Table of Contents

List of Figures and Tables

1. Introduction

Dún Laoghaire-Rathdown County Council (DLRCC) proposes to improve the Glenamuck/Carrickmines/ Kiltiernan area's multi-modal transport infrastructure by developing the Glenamuck District Roads Scheme (GDRS) (See Figure 5-1 on page 11 of this Non-Technical Summary).

The Environmental Impact Assessment Report (EIAR) presents a systematic analysis of the impact of the Proposed Project in relation to the existing environment and follows guidelines published by the Environmental Protection Agency (EPA). The EIAR document is prepared as part of the Environmental Impact Assessment (EIA) process and will be submitted to the Competent Authority (An Bord Pleanála) as part of the planning process for the project. The EIA process is an iterative one in which the assessment findings are linked back to the design development process.

This report presents a 'Non-Technical Summary' of the EIAR for the GDRS. It is a requirement of the Planning and Development Regulations (2001-2018) that a non-technical summary of the Environmental Impact Assessment Report is prepared. This is because one of the fundamental objectives of the EIA process is to ensure that the public are made aware of the environmental implications of proposed projects. The non-technical summary is generally laid out in a similar, but condensed, format to the main EIAR, i.e. describing the project, existing environment, effects and mitigation measures etc.

The need for an EIAR was determined following the preparation of an EIAR Screening Report in December 2017 pursuant to Section 50 of the Roads Act, 1993. The relevant EIAR trigger thresholds as set out in the Roads Act, Article 8 of the Roads Regulations, 1994 include;

> *'The construction of a new road of four or more lanes, or the realignment or widening of an existing road so as to provide four or more lanes, where such new, realigned or widened road would be eight kilometres or more in length in a rural area, or 500 metres or more in length in an urban area.'*

A portion of the GDDR from the intersection with the GLDR to the intersection with the Golf Lane roundabout is proposed to be 4 lanes wide over a length of some 890m. The road scheme was therefore considered to be over the threshold for which an EIAR is required, and the road authority undertook to prepare an EIAR for submission to the Competent Authority. The content of the EIAR was determined pursuant to the preparation of a Scoping Report in March 2018 which was issued to stakeholders and statutory consultees for comment and feedback.

A copy of the consent application and each document accompanying the application (including this EIAR) may be inspected, free of charge, during normal office or opening hours at Dún Laoghaire-Rathdown County Council, Marine Road, Dún Laoghaire, County Dublin and An Bord Pleanála, 64 Marlborough Street, Rotunda, Dublin 1, D01 V902.All planning documents will also be available for download from the DLRCC website[1]. The EIAR is also available for inspection at the EIAR Portal[2].

[1] https://www.dlrcoco.ie/en/council-democracy/public-consultation-hub/dlr-consultation-hub
[2] http://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1

The experts[3] who contributed to the preparation of the report are detailed in Table 1.1 below:

Table 1- 1: Experts who contributed to the preparation of the EIAR.

Environmental Aspect	Company Name	Person Responsible	Qualification
EIAR Manager	Future Analytics	Richard Hamilton	BA (Hons.) MSc MIPI MRTPI
EIAR Support	Future Analytics	Ben Duignan	BA MRUP
EIAR Reviewer	Future Analytics	Meadhbh Nolan	BA MRUP
Traffic and Transportation	DBFL	Danny Pio Murphy	BEng (Hons) MEng
Air Quality and Climate Factors	AWN	Ciara Nolan,	BSc MSc (First Class)
Noise and Vibration	AWN	Aoife Kelly, PHD	BSc PHD
Biodiversity	Openfield	Pádraic Fogarty	BSc MSc IEMA
Cultural heritage	Byrne Mullins	Martin Byrne	BA MA Dip. EIA Mgmt MIAI
Landscape and Visual Impact	Cunnane Stratton Reynolds	Declan O'Leary	B.Agr.Sc. (Land Hort); PG Dip LArch; MILI; MLI(UK)
Land and Soils Hydrology and Hydrogeology	DBFL	John Carr	BEng MSc C. Eng
Resource Waste Management & Material Assets	Future Analytics	Richard Hamilton	BA (Hons.) MSc MIPI MRTPI
Population and Human Health	Future Analytics	James Sweeny Rachel Gleave O'Connor	BA MSc MRUP MSc MIPI LLB (Hons) MA MRTPI MIPI

[3] EPA guidance requires experts preparing an EIAR to list "(ii) his or her competence and experience, including relevant qualifications, if any, in relation to such parts, and (iii) such additional information in relation to his or her expertise that the person or persons preparing the EIAR consider demonstrates the expert's competence in the preparation of the report and ensures its completeness and quality."

2. Background to the Scheme

The need to improve the road network within the Kiltiernan (also known as Kilternan)-Glenamuck area has been a long-term objective of Council policy and was incorporated in the Dún Laoghaire Rathdown County Development Plan 2004-2010 as a six-year road objective for the Glenamuck Road corridor to be upgraded between Enniskerry Road the Carrickmines M50 interchange. This was on the basis that the current road infrastructure was considered unsatisfactory for the current and predicted traffic volumes

The GDRS is included in the current Dún Laoghaire Rathdown County Development Plan 2016-2022 as a Six-year Road Objective and is further detailed in the 'Kiltiernan Glenamuck Local Area Plan 2013-2019' (LAP) as a road infrastructure project. It is noted that the LAP was extended in June 2018 for a further period up to and including September 2023. The roads scheme is a vital infrastructural project to support the development within the LAP lands of between 2,600-3,000 residential units and to act as a bypass road corridor for the village core of Kiltiernan. It is noted that Section 10 of the LAP describes a Phasing proposal for permitted development in the LAP area in advance of the proposed GDRS. This proposal allows for approximately 700 dwelling units to be constructed in advance of the proposed scheme which can be generally served by the existing road network, development in excess of this number is dependent on the proposed roads scheme. DLRCC planning department have noted that pre application consultations are ongoing for in excess of this development quantum across the LAP lands so therefore progression of the roads scheme is imperative. See Figure 2.1 for the LAP map.

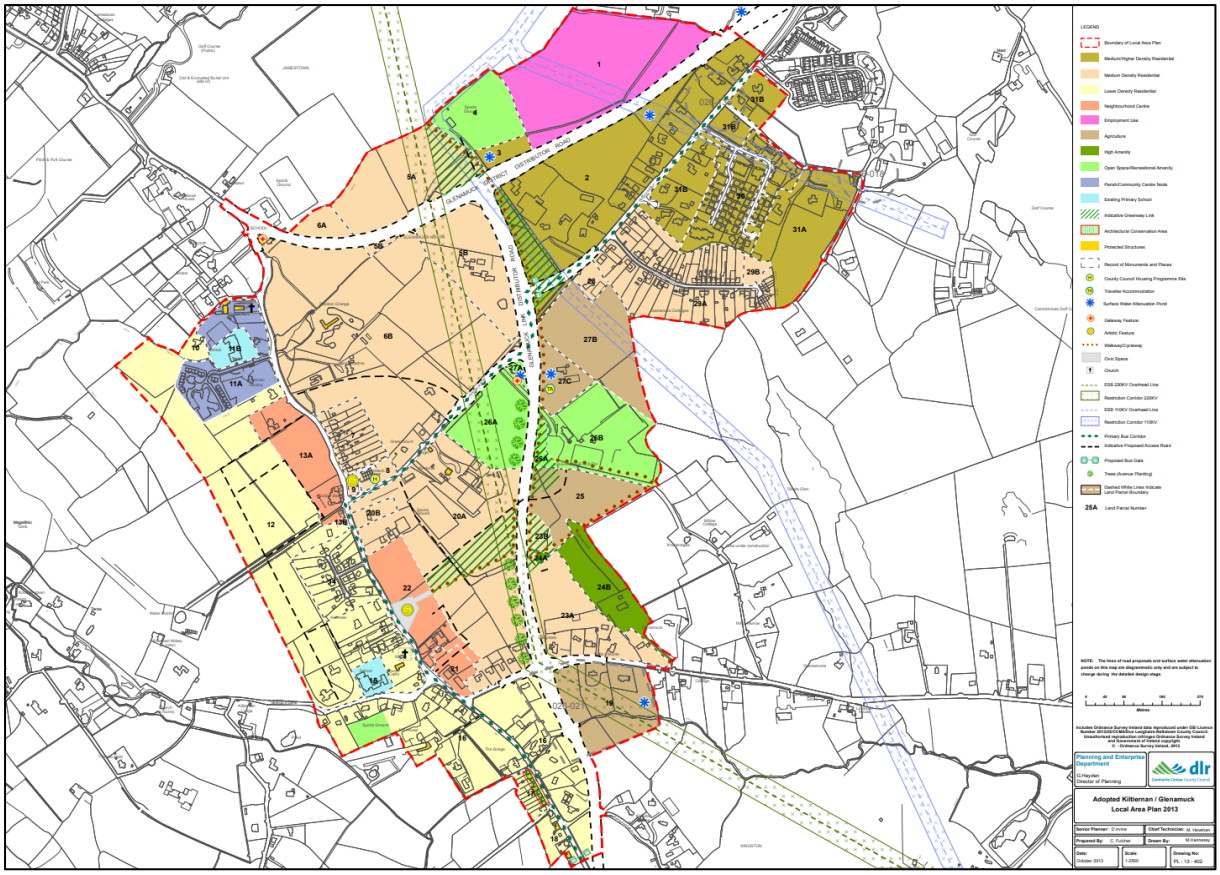

Figure 2- 1: Map of the Kiltiernan/Glenamuck Local Area.
(Source: Kiltiernan/Glenamuck LAP 2013)
**Note the northern Neighbourhood Centre was rezoned "A" (protect and/or improve residential amenity) in the /county Development Plan 2016-2022*

The main objectives of the GDRS are to:

- Design the new road layout to meet the needs of all road users using best practice standards complementing the surrounding environment;
- Facilitate the diversion of through-traffic away from Kiltiernan village core;
- Improve safety along the existing roads and junctions;
- Provide high quality pedestrian and cyclist infrastructure along the proposed route;
- Facilitate local public transport infrastructure; and
- Facilitate the development of the zoned lands within the Local Area Plan by providing suitable transport infrastructure.

The design approach to the GDRS design presented in this EIAR is dictated by the principles of the Design Manual for Urban Roads and Streets (DMURS) 2013 by the Department of the Environment, Community and Local Government/Department of Transport Tourism and Sport. This approach to the road design reflects the need to develop the area in a sustainable manner supporting the integration between land use and multi-modal movement for pedestrians, vehicles, public transport and bicycles.

3. Alternatives

3.1 Introduction

Article 5(1)(d) of the EIA Directive 2014/52/EU requires an EIAR to contain:

> *"A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment."*

The EPA EIAR Guidelines (2017) refer to Alternatives in section 3.4 noting the following:

- *"Higher level alternatives may already have been addressed during the strategic environmental assessment of relevant strategies or plans. Assessment at that level is likely to have taken account of environmental considerations associated, for example, with the cumulative impact of an area zoned for industry on a sensitive landscape. Note also that plan-level/higher-level assessments may have set out project-level objectives or other mitigation that the project and its EIAR should be cognisant of. Thus, these prior assessments of strategic alternatives may be taken into account and referred to in the EIAR. "*

Strategic Alternatives-Land use policy and Route Alignment options;

The Dún Laoghaire-Rathdown County Development Plan 2004-2010 recognised the need to improve the road network within the study area. In order to determine a suitable scheme and assist in the strategic planning of development in the area planning DLRCC commissioned the following studies:

- Glenamuck District Distributor Road, Environmental Study (Vol 1-3), 2007, RPS;
- Glenamuck District Distributor Road, Preliminary Design Report, 2007, RPS;
- Glenamuck District Distributor Road, Feasibility Study & Route Selection Report, 2007, RPS; and
- Glenamuck District Distributor Road, Constraints Study, 2007, RPS.

Following the above studies, Dún Laoghaire-Rathdown County Council commissioned the following reports which considered the overall Draft LAP proposals, including the GDRS alignment, and their impact on the environment:

- Kiltiernan / Glenamuck Draft Local Area Plan (2013-2019), Strategic Environmental Assessment, Environmental Report, May 2013, RPS.
- Kiltiernan / Glenamuck Draft Local Area Plan (2013-2019), Strategic Environmental Assessment, Environmental Report, Screening for Appropriate assessment, May 2013, RPS.

The road alignment under consideration in this EIAR therefore reflects the development of strategic alternatives. In summary, alternatives are considered under the following headings:

- Strategic Alternatives – Land use policy and Route Alignment options;
- Do-Nothing Alternative; and
- Design Alternatives.

3.2 Strategic Alternatives - Land use policy and Route Alignment Options

In the 2007 reports, following the identification of the study area, a Constraints Study was undertaken concerned with the physical, environmental, procedural and legal constraints that potentially affected the choice and design of a route for the scheme. This study included an overview of planning, protected areas, existing road network, water features, landholdings, community facilities, landscape features, cultural heritage, OS mapping, aerial photography, topography, utilities and environmental considerations.

The Route Selection Report (2007) identified 3 primary route options for the GDDR (1, 2 and 3) which commenced at the Carrickmines Interchange Southern Roundabout and extend to meet the Enniskerry Road at various locations (see Figure 3- 1: Glenamuck District Distributor Road, Environmental Study (Vol 1-3), 2007, RPS Fig. 2.1 Route Options for Proposed Scheme)

Subsequent detailed traffic modelling analysis was undertaken that established that a link Road bypassing Kiltiernan Village would be necessary to prevent traffic congestion within the village. The preliminary design further developed the Link Road with three link options to tie into the preferred GDDR route. The preferred route of GDDR Route Option 1 and Link Option C (GDLR)was chosen, which was the subject of an Environmental Report for the Glenamuck District Distributor Road[4] (See Figure 3-1 and Figure 3-2 for route options maps).

[4] Glenamuck District Distributor Road Environmental Study Volume 2

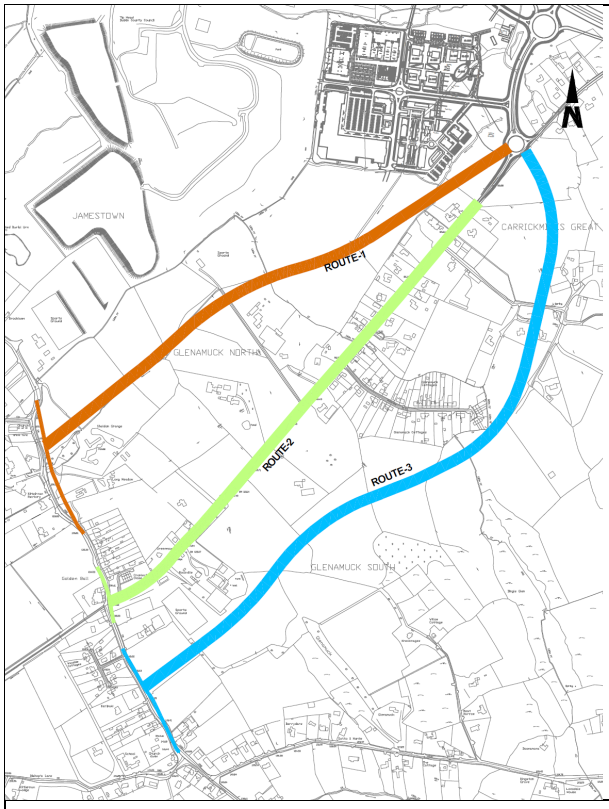

Figure 3- 1: Glenamuck District Distributor Road, Environmental Study (Vol 1-3), 2007, RPS Fig. 2.1 Route Options for Proposed Scheme

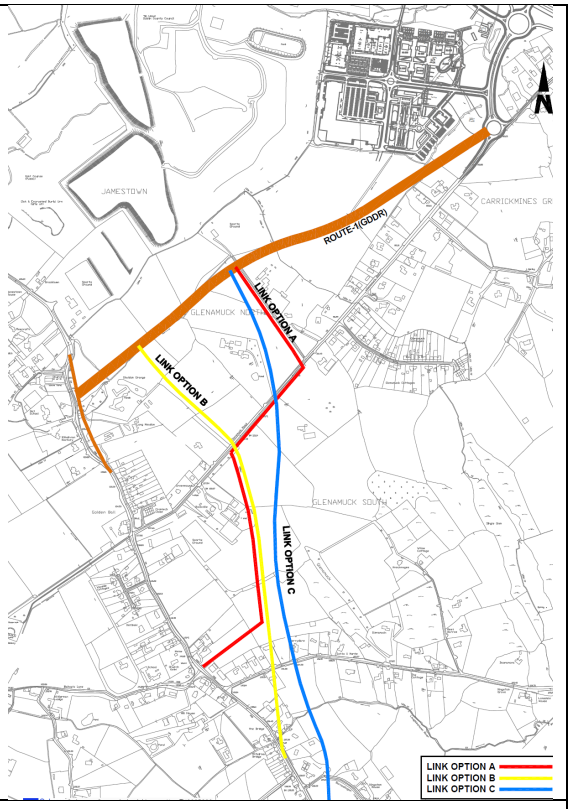

Figure 3- 2: Glenamuck District Distributor Road, Environmental Study (Vol 1-3) 2007, RPS Fig. 2.2 Link Options for Proposed Scheme

The Kiltiernan/Glenamuck Local Area Plan (LAP) (2007) was adopted by DLRCC in July 2007 incorporating the GDDR and GLDR alignment into the statutory plan. During the adoption process of the Draft Kiltiernan LAP (2006), the 'Barnaslingan Link' which is the section of the GLDR from Ballycorus Road to the Enniskerry Road was omitted from the plan. However, as part of the preparation of the Draft County Development Plan (2009), the 'Barnaslingan' Section was reintroduced to the 'Draft Plan'. The alignment was adopted in the County Development Plan (2010). The objective for the alignment was retained in the Kiltiernan/Glenamuck Local Area Plan 2013.

3.3 Do-Nothing Alternative

The do-nothing alternative is a general description of the evolution of the key environmental factors of the site and environs if the proposed project did not proceed. Under a "Do Nothing" scenario, the expansion of the area and the development of zoned lands would generate traffic and associated nuisances onto the existing road network. The existing Glenamuck and Enniskerry Roads would not be able to meet the capacity and traffic demands and would impede future developments of the area.

This would have a significant negative impact on the implementation of the policies of the County Development Plan and Local Area Plan and as such would have a broader significant adverse impact on the wider strategic development policies. Under a do-nothing scenario, residential development on zoned land with supporting access and road infrastructure would be delivered on a piecemeal basis. The opportunity to deliver an integrated approach to movement in the LAP area would be significantly

restricted for cycle and pedestrian infrastructure. Public transport infrastructure and priority measures could not be delivered with potential significant negative impact on sustainable modes of travel.

3.4 Design Alternatives

A fundamental factor for the GDRS design presented in this EIAR was the publication in 2013 of the Design Manual for Urban Roads & Streets (DMURS) by the Department of the Environment, Community and Local Government/Department of Transport, Tourism and Sport. This sets out best practice guidance relating to the design of urban roads and streets, to ensure that the road is not only effective in terms of traffic, but also supports integration with existing and future developments in line with DMURS guidance. In line with DMURS, the approach taken for the GDRS has been influenced and guided by the following design principles:

- **Connected Networks**: To support the creation of integrated street networks which promote higher levels of permeability and legibility for all users, and more sustainable transport;
- **Multi-Functional Streets:** The promotion of multi-functional, place-based streets that balance the needs of all users within a self-regulating environment;
- **Pedestrian Focus:** The quality of the pedestrian environment; and
- **Multi-Disciplinary Approach:** Greater communication and co-operation between design professionals through the promotion of a plan-led, multidisciplinary approach to design.

In addition to the urban design review, the scheme as set out in the LAP was subject to design development and optimisations to address the findings of the parallel EIA process. Optimisations were introduced which addressed the following issues:

- Receiving Environment;
- Drainage and Attenuation;
- Road Design;
- Power Lines; and
- Material Assets - Property

Each of the above alternative issues were addressed as part of the EIAR process and are referred to in the relevant section of the EIAR.

4. Consultations

Consultation is an important part of the EIA process and was undertaken in order to identify the key impacts of the proposed GDRS to be included in the EIAR.

4.1 EIA Screening

The need for an EIAR was determined following the preparation of an EIAR Screening Report in December 2017 pursuant to Section 50 of the Roads Act, 1993. The relevant EIAR trigger thresholds as set out in the Roads Act under Article 8 of the Roads Regulations, 1994 refers to *the construction of a new road of four or more lanes. 500 metres or more in length in an urban area.* The GDRS scheme exceeds the threshold (with some 890m of four lane carriageway) where it becomes necessary and mandatory to prepare an EIAR and submit an application to An Bord Pleanála.

4.2 EIA Scoping

An informal EIAR scoping exercise was undertaken as part of the EIAR process. During this process information on the proposed project and an outline of the proposed EIAR was provided to consultees to request comment/input on the final scope and content of the EIAR. In May 2018, the EIAR Scoping Report (FAC, 2018) was issued to prescribed bodies and stakeholders. Submissions were received from a number of consultees highlighting areas of detail concerning the receiving environment that the EIAR should consider. Each of the issues are addressed in detail in the relevant chapters of the EIAR.

4.3 Public Consultation

Consultation took place via;

- Contact with Key stakeholders during the scoping process of the EIAR;
- Contact with affected landowners during design process;
- Contact with key stakeholders i.e. utilities companies for information relating to the area; and
- With the public during a consultation evening held in Dún Laoghaire Rathdown County Council offices (Ballyogan Operations Depot).

Prior to the submission and completion of the EIAR, a public consultation exercise was undertaken at DLRCC Operations Depot (Ballyogan Depot) on 17th October 2018. The event was advertised on DLRCC's websites, and a mail drop of notifications was delivered to properties in the vicinity of the proposed scheme.

Comments relating to potential environmental impacts of the proposed development were invited on the evening, by post and by email. Members of the EIAR team, design team and Council representatives facilitated the evening to discuss the various elements of the proposed scheme with those attending. 22 Submissions were received. All pertinent comments were reviewed by the EIAR consultants. Comments received from public consultation focused on the location of attenuation ponds, the incorporation of the 'Barnasligan Link' which is the section of the GLDR from Ballycorus Road to the Enniskerry Road as part of the scheme and the potential impact of the proposed bus gate on Glenamuck Road.

5. Description of Scheme

The Glenamuck District Roads Scheme (GDRS) is outlined on Figure 5- 1 and the principal elements associated with the proposed road development include the following:

- The **Glenamuck District Distributor Road** (GDDR). The road consists of approx. 660m of two-lane single carriageway from the Enniskerry Road tie in to the GDDR/GLDR junction and approx. 890m of four lane dual carriageway from this junction to the Golf Lane Roundabout; and
- The **Glenamuck Link Distributor Road (GLDR)** consists of approx. 1.8km of predominantly two-lane single carriageway road. Both roads have additional turning lanes as required at junctions along the route.

The proposed roads scheme will link with the existing road network. New junctions to be formed include:

- GLDR & R117 (Enniskerry Road South) – Enniskerry Road to be diverted onto the GLDR at this location with bus-gated connection and pedestrian/cycle connections to the existing road route to Kiltiernan Village.
- GLDR & Barnaslingan Lane – Barnaslingan Lane to terminate at GLDR at new 3 arm junction. All turning movements accommodated. Short section of Barnaslingan lane to be Cul de saced between GLDR and Enniskerry Road.
- GLDR & R116 (Ballycorus Road) – New 4 arm Junction with turning lanes. All turning movements accommodated.
- GLDR & Glenamuck Road. New 4 arm junction with turning lanes. Vehicle movements between GLDR and Glenamuck Road East of the GLDR to be bus-gated. A small roundabout has been provided to accommodate turning movements for vehicles reaching the end of the Bus-gated section of the Glenamuck Road.
- GDDR & GLDR – New 3 arm Junction with turning lanes. All turning movements accommodated.
- GDDR & Glenamuck Road at Golf Lane Roundabout. Additional arm to be added to existing roundabout.

The proposed scheme will also include:

- Surface water drainage including a number of significant attenuation ponds;
- Public lighting;
- Traffic signals;
- Road marking and signage;
- Diversion of existing utilities and provision of new utilities;
- Accommodation works to existing properties;
- Walls, retaining walls, fencing and other boundary treatments;
- Associated landscaping works; and
- Miscellaneous ancillary works.

Figure 5- 1: Glenamuck District Roads Scheme – General Layout.

General Design

The surrounding zoning and land use vary over the length of the GDRS route. It is therefore important the road design reflects the characteristics of the surrounding land and facilitates effective integration with existing and future developments in line with DMURS guidance. It is also acknowledged that the road is being designed and delivered in isolation as an infrastructural project and the designers are not in control of the phasing, layout, frontage or future boundary treatments of surrounding private developments.

In order to ensure that the road design does not preclude the implementation of high quality urban design in the area, an urban design exercise has been carried out to support the road scheme design and is documented in the "GDRS Urban Design Report" (Included in Appendix 12.4)

The analysis has resulted in variations in road cross sections, landscaping, and junction arrangement over the scheme to respond to the surrounding characteristics and development types and better address pedestrian and cyclist integration with the road layout. The proposed design speed for new roads is to be 50 km/hr.

Public Transport Provision

The road design facilitates all existing public transport routes continuing in their current arrangement. Consultation has been carried out with Dublin Bus to ensure the road design incorporates any current or future requirements which have been identified. The scheme also incorporates "bus-gates" at the GLDR / Enniskerry Road junction and on the east arm of the GLDR / Glenamuck Road.

To achieve a good 'modal share' for public transport and walking /cycling in the LAP area, appropriate priority measures at junctions are provided. Connectivity with the Luas Green Line offers a high quality public transport option linking with major employment centres such as Sandyford and Cherrywood as well as the City Centre. To achieve a high quality bus feeder service to the Luas, a level of priority in the local road network for bus users is provided by the scheme. The bus gates will prevent high levels of through traffic on the Enniskerry Road passing though Kiltiernan village core and also along the eastern section of the Glenamuck Road. This will result in significant traffic calming effects on Glenamuck Road East and in Kiltiernan Village with corresponding decreases in air and noise pollution. The bus gates are considered to be a critical traffic management provision necessary when the zoned lands have developed. The bus gates are intended to be implemented by signage, lanes, traffic signals and road markings and are not intended to include physical barriers.

In order to integrate with the proposed traffic signals, lane and junction arrangements, and to effectively influence driver behaviour in the area, the bus gates will be required to operate at all times. It is noted that all bus gates facilitate pedestrian and cycle movement and affect vehicular movements only. In all cases alternative vehicle routes are maintained. It is also likely that supplementary vehicle routes will be delivered in tandem with local developments.

Pedestrian and Cyclist Infrastructure

A key aim of the scheme is to improve provisions for cyclists, pedestrians and other vulnerable road users. Generous path and cycle track widths are to be provided to encourage and maximise sustainable transport. Best practice guidance from the National Cycle Manual has been implemented on the

scheme. Standard design widths for footpaths, cycle tracks/cycle lanes are provided for all new footpath and cycle infrastructure along the GDDR & GLDR.

Road Cross Sections

A variety of road cross sections are applied over the length of the scheme to ensure the street responds to the surrounding land use and environment. A schematic of the cross sections applied is presented in Figures 5-3 to 5-6 as indicated in the key below (Figure 5-2).

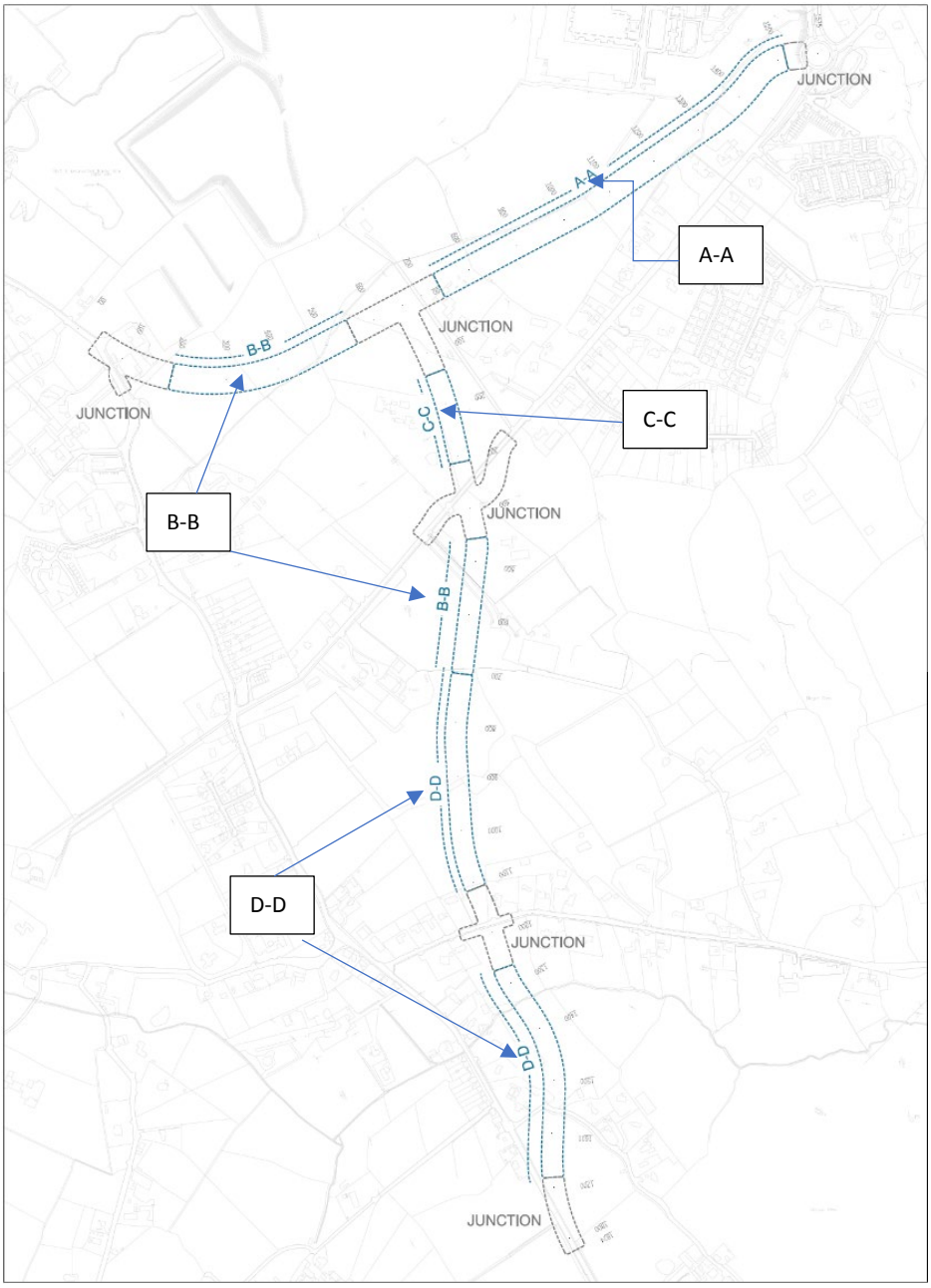

Figure 5- 2: Schematic of Road Cross Sections Key

Section A-A	
Urban Design Reference	Eastern Gateway
Carriageway Elements	• 3.0m – Central Boulevard • 2 x 3.0m Lanes – Both Directions • 2.0m Verge – North Side • 3.15m Verge – South Side [Provision for future 2.4m parking plus 0.75m Buffer to cycle track] • 2m Segregated Cycle Track – Both Directions • 2m Footpath – Both Directions
Variations	• RHS Verge reduced to 1.35m adjacent to pond as parking demand will be reduced and significant landscaping will be present adjacent to road edge

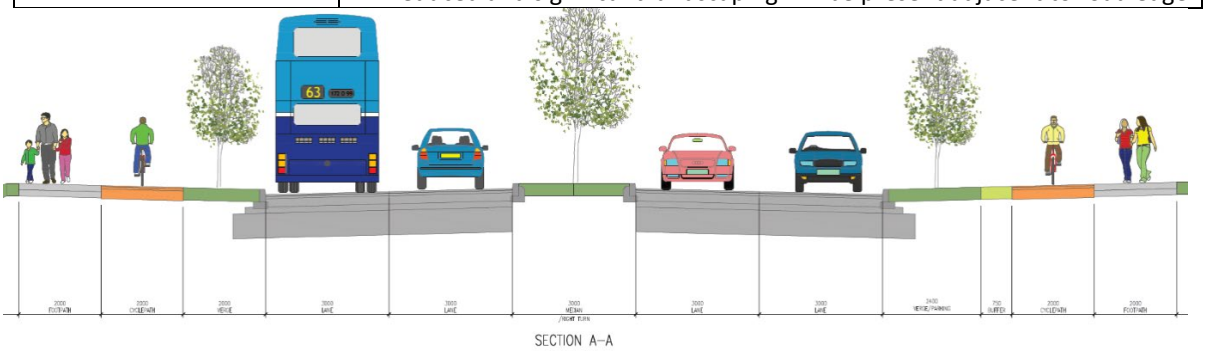

Figure 5- 3: Section A-A Schematic

Section B-B	
Urban Design Reference	Western Gateway, Central Gateway
Carriageway Elements	• 3.25m Lanes – Both Directions • 3.15m Verge – Both Sides [Provision for future 2.4m parking plus 0.75m Buffer to cycle track] • 2m Segregated Cycle Track – Both Directions • 2m Footpath – Both Sides
Variations	• A raised table pedestrian crossing is provided (GLDR approx. STA 600). • On GLDR section parking will be constructed at initial construction stage. On GDDR this will be development driven

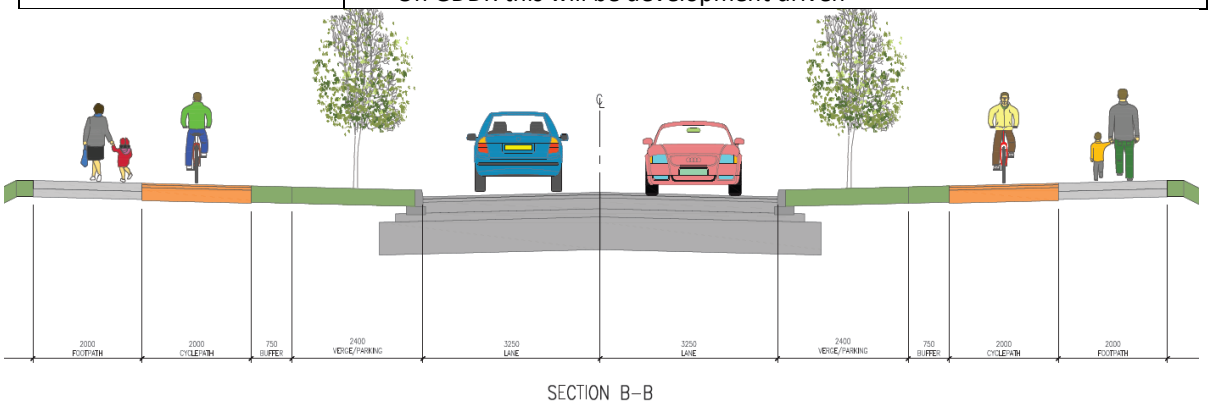

Figure 5- 4: Section B-B Schematic

Section C-C	
Urban Design Reference	Western Gateway, Central Gateway
Carriageway Elements	• 3.25m Lane – South Bound • 2 x 3.0m Lane - Northbound • 3.15m Verge – RHS & LHS [Provision for future 2.4m parking plus 0.75m Buffer to cycle track] • 2m Segregated Cycle Track – Both Directions • 2m Footpath – Both Sides
Variations	

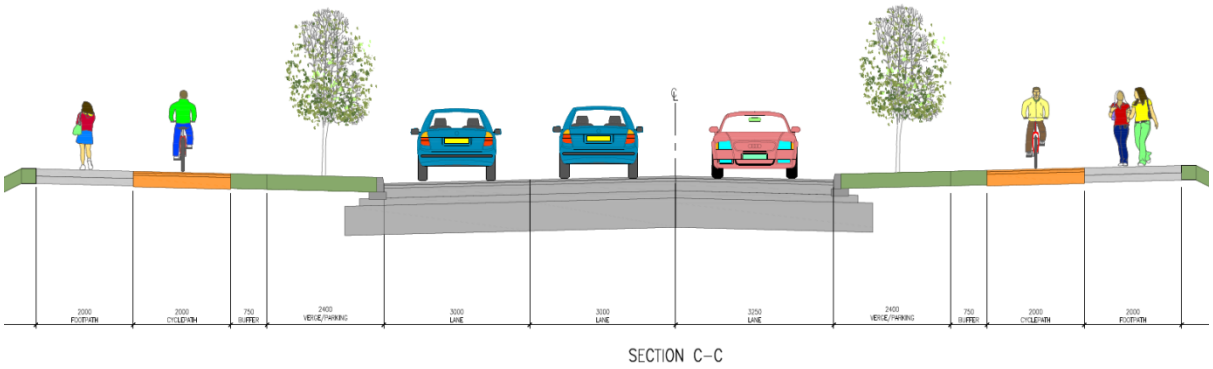

Figure 5- 5: Section C-C Schematic

Section D-D	
Urban Design Reference	Southern Gateway, Central Gateway
Carriageway Elements	• 3.25m Lanes – Both Directions • 2.2m Verge – Both Sides • 2m Segregated Cycle Track – Both Directions • 2m Footpath – Both Sides
Variations	• A raised table pedestrian crossing is provided (approx. STA 950). Crossing includes central vegetated island. • Verge omitted along proposed Loughlinstown River bridge to minimise bridge width

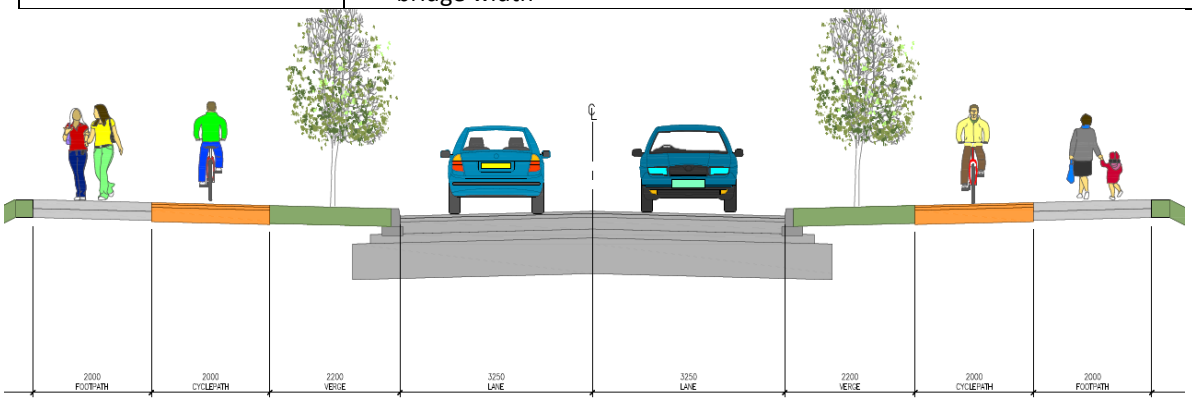

Figure 5- 6: Section D-D Schematic

Boundary Treatments

A preliminary indication of boundary treatments is included within preliminary landscape designs in Volume 3. Final boundary treatments will be determined at detailed design stage in conjunction with affected landowners. It is anticipated that boundary treatment will take the form of fences, hedgerows or walls.

High Voltage ESB Lines

Objective EI13 of the LAP states a desire to underground high voltage transmission lines in the area. Eirgrid (Transmission System Operator) have confirmed that undergrounding of the 220KV line is technically infeasible and only overhead diversions would be considered.

There is significant high voltage ESB infrastructure in the vicinity of the road scheme. This consists of the Arklow – Carrickmines 220kV Double Circuit Route and the Carrickmines – Fassaroe 110 kV line. Previous iterations of the scheme design (at LAP stage) required the movement of pylons on this line however a solution has been developed which delivers the road while maintaining the existing pylons in place which offers significant environmental, material assets, project risk and cost benefits. The feasibility of undergrounding 110KV in the vicinity of the scheme has been explored with relevant stakeholders. It has been confirmed that current policy would require any undergrounding of 110KV infrastructure to commence or terminate at a substation. The closest substation is located on the Ballyogan Road approximately 1.2km west of the scheme extents. The lines cannot therefore be undergrounded as part of the current scheme. It is intended that DLRCC will lay underground ductwork along the scheme which could facilitate the future undergrounding of the line(s) along the route of the proposed roads.

Parking

The provision of on-street parking at suitable locations is recommended in DMURS. The GDRS Urban Design Report has identified a number of locations along the road route where parking provision would be suitable with regard to surrounding land use/zoning. In many cases the proposed parking will not be required in the current rural setting but may be appropriate in conjunction with future street frontage developments. In these cases, the roadside verge will be sized to accommodate the provision of parking/buffer at a future stage.

Utilities

Existing service provider infrastructure impacted by the Glenamuck District Road Scheme will be minimised and any diversions or modifications agreed with the relevant provider. Utility providers will also be notified of the proposed works and offered the opportunity to incorporate new strategic infrastructure into the new road construction.

Watercourse Crossings

The Roads Scheme incorporates four watercourse crossing structures. Crossings of the Glenamuck Stream and minor watercourse are intended to be concrete box culverts and a crossing of the Loughlinstown /Shanganagh River is intended to be a minor bridge.

Surface Water Network

A new surface water network will be constructed to collect and convey all runoff from the proposed project to suitable discharge points. The proposed road scheme lies entirely within the catchment of the Loughlinstown River and the surface water outfalls will discharge to this river and its tributaries. Prior to discharge the run-off will be attenuated using flow control devices and the resulting stormwater volumes will be stored generally in the form of open ponds.

In addition to serving the proposed road, it is anticipated that the road drainage network will receive flow from some additional lands within the LAP once they are developed/redeveloped. An analysis has been carried out to determine the lands outside the road extents which it is anticipated will drain to the road network. DLRCC have indicated that all future developments discharging to the road drainage network will have to provide on-site flow control and attenuation in line with GDSDS requirements prior to discharge to the road drainage network. The ponds will therefore provide primary attenuation for the road and will serve as secondary/regional attenuation for other LAP lands.

Lighting

For the safety and convenience of vehicular road users, pedestrian and cyclists, road lighting will be provided along the proposed route in accordance with the required standards. Where necessary the existing public lighting will be upgraded at junctions with existing roads.

Construction Phase Activities

In the event of a successful grant of planning permission a further stage of detailed design will commence to facilitate the creation of tender documentation. A public tender process will be undertaken to appoint a main contractor. Following award of the tender to the successful contractor it is anticipated that the construction duration for the scheme would be approximately 18 to 24 months. Detailed construction information and methodologies will not be available until appointment of a main contractor.

An overview of the main construction works is set out below which will be further developed as part of contract documentation for the scheme post planning. All works are to be in accordance with the mitigation measures set out in complementary chapters and in accordance with best practice and contract documentation.

- Fencing of construction areas and establishment of site compound(s).
- Traffic management measures.
- Creation of construction stage surface water management measures.
- Stripping of topsoil from the road corridor as required by construction phasing. All stripped topsoil to be stockpiled on site for re-use with excess disposed off-site.

- Earthworks to road formation level will involve excavation of on-site materials and placement of either excavated or imported material to form road profile. Will also involve export of unsuitable/surplus materials and import of road capping gravels.
- Construction of watercourse-crossing structures (culverts/bridge).
- Excavations and surplus soil export for surface water attenuation ponds.
- Installation of services and service diversions. Trenching and laying works for all services including ducting, watermain and drainage.
- Import, placement and compaction of pavement foundation gravels, concrete surfaces, kerbs and bituminous surfacing.
- Environmental mitigation such as mammal pass structures, noise barriers and compensation planting.
- Ancillary roadworks such as placing signage, public lighting, road markings and traffic signals.
- Accommodation works for affected properties such as access roads, fences gates and walls.
- Landscaping of verges, slopes and ponds. Placement of trees, scrubs, surfacing, soils seeding etc. Construction of permanent boundary treatments.

6. Planning & Policy

This section was prepared by Future Analytics Consulting Ltd., Town Planners and refers to the various policies that influence the development of the area within the vicinity of the proposed GDRS scheme.

The National Planning framework 2040 was published in February 2018 and now sets the strategic vision for the spatial development of Ireland for the period from 2018-2040. According to the NPF, the national Strategic Outcomes (including Compact Growth and Sustainable Mobility) are supported by Strategic Investment Priorities where Housing and Sustainable Urban Development and National Road Networks are the first and second priorities. These concepts are central to the proposed GDRS and planning policy documents for the area.

Dún Laoghaire Rathdown County Development Plan 2016-2022

The Dún Laoghaire Rathdown County Development Plan (CDP) 2016-2022, is the statutory development plan for the area, and presents the primary framework for development within the County area. It sets out the strategic framework and land use planning policies and objectives for the County in the interest of the common good.

Under Table 2.2.5 of the CDP, six-year road objectives, the following relevant objectives are cited;

- Enniskerry Road (Stepaside to Glenamuck District Distributor Road);
- Glenamuck District Distributor Road;
- Glenamuck Local Distributor Road (including Ballycorus Link); and
- Glenamuck Road South.

Section 1 of the CDP Core Strategy refers to the Kiltiernan-Glenamuck Local Area Plan under section 1.2.5 Phasing, Prioritisation and Infrastructure Delivery, stating that this is one of the primary growth nodes from which a significant portion of the supply of residential units will derive up to the 2022 horizon and potentially beyond. Section 1.3.4.2 of the CDP notes the Kiltiernan-Glenamuck plan area "*will ultimately accommodate circa 2,500-3,000 residential units, a neighbourhood centre, two tranches of public open space and a large employment node adjacent to the established mixed-use development at The Park, Carrickmines.*"

Kiltiernan Glenamuck Local Area Plan 2013

The Kiltiernan Glenamuck Local Area Plan was adopted in September 2013. In June 2018 it was extended for a further period up to and including September 2023. Under Section 1.4 of the LAP, some elements of the overall planning framework for the area are;

- The proposal to provide a bypass road of the Village Core of Kiltiernan;
- The implementation of a Neighbourhood Framework Plan to consolidate the Village Core;
- The graduation of residential densities, from higher densities adjacent to the Luas line to lower densities further from the main public transport artery.

In the Core Strategy, the LAP lands at Kiltiernan/Glenamuck are allocated an estimated residential 'yield' of approximately 2400 units. Under Section 2 of the LAP, the stated Primary Objectives are;

VO1 To accommodate a sustainable level of residential and other ancillary development to ensure the wider strategic objectives of the 2010-2016 County Development Plan are realised.

VO2 To establish an obvious identity/sense of place for Kiltiernan.

VO3 To establish a focal point/civic node for Kiltiernan.

VO4 To guide sustainable development in order to establish the character of the two component areas that comprise the LAP namely, Glenamuck and Kiltiernan.

VO5 Ensure that all projects in the LAP which could, either individually or in combination with other plans and projects, have a significant effect on a Natura 2000 site (or sites) will be subject to Appropriate Assessment Screening.

VO6 The overarching policies and objectives of the Dún Laoghaire Rathdown County Development Plan will equally apply to any development and any associated works, individually or in combination with other plans or projects within the LAP boundary.

VO7 The EU Directives for Environmental Impact Assessment (EIA), the Water Framework Directive, the Floods Directive and the Strategic Environmental Assessment (SEA) are the fundamental policy framework of environmental protection measures and legislation for the for the delivery of the policies within this document and full compliance with the EIA and SEA Directives shall be provided.

Specific transport objectives, including those which will directly relate to the Proposed Road Scheme include:

MT04 To establish the function, shape and usage of the strategic road network generally within the LAP area.

MT05 To establish the future function of Glenamuck Road in terms of providing local access (including cars, bus, pedestrian and cycle) to the wider strategic road network.

MT06 To establish the appropriate functions of Enniskerry Road in terms of minimising through movements wile accommodating locally generated movements (Car, pedestrian and cycle) from future developments, and also potential future movements associated with the planned neighbourhood centre facility.

MT07 To introduce appropriate traffic calming measures and to divert through traffic away from the future LAP civic node in order to address issues such as safety, noise and air pollution, and the potentially negative severance of the component parts of the LAP area.

The LAP also sets out more detailed guidance on the Broad Framework and Principles of Development in Section 2.2 and a coherent vision on the integrated and sustainable development of the area.

7. Traffic and Transportation.

Currently, in the absence of the proposed scheme, the existing road infrastructure for the local road network is largely rural in nature and not fit for purpose to accommodate future traffic volumes from increased development in the area and surrounding environs while there are also safety and capacity issues associated with the current configuration of the roads based on existing use.

The transportation assessment undertaken investigates the impact of the proposed scheme in two parts, the first during the construction stage of the proposed scheme against 2017 Base traffic conditions and the second at the operational phase of the proposed GDRS for the opening year, 2020 and a design year 2030. The latter assessment is based on comparing 'without Scheme' ('Do Nothing') and 'with Scheme' ('Do Something') scenarios in accordance with TII's Traffic and Transport Assessment Guidelines (May 2004).

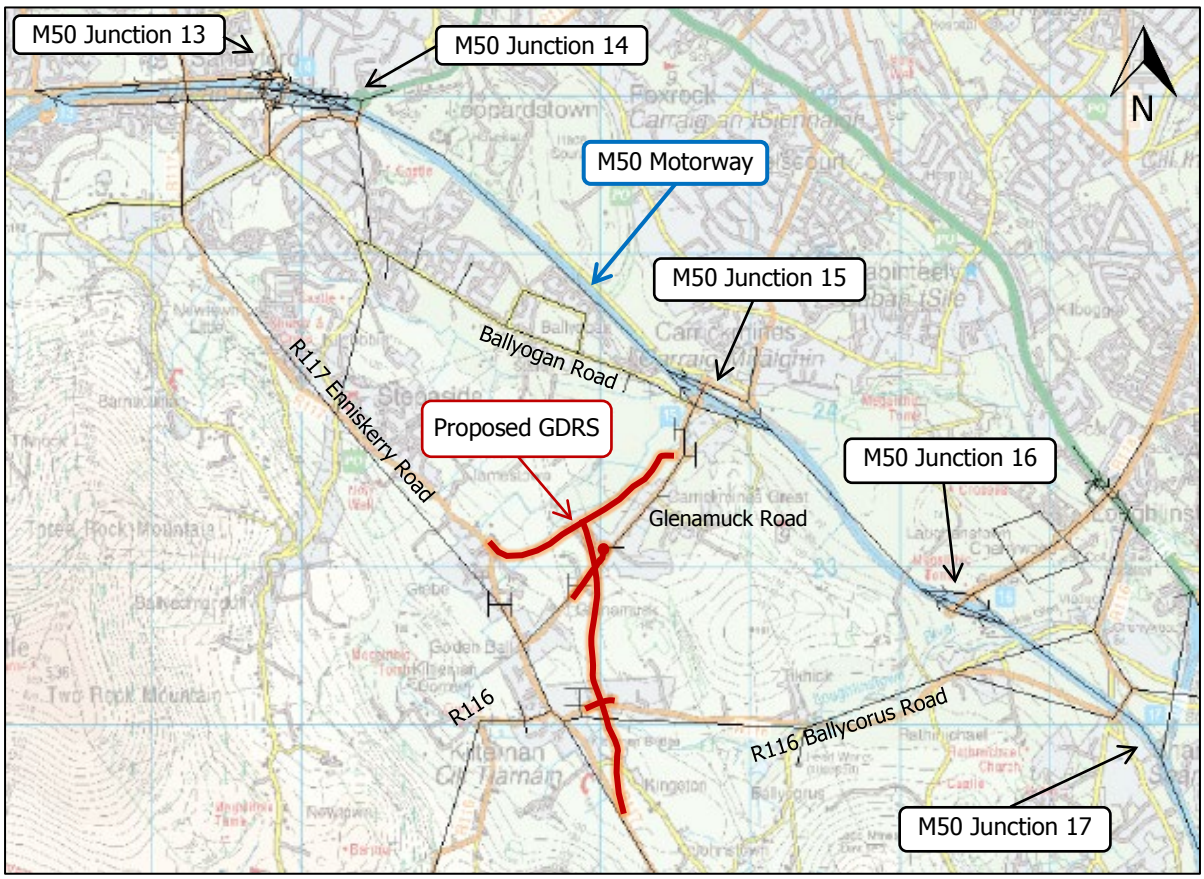

Figure 7- 1: Road Network Extent.

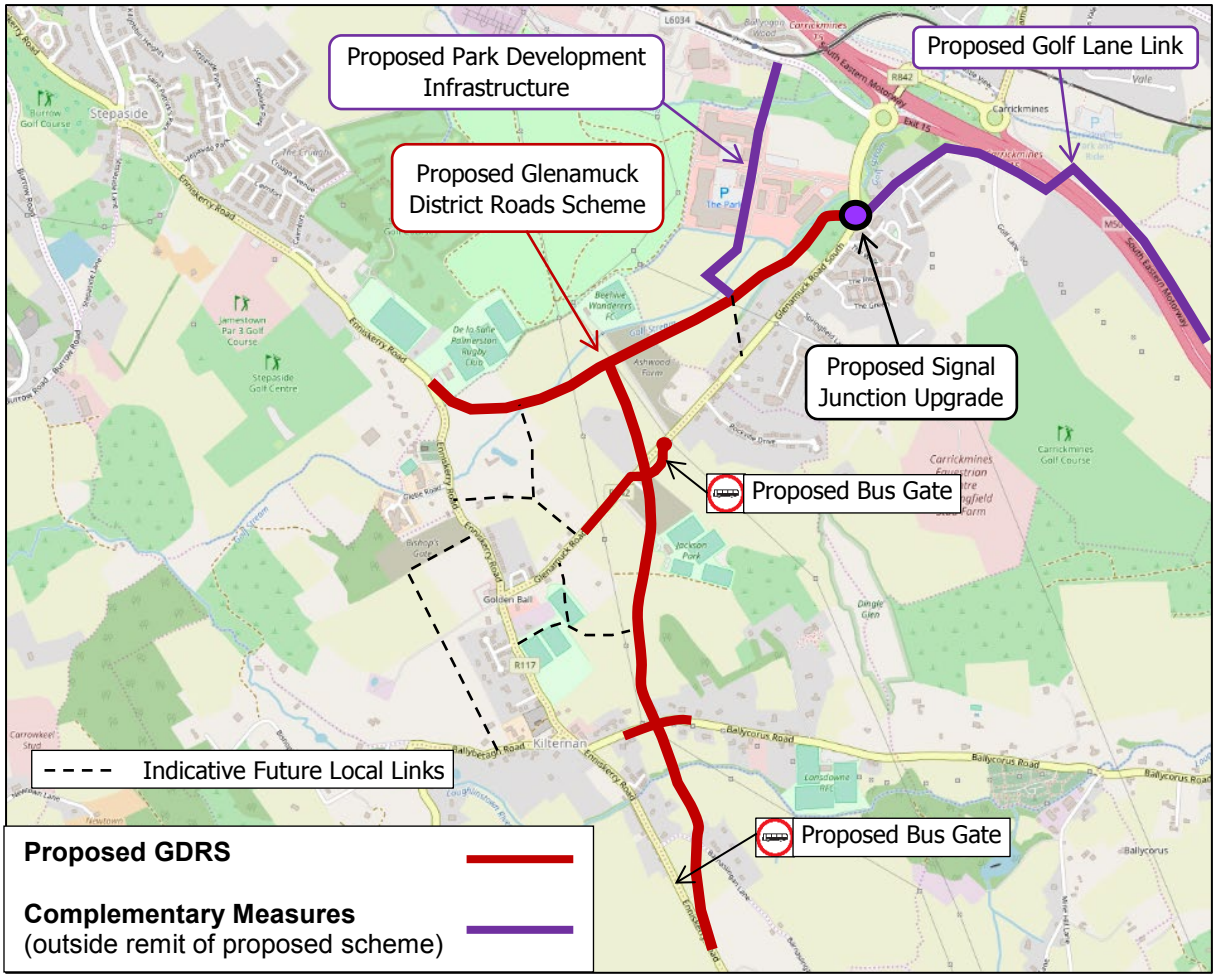

Figure 7- 2: Do-Something with Complementary Measures Road Network.

The proposed GDRS will have a net positive traffic impact on the local road in terms of reducing traffic on key sections of the local road network, particularly, the Kiltiernan village core, the bypassed section of the R117 Enniskerry Road and the existing Glenamuck Road, releasing capacity for local trips and public transport services. In conjunction with this reduction of road traffic, a reallocation of road space will provide considerable relief from severance and afford opportunities to vulnerable road users (pedestrians and cyclists) by offering new segregated pedestrian and cycle facilities that will create a more attractive, safer environment. The proposed scheme will act as a link street for the local network attracting trips from existing and committed developments and the fully developed LAP lands.

The proposed scheme will attract additional traffic from further origin points due to the attraction of the new amenities that will be created following the development of the LAP lands. Furthermore, the impact of this traffic along the M50, will be marginal to slight. The implementation of the proposed scheme is likely to reduce congestion and delay generally while improving journey times on the local network.

In terms of public transport, it is proposed to introduce bus priority measures along the existing Glenamuck Road and Enniskerry Road. These measures will generally take the form of traffic signal-controlled bus gates which will permit through movements by buses, taxis and public service vehicles as well as pedestrians and cyclists. Private vehicular movements will not be permitted through these points which will also have the beneficial impact of reducing traffic volumes on the local network and

specifically on the existing Glenamuck Road, and within Kiltiernan ivllage. Traffic will be reassigned to new streets/roads proposed as part of the scheme which will be suitably designed to accommodate the anticipated traffic volumes. The fundamental function of the bus gates will improve bus journey times and their reliability for existing and potential additional future bus services. Assessment of the GDRS project and its bus gate provision shows that it provides a significant benefit for buses based on average speeds and journey times.

The general trend is that average speed generally increases with each progressive scenario. The proposed scheme will also facilitate increased accessibility and connectivity with the Carrickmines Luas Stop on the Greenline by bus and by walking and cycling.

8. Air Quality and Climatic Factors

A review of existing air quality monitoring data, undertaken by the Environmental Protection Agency (EPA), was undertaken and used to characterise the existing environment. The proposed development is located in Zone A. The long-term monitoring data was used to determine background concentrations for the key pollutants in the region of the proposed scheme. The Air Quality Index for Health map on the EPA website, shows that the current air quality within the proposed development site is classed as 2 – Good.

With regard to NO_2, continuous monitoring data from the EPA at the Zone A locations of Winetavern Street, Rathmines, Dún Laoghaire and Swords are recorded. The most representative monitoring station is Dún Laoghaire which is located approximately 5km north-east of the proposed scheme and suggests an upper average annual mean concentration of no more than 17 µg/m^3. Based on these results a conservative estimate of the current background NO_2 concentration in the region of the proposed scheme is 19 µg/m^3.

The following air quality and climate impacts are noted:

- During the construction stage the main source of air quality impacts will be as a result of fugitive dust and PM10/PM2.5 emissions from site activities;
- Emissions from construction vehicles and machinery have the potential to impact climate;
- The primary sources of air and climatic emissions in the operational context are deemed long term and will involve the change in traffic flows or congestion in the local areas which are associated with the development;
- Best practice mitigation measures are proposed for the construction phase of the proposed scheme which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source;
- The impact of the proposed scheme has been assessed by modelling emissions from the traffic generated as a result of the scheme. The impact of CO, benzene, NO_2, PM_{10} and $PM_{2.5}$ for the opening and design years was predicted at the nearest sensitive receptors to the development; and
- Likely overall magnitude of the changes on climate in the construction and operational stages are imperceptible, long-term and not significant.

Levels of traffic-derived air pollutants for the development will not exceed the ambient air quality standards wither with or without the proposed scheme in place. Using the assessment criteria, the impact of the development in terms of No2 is slight negative at the majority of receptors along the proposed route but there is a slight positive impact in bypassed areas such as the R117. In terms of all other pollutants: PM10, PM2.5, CO and benzene the impact is considered imperceptible and long-term.

The following air quality and climate mitigation measures are recommended:

- The specification and circulation of a dust management plan for the site and the identification of persons responsible for managing dust control and any potential issues;

- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust management plan can be monitored and assessed;
- The specification of effective measures to deal with any complaints received;
- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods;
- Minimising waste materials due to waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site; and
- 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, 2016A, 2016B).

9. Noise and Vibration

An environmental noise survey was conducted in the vicinity of the proposed road realignment in the Glenamuck area. In the majority of cases, for both the attended and unattended survey locations, the ambient noise levels were influenced primarily by road traffic noise although other sources of noise such as birdsong, wind generated noise and barking dogs were also contributory sources.

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

In total 63 noise sensitive properties (61 existing receivers and 2 sites granted planning permission but yet to be developed) were selected to be modelled in order to quantify the traffic noise level associated with the operational phase of the proposed scheme. Based on the predicted noise levels and relevant guidance from published documents, an impact assessment of the potential noise and vibration levels associated with the proposed road development has been conducted.

Comment has been presented in relation to the worst-case predicted noise levels during opening year (2020) and design year (2035) in light of guidance derived from the TII document Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004) and Guidance contained within the TII's Good Practice Guide for the Treatment of Noise during the Planning on National Road Schemes (2014).

During the opening year of 2020, the operational impact assessment has determined that a total of 3 receivers meet the requirements for noise mitigation. During the design year of 2035, the assessment has determined that a total of 10 receivers meet the requirements for noise mitigation.

During the construction phase of the scheme, the impact assessment has determined that at distances of up to 30m from the works, there is potential for the construction noise limit of 70dB L_{Aeq} to be exceeded from Monday through Friday (07:00 to 19:00hrs), depending on the number and type of equipment occurring at any one time. However, it is important to note that the majority of properties are at more than 30m distance from construction works. The calculations would also indicate that at distances of up to 50m from the works, there is potential for the construction noise limit of 65dB L_{Aeq} to be exceeded on Saturdays (between 08:00 and 16:30hrs), depending on the number and type of equipment occurring at any one time.

The potential for vibration at neighbouring sensitive locations during construction is typically limited to forms of excavation works and lorry movements on uneven road surfaces. Given the nature of the scheme and the limited extent of excavation works below ground there are no significant ground or rock breaking activities anticipated.

Therefore, a range of noise and vibration mitigation measures have been proposed in order to ensure appropriate noise and vibration limits are not exceeded during operation or construction. Operational mitigation measures include erecting permanent noise barriers between 2m to 2.5m heights along specific road edges. Construction mitigation measures include positioning suitable 2.4m construction

hoarding along all noise sensitive locations, following day-time operating hours and recommendations for noise abatement good practice in construction activity.

Once consideration is given to the range of mitigation measures outlined in the noise and vibration impact assessment, the associated noise and vibration impact of the proposed Road Scheme is moderate/major in the short-term during construction and negligible during operation at all receptors, with the exception of one receiver (RD2a/b) located on the Ballycorus Road with a residual moderate impact.

10. Biodiversity

The predominant land use in this area remains agricultural. However, in recent years significant built development has been underway which has seen land use change to more urban uses. In terms of analysis, best practice guidance suggests that an initial zone of influence be set at a radius of 2km for non-linear projects (Guidelines for Baseline Ecological Assessment, Institute of Environmental Assessment, 1995). However, some impacts are not limited to this distance and so sensitive receptors further from the project footprint may need to be considered as this assessment progresses. This is shown in Figure 10- 1:.

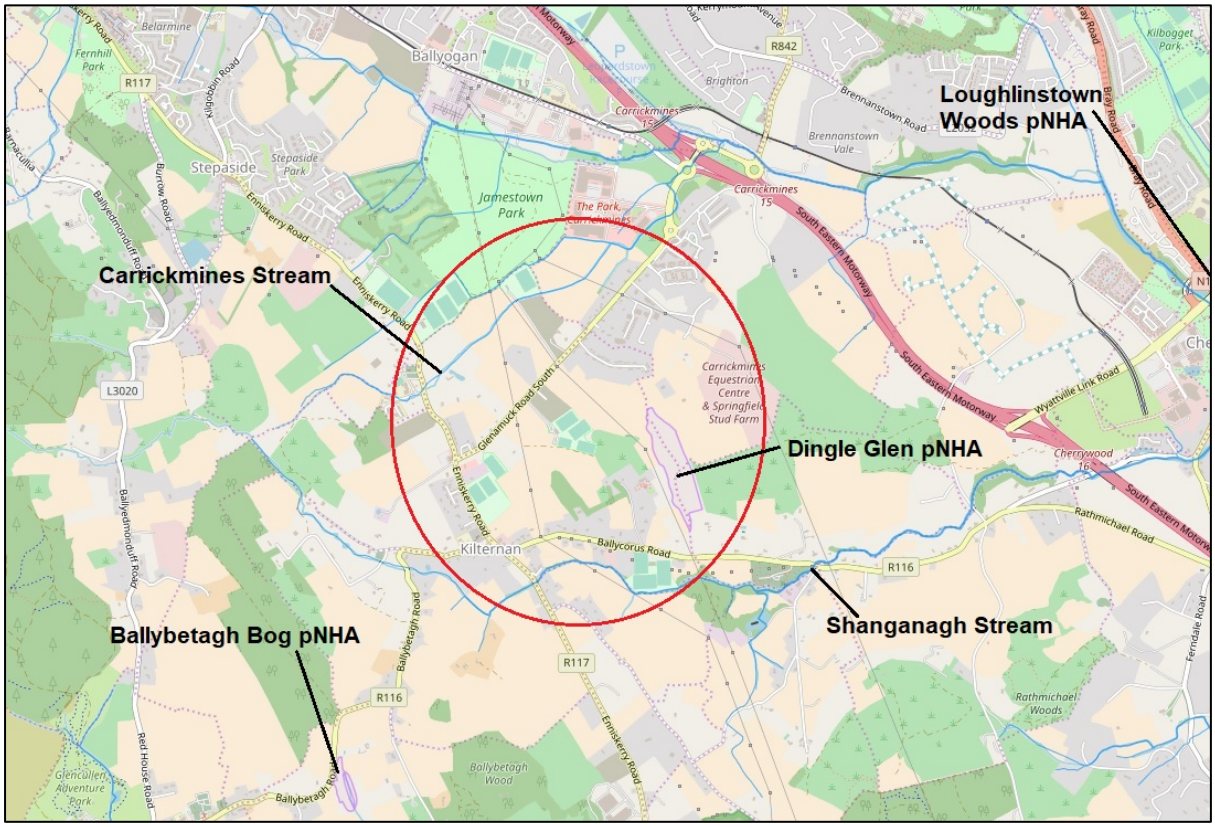

Figure 10- 1: Indicative study area

Indicative study Area (in large circle) and approximate 2km radius showing areas designated for nature conservation and water courses (from www.epa.ie).

Ecological field studies were carried out during winter and summer 2018 in order to capture optimal study periods for habitats, badgers and large mammals, breeding birds and bats. The study area can be broadly described as agricultural lands divided by traditional field boundaries. There are also areas of woodland and artificial habitats (including homes and gardens) which are all drained by a network of ditches and small streams. These are shown as a habitat map in Figure 10.2.

Figure 10- 2: Habitat map of the subject lands.

In summary, the application site is not within or adjacent to any area that has been designated for nature conservation at a national or international level. There are no examples of habitats listed on Annex I of the Habitats Directive or records of rare or protected plants. There is Three-cornered Garlic, an alien invasive species, growing on the site (other invasive species were encountered in the wider study area. There are no significant bat roosts on the land although larger trees provide potential roost locations. No Badger setts were recorded in the study area however activity in the surrounding land was noted. Otters are known from the Shanganagh Stream.

Predicted impacts may arise from:

- The removal of habitats including agricultural fields, scrub, field boundaries, artificial surfaces, drainage ditches and eroding rivers;
- Direct mortality/disturbance of species during land clearance. The scale of this impact depends upon the timing of works as mortality principally arises when vegetation is cleared during the breeding season and when young in nests, dens etc. are not mobile;
- Pollution of watercourses through the ingress of silt, oils and other toxic substances. The loss of pollutants to water courses from the disturbance of soils can affect aquatic habitats by fouling fish spawning beds and directly affecting species, particularly fish;
- Spread of invasive species;
- Protected Areas; There are no areas protected for nature conservation within the zone of influence of this project. The Dingle Glen pNHA is found approx. 600m from the work zone and there is no pathway for negative impacts to occur in this area;
- Indirect effects may occur through the loss of ecological connectivity, disturbance to Badgers or artificial lighting and these impacts have been addressed. The boundary of this area will be fenced and labelled sensitive ecological zone for the duration of the project and this will help to ensure accidental damage does not occur (e.g. through the use of machinery or storage or materials).
- Impact to species through the disruption of ecological corridors;
- Pollution of water from surface water run-off at the operational phase; and
- Disturbance to species from increased human activity.

New areas of land where semi-natural habitats can develop, either through natural regeneration or the planting of native species, have been be identified. If it can be assumed that the width of the linear habitats to be lost is a maximum of 10m, then the total area to be lost is calculated at 12,800 m^2 (~1.3 hectares).

There are wetland/attenuation areas for surface water run-off which are to be allowed to develop natural vegetation with minimal management. The total area to be provided will be in excess of 4.5 hectare and so – in area terms – will be well in excess of the habitat area to be lost. The landscaping scheme will include the erection of 14 new bat roosting boxes which will provide new habitat for these

species. Preliminary/indicative locations of these are given in Figure 10- 3: . These are intended to avail of existing semi-natural corridors (treelines and hedgerows) as well as new habitat compensation areas. Prior to works taking place along the Shanganagh Stream the riparian zone to be affected should be surveyed for otters, and in particular for the potential presence of any holt sites.

- Habitat loss will be mitigated against by creating new areas of land with semi-natural habitats, so these can develop either through natural regeneration or the planting of native species;
- The direct mortality/disturbance of species during land clearance can be mitigated against by allowing woody vegetation to remain in place during the bird nesting season. All mature trees should be checked by a bat specialist prior to felling;
- Preparation of construction management plan to avoid pollution during the construction phase. All river crossings are to be fish and otter passable;
- Appropriate measures should be taken to eradicate invasive species within the zone of influence of the project; and
- A lighting plan will be prepared in consultation with the bat ecologist in order to minimise the negative impact of artificial lighting on bat foraging behaviour.

It is not possible to fully compensate for the loss of high significant field boundaries due to their age and complexity. It is likely however that the range of species will be maintained while the area of mitigation will exceed that of the habitat to be lost. Nevertheless, the loss of treelines and hedgerows will result in a residual impact to biodiversity. There will also be an effect to bats from the disruption of ecological corridors. This is assessed as SLIGHT.

There will also be a SLIGHT residual effect to water courses during the construction phase as it will not be possible to completely eliminate the likelihood of pollution entering the water.

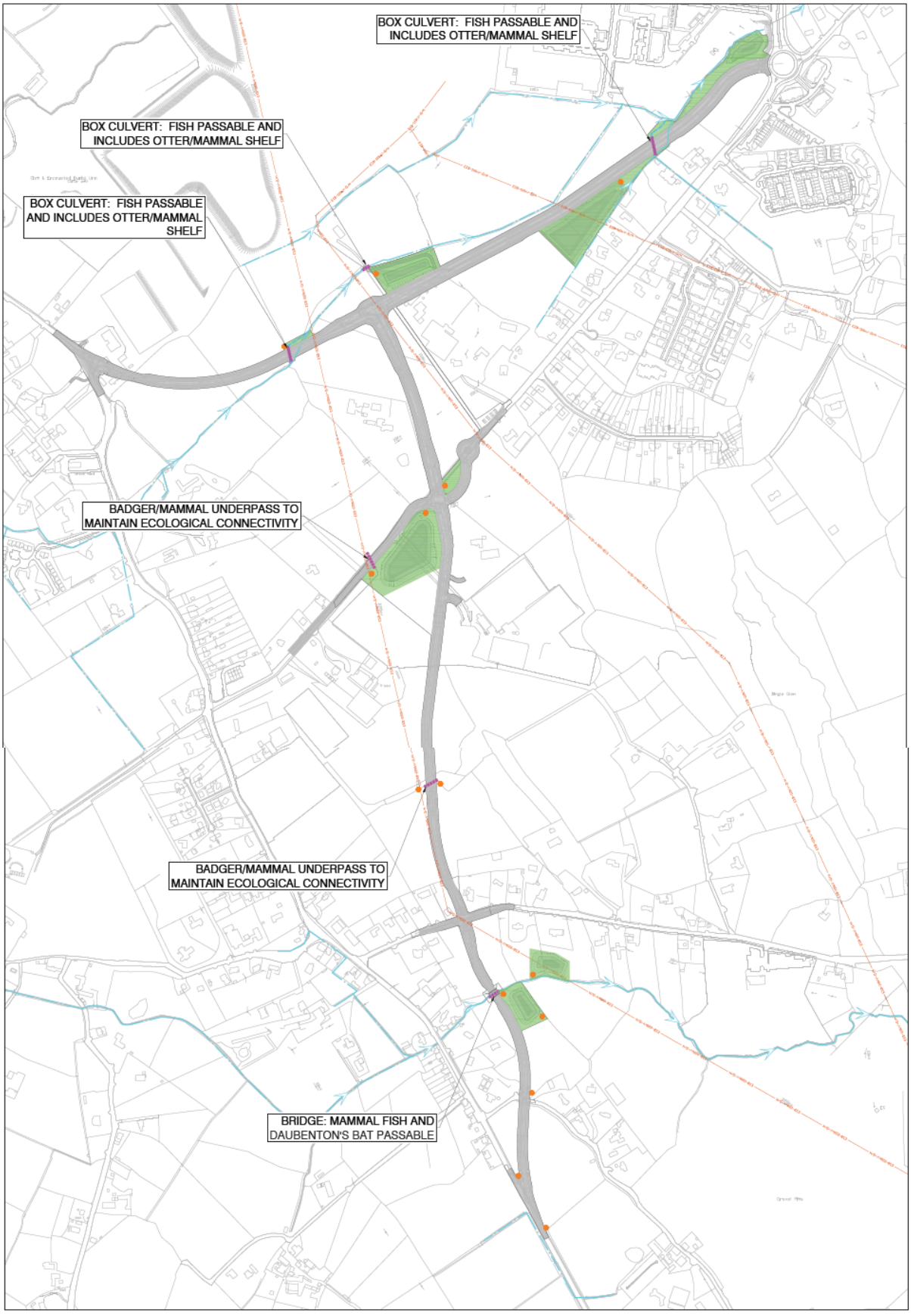

Figure 10- 3: Ecology mitigation measures

Green areas show compensation habitat. Orange dots show indicative locations of bat boxes to be erected.

11. Archaeological, Architectural and Cultural Heritage

This section provides information collected with respect to all previously identified sites of archaeological and architectural heritage interest located within the defined study area associated with the proposed scheme. An attempt was also made to determine any sites or areas that might be associated with significant historical events within the study area. A general historical background check was completed in order to better understand both the archaeological and architectural interest that may be in the area. From the results compiled from the research completed, sites for townland boundaries that cross the roads scheme, items mentioned in the archaeological inventory, units on the list of protected structures, list of industrial heritage structures and list of ACA (Architectural Conservation Area) within the study area all named below.

Table 11- 1: List of Townlands to be crossed by road route

Site No.	Townlands	Descriptions
CH-1	Carrickmines Great, Glenamuck North	Overgrown ditch, mature banked hedge-row
CH-2	Glenamuck North, Jamestown	Overgrown ditch, mature banked hedge-row
CH-3	Glenamuck North, Glenamuck South	Glenamuck Road
CH-4	Glenamuck South, Jamestown	Loughlinstown River (Banks overgrown)

Table 11- 2: Archaeological Inventory

Site No.	Sites and Monuments Record No.	Townland	Classification	Protection
CH-5	DU026-021	Glenamuck South / Kingston	Enclosure(s)	RMP; DLRCDP
CH-6	N/A	Carrickmines Great	Burnt Spread / Fulacht Fiadh	DLRCDP
CH-7	DU026-018	Carrickmines Great	Cross	RMP; DLRCDP
CH-8	DU026-015	Jamestown	Cist	RMP; DLRCDP

Table 11- 3: List of Protected Structures with Study Area.

Site No.	RPS No.	Location	Structure Name	Description
CH-9	1790	Glenamuck Road	Rockville House	House & Gate Lodge
CH-10	1775	Enniskerry Road	Shaldon Grange	House
CH-11	1771	Enniskerry Road	Church of Ireland	Church, School, Sexton's Lodge, Boundary Walls & Gates
CH-12	1802	Ballybetagh Road	Our Lady of the Wayside Church	Church
CH-13	1830	Kiltiernan Gallery, Enniskerry Road	Old Post Office	House and Shop

CH-14	1832	The Old School House, Enniskerry Rd	Orange Lodge	House

Table 11- 4: List of Industrial Heritage Structures with Study Area.

Site No.	IH No	Location	Description
CH-15	995	On west side of Glenamuck Road at junction with Enniskerry Road	Water Tap
CH-16	996	On south side of Enniskerry Road with junction with Barnaslingan Lane	Post Box

Table 11- 5: List of ACA with Study Area.

Site No	Location	Name
CH-17	West side of Enniskerry Road, Kiltiernan	Moss Cottages ACA

The above locations relative to the proposed road development are illustrated in Figure 11- 1.

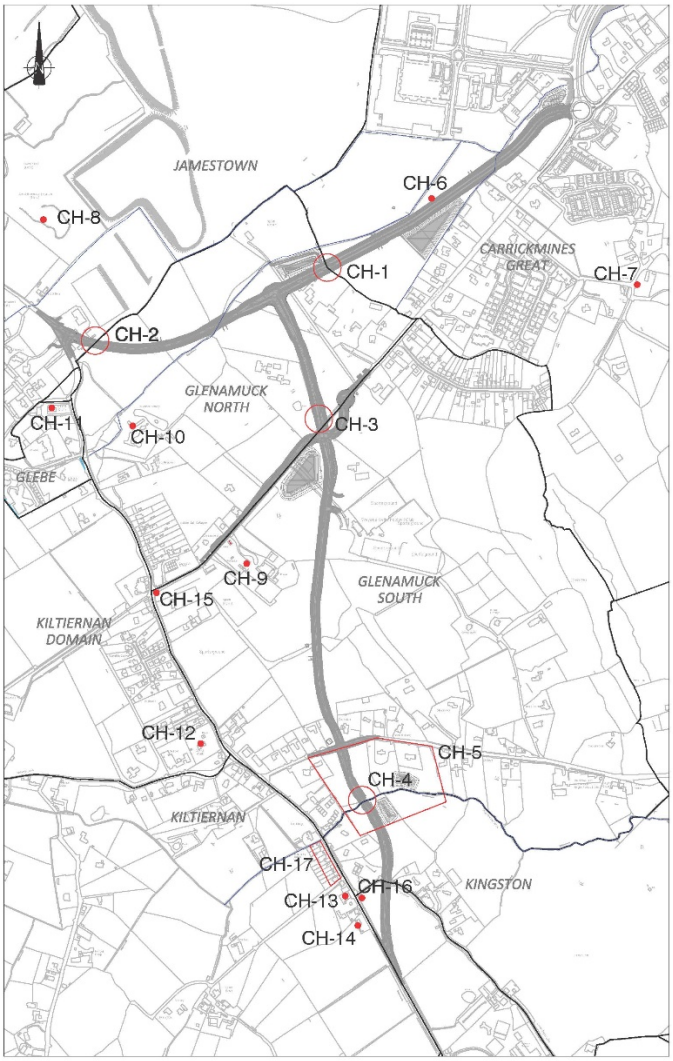

Figure 11- 1: Locations of Cultural Heritage Sites

(Identified Sites – Red, Townland Boundaries -Black; Watercourses -Blue)

During the construction phase of the scheme, a number of impacts have been highlighted in regards to Historical, Archaeological and Architectural heritage. In regards to historical heritage short lengths of townland boundaries, will be removed to facilitate development.

In regards to Terrestrial Archaeological impacts, Site CH-5, will require further archaeological investigation. A Geophysical Survey undertaken in 2006 included the Zone of Archaeological Potential associated with this site and concluded that several small and isolated geophysical responses were recorded within the Zone, possibly representing ephemeral archaeological remains and possibly related to deeply buried ferrous objects; none were indicative of the presence of enclosure sites. In addition, the exact extent of CH-6 is unknown and remains may extend into the road construction corridor; further investigations will be required. In general, groundworks associated with developments such as that under discussion have the ability to uncover and disturb hitherto unrecorded subsurface features, deposits, structures and artefacts of archaeological interest and potential. In regards to underwater archaeology, any artefactual material that might exist at the location of the proposed watercourse crossings would potentially be disturbed and destroyed and not identified and recorded, resulting in a likely negative, very significant and permanent impact. In regards to Architectural

heritage it is deemed unlikely that the construction stage will have any effect on units within the RPS (Record of Protected Structure), Industrial Heritage (IH) and Architectural Conservation Areas (ACA).

During the post-construction/operational phase of the scheme, the impacts of the proposed road scheme will have no negative impacts on the area.

Therefore, a range of archaeological, architectural and cultural heritage mitigation measures have been proposed in order to ensure appropriate limits are not exceeded during operation or construction. In regards to historical heritage, consideration should be given to the erection of stone markers, detailing the names of the associated townlands, at the locations of such boundaries adjacent to the edges of the construction corridor.

In regards to archaeological mitigation measure put in place, the following pre-construction measures are suggested;

- A further programme of Archaeological Geophysical Survey should be undertaken under license from the Department of Culture, Heritage and the Gaeltacht;
- Following completion of the programme of Geophysical Survey, a programme of Archaeological Testing should be undertaken within the extent of the Construction Corridor, under license from the department of Culture, Heritage and the Gaeltacht;
- Following completion of both the Geophysical Survey and Programme of Archaeological Testing, a report describing the results of such should be prepared; and
- A wade survey of Loughlinstown river within the extent of their Construction Corridor should be undertaken by an archaeologist, under license from the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, followed by a metal detecting survey of the stream bed, as well as the two areas of the Glenamuck Stream where it is intended culverts will be constructed.

12. Landscape/Townscape and Visual

This section assesses the proposed scheme with respect to Landscape/Townscape and Visual Impact.

The following statutory plans are referenced in this section, owing to their relevance to the site location and its proposed developments;

- Dún Laoghaire Rathdown County Development Plan 2016-2022; and
- Kiltiernan/Glenamuck Local Area Plan 2013-2019.

The site is situated to the south west of Dun Laoghaire and south of Sandyford village on the eastern slopes of the Dublin Mountains. The current main transport routes through the LAP area comprise Glenamuck Road, aligned through the central portion of the LAP area in a north-east to south-west direction to intersect with Enniskerry Road (R117), which is aligned through the western portion of the area in a north-west to south-east direction. The existing Glenamuck Road links to the Enniskerry Road at the Golden Ball junction in the heart of Kiltiernan village.

The receiving environment is generally rural and agricultural in nature with ribbon development along the R117 and R116 with the historic village of Kiltiernan being a focal point of this. There is also a significant portion of land dedicated to sports facilities with De La Salle Palmerston Rugby Club and Ballyogan Football Club accessed off the R117 while Wayside Celtic Football Club is accessed off the Glenamuck Road. Carrickmines to the northwest has been subject to a relatively intense period of development in the last decade with modern suburban development including apartment blocks and a large format retail centre at Carrickmines.

The land profile within the study area falls to the southeast towards the Loughlinstown Stream (south of the Ballycorus Road). Glenamuck Road incorporates significant hedgerows along the majority of its length. The Arklow – Carrickmines 220kV Double Circuit Electricity Route extends north-south across the Glenamuck Road with at least four pylons within the proposed development area.

Landscape Impacts and Effects

Whilst some of the core elements of the landscape exhibit a timeless quality and are inherently sensitive to change, in particular the rural character of the Glenamuck Road and Barnaslingan lane it must be acknowledged that there have been significant new developments in recent years impinging on the Glenamuck road in particular. The wider environment is set to undergo significant change and urbanisation in accordance with a Local Area Plan.

The receiving landscape is therefore classified as Medium Sensitivity *(exhibits positive character but has evidence of alteration to/degradation/erosion of elements and characteristics resulting in an area of mixed character, therefore potentially sensitive to change in general).*

The physical scale of the proposed road scheme is relatively modest due to it being primarily a physical surface presence integrating with the existing local roads network. In the context of being a key new element of infrastructure in advance of other major changes it is a relatively modest element. In this regard the magnitude of landscape change is classified as Medium *(partial loss of or alteration to one or more key elements or features, and/or introduction of elements that may be prominent but may*

not necessarily be considered to be substantially uncharacteristic in the context of the receiving environment).

The significance of the proposed new road is Medium and Neutral in terms of landscape impact i.e. scheme complements the scale, landform and pattern of the landscape/view and maintains landscape quality and enables repairs / removes damage caused by existing land uses.

It is important to consider the proposed development as part of the infrastructure of a much wider urbanisation planned for the Glenamuck/Kiltiernan Area. The project needs to be assessed on its own merits and whilst creating Localised adverse impacts visually, can generally, over time and with mitigation planting as proposed, be integrated into its receiving environment, with a predominantly neutral effect.

Nonetheless as the surrounding LAP urban development is constructed, the visibility of the new road will decline, behind new buildings and further landscape elements and more significant change will see the road subsumed within more comprehensive urbanisation in the area. The landscape and visual effects described above will become irrelevant to the changed context. The key test will be if urban quality replaces the rural quality. Mitigation proposals and the design of the road seeks to contribute to this process.

13. Land and Soils

The potential effects of the construction and operation of the Glenamuck District Roads Scheme (GDRS) with regard to Land and Soils have been assessed by classifying the sensitivity of land and soil receptors and quantifying the magnitude of impact on these receptors. The significance of the identified potential impacts is acknowledged by the combination of the sensitivity of the receptor and the magnitude of the potential impact.

The Glenamuck District Roads Scheme (GDRS) is underlain in its entirety by Granite Bedrock. The subsoils underlying the road route are comprised of variable sediments and thickness of Quaternary aged Glacial Till (boulder clay. Typically soil strata comprises topsoil (0.2m-0.5m) underlain by subsoils (2.0m-8.0m+). The majority of classifications were as a sandy gravelly clay. There was a degree of variability in the classifications across the site with some areas classified as clayey sands, clayey gravels or clayey silts. Cobbles and boulders up to 500mm diameter were commonly encountered in trial pits.

A small area of made ground is present within the road scheme footprint. This is in an area owned by DLRCC where recent construction works have taken place to provide traveller accommodation. Site investigations within the made ground indicate that this is primarily soil, however some construction rubble is also present

No existing areas of contaminated ground have been identified within the road route. During site investigation environmental testing was carried out on samples from all trial pits. All results indicate that soils would be classed as inert under the EPA Waste acceptance Criteria.

The only waste facility in the vicinity of the site is Ballyogan Landfill / Ballyogan Recycling Park. Ballyogan landfill is situated to the north of Golf Stream to the north of the proposed scheme extents. No portion of the scheme is within the landfill footprint and there are no works proposed within the landfill area.

The proposed scheme is expected to have a requirement for in excess of 40,000 m³ of imported earthworks and pavement materials. There is anticipated to be a surplus of excavated soils of approximately 70,000 m³.

The predicted impacts of the scheme identified on Land and Soils are;

- Chemical Pollution of geological receptors,
- Loss of soil value, and
- Material generation.

Best practice design and construction approaches will be implemented to mitigate against chemical pollution. All soil handing to be in line with best practice guidance and in line with mitigation measures to protect the environment. Topsoil on site will be stripped and stockpiled for reuse, soils handling to ensure soils are suitably stored and transported to maximise re-use. Soils subject to earthworks will be subjected to regular sampling and analysis for contamination. Exposed soil will be covered and seeded for vegetation as soon as possible and all disturbed areas to be reinstated with suitable soils to ensure future growth. The use of soil screening or other treatments should be used on site where it

is possible to process materials which would otherwise be classified as unacceptable into materials suitable for use in the project.

All materials exported from site to be in accordance with the Waste Management Acts. Any potential for use of surplus material within local sites shall be pursued at construction and detailed design stage (subject to compliance with Waste Management Acts).

Post mitigation impact significance for all identified impacts has been determined as Not Significant.

14. Water and Hydrology

The potential effects of the construction and operation of the Glenamuck District Roads Scheme (GDRS) with regard to the Water Environment have been assessed by classifying the sensitivity of water receptors and quantifying the magnitude of impact on these receptors. The significance of the identified potential impacts is acknowledged by the combination of the sensitivity of the receptor and the magnitude of the potential impact.

The GDRS lies entirely within the catchment of the Loughlinstown River (also known as the Shanganagh River and Bridesglen River). The study area affects two primary hydrological sub-catchments. Southern portions of the scheme are within the "Shanganagh" Sub-catchment and northern portions are within the "Carrickmines Stream" sub-catchment. The Carrickmines Stream merges with the Loughlinstown River upstream of its discharge to the Irish Sea at Shanganagh.

In the direct vicinity of the roads scheme there are several minor tributaries of the Loughlinstown River. These include the headwater channel of the Loughlinstown River, Glenamuck Stream, Golf Stream and some minor field and roadside drainage channels.

Granite Bedrock underlies the entire route. The bedrock aquifer underlying the entire site is classified by Geological Survey Ireland as a *"Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones".*

The Glenamuck Stream lies within the "Carrickmines Stream" waterbody and has been assigned as "Moderate" status under Water Framework Directive (WFD) classifications. The Loughlinstown River is in the Shanganagh sub-catchment and is classified as "Good" status. The groundwater body underlying the scheme extents is the Wicklow East waterbody which is classed as good status under the WFD.

Environmental assessments have determined that local watercourses support salmonid species (trout) although the watercourses are not EPA designated salmonid watercourses.

The proposed scheme will require a new crossing of a branch of the Loughlinstown River, two crossings of the Glenamuck Stream and a crossing of an unnamed watercourse. Locations and preliminary details of proposed watercourse crossings are shown in Volume 3.

The proposed road footprint is largely outside the Q100 and Q1000 flood extents and is therefore in Flood Zone C (low risk of flooding).

The predicted Impacts identified are;

- Chemical Pollution of the water environment,
- Pollutions of watercourses by silt / suspended solids,
- Changes to Stream Channels, and
- Changes to runoff and flow patterns.

Best practice design and construction approaches will be implemented to mitigate against chemical pollution and pollution by silts/suspended solids. Construction stage drainage shall be encompassed by a robust Sustainable Drainage System (SuDS) design which will be used to control drainage and silt management on the site.

Operational stage surface water discharges will be attenuated to greenfield run-off rates and attenuation storage ponds will be provided to cater for retained water volumes. Attenuation ponds will be designed accordance with industry guidance and will include measures to address both the quality and quantity of runoff to mitigate against the impact of run-off from the development on the existing environment. All surface water design will allow for increases in rainfall associated with climate change.

Design and construction of watercourse crossings shall be in accordance with best practice guidance and in particular with "Guidelines On Protection Of Fisheries During Construction Works In And Adjacent To Waters" (Inland Fisheries Ireland) and "Guidelines For The Crossing Of Watercourses During The Construction Of National Road Schemes" (NRA). Mammal and fish passage will be accommodated at all watercourse crossings.

Post mitigation impact significance for all identified impacts has been determined as Not Significant.

15. Resource and Waste Management

This section describes the potential for waste to be generated during the excavation, construction and operation of the Proposed Scheme. Mitigation measures are proposed to reduce the impact of the waste generated by the Proposed Project in the excavation, construction and operational phases.

The principal objective of sustainable resource and waste management is to use material resources more efficiently, where the value of products, materials and resources are maintained in the economy for as long as possible and the generation of waste minimised. This section considers the potential environmental effects of the generation and management of solid waste streams arising from the Scheme, in the context of the existing local and national resource and waste management environment. This resource and waste management assessment considers the following aspects;

- The legislative context;
- The construction phase, including excavation; and
- The operational phase.

The most recent figures published by the Environmental Protection Agency (EPA) relating to construction and Demolition (C&D) waste are for the year 2014 which were released on the 22nd March 2018 by the EPA. In 2014, 3,314 ktonnes of construction & demolition waste were finally treated (recovered or disposed). Soil and stones accounted for 74% of the total quantity. Mineral waste (concrete, bricks, gypsum) accounted for 12% of the total quantity. A summary of the estimated excavated material from the scheme is included in Table 15-1 below;

Table 15- 1: Preliminary Material Volume

Description	Quantity
Excavation for Roads	57,500 m^3
Excavation for Ponds	51,600 m^3
Re-use of Excavated material in Road construction	39,500 m^3
Surplus Soils Volume	69,600 m^3
Imported Road Gravels	30,100 m^3
Imported Concrete & Asphalt Surfacing	11,000 m^3

The hazardous waste streams which could arise from construction activities may include the following;

- Waste electrical and electronic components;
- Batteries;
- Asbestos;
- Wood preservatives;
- Liquid fuels; and
- Contaminated soil.

In case of the Proposed Project the most likely type of construction waste will be surplus concrete and unusable or damaged construction materials. The predicted impact of construction waste prior to implementation of mitigation measures is expected to be slight, negative and short-term.

Mitigation measures are set out in the sections below to minimise the effect of the Glenamuck District Roads Scheme on the environment, reduce the quantity of waste sent for final disposal and to promote sustainable waste management practices. Waste from the Glenamuck District Roads Scheme will be managed in accordance with the principles of the waste hierarchy i.e. prevent, reduce, re-use, re-use, recycling, energy recovery and disposal.

The following mitigation measures are implemented in regards to resource and waste management;

- Construction and Demolition Waste Management Plan;
- ICE Demolition Protocol;
- 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;
- Source Segregation;
- Material Management;
- Supply Chain Partners; and
- Waste Auditing.

As a result of proposed mitigation measures there are no predicted significant negative impacts.

16. Population and Human Health

This section addresses potential impacts of the GDRS on population and human health. The purpose of this assessment is to identify and assess the potential health and wellbeing effects on the surrounding population.

Analysis of potential impacts resulting from the Project are described in relation to a number of assessment themes, which were determined at Scoping stage, these include the following;

A. Population Demographic;
B. Settlement Patterns;
C. Economic Activities and Employment;
D. Amenity;
E. Roads and Traffic;
F. Property;
G. Access to Public Transport; and
H. Health Demographics.

Following the sections mentioned above, the analysis of predicted impacts comprises of a study of the key assessment themes as well as consideration of the construction phase, with a conclusion reached in relation to the proposed GDRS on the baseline characteristics described above.

During the construction phase of this scheme the following impacts will be of significance to population and human health;

- An increase in baseline noise levels resulting from construction activities;
- Possible odour releases and associated dust emissions;
- Traffic disruption and associated congestion; and
- Noise, air quality and congestion impacts as a result of construction traffic and movements.

Each of the above impacts is discussed in more detail throughout the rest of the EIAR. Without mitigation, the above impacts would be negative and significant, but this is on a short-term basis and would not result in profound effects. Measures will be in place to control impacts and to limit these to acceptable parameters.

The impact on population demographics of the study area is considered **Positive Moderate.** This is influenced by the improved connectivity of the area. It is expected that the population will continue to grow in line with established trends, but that this growth will be stimulated by the improved road network through the area. The GDRS will increase connectivity to surrounding areas and enhance access to the associated opportunities that this presents to the population (i.e. access to employment opportunities and community facilities). This is likely to alter the established population demographic with an increased diversity in population characteristics.

The study area currently supports a large number of family households and younger persons when compared to the County as a whole. Improved connectivity through the area will enhance access

opportunities to facilities required by this population, including schools, hospitals and day care facilities, as well as work places. This will also influence the desirability of the study area for occupation by future populations, facilitating future population growth and the associated economic value associated with this. The population growth is accounted for within the Kiltiernan/Glenamuck Local Area Plan 2013-2019 and requires infrastructure, such as the GDRS, to support this growth.

The impact on settlement patterns of the study area is considered **Positive Moderate**. In the period between 1991 and 2016, the study area and the areas around it, have seen population increases of greater than 30%. This increase in population can only be sustainably accommodated where infrastructure is also enhanced. The GDRS represents a significant improvement to the road network that will benefit the population through enhanced connectivity and reduced traffic congestion.

It is expected that improved road connectivity through the GDRS will influence settlement patterns, and as a result enhance the attractiveness of the study area for increased settlement by future populations. This is predicted to have a positive influence upon both those areas located immediately adjacent to the GDRS as well as settlements in the wider vicinity that are still proximate to the GDRS and will utilise it as a result.

The GDRS will improve connections through the study area and its immediate locality, providing enhanced connection to employment opportunities for the population.

The GDRS will provide direct connectivity enhancements to a number of open spaces, leisure facilities and attractions having a Positive Moderate Effect on Amenity.

The GDRS will have a **Positive Significant Effect on Roads and Traffic** vis a vis the location of key facilities in the area when considering the demographic of the population. This includes schools, hospitals, day-care facilities and nursing homes. The GDRS provides enhanced connection directly to these institutions or indirectly with reduced journey times to the M50 and other road networks. Enhancing the connectivity of the population to these facilities and reducing journey times through relieving congestion is expected to be a significant positive effect of the proposed road network.

A growth in population is expected in line with existing trends, and this will be facilitated by the road, the type and form of any accommodation constructed to accommodate this growth would only be indirectly influenced by the road network. The impact of the GDRS is considered Neutral in terms of Property and population.

The proposed GDRS will enhance connectivity through the area and improve journey times to interconnected transport services. This is considered a positive moderate effect on access to public transport.

The statistics in relation to health in the study area, indicate that the numbers of people in good health is high at just over 90% and compares favourably to the County overall. It is not expected that the GDRS will result in any significant permanent effects that would alter this characteristic.

Following implementation of the mitigation measures outlined in relevant sections of this EIAR, the residual impact on population and human health is considered to be moderate and positive.

17. Material Assets-Land Use and Property

This section describes the potential impacts of the proposed GDRS on land use at, and adjacent to, the proposed scheme footprint. This section describes the material assets of human origin that could be impacted upon. Land-use also considers if there will be severance, loss of rights of way or amenities, conflicts, or other changes likely to ultimately alter the character and use of the surrounding area.

The core study area is along the proposed GDDR and GLDR alignment and generally within the LAP extents. In addition to the land directly impacted by the scheme, there may be additional impacts on wider landholdings or receptors outside the scheme extents which may be affected by changes to land use patterns brought about by the scheme (See Figure 17- 1: Study Area Context Plan). Building uses are shown in Figure 17-2.

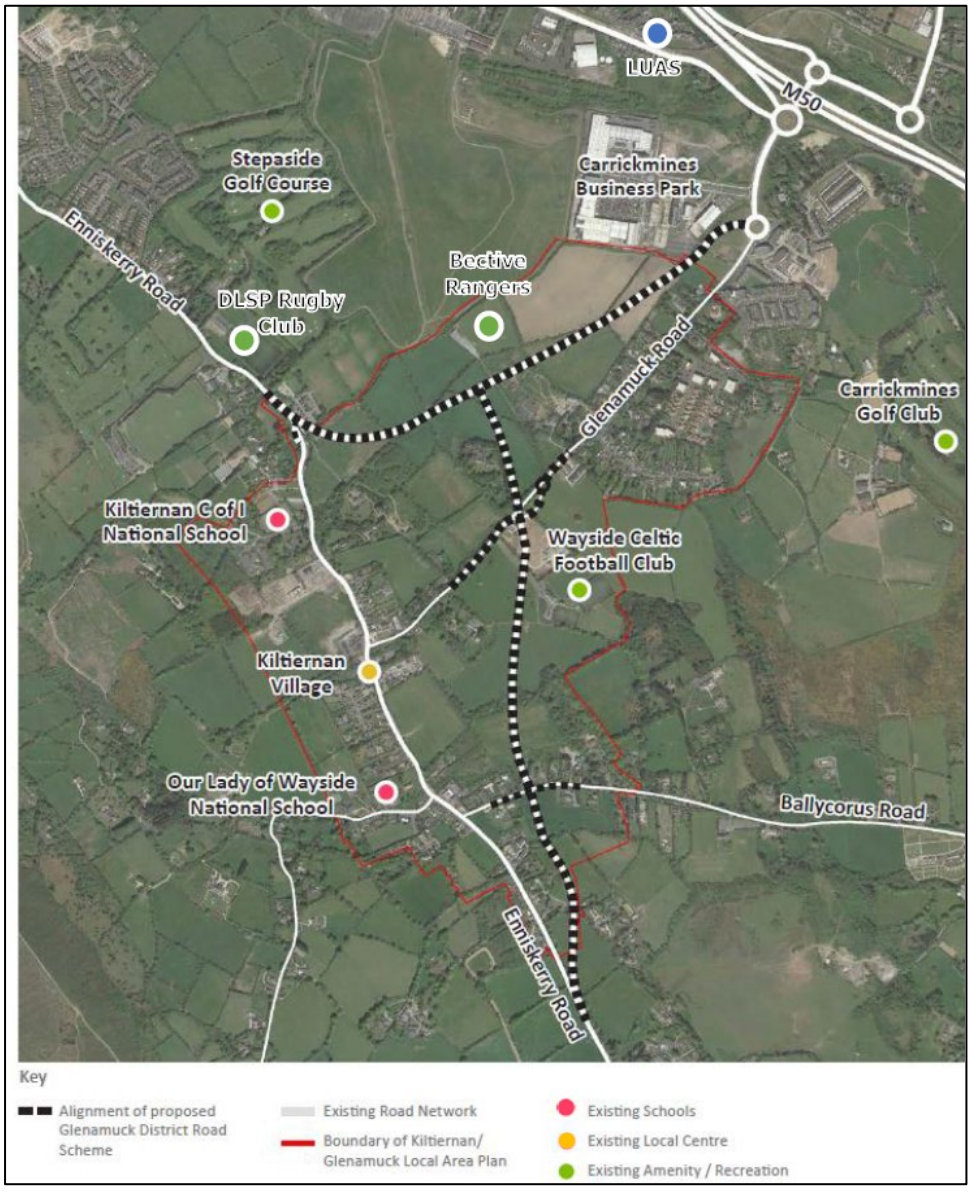

Figure 17- 1: Study Area Context Plan

With regards to the Baseline environment section a review of planning permissions in the area was completed to highlight both grants and refusals for the overall area. Applications for less than 5 dwellings before 2010 are not included on the basis that the permission has either been implemented or the life of the grant now expired. The permissions also do not include minor permissions such as domestic extensions.

The proposed scheme will affect journey characteristics, severance and economic impacts during both construction and operational phases of the scheme. All directly affected properties have been mapped out with the nature of the impact the scheme will have on it mentioned. The specific mitigation required is also named which will mitigate any damage caused in the area.

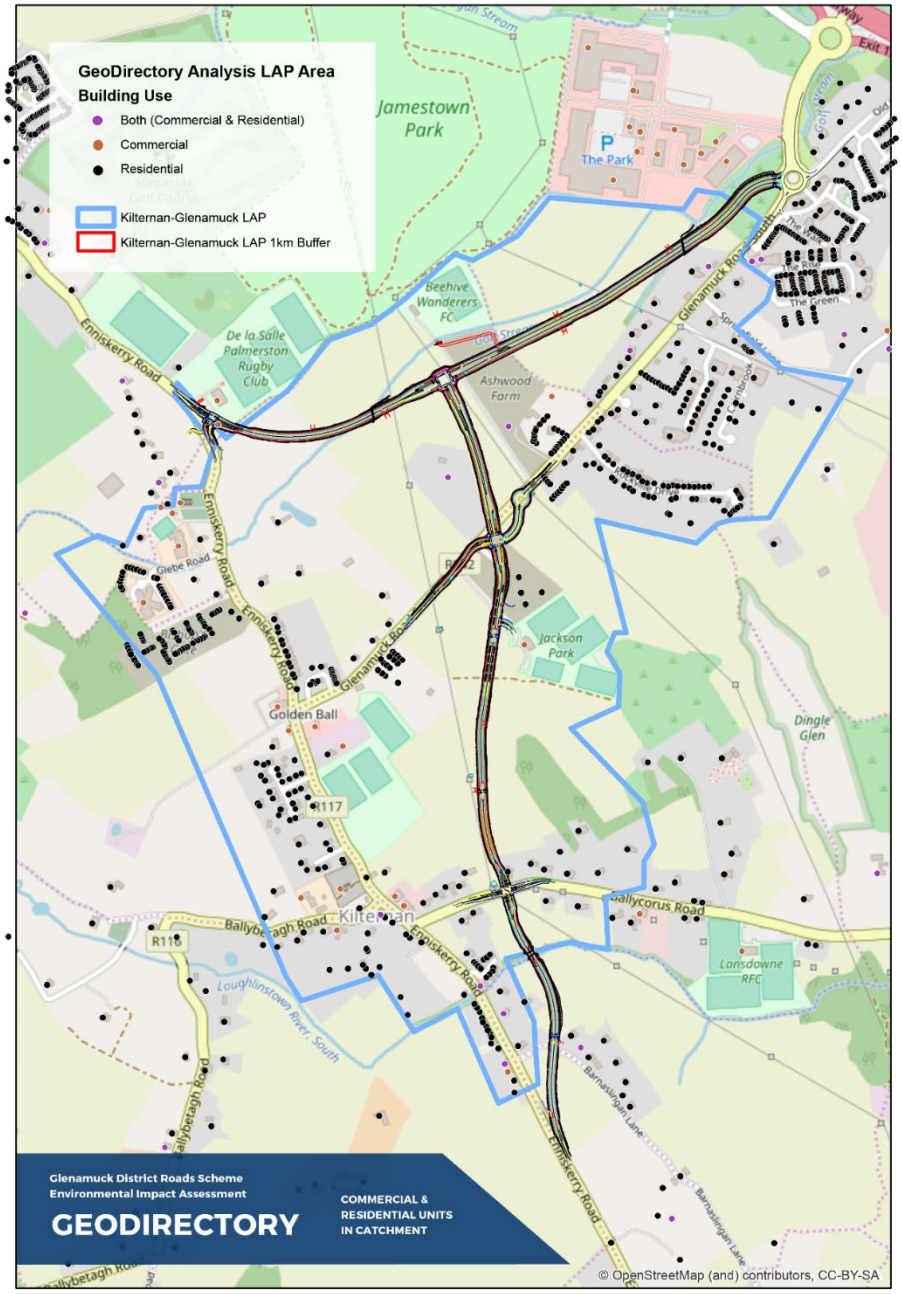

Figure 17- 2: Building Uses in study area

The following general mitigation measures are proposed for the proposed development;

- Access shall be maintained to all affected property (both construction and operational phase). Agricultural accesses will be provided to all served agricultural land portions. Locations will be agreed with relevant landowner's subject to engineering constraints;
- Boundary treatments will typically be as per TII Standard Construction Details (SCDs) and as agreed with affect landowners;
- Where part of the curtilage of a property is to be permanently acquired, the acquiring authority will hold discussions with the property owner and generally agree to replace boundaries on a like for like basis, subject to engineering and planning constraints, or it will be treated as a compensation issue;
- Prior to construction and subject to written agreement of the relevant property owners, property condition surveys will be undertaken in relation to all buildings/structures in the direct vicinity of the proposed works.
- Any services that are interfered with as a result of the road development will be repaired/replaced without unreasonable delay.

Construction Phase

There is likely to be short term-inconvenience to east-west traffic movements at the intersection of the scheme works area with Glenamuck Road, Ballycorus Road and Barnaslingan Lane during the construction phase.

There will be some severance of land parcels during the construction phase. The properties directly affected by the proposed scheme are detailed in **Chapter 17**. Small severed land parcels with very limited land use potential will typically be included in the CPO extents subject to agreement with the affected landowners.

Lands will be required for the construction of the Proposed Project. The use of lands within the scheme footprint will be permanently and profoundly affected. The construction of the Proposed scheme will require also require temporary use of lands outside the scheme footprint to facilitate construction. This impact is considered to be significant short-term and temporary in nature.

There will be a direct effect on some property adjoining the works area. These impacts may be caused from a number of areas including noise, dust etc. and can affect residential properties that are already located in the area. These impacts in the relevant sections of the EIAR.

Operational Phase

The impact on bus gates is considered to be moderate and long term. The measures will result in a slightly increased journey length for certain private vehicular trips. Primary trips affected are those to/from the west from Glenamuck Road East, and trips to/from the south from the portion of Enniskerry Road between Ballycorus Road and the Bus gate. The overall impact on journey characteristics is therefore considered to be a slight positive.

There will be some severance of land parcels during the operational phase. Small severed land parcels with very limited land use potential will typically be included in the CPO extents subject to agreement with the affected landowners. Prior to mitigation this will be significant and long-term and mitigation will be required.

There will be a significant relief from severance to properties along Glenamuck Road and the bypassed portion of Enniskerry Road as a result of the traffic management measures implemented as part of the scheme. This will tend to reduce negative traffic impacts and improve amenity along these routes and will encourage sustainable transport modes such as pedestrian, cyclist and public transport.

In the absence of mitigation, the proposed scheme (and in particular the GLDR), may introduce some community severance. Mitigation will be required to ensure sufficient pedestrian permeability is provided.

Lands will be permanently required for the operation of the Proposed Scheme. The use of lands within the scheme footprint will be permanently and profoundly affected. The scheme does not require the demolition of any existing permanent buildings. The properties directly affected by works are noted in the EIAR.

Residual

In addition to direct impacts, the scheme will facilitate surrounding lands to be developed in line with the LAP zoning and will therefore contribute to increased housing supply and increased employment in the area. The scheme will significantly improve the functionality of the area as well as facilitating community growth in this urban expansion area. The design of the GDRS in accordance with DMURS principles will provide for a high quality urban environment and promote connectivity for all movement modes. This will have a positive economic impact on the area.

It is notable that the positive impacts on property and land use are also affected by cumulative impacts, which depend on other factors including national economic growth, availability of development investment and finance, public transport access to the area and investment by Dún Laoghaire Rathdown County Council in other public realm improvements. The cumulative impact of the Proposed Project taken with other measures is considered significant positive and long term.

A moderate inconvenience to land owners and home owners on access and movement within the local area will be experienced as a result of the establishment and ongoing use of the construction site. However, the mitigation measures outlined in this chapter and complementary chapters will generally maintain access arrangements and ensure no significant negative effects arise.

Overall, in the long term the Proposed Project is expected to have an overall significant positive effect for the area.

18. Material Assets-Utilities

This section deals with the material assets in the form of utilities that could potentially be impacted by the Proposed Scheme. This section assesses the impacts of the proposed utilities on the existing utility network in the areas, which includes the following;

- Electricity;
- Water;
- Drainage;
- Gas; and
- Telecommunications (including broadband and TV).

Predicted Impacts from this study include the requirement for local diversions, temporary outages and an increase in use of existing utilities.

To minimise the impact on the existing material assets (utilities), a number of mitigation measures will be put in place including;

- the Contractor will be obliged to put measures in place during the construction phase to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with the relevant service provider and local authority.
- All works in the vicinity of utilities infrastructure will be carried out in ongoing consultation with the relevant utility company and/or local authority and will be in compliance with any requirements or guidelines they may have. All relevant utility providers will be contacted and offered the opportunity to incorporate new strategic infrastructure in the new road construction. (The majority of major providers have already been notified of the proposed scheme.)
- Where new services are required, the Contractor will apply to the relevant utility company for a connection permit where appropriate and will adhere to their requirements.

No mitigation measures will be required during the operation stage due to measures incorporated in the design.

19. Interactions and Cumulative Effects

Interactions

In addition to the assessment of impacts on individual topics presented in the previous chapters of this EIAR, the interaction between these factors has also been considered as part of the environmental impact assessment.

This chapter analyses the Interrelationships and cumulative effects and main interactions between different aspects of the environment likely to be significantly affected by the proposed project. The first type is the assessment of effects on receptors or receptor groups, such as local residents, which may be affected by different environmental elements generated by the proposed road project simultaneously or concurrently. This is sometimes referred to as the 'interrelationships' or 'in combination effects' between different environmental effects. The assessment includes consideration of particular locations/receptors where several effects for example noise, air and landscape may all occur.

The second type is the assessment of effects of the proposed road project together with other past, present or reasonably foreseeable projects, where there is potential for overlap spatially or temporally, often referred to as cumulative effects.

The potential for significant interactions, cumulative impact and indirect impacts was examined at the screening stage in the preparation of the EIAR. Where the potential for significant interactions or impact was identified, such interactions and impacts were included in the scope and addressed in the baseline and impact assessment chapter for each of the relevant environment media namely Chapters 7 to 18 inclusive.

The matrix and expert opinion approaches, as described and outlined in the aforementioned EU Guidelines were used in the identification of the potential for significant interactions, cumulative impacts, direct and indirect impacts.

All environmental factors are inter-related to some extent, and the relationships can range from tenuous to highly complex. The major interactions between the recorded environmental impacts are assessed within the individual chapters of the EIAR. Table 19-1 provides a matrix summarising the key inter-relationships between the various parameters outlined in this EIAR from Chapters 7 to 18, inclusive.

The matrix highlights the potential for the topic or issue in the left-hand column to have an effect on the environmental issue mentioned in the top row of the matrix. If there is a "✓" in a box this means that there is potential for an effect during the operational or construction phase of the proposed project. If there is considered to be no potential for an effect, the box will be left blank. These interactions have been considered in and assessed in the Environmental Impact Assessment.

Table 19- 1: Matrix to Summarise Key Inter-relationships.

Key Environmental Interaction Matrix	Traffic and Transportation	Air Quality and Climatic Factors	Noise and Vibration	Biodiversity	Archaeological, Architectural and Cultural Heritage	Landscape/Townscape and Visual	Land and Soils	Water and Hydrology	Resource and Waste Management	Population and Human Health	Material Assets- Land Use and Property	Material Assets-Utilities
Traffic and Transportation		✓	✓	✓			✓	✓	✓	✓	✓	
Air Quality and Climatic Factors	✓			✓			✓			✓		
Noise and Vibration	✓			✓			✓			✓		
Biodiversity	✓					✓		✓				
Archaeological, Architectural and Cultural Heritage						✓						
Landscape/Townscape and Visual				✓	✓						✓	
Land and Soils	✓	✓	✓					✓	✓			✓
Water and Hydrology	✓			✓			✓			✓		
Resource and Waste Management	✓						✓					
Population and Human Health	✓	✓	✓					✓			✓	
Material Assets- Land Use and Property	✓					✓				✓		
Material Assets-Utilities							✓					

Cumulative Effects

The EPA draft guidelines on the information to be contained in an EIAR defines cumulative impacts/effects as *'The addition of any minor or significant effects, including effects of other projects, to create larger, more significant effects.'*

Therefore, the assessment of cumulative impacts considers the total impact associated with the Proposed Project when combined with other past, present and reasonably foreseeable future developments.

An examination of the potential for other projects to contribute cumulatively to the impacts from this Proposed Project was undertaken as part of this EIAR. An assessment of other proposed road scheme in the area did not identify any likely significant negative cumulative impacts. Chapter 6 of the EIAR (Planning and Policy) includes an overview of strategic land use policy objectives for the area and significant development proposals with planning permission or under consideration through the statutory planning process. The traffic assessment in Chapter 7 includes a comprehensive assessment of the GDRS within the strategic road network for the area and includes the effect of forecasted development in the area. The GDRS has an integrated relationship with land use under the Kiltiernan/Glenamuck LAP, in that it supports the sustainable development of the LAP area. The GDRS supports the implementation of policies but it is not dependent upon nor does it enable the implementation of other infrastructure projects which would be subject to a separate permission process.

There are no Seveso (COMAH – Control of Major Accidents Hazards) sites near the proposed road development with the nearest Seveso site being the Synergen Power Ltd. t/a ESB Dublin Bay Power, Pigeon House Road, Ringsend, Dublin 4, located approximately 15km north of the site. Therefore, there is no likely significant impact as a result.