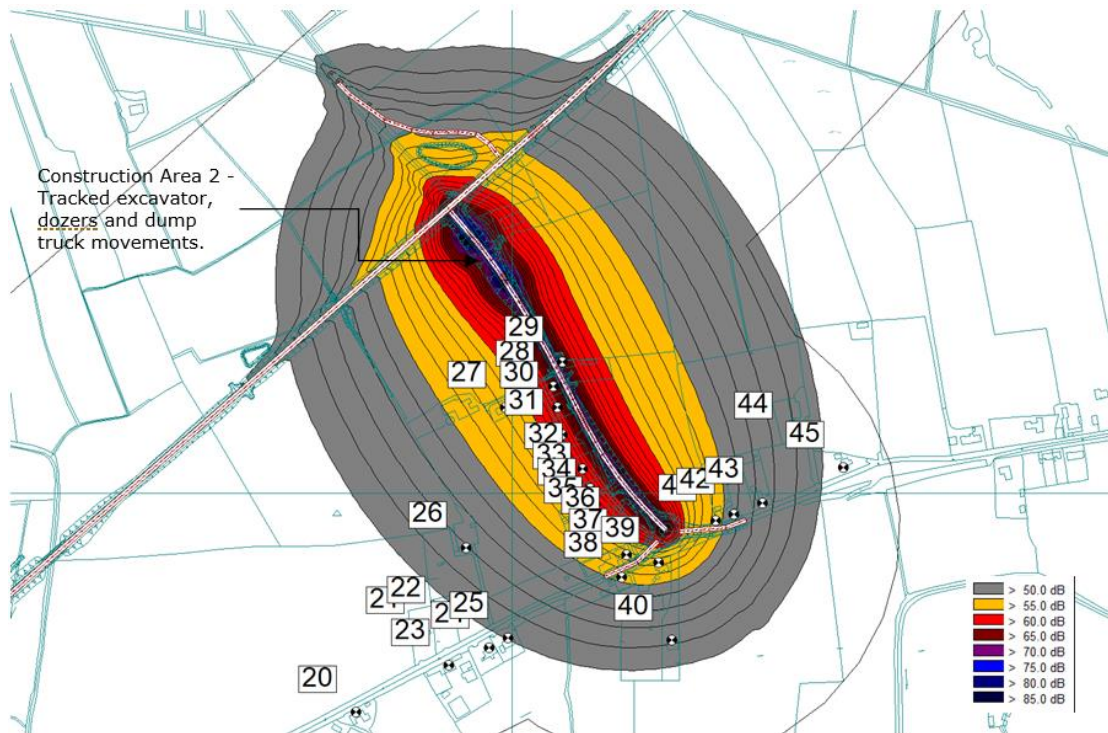


Figure 12-6 Predicted Construction Noise levels – Construction Location 2

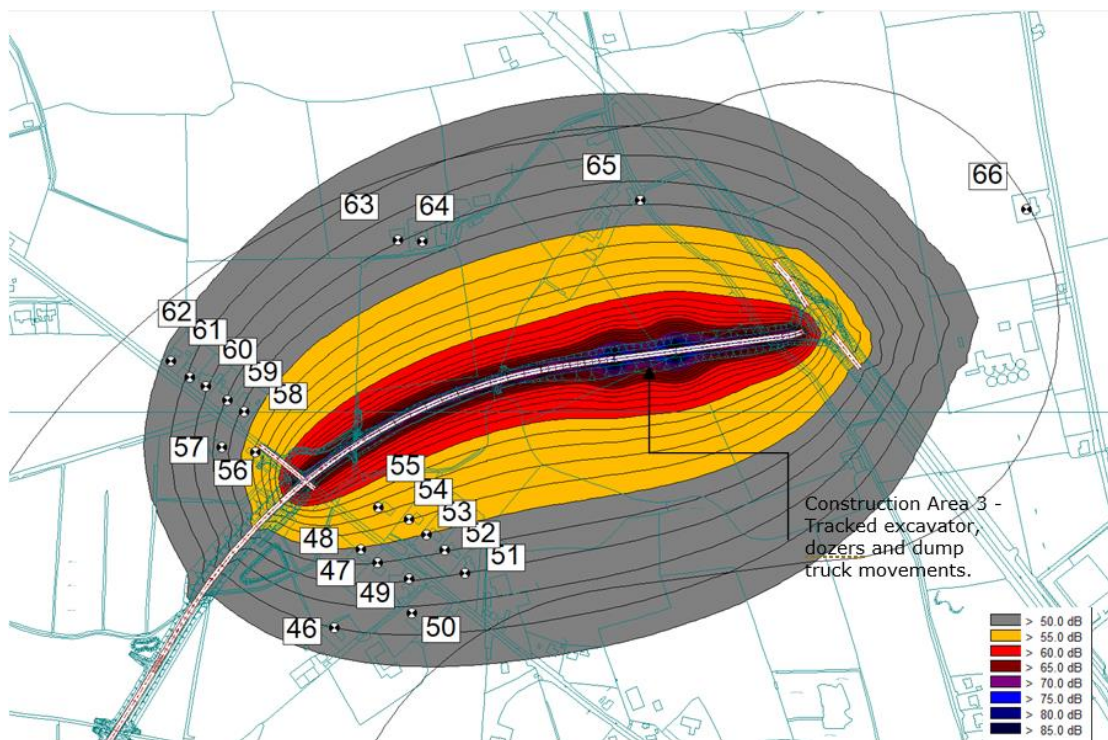


Figure 12-7 Predicted Construction Noise levels – Construction Location 3

12.4.5 Operational Noise & Vibration Impact Assessment

Operation Noise Impacts

This section of the assessment identifies the potential impacts on the environment associated with the proposed road development during operation.

Noise Model Validation:

In relation to the calibration and validation of the noise model, the TII Guidelines state that “*whilst there is no need for further validation of the established CRTN prediction methodology, the Authority considers that the noise models themselves should be validated in order to ensure that the roads, topography and other critical features have been correctly represented and incorporated into the model. This could be done in a number of ways, for example, the survey results could be compared with the predicted results obtained using traffic data that are representative of the conditions during the period when the survey was conducted. The exact method of validation is left to the discretion of the Acoustic Engineer*”. The TII Guidelines state that “*depending upon the circumstances and characteristics of the sound in question, a change in level of 3dB is just perceptible, whereas an increase of 10dB is perceived as a subjective doubling of loudness*”. Therefore, where a monitored and modelled noise level is within approximately +/- 3dB, the location can be deemed to be well validated in relation to monitored and modelled noise levels (i.e. a “Good” Level of Validation). Where a monitored and modelled noise level is within approximately +/- 5dB, the location can be deemed to be moderately validated in relation to monitored and modelled noise levels (i.e. a “Moderate” Level of Validation). Where a monitored and modelled noise level is >5dB, the location can be deemed to be poorly validated in relation to monitored and modelled noise levels (i.e. a “Poor” Level of Validation). It is important to note that the modelled noise levels are entirely due to traffic noise, whereas the monitored noise levels may be prone to impact from other noise sources such as birdsong, children playing, dogs barking, agricultural or commercial activities in the area, etc. The noise model has been validated versus the noise levels recorded at the 24-hour monitoring locations in close proximity to the existing and proposed road alignment (Table 12-9). This is due to the fact that the dominant noise source in these areas is the existing consistent traffic flow. Traffic flow data for the existing alignment has been input into the noise validation model. The results of the validation show that a good level of validation was achieved at the noise monitoring locations.

Table 12-9 Monitored noise levels versus predicted noise levels ‘Base Year 2018 Calibration Model’ at noise monitoring locations.

Receiver Locations	Noise Monitoring Results converted to L_{den}	Validation Noise Model Levels L_{den} dB(A)	Difference between monitored & modelled noise levels	Difference; <3dB(A), 3-5dB(A), >5dB(A)	Level of Validation
NML 1 (24-Hr Location)	65	66.4	1.4	<3 dB(A)	Good
NML 7 (24-Hr Location)	58	59.7	1.7	<3 dB(A)	Good

Noise Impact Prediction

66 residential properties (noise sensitive receivers) located within 300m of the proposed road development have been selected for assessment in the noise prediction model. The results of the predicted noise levels from the CadnaA noise modelling software at the selected 66 receivers located in closest proximity to the proposed road development from the noise model in the Base Year 2018, Year of Opening 2023 and the Design Year 2038 are presented in Appendix D - Table 1.

As the requirement for mitigation measures is influenced by the height at which the receiver is located in relation to the road traffic noise source, the predicted noise levels in Appendix D - Table 1 are presented for noise sensitive receiver locations a receiver

height of 4m for a two-storey building. Where noise mitigation is deemed necessary at a receiver height of 4m, the actual residential building has been checked to assess if this is a bungalow with a receiver height of 1.5m for a bungalow.

On the basis of perceived change and loudness as outlined in Tables 12-1 – 12-3, Appendix D - Table 1 outlines the subjective change in noise level at each individual noise sensitive property. Table 12-10 outlines a summary of the overall perceived impact of change in traffic noise level at the noise sensitive properties in the Design Year (2038), with the proposed noise mitigation measures.

As outlined, the TII guidelines stipulate that all national road schemes should be designed, where feasible, to meet the 60dB Lden design goal. Mitigation measures are deemed necessary when the three conditions as outlined are satisfied at the sensitive receptors.

Preliminary noise prediction modelling (without the use of a low noise road surface along the proposed alignment), indicated that up to nine existing properties would potentially require noise mitigation measures to be included in the proposed road development. This would have resulted in the potential requirement for 3 noise barriers along the proposed alignment to achieve compliance with the 60 dB Lden design goal as specified in the TII Guidelines, as presented in Figure 12-8 and Figure 12-9.

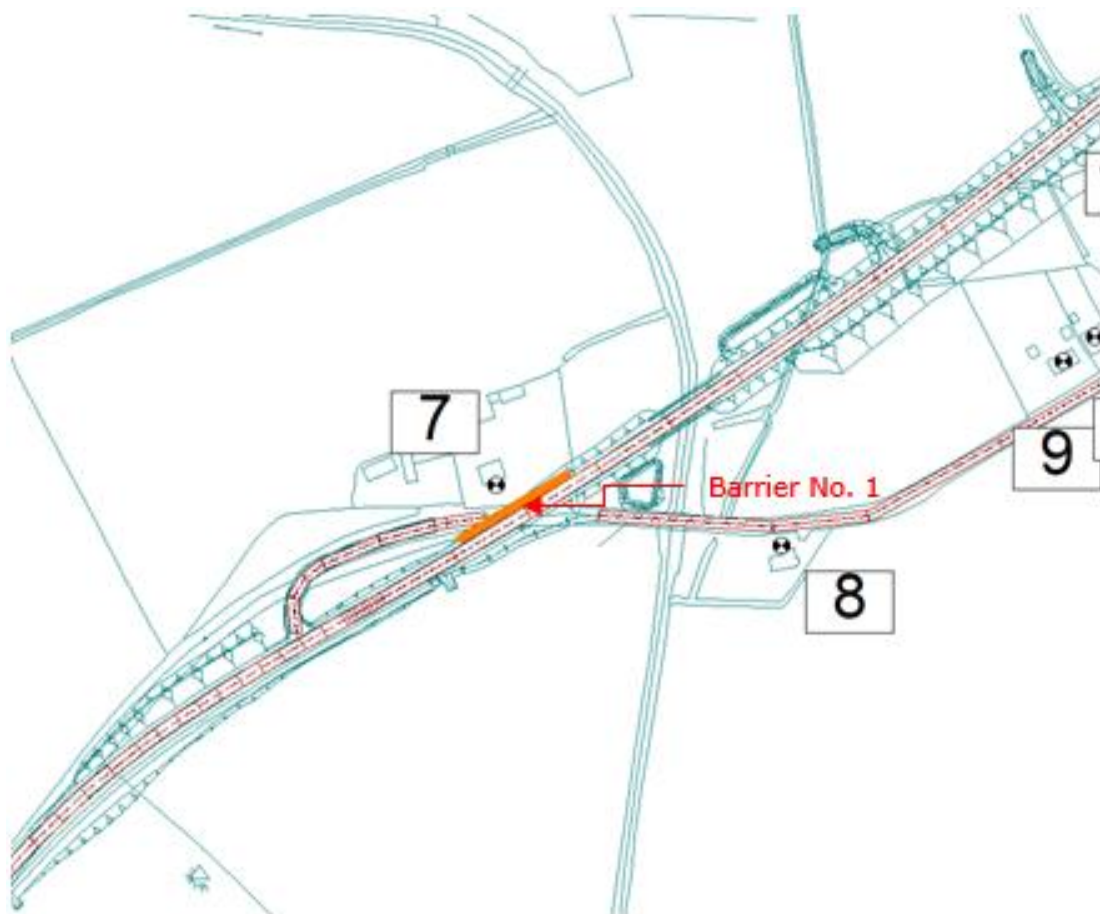


Figure 12-8 Potentially required noise barrier No. 1 at property 7 – 1.25m high x 70m in length, without the use of low noise road surface along the proposed alignment.

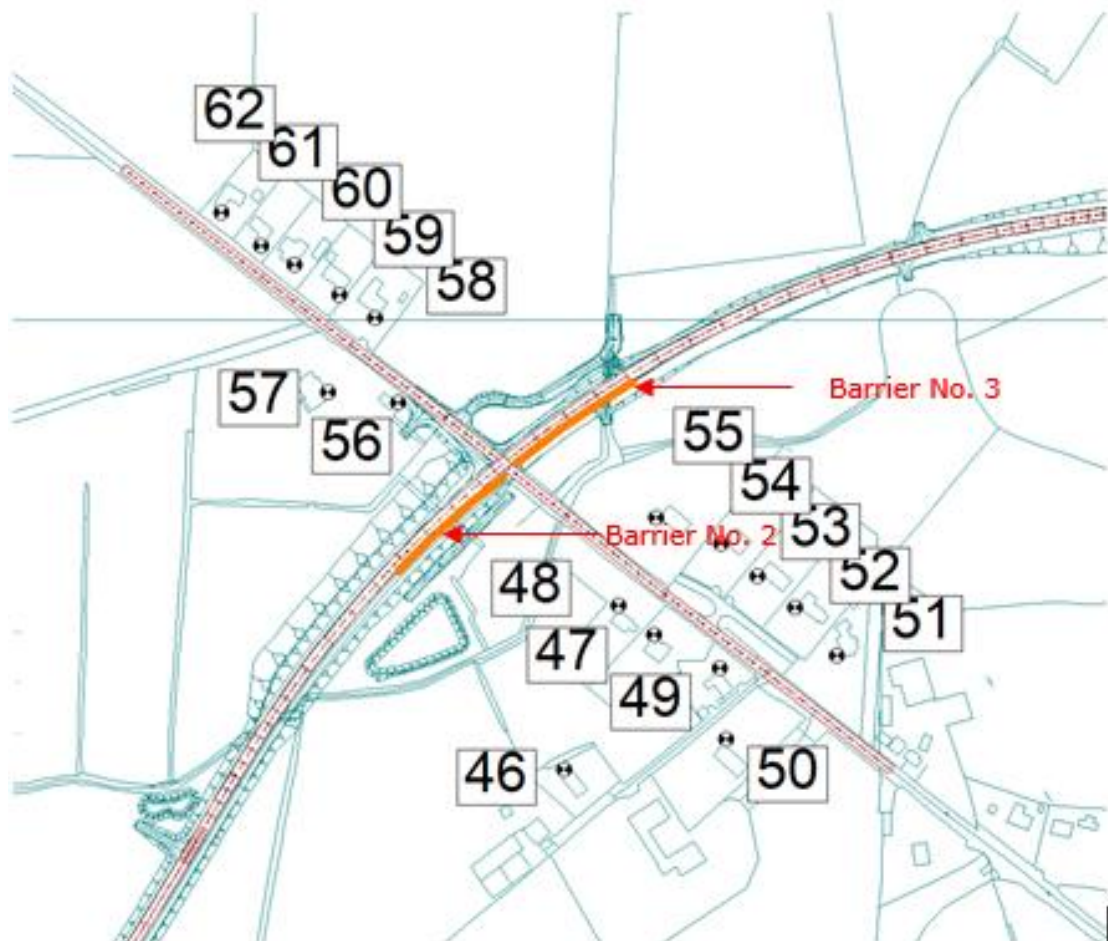


Figure 12-9 Potentially required noise barriers at No.2 & 3 at properties 46 & 53 – 2 x 2m high x 90m in length, without the use of a low noise road surface along the proposed alignment.

On the basis of the above findings and the predicted relative noise impact on residential properties along the proposed road development, the noise prediction model has been completed assuming the proposed use of a low noise road surface along the proposed alignment. Table 4.1 of the TII Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes March 2014 outlines that a correction of minus 2.5 dB(A) should be allowed for a low noise road surface, for all traffic speeds and compositions, in preference to the advice provided in Paragraph 16 of CRTN. This correction allows for the benefit of a low noise road surface without unduly exaggerating its effectiveness over the maintenance life cycle. This correction has been applied for all new stretches of road, including the proposed mainline, junctions and the Silverhill link road.

As outlined in Appendix D - Table 1, the noise impact assessment has indicated that no existing properties will require noise mitigation measures in the form of noise barriers to be included in the proposed road development, with the use of a low noise road surface along the proposed alignment.

Table 12-10 Summary of Subjective Change in Noise Levels, at the Noise Sensitive Properties in the Design Year (2038) – at 1.5m receiver height with the use of a low noise road surface along the proposed alignment

Impact	Negligible	Minor	Moderate	Major
Negative	17	11	5	0
Positive		2	12	19

Appendix D - Tables 1 & 2 detail the predicted noise levels at the 66 noise sensitive receivers at a receiver height of 1.5m (bungalow) and 4m (two-storey) in closest proximity to the proposed N52 Ardee Bypass alignment. There will be a 'Negligible' long-term impact on traffic noise levels at 17 of the 66 noise sensitive receiver locations assessed in proximity to the proposed road development. There will be minor negative changes in noise levels at 11 properties and moderate negative changes in noise levels at 5 properties. There will be a minor positive change in noise levels at 2 properties, a moderate positive change in noise levels at 12 properties and a major positive change in noise levels at 19 properties.

Currently, there are only 13 properties of the 66 assessed within the specific 300m study area corridor in proximity to the N52 Ardee Bypass that are predicted to be below the 53 dB(A) Lden WHO (2018) guideline value. With the proposed road development in operation in the Year of Opening and the Design Year there are 23 properties within the specific 300m study area corridor in proximity to the N52 Ardee Bypass that are predicted to be at or below the 53 dB(A) Lden WHO (2018) guideline value. Therefore, overall, the proposed road alignment will have a positive impact in relation to the WHO (2018) guideline value for community noise levels.

12.5 Mitigation Measures

Noise and Vibration mitigation measures for the two phases of the proposed road development that may impact on the existing noise climate in the area are outlined below. These are:

- Construction Phase Mitigation Measures, and
- Operational Phase Mitigation Measures.

12.5.1 Construction Phase Mitigation Measures

Construction Phase Noise Mitigation Measures

In order to ensure that the noise limit of 70 dB(A) LAeq 1 hour will be achieved, noise emissions at the construction phase will be managed in accordance with the mitigation measures outlined below, which are consistent with the recommendations contained within BS 5228 "Noise control on open and construction sites".

- Where the noise limits outlined in Table 12-5 are exceeded at 1m from the façade of the nearest noise sensitive properties, temporary noise screens will be erected in close proximity to the noise source such as rock breakers, etc. to ensure that a noise level of less than 70 dB(A) LAeq 1 hour is achieved at the nearest noise sensitive properties.
- No plant used on site will be permitted to cause an ongoing public nuisance due to noise.
- Piling (if required) will only be allowed to be carried out using recognised noise reducing systems, and only during specified working hours. However, it is an activity that will be confined to specific locations and be of limited duration.

- Noise due to the operation of plant and machinery on the site will be minimised and no machine which uses the dropping of heavy weights for the purpose of demolition shall be permitted.
- Noise monitoring can be undertaken if required due to complaints or planning conditions.

The contract documents will clearly specify that the Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and ensure that:

- The best means practical, including proper maintenance of plant, will be employed to minimise the noise produced by on-site operations.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract.
- Compressors will be of the “sound reduced” models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machines, which are used intermittently, will be shut down or throttled back to a minimum during those periods when they are not in use.
- Any plant, such as generators or pumps, which are required to work outside of normal working hours, will be surrounded by an acoustic enclosure.
- Throughout the contract, the supervision of the works will include ensuring compliance with the limits using the methods set out in BS 5228.

Works other than the pumping out of excavations, security and emergency works will not be undertaken outside the working hours outlined in Table 12-5 without the written permission of Louth Co. Co. When overtime and shift working, outside normal working hours, is permitted, the maximum permissible noise limits outlined in Table 12-5 will apply, subject to confirmation of operating hours and noise levels with Louth Co. Co.

Construction Phase Vibration Mitigation Measures

In many instances it has been shown that a Public Communication Strategy helps reduce or minimise public complaints. BS 5228: Part 1: 1997 Noise and vibration control on construction and open sites points to the benefits of establishing such a strategy in the excerpted paragraph below:

It is well established that people's attitudes to noise can be influenced by their attitudes to the source itself. Noise from a site will tend to be accepted more readily by local residents if they consider that the site operator is doing all that he or she can to avoid unnecessary noise. People's attitudes to vibration may be similarly influenced.

12.5.2 Operational Phase

Operational Phase Noise Mitigation Measures

The requirement for noise mitigation measures at the noise sensitive receiver locations has been examined based on a review of the three conditions which are required to be satisfied in order for mitigation measures to be deemed necessary as stipulated in the TII Guidelines.

On the basis of preliminary noise prediction modelling, of the 66 No. receiver locations assessed, 9 receivers were deemed to require mitigation measures in the Year of Opening (2023) or the Design Year (2038) as the predicted traffic noise levels at noise sensitive receiver locations did not comply with the TII design goal criteria. Therefore,

there was potentially a requirement for 3 noise barriers to be incorporated into the design of the proposed road development to achieve compliance with the 60 dB Lden design goal as specified in the TII Guidelines.

Based on the above findings and the predicted relative noise impact on residential properties along the proposed road development, the noise prediction model was subsequently completed assuming the proposed use of a use of a low noise road surface along the proposed alignment. This has negated the requirement for noise barriers to be incorporated into the design of the proposed road development.

Operational Phase Vibration Mitigation Measures

No vibration related mitigation measures are required in respect of the operational phase of the proposed N52 Ardee Bypass Road development.

12.6 Residual Impacts

Residual impacts refer to the prevailing noise climate after the proposed N52 Ardee Bypass Road development has been constructed as planned. Therefore, as the construction phase and its associated potential noise and vibration impacts are short term and temporary there will be no residual construction noise and vibration impacts.

12.7 Conclusion

A low noise surface has been determined to be required as part of the proposed road development in order to comply with the TII design goal criteria. As a result of the proposed use of a low noise surface, no further noise barrier mitigation is required.

There will be a 'Negligible' long-term impact on traffic noise levels at 17 of the 66 noise sensitive receiver locations assessed in proximity to the proposed road development. There will be minor negative changes in noise levels at 11 properties and moderate negative changes in noise levels at 5 properties. There will be a minor positive change in noise levels at 2 properties, a moderate positive change in noise levels at 12 properties and a major positive change in noise levels at 19 properties.

12.8 References

TII Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (2014)

TII Guidelines for the Treatment of Noise and Vibration in National Road Schemes. National Roads Authority (2004)

TII Environmental Impact Assessment of National Road Schemes – A Practical Guide (2008)

EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports Draft (August 2017)

ISO 1996-1: 2016 Description and Measurement of Environmental Noise

World Health Organisation Noise Guidelines for the European Region (2019)

BS 5228-1:2009+A1:2014 Noise and Vibration Control on Construction and Open Sites. Noise

BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration

BS 6472 -1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings

BS 7385-2: 1993 Evaluation and measurement of vibration in buildings - Guide to damage levels from ground-borne vibrations

The Guidelines for Noise Impact Assessment (October 2014) produced by the Institute of Environmental Management and Assessment (IEMA) HMSO (1988) Department of Transport Welsh Office, Calculation of Road Traffic Noise (CRTN)

Design Manual for Roads and Bridges (DMRB), Sustainability & Environment Appraisal LA 111 Noise and vibration (formerly HD 213/11, IAN 185/15) Revision 2 (May 2020).

Environmental Noise Regulations (2006) (S.I. No. 140 of 2006)

European Union (Environmental Noise) Directive 2002/49/EC of the European Parliament and of the Council of 25th June 2002 relating to the Assessment and Management of Environmental Noise.

13. CULTURAL HERITAGE

13.1 Introduction

The following section details the archaeological and built heritage assessment which has been undertaken for the proposed development. This assessment has been carried out to ascertain the potential impact of the proposed development on the archaeological, historical, and built heritage resource that may exist within the area.

13.2 Methodology

Cultural heritage comprises archaeology (including known archaeological sites and monuments, areas of archaeological potential and underwater archaeology); architectural heritage (that is, buildings and structures of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest); folklore; and history.

An assessment of Cultural Heritage has been undertaken to inform this chapter, which has involved a detailed study of the archaeological and historical background of the proposed development site and the surrounding area. This included records from the National Monuments Service, the National Inventory of Archaeological Heritage (NIAH) and from the Record of Monuments and Places. In addition, a number of previous studies have been reviewed which were carried out for the previous planning applications prepared for the Ardee Bypass, in particular assessments carried out for the N2/N52 Ardee Bypass in 2001 by Valerie J Keeley Ltd Archaeological Consultancy, and archaeological testing reports which were undertaken between 2012 and 2014.

The following sources have been used in identifying cultural heritage sites within the vicinity of the proposed development:

- National Monuments Service (NMS) *Historic Environmental Viewer*;
- Record of Protected Structures (RPS) for Co. Louth;
- The NMS *National Monuments in State Care: Ownership & Guardianship* (2009);
- Louth County Development Plan (2015 – 2021)
- Draft Louth County Development Plan (2021-2027)
- Meath County Development Plan (2021-2027)
- Ordnance Survey of Ireland (OSi) historic mapping (six-inch 1837 map and 25-inch 1890 map); and
- Bing Maps © aerial imagery (2020).

13.3 Receiving Environment

Ardee is situated within the flat undulating lowland, which forms the southern part of the ancient plain of Muitheimhne beside a fording point on the River Dee. It derives its name 'Ath Fhirdia', 'the ford of Ferdia', from its traditional association with the legendary combat in which Cuchulainn killed Ferdia.⁹ The following archaeological background description is taken from the *N52 Ardee Bypass Scheme Phase II Stage (i) Testing Report by Fintan Walsh of Irish Archaeological Consultancy Ltd, November 2013*.

⁹ Bradley, J., 1984. 'Ardee: An Archaeological Study', *Journal of the County Louth Archaeological and Historical Society*, vol. 20, no. 4, p. 269

Prehistoric Period

Evidence for prehistoric activity in the environs of the proposed scheme is scarce with no Recorded Monuments and Places dating to this period within c. 1km. It is possible that some of the enclosures (RMP LH017-001, LH014-032) may also date to this period although further investigation would be required to confirm this. Two burnt mound sites were identified during advance testing in the townlands of Ballygowan and Boharnamoe (MacLeod and Long, 2012b). Separate licenses were obtained by IAC to archaeologically excavate these sites (Ballygowan 1: 13E289 and Boharnamoe 1: 13E290). A ringditch (RMP LH014-033) is recorded at Mullacloe c. 1.1km north of the proposed scheme. Several standing stones are also recorded in the general area with an example known at Dowdstown (RMP LH014-035) c. 2km to the north-east. These sites generally date to the Bronze Age however they are often reused in the Iron Age and later periods. The town itself has yielded a few notable prehistoric finds including a stone axehead (NMI record only), a flint arrowhead (NMI 1942:534) of probable Neolithic date and a bronze spearhead and bridle pendant (NMI 1929:1356 and 1357) of Iron Age date. Various flint tools including scrapers and cores have been discovered in Townparks townland (NMI 1987:186–203).

Early Medieval Period

The landscape surrounding the proposed scheme is characterised by enclosures, ringforts and souterrains. This period was also characterised by the foundation of a large number of ecclesiastical sites throughout Ireland during the centuries following the introduction of Christianity in the 5th century AD. It is suggested that the cemetery and enclosures recorded at Mullanstown (RMP LH014-043) represent an ecclesiastical settlement however there is no record of a church site to date. The site was first identified in 1909 during the course of ploughing. Over 40 skeletons were recorded at this time in stone-lined graves. A spindle whorl was also retrieved at this time. A geophysical survey of this site in 2002 revealed a multi-ditched circular enclosure containing burials. It is possible that a rectangular enclosure, identified in the geophysical survey on the summit of the hilltop may contain a church building Ardee is mentioned numerous times in the Annals as a battle site during the 10th, 11th and 12th centuries suggesting that this area may have been a frontier between Meath/Mide and the North.

The Anglo Norman and Later Medieval Period

There are indications that Ardee may have its origins as a town in the 12th century. In 1185, Prince John gave the barony of Ardee to Gilbert Pippard. Pippard is attributed with the construction of the motte and bailey situated to the south east of the town. The motte, known as Castle Guard or Dawson's moat (RMP LH014-044) is an octagonal keep surrounded by a curtain wall of the same shape. It is encircled by two ramparts and ditches, however, there is definite evidence of a fosse on the south east side only.

The parish church of St Mary (RMP LH017-10107), located 1.4km south east of the proposed development within the town of Ardee existed by 1197, it was destroyed by Edward Bruce in 1315 and subsequently rebuilt, the present day site incorporates a Medieval font (RMP LH017-10110), burial monuments and various stone fragments. There is also a chantry college (RMP LH017-10106) first recorded in 1487 built to the east of the cemetery of the church. The existence of such a church alone suggests some form of settlement. By 1344, the main linear road incorporating modern day Market Street and Castle Street was in use. The burgage plot pattern still survives along Market street today, as do several narrow lanes which may have once separated medieval houses. At the close of the century growth is reflected in the agricultural, fishing and milling activities focused on the market place. A Crucifixion inscribed cross

(RMP LH107-10109) presently located at St. Mary's church is known to have once stood in the market place marking its significance as a communal commercial centre.

Urbanisation can also be measured by the foundation of the St John the Baptist (*Fratres Cruciferi*) hospital c. 1207 (RMP LH017-10122). The site was positioned on the south side of the river suggesting sizeable habitation on the north side as hospitals were usually built away from the town centre. There are no visible traces remaining.

Richardson's map shows 25 hectares of land enclosed by the town defences (RMP LH017-10101) incorporating six gateway entrances. The wall enclosed a sub rectangular area on the north side of the river Dee, the south side being bounded by the river. The only certain surviving wall fragment exists at Cappock's gate (RMP LH017-19114) although there are other possible fragments incorporated into buildings at strategic points along the presumed old town perimeter. The necessity of such defences is highlighted by the siege and capture of the town on at least three occasions in 1315, 1539 and 1641. The map also records an un-walled suburb outside the north wall of the town in Irish street. This area is unlikely to predate the late 16th century as during times of conflict the construction of buildings would be unlikely without the protection of defensive walls.

The Post Medieval Period

During the 15th century the town of Ardee grew to incorporate buildings of moderate prestige. Pippard's Castle, now the courthouse, situated on Market Street is the largest fortified townhouse in Ireland. There is another four storey building known as Hatch's Castle situated on the east side of Market Street (RMP LH017-10115) complete with battlements and a wall walk. Both structures are mentioned on Richardson's map of 1677. The existence of so many prominent buildings, such as the courthouse, during the middle ages suggest that Ardee was an important frontier town of the English pale, as well as being a good example of a medieval market town. Much of the lands surrounding the proposed scheme has been subject to drainage schemes during the post medieval and modern era.

Archaeological Heritage

The archaeological sites listed in Table 13-1 have been identified within 500m of the proposed development.

Table 13-1 Recorded Archaeological Sites Within 500m of Proposed Development

Ref.	Description	Distance from Proposed Development
ME007-002----	Barrow – Mound Barrow	60m
ME007-001001-	Graveyard	480m
ME007-001----	Church	480m
LH017-001----	Enclosure	370m
LH014-054----	Souterrain	480m
LH014-043001-	Burial Ground	45m
LH014-043002-	Enclosure	50m
LH014-042----	Castle – Unclassified	280m

The proposed route of the Ardee Bypass route was subject to desk based archaeological assessment, walkover and aerial survey during the course of the route

selection and Part X application in 2001 by Valerie J Keely Limited. The basic site investigation (geotechnical) works were completed and this was monitored archaeologically (VJK 2001d). The area around the known archaeological monument at Mullanstown has also been subject to Geophysical Survey (GSB prospection 2002).

Previous Archaeological Investigations

Archaeological testing in 2002 – IAC Ltd (Bailey 2003; licence ref.: 02E1745)

In 2002 testing was undertaken along two route options (North and South) where they pass through a medieval, D-shaped enclosure that contains a cemetery (RMP LH014-043). The results of the testing are summarised below:

The Northern Route

The northernmost of the 2 route options contained very little material of archaeological interest, with a section of a post-medieval cobbled roadway being the only feature recorded that was unique to the northern part of route. A single inhumation burial, 2 circular features with charcoal inclusions situated to the west of the inhumation, and a possible wall foundation of unknown date were also recorded at the eastern end of the test area, which is Common to both route options. It is slightly unusual for simple inhumation burials to be isolated, so it is quite possible that more burials are located at the eastern end of the scheme.

The Southern Route

The southern route contained a significant amount of archaeological remains, including 19 linear ditch-type features and 20 potential inhumation burials. Three potential pit type features were also recorded. Most of the ditch-type features recorded, tie in with the multiple ditched circular enclosure and associated field systems highlighted during the geophysical testing programme. This enclosure was located close to the top of the hill, in a slight depression on the lee side, and was c. 40m in diameter, which is typical of an early medieval rath or ringfort. No postholes, or other structural indicators were recorded on the interior of the enclosure, with the only real evidence of occupation being the abundance of animal bone recovered. Two of the 3 pit type features recorded were to the north-east of the enclosure, with strong evidence of in situ burning in one of them suggesting a possible area of industrial activity outside the enclosure. Nineteen of the twenty burials occurred on the interior of the enclosure, but it is unlikely that the enclosure marked the boundaries of the cemetery. It is more likely that the burials are associated with the Medieval D-shaped enclosure that is still evident in the surrounding field boundaries. It is possible that stone buildings, such as a church, were present within the D-shaped enclosure, but no evidence of this was discovered during testing. The rectangular enclosure coincidental with the summit of the hill, highlighted during the geophysical testing, and suggested as the location of a postulated church, was outside the land-take of the road and so could not be tested. It is estimated that approximately 60 – 70 % of the site lies within the land-take of the road. It is possible that a second cemetery is located at the eastern end of the scheme, and that the burial found during testing was an 'outlier' of this cemetery. A second cairn was noted lying outside the land-take at the eastern end of the scheme, and locals believe that these cairns were erected by the landowner to mark the sites of cemeteries (pers. comm). The whole site lies within a D-shaped boundary, which may form a medieval enclosure. This boundary was walked and inspected during the testing programme. It varies in form from a stone-faced bank, to positive and negative lynchets, and at the southern side it shows evidence for an internal drainage ditch. It only partly follows a stream line, at the south-western corner, and the western boundary does not follow the contours of the land, as it rises over the land. These

findings resulted in the route of the proposed scheme being moved to the north, avoiding the enclosure and cemetery site LH014-043.

Additional Testing in 2003 – IAC Ltd (Bayley 2004; 02E1745ext.)

Additional testing was carried out in 2003 to determine the origin and function of the D-shaped enclosure in the western limit of Mullanstown. Three additional trenches were excavated targeting boundary of the possible D-shaped enclosure. No features of archaeological significance were identified and it was determined that all three of the boundaries were laid down in recent centuries.

Further Testing undertaken from 2012 - 2014

Excavations were carried out along the route of the proposed development in 2012, 2013 and 2014 as part of the N52 Ardee Bypass Archaeological Services Contract prior to the commencement of construction works for the previous N52 Ardee Bypass which was granted planning in 2001 and 2006.

Testing in 2012 – Rubicon Heritage (McLeod and Long 2012a; 12E0373)

Further archaeological testing was carried out in Mullanstown in 2012 to investigate the potential for further burials associated with the isolated burial identified in 2002. Stage (i)k works (removal of topsoil near a known or suspected monument) were carried out within Area 10, measuring c. 5600m². Several features of archaeological significance, comprising of ditches, were identified however no further burials were recorded. It was recommended in this report that these features be fully excavated in advance of construction works.

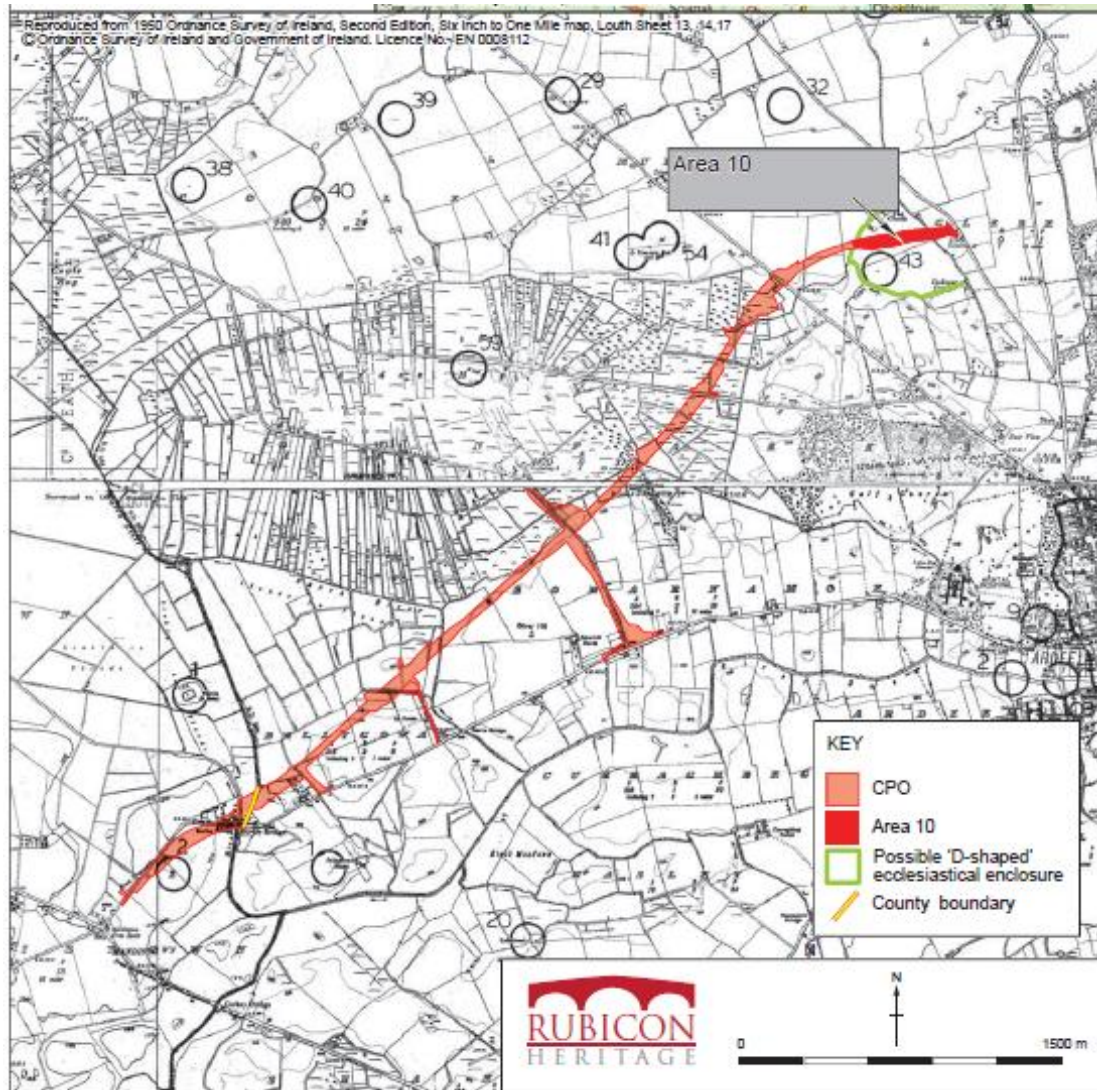


Figure 13-1 Area 10 which was tested by Rubicon Heritage in 2012

Testing in 2012 – Rubicon Heritage (McLeod and Long, 2012b; 12E0374)

Standard Stage (i) testing was also undertaken along the proposed route in 12 areas in late 2012. Two areas of archaeological significance were identified at this time, both of which appeared to represent burnt mound activity. These sites were designated as Ballygowan 1 and Boharnamoe 1.

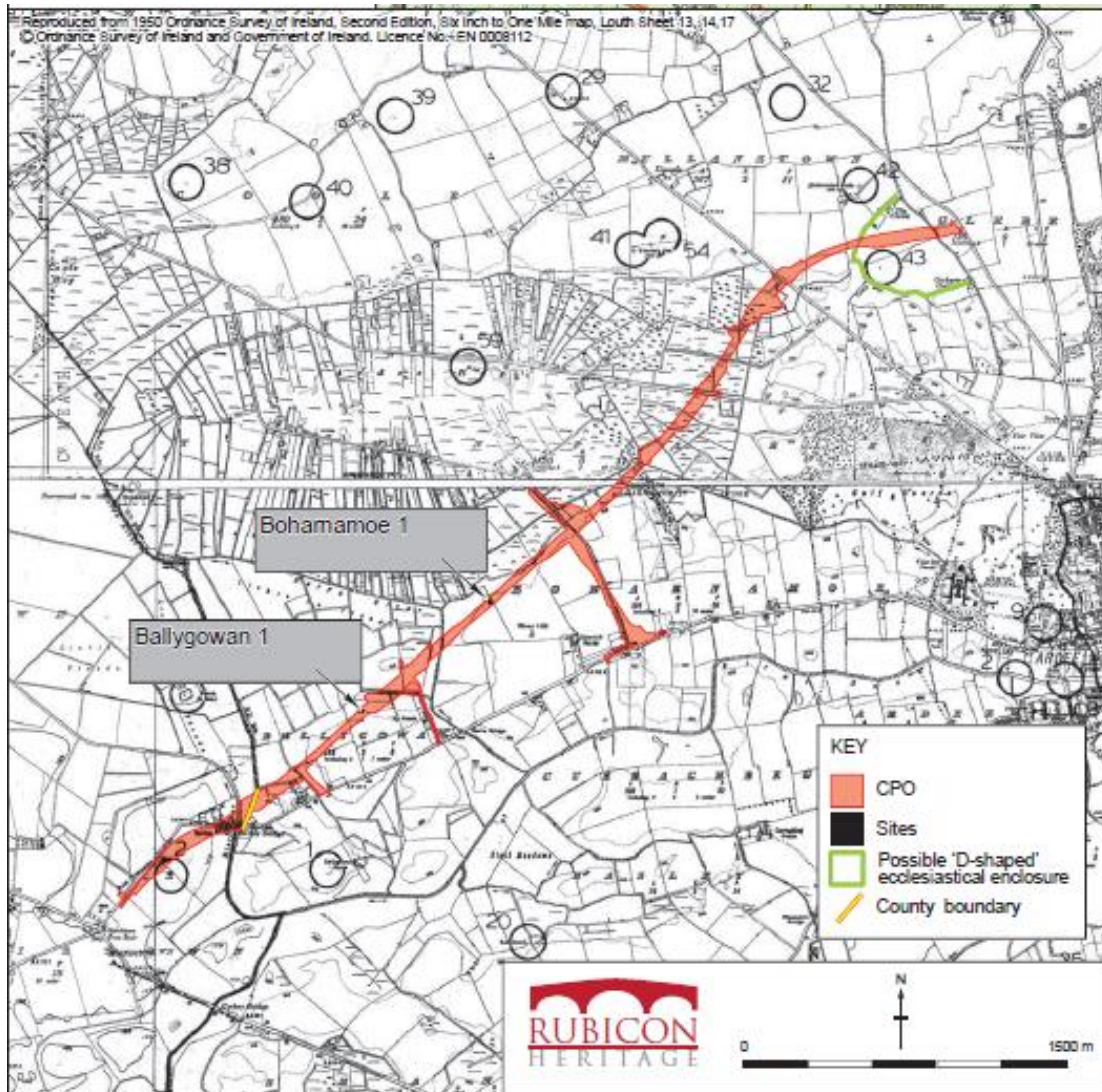


Figure 13-2 Ballygowan 1 and Boharnamoe 1 which were tested by Rubicon in 2012

Testing in 2014 – IAC (Walsh, 2014a; 13E289)

Stage (iii) excavation work at Ballygowan 1 (see Figure 13-3) was undertaken between the 4th and 5th of September 2013. The Stage (iv) post-excavation and dissemination services included all post-excavation analyses, environmental, dating, illustrative, archival, etc. arising from the Stage (iii) on-site works the results of which are detailed in this report. Ballygowan 1 comprised a heavily truncated burnt mound surviving only as an oval trough and associated burnt mound spread. Hazel charcoal from the primary fill of this trough produced a date suggesting that this site was in use in the early Bronze Age (2288–2056 BC).

Testing in 2014 – IAC (Walsh, 2014b; 13E288)

Stage (iii) excavation at Mullanstown 1 (see Figure 13-3) was undertaken between the 26th August and 6th of September 2013. Mullanstown 1 was located between 60m and 160m ENE of recorded monument LH014-043 which is a cemetery enclosure of possible early medieval date. The excavated features at Mullanstown 1 (some of which were radiocarbon dated during the Stage (ii) works) comprised: a linear ditch (AD 442–543); a field boundary ditch (AD 601–662); a curvilinear ditch/gully (AD 425–550); a cereal-drying kiln (AD 566–649); small pits; and an isolated inhumation burial

dating to AD 437–639. These features are likely to be associated, periphery, features which are effectively part of the cemetery enclosure site.



Figure 13-3 Locations of excavations undertaken by IAC in September 2013

Additional lands

Small areas of additional lands have been included within the landtake boundary for the proposed development which were not covered in the previous excavations and therefore may present a new risk of underground archaeological remains being present.

Architectural Heritage

There are no recorded Architectural Heritage sites within 500m of the proposed development.

13.4 Predicted Impacts

13.4.1 Construction Phase

The degree of impact to the archaeological, architectural and cultural heritage sites from the proposed development can be categorised as direct and indirect impacts. Direct impacts relate to a situation where the extents of a site or of its features are physically located within the footprint of the proposed road development and the associated construction works. This may include the removal of part or all of the site. Indirect impact results if the sites are in the immediate environs of the proposed development. An indirect impact can also occur if a site or parts of its features are in close proximity to the new development i.e. within c. 50m.

Archaeology

The majority of the proposed development is located within a greenfield site that has been subject to previous phase I – phase III testing. Focused excavations have been carried out in sensitive areas and any finds of archaeological interest have been recorded. Therefore, there are no predicted impacts anticipated within this area. Where testing or topsoil stripping didn't include the full footprint of the road footprint, there may still be potential for impacts on unknown archaeological features.

There are small areas of additional landtake in greenfield areas and therefore it is possible that previously unrecorded archaeological features that have the potential to survive beneath the current ground level. Earthworks associated with the proposed development could have the potential to damage any unknown sites.

Built Heritage

No direct impact is predicted to the setting of any protected structures from the proposed development as they are located more than 50m from the study area.

13.4.2 Operational Phase

The operational phase will not have any direct impacts on any archaeological or architectural sites or buildings. The potential for indirect impacts in the form of impacts on the setting of archaeological sites or architectural buildings are set out in Table 13-2 below.

Table 13-2 Potential Impacts on Archaeological Sites Operational Stage

Ref.	Class	Townland	Distance from Proposed Development	Description	Potential Impact Type	Potential Impact Level
ME007-002----	Barrow – Mound Barrow	Mandistown	60m S	Situated on a low hill. This is a grass-covered mound (diam. of base 15m; NW-SE; H 1.4-1.9m) with a fairly flat top (diam. 7m E-W) and a rather square base (diam. 23m NW-SE) caused by plough scarps (H 1.2-2m), which increases the apparent height (H 2.5-3m).	Indirect Negative	Not significant
ME007-001001-	Graveyard	Mandistown	480m N	Situated on a rise in a low-lying landscape with a W-E section of the River Dee c. 250m to the S. The church of Inismocht (ME007-001----) is within a rectangular enclosure (dims 33m NE-SW; 21m NW-SE) defined by traces of wall foundations and scarps. There are no headstones visible, but bones are said locally to have been found in the vicinity. (Tempest 1944)	Indirect Negative	Not Significant
ME007-001----	Church		480m	The monastery of Inismocht was founded on an island in what is now a dried out lake of the River Dee, by Mochta Mac Cearnagh, a priest of Armagh who died in 922. Mochta is remembered on 26 March and is not to be confused with St. Mochta of Louth (Ó Riain 2011, 466). It served as the parish church of Inismott and is listed in the ecclesiastical taxation (1302-06) of Pope Nicholas IV (Cal. doc. Ire. 5, 261). Ussher describes Ennismoughton as a ruined (Erlington 1847-64, 1, xcvi) as does Dopping (1682-5) when it was not enclosed (Ellison 1973, 6). It is depicted as a roofless ruin on the Down Survey (1656-8) barony map of Slane where it is described as 'Enesmott church in the bog.' By the 19th century the tithes of Innismott were inappropriate to St. Mark's chapel in Drogheda (Lewis 1837, 2, 24). The church is on a rise in a level landscape with the canalised W-E River Dee c. 230m to the S. The remains consist of the N and S walls of a church (ext. dims 8.3m E-W, originally c. 14.5m; 7.2m N-S) standing in a rectangular enclosure (dims 33m NE-SW; 21m NW-SE) defined by scarps. There is no evidence of grave markers but bones have been found in vicinity (Tempest 1944).	Indirect Negative	Not Significant

Ref.	Class	Townland	Distance from Proposed Development	Description	Potential Impact Type	Potential Impact Level
LH017-001----	Enclosure	Ballygowan	370m SE	Situated on small, natural ridge, just N of River Dee. Rectangular area (max. dims. 52m WSW-ENE, 32m NNW-SSE) with rounded corners enclosed from S-W-N-E by earthen bank (Wth 6m, H 0.3m), from E-S by steep scarp. Aerial photograph (GB91.DC.17) shows cropmark of a large enclosure defined by two incomplete fosses. Traces of a third possible fosse are visible on the southern side of the enclosure. The cropmark enclosure surrounds the small rectilinear enclosure described above.	Indirect Negative	Imperceptible
LH014-054----	Souterrain	Mullanstown	480m	Local tradition of a 'cave' in 'Lissespin Fort' (LH014-041----).	Indirect Negative	Imperceptible
LH014-043001-	Burial Ground	Mullanstown	45m	Situated on a low flat hillock and discovered c. 1909 during the course of ploughing. Prior to that date gravel-digging had revealed four human skeletons (CLAJ 1909, 204). The owner of the land, on discovering the remains in 1909, uncovered an area of c. 10m by 4.5m. An estimated forty skeletons were discovered, only three of which appeared to be complete. The graves were closely adjoining, separated from each other by rough stones and covered wholly or partially with rough stones. The graves were not more than one foot under the surface. A spindle-whorl was found amongst the graves. (CLAJ 1909, 204-5)	Indirect Negative	Slight
LH014-043002-	Enclosure	Mullanstown	50m	Currently the information for this record has not been uploaded.	Indirect Negative	Imperceptible
LH014-042----	Castle – Unclassified	Mullanstown	280m	A castle is shown on Taylor and Skinner's map of 1777, but not on the 1778 edition (P 38). It is marked as the site of a castle on the 1835 and 1907 eds of the OS 6-inch map. The location is now disused quarry pit and no features are visible at ground level.	Indirect Negative	Imperceptible

13.5 Mitigation Measures

All recommendations are subject to approval by the National Monuments Service of the Heritage and Planning Division, Department of Culture, Heritage and the Gaeltacht. The mitigation measures recommended include:

Archaeology

A number of additional areas of land are required to be made available to facilitate the construction of the proposed N52 Ardee Bypass, in particular to facilitate the revised junction layouts and drainage works.

The additional areas have a low archaeological potential, given the extent of testing undertaken on lands immediately adjacent to the additional lands. However, it is proposed to carry out a programme of trench testing within these areas to ensure that there are no underlying features of archaeological potential. The following areas will therefore be subject to testing prior to construction:

- Area 102 (2034 sqm) at Chainage 1+500 where the proposed attenuation pond will be located.
- Area 103 (2700 sqm) at Chainage 2+075 where the proposed attenuation pond will be located.
- Area 104: (4685 sqm) at Chainage 0+450 on Silverhill Road, where the site compound is proposed to be located.
- Area 105: (6100 sqm) at Chainage 3+200 where the Townparks north junction link road is proposed to be located.

The total area which will be subject to archaeological testing prior to works commencing will comprise 15,519 sqm (1.55 hectares). These areas are identified in Drawing N52A-ROD-EAC-SW_AE-DR-EN-300056.

If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the NMS of the DoCHG.

Archaeological Monitoring

Archaeological Monitoring is recommended during soil stripping of all ground areas associated with the preferred route and any associated earthworks and drainage works, with the full excavation of any archaeologically significant material uncovered at this time.

Retaining an Archaeologist/s

An archaeologist/s should be retained for the duration of the relevant earthworks.

Time-Scale

The time-scale for the construction phase should be made available to the archaeologist, at an early stage, with information on where and when topsoil stripping will take place.

Sufficient Notice

It is essential to give sufficient notice to the archaeologist/s in advance of topsoil stripping (minimum four weeks). This will allow for prompt arrival on site to monitor the soil stripping. As often happens, intervals may occur during the construction phase. In

this case, it is also necessary to inform the archaeologist/s as to when earthworks will recommence.

Discovery of Archaeological Material

In the event of archaeological features or material being uncovered during the construction phase, it is crucial that the machine work cease in this immediate area to allow the archaeologist/s to inspect any such material.

Archaeological Team

It is also recommended that the core of an archaeological team be on standby to deal with any such rescue excavation. This would be complemented in the event of full excavation.

Secure Site Offices

Site offices and facilities should be provided on or near those sites where archaeological excavation is required.

Fencing

Fencing of any archaeological sites would be necessary once discovered and during their excavation.

Adequate Funds

Adequate funds to cover preparatory survey work, excavation, post-excavation work, and any testing, specialist analysis or conservation work required should be made available.

Site Offices

No site offices, depots, or storage facilities should be placed on or near any of the areas of archaeological potential.

Access Roads

Access roads or haul roads during construction should not encroach on any selected sites or areas of archaeological potential and their environs.

Machinery

Small machines should be used in any areas that are particularly sensitive.

Spoil

Spoil should not be dumped on any selected sites or their environs.

Borrow Pits

Borrow pits should not be located on or in proximity to any of the selected sites and their environs.

Underwater Archaeology

It is the recommendation of the Underwater Archaeology Unit that the areas to be impacted by proposed works be subject to a full underwater archaeological assessment – that is all rivers and streams to be impacted by the road construction and associated vehicular/construction plant. The underwater assessment should take the form a detailed desktop study, field survey to include banks of rivers and streams,

underwater survey of waters more than 0.75m, deep and wading surveys of any rivers/streams less than 0.75m deep.

The underwater surveys should also be accompanied by a metal detection survey. The underwater assessment should be licensed to the Department of Housing, Local Government & Heritage under the National Monuments Acts 1930-2004 and should be undertaken by a suitably qualified archaeologist. The results should be forwarded to the office of the Underwater Archaeology Unit for review in advance of works proceeding.

All diving will be undertaken in accordance with the Health and Safety Authority's Safety in Industry (Diving at Work) Regulations 1981, SI 422. As such the developer(s)/applicant(s) engaging the necessary archaeological personnel should ensure that all dive equipment used and dive team personnel qualifications are properly certified and that the correct commercial dive insurance is in place.

Architecture

There are no predicted impacts to any architectural structures, therefore no mitigation measures are proposed.

Operational Phase

There are no mitigation measures proposed for the operation phase for Archaeology, Architecture or Cultural Heritage.

13.6 Residual Impacts

Following the implementation of the mitigation measures, as proposed above, there will be no residual impact on the archaeological and built heritage resource during the construction stage. The operational stage may have an indirect impact on the setting or archaeological sites in proximity to the route, however these are likely to range from imperceptible to slight.

13.7 Conclusion

A suite of archaeological tests and excavations were carried out previously on the footprint of the proposed development for previous projects. A number of additional areas of land have been included in the land take which have not previously been subject to testing, therefore mitigation measures have been put in place to ensure that areas of potential are tested in advance of works commencing.

A range of mitigation measures are outlined for the construction stage to ensure that any potential archaeological features if found, are monitored by an onsite archaeologist.

13.8 References

Bailey 2003; licence ref.: 02E1745; Archaeological testing report, N52 Ardee Bypass, Area 10

Bayley 2004; 02E1745 ext. Archaeological testing report, N52 Ardee Bypass, Area 10

Bradley. J., 1984. 'Ardee: An Archaeological Study', Journal of the County Louth Archaeological and Historical Society, vol. XX, no. 4, p. 269

McLeod and Long 2012a; N52 Ardee Bypass Archaeological Services Contract Stage (i) & (ii) Services Report on Stage (i)a and k Test Excavation Services and Stage (ii) Pre-excavation Services at Area 10, Mullanstown Townland, Co. Louth

McLeod and Long, 2012b; N52 Ardee Bypass Archaeological Services Contract Stage (i) & (ii) Services Report on Stage (i) Test Excavation Services and Stage (ii) Pre-Excavation Services.

Walsh, 2013; N52 Ardee Bypass Scheme Phase II Stage (i) Testing Report, Irish Archaeological Consultancy Ltd, November 2013

Walsh, 2014a; 13E289; N52 Ardee Bypass Scheme Phase II, County Louth, Ballygowan 1: Burnt Mound, Stage (iv) Final Excavation Report.

Walsh, 2014b; 13E288; N52 Ardee Bypass Scheme Phase II, County Louth Mullanstown 1: Early Medieval Ditches, Kiln and Burial; Final Excavation Report.

Valerie J Keeley Ltd Archaeological Consultancy, Archaeological Assessment Preferred Route Assessment for Environmental Impact Study N2/N52 Ardee Bypass Co. Louth, October 21.

14. MATERIAL ASSETS AND LAND

14.1 Introduction

Material assets are considered to include infrastructure and utilities including rail, road, water supply, electric grid, gas network and wastewater treatment facilities. It also includes economic assets, properties and land. There are a number of material assets present within the proposed development boundary.

14.2 Methodology

This chapter will describe the receiving environment and determine the significance of the impact of the proposed development on:

- Land use and ownership – an examination of impacts on housing, severance, loss or rights of way or amenities, conflicts, or other changes likely to ultimately alter the character and use of the surroundings
- Local businesses at construction and operation phases of the proposed development.
- Existing utilities
- Agronomy

To complete this assessment, a baseline study of the existing material assets environmental has been undertaken using desktop research. Additionally, aerial photography, Google Maps and a site layout plan of the existing area and proposed development have been consulted.

The assessment will involve the following stages:

- A description of the receiving environment in relation to material assets and land
- A qualitative assessment of impacts on material assets and land
- Prescription of mitigation measures to avoid, reduce or compensate for negative impacts identified (if applicable).
- Description of any residual impacts after assumed implementation of mitigation measures (if applicable).

The Material Assets and Land chapter should be read in conjunction with the following chapters:

- Chapter 3 - Description of the Proposed Development
- Section 5 - Traffic and Transport
- Section 6 - Population and Human Health

14.3 Receiving Environment

Agriculture and Land

Due to the greenfield nature of the site, the main land use within the vicinity of the proposed development is agriculture. Most of this land is owned by Louth County Council under a Compulsory Purchase Order (CPO) which was granted in 2006. The lands within this CPO were previously used for agriculture and fencing was erected in 2018. The agricultural enterprises affected by the proposed development predominantly consist of grassland enterprises such as sheep and beef farming and land that is used for silage and hay. Additionally, lands are used for tillage enterprises. There are two known high sensitivity agricultural enterprises that will be affected by

the proposed development – Duleek Poultry farm on Silverhill Road and a Dairy Enterprise located on Silverhill Road.

Non-Agriculture

This aspect of the baseline environment considers adjacent properties, businesses and community facilities. There are several residential dwellings located along the National and Local roads crossed by the proposed development, namely the N52, the Silverhill Road, Townparks Road and the N2.

There are several businesses and community amenities located within the vicinity of the proposed development, such as Seamie Walsh Interiors, Ardee Precast, Ardee Coach, Ardee Celtic Football Club on Townparks Road, Ardee Golf Club and Ardee Rugby Club on Golf Links Road.

ESB

The ESB distribution network comprises medium voltage (MV) and low voltage (LV) electricity lines which are managed by ESB networks area offices. These include:

- Existing MV/LV underground lines east of Silverhill Road
- 38kV high voltage overhead powerline, located east of the proposed development in a north south direction
- Existing overhead LV/MV lines located

Gas Networks

Gas Networks Ireland records indicate that there is a 250mm high pressure transmission gas main crossing the existing N52 and the proposed development in a north-west to south-east direction that will require diversion and protection works to be undertaken to facilitate the proposed development.

Telecommunications

Eircom records indicate that there is existing overhead and underground infrastructure in the vicinity of the proposed development. The overhead lines run along the existing N52. The underground lines are located at the proposed Silverhill Road junction

Water Supply

There is existing watermain infrastructure located within the vicinity of the proposed development. The watermain runs parallel to the existing N52.

14.4 Predicted Impacts

Agriculture and Land

Construction Phase

Acquisition of a small area of private lands from landowners will be required through either landowner agreement or a Compulsory Purchase Order (CPO) to accommodate the proposed development design. Compensation will be given to landowners which will be agreed with the affected landowners during the CPO process. There will be no agricultural buildings affected by the proposed development. Accommodation works necessary to construct the project are likely to temporarily affect public lands outside of this CPO and will be subject to landowner agreements. Table 14-1 provides an outline of the predicted impacts on agricultural lands before and after mitigation is put in place, in accordance with the EPA impact ratings.

Operation Phase

11 agricultural properties will be affected by additional land take. The majority of properties are currently experiencing severance due to the CPO from the previous bypass scheme.

Non-Agriculture

Construction Phase

There will be no dwelling houses demolished to accommodate the proposed development. The curtilage of three no. residential properties on the Silverhill Road and one on the existing N52 will be directly affected to accommodate the proposed junction with the existing N52. Some short-term restrictions may be required to certain properties.

Operation Phase

There are no impacts on non-agricultural properties predicted during the operation stage of the proposed development.

ESB

Construction Phase

Disruption to utilities may occur during the construction phase, however outages to facilitate diversion of these utilities will be kept to the minimum required and advance notice given to affected properties prior to any loss of service.

Operation Phase

No impacts are predicted for ESB for the operation phase of the proposed development.

Gas Networks

Construction Phase

A 250mm high pressure transmission gas main which crosses the alignment of the proposed development in a north-west to south-east direction will require diversion to facilitate the proposed development.

Operation Phase

No impacts are predicted for Gas Networks for the operation phase of the proposed development.

Telecommunications

Construction Phase

Disruption to utilities may occur during the construction phase, however outages to facilitate diversion of these utilities will be kept to the minimum required and advance notice given to affected properties prior to any loss of service.

Operation Phase

No impacts are predicted for telecommunications for the operation phase of the proposed development.

Water Supply

Construction Phase

Disruption to utilities may occur during the construction phase, however outages to facilitate diversion of these utilities will be kept to the minimum required and advance notice given to affected properties prior to any loss of service.

Operation Phase

No impacts are predicted for water supply for the operation phase of the proposed development.

14.5 Mitigation Measures

Agriculture and Land

Construction Phase

The following mitigation measures will be implemented during the construction phase:

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare an Emergency Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues;
- Stock proof fencing erected to severed lands to prevent access to the construction site from the adjacent lands;
- Existing roads to be kept open to facilitate access as far as practicable, with temporary diversions implemented where necessary to ensure access is maintained.

Operation Phase

The following mitigation measures will be implemented as shown on drawings N52A-ROD-EAC-SW_AE-DR-EN-300004 to 300022:

- Replacement of or new accesses to land holding;
- Replacement of or new animal underpasses to connect severed land where warranted;
- Provision of new gated access tracks to lands severed by the proposed development.

Non-Agriculture

Construction Phase

The following mitigation measures will be implemented during the construction phase:

- Traffic Management will be put in place to ensure access to residential and commercial property is maintained during construction.

Operation Phase

The following mitigation measures will be implemented during the construction phase:

- Boundaries and accesses to residential and commercial property where affected, will be reinstated on a like for like basis.

ESB

Construction Phase

The following mitigation measures will be implemented during the construction phase:

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare a Stakeholder Management Plan which will ensure agreement with utility owners and notification of local residents which may be affected by the interruption to utilities, services and infrastructure provisions during the construction stage.
- Prepare an Incident Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues.
- Residents will be notified in advance of any disruption to utilities.

Operation Phase

No mitigation measures are proposed for the operation phase.

Gas Networks

Construction Phase

The GNI diversion of the high-pressure transmission main will be required to commence early in the construction period or as an advance works contract to ensure that adequate protection over the gas main is provided to facilitate construction traffic traversing the gas main and thereby provide access to the River Dee and River Gara bridges.

The following mitigation measures will be implemented during the construction phase:

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare a Stakeholder Management Plan which will ensure agreement with utility owners and notification of local residents which may be affected by the interruption to utilities, services and infrastructure provisions during the construction stage.
- Prepare an Incident Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues
- Residents will be notified in advance of any disruption to utilities.

Operation Phase

No mitigation measures are proposed for the operation phase.

Telecommunications

Construction Phase

The following mitigation measures will be implemented during the construction phase:

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare a Stakeholder Management Plan which will ensure agreement with utility owners and notification of local residents which may be affected by the interruption to utilities, services and infrastructure provisions during the construction stage.
- Prepare an Incident Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues.

- Residents will be notified in advance of any disruption to utilities.

Operation Phase

No mitigation measures are proposed for the operation phase.

Water Supply

Construction Phase

The following mitigation measures will be implemented during the construction phase:

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare a Stakeholder Management Plan which will ensure agreement with utility owners and notification of local residents which may be affected by the interruption to utilities, services and infrastructure provisions during the construction stage.
- Prepare an Incident Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues
- Residents will be notified in advance of any disruption to utilities.

Operation Phase

No mitigation measures are proposed for the operation phase.

14.6 Residual Impacts

With the inclusion of mitigation measures, it is envisaged there will be no likely significant effects to utilities or non-agricultural land. Some severance of agricultural land will be required to accommodate the proposed development alignment, which will result in a slight, negative, long-term effect.

Table 14-1 Agricultural Assessment Table

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
001		- Severance currently exists due to the CPO from previous scheme - Agricultural lands located to the south of the proposed road alignment	No additional land take is required.	Moderate	Access roads will be provided south of the proposed road alignment at Ch. 0+450 and between Ch. 0+100 to Ch. 0+150	Slight
002(i)	0.203	- Agricultural lands located to the north and south of the proposed road alignment - Current access to this land is located approx. 20m west of Ch. 0+000	Additional land take required to accommodate attenuation pond at Ch. 0+050 to Ch. 0+100.	Moderate	- During the operational phase, Louth County Council will be responsible for carrying out regular, maintenance of attenuation ponds. - An access road will be provided between Ch. 0+000 and Ch. 0+050	Slight
002(ii)		- Agricultural lands located to the north and south of the proposed road alignment - Severance currently exists due to the CPO from previous scheme - Residential property and agricultural buildings located to the north of the proposed road alignment	2no. attenuation ponds proposed, located south of the proposed road alignment at between Ch. 0+550 and 0+600 and north of the proposed alignment between Ch. 0+600 and 0+750. - No additional land take is required to accommodate the attenuation ponds	Slight	2no. access roads will be provided north of the proposed alignment between Ch. 0+350 and 0+400 and between Ch. 0+750 and 0+800 - During the operational phase, Louth County Council will be responsible for carrying out regular, maintenance of attenuation ponds.	Not Significant
003		- Severance currently exists due to the CPO from previous scheme - Residential properties located to the south of the proposed road alignment	No additional land take is required.	Slight	No mitigation measures are proposed for this plot	Slight

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
		Agricultural lands located to the north of the proposed road alignment				
004		- Severance currently exists due to the CPO from previous scheme - Residential properties located to the south of the proposed road alignment	No additional land take is required.	Not Significant	No mitigation measures are proposed for this plot	Not Significant
005		- Severance currently exists due to the CPO from previous scheme - Residential properties located to the south of the proposed road alignment - Agricultural land located to the north of the proposed road alignment	No additional land take is required.	Not Significant	Access roads will be provided north of the proposed road alignment at Ch. 0+900	Not Significant
006		- Severance currently exists due to the CPO from previous scheme - Agricultural lands located to the south of the proposed road alignment	No additional land take is required.	Not Significant	No mitigation measures are proposed for this plot	Not Significant
007		- Severance currently exists due to the CPO from previous scheme - Agricultural lands located north and south of the proposed road alignment	No additional land take is required.	Moderate	An access road will be provided north of the proposed road alignment between Ch. 1+300 and 1+350	Slight
008		Severance currently exists due to the CPO from previous scheme	No additional land take is required.	Not Significant	No mitigation measures are proposed for this plot	Not Significant

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
		Agricultural lands located south of the proposed road alignment				
009		- Severance currently exists due to the CPO from previous scheme - Agricultural lands located to the north and south of the proposed road alignment	No additional land take is required.	Not Significant	An access road will be provided north of the proposed road alignment between Ch. 1+500 and 1+550	Not Significant
010	0.198	- Agricultural buildings located south of the proposed road alignment - Agricultural lands located to the north of the proposed road alignment - Severance currently exists due to the CPO from previous scheme	Additional land take required to accommodate attenuation pond at Ch. 1+450 to 1+500.	Moderate	- During the operational phase, Louth County Council will be responsible for carrying out regular, maintenance of attenuation ponds. - New access roads will be provided north and south of new road alignment to maintain access agricultural lands between Ch. 1+500 and 1+550.	Slight
011		- Severance currently exists due to the CPO from previous scheme - Agricultural lands located north and south of the proposed development	No additional land take is required.	Not significant	No mitigation measures are proposed for this plot	Not significant
012	0.147	- Agricultural lands located to the north and south of the proposed road alignment - Severance currently exists due to the CPO from previous scheme	Additional land take required to accommodate attenuation pond at Ch. 2+050 to Ch. 2+150	Moderate	- During the operational phase, Louth County Council will be responsible for carrying out regular, maintenance of attenuation ponds. - New access roads will be provided north and south of new road alignment, between Ch. 2+000 and 2+2050 to ensure access is	Slight

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
					maintained between agricultural lands	
013		- Severance currently exists due to the CPO from previous scheme - Agricultural lands located to the north and south of the proposed road alignment	No additional land take is required.	Moderate	- A cattle underpass will be provided at Ch. 2+200 allowing for access to lands located north and south of the proposed road alignment 2no. access roads will also be provided between Ch. 0+150 and Ch. 0+200 off Silverhill Road West. Existing Accesses on the existing N52 and Silverhill Road East maintained	Not Significant
014	0.549	- Agricultural lands located to the north and south of the proposed road alignment - Residential and farm buildings located south of the proposed alignment - Severance currently exists due to the CPO from previous scheme	- Additional land take required to accommodate cycleway along the southern verge of the proposed alignment from Ch. 2+650 to Ch. 2+700. Additional land take required to accommodate site compound at proposed roundabout on Silverhill road. - Proposed attenuation pond located north of the proposed alignment between Ch. 2+400 to 2+500.	Moderate	4no. new access roads will be provided for access to lands north and south of the proposed development. - An access road will be located north of the proposed road alignment between Ch. 0+050 and Ch. 0+100 on Silverhill Road West. - An access road will also be provided between Ch. 0+050 and Ch. 0+100 on Silverhill Road East to provide access to the farm sheds - Two accesses between Ch. 0+200 and Ch. 0+250 and Ch.0+250 and Ch. 0+300 are provided off the realigned Silverhill Road to provide access to the lands and reinstate existing accesses.	Slight
015	0.025	Agricultural lands located to the north and south of the proposed road alignment	Additional land take required to accommodate cycleway along the verge	Slight	A new access road will be provided between Ch. 0+150 and Ch. 0+200 on Silverhill Road West.	Not Significant

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
		Severance currently exists due to the CPO from previous scheme	of the proposed road at Ch. 2+700 to Ch. 2+800			
016 / 034	0.603	- Severance currently exists due to the CPO from previous scheme - Agricultural roads located to the north and south of the proposed alignment	- Additional land take required for proposed Townparks link - Additional land take required to facilitate cycleway	Slight	- Access roads will be provided north and south of the proposed road alignment at Ch. 3+350. - An additional access road will be provided at Ch. 0+050 on Townparks Road East and CH0+300 on the Townparks Road West	Not Significant
017		- Severance currently exists due to the CPO from previous scheme - Residential property located east of the proposed Silverhill Road alignment - Agricultural lands located east of Silverhill Road	No additional land take is required.	Not Significant	A new access road will be provided north of the proposed alignment at Ch. 0+275 on Silverhill Rd East	Imperceptible
018		- Severance currently exists due to the CPO from previous scheme - Residential property located west of Silverhill Road - Agricultural lands located west of Silverhill Road	No additional land take is required	Not Significant	Farm access track reinstated to connect to realigned Silverhill Road East	Imperceptible
019		- Severance currently exists due to the CPO from previous scheme - Residential property located west of Silverhill Road - Agricultural lands located west of Silverhill Road	No additional land take is required.	Not Significant	An access road will be provided south of the proposed road alignment at Ch. 0+300 on Silverhill Road	Imperceptible

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
020		- Severance currently exists due to the CPO from previous scheme - Residential property located west of Silverhill Road - Agricultural lands located west of Silverhill Road	- No additional land take is required. - The current access to this property will be maintained	Not Significant	An access road will be provided at Ch. 0+425 on Silverhill Road to allow access to residential properties	Imperceptible
021		- Severance currently exists due to the CPO from previous scheme - Residential property located west of Silverhill Road - Agricultural lands located west of Silverhill Road	- No additional land take is required. - The current access to this property will be maintained	Not Significant	An access road will be provided at Ch. 0+425 on Silverhill Road to allow access to residential properties	Imperceptible
022		- Severance currently exists due to the CPO from previous scheme - Residential property located west of Silverhill Road - Agricultural lands located west of Silverhill Road	- No additional land take is required. - The current access to this property will be maintained	Not Significant	An access road will be provided at Ch. 0+425 on Silverhill Road to allow access to residential properties	Imperceptible
023		- Severance currently exists due to the CPO from previous scheme - Residential property located west of Silverhill Road - Agricultural lands located west of Silverhill Road	- No additional land take is required. - The current access to this property will be maintained	Not Significant	An access road will be provided at Ch. 0+425 on Silverhill Road to allow access to residential properties	Imperceptible
024		Severance currently exists due to the CPO from previous scheme	- No additional land take is required. - The current access to this property will be maintained	Not Significant	An access road will be provided at Ch. 0+425 on Silverhill Road to allow access to residential properties	Imperceptible

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
		- Residential property and agricultural buildings located west of Silverhill Road - Agricultural lands located west of Silverhill Road				
025		Agricultural lands located south of the existing N52 west road alignment	No additional land take is required. The current access to this property will be maintained	Imperceptible	No mitigation measures are proposed for this plot	Imperceptible
026		Residential property located east of the existing N52 at Silverhill Road	- No additional land take is required. - The current access to this property will be maintained	Not Significant	Access realigned to connect to realigned N52 south of proposed Silverhill Roundabout	Imperceptible
027		Residential property located south of the existing N52 west road alignment	- No additional land take is required. - The current access to this property will be maintained	Imperceptible	Access realigned to connect to Silverhill Road Roundabout	Imperceptible
028		Agricultural lands located south of the existing N52 east road alignment	No additional land take is required.	Imperceptible	Access realigned to connect to Silverhill Road Roundabout	Imperceptible
029		Residential property located north of the existing N52 east alignment/proposed road alignment	- No additional land take is required. - The current access to this property will be maintained	Imperceptible	Existing access reinstated	Imperceptible
030		Residential property located north of the existing N52 east alignment/proposed road alignment	No additional land take is required.	Imperceptible	Existing access retained	Imperceptible
031		Residential property located north of the existing N52 east alignment/proposed road alignment	No additional land take is required.	Imperceptible	Existing access retained	Imperceptible

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
032	0.0004	Agricultural lands located to the north and south of the proposed road alignment	Additional land take required to accommodate cycleway.	Imperceptible	No mitigation measures are proposed due to the small amount of additional land required.	Imperceptible
033	0.137	- Agricultural lands located to the north and south of the proposed road alignment - Severance currently exists due to the CPO from previous scheme	- Additional land take required to accommodate attenuation pond at Ch. 2+800 to 2+900 - Additional land take required to accommodate cycleway along the verge at Ch. 2+800 to Ch. 3+075.	Slight	- During the operational phase, Louth County Council will be responsible for carrying out regular, maintenance of attenuation ponds. 2 access roads will be provided north and south of the proposed road alignment at Ch. 2+825	Not significant
035	0.847	Agricultural lands located east of Townparks road	Additional land take required to accommodate Townparks link resulting in land severance	Slight	Existing Access retained	Slight
036	0.060	- Severance currently exists due to the CPO from previous scheme - Agricultural lands located to the north and south of the proposed road alignment	Additional land take required to accommodate cycleway along the verge at Ch. 3+350 to Ch.3+575.	Moderate	- During the operational phase, Louth County Council will be responsible for carrying out regular, maintenance of attenuation ponds. - Two access roads will be provided north and south of the proposed road alignment at Ch. 3+375.	Slight
037	0.454	- Severance currently exists due to the CPO from previous scheme - Agricultural lands located to the north the proposed road alignment	Additional land take required to accommodate site for disposal of material and realignment of the Mullanstown Road	Moderate	- An access road will be provided north of the proposed alignment between Ch. 3+700 to 3+750 - During the operational phase, Louth County Council will be responsible for carrying out regular, maintenance of attenuation ponds.	Slight

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
039	0.015	- Severance currently exists due to the CPO from previous scheme - Residential properties located to the north and south of the proposed road alignment - Agricultural lands located north of the proposed road alignment	Additional land take required to accommodate realignment of the Mullanstown Road	Slight	Existing access retained	Not Significant
040		- Severance currently exists due to the CPO from previous scheme - Agricultural lands located to the north and south of the proposed road alignment	No additional land take is required.	Slight	- Access roads will be provided north and south of the proposed alignment at Ch. 3+850 - Farm access track realigned to connect to Mullanstown Road north	Not Significant
042		- Severance currently exists due to the CPO from previous scheme - Agricultural lands located to the north and south of the proposed road alignment	No additional land take is required.	Moderate	Access roads will be provided north and south of the proposed alignment at Ch. 4+050	Not Significant
043		- Severance currently exists due to the CPO from previous scheme - Agricultural lands located to the north and south of the proposed road alignment	No additional land take is required.	Not significant	Existing field accesses retained	Not Significant
044		Agricultural land located east of the existing N2 road alignment	No additional land take is required.	Imperceptible	An access road will be provided along the existing N2	Imperceptible

Plot Ref. No.	Agri Land (Hectares) Additional Land Take	Baseline	Impact Details	Impact Rating	Mitigation Measures	Residual Impact Significance
046		Residential property located south of the existing N52 road alignment	- No additional land take is required. - Current access to the property will be maintained	Imperceptible	No mitigation measures are proposed for this plot	Imperceptible
047		Residential property located south of the existing N52 road alignment	- No additional land take is required. - Current access to the property will be maintained	Imperceptible	No mitigation measures are proposed for this plot	Imperceptible
048		Residential property located north of the existing N52 road alignment	- No additional land take is required. - Current access to the property will be maintained	Imperceptible	No mitigation measures are proposed for this plot	Imperceptible
049		Residential property located to the north of the existing N52 road alignment	- No additional land take is required. - Current access to the property will be maintained	Imperceptible	No mitigation measures are proposed for this plot	Imperceptible

14.7 Conclusion

The impacts from the proposed development on Material Assets have been assessed with regard to agriculture, non-agricultural properties and utilities. Overall, with the inclusion of mitigation measures it is envisaged there will be no likely significant effects as a result of the proposed development.

15. MAJOR ACCIDENTS AND DISASTERS

15.1 Introduction

This chapter presents the information required to allow the Competent Authority (Louth County Council) to complete an assessment of the proposed N52 Ardee Bypass (the 'proposed development' hereafter) in terms of its potential to cause major accidents and disasters ('MADs' hereafter), and its vulnerability to the negative effects of same.

15.2 Methodology

Scope

In accordance with the IEMA guidelines (IEMA, 2020), the MADs assessment considers whether the associated risks are mitigated to a level that is 'low as reasonably practicable'.

As recommended by IEMA (2018a), minor accident risks of relatively low consequence, e.g. localised flooding, have been scoped out of the assessment. Such events are addressed where appropriate, in the relevant specialist sections of this Part VIII Planning Report.

This chapter does not deal with the impacts of gradual trends associated with climate change, e.g. sea level rise or increasing annual rainfall volumes. It does, however, address sudden events whose frequency may be increased as a result of climate change related trends, e.g. extreme weather events.

The geographic scope of the assessment shall take in all external features which may present a hazard to the development, even if these are beyond the development boundary.

Definitions

This assessment is based on the following definitions of key concepts, which have been informed by the IEMA (2020), IPCC (2012) and UN/ISDR (2004) definitions, as well as the relevant sections of the EIA Directive.

Hazard

A potentially harmful, sudden event of natural, semi-natural or anthropogenic origin, including latent conditions which may pose future threats; and single, sequential or combined events.

Receptors

Annex IV, Point 5 (d) of the EIA Directive states that "*the risk to human health, cultural heritage or the environment*" [as a result of major accidents and disasters] should be considered. As such, humans, cultural heritage assets and the environment are considered potential receptors herein.

Vulnerability

The propensity of a receptor to be adversely affected by a hazard.

Major Accident/Disaster (MAD)

A hazard to which vulnerable receptors (i.e. humans, cultural heritage and / or the environment) are exposed, resulting in major negative impacts on one or more of

these, which requires the use of resources beyond those of the Applicant or its appointed representatives (i.e. Contractors) to manage.

Note: Some sources differentiate between ‘accidents’ and ‘disasters’ as different classes of hazards, e.g. anthropogenic versus natural in origin. This is not necessary for the purposes of this assessment and is not carried out herein.

Risk

Risk = Hazards x Vulnerability. It is the probability of negative impacts on human health and/or cultural heritage and/or the environment as a result of the interaction between a hazard and receptors.

Significant Environmental Effect

Effect which could include the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean up or restoration.

As Low As Reasonably Practicable (ALARP)

ALARP describes the level of which we expect risks to be controlled, i.e. a tolerable level. Whether a risk is ALARP comes down qualitative, professional judgement.

General Methodology

According to IEMA guidelines (IEMA, 2020), this assessment will follow a three-stage methodology:

Stage 1 – Screening

The IEMA (2020) guidelines state that “*During screening it should be sufficient to identify if a development has a vulnerability to major accidents and/or disasters and to consider whether a development could lead to a significant effect*” (p.10). Questions to consider at this stage include the following (adapted from IEMA, 2020)

- Is the proposed development a source of hazard itself that could conceivably result in a major accident and/or disaster occurring?
- Does the proposed development interact with any sources of external hazards that may conceivably make it vulnerable to a major accident and/or disaster?
- If an external major accident and/or disaster occurred, would the existence of the proposed development conceivably increase the risk of a significant effect to an environmental receptor occurring?

Stage 2 – Scoping

If the proposed development is screened in for the assessment of impacts in relation to MADs at Stage 1, the scoping stage aims to determine *in more detail* whether there is potential for significant effects as a result of MADs in relation to the proposed development.

At this stage, various hazard classes are considered in relation to the proposed development. The UK National Risk Register of Civil Emergencies (2017 Edition) has been used as a primary source to identify hazard classes herein. The baseline (i.e. receiving) environment is described insofar as is relevant to the hazard class in question.

IEMA provide a useful infographic illustrating the scoping decision process to aid at this stage.

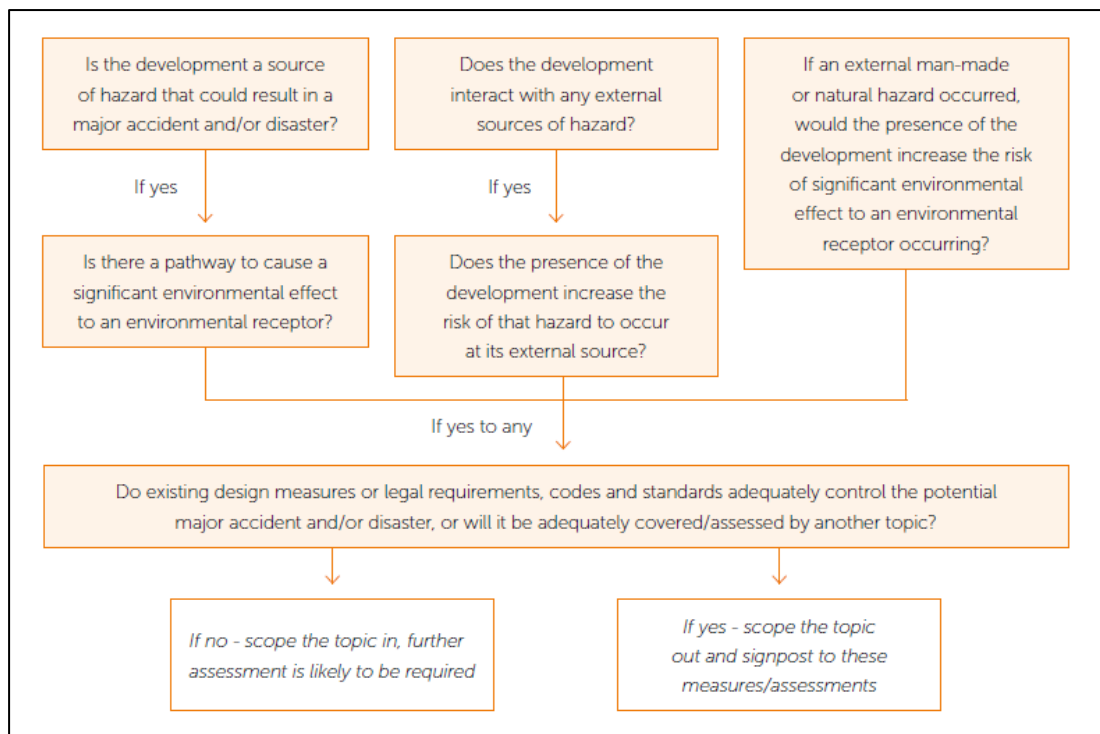


Figure 15-1 IEMA MADs Scoping Decision Flowchart

It is stated that the assessment of impacts in relation to MADs can be scoped out if it can be demonstrated that:

- *“There is no source-pathway-receptor linkage of a hazard that could trigger a major accident and/or disaster or potential for the scheme to lead to a significant environmental effect; or*
- *All possible major accidents and/or disasters are adequately covered elsewhere in the assessment of covered by existing design measures or compliance with legislation and best practice.” (IEMA, 2020; p. 12)*

It is pointed out in the IEMA (2020) guidelines that ‘A major accidents and/or disasters assessment will be relevant to some developments more than others, and for many developments it is likely to be scoped out of the assessment’ (p.11)

Stage 3 – Assessment

If hazard class(es) are screened in at Stage 2, they are brought forward to Stage 3 for a detailed consideration of the potential for significant impacts to arise. At this stage, the following exercises are carried out (as per IEMA, 2020):

- The potentially affected receptors are identified with as much speciality as practicable. If no receptors can be identified, the hazard class in question is excluded from further consideration, since there is no valid source-pathway-receptor linkage.
- The reasonable worst-case impacts on the receptors are identified insofar as possible. This exercise is based on a qualitative, professional judgement. Uncertainty at this stage is to be acknowledged. Hazard classes which are not predicted to result in significant impacts under this reasonable worst-case scenario are excluded from further consideration.

If, after all of the above-stated exercises have been carried out, there remain hazard classes which may potentially give rise to significant effects as a result of the proposed

development or interaction with the proposed development, it is considered whether mitigation measures can be incorporated into the design of the proposed development which would mitigate the associated risk level(s) to be ALARP.

15.3 Stage 1 - Screening

It is considered that the proposed development should screen in for the impact assessment in relation to MADs since, on the basis of a preliminary consideration of the proposed development and receiving environment, it is *conceivable* (although highly unlikely) that:

- The proposed development could result in a MAD;
- The proposed development could interact with external sources of hazards that could conceivably make it vulnerable to a MAD; and that
- If an external MAD occurred, the proposed development could conceivably exacerbate the associated risk of significant impacts.

15.4 Stage 2 – Scoping

The scoping exercise is documented in Table 15-1

Table 15-1 Material Accidents and Disasters Scoping

Class of Hazard	Reason(s) for Scoping Out	Scoped In/Out?
Flooding	Subject addressed in Section 9. A flood risk assessment has been undertaken to assess the proposed development for the existing and future sources of flood risk. The drainage network for the proposed development on the site will incorporate Sustainable Drainage Systems (SuDS) for the purpose of managing surface water in terms of both flow and quality. Discounted from further consideration herein.	Out
Storm Surges	The proposed development does not have the potential to cause such an event. The proposed development is located approx. 12.7km from the coastline.	Out
Gale force winds / tornado/ cyclone / hurricane / typhoon	The proposed development does not have the potential to cause such an event.	Out
Lightening strikes	The proposed development does not have the potential to cause such an event.	Out
Heatwaves	The proposed development does not have the potential to cause such an event.	Out
Drought	The proposed development does not have the potential to cause such an event. It is not especially vulnerable to negative impacts as a result of water supply shortages/changes. Nor is it likely to exacerbate such an event.	Out
Extreme cold weather	The proposed development does not have the potential to cause such an event.	Out
Volcanic eruption	There is no volcanic activity in Ireland. Indirect impacts (i.e. tsunamis and disruption to air travel) are considered separately below. Subject discounted from further consideration herein. Likelihood of significant impacts ALARP.	Out
Earthquake	The proposed development does not have the potential to cause such an event. Seismic activity in and around Ireland is typically of low magnitude – although moderately damaging events of higher magnitude do occasionally occur. As stated by Blake (2006; p. 79), “ <i>The most recent damaging earthquake in Ireland recorded by the DIAS network was on July 19th 1984. This was a deep crustal event of magnitude 5.4Ml whose epicentre was off the Llyn Peninsula of NW Wales. This was felt widely in Britain and on the east coast of Ireland and caused some structural damage to houses on the east coast of Ireland.</i> ” No account	Out

Class of Hazard	Reason(s) for Scoping Out	Scoped In/Out?
	could be found of any damage of transport infrastructure as a result of a seismic event. The detailed design of the proposed development will be in accordance with the relevant design codes and standards in order to ensure structural integrity such that the level of risk associated with such an event will be mitigated to a tolerable level. Likelihood of significant impacts ALARP.	
Mass wasting	The proposed development does not have the potential to cause such an event. No significant volumes of soil / rock / debris on slopes in vicinity. Discounted from consideration herein. Likelihood of significant impacts ALARP.	Out
Sinkhole	The proposed development does not have the potential to cause such an event.	Out
Limnic eruption/venting	The proposed development does not have the potential to cause such an event.	Out
Tsunami	The proposed development does not have potential to cause such an event. Extreme wave events do occur in Ireland's marine and coastal waters, Accordingly, this class of hazard is discounted from further consideration herein. Likelihood of significant impacts ALARP.	Out
Major system / utilities / infrastructure failure	<i>Damage to Existing Utility Infrastructure</i> Construction works have the potential to result in damage to existing utilities infrastructure (e.g. overhead power lines, underground gas pipelines) if improperly planned and managed for. For the proposed development, this risk has been addressed in Chapter 14.4 and is not considered further herein. Likelihood of significant impacts ALARP.	Out
Major nuclear radiation event	The proposed development does not have the potential to cause such an event. It is not especially vulnerable to negative impacts as a result of elevated levels of background radiation. Nor is it likely to exacerbate such an event. Discounted from further consideration herein. Likelihood of significant impacts ALARP.	Out
Major disruption of air travel	The proposed development does not have the potential to cause such an event. It would not be affected negatively by a major disruption of air travel. Nor is it likely to exacerbate such an event. Discounted from further consideration herein.	Out
Major air pollution event	The proposed development does not have the potential to cause such an event. Emissions to Air during the construction and operation phases have been assessed in section 11.4 and is not considered further herein.	Out
Major water pollution event	The risk to water quality has been assessed in section 9.4.1 and standard mitigation measures to be implemented during the construction phase have been outlined in section 9.5.1 of this Planning Report. A CEMP is provided in Appendix B which includes measures for works in the vicinity of watercourses and sets out measures to be undertaken in response to any incidents. The likelihood of significant impacts ALARP , therefore, this is not considered further herein.	Out
Major explosion / fire	The proposed development does not have the potential to cause such an event.	Out
Wildfire	The proposed development does not have the potential to cause such an event.	Out
Infectious disease pandemic	The proposed development does not have the potential to cause such an event. It would not be affected negatively by such an event. Nor is it likely to exacerbate such an event. Discounted from further consideration herein. Likelihood of significant impacts ALARP.	Out
Major traffic accident	The proposed road development is designed in accordance with current TII Publication Standards. Therefore, the likelihood of significant impacts ALARP , and this is not considered further therein.	Out
Major industrial accident	The proposed development does not have the potential to cause such an event. The closest Seveso sites are located >10km from the proposed development, therefore major accidents are not likely. Discounted from further consideration herein.	Out
Building collapse	The proposed development does not include the provision of any buildings.	Out

Class of Hazard	Reason(s) for Scoping Out	Scoped In/Out?
Major construction works-related accident	The CEMP included in Appendix B requires the contractor to ensure that construction workers are trained and sufficiently experienced. A suitability experienced and qualified contractor will be selected through the procurement process, with experience of undertaking works of a similar nature. Therefore, the likelihood of significant impacts ALARP , and this is not considered further therein.	Out
Major public disorder	The proposed development does not have the potential to cause such an event. It is not especially vulnerable to such an event or likely to exacerbate such an event. Discounted from further consideration herein. Likelihood of significant impacts ALARP.	Out
Physical attack	The proposed development does not have the potential to cause such an event. It is not especially vulnerable to such an event or likely to exacerbate such an event. Discounted from further consideration herein. Likelihood of significant impacts ALARP.	Out
Cyber attack	The proposed development does not have the potential to cause such an event. Nor is it likely to exacerbate such an event. Likelihood of significant impacts ALARP.	Out

15.5 Conclusion

As per the scoping exercise undertaken in Table 15-1, all MADs have scoped out and therefore there are no items brought forward to Stage 3. It is therefore concluded that as a result of the design of the proposed development and the mitigation measures outlined in this Part VIII Planning Report, that the likelihood of significant impacts as a result of major accidents or disasters are as low as reasonably practicable.

16. CUMULATIVE IMPACTS

16.1 Introduction

This section presents a preliminary consideration of likely significant impacts which may be expected to arise as a result of the combined effects of the proposed development and other, proposed or existing developments and plans. This cumulative assessment has considered cumulative impacts that are:

- Likely;
- Significant; and
- Relating to an event which has either occurred or is reasonably foreseeable together with the impacts from this development

The following sources were consulted to inform this assessment:

- Proposed developments and developments that have been granted planning permission within the preceding five years in the immediate vicinity of the proposed development, as recorded in the Louth County Council Planning Portal and Meath County Council Planning Portal (checked on 8th of September 2021)
- Projects listed on the EIA Portal; and
- Development objectives of the Louth County Council Development Plan (2015-2021) and the Ardee Local Area Plan (2010-2016)

16.2 Cumulative Assessment of Plans and Projects

Developments and plans which might potentially give rise to cumulative impacts of the character described above are discussed below.

Light Industrial / warehouse on Kells Road (LCC Planning Ref 20160)

Permission was granted on 19/10/2020 for 1 no. light industrial/warehouse building including offices extending to a total floor area of 1193sqm. The proposed development includes surface car parking, enclosed yard, truck wash bay, waste water treatment system and all associated site development works. An NIS was provided for the application. On review of the planning documents, it is not anticipated that significant effects will arise as a result the proposed development.

3 no poultry houses & 2 no egg/general purpose stores (Planning Ref 2022)

Extension of duration was granted in March 2020 for planning ref 15/233 which comprises permission to construct 3 no poultry houses & 2 no egg/ general purpose stores together with all ancillary structures (to include meal storage bin(s) & soiled water tanks) and all associated site works associated with the proposed development. This development is located between the N2 and the R171 approximately 200m from the northern tie in of the proposed road development. Access to the site will be provided on the R171. Due to the size and nature of the development, it is not likely that there will be significant cumulative impacts as a result of the development in combination with the proposed N52 Ardee Bypass.

Continuance of operation of existing permitted quarry (Planning ref: LB200106)

Lagans Materials Ltd. was granted planning permission for development at Heronstown, Lobinstown, Navan, Co.Meath on the 18/02/2021. The development will consist of continuance of operation of the existing permitted quarry (ABP. 17.QD.0017), a lateral and vertical extension of the existing quarry including the deepening of the quarry extraction area by two extractive benches to 50m OD, within

a total quarry extraction area of c.4.5 hectares, an increase in the permitted extraction rate to 200,000 tonnes per annum, provision of an aggregates and overburden stockpiling area and settlement lagoon system (c. 2,000m²), and restoration of the site to natural habitat after uses following completion of extraction, within an overall application area of c 14.12 hectares, and all for a period of 20 years. An EIAR has been prepared in respect of this planning application. This project is 8.5km south-west of the proposed development and on review of the EIAR, it is not anticipated that significant cumulative impacts will occur in relation to the proposed Ardee Bypass. The decision of Local Authority has subsequently been appealed by the applicant to An Bord Pleanála on financial grounds and is currently awaiting a decision.

Construction of 1 no. pig house together with all ancillary structures (Planning ref: 19113; ABP-305468-19).

Louth County Council granted permission for a development to construct 1 no. pig house together with all ancillary structures, (to include meal storage bin(s)), and all site works associated with the proposed development at Rossmakay, Knockbridge, Co. Louth on the 23rd day of August, 2019. The development was subsequently appealed to An Bord Pleanála, who requested an EIAR and a Revised NIS were to be submitted. Planning permission was granted by An Bord Pleanála on 09/11/2020. This project is 12km northeast of the proposed development and due to the distance from the proposed development, it is not anticipated that significant cumulative impacts will arise as a result of the proposed Ardee Bypass.

Integrated Pharmaceutical manufacturing facility (Planning ref: 19 861).

Planning permission was granted for the proposed development on 10/12/2019, comprising of the following; 1. A three storey Pharmaceutical manufacturing facility sized approximately 15,520 square metres and approximately 26 metres high and with roof mounted plant and equipment and stacks. 2. A four storey Administration and Laboratory building sized 8,789 square metres and approximately 22.5 metres high and with roof mounted plant and equipment and stacks. 3. A two storey modular support laboratory sized approximately 820 square metres and approximately 10.1 metres high and with roof mounted plant and equipment and stacks. 4. A single storey boiler/utility area sized approximately 864 square metres and 9.6 metres high including two boiler stacks approximately 31 metres high. 5. 4no. modular plant and equipment storage units sized approximately 35 square metres and 3 metres high per unit. 6. A single storey drum store sized approximately 75 square metres and 6 metres high. 7. A single storey waste store sized approximately 75 square metres and 6 metres high. 8. Siteworks including carpark for 278 cars, docking areas, yard areas housing external plant, tanks and equipment, a large landscaped berm to the North and West of the facility, a surface water attenuation pond, roads, and underground services, external lighting, security fencing, fire water tanks and modular housing for pumps, 2 no. vehicular entrances off the previously permitted internal road access currently under construction, bicycle shelters and facilities for E-car charging and disabled parking as well as all associated site works and landscaping.

This application consists of development for an activity for which a licence under Part IV of the Environmental Protection Agency Act 1992 (as amended by the Protection of the Environment Act, 2003) is required. An EIAR and NIS accompany this application. This project is 13km northeast of the proposed development. Due to the distance between the developments, it is not anticipated that significant cumulative impacts will arise as a result of the proposed Ardee Bypass.

Strategic Housing Development (Planning ref: ABP-304782-19).

Planning permission was granted for the proposed development consisting of 483 no. dwellings, a childcare facility of 677 sqm, a new access junction and works to the Blackrock Road, 2 no. pedestrian and cyclist accesses onto Bóthar Maol, landscaped open spaces, internal roadways and potable, surface and foul water infrastructure. The proposed residential element of 483 no. units comprises of 258 no. detached, semi-detached and terraced houses, 213 no. apartments in 7 no. apartment blocks, and 6 no. own-door apartments and 6 no. duplex units in 2 no. duplex over apartment blocks. The duplex over apartment units are 3 storeys in height, the proposed apartment Blocks A, B, C, E, F, and G are 4 storeys in height, and Block D is 3 storeys. Blocks A, B and F accommodate underground car parking. The proposed 2 storey childcare facility of 677 sqm has an outdoor play area of 660 sqm and is located near the main entrance to the site. A total of 824 no. car parking spaces and 512 no. bicycle spaces are proposed. An EIAR and NIS have been prepared in respect of the proposed development. This project is 15km northeast of the proposed development, therefore it is not anticipated that significant cumulative impacts will arise as a result of the proposed Ardee Bypass.

Backfilling of existing quarry (Planning ref: 19521).

Kilsaran Concrete Unlimited Company was granted planning permission on 15/11/2019 for development at this site at Moutaintown and Cluide townlands, Dunleer, Co. Louth. The development, within an application area of 16.7 hectares will comprise restoration by backfilling of a former quarry and includes: Backfilling an existing void created by previous extraction of rock to surrounding ground level and the restoration of the site to long-term beneficial agricultural use by the importation of c.3.6 million tonnes of natural inert waste and/or non-waste materials suitable for restoration purposes, principally excess soil, stone and/or broken rock; Installation of site and services infrastructure for the duration of the development, Upgrade of former quarry site infrastructure; Use of a former quarry storage shed as a waste inspection and quarantine facility and for storage of plant and machinery; Dewatering of the existing quarry void by pumping; The separation of any intermixed construction and demolition waste prior to removal off-site to authorised waste disposal or recovery facilities; Temporary stockpiling of imported topsoil pending re-use; and Restoration of the excavated landform (including placement of cover soils and seeding) to agricultural grassland. The development will be carried out on a phased basis and will be completed within 10 years with an additional 2 years to complete restoration works (total duration sought is 12 years). A waste licence will be required from the Environmental Protection Agency (EPA) in respect of waste used for backfilling and restoration purposes. A waste facility permit will also be sought from Louth County Council to facilitate intake of waste pending the grant of a waste licence from the EPA.

An EIAR has been prepared in respect of this planning application. This project is 14km east of the proposed development and is currently in planning. It is not anticipated that significant cumulative impacts will arise as a result of the proposed Ardee Bypass due to the distance between the two developments.

To amend a permitted Biodiesel Manufacturing Facility (Planning ref. KA180354)

Planning permission was granted on 28/05/2018 for an amendment to a permitted Biodiesel Manufacturing Facility (Meath County Council Reg. Ref. KA/160786), on a site of 1.49 hectares. The development will consist of the reconfiguration of the process building and associated tank farm and the provision of a new gas electricity generation unit with heat recovery. The reconfiguration on site will consist of: A revised configuration of the process building, resulting in an increase of c.53 sqm in the gross floor area of the building from c. 3,284 sqm to c. 3,337 sqm. There is no increase in

the overall height of the building; An increase in the footprint of the tank farm and number of external storage tanks from 12 no. to 21 no.; Amendments to the permitted drainage layout; The proposed amendments do not result in an increase in the overall permitted production of 25,000 tonnes of biodiesel per annum. The following works will be completed as enabling works (as permitted under Reg. Ref. KA/160786): Site access works, excavation works and gravel infill to allow for the provision of foundations for the permitted layout of the process building. This project is 9km west of the proposed development. It is not anticipated that significant cumulative impacts will arise as a result of the proposed Ardee Bypass.

Two No. Free Range Poultry houses, together with all ancillary structures (Planning ref: KA/201448)

Planning permission was granted on 21/05/2021 to construct 2 No. Free Range Poultry houses, together with all ancillary structures (to include 4 No. Meal Bins and 1 No. Soiled water tank) and associated site works arising from the above development at Fletcherstown, Wilkinstown Navan, Co. Meath. This application relates to a development, which is for the purposes of an activity requiring a Licence under part IV of the Environmental Protection Agency (Licensing) Regulations 1994 to 2013. An EIAR will be submitted with this planning application. This project is 10km southwest of the proposed development and has been granted conditional planning. It is not anticipated that significant cumulative impacts will arise as a result of the proposed Ardee Bypass.

Approximately 4km of underground electricity transmission cable (Planning ref: KA171177; PL02.247401)

Planning permission was granted on 04/05/2018 for the installation of approximately 4km of underground electricity transmission cable across private lands and within the public roads numbered R165, L74021 and L7408. The cable will be installed predominantly in excavated trenches of approximately 1.2m in depth and will include associated underground ducting, joint bays, chamber bays, sheath link boxes and inspection chambers: ducting across the length of span of 1 no. bridge/culvert and directional drilling at 1 no. bridge/culvert; and all associated site development and reinstatement works. The proposed development is part of a larger overall development which will involve the installation of approximately 13km of underground electricity transmission cable from the permitted (wind farm) substation in the townland of Taghart South, County Cavan to the existing electricity substation in the townland of Meath Hill, County Meath. A concurrent planning application for that part of the overall development located within County Cavan has been submitted to Cavan County Council. This planning application is accompanied by an EIAR, which includes an assessment of the likely impacts of the proposed development, as a whole and in combination with the relevant off-site or secondary developments which will occur as a direct result of the proposed development, including the wind farm development permitted pursuant to County Cavan Planning Register Reference 16/74 & An Bord Pleanála Reference PL02.247401. This project is 11km north west of the proposed development at its nearest point and it is not anticipated that significant cumulative impacts will arise as a result of the proposed Ardee Bypass due to the distance between the two projects.

21168 Cubicle cattle shed, milking parlour

Permission was granted on 06/08/2021 for proposed cubicle cattle shed, milking parlour and dairy with associated underground slatted tanks, walled double silage pit with associated underground run off tank and all associated works in existing farmyard. This project is located 8km south of the proposed development. Having regard to the

nature, scale and distance of this project from the proposed development, no cumulative effects are predicted.

21174 Provision of single-storey industrial/storage unit

Permission was granted on 03/09/2021 for development that will consist of the provision of a 973sq/m single-storey industrial/storage unit and all associated site development works. This project is located approx. 2.1km south of the proposed development. The Planners Report for this project states that given the nature and scale of the project it is unlikely that there would be any significant effect on any Natura 2000 sites. Similarly, the Planners Report states that the project will not account for environmental pollution. Given the nature and scale of this project, it is unlikely that significant cumulative effects

21190 Permission for revision to planning permission

Permission for revision to planning permission reg. ref. 081220 (extended duration under planning reg.ref. 19178) and previously amended by permission Reg.Ref. No. 2120 comprising:

- The omission of 5 No. apartment blocks totalling 48no. approved residential units and their associated site works. The omission of 28 No 2 storey dwelling houses consisting of 3 & 4 bedroom types and their associated site works.
- The provision of 48 no. revised residential dwelling types, ranging from 2-3 storeys in height and between 3-5 bedroom house types and their associated site works
- Development and associated site works

All located on a site of 4.6 hectares at Cappocksgreen, Ardee, Co Louth, bounded at north by the N33 Ardee Link Road and at South by Sean O'Carroll Street. This project is located 1.6km south-east of the eastern extent of the proposed development. It is not anticipated that significant cumulative impacts will arise from the proposed Ardee Bypass and the extension of this planning permission. The development is located on residential zoned lands with access from the N33 National road, to the east of Ardee town, therefore, any potential impacts during construction, if the two developments were to be constructed during the same timeframe, would not be likely to be significant on receptors.

20749 Construction of new industrial facility

Permission was granted on 14/12/2020 for the construction of a new industrial facility to include 2 no. 3535m² manufacturing units (9.3m high, 1 no. 42m² security unit 3.5m high, hard standing areas together with associated parking provision, gated entrances and boundary treatments, connection to existing road network & drainage system, company signage, together with all other associated ancillary site works. A Natura Impact Statement accompanied the Planning Application. This project is located 1.8km south-east of the proposed development. The Natura Impact Statement predicts that there are no significant effects on the qualifying features of Natura 2000 sites and that no cumulative effects will occur for any Natura 2000 sites. The planners Report concluded that an EIA would not be required as there is no real likelihood of significant effects on the environment. Due to the nature of the impacts of the proposed road development and the distance from the proposed industrial facility, significant cumulative effects will not arise.

21535 Extension of duration for Residential Development

Extension of duration was granted on 24/06/2021 for Residential Development permitted under Reference 10/174 (ABP PL.15.238053) consisting of Permission for a 10-year permission for a development consisting of (i) public park (4.91ha) including play areas & a MUGA (Multi Use Games Area) (ii) a total of 281 residential dwellings (iii) A single storey community building (167m²), (iv) a three storey neighbourhood centre incorporating 2 no. retail units & 1 no. unit for sale of hot food; (v) construction of a section of new Local Collector Road (c.600m in length), (vi) 503 no. car parking spaces & 54 no. cycle parking spaces, (vii) Bring bank re-cycling facility, (viii) landscaping works, (ix) new road junction access off Drogheda road (N2 (x) 5 no. ESB sub stations (xi) All associated site development works.

A Master Plan pertaining to an area extending to 27.8 hectares & incorporating the application site accompanies the application and it is stated that an Environmental Impact Statement (EIS) will be submitted to the Planning Authority with this application, however these documents are not currently available. A review of the EIS prepared for the development in 2010 was undertaken which didn't identify any significant effects on the environment as a result of the development. Therefore, it is assumed that at it's reduced density, that significant effects are not anticipated, and due to the distance from the proposed development that significant cumulative effects are not anticipated.

5km of 20kV underground cable (Planning ref: PL02.248394)

Planning permission has been granted for a 20kV underground electricity grid connection of c. 5km (4.6km on Co. Cavan and 0.2km in Co. Meath), connecting an already permitted substation to the national electricity grid at Kingscourt Substation, for the purpose of connecting 5no wind turbine granted under PL02.2236608, which may be summarised as follows:

- Underground trench of c. 1m to accommodate cable ducting along the existing road
- infrastructure except for c. 400m at the start agricultural,
- The ducting will sit in a trench which will have a minimum width of c.325mm and depth of c. 925mm,
- Installation of 17 cable joint bays (concrete chambers) and ancillary marker posts and plates,
- 3 no. bridge crossings, and
- 3 no. culvert crossings.

This project is 14km north west of the proposed development at its nearest point and therefore is not anticipated that significant cumulative impacts will arise as a result of the proposed Ardee Bypass.

N2 Ardee to Castleblayney Road Scheme

This development comprises 35km of Type 2 dual carriageway linking Ardee, Co. Louth to Castleblayney, Co. Monaghan. An 'Emerging Preferred Route Corridor' has been published and the project has launched the next stage of public consultation. This scheme is <1km from the proposed development and will likely intersect with the proposed development at the easternmost tie in on the N2. An EIAR and an AA Screening will be undertaken to assess the impacts of the scheme. The details of the scheme are not available as of yet due to the current stage. It is expected that if both projects were to proceed, the proposed development would be constructed in advance of the N2 Ardee to Castleblayney Road Scheme. It is anticipated that the operational

stage of the developments will have a positive cumulative effect on connectivity and access within and around Ardee and further north to Monaghan. It is not anticipated from the information currently available, that significant cumulative impacts will arise as a result of the proposed Ardee Bypass and the N2 Ardee to Castleblayney Road Scheme. As the proposed N52 Ardee Bypass will be subject to planning in advance of the N2 project, the N2 Ardee to Castleblayney project will be required to consider the cumulative impact of the N52 Ardee Bypass within their EIAR.

N2 Slane Bypass Road Scheme

This development comprises 4km of Type 2 single carriageway bypassing the village of Slane and including a new bridge over the River Boyne. The scheme is currently undergoing Phase 3 – Design and Environmental Evaluation. This project is 15km south of the proposed development. While the predicted impacts of the N2 Slane Bypass Road Scheme are not available at the time of writing, it is anticipated that due to the distance between the two schemes, significant negative cumulative impacts will not arise as a result of the proposed Ardee Bypass. As the proposed N52 Ardee Bypass will be subject to planning in advance of the N2 Slane Bypass Road Scheme, the Slane Bypass project will be required to consider the cumulative impact of the N52 Ardee Bypass within their planning documents.

N52 Grange to Clontail

The realignment of the N52 National Secondary route in the townlands of Grange, Castletown, Stephenstown, Fringestown, Mitchelstown and Clontail comprising the construction of a Type 2 Single Carriageway road for a distance of 4.8km from a location approximately 300m south west of Cassidy's Cross (N52/R162 junction) to a tie in point approximately 300m northeast of Mitchelstown Cross; and associated accommodation & fencing works, landscaping works, surface water drainage / attenuation works and ancillary works. This project is approximately 6km west of the proposed development. The Part 8 planning application is currently open for public consultation.

Glyde and Dee Arterial Drainage Scheme 2018-2022

Within the Glyde and Dee Arterial Drainage Scheme the exact location and type of required maintenance activity varies over time. The following works are planned for the channels and embankments on the Glyde and Dee Scheme within the timeframe 2018-2022:

- Silt and vegetation management
- Bush cutting/branch trimming
- Tree cutting
- Mulching

The proposed development will clearspan the River Dee as part of the design which will not interfere with the existing banks of the river. The Arterial Drainage Scheme has been accounted for as part of the hydrological assessment for the N52 Ardee Bypass and therefore significant cumulative impacts on the hydrological regime are not anticipated.

Louth County Development Plan 2015-2021

The Louth County Development Plan 2021-2027 outlines a number of objectives regarding transport infrastructure. As set out under Policy Objective MOV1, it is LCC's aim to:

“To work with national transport agencies in supporting the delivery of a high quality, climate resilient and sustainable transport network in the County.”

The Plan outlines that *“there is a well-developed network of roads in Louth that are a fundamental part of the economic competitiveness of the County facilitating the efficient movement of goods and people. The strategic location of the County along the Dublin-Belfast Economic Corridor means the County benefits from access to the motorway network in addition to national primary and secondary routes, which provide connectivity with Dublin, Belfast and key service centres in the region and the border area”*. The N52 Dundalk-Nenagh (via Ardee and Kells) along with other national routes, is noted to provide an important level of connectivity between the Regional Growth centres of Drogheda and Dundalk and key service centres in the wider region and beyond.

Whilst this Plan promotes and supports a modal shift to more sustainable modes of transport it is also recognised that improvements to the existing road infrastructure in the County are required in order to improve connectivity and support more balanced economic development. This will allow settlements to fulfil their economic potential.

The N52 Ardee Bypass is listed as a National Road Project in Table 7.7 of the CDP, the progression of which is supported by the plan. Section 7.9.2 N52 Ardee Bypass of the CDP states the following:

“The need for a bypass of Ardee has been identified and included in national, regional and local policy for a number of years. However, due to funding constraints the project was not progressed. The scheme was reactivated in 2018 with a detailed review ongoing at the time of the writing. The scheme has been included in the NDP. The RSES also recognises the benefits of the project and includes support for its progression and delivery in Regional Policy Objective 8.10.

Policy Objective MOV 51: To support the progression of the N52 Ardee Bypass and to continue to work closely with Transport Infrastructure Ireland and Meath County Council and other stakeholders in the delivery of this project.” (p7-29)

The plan has set out several strategic settlement policy objectives for Ardee, including the following objective related to transport:

“Policy Objective SS 41: To secure the construction, pending approval by Transport Infrastructure Ireland, of the N2 bypass and the N52 bypass and preserve free of development their proposed routes.”

The proposed development supports the CDP Policy Objectives by delivering the N52 bypass.

Section 7.6.11 Cycling and Walking outlines the support for the development of walking and cycling infrastructure throughout the County to encourage a modal shift away from a dependence on the private car. The following Policy Objectives support the development of pedestrian and cycleways as providing connectivity and a modal shift:

“Policy Objective MOV 25: To support the retrospective provision of walking and cycling infrastructure in existing settlements, where feasible, to achieve growth in sustainable mobility and strengthen and improve the walking and cycling network”

“Policy Objective MOV 26 “To improve pedestrian and cycle connectivity to schools, third level colleges, major employment areas, bus and rail stations, and other public transport hubs.”

“Policy Objective MOV 28: “To promote walking and cycling as a safe, convenient, healthy, efficient, and environmentally friendly mode of transport for all age groups.”

The proposed development will support the above listed Policy Objectives in providing new, safe infrastructure for pedestrians and cyclists along the proposed bypass to ensure connectivity east and west of the proposed development.

Ardee Local Area Plan 2010-2016

The Ardee Local Area Plan presented a strategy for spatial planning and development in the town of Ardee, Co. Louth between 2010 and 2016. A new LAO for the town is yet to be drafted.

Chapter 4 of the Ardee Local Area Plan (LAP) outlines objectives in relation to transport infrastructure. Policy INF12 states the need “To secure the construction, pending approval by the [NRA], of the N2 bypass and the N52 bypass and preserve free of development their proposed routes” (p. 21). Regarding the bypasses, the LAP states that:

“The council is proposing to construct by-passes on the N52 and N2 to the east and west of the town. When completed, the traffic congestion in Ardee town centre will be significantly improved. Lands have been purchased to facilitate the construction of the N52 section and this section is likely to process during the period of this Plan.” (p. 1).

“Traffic congestion in Ardee town centre is a major problem caused by the volumes of traffic passing through the town along the N2 Derry to Dublin National Primary route and the N52 Dundalk to Nenagh national secondary route. Traffic management plans, including pay parking, have improved the situation. When by-passes on the N2 and N52 are constructed, pending approval by the National Roads Authority, congestion will be greatly alleviated.” (p.23)

As outlined in the above objectives of the Ardee Local Area Plan, the proposed development is likely to result in positive cumulative effects for the town of Ardee and the connectivity along the N52 and N2 in combination with the other proposed projects.

16.3 Conclusion

A range of plans and projects within a 15km radius of the proposed development have been assessed to assess whether cumulative effects are anticipated as a result of all reasonably foreseeable development.

It is not anticipated that the above plans and projects will result in significant cumulative impacts during the construction or operation phases. It is anticipated that once built, the proposed development will have positive impacts on developments planned within the Ardee Area, through improved access and connectivity for the delivery of materials.

No further mitigation measures are therefore proposed as a result of this assessment.

17. CONCLUSIONS

This Part VIII Planning Report and supporting drawings provides a description of the nature and extent of the proposed N52 Ardee Bypass development. It has considered and assessed the likely significant environmental effects of the proposed development.

The environmental considerations have included assessing likely impacts on a range of environmental topics including traffic; population and human health; biodiversity; soils, geology and hydrogeology; hydrology; landscape and visual; noise and vibration; air quality and climate; cultural heritage; and material assets and land. The likely environmental effects and recommended mitigation measures are detailed at the end of each environmental factor addressed in Section 4 of this Report.

The Contractor will be required to demonstrate how it addresses the likely environmental effects and will be required to include the mitigation measures herein, and within the Construction Environmental Management Plan, which will be agreed with Louth County Council prior to the works commencing.

This assessment found that there are no likely significant adverse environmental effects as a result of the proposed development.

APPENDIX A
DEVELOPMENT DRAWINGS
(see A3 Booklet)

APPENDIX B

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

N52 ARDEE BYPASS

Outline Construction Environmental Management Plan

December 2021



N52A-ROD-LSI-SW_AE-RP-CH-40001B

Client:
Louth County Council
Town Hall
Crowe Street
Dundalk
Co. Louth
A91 W20C

N52 Ardee Bypass, Louth Outline Construction Environmental Management Plan

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1.0 INTRODUCTION

This document sets out the Outline Construction Environmental Management Plan (OCEMP) for the construction of the N52 Ardee Bypass project on behalf of Louth County Council.

This OCEMP applies to all works associated with the construction of the proposed works, including the pre-construction site clearance works.

As a contractor has not yet been appointed the Construction Environmental Management Plan (CEMP) has not been formally adopted and further development and commitment to the CEMP will be undertaken following selection of Contractors and before commencement of site works.

The OCEMP and its associated and supporting documents (see below) provide the environmental management framework for the appointed Contractors and Sub Contractors as they incorporate the mitigating principles to ensure that the work is carried out with minimal impact on the environment. The construction management staff as well as Contractors and Sub Contractors staff must comply with the requirements and constraints set forth in the OCEMP in developing their CEMP. The key environmental aspects associated with the construction of the N52 Ardee Bypass, the appropriate mitigation and monitoring controls, are identified in the OCEMP and its supporting documentation.

The implementation of the requirements of the OCEMP will ensure that the construction phase of the project is carried out in accordance with the commitments made by Louth County Council in the planning application process for the development, and as required under the conditions of the planning approval. Once commenced the CEMP is considered a living document that will be updated according to changing circumstances on the project and to reflect current construction activities. The CEMP will be reviewed on an ongoing basis during the construction process and will include information on the review procedures.

1.1 Roles and Responsibilities

The Contractor will be responsible to ensure that all members of the Project Team, including sub-contractors comply with the procedures set out in the CEMP. The Contractor will ensure that all persons working on site are provided with sufficient training, supervision and instruction to fulfil this requirement.

The Contractor will ensure that all persons allocated specific environmental responsibilities are notified of their appointment and confirm that their responsibilities are clearly understood. The following have been identified as key staff members:

- Project Manager
- Site Manager
- Site Environmental Manager
- Design Manager
- Sections Managers and Agents
- Forepersons
- Project Ecologist
- Engineering Staff
- Supervisors

The principal roles and responsibilities for key staff are detailed in Section 3.3.

1.2 Training and Induction

1.2.1 Site Induction

All personnel involved in the proposed development will receive environmental awareness training. The environmental training and awareness procedure will ensure that staff are familiar with the principles of the CEMP, the environmental aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures.

1.2.2 Specific Training and Awareness Raising

A project specific training plan that identifies the competency requirements for all personnel allocated with environmental responsibilities will be produced by the Contractor. Training will be provided by the Contractor to ensure that all persons working on site have a practical understanding of environmental issues and management requirements prior to commencing activities. A register of completed training is to be kept by the SEM. The Site Manager will ensure that environmental emergency plans are drawn up and the SEM will conduct the necessary training/inductions.

2.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Project Description

The proposed N52 Ardee Bypass development involves the following elements:

- Construction of approximately 4.3 km of Type 2 Single Carriageway;
- The provision of 4 no. junctions on the Ardee Bypass:
 - A staggered T-Junction on the Silverhill Road, providing access to the Silverhill Road east and west of the proposed development;
 - A Staggered junction on the Townparks Road, providing access to the Townparks Road east and west of the proposed development.
 - A T-Junction on the Mullanstown Road to the north providing access to the proposed development. The proposed development will create a cul-de-sac on Mullanstown Road by closing access on the southern (i.e. Ardee) side of the alignment;
 - A multi-lane roundabout on the N2;
- The provision of a new single lane entry roundabout on the existing N52 at the junction with the realigned Silverhill Road;
- Construction of 2 no. bridge structures spanning over River Dee and River Garra, both with a span of approximately 30m;
- Provision of pedestrian and cyclist facilities in the eastern verge of the N52 Ardee Bypass between the Silverhill Road and Mullanstown Road, including connections to the existing Silverhill Road, Townparks Road and Mullanstown Road;
- Provision of pedestrian and cycle facilities at the southern tie-in of the N52 Ardee Bypass, providing connection to the stopped-up section of the existing N52 at Burley Bridge;

- Provision of pedestrian and cycle facilities in the northern verge of the realigned Silverhill Road, providing connectivity between the existing N52 and N52 Ardee Bypass;
- Utilities and services diversion works and the connection of road / land drainage outfalls to the new sustainable drainage system (SuDS) network;
- Associated earthworks including excavation of peat and unacceptable material, excavation and processing of rock and other material, provision of material deposition areas, and deposition and recovery of unacceptable material for use in the works;
- Erection of a temporary site compound;
- Completion of landscaping works;
- Erection of safety barriers, public lighting and fencing;
- Completion of all accommodation works; and
- Implementation of environmental measures and all other ancillary works.

2.2 Construction

2.2.1 Pre-Construction Works

- Erection of site compound
- Site Clearance and boundary fencing. Site clearance will be undertaken during the permitted months, with the majority of the site already fenced off.
- Boundary treatment, such as fencing, hedgerows and walls at adjoining land and residences.

2.2.2 Main Construction Works

The works are likely to take place in the following sequence:

- Gas Networks Diversion. The GNI diversion of the high pressure transmission main will be required to commence early in the construction period, or as an advance works contract, to ensure that adequate protection over the gas main is provided to facilitate construction traffic traversing the gas main and thereby provide access to the River Dee and River Gara bridges.
- The installation of pre-earthworks drainage and temporary settlement ponds to intercept silt laden run-off in advance of the main earthworks operations commencing construction.
- The construction of the roadworks will commence simultaneously with the bridge works construction.
 - a. Road construction is expected to commence from the Silverhill Road and the southern and northern tie-ins to facilitate provision of haul routes and access routes to the River Dee and River Gara bridge crossings to permit the construction of the two river bridges to commence.
 - b. The construction of this main section of the route will entail improvements to the existing ground through a combination of surcharging the sub-soils or excavation and replacement of soft materials.
 - c. The installation of the Cattle Underpass and watercourse culverts will also be necessary in this section to facilitate the haul route. It may be that some temporary watercourse crossings are installed to facilitate construction traffic

- Road construction of the remaining earthworks on the project, including the installation of the remaining watercourse culverts, pre-earthworks drainage and settlement ponds.
- Installation of permanent drainage system, including petrol interceptors and attenuation/treatment facilities and their outfalls to the receiving watercourses;
- Construction of pavement, including sub-base, base, binder and surface courses, kerbing, including combined kerb drainage systems and footways/cycleways. During these works, in particular, temporary diversion of existing roads in particular at tie-in areas are likely to be necessary.
- Installation of street lighting, signage and road markings;
- Completion of the River Dee and River Garra bridges, including the installation of parapets, approach and departure lengths of safety barriers.
- Landscaping, accommodation works and other ancillary works

2.2.3 Site Preparation

The site preparation works will likely be conducted through an advance works contract to be completed before construction commences on site.

Prior to any work commencing on the development site, boundary security will be required to be established around the site to prevent unauthorised access.

All site clearance and excavation works will be required to follow the mitigation measures of the Part VIII Planning Report. For all site clearance works and excavation works suitably qualified, experienced and licensed personnel will be required to undertake this specialist work in accordance with the waste management legislation.

2.2.4 Sourcing of Materials

The majority of the proposed development lies over soils that are competent for building embankments on and with high reusability where excavated in cuttings. The proposed development also traverses lands which are subject to flooding, resulting in the deposition of soft silt strata. These soft silt layers do not possess the adequate strength and compressibility characteristics on which to construct a road and typically require to be excavated to firm strata and filled back to ground level to provide a firm foundation for the road construction. To minimise the volume of unacceptable material to be excavated, where possible the sub-strata will be improved by surcharging the existing ground to compress the sub-soils, eliminating the requirement to excavate these materials, thus minimising the volume of unsuitable material requiring disposal and the volume of materials requiring importation.

Earthworks materials that are being excavated are to be processed, where possible, to render them suitable for re-use in the road embankment or bunds to minimise the importation requirement, with a material deposition area identified that will be landscaped within the land take to accommodate materials that cannot be re-used within the road construction or environmental bunds.

2.3 Project Programme

It is likely that the construction of the proposed development will be progressed as a single construction contract with the construction phase lasting approx. 18-24 months.

The construction sequence will generally be as follows:

- (1) Site Clearance
- (2) Fencing

- (3) Earthworks, including pre-earthworks drainage and temporary settlement ponds
- (4) Construction of bridge foundations and superstructure
- (5) Drainage works, including service diversions
- (6) Pavement construction
- (7) Accommodation works
- (8) Installation of safety barriers, signs and environmental barriers

2.4 Site Compounds

Site Compounds will be required during construction to ensure enough room is afforded for construction. The compounds may include offices, material storage areas, material processing areas, plant storage and parking for site and staff vehicles. These sites are proposed to remain in place for the duration of the contract but may be scaled up or down during particular activities on site. A site compound location has been identified at the Silverhill Road as illustrated on Drawing *N52A-ROD-HML-SW-AE-DR-EN-300007* in Appendix A. This provides access from the existing National Road network for the early stages of construction, whilst also facilitating access to the proposed development via the Silverhill Road.

2.5 Chemical/Fuel Storage Area

[Details of chemical/fuel storages areas to be inserted here by the successful contractor.]

2.6 Construction Plant Storage

[Details of construction plant storage areas to be inserted here by the successful contractor.]

2.7 Working Hours and Days

Permissible working hours are outlined in Table 2.1.

Table 2.1 Permissible working hours

Days & Times
Monday to Friday - 07.00 to 19.00
Saturday - 08.00 to 16.30

*Construction activity outside of these hours, other than that required in respect of emergency works, will require permission from the relevant local authority

3.0 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

The CEMP will be developed by the contractor to meet the requirements of ISO 14001 and all site works will be undertaken in compliance with the CEMP. The CEMP shall include details of the topics listed below, further information on which is given in the following section.

- Environmental Policy;
- Environmental Aspects Register;
- Project Organisation and Responsibilities;
- Project Communication and Co-ordination;
- Training;
- Operational Control;
- Checking and Corrective Action;
- Environmental Control Measures;
- Complaints Procedure.

The Construction Environmental Management Plan (CEMP) details all the environmental aspects and impacts associated with this contract such as waste management, pollution prevention and protection of flora and fauna with particular emphasis on the Special Area of Conservation (SAC), Special Protection Area (SPA) and Water Quality. The Register of Impacts provides the framework for identifying the potential environmental impacts generated by construction and the associated works. The Environmental Operational Control Procedures and activity specific method statements will detail the working methods necessary for managing and mitigating these impacts, whether it is by prevention or mitigation. Prior to the commencement of construction activities, the Environmental Operational Control Procedures and activity specific method statements will be completed so as to conform to precise site-specific requirements.

3.1 Environmental Policy

The contractor will complete an Environmental Policy with consideration for impacts on the natural and built environment. All project personnel will be accountable for the environmental performance of the project and will be made aware of the Environmental Policy at induction. The environmental policy will consider and make commitments with regard to the protection of Natura 2000 sites (SAC and SPA), NHA sites, emissions to the atmosphere, maintenance of water quality, resource usage energy consumption and waste management.

3.2 Environmental Aspect Register

Once appointed, the contractor will prepare a register of all sensitive environmental features which have the potential to be affected by the construction works, together with details of commitments and agreements made within the Part VIII planning documentation, the Contract Documentation, Planning conditions imposed by the local authority, and conditions identified by Statutory Authorities with regards mitigation of potential impacts.

The Environmental Aspects Register provides the relevant information for the preparation of construction method statements and will be regularly updated during the works.

The Environmental Aspects Register will consider sensitive environmental features as listed below (please note this list is not exhaustive and will be amended and expanded upon as required by the contractor).

- Identification off all waterbodies. This includes dry drains and ditches capable of carrying water, for the protection against ingress of suspended solids or any pollutant.
- Air emissions;
- Noise & Vibration emissions;
- Light emissions;
- Sanitary and domestic sewage discharge;
- Waste generation;
- Treatment of contaminated materials;
- Treatment of Asbestos Containing Materials;
- Treatment of invasive species;
- Use of hazardous materials;
- Energy usage;
- Water usage;
- Discharge of waste water;
- Traffic generation;
- Biodiversity;
- Landscape and Visual impacts;
- Hydrogeology;
- Archaeology and Cultural Heritage;
- Architectural Heritage.

3.3 Project Organisation and Responsibilities

The CEMP will define the roles and responsibilities of the project team. The overall responsibility lies with the Project Manager whose responsibility it will be to approve key personnel required for employment on the project. They will liaise with the Site Environmental Manager.

The Project Manager will lead the works on site. They will be responsible for the management and control of the activities and will have overall responsibility for the implementation of the CEMP. They will be assisted by the SEM who will act as his deputy.

The SEM will prepare and implement all aspects of the CEMP.

3.3.1 Project Manager

The Project Managers main duties and responsibilities in relation to the CEMP include liaising with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor's project staff.

3.3.2 Site Manager

The Site Manager's environmental management responsibilities include but are not limited to:

- preparation and implementation of the CEMP;
- close liaison with the Site Environmental Manager (SEM) to ensure adequate resources are made available for implementation of the CEMP;
- ensuring that the risk assessments for control of noise and environmental risk are prepared and effectively monitored, reviewed and communicated on site; and
- managing the preparation and implementation of method statements; and
- ensuring that the Site Environmental Manager reviews all method statements and that relevant environmental protocols are incorporated and appended.

3.3.3 Site Environmental Manager (SEM)

In order to ensure the successful development and implementation of the CEMP, each Contractor will appoint an independent Site Environmental Manager (SEM). The SEM must possess training, experience and knowledge appropriate to the role, including:

- A National Framework of Qualifications (NFQ) Level 8 qualification or equivalent or other acceptable qualification in environmental science or management

The main duties and responsibilities of the SEM include and are not limited to the following:

- Have regard to all legislation and guidance in relation to protection of the environment with particular focus on the habitats and species of the European protected sites.
- Liaising with management in preparing and inspection of site specific method statements for activities where there is a risk of pollution or adverse effects on the environment;
- Liaising with LCC on all Method Statements, any alternations to live documents and any other works to ensure protection of water quality
- Being familiar with the information in the pre-construction surveys, construction Requirements, Louth County Council conditions and all relevant Method Statements;
- Being familiar with the contents, environmental commitments and requirements continued within the reference documentation listed in this CEMP;
- Being familiar with the baseline data collated during the compilation of the Part VIII Planning Report;
- Liaising with the Project Team in assigning duties and responsibilities in relation to the CEMP, to individual members of the main contractor's project staff;
- Overseeing, ensuring coordination and playing a lead role in third party consultations required statutorily, contractually and in order to fulfil best practice requirements;
- Liaising with Management in agreeing site specific Method Statements with Third Parties;
- Ensuring that all relevant works are undertaken in accordance with the relevant legislation;
- Bring any legal constraints that may occur during certain tasks to the attention of management;
- Hold copies of all permits and licenses provided by waste contractors;
- Ensuring that any operations or activities that require certificates of registration, waste collection permits, waste permits, waste licences, etc have appropriate authorization;

- Gathering and holding documentation with respect to waste disposal;
- Keeping up to date with changes in environmental practices and legislation and advising staff of such a changes and incorporating them into the CEMP;
- Liaising with contactors and consultants prior to works;
- Procuring the services of specialist environmental contactors when required;
- Ensuring that all specialist environmental contactors are legally accredited and proven to be competent;
- Coordinating all the activities of the specialist environmental contractors;
- Ensuring that Environmental Induction Training is carried out on all personnel on site and ensuring that tool box talks include aspects of Environmental Awareness and Training;
- Respond to all environmental incidents in accordance with legislation, the CEMP and company policy/procedures;
- The SEM is responsible for notifying the relevant statutory authority when environmental incidents occur and producing the relevant reports as required;
- Ensuring that all relevant works have (and are being carried out in accordance with) the required permits, licenses, certificates and planning permissions;
- Liaising with the designated licence holders and specific agent defined in the licence with respect to licences granted pursuant to the EC (Natural Habitats) Regulations 1997;
- Carrying out regular documented inspections of the site to ensure that work is being carried out in accordance with the Environmental Control Measures and relevant site specific Method Statements;
- The SEM should prepare and be in readiness to implement at all times the Emergency Incident Response Plan;
- Responsible for reviewing all environmental monitoring data and ensuring that they all comply with stated guidelines and requirements;
- Have regard for best practice documentation including but not limited to the NRA/TII Environmental Assessment and Construction Guidelines;
- Maintaining environmental records;
- Providing guidance for the site team in dealing with environmental matters, including legal and statutory requirements affecting the works;
- Reporting environmental performance to the Site Manager;
- Ensuring that the mitigation and environmental commitments referred to in Section 4.1 are fully and properly implemented in the development and implementation of the CEMP;
- Maintain and update the Incident Response Plan as required.

3.3.4 Design Manager

The main duties and responsibilities of the Design Manger having regard to the implementation of the Construction Environmental Management Plan (CEMP):

- Be familiar with the CEMP and relevant documentation referred to within;
- Participate in Third Party Consultations and liaising with third Parties through the SEM.

3.3.5 Section Managers and Agents

The Section Managers and Agents are responsible for the following:

- Ensuring Forepersons under his/her control adhere to the relevant Environmental Control measures and relevant site specific Method Statements, etc.
- Ensuring that the procedures agreed during third party consultations are followed;
- Reporting immediately to the SEM any incidents where there has been a breach of agreed environmental management procedures, where there has been a spillage of a potentially environmentally harmful substance, where there has been an unauthorised discharge to ground, water or air, damage to habitat, etc.
- Attending Environmental review Meeting and preparing any relevant documentation as required by Management.

3.3.6 Forepersons

The forepersons on site are responsible for the following:

- Ensuring personnel under his/her control adhere to the relevant environmental control measures and relevant site specific Method Statements;
- Reporting immediately to the site agents and SEM any incidents where there has been a breach of agreed procedures e.g. spillages and discharges.

3.3.7 Project Ecologist

In order to ensure the successful development and implementation of the CEMP, LCC will appoint a Project Ecologist to supervise the entire proposed development. The Project Ecologist must possess training, experience and knowledge appropriate to the role, including:

- An NFQ Level 8 qualification or equivalent or other acceptable qualification in ecology or environmental biology;
- Competency in invasive species management.

The principal functions of the Project Ecologist are:

- To develop and collect the necessary pre-construction baseline information.
- To advise the Contractor on any monitoring requirements for ecological features

During the preparation of each Contractor's CEMP, the SEM may, as appropriate, assign other duties and responsibilities to the Project Ecologist.

3.3.8 Engineering Staff

The engineering staff's environmental management responsibilities include but are not limited to:

- reporting any operations and conditions that deviate from the CEMP to the Site Manager;
- taking an active part in site safety and environmental meetings; and
- ensuring awareness of the contents of method statements, plans, supervisors' meetings or any other meetings that concern the environmental management of the site.

3.3.9 Supervisors

The supervisors' environmental management responsibilities include but are not limited to:

- ensuring all personnel affected by a method statement are briefed and fully understand its content. Monitor operatives for compliance, including sub-contract operatives;
- implementation of environmental management activities required by the CEMP and works method statements; and
- ensuring that all inspections are carried out as prescribed in the CEMP.

3.3.10 All Project Personnel

All project personnel have the following responsibilities:

- Attend environmental training as required;
- Reporting immediately to the Forepersons/Agents or SEM any spillage incidents or observations regarding adverse effects to the Environment.

3.4 Project Communication and Co-ordination

Environmental issues and performance aspects will be communicated to the workforce on a regular basis. Weekly project meetings which follow a set agenda incorporating Environment will be held alongside overall management meetings.

All staff and sub-contractors involved in all phases of the project will be encouraged to report environmental issues.

3.5 Training

All employees and subcontractors involved on site will be given a comprehensive induction prior to commencement of the works. This environmental training can be run concurrently with safety awareness training.

Training will include:

- Overview of the Environmental Policy and Environmental Management Plan, goals and objectives;
- Awareness in relation to risk, consequence and methods of avoiding environmental risks as identified within the Register of Aspects and with the planning conditions;
- Awareness of roles and individual environmental responsibilities and environmental constraints to specific jobs;
- Location of and sensitivity of Special Area of Conservations, Special Protection Areas, protected monuments, structures etc.;
- Location of habitats and species to be protected during construction, how activities may affect them and methods necessary to avoid impacts.

A record will be kept of a signed register on the project files of all attendees of the environmental induction.

Toolbox talks, based on specific activities being carried out will be given to personnel by the nominated project representative. These will be based on specific activities being carried out and will include environmental issues particular to the N52 Ardee Bypass development, including:

- Oil/Diesel spill prevention and safe refuelling practice;
- Storage of materials including oil/diesels and cement;
- Emergency response processes used to deal with spills;
- Minimising disturbance to wildlife;
- Emergency response to include water pollution hotline to the EPA/Local Authority (LA) for regulator response. Identification of registered / accredited spill cleanup company for oil etc.; and
- Consideration of importance of containment of vehicle washing, containments of concrete /cement / grout washout etc, bank protection using hessian to prevent excessive scour and mobilisation of suspended solids, maintenance of vegetation corridors etc.

3.6 Operational Control

Site works will be checked against the CEMP requirements. Any mitigation measures that have been agreed with the Statutory Authorities, or are part of planning conditions, will be put into place prior to the undertaking of the works for which they are required and all relevant staff will be briefed accordingly.

Method statements that are prepared for the works will be reviewed / approved by the Client Project Manager and where necessary the relevant Environmental Specialist. All method statements for works in, near or liable to impact on a waterway must have prior agreement with IFI and NPWS.

A Quality Management System (QMS) will also be put into operation for the project. Document control will be in accordance with this QMS and copies of all audits, consents, licences, etc will be maintained by the SEM and his team and kept on site for review at any time.

3.7 Checking and Corrective Action

Daily inspections of the site and the works will be undertaken to minimise the risk of environmental damage and to ensure compliance with the CEMP. Any environmental incidents are to be reported immediately to the Site Foreman. The Site Environmental Manager will undertake periodic inspections and complete an assessment of the projects environmental performance with regard to the relevant standards/legislation and the contents of the CEMP. Following these inspections the SEM will produce a report detailing the findings which will be provided to the Client Project Manager and reviewed at the monthly project meeting.

3.8 Environmental Control Measures

Licensing requirements will be in place and Specific procedures to manage the key environmental aspects of the project will be developed by the contractor prior to work commencing.

3.9 Complaints Procedure

A liaison officer will be available to allow for members of the public or interested parties to make complaints about the construction works. The CEMP will contain details of the complaints procedures and a monitoring system will be implemented to ensure that any complaints are addressed and satisfactory outcome is achieved for all parties.

3.10 Compliance with Project Consents

The Louth County Council consent and all other licences and consents shall be complied with and enclosed in an Appendix to the CEMP.

3.11 Emergency Preparedness & Response

The successful contractor shall provide an Emergency Response Plan, including method statements for the following:

- Evacuation and assembly of site personnel
- Administering First Aid
- Contacting emergency services
- Immediate action that can be taken to mitigate the consequences

3.12 Incident Response

Introduction

This section describes the procedures, lines of authority and processes that will be followed to ensure that incident response efforts during the construction phase of the proposed development are prompt, efficient, and appropriate to particular circumstances. It has been developed to provide the information that each employee may need to respond to an emergency and to handle it effectively.

Objectives for Incident Response

The primary objectives are to:

- Ensure the health and safety of workers and visitors along the site;
- Minimise any impacts to the environment and to ensure protection of the water quality and the aquatic species dependant on it;
- Protect property and operations at the proposed site and to minimise the impact on the continuity of business; and,
- Establish procedures that enable personnel to respond to incidents with an integrated multi-departmental effort and in a manner that minimises the possibility of loss and reduces the potential for affecting health, property and the environment.

Responsibility

It is the responsibility of the SEM (Section 3.3.3) to maintain and update this Plan as required. It shall be reviewed on an ongoing basis and amended, as necessary, when one or more of the following occur:

- Applicable regulations are revised;
- The Incident Response Plan (Section 3.12.1) fails (in respect of any one or more of the above-stated objectives) in an emergency;
- The project changes in its design, construction, operation, maintenance, or other circumstance in a way that materially increases the magnitude / changes the nature of the potential impacts on the environment, workers or visitors to the site; and/or,
- Amendments are required by a regulatory authority.

3.12.1 Incident Response Plan

The Incident Response Plan will include the following, as appropriate:

- Reference to the Method Statements and Management Plans for other construction activities, insofar as they are relevant for the purposes of mitigating against health and safety and pollution incidents
- Procedures to be adopted to contain, limit and mitigate any adverse effects, as far as reasonably practicable, in the event of a health and safety or pollution incident;
- Details of spill clean-up companies appropriate to deal with pollution incidents associated with the materials being used or stored on site;
- Procedures to be followed and appropriate information to be provided in the event of any incident, such as a spillage or release of a potentially hazardous material;
- Procedures for notifying appropriate emergency services, authorities, the Employer's Representative and personnel on the construction site;
- Procedures for notifying relevant statutory bodies, environmental regulatory bodies, local authorities and local water and sewer providers of pollution incidents, where required;
- Maps showing the locations, together with address and contact details, of local emergency services facilities such as police stations, fire authorities, medical facilities and other relevant authorities; and,
- Contact details for the persons responsible on the construction site and within the Contractor's organisation for pollution incident response.

The following table of information shall be included in the plan:

Name and address of the Client: Louth City and County Council Millennium Centre, County Hall, Dundalk, Co.Louth, A91KFW6 The contact within the Client organisation is [name TBC] (tel. no TBC). Site Location: The proposed road development is located in County Louth in a predominantly rural area, with the exception of Ardee town.
Potential Incidents: Potential incidents requiring emergency response procedures: • Fuel and oil spills; • Road traffic accidents involving chemical or biological spills; • Landslides and earth slippages; • Extreme rainfall events, causing flooding of watercourse; • Fires; • Activities resulting in noise and vibration, air pollution, hazardous substances or impacts on water; • Waste management; and, • Discharge of effluent. The Contractor will update the list of potential incidents based on the detailed design of the proposed development, and include, as a minimum, the following: • The measures to be taken to reduce the risk potential;

- Procedures to be put in place to deal with the risk; - Person responsible for dealing with incidents; - Procedures for alerting key staff; - Standby/rota systems; - Clearly defined roles and responsibilities; - Names of staff and Contractors trained in incident response; - The types and location of emergency response equipment available and appropriate personal protective equipment to be worn; - A system of response coordination; - Off-site support; and, - Particular emergency service or persons to be notified in case of incident.		
Date and version of the plan: November 2021 V1		Name or position of person(s) responsible for compiling / approving the plan: TBC Roughan & O'Donovan
Review Date:		Date of next exercise:
Objectives of the IRP: To carry out the construction works in such a way as to avoid injury, health hazards or pollution incidents. However, should any such incident occur, procedures and measures will be implemented to contain, limit and mitigate the effects as far as reasonably practicable.		
List of external organisations consulted in the preparation of the IRP: [TBC by Contractor when preparing IRP]		
Distribution of the IRP		
Recipient	No. of copies	Version

Resources

Relevant staff, including cover staff, shall be trained in the implementation of the Incident Response Plan and the use of any spill kit / control equipment as necessary. The contractor shall provide a list of all such staff to the Employer's Site Representative detailing the name, contact number, and training received, and the date of that training. The Contractor shall provide a full list, including the exact locations, of all pollution control plant and equipment to the Employer's Site Representative. All such plant and equipment shall be maintained in place and in good working order for the duration of the works.

Spill Response

The Incident Response Plan shall include a Spill Response with the following as a minimum:

- i. Instruction to stop work;
- ii. Instruction to contain the spill;
- iii. Details of spill clean-up material location;
- iv. Name and contact details of responsible staff;
- v. Measures particular to the location and the activity;

- vi. Instruction to contact the SEM (including Name and Contact Details).

This Spill Response shall be displayed at several locations throughout the site and at all sensitive locations.

3.12.2 External Contacts

External Contacts		
Contact	Office Hours	Out of Hours
Louth County Fire Service	+353 (61) 556859	+353 (61) 417833
Gardaí: Emergency	999 / 112	999 / 112
Gardaí: Ardee Garda Station	+353 (41) 687 1130	+353 (41) 687 1130
Louth County Hospital	+353 (042) 933 4701	+353 (042) 933 4701
EPA Regional Office Monaghan	+353 (047) 77600	+353 (047) 77600
Louth County Council Emergency Planning Department	TBC	TBC
ESB	1850 372 757	1850 372 999
Bord Gáis	1850 200 694 / 1850 20 50 50	1850 205 050
Waste Management Contractor	TBC	
Specialist Advice	TBC	
Specialist Clean up Contractor	TBC	
Louth County Council	+353 (042) 933 5457	+353 (042) 933 5457
Inland Fisheries Ireland		To be agreed with IFI
National Parks & Wildlife Service		To be agreed with NPWS

3.12.3 Internal (Contractor's) Contacts

Internal Contacts		
Contact	Office Hours	Out of Office Hours
Names and positions of staff authorised / trained to activate and coordinate the IRP	TBC	
	TBC	
	TBC	
	TBC	
	TBC	
	TBC	
Other Staff	TBC	
Managing Director	TBC	
Site Manager	TBC	
Health & Safety Manager	TBC	

3.12.4 Chemical Product and Waste Inventory

Inventory of Chemical Products and Wastes						
Trade Name / Substance	Solid / Liquid / Gas or Powder	UN Number	Maximum Amount	Location Marked on Site Plan	Type of Containment	Relevant Health and Environmental Problems

3.12.5 Pollution Prevention Equipment Inventory

Inventory of Pollution Prevention Equipment (on- and off-site resources)			

3.13 Waste Management Strategy

Scope

The Contractor will develop a Construction and Demolition Waste Management plan that will detail (at a minimum):

- Licensing of Waste Disposal;
- Site clearance;
- Excavations, stockpiling and disposal of materials;
- Measures to protect water quality;
- Importation, stockpiling and placing of fill;
- Management of drainage works to ensure no pollution of watercourses;
- Construction vehicle management; and,
- Dust and noise abatement measures.

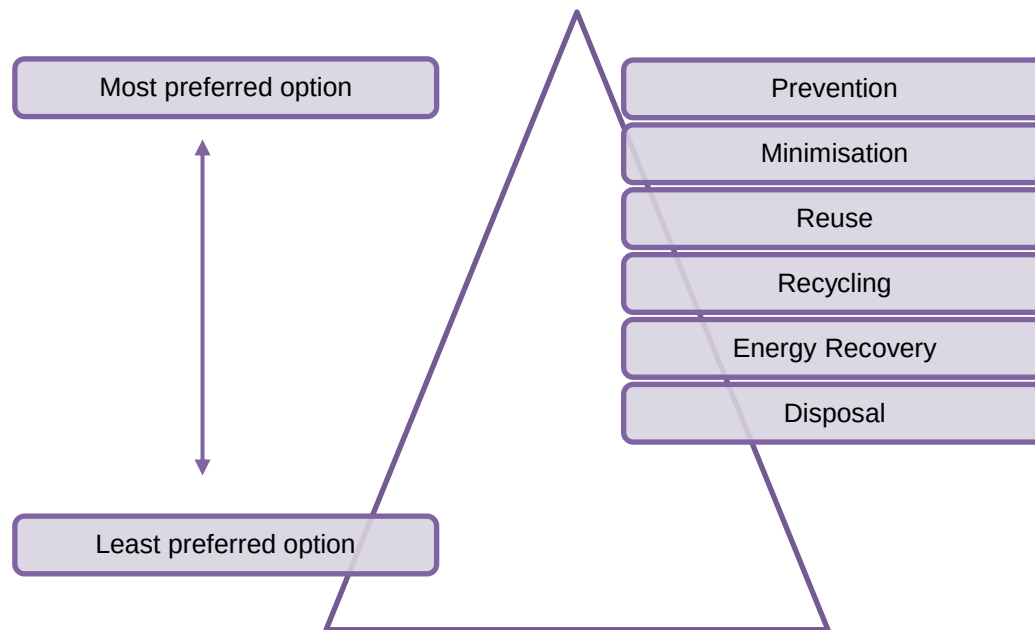


Figure 1 Waste Hierarchy

The management of construction and demolition waste will be conducted in accordance with 'the waste hierarchy'; with waste prevention and minimisation being the first priority, followed by reuse and recycling, and disposal (i.e. to landfill) and energy recovery (i.e. incineration) regarded as least preferred options (Figure 1). During site clearance and construction works, there are numerous opportunities for the beneficial reuse or recycling of materials, which ultimately reduces the volume of material which needs to be consigned to landfill sites. The Construction and Demolition Waste Management Chapter finalised by the Contractor shall be developed in accordance with the waste hierarchy, as it is ordered in Figure 1.

Source Segregation

Wastes generated on the construction site will be identified and segregated according to their respective categories, as described by the European Waste Catalogue (EWC) list of 'construction and demolition wastes (including excavated soil from contaminated sites)'.

Wherever possible, metal, timber, glass and other recyclable material will be segregated and removed off-site to a permitted / licensed facility for recycling. In order to achieve this, designated waste storage areas will be created at the construction compound or other suitable locations for the storage of segregated wastes prior to transport for recovery / disposal at suitably licensed / permitted facilities. Suitably sized containers for each waste stream will be provided within the waste storage area and will be supervised by the WMC. The number and sizing of containers will be agreed with waste management contractors in advance of the commencement of construction works. Source segregation of waste will result in cost savings to the project as well as providing an environmentally sound route for the management of all construction and demolition wastes.

Re-use

Possibilities for re-use of clean, non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use. Where excavated material is not be reused within the works, the Contractor will endeavour to send material for recovery or

recycling so far as is reasonably practicable. The Contractor will ensure that any off-site interim storage facilities for excavated material have the appropriate waste licences or waste facility permits in place.

Material Management

In order to prevent and minimise the generation of waste, the Contractor will be required to ensure that raw materials are ordered so that the timing of delivery, the quantity delivered, and the storage is not conducive to the creation of unnecessary waste. The Contractor, in conjunction with the material suppliers, will be required to develop a programme showing the estimated delivery dates and quantities for each specific material associated with each element of construction and demolition works. Following a 'just-in-time' approach improves cash flow, better utilises storage space and reduces potential loss to theft and accidental damage, as well as making the site safer.

It is essential that the planning, construction and demolition works are undertaken in close collaboration with waste management contractors, in order to determine the best techniques for managing waste and to ensure a high level of recovery of materials for recycling. The Contractor will be required to continuously seek to improve the waste management process on-site during all stages of construction and maximise opportunities for re-use and recycling where they exist. For example, in relation to waste packaging, the Contractor will seek to negotiate take-back of as much packaging waste as possible at source to ensure maximum recycling. The finalised Construction and Demolition Waste Management Chapter will be included as an agenda item at the weekly construction meetings. In addition, any updates to the text will be communicated to the whole team (including the Client) at the monthly meetings.

Auditing

The Contractor will record the quantity (in tonnes) and types of waste and materials leaving the site during the construction phase. The name, address and authorisation details of all facilities and locations to which waste and materials from the construction phase are delivered will be recorded along with the quantity of waste (in tonnes) delivered to each facility. Records will show all material recovered and disposed of.

The waste management strategy for the project will follow the accepted waste hierarchy and the Contract will implement the following measures (at a minimum):

- Wherever possible, materials for construction activities will be ordered as to require the minimum possible storage time;
- Materials will be ordered, where possible, in sizes to prevent wastage;
- A WMC shall be appointed by the Contractor, who will be responsible for handling, storage and delivery of materials to the proposed road development;
- It shall be ensured that stored material is protected from damage from plant and environmental factors such as rain and wind;
- Storage areas shall be secured so as to prevent unauthorised access;
- A waste management compound shall be established to handle incoming waste from construction activities – this should facilitate the segregation of key waste streams to maximise the opportunity to re-use, recycle and return wastes generated on-site;
- A separate secured area shall be provided for dealing with hazardous waste; and,
- Separate facilities shall be provided for the storage of fuels and chemicals.

Waste and Recycling Targets

Through their finalised waste management strategy, The Contractor shall aim to achieve the following targets, insofar as possible:

- Reuse of all earthworks materials on site; and
- No contamination of skips / waste containers, i.e. no additional costs due to incorrect materials being placed in skips / containers designated for other categories of waste.

Waste and Recycling Opportunities

The Contractor will seek opportunities, wherever possible, to reduce the amount of waste generated on site and maximize the potential for recycling materials in accordance with the waste hierarchy through the following:

- Maximising the re-use of soils on site during the construction of the proposed road development;
- Storing materials in designated areas and separate from wastes to minimise damage;
- Returning packaging to the producer where possible;
- Segregating construction and demolition wastes into reusable, recyclable and non-recyclable materials;
- Reusing and recycling materials on site during construction where practicable;
- Recycling other recyclable materials through appropriately permitted/licensed Contractors and facilities; and,
- Disposing of non-recyclable wastes to licensed landfills.

3.14 Construction Erosion and Sediment Control

This section outlines the procedures and technical practices for implementing effective erosion and sediment control during the construction phase of the proposed development, through a variety of delivery methods. It provides an effective tool for reducing potential environmental effects by:

- Identifying erosion and sediment control objectives before construction;
- Encouraging planning to manage water, control erosion and control sediment by identifying potential impacts and mitigation measures;
- Providing a mechanism for clear communication to workers;
- Defining a performance expectation; and
- Assuring owners and regulators that due diligence has been exercised.

The purpose of the construction erosion and sediment control is to:

- Minimise erosion potential by effective planning, procedures and water management;
- Apply erosion control measures to prevent the movement of sediment; and
- Apply sediment control measures to prevent off-site sediment release in the event of sediment movement.

This Section is intended to be a live, working text and, therefore, the measures proposed herein may be added to or amended as the project progresses.

All of the protective measures and procedures included in this Section will be implemented in full in order to ensure that sediment laden run-off from the construction site does not enter watercourses / water bodies. It sets out the minimum requirements that must be adhered to by the Contractor – any alternative measures that may be incorporated at the construction stage will be required to provide at least the same or a better standard of protection.

3.14.1 Principles of Erosion and Sediment Control

The principles of erosion and sediment control during the construction stage of a road project as outlined in CIRIA C648 (2006) include:

- Erosion control (i.e. preventing run-off) is more effective than sediment control in preventing water pollution. Erosion control is less subject to failure from high rainfall, requires less maintenance and is also less costly.
- Plan erosion and sediment controls early in the project lifecycle and incorporate into the design and construction programme.
- Install drainage and run-off controls before starting site clearance and earthworks.
- Minimise the area of exposed ground.
- Prevent run-off and pollutants from entering the site from adjacent ground, as this creates additional polluted water.
- Provide appropriate control and containment measures on site.
- Monitor and maintain erosion and sediment controls throughout the project.
- Establish vegetation as soon as practical on all areas where soil has been exposed.

3.14.2 Erosion and Sediment Controls

General

The principal objectives in relation to erosion and sediment control during the earthworks operation will be:

- To keep the exposed surface area to an absolute minimum;
- To minimise the amount of run-off from the site;
- To organise the work so that it progresses from the low point towards the high point within each outfall catchment;
- To have an efficient earthworks operation to ensure that fill is placed as material is removed; and
- To ensure that the unacceptable material is removed and placed in controlled material deposition areas in an efficient manner.

3.14.3 Principal Avoidance Measures

The protection of watercourses from pollution by construction works is achieved through avoidance in the first instance. In this regard, the following measures will be implemented during the construction phase:

- i. Site clearance involving topsoil stripping will progress along with the earthworks and will not be carried out over large areas in advance of the earthworks;
- ii. Soft soils to be excavated as part of the proposed road development will be deposited within the works area as part of the landscaping treatment for the completed earthworks along the route. The use of silt fencing and limiting the proximity of soil improvements to streams and watercourses will limit sediment

entering adjacent watercourses and minimise water quality impacts on waterbodies; and

- iii. Bridge crossings of the Rivers have been designed to be clear spans, with the abutments setback from the top of bank to avoid works within the river channel and provide a separation for works from the river. Culverts have been designed as pre-cast concrete structures to minimise the works adjacent to the minor watercourses.

3.14.4 Principal Control Measures – General

This Section outlines the principal mitigation and protection measures that will be prescribed for the construction phase in order to protect all the catchments, watercourses and ecologically designated areas. General control measures will include:

- Maintenance of good site management at all times and all site personnel will be made aware of the importance of the freshwater environment and the requirement to avoid pollution of all types, throughout all stages of the construction phase.
- Surface water flowing onto the construction area will be minimised through the advance construction of cut-off ditches (Figure 2, below).
- All soiled construction run-off water will pass through sedimentation ponds prior to outfall to the receiving watercourse. These sedimentation ponds may be a combination of temporary settlement ponds and permanent attenuation ponds for the road drainage during the construction phase—.
- The storage of oils, fuel, chemicals and hydraulic fluids will be in secure areas within the site compounds and will not occur within a minimum of 10m from watercourses.
- Storage tanks shall have secondary containment provided by means of an above ground bund to capture any oil leakage. Storage tanks and associated provision, including bunds, will conform to the current best practice for oil storage and will be undertaken in accordance with *Best Practice Guide BPGCS005 – Oil Storage Guidelines* (Enterprise Ireland).
- Protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance to the *NRA Guidelines for the crossing of watercourses during the construction of National Road Schemes*. All chemical and fuel filling locations will be protected from potential spillages through the provision of appropriate protection measures including bunded areas and double skinned bowser units with spill kits.
- Compounds / storage facilities will be located at least 50m away from sensitive watercourses. In addition, measures will be implemented to ensure that silt laden or contaminated surface water run-off from the compound does not discharge directly to the watercourse.
- Foul drainage from all site offices and construction facilities will be taken off-site and disposed of by a licensed Contractor in accordance with legislation to prevent pollution of rivers and local water supply.



Figure 2 **Example of cut-off ditch**



Figure 3 **Typical silt fence usage**

- Management of construction material stockpiles to prevent siltation of watercourse systems through run-off during rainstorms will be undertaken. This will involve the construction of collector ditches surrounding material stockpiles to contain run-off and direct it to the settlement ponds (either operational or temporary depending on the construction sequence) before discharge to an adjacent watercourse. In addition, the establishment of vegetation on the exposed soil adjacent to material stockpiles may also be used to slow down and treat (through settlement) run-off waters. A typical example of where silt fences would be employed adjacent to stockpiled material is indicated in Figure 3, above.

- Where construction works are carried out alongside stream and river channels, protection of such rivers from silt load will be carried out. This will be through the use of retaining a grassed buffer zone, the provision of silt fences or compacted earthen berms so as to prevent direct run-off of waters from the construction site to watercourses.
- Where road drainage outfalls are to be located, the vegetation at these sites will be stripped immediately prior to the construction of the outfall and a Hessian or equivalent material pinned over all exposed soil following completion. This will be re-seeded using native species of grass only.
- Where required, the pouring of concrete, sealing of joints, application of water-proofing paint or protective systems, curing agents, etc., for outfalls, bridges and culverts will be completed in the dry and allowed cure for 48 hours before re-flooding in order to avoid pollution of watercourses.
- Use of settlement ponds, silt traps and bunds and minimising construction within watercourses. Where pumping of water is to be carried out, filters will be used at intake points and discharge will be through a sediment trap. Examples of typical temporary settlement ponds / lagoons are presented in Figures 4 – 6, below.
- Riparian vegetation will be fenced off to provide a 5m buffer zone for its protection. Construction works at crossings will result in the loss of riparian vegetation which will be minimised so as to result in the least amount of disturbance and loss being incurred.
- Any surface water abstracted from a river for use during construction (e.g. over-pumping of a drain) shall be through a pump fitted with a filter to prevent intake of fish.



Figure 4 **Typical temporary settlement pond/lagoon**



Figure 5 Typical temporary settlement pond/lagoon



Figure 6 Typical temporary settlement pond/lagoon

- The use and management of concrete in or close to watercourses will be carefully controlled to avoid spillage which as stated earlier has a deleterious effect on water chemistry and aquatic habitats and species. Alternate construction methods are encouraged for example, use of pre-cast concrete or permanent formwork will reduce the amount of in-situ concreting required. Where on-site batching is proposed by the Contractor, this activity will be carried away from watercourses (minimum 10m). Washout from such mixing plant and also from concrete delivery trucks will be carried out only in a designated contained impermeable area. A typical washout facility is indicated in Figure 7, below.



Figure 7 **Typical washout facility**

- Wheel wash facilities will be installed at the exit from the material deposition area. All construction vehicles leaving the material deposition areas will be required to pass through these facilities.
- Temporary sedimentation ponds will be provided within these areas at appropriate locations which will be influenced by the compartmentalisation sequencing. These ponds will provide treatment for sediment run-off prior to discharge to adjacent watercourses.

3.15 Traffic Management Plan

A Traffic Management Plan will be submitted for approval to Louth County Council Road and Traffic Division by the appointed contractor prior to the commencement of any construction works. This plan will put diversions in place during temporary road closures and will ensure that temporary traffic works and road safety measures will be in place during the duration of the construction phase to minimise the impact on local road users.

3.16 Project Procedures and Method Statements

Method statements will be developed by the Contractor where appropriate to cover the following as a minimum:

3.16.1 Diversion of Services

[To be inserted by the successful contractor]

3.16.2 Excavation and Blasting (through peat, soils & bedrock)

[To be inserted by the successful contractor]

3.16.3 Piling

[To be inserted by the successful contractor]

3.16.4 Construction of pipelines

[To be inserted by the successful contractor]

3.16.5 Temporary hoarding & lighting

[To be inserted by the successful contractor]

3.16.6 Borrow Pits & location of crush plant

[To be inserted by the successful contractor]

3.16.7 Storage and Treatment of peats and soft soils

[To be inserted by the successful contractor]

3.16.8 Disposal of surplus geological material (peat, soils, rock etc)

[To be inserted by the successful contractor]

3.16.9 Earthworks material improvement

[To be inserted by the successful contractor]

3.16.10 Protection of watercourses from contamination and silting during construction

[To be inserted by the successful contractor]

4.0 SCHEDULE OF ENVIRONMENTAL COMMITMENTS

Project environmental mitigation has been set out in the application documentation, in the Part VIII Planning Report and will be detailed in the final Construction Environmental Management Plan (CEMP). The final CEMP will provide a framework for compliance auditing and inspection to ensure that these construction practices and mitigation measures as set out in the Part VIII Planning Report and the conditions in the planning approval are adhered to.

4.1 Mitigation Measures

4.1.1 Population and Human Health

Construction Phase

- A Construction Environmental Management Plan (CEMP) will be implemented as part of the construction stages to account for all works associated with the construction of the proposed development, including pre-construction site clearance works. This plan will ensure construction practices and measures are put in place to minimise any effects on road users.
- The appointed contractor will be required to finalise the CEMP, in agreement with Louth County Council prior to the commencement of construction. The contractor will identify an Environmental Manager/Site Representative who will be responsible for implementing the Plan and who will act as a liaison between the contractor, Louth County Council and the public with regard to the environmental management of the development works. The Environmental Manager will prepare the CEMP and their duties will include maintaining an environmental record, providing guidance to the site team in relation to environmental matters as well as reviewing environmental management content of method statement.
- A Traffic Management Plan will be submitted for approval to Louth County Council Road and Traffic Division by the appointed contractor prior to the commencement of any construction works as part of the Environmental Management Plan. This plan will put diversions in place during temporary road closures and ensure that temporary traffic works and road safety measures will be in place during the duration of the construction phase to minimise the impact on local road users.
- An Environmental Operating Plan will be implemented prior to construction works. This plan will outline procedures for the delivery of environmental mitigation measures and for addressing day-to-day environmental issues that can arise from construction.

- To minimise air quality impacts, dust minimisation measures will be implemented, see Section 11.5.
- Noise and vibration mitigation measures are outlined in section 12.5 and will be implemented during construction and operation stage.

Operational Phase

- Noise barriers will be placed at noise sensitive locations.
- Landscape planting will be implemented to reduce visual effects for local residents.

4.1.2 Biodiversity

Construction Phase

- Prior to any demolition, excavation, or construction a Construction Environmental Management Plan (CEMP) will be produced by the Contractor, using the outline plan set out in Appendix B. The CEMP will set out the Contractor's overall management and administration of the construction project and will be developed by the Contractors during the pre-construction phase, to ensure commitments included in the statutory approvals are adhered to. The CEMP will also be required to integrate with the requirements of the Environmental Operating Plan (EOP).
- Before any works commence on site, the Contractor will be required to prepare an Environmental Operating Plan (EOP) in accordance with the TII Guidelines for the Creation and Maintenance of an Environmental Operating Plan. The EOP will set out the Contractors approach to managing environmental issues associated with the construction of the road and provide a documented account to the implementation of the environmental commitments set out in the the Part VIII Planning Application Report.
- An Ecological Clerk of Works (ECoW) shall be appointed prior to the commencement of works. It shall be their responsibility to supervise and provide recommendations on the execution of any and all works which have the potential to give rise to negative or positive effects on biodiversity. The ECoW will have at least five years' experience as an Ecological Clerk of Works on road infrastructure projects.
- The Contractor will appoint a Site Environmental Manager (SEM) prior to the commencement of works. This person shall be responsible for carrying out environmental monitoring of the works and ensuring that the mitigation measures proposed in this EclA are adhered to.
- Site Compounds will be required during construction to ensure enough room is afforded for construction. The construction envelopes for the compounds, bridges and other ancillary infrastructure will be temporarily fenced off at the outset of the construction and will avoid the potential for un-necessary loss of habitat outside of the construction footprint.
- The fencing for the compound at Silverhill Road will be set inside existing hedgerow and treeline boundaries to avoid habitat loss. The set-back distance will be directed by the ECoW.
- The mitigation measures presented in other sections of the Part VIII Planning Application Report, including, but not limited to 'Hydrology' and 'Landscape and Visual' sections will be implemented in full.
- The use of artificial lighting on site will be minimised in terms of the area required to be illuminated and the length of time for which any lighting is switched on.

Light spillage will be prevented as far as reasonably practicable. Artificial lighting will be shut off at night when not in use or when works cease at the end of the day in order to minimise the effects of light pollution and disturbance to crepuscular and nocturnal species. Security lighting, if required, will be cowed, to prevent light spill outside the works areas. Direct or indirect lighting onto the watercourses will be avoided. The ECoW will ensure that light spill is reduced as much as possible.

- A pre-construction survey will be undertaken 2-3 weeks prior to construction to ensure that protected species such as Otter and Badger have not taken up residence within the construction envelope and to record invasive species extent and distribution. The survey will cover the footprint of the proposed development and a 50m buffer. Should any protected species shelters (e.g. holts, setts) be found, the ECoW will seek direction from the NPWS.
- Any excavations deeper than 1m will be either covered or have ramps fitted outside of working hours, which will allow badgers and other wildlife to escape. Similarly, any temporarily exposed open pipe system will be capped to prevent species such as Otter from gaining access when contractors are off site.
- Two new watercourse crossings are proposed as part of the proposed development. The first bridge will cross the River Dee at Ch. 0+600 while the second will cross the River Garra Ch. 1+700. Both bridges are clear span and the bridge abutments of each will be designed to provide a minimum setback of 2m from the top of the natural riverbank.
- The natural riverbank will be retained to allow mammals to pass under the bridges. Should this not be possible, mammal ledges will be provided in these structures in accordance with TII (2008). The ledges will be at least 500mm wide and at least 150mm above the 1 in 5-year flood event and have at least 600mm of headroom.
- Noise mitigation measures will be employed to ensure the construction noise limits are not exceeded along the entire length of the proposed development. The contract documents will clearly specify the construction noise criteria which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of BS 5228- 1:2009+A1:2014.

The risk of accidental transfer of non-native invasive species and diseases will be minimised by the implementation of Invasive Species and Biosecurity Management measures to avoid the spread or transfer of all invasive plants, animals and diseases in accordance with current best practice protocol, the TII Guidelines on the Management of Noxious Weeds and Non-native plant species on National Road Schemes (2010)

Non-Specific Mitigation Measures

The following is an overview of the non-specific mitigation measures that will be employed to avoid or minimise significant impacts on the ecological receptors within the Zone of Influence:

Water Quality – Construction Phase

Best practice pollution control measures shall be implemented during the construction phase, including:

- All material including oils, solvents and paints will be stored within temporary bunded areas or dedicated bunded containers;
- The Contractor will not be permitted to use lands liable to flooding for the storage of materials and will be required to monitor weather forecasts to ensure works within flood prone areas are not undertaken in during times of flood.
- Refuelling will take place in a designated bunded area away from surface water gullies, drains and water bodies, in the event of refuelling outside of this area, fuel will be transported in a mobile double skinned tank;
- All machinery and plant used will be regularly maintained and serviced and will comply with appropriate standards to ensure that leakage of diesel, oil and lubricants is prevented;
- Spill kits and hydrocarbon absorbent packs will be available and drip trays will be used during refuelling;
- Elements of the bridge will be prefabricated to reduce the need for pouring wet concrete on site.
- The use of machinery carries the potential for accidental hydrocarbon contamination of works areas by fuel spillages or oil leaks for example. The works will be carried out in accordance with the following measures to avoid such impacts:
 - Mobile storage such as fuel bowzers will be bunded to 110% capacity to prevent spills. Tanks for bowzers and generators will be double-skinned.
 - When not in use, all valves and fuel trigger guns from fuel storage containers will be locked.
 - All plant refuelling will take place using mobile fuel bowzers. Plant refuelling will take place as far as practicable from watercourses. A spill kit and drip tray shall be on site at all times and available for all refuelling operations. Equipment will not be left unattended during refuelling. All pipework from containers to pump nozzles will have anti-siphon valves fitted.
 - Strict procedures for plant inspection, maintenance and repairs will be detailed in the contractor's method statements and machinery shall be checked for leaks before arrival on-site.
 - All site plant will be inspected at the beginning of each day prior to use. Defective plant will not be used until the defect is satisfactorily fixed.
 - All major repair and maintenance operations will take place off-site.

Water Quality – Operation Phase

- The road drainage for the proposed development has been designed based on Sustainable Drainage Systems (SuDS) which will provide attenuation for a 1 in 100-year flood event including a 20% increase due to climate change. These systems will also include hydrocarbon interceptors which will treat all run-off prior to discharge into the existing surface water drainage network and the River Dee and River Garra. This will prevent impacts on water quality, both in terms of sedimentation, pollutants and the sudden increase in flows following a rainfall event, as a result of the proposed development. The drainage system developed for the proposed development will provide a suitable drainage system to service the road and to ensure that the existing drainage systems adjacent to the proposed development are not adversely impacted.

- A number of the attenuation ponds are situated in flood-prone areas. The crest of the bunds that form the attenuation ponds are above the 1:100-year flood levels, such that they are not envisaged to be inundated in a flood event through overtopping. However, the outfalls of the ponds to the receiving watercourses are below the 1:100-year flood level in most instances. To ensure that flood waters can't back-up through the outlet into the pond, non-return valves will be provided on all attenuation pond outlets below the 1:100 year flood level. In the case of more severe than 1:100-year flood events, in which one or more attenuation pond is flooded, there will be mobilisation of fine sediment and contaminants. Assuming regular maintenance of ponds, the associated impact would be minor.
- Excavated material will be processed and reused on site where possible. A material deposition area has been selected at Ch. 3+725 which will receive approximately 4500m³ of peat and soil which will be excavated during the construction phase. Depending on the final volume of excavated material, surplus material may be deposited off-site to a suitably licensed facility or potentially reused on nearby projects. The deposition area will be positioned at least 10m from the adjacent watercourse as per *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*. (TII, 2006). Best practice drainage and pollution prevention measures will be implemented to prevent / minimise potential run-off from the proposed material deposition area at Ch. 3+725 this will include the use of silt traps which will intercept run-off.

The proposed route traverses' areas indicated as liable to flood in extreme events. Conveyance within the floodplain will be maintained by the provision of adequately sized watercourse crossings and flood conveyance culverts to ensure that the road embankment does not act as a barrier to the flood waters. The road embankment from ground level to the 1:100year flood level will be constructed of coarse graded granular fill (Class 6) that has a void ratio of 30%, to allow storage of flood waters within the embankment. The design of the scheme will ensure that it will have no residual significant impact on flooding as can be seen in the flood extent drawings. There is no discernible difference in the flood extent between the pre- and post-development scenarios.

Lighting

- The lighting design has been designed in accordance with TII guidance document *Design of Road Lighting for the National Road Network* (TII, 2018) and *Bats and Artificial Lighting in the UK* (BCT, 2018).
- The lighting design will ensure that all luminaries will be LED which lack UV elements and will have peak wavelengths greater than 550nm (~3000°K). This will produce a warm white colour, and, in tandem with maintaining the minimum allowable lux levels, will reduce the impacts of lighting on wildlife.
- Lights will be designed to minimise light spill outside the intended area. This will include the use to light shields or cowls to prevent light spill onto habitats adjacent to the proposed development.

Fencing

- Mammal-resistant fencing as shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050 will be provided along the route to guide Badgers and Otter to mammal underpasses and other safe crossing points. The specification for mammal-resistant fencing is given in the

Guidelines on the Treatment of Badgers prior to the Construction of National Road Schemes (TII, 2006a) and *Guidelines on the Treatment of Otters Prior to the Construction of National Road Schemes* (TII, 2008b).

- Fencing will be recessed and tied into mammal crossings points to guide Badgers and Otter safely under the road and prevent them accessing the road carriageway.
- Mammal-resistant fencing will be incorporated at the earliest possible stage during road construction, preferably during erection of the permanent fence line with gaps left at locations recommended for mammal crossing points.
- Where there is an overlap of stock-proof fencing and mammal-resistant fencing at mammal crossing points, stock-proof fencing must be adjusted to allow for unimpeded access to the mammal crossing points. This involves modification of the lower section of the stock-proof fence. The fence will be adjusted so that the bottom rail and wire mesh are removed and chain-link is not fixed to the ground at the location of the underpass. This allows the animals to see a break in the fence line and thus clear access to the mammal crossing points nearby.

Landscaping

A landscape plan (CSR,2021 – refer to Drawings N52A-ROD-EAC-SW_AE-DR-EN-300052 - N52A-ROD-EAC-SW_AE-DR-EN-300055) has been prepared for the proposed development. It includes the following measures:

- In order to compensate for the loss hedgerow and treeline habitat, hedgerows and trees will be planted along the CPO line.
- Dedicated mammal crossings points (as shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050) will have appropriate landscape planting to provide cover.
- Green areas which would ordinarily be seeded with grass will be planted with a locally sourced wildflower mix containing native species. This area will be mown twice per year, once in early spring and once in late summer.
- In order to provide resources for pollinators and birds, a heathland mix containing Ling Heather (*Calluna vulgaris*) and Bell Heather (*Erica cinerea*) together with a mix of other flowering species, will be planted in areas of peaty soil.
- Planting will consist of locally sourced native species of national provenance only, insofar as possible.
- Planting will be undertaken in accordance with guidelines set out in the following documents:
 - All Ireland Pollinator Plan 2021-2025 (NBDC, 2021)
 - Pollinator-friendly management of: Transport Corridors (NBDC, 2019)
- If soil/substrate needs to be imported to the site for the purposes of the proposed development, the Contractor shall ensure that the imported soil/substrate is free from invasive species.

Specific Mitigation Measures

In addition to the general mitigation measures described above, specific measures are described in relation to individual Key Ecological Receptors in the following sections. Biodiversity mitigation measures are presented in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050.

Ardee Bog pNHA (KER1)

The proposed development will result in the loss of habitat within the pNHA. The habitats are improved agricultural grassland and the loss of this habitat is not considered significant in the context of the ecological integrity of the pNHA.

The road drainage has been designed to achieve a drainage neutral effect on the surrounding area. This has been achieved by preserving existing drainage paths and using adequately sized culverts, flood conveyance culverts and watercourse crossings. To prevent dewatering effects of peat excavation, impervious subsurface liners will be used in these areas. Transverse impermeable geotextile barriers will be installed to prevent the road formation from draining the peat.

Watercourses (KER2)

In addition to the construction phase and non-specific mitigation measures described above, the following measures will be implemented to ensure the protection of Key Ecological Receptor 2 Watercourses:

- Works within and adjacent to watercourses will comply with *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (IFI, 2016) and *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes* (TII, 2008). Measures contained in these documents include the following:
 - Prior to any excavations, the works area will be assessed and clearly *delineated* with temporary fencing. The minimum area necessary will be identified as part of the works area and there will be no access to works vehicles outside the fenced off areas.
 - All storage of plant, excavated material/topsoil and other materials required for construction, will be held within the fenced area.
 - No washing of plant, vehicles or equipment will be completed within 50m of a watercourse. The site foreman will ensure that all deliveries are required to complete wash-out at their own company base, i.e. not on site.
 - In all circumstances, excavation depths and volumes will be minimised, and excavated material will be re-used where possible.
 - During the operational phase, TII will be responsible for carrying out regular, best practice maintenance of attenuation ponds.
 - The measures prescribed in the CEMP will be strictly adhered to during both the construction and the operational phase.
- In-stream works will only take place between the 1st July and 30th September, subject to agreement with Inland Fisheries Ireland.
- Where pipe culverts are required for minor watercourses or field drains pipes they will be up to 2m wide, designed to match existing channel widths, whilst accommodating flood flows in line with the OPW requirements. These culverts will have inverts set 500mm below bed level for box culverts and 200mm below bed level for pipe culverts to ensure they are always backwatered and therefore accommodate unimpeded fish movement under all flow conditions.

Hedgerows and Treelines (KER3)

The existing hedgerows and treelines along the route are to be retained and protected except at specific locations where vegetation removal is necessary to facilitate the proposed development. Adequate protective fencing will be erected around trees and hedgerows which are to be retained and will include a Root Protection Area.

Badger (KER4)

In addition to the construction phase and non-specific mitigation measures described above, the following measures which comply with *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes* (TII, 2006b). will be implemented to ensure the protection of Key Ecological Receptor 4 Badger:

One badger sett was recorded 30m from at Ch. 2+800. The location of the sett is illustrated in Drawing N52A-ROD-EAC-SW_AE-DR-EN-300049. Works within 50m of a badger sett have the potential to lead to sett abandonment including the abandonment of dependent young. Due to its location within 30m of the proposed development and risk that the sett may be used in the future by badgers, it is recommended that a licence for disturbance and exclusion be sought from the NPWS prior to the commencements of any works within 30m of the badger sett.

- Prior to construction, the sett at Ch. 2+800 will be surveyed to assess if it is active or inactive. Monitoring using camera traps may be required to ascertain whether the sett is active or inactive and whether it is being used for breeding.
- The sett will be temporarily closed, in accordance with TII (2006b). Exclusion/closing of active setts will be carried out under licence from the NPWS and under the supervision of an appropriately qualified ecologist. An artificial sett will not be provided as the sett is not a main sett. The sett will be closed as follows:
 - The sett should be closed outside the breeding season (December to June inclusive). No construction machinery will be used within 30m of the badger sett (extended to 50m for active setts during the breeding season).
 - Prior to any closure works it is recommended that the sett is soft blocked for five days to determine if the sett is inactive. This should be carried out using small twigs and placing them over the entrance of the sett, the site will then be revisited after 5 days to see if the twigs have been moved and therefore confirming if the sett is active or not. Camera traps will be used to ascertain if the sett is in use or not.
 - If soft blocking proves the sett is inactive, the sett should be closed immediately.
 - If required, a one-way Badger gate will be fitted over each sett entrance. The badger gate will be tied open for approximately three days to allow mammals (if present) to move freely from the sett.
 - Gates will be closed after three days and will be monitored every three days for 21 days in total before the sett is then deemed inactive.
 - The gates and fencing can be left in place for the duration of the construction period within that vicinity and will be removed after works are complete. This will allow the badgers to move back into the sett once works have been completed.
 - While the sett is closed it should be monitored on a monthly basis to ensure there has been no interference with the closure and no mammals have attempted to dig back into the sett.

- 9 No. mammal crossing points will be provided at suitable locations along the proposed development to accommodate unimpeded movement of badger across the proposed development and avoid road traffic collision (listed in Table 4-1 below and shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050). The locations of mammal crossing points have been selected based on existing mammal trails, locations close to the badger setts and where foraging activity has been recorded and which tie-in with existing features on either side of the carriageway (hedgerows, treelines, etc.).
- Mammal crossing points in the form of underpasses will be constructed in accordance with adherence to the following general guidelines:
 - The exit and entrance to tunnels will be flush with mammal-resistant fencing and the invert set at ground level.
 - A concrete surround will provide a solid connection to the uprights of the fence and inhibit any efforts by Badgers to dig under the pipe.
 - Drainage will be adequate to prevent water-logging at the entrances during wet weather. Specific design of underpasses will be tailored to individual locations and will be carried out at the detailed design stage.
- One box culvert measuring 2.7m (W) x 1.8m (H) in vicinity of the badger sett, will be designed for mammal passage. The culvert be fitted with a raised mammal ledge along one or both sides as *per Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes* (TII, 2005). Ledges shall be at least 500mm wide, constructed at least 150mm above the 1 in 5 year flood event, and allow at least 600mm headroom.
- Four separate mammal pipes measuring >600mm will be constructed above flood level adjacent to the stream culverts.
- The natural riverbank at bridges crossing the River Dee and Garra will be retained to allow Badgers pass under the bridges. Should this not be possible, each structure will be fitted with a raised mammal ledge along one or both sides as *per Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes* (TII, 2005). Ledges shall be at least 500mm wide, constructed at least 150mm above the 1 in 5 year flood event, and allow at least 600mm headroom.
- Badger-resistant fencing will be provided along the entire route of the proposed development as shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050. The fencing will adhere to the relevant specifications set out in *Figure 2 Specifications for the Development of Badger-Resistant Fencing* in TII (2006b).
- The success of the mitigation measures for badgers will be monitored for a period after construction, and measures taken to enhance use of mammal crossings where required. Monitoring will be carried out to determine the success of the measures employed within one year after construction ceases, in accordance with TII (2006b).
- In order to ensure that the long-term effectiveness of badger-resistant fencing and mammal crossings, these will require periodic maintenance in accordance with TII (2006b).

Table 4-1 Mammal Crossing Points

Mammal Crossing Points	Location	Type of Crossing Point
MU0.1	CH 0+600	Riverbank at bridge over the River Dee
MU0.2	CH 0+900	600mm mammal underpass
MU1.1	CH 1+700	Riverbank at bridge over the River Garra
MU2.1	CH 2+200	Farm underpass
MU2.2	CH 2+700	600mm mammal underpass
MU2.3	CH 2+800	Culvert with ledge near badger sett
MU3.1	CH 3+050	600mm mammal underpass
MU3.2	CH 3+350	600mm mammal underpass
MU3.3	CH 3+850	600mm mammal underpass

Otter (KER5)

In addition to the construction phase and non-specific mitigation measures described above, the following measures which will comply with *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (TII, 2008b). will be implemented to ensure the protection of Key Ecological Receptor 5 Otter:

- A pre-construction survey will be undertaken 2-3 weeks prior to construction to ensure that Otter have not taken up residence within the construction envelope. The survey will cover the footprint of the proposed development and a 150 m buffer. Should any holts be found, the SEM will seek direction from the NPWS. Watercourse crossings will be designed to ensure that otter passage is not impeded.
- As outlined in Section 7.3.4 9 No. mammal crossing points will be provided at suitable locations along the proposed development to accommodate unimpeded movement of otter across the proposed development and avoid road traffic collision (listed in **Error! Reference source not found.** above and shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050).
- Otter-resistant fencing will be provided with 50m either side at watercourse crossings as shown in Drawings N52A-ROD-EAC-SW_AE-DR-EN-300047 - N52A-ROD-EAC-SW_AE-DR-EN-300050. Otter-resistant fencing will be incorporated on either side of watercourses and will stretch to at least 50m or more either side of the crossing. The fencing will adhere to the relevant specifications set out in *Figure 1 Mammal Fencing* in TII (2008b).

Bats (KER6)

The mitigation measures described in Section 7.6.1 and 7.6.2 will ensure that there are no impacts on Key Ecological Receptor 6 Bats.

Two bat boxes will be installed on the proposed bridges. The bat boxes should be a mix of cavity and crevice type bat boxes such as the Schwegler 2F and 1FF, or equivalent. Bat boxes should be at least 2m off the ground with a clear flight path in and out of box. They should be south facing. Bat boxes are available from www.nhbs.co.uk. The position of the bat boxes will be determined by the ECoW.

Nesting Birds (KER7)

In addition to the construction phase and non-specific mitigation measures described above, the following measures will be implemented ensure the protection of Key Ecological Receptor 7 Nesting Birds:

The protection of habitats during the nesting season (1st March to 31st August, inclusive) are set out in the Wildlife Act. Late-nesting species, such as the Red-listed Yellowhammer, nest into September and, therefore, no removal of vegetation will be undertaken between 1st March and 30th September, inclusive. If site clearance is required during the nesting bird season, the area will be checked by the ECoW. If nesting birds are found to be present, the site clearance works will be postponed until the chicks have fledged.

A pre-construction survey will be undertaken 2-3 weeks prior to construction to ensure that Kingfisher have not taken up residence within the construction envelope. The survey will cover the crossings of the River Dee and River Garra and a 50 m buffer. Should any Kingfisher nests be found, the ECoW will seek direction from the NPWS.

Four 17A Schwegler Swift Nest Boxes (triple cavity) or similar will be incorporated into the existing bridges/viaducts and into new bridges crossing the River Dee and River Garra. These will be positioned on the northern faces of the bridges out of the prevailing wind and at least 2m high. The position of the swift boxes will be determined by the ECoW and will follow best practice guidance *Notes on the Common Swift and Setting up Nest Boxes* (Huxley, 2014) provides guidance on setting up swift boxes.

Landscaping along the proposed development will provide nesting and feeding habitat for a range of small bird species and will help to off-set the loss of habitat and the effects of habitat fragmentation as a result of the proposed development.

Wintering Birds (KER8)

The proposed development has been designed to reduce impacts to wintering birds. TA Site-Specific Flood Risk Assessment (SSFRA) has been prepared for the Project. The SSFRA indicates that the proposed development will have minimal impact on the existing flood regime. The low-lying nature of Ardee Bog and the surrounding lands ensure that any displacement of flood waters by the Project is dispersed across a very wide area and the effect on water level is barely perceptible. The hydraulic model estimates the increase in flood levels in the 0.1%AEP (1 in 1000 year) + mid-range future climate change scenario to be a median change of 2 mm across all modelled reaches. As can be seen in the flood extent drawings (Appendix B), there is no discernible difference in the flood extents between the pre- and post-development scenarios. Therefore, there is no discernible difference to flooding in fields used by wintering birds. The landscape plan includes planting of hedgerows and treelines which will screen the road from adjacent lands.

Invasive Species (KER9)

In addition to the construction phase and non-specific mitigation measures described above, the following measures will be implemented to prevent the further spread of Key Ecological Receptor 9 Invasive Species:

- The Contractor will prepare an invasive species management plan, detailing how the introduction and spread of invasive species will be prevented. The invasive species management plan will be approved by Louth County Council.

- Aquatic invasive species such as Canadian Pondweed spread by fragmentation and are occur in watercourse along the route. The invasive species management plan will include measures to prevent their spread to other waterbodies by thoroughly cleaning all equipment involved in working the watercourses.
- Herbicides will be used in accordance with the European Communities (Plant Protection Products) Regulations, 2012 (S.I. No. 159 of 2012) and the (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012) (as amended).
- Landscaping of the proposed development shall use native species of plants of national provenance only and, insofar as possible, soil reused from on-site excavations. If soil/substrate needs to be imported to the site for the purposes of the proposed development, the Contractor shall ensure that the imported soil/substrate is free from invasive species.

4.1.3 Soils, Geology and Hydrogeology

Construction Phase

- The proposed construction operations will be implemented with the least soil disturbance possible. The extent of the excavated material will be limited to the cuttings and soft spots beneath embankment footprint that include peat and organic soils across the embankment footprint.
- All excavated peat will be safely removed to the material deposition area designated as a part of the scheme. A small volume of organic clay will also be removed there where the volume of deposition area allows. The rest of the surplus excavated soft ground will be improved in-situ to be used as Class 4 landscaping fill or disposed of in a suitably licensed landfill. No more than 20,000 m³ of material for disposal off-site is expected. The contractor will be required to submit a C&D Waste Management Plan to the local authority for approval which should address all types of material to be disposed of.
- All other areas of soft ground without organic content (i.e., alluvial or lacustrine deposits) are to be subject to preloading with surcharge with the help of band drains, thus improving them in-situ. This will mitigate the requirement for large scale excavation and replacement of all soft soils, which is the typical construction process.
- Excavated soils from cutting, such as glacial till, will be reused for embankment construction and landscaping fill purposes wherever these comply to the fill reusability criteria dictated by the Specification for Road Works. This will minimise the volume of imported fill.
- Imported fill material will be acquired from quarries from as near as possible to the proposed development area. There are a number of active quarries in the vicinity of the proposed development. General fill is ubiquitous in the in-situ ground surrounding the proposed development area.
- Standard construction practices necessitate silt-laden surface water run-off and spillages to be collected and treated prior to discharge, where necessary, settlement ponds will be lined to prevent infiltration to the groundwater.
- The contractor shall prepare a project-specific Construction Environmental Operating Plan (CEMP) for approval by LCC. It will be maintained by the Contractor for the duration of the construction phase. The CEMP will cover all potentially polluting activities and include an emergency response procedure. All

personnel working on the site will be trained in the implementation of the procedures. As a minimum, the CEMP for the proposed development will be formulated in consideration of the standard best practice. The CEMP will include a range of site-specific measures such as management of temporary storage of any contaminated material, measures to limit transport of erodible soils around the perimeter of temporary storage and earthworks, dust suppression, appropriate PPE and similar.

- The installation of transverse barriers along sections of the proposed route as shown in drawings N52A-ROD-EAC-SW_AE-DR-EN-300051 in Appendix A are designed to allow the flow of groundwater to maintain its current state. The transverse barriers are to be constructed in areas in which cutover peat has been excavated and to be replaced with a more stable road base for the proposed road.

Operational Phase

There are no mitigation measures proposed for the operational phase which apply in relation to soils, geology or hydrogeology.

4.1.4 Hydrology

Construction Phase

The following will be implemented as part of this plan:

- An Incident Response Plan (see requirements outlined in the CEMP) will be finalised by the contractor detailing the procedures to be undertaken in the event of spillage of chemical, fuel or other hazardous wastes, non-compliance with any permit or license, or other such risks that could lead to a pollution incident, including flood risks.
- All necessary permits and licenses for in stream construction work for provision of the flood defences will be obtained prior to the commencement of construction.
- During construction, cognisance will have to be taken of the following guidance documents for construction work on, over or near water:
 - *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites* (Eastern Regional Fisheries Board)
 - *Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers.*
 - *CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.*
 - *CIRIA C648 Control of Water Pollution from Constructional Sites.*
 - *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII, 2006).*

Based on the above guidance documents concerning the control of construction impacts on the water environment, the following outlines the standard mitigation measures that will be adhered to for the construction phase, in order to protect all catchments and watercourses from direct and indirect impacts.

Standard Mitigation Measures

- Site works will be limited to the minimum required to undertake the necessary elements of the project.
- Surface water flowing onto the construction area will be minimised through the provision of berms, diversion channels or cut-off ditches.

- Management of excess material stockpiles to prevent siltation of watercourse systems through runoff during rainstorms will be undertaken. This may involve allowing the establishment of vegetation on the exposed soil and bunding.
- Protection of waterbodies from silt load will be carried out through the use of gully silt/sediment filters and shallow berms in hardstanding areas to provide adequate treatment of runoff to watercourses.
- Settlement tanks/ponds, silt traps/bags and bunds will be used. Where pumping of water is to be carried out, filters will be used at intake points and discharge will be through a sediment trap.
- The anticipated site compound/storage facility will be fenced off at a minimum distance of 5m from the top of the edge of the watercourse bank. Any works within the 10m buffer zone will require measures to be implemented to ensure that silt laden or contaminated surface water runoff from the compound does not discharge directly to the watercourse. CEMP has been drafted and will need to be finalised by the appointed Contactor. See the CEMP in Appendix B for further detail.
- Protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with the TII document "*Guidelines for the crossing of watercourses during the construction of National Road Schemes*". All chemical and fuel filling locations will be contained within bunded areas and set back a minimum of 50m from watercourses.
- Foul drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner, off site, to prevent pollution.
- The construction discharge will be treated such that it will not reduce the environmental quality standard of the receiving watercourses.
- Water quality monitoring will be undertaken in the River Dee and Garra, with monthly samples being taken from at least 6 months prior to commencement of construction until at least 24 months post-completion. Water samples will be taken from at least two locations. The final number and location of sampling points will be determined by the Site Environmental Manager. The results of the water quality monitoring programme will be reviewed by the Site Environmental Manager and Ecological Clerk of Works on an ongoing basis during construction. In the event of any non-compliance with regulatory limits for any of the water quality parameters monitored, an investigation will be undertaken to identify the source of this non-compliance and corrective action will be taken where this is deemed to be associated with the proposed development.

Specific Mitigation Measures - Concrete Works

The use and management of concrete in or close to watercourses must be carefully controlled to avoid spillage which has a deleterious effect on water chemistry and aquatic habitats and species. As the use of concrete cannot be avoided, the following control measures will be employed:

- Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water;
- When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used;
- Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge

into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters;

- Placing of concrete in or near watercourses will be carried out only under the supervision of the Ecological Clerk of Works (ECoW);
- The weather forecast will be consulted prior to commencing concrete pours. No such works will be undertaken if inclement weather is forecast such that precipitation may make it difficult to maintain a dry working area.
- There will be no spills of concrete, cement, grout or similar materials hosed into surface water drains. Such spills shall be contained immediately and runoff prevented from entering the watercourse;
- Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface watercourses;
- On-site concrete batching and mixing activities will only be allowed at the identified construction compound areas;
- Washout from concrete lorries, with the exception of the chute, will not be permitted on site and will only take place at the construction compound (or other appropriate facility designated by the manufacturer);
- Chute washout will be carried out at designated locations only. These locations will be signposted. The Concrete Plant and all Delivery Drivers will be informed of their location with the order information and on arrival to site; and
- Chute washout locations will be provided with an appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the Contractor's Waste Management Plan.

Flooding

The Contractor will provide method statements for weather forecasting and continuous monitoring of water levels in the River Dee and Garra. The Contractor will also provide method statements for the removal of site materials, fuels, tools, vehicles and persons from flood zones in order to minimise the risk to persons working on the site as well as potential input of sediment or construction materials into the river during flood events.

Hydromorphology

Impacts to hydromorphology will be managed through the implementation of measures outlined above and detailed in the Environmental Operating Plan (EOP) and Construction Environmental Management Plan.

4.1.5 Landscape and Visual

Construction Phase

- Construction activity will be carried out in accordance with the Construction Environmental Management Plan (CEMP) to ensure minimal disruption to landscape elements and local residential receptors.
- The extent of the Proposed Development has been confined to the area already fenced off insofar as possible to minimise land take. Small areas of further land take have been identified which are required for construction of the development.
- Any site works occurring near to trees located on lands bordering the site to be carried out in accordance with BS 5837: 2012 *Trees in relation to design*,

demolition and construction– Recommendations to ensure these trees are protected from any damage.

- Design and placement of supporting elements e.g. lighting, signage, noise barriers, walls to be considered so to minimise impact on the landscape character and views of receptors.

Operational Phase

- Areas where landscape works are implemented will require monitoring until they become established, with any new planting which dies replaced within the first five years. This is to ensure that the intended screening and softening in appearance of the proposed development is achieved over time.
- Occasional landscape maintenance will be required for the general upkeep of the proposed development's landscaping during its operational phase.

4.1.6 Air and Climate

Construction Phase

Air Quality

- Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust shall be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using site roads shall have their speed restricted, and this speed restriction shall be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Vehicles delivering material with dust potential (soil, aggregates) shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- Before entrance onto public roads, trucks shall be adequately inspected to ensure no potential for dust emissions.
- Public roads outside the site shall be regularly inspected for cleanliness and cleaned, as necessary.
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.
- Access gates to site shall be located at least 10m from sensitive receptors where possible.
- Vehicles shall have engines switched off when stationary – no idling. Similarly, the use of diesel or petrol powered generators shall be avoided, and electricity or battery powered equipment shall be used when practical.

At all times, these procedures will be strictly monitored and assessed by the site contractor. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust shall be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations. The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board shall also

include head/regional office contact details. Community engagement before works commence on site shall be put in place, including a communications plan. All dust and air quality complaints shall be recorded and causes identified, along with the measures taken to reduce emissions.

Climate

The embodied energy of construction materials is predicted to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Good practice to ensure emissions are reduced where possible is the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

Operational Phase

No site-specific mitigation measures are required for the operational phase for air quality and climate.

4.1.7 Noise and Vibration

Construction Phase

In order to ensure that the noise limit of 70 dB(A) LAeq 1 hour will be achieved, noise emissions at the construction phase will be managed in accordance with the mitigation measures outlined below, which are consistent with the recommendations contained within BS 5228 "Noise control on open and construction sites".

- Where the noise limits outlined in Table 4-1 are exceeded at 1m from the façade of the nearest noise sensitive properties, temporary noise screens will be erected in close proximity to the noise source such as rock breakers, etc. to ensure that a noise level of less than 70 dB(A) LAeq 1 hour is achieved at the nearest noise sensitive properties.
- No plant used on site will be permitted to cause an ongoing public nuisance due to noise.
- Piling (if required) will only be allowed to be carried out using recognised noise reducing systems, and only during specified working hours. However, it is an activity that will be confined to specific locations and be of limited duration.
- Noise due to the operation of plant and machinery on the site will be minimised and no machine which uses the dropping of heavy weights for the purpose of demolition shall be permitted.
- Noise monitoring can be undertaken if required due to complaints or planning conditions.

The contract documents will clearly specify that the Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and ensure that:

- The best means practical, including proper maintenance of plant, will be employed to minimise the noise produced by on-site operations.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract.
- Compressors will be of the "sound reduced" models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.

- Machines, which are used intermittently, will be shut down or throttled back to a minimum during those periods when they are not in use.
- Any plant, such as generators or pumps, which are required to work outside of normal working hours, will be surrounded by an acoustic enclosure.
- Throughout the contract, the supervision of the works will include ensuring compliance with the limits using the methods set out in BS 5228.

Works other than the pumping out of excavations, security and emergency works will not be undertaken outside the working hours outlined in Table 4-2 without the written permission of Louth Co. Co. When overtime and shift working, outside normal working hours, is permitted, the maximum permissible noise limits outlined in **Error! Reference source not found.** will apply, subject to confirmation of operating hours and noise levels with Louth Co. Co.

Table 4-2 Maximum Permissible Noise Levels at the Façade of Dwellings During Construction (Source: TII Guidelines).

Days & Times	L _{Aeq} (1hr) dB	L _{AMax} dB
Monday to Friday - 07.00 to 19.00	70	80
Monday to Friday - 19.00 to 22.00	60*	65*
Saturday - 08.00 to 16.30	65	75
Sundays and Bank Holidays - 08.00 to 16.30	60*	65*

Construction Phase Vibration Mitigation Measures

In many instances it has been shown that a Public Communication Strategy helps reduce or minimise public complaints. BS 5228: Part 1: 1997 Noise and vibration control on construction and open sites points to the benefits of establishing such a strategy in the excerpted paragraph below:

It is well established that people's attitudes to noise can be influenced by their attitudes to the source itself. Noise from a site will tend to be accepted more readily by local residents if they consider that the site operator is doing all that he or she can to avoid unnecessary noise. People's attitudes to vibration may be similarly influenced.

Operational Phase

The requirement for noise mitigation measures at the noise sensitive receiver locations has been examined based on a review of the three conditions which are required to be satisfied in order for mitigation measures to be deemed necessary as stipulated in the TII Guidelines.

On the basis of preliminary noise prediction modelling, of the 66 No. receiver locations assessed, 9 receivers were deemed to require mitigation measures in the Year of Opening (2023) or the Design Year (2038) as the predicted traffic noise levels at noise sensitive receiver locations did not comply with the TII design goal criteria. Therefore, there was potentially a requirement for 3 noise barriers to be incorporated into the design of the proposed road development to achieve compliance with the 60 dB Lden design goal as specified in the TII Guidelines.

Based on the above findings and the predicted relative noise impact on residential properties along the proposed road development, the noise prediction model was subsequently completed assuming the proposed use of a use of a low noise road

surface along the proposed alignment. This has negated the requirement for noise barriers to be incorporated into the design of the proposed road development.

Operational Phase Vibration Mitigation Measures

No vibration related mitigation measures are required in respect of the operational phase of the proposed N52 Ardee Bypass Road development.

4.1.8 Cultural Heritage

Construction Phase

All recommendations are subject to approval by the National Monuments Service of the Heritage and Planning Division, Department of Culture, Heritage and the Gaeltacht. The mitigation measures recommended include:

Archaeology

A number of additional areas of land are required to be made available to facilitate the construction of the proposed N52 Ardee Bypass, in particular to facilitate the revised junction layouts and drainage works.

The additional areas have a low archaeological potential, given the extent of testing undertaken on lands immediately adjacent to the additional lands. However, it is proposed to carry out a programme of trench testing within these areas to ensure that there are no underlying features of archaeological potential. The following areas will therefore be subject to testing prior to construction:

- Area 102 (2034 sqm) at Chainage 1+500 where the proposed attenuation pond will be located.
- Area 103 (2700 sqm) at Chainage 2+075 where the proposed attenuation pond will be located.
- Area 104: (4685 sqm) at Chainage 0+450 on Silverhill Road, where the site compound is proposed to be located.
- Area 105: (6100 sqm) at Chainage 3+200 where the Townparks north junction link road is proposed to be located.

The total area which will be subject to testing prior to works commencing will comprise 15,519 sqm (1.55 hectares). These areas are identified in Drawing N52A-ROD-EAC-SW_AE-DR-EN-300056.

If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the NMS of the DoCHG.

Archaeological Monitoring

Archaeological Monitoring is recommended during soil stripping of all ground areas associated with the preferred route and any associated earthworks and drainage works, with the full excavation of any archaeologically significant material uncovered at this time.

Retaining an Archaeologist/s

An archaeologist/s should be retained for the duration of the relevant earthworks.

Time-Scale

The time-scale for the construction phase should be made available to the archaeologist, at an early stage, with information on where and when topsoil stripping will take place.

Sufficient Notice

It is essential to give sufficient notice to the archaeologist/s in advance of topsoil stripping (minimum four weeks). This will allow for prompt arrival on site to monitor the soil stripping. As often happens, intervals may occur during the construction phase. In this case, it is also necessary to inform the archaeologist/s as to when earthworks will recommence.

Discovery of Archaeological Material

In the event of archaeological features or material being uncovered during the construction phase, it is crucial that the machine work cease in this immediate area to allow the archaeologist/s to inspect any such material.

Archaeological Team

It is also recommended that the core of an archaeological team be on standby to deal with any such rescue excavation. This would be complemented in the event of full excavation.

Secure Site Offices

Site offices and facilities should be provided on or near those sites where archaeological excavation is required.

Fencing

Fencing of any archaeological sites would be necessary once discovered and during their excavation.

Adequate Funds

Adequate funds to cover preparatory survey work, excavation, post-excavation work, and any testing, specialist analysis or conservation work required should be made available.

Site Offices

No site offices, depots, or storage facilities should be placed on or near any of the areas of archaeological potential.

Access Roads

Access roads or haul roads during construction should not encroach on any selected sites or areas of archaeological potential and their environs.

Machinery

Small machines should be used in any areas that are particularly sensitive.

Spoil

Spoil should not be dumped on any selected sites or their environs.

Borrow Pits

Borrow pits should not be located on or in proximity to any of the selected sites and their environs.

Underwater Archaeology

It is the recommendation of the Underwater Archaeology Unit that the areas to be impacted by proposed works be subject to a full underwater archaeological assessment – that is all rivers and streams to be impacted by the road construction and associated vehicular/construction plant. The underwater assessment should take the form a detailed desktop study, field survey to include banks of rivers and streams, underwater survey of waters more than 0.75m, deep and wading surveys of any rivers/streams less than 0.75m deep.

The underwater surveys should also be accompanied by a metal detection survey. The underwater assessment should be licensed to the Department of Housing, Local Government & Heritage under the National Monuments Acts 1930-2004 and should be undertaken by a suitably qualified archaeologist. The results should be forwarded to the office of the Underwater Archaeology Unit for review in advance of works proceeding.

All diving will be undertaken in accordance with the Health and Safety Authority's Safety in Industry (Diving at Work) Regulations 1981, SI 422. As such the developer(s)/applicant(s) engaging the necessary archaeological personnel should ensure that all dive equipment used and dive team personnel qualifications are properly certified and that the correct commercial dive insurance is in place.

Architecture

There are no predicted impacts to any architectural structures, therefore no mitigation measures are proposed.

Operational Phase

There are no mitigation measures proposed for the operation phase for Archaeology, Architecture or Cultural Heritage.

4.1.9 Material Assets and Land

Construction Phase

Agriculture and Land

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare an Emergency Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues;
- Stock proof fencing erected to severed lands to prevent access to the construction site from the adjacent lands;
- Existing roads to be kept open to facilitate access as far as practicable, with temporary diversions implemented where necessary to ensure access is maintained.

Non-Agriculture

- Traffic Management will be put in place to ensure access to residential and commercial property is maintained during construction.

ESB

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare a Stakeholder Management Plan which will ensure agreement with utility owners and notification of local residents which may be affected by the interruption to utilities, services and infrastructure provisions during the construction stage.
- Prepare an Incident Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues.
- Residents will be notified in advance of any disruption to utilities.

Gas Networks

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare a Stakeholder Management Plan which will ensure agreement with utility owners and notification of local residents which may be affected by the interruption to utilities, services and infrastructure provisions during the construction stage.
- Prepare an Incident Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues
- Residents will be notified in advance of any disruption to utilities.

Telecommunications

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare a Stakeholder Management Plan which will ensure agreement with utility owners and notification of local residents which may be affected by the interruption to utilities, services and infrastructure provisions during the construction stage.
- Prepare an Incident Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues.
- Residents will be notified in advance of any disruption to utilities.

Water Supply

- Prepare a CEMP prior to construction to be agreed with Louth County Council prior to the works commencing.
- Prepare a Stakeholder Management Plan which will ensure agreement with utility owners and notification of local residents which may be affected by the interruption to utilities, services and infrastructure provisions during the construction stage.
- Prepare an Incident Response Plan detailing the procedures to be undertaken in the event of a chemical, fuel or hazardous waste spill, a fire, or non-compliance incident with any permit of licence issues
- Residents will be notified in advance of any disruption to utilities

Operational Phase

Agriculture and Land

The following mitigation measures will be implemented as shown on drawings N52A-ROD-EAC-SW_AE-DR-EN-300004 to 300022:

- Replacement of or new accesses to land holding;
- Replacement of or new animal underpasses to connect severed land where warranted;
- Provision of new gated access tracks to lands severed by the proposed development.

Non-Agriculture

- Boundaries and accesses to residential and commercial property where affected, will be reinstated on a like for like basis.

ESB

No mitigation measures are proposed for the operation phase.

Gas Networks

No mitigation measures are proposed for the operation phase.

Telecommunications

No mitigation measures are proposed for the operation phase.

Water Supply

No mitigation measures are proposed for the operation phase.

4.1.10 Major Accidents and Disasters

Construction Phase

Mitigation measures outlined in Section 4.1.1 to 4.1.9 are to be implemented.

Operational Phase

Mitigation measures outlined in Section 4.1.1 to 4.1.9 are to be implemented.

4.1.11 Monitoring

Water Quality

Water quality monitoring will be undertaken in the River Dee and Garra, with monthly samples being taken from at least 6 months prior to commencement of construction until at least 24 months post-completion. Water samples will be taken from at least two locations. The final number and location of sampling points will be determined by the Site Environmental Manager. The results of the water quality monitoring programme will be reviewed by the Site Environmental Manager and Ecological Clerk of Works on an ongoing basis during construction. In the event of any non-compliance with regulatory limits for any of the water quality parameters monitored, an investigation will be undertaken to identify the source of this non-compliance and corrective action will be taken where this is deemed to be associated with the proposed development.

Flooding

The Contractor will provide method statements for weather forecasting and continuous monitoring of water levels in the River Dee and Garra. The Contractor will also provide method statements for the removal of site materials, fuels, tools, vehicles and persons from flood zones in order to minimise the risk to persons working on the site as well as potential input of sediment or construction materials into the river during flood events.

Noise

The contractor will be required to undertake noise monitoring during the construction works. Noise monitoring can also be undertaken if required due to complaint or planning conditions.

4.2 Implementation and Compliance

In order to ensure the full and proper implementation of the mitigation and monitoring prescribed in the Part VIII Planning Report, it should be a condition of any consent granted in respect of the proposed development that this mitigation and monitoring be binding, during the construction phase, on the Contractors and, during operational phase, on the occupiers. All construction-phase mitigation and monitoring will be transposed into the relevant Contract Documents via a Construction Environmental Management Plan (CEMP), as per Section 4.2.1 below, and compliance with the same will be ensured by appropriate oversight, as per Section 4.2.2 below.

4.2.1 Construction Environmental Management Plan

Prior to the commencement of construction, demolition or excavation, each Contractor will be required to develop a Construction Environmental Management Plan (CEMP) in accordance with *Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan* (NRA, 2007). The CEMP will detail the Contractor's approach to managing environmental issues during the construction of the proposed development. In particular, the CEMP will detail how the Contractor intends to ensure full compliance with the following:

- The Schedule of Commitments.
- Any conditions which might be attached to the proposed development's planning consent.
- Any requirements of stakeholders and statutory bodies, e.g. the NPWS, IFI and the IWDGC, including:
 - *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (IFI, 2016);
 - *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters* (DAHG, 2014); and,
 - The MMRA prepared by the IWDGC in respect of the proposed development (see Appendix H to the NIS).
- All applicable legislative requirements in relation to environmental protection.
- All relevant construction industry guidelines, including:
 - *C744 Coastal and marine environmental site guide - 2nd ed.* (CIRIA, 2015).
 - *C532 Control of water pollution from construction sites: guidance for consultants and contractors* (CIRIA, 2001).
- The Transport Infrastructure Ireland (TII) and National Roads Authority (NRA) Environmental Assessment and Construction Guidelines, specifically:

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

This list is non-exhaustive. All environmental commitments/requirements and relevant legislation and guidelines which are current at the time of construction will be followed.

The CEMP will contain the following information of general importance:

- An overview of the proposed development.
- An organisational chart illustrating the structure of the Contractor's project team and the duties and responsibilities of the various members.
- The Contractor's communications strategy.
- The contact details of relevant persons/entities, e.g. the Safety Officer, the Site Environmental Manager and the emergency services.
- A list of the documents which will have informed the CEMP, including all relevant legislation and construction/environmental guidelines.

In relation to environmental management, the CEMP will provide a full list of the Contractor's environmental commitments and will detail the Contractor's approach to the following:

- Management of waste arising from construction and demolition.
- Control of sediment, run-off, erosion and pollution.
- Minimisation of noise and vibration impacts.
- Minimisation of artificial lighting and shading.
- Management of risk from invasive alien species.
- Response to emergencies/other incidents, including environmental incidents.
- Awareness of the surrounding environment and the Contractor's environmental commitments among site personnel.
- Monitoring, inspection and auditing of the Contractor's compliance with his/her environmental commitments.

Other topics covered by the CEMP will include the management of construction traffic and Health & Safety issues.

All of the mitigation measures prescribed in the Part VIII Planning Report must be effectively transposed into the appropriate sections of Contractor's CEMP. In addition, it must be acknowledged that the receiving environment is not static.

This outline CEMP will be provided to the Contractor and it will be his/her responsibility to develop his/her own CEMP based on the outline provided. Prior to its acceptance and implementation, the Contractor's CEMP will be subject to approval by the Site Environmental Manager (described in Section 4.2.2 below) and the Employer's Representative. It shall also be submitted to the NPWS, IFI and the IWDGC to ensure that all requirements of those bodies are satisfied.

4.2.2 Inspection and Monitoring

Site Environmental Manager

Separate from the on-going and detailed monitoring carried out by the Contractor, each SEM will carry out the following inspection and monitoring on behalf of LCC:

- Daily visual inspections of all outfalls from the construction site to surface waters and all surface waters in the vicinity of the site.
- Daily inspections of all construction site surface water treatment measures, e.g. ponds, tanks, mini-dams and sandbags.
- Daily inspections of material borrow/deposit areas while in operation and weekly inspections thereafter.
- Weekly inspections of the principal control measures described in the CEMP and reporting of findings to the Contractor.
- Weekly inspections of wheel-wash facilities.
- Weekly monitoring of stockpiles (daily during filling or emptying).
- Frequent (at least fortnightly) auditing of the Contractor's monitoring results.

The results of the SEM's inspections and monitoring will be stored in his/her monitoring file and will be made available for inspection or audit by LCC, the NPWS or IFI at any time.

Project Ecologist

In exercising his/her functions, the Project Ecologist will be required to keep a monitoring file and this will be made available for inspection or audit by LCC, the NPWS or IFI at any time.

5.0 SUMMARY

This Outline CEMP is indicative only, however, it is expected that the final CEMP to be prepared by the Contractor will incorporate the items outlined above and ensure that all requirements identified as part of the planning consents will be included in the CEMP.

APPENDIX A

Drawings of the Development (See Part VIII Report Appendix A)

APPENDIX B

Planning Approval

To be added by Contractor subject to planning approval

APPENDIX C

Planning Conditions

To be added by Contractor subject to planning approval

APPENDIX C

TRAFFIC DATA USED IN AIR QUALITY AND CLIMATE MODELLING ASSESSMENT

Traffic Data Used In Air Quality And Climate Modelling Assessment

Link ID	Base Year 2018		Opening Year 2023				Design Year 2038			
			Do Nothing		Do Something		Do Nothing		Do Something	
	Speed (kph)	AADT (%HGV)	Speed (kph)	AADT (%HGV)	Speed (kph)	AADT (%HGV)	Speed (kph)	AADT (%HGV)	Speed (kph)	AADT (%HGV)
1	0	0 (0%)	0	0 (0%)	91	5499 (6.53%)	0	0 (0%)	90	7455 (9.35%)
2 Note 1	0	0 (0%)	0	0 (0%)	92	5238 (6.8%)	0	0 (0%)	90	7206 (9.64%)
3	0	0 (0%)	0	0 (0%)	92	4878 (7.22%)	0	0 (0%)	90	6716 (10.18%)
4	0	0 (0%)	0	0 (0%)	92	5238 (6.82%)	0	0 (0%)	90	7091 (9.72%)
5	88	12259 (10.01%)	86	13519 (10.62%)	85	18121 (9.87%)	85	16283 (11.59%)	83	22643 (11.35%)
6	27	7800 (11.27%)	28	8971 (11.36%)	24	13291 (10.01%)	24	12246 (11.35%)	19	18047 (10.95%)
7	27	4221 (10.47%)	25	4751 (10.63%)	21	7144 (9.83%)	21	6262 (10.84%)	15	9591 (10.95%)
8	35	3883 (5.51%)	34	4423 (6.08%)	37	2858 (4.3%)	31	6115 (7.72%)	35	3913 (4.78%)
9	32	3579 (12.21%)	30	4220 (12.18%)	26	6147 (10.23%)	27	5984 (11.88%)	21	8456 (10.96%)
10 Note 2	31	7880 (4.58%)	30	8726 (5.24%)	34	5759 (3.49%)	26	11296 (7.33%)	30	7944 (4.17%)
11	32	7840 (4.62%)	30	8608 (5.27%)	34	5415 (3.55%)	26	10890 (7.45%)	32	7049 (4.2%)
12	31	7984 (4.48%)	29	8675 (5.06%)	32	6943 (4.55%)	26	10215 (6.98%)	30	8188 (5.67%)
13	33	6524 (7.53%)	31	7324 (7.97%)	35	5450 (7.41%)	27	9664 (9.79%)	32	7155 (8.13%)
14	31	6753 (6.2%)	29	7549 (6.68%)	32	5968 (5.8%)	26	9208 (8.89%)	31	7119 (7.04%)
15	26	14508 (5.85%)	23	15999 (6.39%)	27	12393 (5.81%)	19	19879 (8.35%)	24	15343 (6.82%)
16	24	13737 (6.01%)	24	15100 (6.66%)	28	11713 (6.02%)	20	18536 (8.79%)	25	14279 (7.14%)
17 Note 2	27	12874 (6.62%)	24	14208 (7.14%)	29	10852 (6.59%)	20	17403 (9.41%)	26	13261 (7.73%)
18	25	14060 (6.15%)	23	15566 (6.6%)	28	11763 (6.11%)	19	18955 (8.77%)	25	14322 (7.25%)
19	25	14060 (6.15%)	23	15566 (6.6%)	28	11763 (6.11%)	19	18955 (8.77%)	25	14322 (7.25%)
20	26	13367 (6.49%)	24	14849 (6.86%)	29	10733 (6.62%)	20	18415 (8.99%)	26	13271 (7.76%)
21 Note 2	27	12427 (6.61%)	25	13995 (7.18%)	30	10158 (6.86%)	21	17128 (9.56%)	27	12486 (8.14%)
22	27	12427 (6.61%)	25	13995 (7.18%)	30	10158 (6.86%)	21	17128 (9.56%)	27	12486 (8.14%)
23	26	12427 (6.61%)	25	13995 (7.18%)	30	10158 (6.86%)	21	17128 (9.56%)	27	12486 (8.14%)
24	25	14460 (6.22%)	23	16032 (6.62%)	28	11248 (6.27%)	19	19959 (8.6%)	26	13653 (7.5%)
25	31	6423 (5.18%)	30	7091 (6.13%)	38	1977 (3.89%)	26	9126 (8.83%)	38	2051 (5.31%)
26 Note 2	31	6423 (5.18%)	30	7091 (6.13%)	38	1977 (3.89%)	26	9139 (8.83%)	38	2051 (5.31%)
27	33	5940 (5.52%)	31	6616 (6.23%)	39	1501 (3.6%)	27	8704 (9.03%)	39	1622 (5.36%)

Link ID	Base Year 2018		Opening Year 2023				Design Year 2038			
			Do Nothing		Do Something		Do Nothing		Do Something	
	Speed (kph)	AADT (%HGV)	Speed (kph)	AADT (%HGV)	Speed (kph)	AADT (%HGV)	Speed (kph)	AADT (%HGV)	Speed (kph)	AADT (%HGV)
28	31	5940 (5.52%)	31	6616 (6.23%)	39	1501 (3.6%)	27	8704 (9.03%)	39	1622 (5.36%)
29	32	5068 (6.24%)	32	5749 (6.98%)	39	1333 (3.23%)	28	7816 (9.92%)	39	1438 (5.35%)
30 Note 2	84	5068 (6.24%)	83	5749 (6.98%)	85	1333 (3.23%)	78	7816 (9.92%)	85	1438 (5.35%)
31 Note 2	36	4331 (0.83%)	34	4886 (1.17%)	35	3611 (1.08%)	31	6248 (1.71%)	33	4812 (1.77%)
32	0	5068 (0%)	83	5749 (6.98%)	85	1333 (3.23%)	78	7816 (9.92%)	85	1438 (5.35%)
33 Note 2	83	4959 (6.41%)	83	5624 (7.09%)	85	0 (0%)	78	7685 (10.03%)	85	0 (0%)
34 Note 2	73	4960 (6.43%)	72	5624 (7.09%)	80	0 (0%)	69	7685 (10.03%)	80	0 (0%)
35	0	0 (0%)	0	0 (0%)	92	5713 (6.95%)	0	0 (0%)	89	7802 (9.87%)
36 Note 2	0	0 (0%)	0	0 (0%)	92	5713 (6.95%)	0	0 (0%)	89	7802 (9.87%)
37	0	0 (0%)	0	0 (0%)	92	5713 (6.95%)	0	0 (0%)	89	7802 (9.87%)
38	0	0 (0%)	0	0 (0%)	92	5713 (6.95%)	0	0 (0%)	89	7802 (9.87%)
39	0	0 (0%)	0	0 (0%)	92	5713 (6.95%)	0	0 (0%)	89	7802 (9.87%)
40 Note 2	0	0 (0%)	0	0 (0%)	92	5763 (6.28%)	0	0 (0%)	90	7637 (9.11%)
41 Note 2	0	0 (0%)	0	0 (0%)	96	1333 (3.23%)	0	0 (0%)	96	1438 (5.35%)
42	33	2529 (2.89%)	0	0 (0%)	0	0 (0%)	34	3555 (2.335%)	37	2052 (0.68%)
43	34	5739 (8.42%)	0	0 (0%)	0	0 (0%)	29	9154 (8.761%)	29	7959 (8.97%)
44	37	1881 (2.29%)	0	0 (0%)	0	0 (0%)	36	2643 (2.951%)	38	1560 (0.64%)
45	36	2705 (2%)	0	0 (0%)	0	0 (0%)	35	3402 (2.557%)	37	2222 (0.9%)
46	38	1750 (1%)	0	0 (0%)	0	0 (0%)	36	3553 (2.42%)	37	2551 (2.59%)

Note 1 Road link used in ecological assessment of air quality impact on Ardee Cutaway Bog pNHA.

Note 2 Road link used in air quality assessment as it is within 200m of a chosen sensitive receptor.

Note 3 All road links used in operational phase climate assessment.

APPENDIX D

NOISE AND VIBRATION ASSESSMENT TABLES

Appendix D - Table 1: Predicted noise levels at 66 noise sensitive receivers in closest proximity of the proposed N52 Ardee Bypass alignment – Receivers at 1.5m height

Receptor No. (West to East) - (At 1.5m Receiver Height)	2018 Base Year - (L_{den} dBA)	2023 Do Nothing - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2023 Difference between Do Nothing & Do Something (dBA)	2023 Difference between Do Nothing & Do Something Scheme Only (dBA)	2038 Do Nothing - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2038 Difference between Do Nothing & Do Something (dBA)	2038 Difference between Do Nothing & Do Something Scheme Only (dBA)	Noise Mitigation Measures Required?	Subjective Response
1	64.1	64.6	65.2	53.7	0.6	-10.9	66.1	66.7	55.1	0.6	-11.0	No	Negligible
2	57.9	58.4	58.2	46.7	-0.2	-11.7	59.8	60.2	48.1	0.4	-11.7	No	Negligible
3	66.9	67.4	67.9	65	0.5	-2.4	68.9	69.5	66.5	0.6	-2.4	No	Negligible
4	66.8	67.3	67.8	66.5	0.5	-0.8	68.8	69.3	68.1	0.5	-0.7	No	Negligible
5	65.5	66.1	66.1	65.3	0.0	-0.8	67.5	67.6	66.7	0.1	-0.8	No	Negligible
6	67.4	68	68.1	67.7	0.1	-0.3	69.5	69.6	69.3	0.1	-0.2	No	Negligible
7	64.2	64.7	64.7	64.7	0.0	0.0	66.2	66.1	66.1	-0.1	-0.1	No	Negligible
8	67.1	67.6	57.3	56.4	-10.3	-11.2	69.2	58.5	57.8	-10.7	-11.4	No	Major +ve
9	63.1	63.6	55.3	54.7	-8.3	-8.9	65	56.5	56.1	-8.5	-8.9	No	Moderate +ve
10	61.7	62.3	55	54.6	-7.3	-7.7	63.6	56.3	56	-7.3	-7.6	No	Moderate +ve
11	64.8	65.4	55	54.1	-10.4	-11.3	66.9	56.1	55.4	-10.8	-11.5	No	Major +ve
12	63.2	63.8	54.4	53.6	-9.4	-10.2	65.1	55.5	55	-9.6	-10.1	No	Major +ve
13	67	67.5	53.8	51.7	-13.7	-15.8	69.1	54.7	53	-14.4	-16.1	No	Major +ve
14	66.9	67.5	54.6	52.9	-12.9	-14.6	69.1	55.6	54.2	-13.5	-14.9	No	Major +ve
15	64.9	65.5	54.2	53	-11.3	-12.5	66.9	55.2	54.3	-11.7	-12.6	No	Major +ve
16	63	63.5	52.6	51.5	-10.9	-12.0	64.9	53.7	52.9	-11.2	-12.0	No	Major +ve
17	55.2	55.7	53.3	53.2	-2.4	-2.5	57.1	54.6	54.5	-2.5	-2.6	No	Minor +ve
18	65.6	66.1	51.2	47.8	-14.9	-18.3	67.6	51.9	49.1	-15.7	-18.5	No	Major +ve
19	54.2	54.7	49.8	49.6	-4.9	-5.1	56.1	51.1	50.9	-5.0	-5.2	No	Moderate +ve
20	68.8	69.4	52.5	45.2	-16.9	-24.2	71	52.7	46.4	-18.3	-24.6	No	Major +ve
21	60.5	61.1	47.4	44.7	-13.7	-16.4	62.4	48.2	45.9	-14.2	-16.5	No	Major +ve
22	60.6	61.1	47.5	44.7	-13.6	-16.4	62.5	48.2	45.9	-14.3	-16.6	No	Major +ve

Receptor No. (West to East) - (At 1.5m Receiver Height)	2018 Base Year - (L_{den} dBA)	2023 Do Nothing - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2023 Difference between Do Nothing & Do Something (dBA)	2023 Difference between Do Nothing & Do Something Scheme Only (dBA)	2038 Do Nothing - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2038 Difference between Do Nothing & Do Something (dBA)	2038 Difference between Do Nothing & Do Something Scheme Only (dBA)	Noise Mitigation Measures Required?	Subjective Response
23	67.2	67.7	51.2	44.5	-16.5	-23.2	69.3	51.5	45.7	-17.8	-23.6	No	Major +ve
24	65.1	65.6	49.8	44.1	-15.8	-21.5	67.1	50.1	45.1	-17.0	-22.0	No	Major +ve
25	65.5	66.1	50.2	44.4	-15.9	-21.7	67.5	50.5	45.4	-17.0	-22.1	No	Major +ve
26	54.6	55.1	46.8	46	-8.3	-9.1	56.5	47.8	47.2	-8.7	-9.3	No	Moderate +ve
27	47.8	48.3	49.4	49.3	1.1	1.0	49.4	50.4	50.3	1.0	0.9	No	Negligible
28	54.3	54.7	58.3	58.3	3.6	3.6	55	58.8	58.8	3.8	3.8	No	Minor -ve
29	56.1	56.5	60.3	60.3	3.8	3.8	56.6	60.8	60.8	4.2	4.2	No	Minor -ve
30	52.9	53.3	55.9	55.8	2.6	2.5	53.7	56.3	56.3	2.6	2.6	No	Minor -ve
31	52	52.5	53.1	53	0.6	0.5	53.3	53.6	53.6	0.3	0.3	No	Negligible
32	54.1	54.6	52.4	52.2	-2.2	-2.4	55.5	52.9	52.8	-2.6	-2.7	No	Minor +ve
33	55.4	55.9	51.3	51	-4.6	-4.9	56.8	51.9	51.6	-4.9	-5.2	No	Moderate +ve
34	56.1	56.6	50.5	50.1	-6.1	-6.5	57.6	51	50.6	-6.6	-7.0	No	Moderate +ve
35	57.6	58.2	50.6	50.1	-7.6	-8.1	59.3	51.1	50.6	-8.2	-8.7	No	Moderate +ve
36	61.8	62.3	52.3	51.8	-10.0	-10.5	63.3	52.7	52.2	-10.6	-11.1	No	Major +ve
37	66.3	66.9	52.9	52.2	-14.0	-14.7	68.3	53.2	52.5	-15.1	-15.8	No	Major +ve
38	70	70.6	53.3	52	-17.3	-18.6	72.3	53.5	52.3	-18.8	-20.0	No	Major +ve
39	70.2	70.8	53.7	52.8	-17.1	-18.0	72.4	54	53.1	-18.4	-19.3	No	Major +ve
40	56.2	56.7	47.8	46.2	-8.9	-10.5	58.1	48.4	46.9	-9.7	-11.2	No	Major +ve
41	67.5	68.1	62.6	62.3	-5.5	-5.8	69.6	63	62.7	-6.6	-6.9	No	Moderate +ve
42	67.6	68.2	61.5	60.1	-6.7	-8.1	69.7	61.9	60.5	-7.8	-9.2	No	Moderate +ve
43	68.1	68.7	62	53.1	-6.7	-15.6	70.3	62.4	53.5	-7.9	-16.8	No	Moderate +ve
44	55.9	56.5	51	47	-5.5	-9.5	57.8	51.6	48	-6.2	-9.8	No	Moderate +ve
45	66.5	67	60.6	44.6	-6.4	-22.4	68.5	61	45.5	-7.5	-23.0	No	Moderate +ve
46	46.7	47.2	54.7	53.9	7.5	6.7	47.6	55.9	55.2	8.3	7.6	No	Moderate -ve

Receptor No. (West to East) - (At 1.5m Receiver Height)	2018 Base Year - (L_{den} dBA)	2023 Do Nothing - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2023 Difference between Do Nothing & Do Something (dBA)	2023 Difference between Do Nothing & Do Something Scheme Only (dBA)	2038 Do Nothing - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2038 Difference between Do Nothing & Do Something (dBA)	2038 Difference between Do Nothing & Do Something Scheme Only (dBA)	Noise Mitigation Measures Required?	Subjective Response
47	54.7	55.2	58.2	55.1	3.0	-0.1	55.3	58.8	56.3	3.5	1.0	No	Minor -ve
48	55.5	56	59.1	56.2	3.1	0.2	56.1	59.8	57.4	3.7	1.3	No	Minor -ve
49	56.1	56.6	58.2	52.9	1.6	-3.7	56.7	58.6	54.1	1.9	-2.6	No	Negligible
50	51.8	52.3	55.5	52.9	3.2	0.6	52.5	56.3	54.1	3.8	1.6	No	Minor -ve
51	52.3	52.8	55.1	51.1	2.3	-1.7	53	55.7	52.2	2.7	-0.8	No	Minor -ve
52	51.3	51.8	55.5	53	3.7	1.2	52	56.2	54.1	4.2	2.1	No	Minor -ve
53	51.1	51.6	56.1	54.2	4.5	2.6	51.8	56.9	55.3	5.1	3.5	No	Moderate -ve
54	51.3	51.9	56.9	55.3	5.0	3.4	52	57.7	56.4	5.7	4.4	No	Moderate -ve
55	53.7	54.2	59	57.3	4.8	3.1	54.3	59.8	58.4	5.5	4.1	No	Moderate -ve
56	59.1	59.6	60.7	58.7	1.1	-0.9	59.6	61.1	59.3	1.5	-0.3	No	Negligible
57	52.8	53.4	56.4	54.2	3.0	0.8	53.5	57.2	55.3	3.7	1.8	No	Minor -ve
58	55.2	55.8	58	54.7	2.2	-1.1	55.8	58.5	55.8	2.7	0.0	No	Minor -ve
59	55.6	56.1	58.1	54.2	2.0	-1.9	56.2	58.6	55.3	2.4	-0.9	No	Negligible
60	55.9	56.5	57.9	52.7	1.4	-3.8	56.5	58.3	53.8	1.8	-2.7	No	Negligible
61	56.3	56.9	57.9	51.7	1.0	-5.2	56.9	58.2	52.9	1.3	-4.0	No	Negligible
62	55	55.6	56.6	50.3	1.0	-5.3	55.6	57	51.5	1.4	-4.1	No	Negligible
63	48.2	48.6	52.7	50.3	4.1	1.7	49.3	53.7	51.4	4.4	2.1	No	Minor -ve
64	48.8	49.2	53.5	51.1	4.3	1.9	50	54.5	52.2	4.5	2.2	No	Moderate -ve
65	59.9	60.3	61.7	50.3	1.4	-10.0	61.1	62.7	51.4	1.6	-9.7	No	Negligible
66	50.1	50.5	51.6	46.5	1.1	-4.0	51.3	52.6	47.5	1.3	-3.8	No	Negligible

Appendix D - Table 2: Predicted noise levels at 66 noise sensitive receivers in closest proximity of the proposed N52 Ardee Bypass alignment – Receivers at 4m height

Receptor No. (West to East) - (At 4m Receiver Height)	2018 Base Year - (L_{den} dBA)	2023 Do Nothing - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2023 Difference between Do Nothing & Do Something (dBA)	2023 Difference between Do Nothing & Do Something Scheme Only (dBA)	2038 Do Nothing - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2038 Difference between Do Nothing & Do Something (dBA)	2038 Difference between Do Nothing & Do Something Scheme Only (dBA)	Noise Mitigation Measures Required?	Subjective Response
1	65.5	66	66.3	54.4	0.3	-11.6	67.5	67.8	55.8	0.3	-11.7	No	Negligible
2	61.4	62	61.7	53.6	-0.3	-8.4	63.3	63.3	55	0.0	-8.3	No	Negligible
3	68.4	69	69.3	66.4	0.3	-2.6	70.5	70.8	67.9	0.3	-2.6	No	Negligible
4	68.3	68.9	69.2	67.9	0.3	-1.0	70.4	70.7	69.4	0.3	-1.0	No	Negligible
5	67.1	67.6	67.8	67	0.2	-0.6	69.1	69.2	68.4	0.1	-0.7	No	Negligible
6	68.9	69.5	69.4	69.1	-0.1	-0.4	71	71	70.7	0.0	-0.3	No	Negligible
7	66.6	67.1	67.1	67.1	0.0	0.0	68.5	68.5	68.5	0.0	0.0	No	Negligible
8	69.2	69.7	58.7	57.5	-11.0	-12.2	71.3	59.8	58.9	-11.5	-12.4	No	Major +ve
9	65	65.5	56.3	55.6	-9.2	-9.9	66.9	57.5	56.9	-9.4	-10.0	No	Moderate +ve
10	63.4	64	56	55.5	-8.0	-8.5	65.3	57.2	56.8	-8.1	-8.5	No	Moderate +ve
11	66.8	67.3	56.1	54.9	-11.2	-12.4	68.8	57.1	56.3	-11.7	-12.5	No	Major +ve
12	65.1	65.6	55.6	54.7	-10.0	-10.9	67	56.7	56	-10.3	-11.0	No	Major +ve
13	68.8	69.3	55.2	52.7	-14.1	-16.6	70.9	56	54.1	-14.9	-16.8	No	Major +ve

Receptor No. (West to East) - (At 4m Receiver Height)	2018 Base Year - (L_{den} dBA)	2023 Do Nothing - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2023 Difference between Do Nothing & Do Something (dBA)	2023 Difference between Do Nothing & Do Something Scheme Only (dBA)	2038 Do Nothing - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2038 Difference between Do Nothing & Do Something (dBA)	2038 Difference between Do Nothing & Do Something Scheme Only (dBA)	Noise Mitigation Measures Required?	Subjective Response
14	68.8	69.4	56.1	54.1	-13.3	-15.3	71	57	55.4	-14.0	-15.6	No	Major +ve
15	67	67.5	55.6	54.2	-11.9	-13.3	69	56.6	55.5	-12.4	-13.5	No	Major +ve
16	65.1	65.7	54.4	53.1	-11.3	-12.6	67.1	55.4	54.5	-11.7	-12.6	No	Major +ve
17	56.9	57.4	54.9	54.7	-2.5	-2.7	58.8	56.2	56.1	-2.6	-2.7	No	Moderate +ve
18	67.5	68.1	52.7	48.5	-15.4	-19.6	69.6	53.3	49.9	-16.3	-19.7	No	Major +ve
19	55.6	56.1	50.7	50.4	-5.4	-5.7	57.5	52	51.8	-5.5	-5.7	No	Moderate +ve
20	70.2	70.7	53.8	46.1	-16.9	-24.6	72.4	54.1	47.4	-18.3	-25.0	No	Major +ve
21	62.8	63.3	49.2	45.8	-14.1	-17.5	64.7	49.8	47	-14.9	-17.7	No	Major +ve
22	62.8	63.4	49.2	45.8	-14.2	-17.6	64.7	49.8	47	-14.9	-17.7	No	Major +ve
23	69.2	69.8	53.1	45.4	-16.7	-24.4	71.3	53.3	46.6	-18.0	-24.7	No	Major +ve
24	67.3	67.8	51.6	45.1	-16.2	-22.7	69.3	51.9	46.1	-17.4	-23.2	No	Major +ve
25	67.4	68	51.8	45.4	-16.2	-22.6	69.4	52.1	46.4	-17.3	-23.0	No	Major +ve
26	56	56.5	48.1	47.2	-8.4	-9.3	57.8	49.1	48.4	-8.7	-9.4	No	Moderate +ve
27	49	49.5	51.3	51.2	1.8	1.7	50.5	52.2	52.1	1.7	1.6	No	Negligible
28	56.3	56.7	60.5	60.5	3.8	3.8	56.9	60.9	60.9	4.0	4.0	No	Minor -ve

Receptor No. (West to East) - (At 4m Receiver Height)	2018 Base Year - (L_{den} dBA)	2023 Do Nothing - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2023 Difference between Do Nothing & Do Something (dBA)	2023 Difference between Do Nothing & Do Something Scheme Only (dBA)	2038 Do Nothing - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2038 Difference between Do Nothing & Do Something (dBA)	2038 Difference between Do Nothing & Do Something Scheme Only (dBA)	Noise Mitigation Measures Required?	Subjective Response
29	57.7	58	62	62	4.0	4.0	58.2	62.4	62.4	4.2	4.2	YES (Bungalow, i.e. not required.)	Minor -ve
30	54.8	55.2	58.3	58.2	3.1	3.0	55.6	58.7	58.7	3.1	3.1	No	Minor -ve
31	53.9	54.3	55.5	55.4	1.2	1.1	55.1	56	55.9	0.9	0.8	No	Negligible
32	56.3	56.7	55.1	55	-1.6	-1.7	57.6	55.6	55.4	-2.0	-2.2	No	Minor +ve
33	57.3	57.8	53.5	53.3	-4.3	-4.5	58.7	54	53.8	-4.7	-4.9	No	Moderate +ve
34	58.1	58.6	52.4	52	-6.2	-6.6	59.6	52.9	52.5	-6.7	-7.1	No	Moderate +ve
35	59.7	60.2	52.4	51.9	-7.8	-8.3	61.3	52.9	52.4	-8.4	-8.9	No	Moderate +ve
36	63.2	63.7	53.9	53.4	-9.8	-10.3	64.7	54.4	53.9	-10.3	-10.8	No	Major +ve
37	68.3	68.8	54.9	54.1	-13.9	-14.7	70.2	55.2	54.4	-15.0	-15.8	No	Major +ve
38	71	71.6	54.7	53.5	-16.9	-18.1	73.2	54.9	53.7	-18.3	-19.5	No	Major +ve
39	70.9	71.5	55.6	54.8	-15.9	-16.7	73.1	55.9	55.1	-17.2	-18.0	No	Major +ve
40	57.2	57.7	48.7	47.1	-9.0	-10.6	59	49.3	47.8	-9.7	-11.2	No	Major +ve
41	69.2	69.8	64.1	63.7	-5.7	-6.1	71.3	64.5	64.1	-6.8	-7.2	No	Moderate +ve
42	69.5	70	63.4	61.9	-6.6	-8.1	71.6	63.8	62.3	-7.8	-9.3	No	Moderate +ve

Receptor No. (West to East) - (At 4m Receiver Height)	2018 Base Year - (L_{den} dBA)	2023 Do Nothing - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2023 Difference between Do Nothing & Do Something (dBA)	2023 Difference between Do Nothing & Do Something Scheme Only (dBA)	2038 Do Nothing - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2038 Difference between Do Nothing & Do Something (dBA)	2038 Difference between Do Nothing & Do Something Scheme Only (dBA)	Noise Mitigation Measures Required?	Subjective Response
43	69.9	70.5	63.9	54.9	-6.6	-15.6	72	64.3	55.3	-7.7	-16.7	No	Moderate +ve
44	57.9	58.4	52.7	47.9	-5.7	-10.5	59.8	53.2	48.9	-6.6	-10.9	No	Moderate +ve
45	68.4	69	62.6	46.5	-6.4	-22.5	70.5	62.9	47.4	-7.6	-23.1	No	Moderate +ve
46	47.5	48	55.7	54.9	7.7	6.9	48.4	56.8	56.1	8.4	7.7	No	Moderate -ve
47	56.5	57.1	59.6	56	2.5	-1.1	57.2	60.2	57.2	3.0	0.0	No	Minor -ve
48	57.2	57.8	60.5	57.2	2.7	-0.6	57.8	61.1	58.4	3.3	0.6	No	Minor -ve
49	58.3	58.9	60	54	1.1	-4.9	58.9	60.4	55.2	1.5	-3.7	No	Negligible
50	53.1	53.6	56.5	53.6	2.9	0.0	53.8	57.3	54.8	3.5	1.0	No	Minor -ve
51	54.3	54.9	56.9	52.7	2.0	-2.2	55	57.5	53.8	2.5	-1.2	No	Minor -ve
52	53.1	53.7	56.8	53.9	3.1	0.2	53.9	57.5	55.1	3.6	1.2	No	Minor -ve
53	52.8	53.3	57.5	55.3	4.2	2.0	53.5	58.2	56.4	4.7	2.9	No	Moderate -ve
54	53	53.6	58.3	56.5	4.7	2.9	53.7	59.1	57.6	5.4	3.9	No	Moderate -ve
55	55.4	55.9	60.5	58.7	4.6	2.8	56	61.2	59.8	5.2	3.8	No	Moderate -ve
56	60.9	61.5	62.8	60.7	1.3	-0.8	61.5	63.1	61.3	1.6	-0.2	No	Negligible
57	55.1	55.6	58.3	55.7	2.7	0.1	55.7	58.9	56.8	3.2	1.1	No	Minor -ve

Receptor No. (West to East) - (At 4m Receiver Height)	2018 Base Year - (L_{den} dBA)	2023 Do Nothing - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels (L_{den} dBA)	2023 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2023 Difference between Do Nothing & Do Something (dBA)	2023 Difference between Do Nothing & Do Something Scheme Only (dBA)	2038 Do Nothing - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels (L_{den} dBA)	2038 Do Something - Noise Levels - Scheme Only (L_{den} dBA)	2038 Difference between Do Nothing & Do Something (dBA)	2038 Difference between Do Nothing & Do Something Scheme Only (dBA)	Noise Mitigation Measures Required?	Subjective Response
58	57.3	57.9	59.9	56.5	2.0	-1.4	57.9	60.4	57.5	2.5	-0.4	No	Minor -ve
59	57.7	58.3	59.9	55.3	1.6	-3.0	58.3	60.3	56.4	2.0	-1.9	No	Negligible
60	57.9	58.5	59.6	53.8	1.1	-4.7	58.5	59.9	54.9	1.4	-3.6	No	Negligible
61	58.4	59	59.7	52.7	0.7	-6.3	59	60	53.8	1.0	-5.2	No	Negligible
62	57	57.5	58.3	51.3	0.8	-6.2	57.5	58.6	52.5	1.1	-5.0	No	Negligible
63	48.7	49.1	53.6	51.4	4.5	2.3	49.9	54.7	52.6	4.8	2.7	No	Moderate -ve
64	49.7	50.2	54.6	52.2	4.4	2.0	50.9	55.6	53.3	4.7	2.4	No	Moderate -ve
65	62.4	62.8	64.2	51.4	1.4	-11.4	63.6	65.1	52.5	1.5	-11.1	No	Negligible
66	51.4	51.8	53	47.8	1.2	-4.0	52.7	54	48.8	1.3	-3.9	No	Negligible

N52 Ardee Bypass Noise Monitoring - Results of monitoring @ Location N1 (24 Hour Location 1) (15th & 16th October 2020)

Survey Time Period	Survey Time	L _{Aeq 1h} (dB)	L _{Aeq 1h} (dB) Average	L _{den} (dB) ^{Note 1}
L _{day}	7:00:00	64.7	64	65
	8:00:00	65.4		
	9:00:00	64.3		
	10:00:00	63.5		
	11:00:00	63.1		
	12:00:00	64.6		
	13:00:00	62.2		
	14:00:00	61.9		
	15:00:00	62.8		
	16:00:00	62.8		
	17:00:00	64.6		
	18:00:00	63		
L _{evening}	19:00:00	64.5	61	
	20:00:00	59.6		
	21:00:00	58.5		
	22:00:00	56.7		
L _{night}	23:00:00	54.3	57	
	0:00:00	54.6		
	1:00:00	52.9		
	2:00:00	43.3		
	3:00:00	53.5		
	4:00:00	54.3		
	5:00:00	56.6		
	6:00:00	63.5		

Note 1: $L_{den} = 10 \times \log_{10} \left(\frac{1}{24} (12 \times 10^{L_{day}/10} + 4 \times 10^{(5 + L_{evening})/10} + 8 \times 10^{(10 + L_{night})/10}) \right)$ dB(A)

where :

L_{day} = 07:00 to 19:00 hours

L_{evening} = 19:00 to 23:00 hours

L_{night} = 23:00 to 07:00 hours

N52 Ardee Bypass Noise Monitoring - Results of monitoring @ Location N7 (24 Hour Location 7) (15th & 16th October 2020)

Survey Time Period	Survey Time	L _{Aeq 1h} (dB)	L _{Aeq 1h} (dB) Average	L _{den} (dB) ^{Note 1}
L _{day}	7:00:00	58.5	57	58
	8:00:00	59.2		
	9:00:00	59.1		
	10:00:00	55.8		
	11:00:00	56.1		
	12:00:00	55.3		
	13:00:00	56.4		
	14:00:00	55.9		
	15:00:00	56.6		
	16:00:00	56.7		
	17:00:00	57.8		
	18:00:00	57.7		
L _{evening}	19:00:00	56.9	55	
	20:00:00	56.4		
	21:00:00	54.3		
	22:00:00	47.4		
L _{night}	23:00:00	47	48	
	0:00:00	47.8		
	1:00:00	42.6		
	2:00:00	41.7		
	3:00:00	43		
	4:00:00	46.7		
	5:00:00	47.4		
	6:00:00	53.5		

Note 1: $L_{den} = 10 \times \log_{10}\left(\frac{1}{24}\right)(12 \times 10^{L_{day}/10} + 4 \times 10^{(5 + L_{evening})/10} + 8 \times 10^{(10 + L_{night})/10})$ dB(A)

where :

L_{day} = 07:00 to 19:00 hours

L_{evening} = 19:00 to 23:00 hours

L_{night} = 23:00 to 07:00 hours

N52 Ardee Bypass Noise Monitoring - Results of short-term 15-minute monitoring @ Locations N2 – N6 (15th & 16th October 2020)

NSR Noise Reference	L _{Aeq} 15min(dB)	L _{A10} 15min (dB)	L _{A10} (18hour) (dB) ^{Note 2}	L _{den} (dB) ^{Note 3}
N2	48.8	49.2	47	50
	49	46.9		
	50.1	47.1		
N3	53.6	50.8	48	52
	52.1	48.7		
	52.7	48.9		
N4	66.6	70	68	69
	66.1	70.1		
	65	68.3		
N5	53.1	55.5	54	56
	50.6	52.7		
	56.3	56.8		
N6	61.1	54.2	51	54
	60.3	50.6		
	60.9	52.6		

Note 2: L_{A10} (18hour) = (average of three L10 measurments) - 1

Note 3: L_{den} = 0.86 x L_{A10(18hr)} + 9.86dB